



Studies On The Physico-Chemical Parameters Of Water Body-Dara Dam, Maharashtra

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Abstract:

The present paper includes an assessment of the quality of water reservoir situated near Dara village of Taluka Shahada, Dist Nandurbar in Maharashtra. Since 'good' water quality will produce healthier humans than one with 'poor' water quality, an analysis on the physico-chemical parameters of Dara Dam water was made. The dam is situated near Dara village in hilly tribal area, and beneficial to local tribe. The use of water is mostly for irrigation, drinking and fishing purpose. The findings of the analysis will prove to be quite informative, to the daily consumers of the water. The water samples were analyzed form September 2007 to April 2008. Water samples from this site were analyzed for Odour, pH, TDS, hardness, Chloride, alkalinity, Fluoride, Sulphate, Iron, Chlorine, Carbonate and Bicarbonate. The result reveal that the range of variation in different parameters was pH 7.23 to 8.65, TDS 186 to 365 mg/l hardness 130 to 260 mg/l, alkalinity 44 to 56 ppm, chloride 9 to 18 mg/l, calcium 52.8 to 36.8 mg/l, fluoride 0.225 to 0.260 mg/l, sulphate 4 to 8.2 mg/l, Iron 0.24 to 0.267 mg/ml, Bicarbonate 51.24 to 58.56 mg/l, Chlorine and Carbonate were nil during different months. All the physico-chemical parameters of Dara Dam water are within the highest desirable limit or maximum permissible limit set by WHO.

Key words: Physico-chemical parameters, Dara Dam, Hydrology.

1.Introduction

Water is one of the abundantly available substances in nature which man has exploited more than any other resources for the sustenance of life. Water of “good” quality is required for leaving organisms. The chemistry of water is influenced by the input of material containing minerals, their solubility and chemical equilibrium prevailing in the aqueous solution. Any water is capable of assimilating certain amount of pollution without serious effect due to dilution and self-purification factors.

The physico-chemical characteristics of any aquatic ecosystem and the nature and distribution of its biota are directly related to and influenced by each other and controlled by a multiplicity of natural regulatory mechanisms. However, because of man’s exploitation of the water resources, the normal dynamic balance in the aquatic ecosystem is continuously disturbed, and often results in each dramatic response as depletion of fauna and flora, fish kill, change in physico- chemical character etc.(Sakhre V.B and P.K. Joshi, 2003) ⁽¹⁾ Artificial changes which lead to such ecological responses are referred to as pollution and pollutional stage may reach a stage when these valuable aquatic resources are no longer safe for human use.

Everything originated in the water and water sustains everything. 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 rapid population growth, urbanization, industrialization and indiscriminate development it reduces the catchments area, which ultimately leads to gradual deterioration of these lakes.

Water quality can have great influence on ability of aquatic organism to exist and to grow in a stream, pond or lake. It is well known that pollution of water cause adverse effect on fish and other aquatic organisms. Water polluted by industrial effluents decreased the amount of protein, Glycogen and lipids fresh water mullet *Liza parsia* (Bharatha Lakshmi et, al.,2001) ⁽²⁾ Numerous anthropogenic activities like disposal of sewage and industrial water, recreational activities, excess fertilization of land and use of pesticides has threatened environmental health of both surface and ground water.

Water pollution is now a day is considered not only in the term of public health but also in terms of its conservation, aesthetics and preservation of natural beauty and resources. Water pollution has however threatened to reduce the quantity in ponds, lakes and rivers and reservoirs due to disposal of sewage, industrial water and due to other human activities (Trivedi and Chandrasekhar, 1999) ⁽³⁾. Sinha et.al. (1990) ⁽⁴⁾ carried out the assessment of drinking water quality of Santhal Pargana Bihar. The water quality of reservoirs and temple tanks at Tirupati and Tirumala was studied by Naidu et. al. (1990)⁽⁵⁾. According to different surveys, 70 to 80 present of Indian water sources are polluted and different enteric diseases affect millions of the peoples every year. Hence now day raw water from water bodies is being analyzed for its utilities like drinking, aquaculture, industrial and irrigation purpose.

Effect of mass bathing on water quality of Pushkar Sarover was studied by Lal (1996)⁽⁶⁾. Salaskar (1997) ⁽⁷⁾ studied the water quality characteristics of Snehal Lake, Kalyan (M.S.).

The water body selected for the present investigation is man maid reservoir. Dara Mesian Project is situated near Dara village in hilly tribal area, and beneficial to local tribe of Taluka Shahada Dist. Nandurbar in Maharashtra State. It is earthen dam with side Masonry spillway. The dam receives water from rainfall during rainy season, Waki River and tributary of Tapti with in Tapti basin.

The use of water is mostly for irrigation, drinking and fishing purpose. Several fish species occur in dam water and there is tremendous scope for enhancing inland fish production through specific management.

The area of Dara dam is 63.71 Sq Km and nearly 4404 hectare gross area is being irrigated .The aim of the study is to make a qualitative assessment of the physico-chemical condition prevailing in the dam and how that water is useful for irrigation and drinking for human and fishing purpose. The findings of the analysis will prove to be quite informative, to the daily consumers of the water.

