

ASSESSMENT OF POLLUTION IN ATARITAL DAM, MAUGANJ REWA (M.P.)

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ABSTRACT: In the present study water quality and assessment of pollution of Atarital dam in Mauganj district Rewa (M.P.) India were determined during year 2011. Atarital Dam (stop dam) is an anthropogenic construction on the confluence of two small nallahs Garha and Atari on the right hand side of N.H.7 in Mauganj tahsil of Rewa district at 24°43' 13" N and 80°2'53"S. Rewa has 7495 sq. Km of territory and occupies about 2.5% of total geographical area of the state. It stretches about 150 Km from north to south and 83 Km. from east to west. Atarital dam is the most important dam of Mauganj; besides being a source of water for irrigation and also the water of this dam. The monthly intervals during 2011 with an objective to estimate the water quality of the dam on various physico-chemical parameters Total 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, total hardness, dissolved oxygen phosphate and nitrate was higher during summer months.

Keywords: Atarital dam, water quality

I. INTRODUCTION

Water is one of the important sources to sustain the life and has long been suspected of being the source of much human illness. Water is the elixir of life and abounds on earth, 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 urgent and front rank problem today is supply and maintenance of clean drinking water. The climate change and spells of droughts have even stressed regional water tables. There are strides to fight the grim battle of acute shortages of water. The problems relating to water attract the attention to the urgency for investigating causes and suggest remedies in a bid to prepare future plan of action for maintenance of potable waters and related development issues.

Reservoirs are formed or modified by human activity for specific purposes, in order to provide a reliable and controllable resource. Reservoirs are usually found in areas of water scarcity or excess, or where there are agricultural or technological reasons to have controlled water resources (Wetzel, 1995).

Expanding human population brought about by the opportunities of good water supply, irrigation, fish production recreation and navigation offered by Dam has put enormous pressure and stress on the quality of water impounded by the dam. The impact of human activities in and around the dam is felt on the unique physical and chemical properties of water on which the sustenance of fish that inhabit the reservoir is built as well as to the functions of the reservoir.

Water quality is determined by the physical and chemical limnology of a reservoir (Sidnei *et al.*, 1992) and includes all physical, chemical and biological factors of water that influence the beneficial use of the water. Water quality is important in drinking water supply, irrigation, fish production, recreation and other purposes to which the water must have been impounded.

Water quality deterioration in reservoirs usually comes from excessive nutrient inputs, eutrophication, acidification, heavy metal contamination, organic pollution and obnoxious fishing practices. The effects of these “imports” into the dam do not only affect the socio-economic functions of the dam negatively, but also bring loss of structural biodiversity of the reservoir. Djukic *et al.* (1994) have used the physico-chemical properties of water to assess the water quality of a dam. The use of the physico-chemical properties of water to assess water quality gives a good impression of the status, productivity and sustainability of such water body. The changes in physical characteristics like temperature, transparency and chemical elements of water such as dissolved oxygen, chemical oxygen demand, nitrate and phosphate provide valuable information on the quality of the water, the source of the variations and their impacts on the functions and biodiversity of the dam.

This study aimed at assessing the pollution of Atarital dam for drinking and fish production using some selected physico-chemical properties. The results will form the baseline for monitoring and tracking changes in the water quality as a result of the dams natural dynamics over time or impact of human activities on the dam.

II. DESCRIPTION OF THE STUDY SITE

Atarital (stop dam) is on anthropogenic construction on the confluence of Small River Garha Atari nala on right hand side of N.H.7 in Mauganj tahsil, 70 K.m. away in east from Rewa district. The Geographical location of Atarital dam is situated on Latitude of 81⁰.55'30'' and 24⁰.39'30'' Longitude.

The salient features of dam is as following-

1) Construction period	-	1968
2) Operation started	-	1972
3) Length of dam	-	381.70 meter
4) Height of dam	-	23.02 meters
5) Catchments area	-	14.60 sq.mile
6) water storage area	-	4.40sq. K.m.
7) Level Section Level	-	1099 ft.
8) F.T.L.	-	10211 ft
9) M.W.L.	-	1114ft
10) T.B.L.	-	1123 ft

11) Length of waste weir	-	120 meters
12) Max. disch. of waste weir	-	2445 meters

(Data is collect from irrigation Dept. of Rewa M.P. State).

