

## **Physico-Chemical Analysis of Water of River Panjara at Dhulia District Dhulia, Maharashtra, India**

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### **Abstract**

Dhulia is the district place in khandesh region of Maharashtra, India is considered as a perfect travel destination attracted by tourists from khandesh region. Though famous city in Khandesh region, still this cultural city is facing current trends of urbanization, agriculture activities and human being activities has increased the pollution of surface water is needed and over-exploitation of resources and exorbitantly increasing population. Shri Ganesh and Shri Swami Samrath Temple, a shrine of Dhulia is located at the town Dhulia City. Water, the elixir of life, is a priceless commodity and accessibility of clean water is a right of each and every person. Therefore, study of physico-chemical analysis of water is considered as an important aspect of pollution studies in the environment. This study is designed to assess the water quality standards of physico-chemical analysis of water of River Panjara at Dhulia near Shri Ganesh and Shri Swami Samrath Temple. In this study, we found that Turbidity is comparatively more than that of permissible limit in months of Monsoon Season.

**Keywords:** Physico-chemical, Water, Ganesh and Shri Swami Samrath Temple, Dhulia

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### **I. INTRODUCTION**

Increase in urbanization, industrialization, agriculture activity and various human activities have increased the pollution of surface water & ground water. As the safe & potable drinking water is needed. Various treatment methods are adopted to raise the quality of drinking water. Water should be free from the various contaminations viz. Organic and Inorganic pollutants, Heavy metals, Pesticides etc. as well as all its parameter like pH, Electrical Conductivity, Calcium, Magnesium, Total Hardness, Carbonate, Bicarbonate, Chloride, Total Dissolved Solid, Alkalinity, Sodium Potassium and Nitrate.

### **II. MATERIALS AND METHODS**

In this study, the water quality standards of different physico-chemical parameters such as pH, Temperature, Conductivity, Turbidity, Total dissolved solids, BOD, COD, TA, TH, Calcium, Potassium, Sodium, Magnesium, Nitrate, Sulphate, Phosphate, Chloride, Fluoride, and their statistical interpretation for domestic and agriculture purpose were evaluated for the water of Panjara River Near Shri Ganesh and Shri Swami Samrath Temple in the city Dhulia. Six samples readings were considered for the water of River Panjara at Ganesh and Shri Swami Samrath Temple District Dhulia. Water sample readings were analyzed throughout the year for various Physico-chemical parameters using standard methods recommended by the American Public Health Association. There are various methods to determine different physical and chemical parameters. All Sample readings for different Physico-chemical analysis were taken at Department of Chemistry, B.Raghunath College, Parbhani and C-MET, Pune. In this analysis, six sample readings were considered in the Month of November 2020 year. In some cases, there was an increase or decrease shown in readings which were due to change in weather.

**Table-1 Physico-chemical analysis of water of Panjara at Shri Ganesh and Shri Swami Samarth Temple**

Physico-chemical Parameters	Year 2020					
	March	April	May	June	July	August
PH	6.8	7.04	7.09	7.15	7.02	7.03
Temp.	23	29	32	32	32	20
Turbidity	2.4	3.1	3.7	3.9	3.2	4.2
TDS	512	590	625	239	267	390
EC	700	780	845	315	362	615
TA	165	185	19	129	142	143
TH	165	147	190	129	168	148
BOD	2.2	1.38	2.41	1.5	4.9	2.53
COD	12.84	32.55	28.35	8.65	43.4	20.9
Ca <sup>2+</sup>	36.9	43.5	42	28.5	28.9	38.5
Mg <sup>2+</sup>	16.80	15.41	22.41	14.64	15.63	12.6
Na <sup>+</sup>	85	85	1178	48	54	64
K <sup>+</sup>	1.7	1.3	1.9	1.2	1.6	1.7
Cl <sup>-</sup>	207	175	229	85	85	139
SO <sub>4</sub> <sup>2-</sup>	145.3	152	138	39	52	78

### III. RESULT AND DISCUSSION

#### 3.1 Water Quality Parameters

Different physico-chemical parameters were reported in Table-1. Six samples from the months of March-August 2020 year were analyzed for the following parameters like P<sup>H</sup>, Turbidity, TDS, EC, TA, TH, BOD, COD, Ca<sup>2+</sup>, Mg<sup>2+</sup>, Na<sup>+</sup>, K<sup>+</sup>, Cl<sup>-</sup> and SO<sub>4</sub><sup>2-</sup>. Following water quality parameters were studied in the water and compared with standard permissible limits.

**3.1.1 pH** – A significant parameter that reflects the acidic and alkaline nature of water. It is vital for varied biochemical reactions. The permissible limit for pH in water is 6.8 -7.25. Less pH causes tuberculation and corrosion while higher pH causes Incrustation and sediment deposit [14].

**3.1.2 Temperature**- A vital parameter which not only influences the chemistry of water but also governs biological activity and growth of living organisms. It also influences the different kinds of organisms that can live in water bodies.

