



# Assessment of Some Physico-Chemical Parameters of River Kyasara, Jhalawar District (Rajasthan)

*Bharat Singh Meena<sup>\*,1</sup>, Manju Meena<sup>1</sup>*

<sup>1</sup>Department of Chemistry, Government College, Kota- 324001, Rajasthan, India

*\*Corresponding author*

*E-mail: meenabharat81@gmail.com*

**Abstract:** This study assessed the physico-chemical quality of river Kyasara, Jhalawar District (Rajasthan). River water samples of Kyasara were collected from 10 sampling sites and analysed as per standard methods. Sampling was done during three seasons (summer, rainy and winter) throughout the one year from various villages (Nov., 2010 to Oct., 2011). The physico-chemical parameters like pH, turbidity, total dissolved solids, total hardness and concentrations of ions like chloride, fluoride, nitrate and sulphate were analyzed to know the present status of the river water quality. The results were compared with the drinking water standards of ISI (10500-91) and WHO (1973). It was found that the river water was contaminated at few sampling sites therefore needs to be treated if it is to be used at all. The remaining sampling sites shows physicochemical parameters within the water quality standards and the quality of water is good and it is fit for domestic uses, drinking and agricultural purposes.

**Keywords:** River water, Drinking water, Physiochemical parameters, Water quality standards.

## I. INTRODUCTION:

Water is necessary to the mechanics of the human being and the body cannot survive without it. Water quality is essential for the well being of all people, the quality of water can be affected by different pollutants such as, chemical, biological and physical. Contaminates such as bacteria, viruses, heavy metals, nitrate and salt have found their way into water supplies, the water pollution occurs when a body of water is adversely affected due to the addition of large amounts of materials to the water [1].

Rivers are the most important natural resource for human development but it is being polluted by indiscriminate disposal of sewage, industrial waste and plethora of human activities, which affects its physico-chemical and microbiological quality. The potential causes of degradation of river water quality due to various point and nonpoint sources. Increasing problem of deterioration of river water quality, it is necessary to monitoring of water quality to evaluate the production capacity [2-9].

Keeping above in view the present investigation was undertaken to study the seasonal hydrological assessment of the *Kyasara* River water quality at Jhalawar District (Rajasthan). This study involves the determination of physical and chemical parameters of *Kyasara* River of Jhalawar *District*. The objective of this study is to assess the present water quality, through analysis of some selected water quality parameters like temperature, pH, Turbidity, TH, TDS,  $\text{Cl}^-$ ,  $\text{F}^-$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$  and compare the results with the standards values recommended by ISI and WHO.

## II. MATERIAL AND METHODS:

### 2.1 Study area:

Jhalawar district located in the south-east of Rajasthan, between the longitudes of  $75^{\circ} 27' 35''$  to  $76^{\circ} 56' 48''$  East and latitudes of  $23^{\circ} 45' 20''$  to  $24^{\circ} 52' 17''$  North, adjoining the neighbouring state of Madhyapradesh.

### 2.2 Methodology:

Water samples were collected from 10 sampling sites of *Kyasara* River at Jhalawar District in 2010-2011. Samples were collected in clean polythene bottles pre-washed with dilute hydrochloric acid and rinsed three to four times with the water samples before the samples were stored at a temperature below  $4^{\circ}\text{C}$  prior to analysis in the laboratory. The physico-chemical parameters such as pH, Turbidity, TDS,  $\text{Cl}^-$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$  and  $\text{F}^-$  were determined by using standard methods [10]. Sodium and potassium were determined by Flame photometric methods (systronic -128). Specific reagents were used for the analysis and double distilled water was used for preparation of solutions.

## III. RESULTS AND DISCUSSION:

River water samples of *Kyasara* River were collected and analysed as per standard methods. With the help of these, we assessed the seasonal results of *Kyasara* River. Sampling was done during three seasons (summer, rainy and winter) throughout the one year from various villages (Nov., 2010 to Oct., 2011). Results of three seasons physico- chemical parameters are shown in Table1 and minimum, maximum and average concentration of various physico-chemical parameters are represented by Figure1.