Atrital reservoir is associated with the life line of surrounding habitants. The reservoir is used for irrigation, domestic and fish culture. Total irrigatory area is 2315 hectare and pisciculture the barrage produces about 45 tons of fish every year which is of a great economic importance. During pisciculture the use of chemical fertilizers and other adulteration are taking place in water body.

During the summer when water is concentrated and centralized in deep reservoir then the rest area which is blank of water is used for agriculture so the blank area is ploughed by formers and cropping takes place. During rains the plowed soil is dissolved through rain water and deposited into the reservoir and causes high silt load (Turbidity in water).

III. MATERIAL AND METHODS

Samples were collected monthly for one year (January 2011 to December 2011). The samples were collected at 9 am -1pm during first week of each month. Some of the physicochemical characteristics of water were analyzed at the spot such as water temperature, colour, transparency, pH which were determined by thermometer, visual sechi disc, and digital pH meter respectively. While, others like D.O., Total alkalinity, contents were analyzed by titric method in laboratory and other parameters like turbidity, Nitrate, Phosphate, were analyzed within 24 hrs. as per the procedure given in APHA (1995) , and Trivedy and Goel(1986).

IV. RESULTS AND DISCUSSION

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

Water temperature (0⁰C):-

During the present study period water temperature ranged from 19.5 ±0.16 ⁰C to 30.44 ±0.11 ⁰C Jayabhaye *et. al*; (2006) observed that during summer, water temperature was high due to low

water level and clear atmosphere. Similar results were obtained in the present study.

pH:-

The pH values ranges from 7.22 ± 0.1 to 8.1 ± 0.08 . The maximum value was recorded from June and Minimum in the month of January. pH was alkaline throughout study period.

Dissolved Oxygen (mg/l):-

The value of DO fluctuate from 7.32 ± 0.19 mg/l to 9.45 ± 0.16 mg/l. The maximum values were recorded in the month of April (Summer) and minimum value in the month of December (winter). 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)*.

Hardness (mg/l)

The value of hardness fluctuates from 164.2 ± 2.39 mg/l to 255 ± 1.58 mg/l. The maximum value was recorded in the month of June (summer) and minimum in the month of December (winter).

Alkalinity (mg/l):-

Total alkalinity ranges from 157 ± 1.58 mg/l to 210 ± 1.92 mg/l. The maximum value was recorded in the month of July (monsoon) and minimum value in the month of December (winter).

Phosphate (mg/l):-

The value of phosphate ranged from 0.19 ± 0.02 mg/l to 0.33 ± 0.01 mg/l. The maximum value was recorded in the month of August (monsoon) and minimum values in the month of April (summer). The high values of phosphate in August (monsoon) months are mainly due to rain, surface run-off, agricultural run-off; washing activities that contributed to the inorganic phosphate content. Similar results were reported by *Arvind Kumar ((1995)*.

Nitrate (mg/l):-

The value of nitrate ranges from 0.031 ± 0 mg/l to 0.047 ± 0 mg/l. The maximum value was recorded in the month of August (monsoon) and minimum in the month of January (winter). *Swaranlatha and Narsingrao (1998)* reported that nitrates are in low concentration in summer and high during monsoon which might be due to surface run-off and rain. Similar results were obtained in the present study.

Table No. 1- Monthly Variation of Physico-chemical parameters of water samples of Atarital dam of Mauganj Rewa (M.P.)