**3.1.3 Turbidity** -Turbidity represents cloudiness of the liquid which is formed by the accumulating individual particles which are not visible by the naked eyes like smoke in the air. The permissible limit for turbidity is 5-10 NTU

**3.1.4 Total Dissolved Solids (TDS)** - TDS measures the total number of charged ions absorbed in a sample of water, including minerals, salts, or metals. In mg/lit, it is represented. TDS originates from natural sources, sewage, urban runoff, chemicals used in water treatment processes, industrial wastewater and nature of hardware used in water transport. Permissible limit is 1500 mg/lit.

**3.1.5 Electrical conductance** -The measure of water's capacity to pass electric flow. Electrical conductance is represented in the ionized form of dissolved salts and other inorganic chemicals present in the water. This concentration of ionized form contributes to conductance. Permissible limit is 200-1000 µmho/cm.

**3.1.6 Total Alkalinity**- The measure of the buffering capacity of water or the capacity of bases to neutralize acids. It basically regulates the pH of a water body and also maintains the metal content. It refers to the power of water to resist change in pH. The general level of freshwater for the alkalinity level is 20-200 mg/lit.

**3.1.7 Total Hardness** -A significant measure of polyvalent cations in water is a vital factor. Polyvalent cations mainly include the concentration of calcium and magnesium including other cations like aluminum, barium, manganese and iron etc also contribute to it. 300 mg/lit is permissible to limit of total hardness of water by ICMR. The higher hardness content is due to unnecessary lime usage by the manufacturing and chemical effluent.

**3.1.8 Biochemical Oxygen Demand (BOD)** -BOD measures the oxygen utilized for the biochemical degradation of organic material (carbonaceous demand) and oxidation of inorganic material such as sulphides and ferrous ions during a specified incubation period. The permissible limit for BOD is 3-5 ppm which represents a moderately clean level.

**3.1.9 Chemical Oxygen Demand (COD)** -The measure of the capacity of water to consume oxygen during the process of decomposition of organic matter and oxidation of inorganic compounds like Ammonia and nitrite. It also means the oxygen mass absorbed in the solution volume. It is expressed in mg/lit. Ideally COD should be zero.

**3.1.11 Calcium**- The permissible limit for Calcium is 75-200 mg/lit. Excess amount of calcium concentration causes less absorption of essential minerals in the human body.

**3.1.12 Magnesium-** The greater concentration in water makes unpleasant taste. The main source of magnesium in water is by the erosion of rocks and minerals like dolomite or magnetite. The permissible limit of Magnesium is 30-150 mg/lit.

**3.1.13 Sodium-** Permissible limit for sodium in drinking water must be in the range of 30 to 60 mg/lit. Higher concentrations are caused by hypertension, renal and heart-related diseases.

**3.1.14 Potassium** – As well as for humans, the lower potassium concentration is advantageous for vegetation. Hypertension, diabetes, adrenal insufficiency, kidney and heart-related diseases are caused by a hi

**3.1.15 Chloride-** Chlorides are present in almost all natural water resources. As we all know, the concentration of chloride content varied widely and it is maximum in ocean water. The maximum permissible limit of Chloride ion by WHO in 1991 is 200 ppm and the maximum allowable limit is 600 ppm. It is considered an essential water quality parameter by affecting its usability and aesthetic property with taste and make it unfit for drinking purpose. The main source of Chloride concentration is the formation of rocks and soil with sewage wastes.

**3.1.16 Sulphate** –Sulphate is present in almost all drinking natural water sources. The sources for sulphate concentrations are rocks and geological formation. The excess amount of sulphate content causes a laxative effect. The permissible limit for sulphate is 200-400 mg/lit.

### **3.2 Water quality criteria for irrigation**

The appropriateness of water for agricultural use is determined by its quality for irrigation purpose. The quality of water for irrigation purpose is determined by the concentration and composition of dissolved constituents in water. Quality of water is an important aspect in any appraisal of salinity or alkalinity conditions in an irrigated area. Good soil and water management practices result in good quality of water which can promote maximum yield of the crop.

Total dissolved Solids and the sodium content in relation to the amounts of calcium and magnesium or SAR [2] determines the suitability of water for irrigation. The suitability of groundwater for irrigation use was evaluated in the form of salinity by different statistical calculations such as (Sodium absorption ratio (SAR), soluble sodium percentage (SSP) and Chloro alkaline indices (CAI).

## **IV. CONCLUSION**

From the observations made in the study, the following conclusions are drawn:

- All the samples readings come near to the permissible range for drinking and irrigation use apart few samples which are exceeding the limit due to anthropogenic activities.
- On the basis of statistical analysis, that all samples are alkaline in nature and are present in permissible range and it shows requirement of mild conditioning agents for drinking and industrial purposes.
- The concentrations of cations and anions are within the allowable limits for drinking water standards except a few samples.
- The suitability of water for irrigation is evaluated based on SAR, CAI, % Na, KR and salinity hazards. Most of the samples fall in the suitable range for irrigation purpose based on SAR, CAI, % Na and KR values, but very few samples that are exceeding the permissible limits. These variations are observed to be in different kind of geological areas and different anthropogenic activities were carried in the study area.

This study will be helpful in sustainable development of water sources of River Panjara at Dhulia Near Shri Ganesh and Shri Swami Samrath Temple city Dhulia.

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