Evaluation of Water Quality Parameters- A Case of Banas River, Rajasthan

Sandeep Kumar Sukhwal[1], Aditya Prakashj[2],
Arpit Singhal[3], Afreen Khan[4] and Arsh Shah[5]

[1,2,3,4,5]*Department of Civil Engineering, Poornima Institute of Engineering & Technology,*
Sitapura Jaipur, Rajasthan, India
E-mail: [1]sandeep.sukhwal@poornima.org, [2]2014pietcivaditya@poornima.org, [3]2014pietcivarpit@poornima.org,
[4]2014pietcivafreen@poornima.org, [5]2014pietcivarsh@poornima.org

Abstract—*The water quality is now more focused than the quantity due to the environmental problems such as pollution which is increasing at an alarming rate. Keeping this point in our mind we have done a case study on the water quality assessment of Banas River located in Rajasthan as its water is transported and used in various cities of Rajasthan such as Jaipur, Kota etc. We have taken the water samples from three different points (upstream and downstream) and then we have conducted physical , chemical and biological test such as ph, TDS, conductivity, hardness, calcium, magnesium, nitrogen, iron, fluoride, coliforms etc. After conducting the test we have compared our results with the Indian Standards and came to know that some of the parameter are not in the permissible limit and affect the quality of water,*

Index Terms: *Coliforms, Permissible Limit.*

1. INTRODUCTION

Water quality refers to the chemical, physical and biological characteristics of water. It is a measure of the condition of water relative to the requirements of one or more biotic species and or to any human need or purpose [1]. It is most frequently used by reference to a set of standards against which compliance, generally achieved through treatment of the water, can be assessed. The most common standards used to assess water quality relate to health of ecosystem, safety of human contact, and drinking water.

Water pollution is the contamination of water bodies (e.g. lakes, rivers, oceans, aquifers and groundwater). This form of environmental degradation occurs when pollutants are directly or indirectly discharged into water bodies without adequate treatment to remove harmful compounds.

Water pollution affects the entire biosphere of plants and organisms living in these water bodies, as well as organisms and plants that might be exposed to the water. In almost all cases the effect is damaging not only to individual species and populations, but also to the natural biological communities

The Banas is a river of Rajasthan state in western India. It is a tributary of the Chambal River, which in turn flows into the Yamuna, a tributary of the Ganges. The Banas is approximately 512 kilometres in length. It is also known as 'Van Ki Asha' (Hope of forest).

The Banas originates in the Veron ka Math situated in Khamnor Hills of the Aravalli Range, about 5 km from Kumbhalgarh in Rajsamand district. It flows northeast through the Mewar region of Rajasthan, and meets the Chambal near the village of Rameshwar in SawaiMadhopur District.

The cities of Nathdwara, Jahazpur, and Tonk lie on the river. Major tributaries include the right bank tributaries of Berach and Menali and the left bank tributaries of Kothari, Khari, Dai, Dheel River, Sohadara, Morel and Kalisil

2. OBJECTIVE OF CASE STUDY

The objective of case study is to assess the water quality of Banas River, Rajasthan. This study has been conducted to find out the physical, chemical and biological characteristics of water sample.The test includes Ph, Total dissolved solids, Electrical Conductivity, Total hardness, calcium, magnesium, chloride, sulphate, nitrate,iron and fluoride content, dissolved oxygen, alkanity, total and fecal coliform. Samples have been collected in bottles and were analysed for physio-chemical characteristics APHA(1980). Some of the tests such as Calcium magnesium, sulphate, nitrate iron and fluoride content and total and fecal coliforms.

Fig. 1 Bisalpur Dam Site

3. METHODOLOGY

All the test were performed as per the Indian Standards and the procedure was strictly followed as given in Bureau of Indian Standards. The following table shows the method used in testing water sample.

Table 1: Testing Method of Sample Water

Sr. No.	Parameter	Method
1.	Ph	Ph meter
2.	Total Dissolved Solid	TDS meter
3.	Electrical Conductivity	Conductivity meter
4.	Total Hardness	EDTA
5.	Chloride	Titration by AgNo3
6.	Calcium	EDTA
7.	Magnesium	EDTA
8.	Sulphate	Turbidity Meter
9.	Nitrate	UV Spectrophotometer
10.	Iron	Spectrophotometer
11.	Flouride	APHA-22
12.	Dissolved Oxygen	
13.	Alkanity	Titration by H2So4
14.	Total Coliform	IS-1622-1981
15.	Fecal Coliform	IS-1622-1981

4. RESULTS & DISCUSSION

The physio-chemical characteristics and phytoplankton composition was quite variable. But overall water can be used for drinking pourpose as almost all the contents were not in high range but in normal range and it shows that the satisfactory results were obtained.

The following table shows that the permissible limit of testing parameters.

Table 2: Permissible limit of Drinking Water

Sr. No.	Parameter	Permissible Limit
1.	Ph	6.5-8.5
2.	Total Dissolved Solid	500-2000mg/L
3.	Electrical Conductivity	Upto 1500micro s /cm
4.	Total Hardness	200-600mg/L
5.	Chloride	250-1000mg/L
6.	Calcium	75-200mg/L
7.	Magnesium	30-100mg/L
8.	Sulphate	200-400mg/L
9.	Nitrate	Upto 45mg/L
10.	Iron	0.3mg/L
11.	Flouride	-
12.	Dissolved Oxygen	-
13.	Alkanity	200-600 mg/L
14.	Total Coliform	10 max
15.	Fecal Coliform	Negative

Upstream left side

The below given table shows the obtained results of various parameters.