Table 1.4: Physico-Chemical Parameters of Kyasara River Water

S.No.	Sample No.	Village	Season	pH	Turbidity (NTU)	TDS (mg/l)	TH (mg/l)	Cl <sup>-</sup> (mg/l)	F <sup>-</sup> (mg/l)	NO <sub>3</sub> <sup>-</sup> (mg/l)	SO <sub>4</sub> <sup>-2</sup> (mg/l)
1	S <sub>1</sub>	Devgarh	Summer	7.72	6.5	280	108.3	24.9	0.18	9.9	4.1
			Rainy	7.84	114.3	190	34.9	18.5	0.21	10.3	5.9
			Winter	7.63	9.8	210	98.5	29.3	0.25	11.4	4.6
2	S <sub>2</sub>	Matajka khera	Summer	7.76	3.8	270	111.2	32.8	0.19	10.1	3.8
			Rainy	7.99	127.4	210	39.8	17.6	0.22	7.8	5.2
			Winter	7.84	7.9	240	97.7	28.5	0.28	8.9	4.3
3	S <sub>3</sub>	Merukheri	Summer	7.52	11.2	290	102.8	31.7	0.16	13.6	3.9
			Rainy	7.78	138.2	180	32.8	13.2	0.24	6.4	6.8
			Winter	7.97	5.4	230	76.9	22.3	0.26	10.5	7.4
4	S <sub>4</sub>	Napahiya	Summer	7.49	6.5	220	97.8	33.8	0.18	12.8	2.8
			Rainy	7.84	141.8	180	31.2	14.6	0.23	5.3	3.5
			Winter	8.05	10.8	290	88.5	25.9	0.27	5.9	3.9
5	S <sub>5</sub>	Pattai	Summer	7.59	12.8	250	100.6	34.8	0.17	10.6	3.0
			Rainy	7.86	188.9	210	47.6	17.4	0.29	11.2	4.8
			Winter	8.06	5.2	200	86.2	27.6	0.25	7.6	5.6
6	S <sub>6</sub>	Khanwala	Summer	7.99	13.6	240	99.2	28.4	0.19	14.5	3.5
			Rainy	8.20	162.3	190	34.9	15.9	0.24	7.8	4.8
			Winter	7.84	9.8	270	81.8	31.5	0.23	12.9	6.2
7	S <sub>7</sub>	Piplirya kalan	Summer	8.12	8.2	280	87.4	30.8	0.20	11.3	6.7
			Rainy	8.01	163.7	200	38.8	14.4	0.26	9.6	5.9
			Winter	7.83	11.2	220	79.9	16.8	0.25	10.5	4.3
8	S <sub>8</sub>	Sujanpur	Summer	8.06	3.3	300	110.5	31.2	0.18	11.8	7.8
			Rainy	8.24	142.5	190	42.9	13.9	0.27	4.9	6.5
			Winter	7.86	7.7	270	78.3	22.4	0.24	10.4	3.5
9	S <sub>9</sub>	Keetiya	Summer	7.78	6.3	240	91.7	31.9	0.16	12.6	4.6
			Rainy	8.03	129.8	200	46.4	14.6	0.27	6.7	3.7
			Winter	8.14	38.2	280	85.3	23.5	0.25	13.9	4.5
10	S <sub>10</sub>	Kyasara	Summer	7.76	12.1	290	98.3	32.3	0.17	13.1	5.2
			Rainy	7.95	138.3	150	49.8	13.1	0.21	8.5	7.3
			Winter	8.11	5.8	240	78.3	18.6	0.29	12.8	4.8

**3.1 pH:** pH values ranged between 7.49 to 8.24 during one year samplings. The pH values showed that water samples were alkaline and these values were within the limits as prescribed by ISI. The average value of pH was 7.89. The minimum value of pH was monitored in sample S<sub>4</sub> and the maximum value of pH was viewed in sample S<sub>8</sub>.

**3.2 Turbidity:** Turbidity values ranged from 3.3 NTU to 188.9 NTU and the average value of turbidity was 54.77 NTU all of the studied samples of one year. In rainy season all samples were higher

values than the prescribed WHO standards. The minimum value of turbidity was examined in sample S<sub>8</sub> and the maximum value of turbidity was scrutinized in sample S<sub>5</sub>.

**3.3 Total Dissolved Solids (TDS):** TDS values were varied from 150 mg/l to 300 mg/l and these values were within permissible limits prescribed by ISI and WHO. The average value of TDS was 233.66 mg/l. In sample S<sub>10</sub> minimum value of TDS was observed and in sample S<sub>8</sub> maximum value was surveyed.

**3.4 Total Hardness (TH):** The data table reveals that the TH values in one year varied from 31.2 mg/l to 111.2 mg/l for all river water samples and these values were within the standard limits recommended by ISI and WHO for all samples. The minimum value of TH was observed in sample S<sub>8</sub> and the maximum value of TH was found in sample S<sub>2</sub>. 75.2 mg/l was the average value of TH.