Months 2011	Temp 0°C	pH	Dissolved Oxygen(mg/l)	Hardness (mg/l)	Alkalinity (mg/l)	Phosphate (mg/l)	Nitrate (mg/l)
January	19.5 ± 0.16	7.21 ± 0.1	8.45 ± 0.33	164.2 ± 1.3	203 ± 1.58	0.32 ± 0.02	0.032 ± 0
February	20.42 ± 0.13	7.34 ± 0.16	8.62 ± 0.27	175.8 ± 1.3	210 ± 2.39	0.27 ± 0.02	0.046 ± 0
March	25.68 ± 0.13	7.55 ± 0.21	8.46 ± 0.23	166 ± 1.58	199 ± 2.07	0.25 ± 0.02	0.042 ± 0
April	28.94 ± 0.11	7.76 ± 0.2	9.45 ± 0.16	251 ± 1.58	183 ± 2.24	0.19 ± 0.02	0.043 ± 0
May	29.56 ± 0.17	7.82 ± 0.2	8.2 ± 0.16	245 ± 1.58	172 ± 2.07	0.21 ± 0.02	0.038 ± 0
June	30.44 ± 0.11	8.2 ± 0.08	9.3 ± 0.2	255 ± 1.58	196 ± 1.58	0.23 ± 0.02	0.034 ± 0

July		27.53±0.11	7.72±0.11	8.5±0.16	250±1.34	209±2.07	0.25±0.02	0.047±0
August		27.65±0.16	7.62±0.17	7.55±0.29	224±2.77	182±2.22	0.33±0.01	0.031±0
September		26.62±0.11	7.42±0.08	7.44±0.19	201±1.14	199±1.58	0.25±0.02	0.032±0
October		25.31±0.16	7.21±0.12	7.37±0.11	170±3.16	196±1.92	0.29±0.02	0.033±0
November		22.5±0.16	7.17±0.11	7.61±0.29	167±3.16	200±1.92	0.32±0.02	0.032±0
December		20.42±0.11	7.14±0.06	7.32±0.19	165±2.39	157±1.58	0.28±0.02	0.035±0
Range	Min	19.5±0.16	7.32±0.19	7.32±0.19	164.2±2.39	157±1.58	0.19±0.02	0.031±0
	Max	30.44±0.11	8.2±0.16	9.45±0.19	255±1.58	210±1.92	0.33±0.01	0.047±0

V. CONCLUSION

It is concluded from the present investigation that the quality of the Atarital dam water system is continuously degrading. The source of water pollution in this pond, municipal, domestic and agricultural wastes. Various physical, chemical like temperature, pH, total alkalinity, total hardness, have been observed to either approach or to have exceeded the permissible limits set for drinking water or for human use.

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REFERENCES:-

1. APHA, AWWA and WPCF (1995)- Standard methods for examination of water and wastewater. 20th Edition, American Public Health Association. Washington, DC.
2. Arvind Kumar (1995) – Some Limnological aspects of the fresh water tropical wetland of Santhal Pargana (Bihar) India. J. Environ. And Poll. 2(3):137-141.
3. Djukic, N., Maletin, S., Pujin, V., Ivanc, A. and Milajonovic, B. Ecological assessment of water quality of Tisze by physico-chemical and biological parameters. Tisca Szeged, 28(1): 37-40. (1994).
4. Jayabhaye, U.M.; Pentewar, M.S. and Hiware C.J. (2006) – A study on physico-chemical parameters of minor reservoir, Sawana, Hingoli district, Maharashtra.
5. Masood Ahmed and Krishnamurthy R. (1990) – Hydrobiological studies of Wohar reservoir Aurangabad (Maharashtra state) India. J. Environ. Biol. 11(3),335-343..
6. Sidnei, M.T., Fakio, A.L.T., Maria, C.R., Francis, A.E. and Adaunto, F. Seasonal variation of some limnological factors of Lagoa does
7. Swarnalatha. P. and Rao, A.N. (1998) – Ecological studies of Banjara Lake with reference to water pollution Hyderabad. J. Environ. Biol., 19(2): 179-186.
8. Trivedi, R.K., and Goel, P.K . Practical methods in Ecology and Environmental sciences. Environ. Public. Karad, (India). pp336. (1986).
9. Wetzel, R. G: Fresh water ecology: changes, requirements, and future demands. Liminology, 1, pp 39.(1995)