



## Assessment of water quality from Chanakapur Dam of Kalwan tahsil, Nasik district, Maharashtra

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### Abstract

The water quality assessment of Chanakapur dam of KalwanTahsil of Nasik District of Maharashtra was carried out monthly for the year 2014. Monthly variation in physicochemical parameters such as Water Temperature, pH, Turbidity, Hardness, E.C., TDS, DO, Free CO<sub>2</sub>, BOD, Total Alkalinity, Cl, CO<sub>3</sub>, HCO<sub>3</sub>, NO<sub>3</sub>, S, Ca, Mg, K, Na. In the present study the result indicate that water is non-polluted and suitable for human consumption and irrigation in the permissible limits.

**Keywords:** water quality, physicochemical parameters, monthly variation, chanakapur dam

### Introduction

Water is a universal gift of life that is adversely affected by human intervention. The life on the earth would be impossible without water. Water of good quality is required for living organisms. It has unique natural qualities. It is used in various biological activities by plants and animals. It is main component of cytoplasm of cell. All life on the earth depends on water. Water is significant source of habitat for plants, animals and is found in every section of ecosphere. Source of water are atmospheric, with surface water, stored water and ground water. Stored water present in ponds, reservoirs, lakes or oceans is important features of the earth landscape. Humans have constructed lakes to stop runoff water for various uses like drinking, irrigation and recreation during the day periods. Due to geometric increase in population coupled with rapid urbanization, industrialization and indiscriminate development it reduces the catchments area, which ultimately leads to gradual determination of these lakes. Indiscriminate use of chemical fertilizers and pesticides in agriculture are causing heavy pollution in aquatic ecosystem has resulted in high impact on quality and quantity of water in our country. According to different survey 70-80% of Indian water resources are severally polluted. It causes various water born diseases. Water pollution not only influences the public health but also affects the conservation and preservation of natural resources and beauty of environment. The reports of United Nations Organization (UNO) revealed that the world population is suffering from scarcity of pure and safe drinking water. Therefore raw water from the water bodies is being analyzed for its utilities like drinking, agriculture, irrigation, aqua culture and industrial purposes. Discharge of toxic chemicals and contamination of water bodies with substance that promote algal growth are some of the today's major causes of water quality degradation. Considerable work has been done on physicochemical and biological assessment and their functional dynamics in aquatic environment all over world.

### Materials and Method

Chanakapur dam water reservoir was selected for the present

study. It is located in hilly region and tribal area of Kalwan tehsil of Nasik District.

The water samples were collected monthly intervals during the year 2014. The samples were collected during morning hours between 8.00 am to 10.00 am. The water parameters like Water Temperature, pH, Turbidity, Hardness, Electrical Conductivity, Total Dissolved Solids, Demand of Oxygen, Total Alkalinity, Calcium, Magnesium, Potassium, Sodium, Chlorides, Sulphates, Nitrate, Carbonate, Bicarbonate were analyzed according to standard methods prescribed by APHA (1985).

### Study Area

The study area Cahankapur dam lies in Maharashtra in the Kalwan tehsil, district Nasik .The water reservoir is at village Chanakapur near Abhona village (20°29'58.1'' N73°55'21.6''E). Chanakapur dam is an earthfill dam on the Girna and Sarganga river. It is one of the biggest dam in Maharashtra.

### Result and Discussion

The variation in physicochemical parameters of the water reservoir have been summarized in Table-1.

1. Water Temperature: The temperature recorded maximum in the month of May as 25.95°C and minimum in the month of December as 17.98°C in 2014. Water temperature is very important parameter. Many physical, biological and chemical characteristics of reservoir are affected by the temperature. Temperature affects the aquatic life. Water temperature affects plant growth, rate of photosynthesis increases the need for oxygen in water (BOD) Zafar (1967).
2. pH: The pH value recorded maximum as 7.75 in June and minimum as 7.24 in the month of January in year 2014. It has reported a direct relationship between water temperature and pH according to Mishra *et al.* (2010). pH is important parameter to decide the water quality. At extremely high or low pH values (9.6 or 4.5) the water becomes unsuitable for most organisms. pH results are