Table 3: Testing Result of Sample Water

Sr. No.	Parameter	Limit
1.	Ph	7.2
2.	Total Dissolved Solid	162mg/L
3.	Electrical Conductivity	350micro s /cm
4.	Total Hardness	615mg/L
5.	Chloride	324mg/L
6.	Calcium	32.1mg/L
7.	Magnesium	17.6mg/L
8.	Sulphate	20.1mg/L
9.	Nitrate	3.9mg/L
10.	Iron	Nil
11.	Flouride	0.42mg/L
12.	Dissolved Oxygen	6.1mg/L
13.	Alkanity	162mg/L
14.	Total Coliform	1.3MPN
15.	Fecal Coliform	Negative

Upstream right side

The below given table shows the obtained results of various parameters

Table 4: Testing Result of Sample Water

Sr. No.	Parameter	Limit
1.	Ph	6.7
2.	Total Dissolved Solid	172mg/L
3.	Electrical Conductivity	343micro s /cm
4.	Total Hardness	415mg/L
5.	Chloride	224mg/L
6.	Calcium	38.6mg/L
7.	Magnesium	15.8mg/L
8.	Sulphate	18.2mg/L
9.	Nitrate	4.1mg/L
10.	Iron	0.03mg/L
11.	Flouride	0.36mg/L
12.	Dissolved Oxygen	172mg/L
13.	Alkanity	154mg/L
14.	Total Coliform	1.0MPN
15.	Fecal Coliform	Negative

Up stream right center

The below given table shows the obtained results of various parameters.

Table 5: Testing Result of Sample Water

Sr. No.	Parameter	Limit
1.	Ph	6.5-8.5
2.	Total Dissolved Solid	150mg/L
3.	Electrical Conductivity	367micro s /cm
4.	Total Hardness	835mg/L
5.	Chloride	336mg/L

6.	Calcium	32.6mg/L
7.	Magnesium	17.4mg/L
8.	Sulphate	20.2mg/L
9.	Nitrate	4.6mg/L
10.	Iron	Nil
11.	Flouride	.43mg/L
12.	Dissolved Oxygen	6.1mg/L
13.	Alkanity	154 mg/L
14.	Total Coliform	1.3MPN
15.	Fecal Coliform	Negative

Up stream left centre.

The below given table shows the obtained results of various parameters.

Table 6: Testing Result of Sample Water

Sr. No.	Parameter	Limit
1.	Ph	7.5
2.	Total Dissolved Solid	154mg/L
3.	Electrical Conductivity	360micro s /cm
4.	Total Hardness	425mg/L
5.	Chloride	331mg/L
6.	Calcium	35.8mg/L
7.	Magnesium	13.9mg/L
8.	Sulphate	17.8mg/L
9.	Nitrate	4.2mg/L
10.	Iron	0.001mg/L
11.	Flouride	0.4mg/L
12.	Dissolved Oxygen	154mg/L
13.	Alkanity	177 mg/L
14.	Total Coliform	1.6MPN
15.	Fecal Coliform	Negative

Down stream centre.

The below given table shows the obtained results of various parameters.

Table 7: Testing Result of Sample Water

Sr. No.	Parameter	Limit
1.	Ph	6.3
2.	Total Dissolved Solid	183mg/L
3.	Electrical Conductivity	396micro s /cm
4.	Total Hardness	830mg/L
5.	Chloride	174mg/L
6.	Calcium	30.5mg/L
7.	Magnesium	11.9mg/L
8.	Sulphate	15.9mg/L
9.	Nitrate	3.9mg/L
10.	Iron	0.02mg/L
11.	Flouride	0.6mg/L
12.	Dissolved Oxygen	8.3mg/L
13.	Alkanity	372 mg/L
14.	Total Coliform	10 max
15.	Fecal Coliform	Negative

Down stream side 1.

The below given table shows the obtained results of various parameters.

Table 8: Testing Result of Sample Water

Sr. No.	Parameter	Limit
1.	Ph	5.8
2.	Total Dissolved Solid	182mg/L
3.	Electrical Conductivity	367micro s /cm
4.	Total Hardness	820mg/L
5.	Chloride	332mg/L
6.	Calcium	33.6mg/L
7.	Magnesium	12.7mg/L
8.	Sulphate	10.3mg/L
9.	Nitrate	4.7mg/L
10.	Iron	Nil
11.	Flouride	0.6mg/L
12.	Dissolved Oxygen	7.5mg/L
13.	Alkanity	178 mg/L
14.	Total Coliform	1.2MPN
15.	Fecal Coliform	Negative

Down stream side 2.

The below given table shows the obtained results of various parameters.

Table 9: Testing Result of Sample Water

Sr. No.	Parameter	Limit
1.	Ph	6.9
2.	Total Dissolved Solid	168mg/L
3.	Electrical Conductivity	348micro s /cm
4.	Total Hardness	935mg/L
5.	Chloride	304mg/L
6.	Calcium	42.7mg/L
7.	Magnesium	19.5mg/L
8.	Sulphate	23.2mg/L
9.	Nitrate	4.4mg/L
10.	Iron	0.003mg/L
11.	Flouride	0.33mg/L
12.	Dissolved Oxygen	168mg/L
13.	Alkanity	165mg/L
14.	Total Coliform	1.2MPN
15.	Fecal Coliform	Negative

5. ACKNOWLEDGMENT

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