2.Material And Methods

The water samples were analyzed form September 2007 to April 2008.Samples were collected in plastic containers, which were thoroughly cleaned with nitric acid and rinsed several times with distilled water. Analysis was performed to determine odour, pH, TDS, hardness, chloride, alkalinity, Fluoride, Sulphate, Iron, Chlorine, Carbonate and Bicarbonate. Hardness, alkalinity, Fluoride, Sulphate and Chlorine and other

parameters were analyzed in the laboratory as per the standard methods of APHA (1998) ⁽⁸⁾.

Criteria	Desirable Standard	Range in Dara Dam
	WHO	
Physical appearance	-	Clear
Odour	Unobjectionable	Unobjectionable
pH	6.5 to 8.5	7.23 to 8.65
Total Dissolved Solids(TDS)	500 to 1500 mg/l	186 to 365 mg/l
Chloride (as Cl)	250 mg/l	9 to 18 mg/l
Calcium	75 mg/l	36.8 to 52.8 mg/l
Total Hardness	300 mg/l	130 to 260 mg/l
Fluoride	1 mg/l	0.225 to 0.260 mg/l
Sulphate	200 mg/l	4 to 8.2 mg/l
Iron as (Fe)	0.3 mg/l	0.24 to 0.267 mg/l
Chlorine	0.2 mg/l	Nil
Total alkalinity	30 to 500 mg/l	44 to 56 mg/l
Carbonate	----	Nil
Bicarbonate	----	51.24 to 58.56 mg/l

Table 1: Comparison of different physico-chemical parameters with suggested surface water standards for source suggested by WHO for drinking water supply.

5. Results And Discussion

Table-1 shows the range of different physico-chemical parameters important to deciding the quality criteria for drinking water from Dara Dam. The recorded values are also compared with quality standards as proposed by WHO (1984) ⁽⁹⁾.

5.1. Physical Parameters

The present study shows that the permissible limits of odour, taste, turbidity, and temperature are mostly narrative and the water from the present water body is acceptable for the drinking purpose

5.2. pH

The permissible limit for pH for potable water ranges from 6.0 to 8.5. In the present study pH ranged from 7.23 to 8.65. Thus pH values are within permissible limit. The pH is being slightly alkaline, which is very suitable condition for the growth of aquatic biota and fishing. The pH constantly remains above 7 which indicate high buffering capacity of the system (K. M. Nagraj and Goudappa M. Patil, 2008)⁽¹⁰⁾.

5.3. Total Dissolved Solids (TDS)

T.D.S. values are also within permissible limit of drinking water standards (500 to 1500 mg/lit) suggested by WHO. The minimum value found was 186 mg/l and maximum value found was 365 mg/l.

5.4. Alkalinity

In the present study total alkalinity ranged between 44 to 56 ppm. That is also within permissible limits suggested by WHO (1984)⁽⁹⁾.

5.5. Total Hardness

Total hardness which is very important parameter determining usefulness of water in different sectors is also very much below the permissible limit that is, 130 to 260 mg/lit. This denotes that water is very soft and good for drinking purpose.

5.6. Fluoride

Fluoride is an important nutrient for the development of the normal bone and teeth. Excess fluoride deposited on bone produce skeletal fluorosis and in teeth cause dental fluorosis. The permissible limit for fluoride is 1 mg/lit and in our study it ranged between 0.225 to 0.260 mg/lit, which is very much within the permissible limit.

5.7.Sulphate

The maximum permissible limit for Sulphate is 200 mg/l and in our study it ranged from 4 to 8.2 mg/l, which is quite below the desirable limit for drinking water standards

5.8.Iron As (Fe)

The existence of Iron in reduced condition was found throughout the year. The minimum concentration was found 0.24 mg/l and maximum was 0.267 mg/l, which are very much within the permissible limit.

5.9.Chloride

The desirable limit for chloride is 250 mg/l and in our study it ranged from 9 to 18 mg/l. The concentration of chloride is directly correlated to the pollution level (Munnavar 1970)⁽¹¹⁾. In Dara Dam water it is within the permissible limit

5.10.Calcium As (Ca)

In our study calcium was found within its permissible limit. The minimum value was 36.8 mg/l and maximum was 52.8 mg/l.

5.11.Bicarbonate

The value of bicarbonate ranged from 51.24 to 58.56 mg/l, which is within the permissible limit.

5.12. Carbonate

Carbonate was not detected throughout the year.

5.13. Chlorine (Residual)

Residual chlorine was not detected throughout the year.

6.Conclusion

- Our study shows that all parameters are within the permissible limits as per standards proposed by WHO (1984)⁽⁹⁾, Which revealed that the water is perfectly suitable for irrigation purpose (Fafioye, O.O, Olurin et. al. 2005)⁽¹²⁾.
- The presence of good number of fishes in the dam reservoir indicates that the water is suitable for pisciculture. (Jigna Desai and S.K.Tank, 2008)⁽¹³⁾
- The normal treatment at filtration unit makes the dam water potable for drinking.

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