- observed by Borseet *et al.*, (2003), Pandeyet *et al.*, (1991).
3. Turbidity: The turbidity recorded maximum as 16.40 Nephelometric Turbidity Unit (NTU) in May and minimum as 12.39 NTU in January in 2014. Turbidity is a measure of the relative clarity of water. AT the higher levels of turbidity. Water loses its ability to support a diversity of aquatic organisms. Results compared with Deoreet *et al.*, (2005).
  4. Hardness: The hardness of water recorded maximum as 108.86 mg/L in April and minimum as 55.13 mg/L in July 2014. Calcium and Magnesium are the principal cations causing hardness of water. Results observed by Ganesh *et al.*, (2002).
  5. Electrical Conductivity: The electrical conductivity was recorded maximum in the month of August as 0.850 Siemens per meter ( $\text{sm}^{-1}$ ) and minimum in the month of May as  $0.285 \text{ sm}^{-1}$ . Conductivity is proportional of the dissolved solids and both showed analogous trends in seasonal variation.
  6. Total Dissolved Solids (TDS): The TDS recorded maximum in the month of May as 52 mg/L. TDS were found high value in the month may during the study the reduced the algal population. Shiva Kumar and Singh (2009).
  7. Dissolved Oxygen : The dissolved oxygen recorded maximum in the month of December as 8.60 mg/L and minimum in the month of May as 5.54 mg/L. Highest dissolved oxygen was recorded in the month of December followed by post monsoon. LaskarHafsa Sultana (2009). Solubility of oxygen depends on temperature, pressure and salinity of water.
  8. Free Carbon Dioxide (Free  $\text{CO}_2$ ): The free  $\text{CO}_2$  recorded maximum in the month of may as 9.98 mg/L and minimum in the month of March as 2.28 mg/L.
  9. Biological Oxygen Demand (BOD): The BOD recorded maximum in the month as 18.47 mg/L and minimum value in month of June as 11.47 mg/L in the year 2014. Biological oxygen demand is a measure of the quantity of oxygen used by microorganisms in aerobic oxidation of organic matter, Trivedyet *et al.*, (1987).
  10. Alkalinity: The alkalinity recorded maximum in the month of June as 43.75 mg/L. High values of alkalinity may be attributed to increase inorganic decomposition during which carbon dioxide is liberated. Airsang, R.V. *et al.*, (2013). Total alkalinity could be used as a important parameter to measure productivity of the reservoirs, Richard (1968).
  11. Chloride: The chloride recorded maximum in the month of Novemebr as 17.06 mg/L and minimum in the month of April as 7.43 mg/L. Presence of high chlorides in water indicates pollution due to domestic waste, Trivedy and Kulkarni (1998).
  12. Carbonate: The carbonate recorded maximum in the month of November as 1.25 mg/L and minimum in the month of February as 0.05 mg/L. Carbonate and bicarbonate act as buffers in stabilizing the pH of water.
  13. Bicarbonate: The bicarbonate recorded maximum in the month of April as 43.81 mg/L and minimum in the month of December as 20.83 mg/L in 2014.
  14. Nitrate : The Nitrate recorded maximum in the month of August and September as 0.61 mg/L and minimum in the month of March and December 0.03 mg/L. Concentration of Nitrates in fresh water bodies is very low.
  15. Sulphate: The sulphate recorded maximum in the month of December as 4.83 mg/L and minimum in the month of July as 0.74 mg/L.
  16. Calcium: The calcium recorded maximum in the month of May as 16.12 mg/L and minimum in the month of September as 4.51 mg/L. Concentration of calcium also causes the richness of bicarbonates. Richard (1968).
  17. Magnesium: The magnesium recorded maximum in the month of May as 8.23 mg/L and minimum in the month of January as 3.64 mg/L. Magnesium play important role in antagonizing the toxic effect of various irons in neutralizing excess acid produced, Munawar (1970).
  18. Potassium: The potassium recorded maximum in the month of June as 1.48 mg/L and minimum in the month of July and August as 0.14 mg/L. It is an essential nutritional element.
  19. Sodium: The sodium recorded maximum in the month of March as 24.42 mg/L and minimum in the month of June as 9.06 mg/L. The highest amount of sodium, potassium and chloride make water sour to taste.