**3.5 Chloride (Cl<sup>-</sup>):** Chloride values ranged from 13.1 mg/l to 34.8 mg/l and the average value of chloride was 23.7 mg/l all of the studied samples of one year. All samples were lesser values than the prescribed ISI and WHO standards. The minimum value of chloride was examined in sample S<sub>10</sub> and the maximum value of chloride was scrutinized in sample S<sub>5</sub>.

**3.6 Fluoride (F<sup>-</sup>):** All values of fluoride were under recommended standards in one year. Fluoride values varied between 0.16 mg/l to 0.29 mg/l. The minimum values of fluoride were found in sample S<sub>3</sub> & S<sub>9</sub> and the maximum value of fluoride was detected in sample S<sub>5</sub> & S<sub>10</sub>. The average value of fluoride was 0.22 mg/l.

**3.7 Nitrate (NO<sub>3</sub><sup>-</sup>):** Nitrate values were varied from 4.9 mg/l to 14.5 mg/l and these values were within permissible limits prescribed by ISI and WHO. The average value of nitrate was 10.1 mg/l. In sample S<sub>8</sub> minimum value of nitrate was observed and in sample S<sub>6</sub> maximum value was surveyed.

**3.8 Sulphate (SO<sub>4</sub><sup>2-</sup>):** All values of sulphate were under recommended WHO and ISI standards in one year. Sulphate values varied between 2.8 mg/l to 7.8 mg/l. The minimum value of sulphate was found in sample S<sub>4</sub> and the maximum value of sulphate was detected in sample S<sub>8</sub>. The average value of sulphate was 4.9 mg/l.

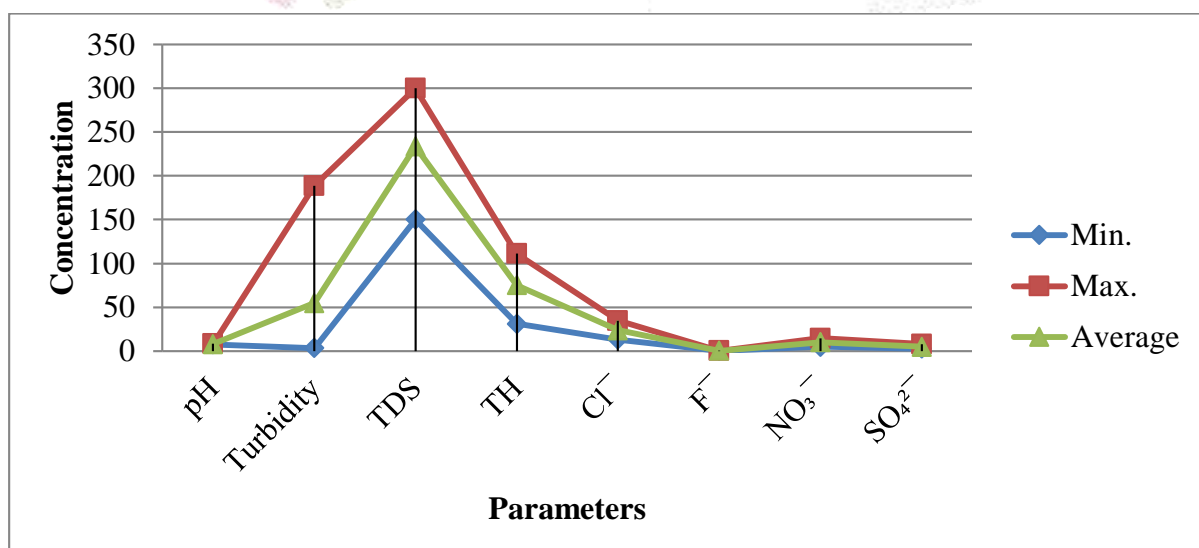


Figure 1: Minimum, Maximum & Average Concentration of Various Parameters in Kyasara River.

#### IV. CONCLUSION:

From the analysis, it is evident that the values of pH, TDS, TH, Cl<sup>-</sup>, F<sup>-</sup>, NO<sub>3</sub><sup>-</sup> and SO<sub>4</sub><sup>-2</sup> are within permissible standard limits but all samples of the river water were high in turbidity which suggest the poor water quality in these water samples.

#### Treatment:

**Moderate pH and disinfection:** Addition of bleaching powder is advised so that water may attain normal pH and disinfected properly. This water may be used for irrigation and drinking purpose through distribution tanks in the system.

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