**Table 1:** Monthly variation of water samples at Chanakapur Dam, Kalwan, District Nasik (2014)

Parameters	January	February	March	April	May	June	July	August	September	October	November	December
Water Temp.	20.72	21.36	20.68	25.67	25.95	25.74	22.13	22.63	21.60	18.02	18.50	17.98
pH	7.24	7.31	7.36	7.55	7.70	7.75	7.47	7.51	7.43	7.49	7.34	7.37
Turbidity	12.389	13.47	13.09	17.52	16.40	14.79	14.10	14.32	15.03	13.76	13.60	13.43
Hardness	86.55	96.06	83.34	108.86	94.35	74.86	55.13	69.75	68.60	65.38	66.50	60.25
EC	0.330	0.285	0.299	0.291	0.285	0.302	0.768	0.850	0.630	0.712	0.502	0.345
TDS	140.50	151.00	133.50	150.88	171.29	128.25	90.00	52.00	58.00	76.00	82.50	80.63
DO	8.19	7.94	8.59	5.28	5.54	6.60	6.76	6.79	6.17	6.45	7.94	8.60
Free $\text{CO}_2$	3.07	2.93	2.88	7.96	9.98	7.20	5.07	8.27	5.25	3.51	3.92	3.44
BOD	15.86	16.98	14.70	15.86	15.44	11.47	16.68	13.70	14.22	17.79	15.38	18.47
Total Alkalinity	144.63	143.50	127.38	45.00	47.50	43.75	62.56	62.75	65.00	88.00	94.75	81.85
Chloride	11.36	9.62	9.96	7.43	7.81	8.26	11.54	13.14	12.98	14.09	17.09	14.86
Carbonate	0.07	0.05	0.08	0.12	0.12	0.14	0.42	0.50	0.54	0.76	1.25	0.92
Bicarbonate	26.28	23.52	26.27	43.81	41.44	39.35	27.21	28.32	27.40	25.76	24.12	20.83
Nitrates	0.04	0.05	0.03	0.10	0.10	0.10	0.55	0.61	0.61	0.04	0.07	0.03
Sulphate	1.58	1.51	1.95	2.36	2.45	2.30	0.74	0.84	0.75	3.26	3.16	4.83

Calcium	13.24	13.37	12.93	13.26	16.12	14.95	4.59	4.89	4.51	10.17	8.42	8.38
Magnesium	3.64	5.04	4.00	7.46	8.23	5.96	5.34	5.27	5.35	5.16	6.70	5.53
Potassium	0.57	0.55	0.52	1.43	0.80	1.48	0.14	0.14	0.18	0.53	0.63	0.48
Sodium	24.04	24.08	24.42	22.20	23.63	09.06	10.22	10.34	13.75	19.19	21.51	19.02

Unit: Water Temp in °C and rest are in mg/L.

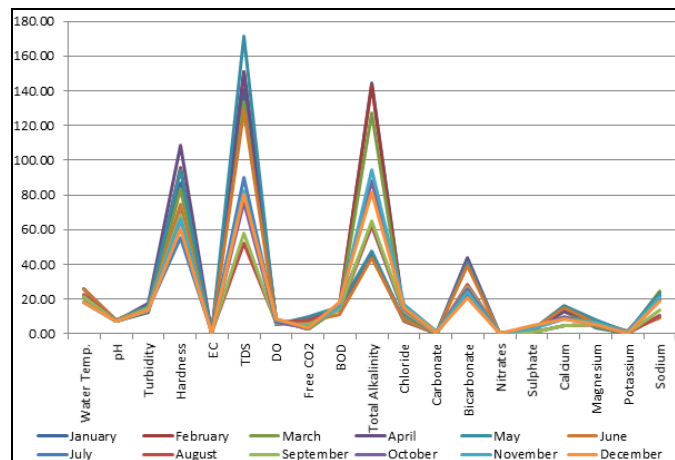


Fig 1

### Conclusion

Present study of physicochemical parameters concluded that, the values of all the parameters were observed in permissible limits as per standard proposed by WHO. Which revealed that water is perfectly suitable for irrigation, pisciculture and the normal treatment at filtration unit makes the dam water potable for drinking. However, there is need for routine checkup and addition of prescribed amount of chlorine of these water sources so as to forestall outbreak of water borne diseases.

### Acknowledgement

The authors are very much grateful to the Principal, Z.B.Patil College, Dhule for providing research facilities.

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