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Study on Water Quality Parameters of Ujani Dam Back Water in Pune District (M.S.) India

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Abstract: ***The present study was conducted in order to know the role of various climates, geomorphologic and manmade practices in agricultural farming in Ujani Dam back water in Pune District in Maharashtra State. A simple random sampling technique was used for the selection of water samples from various locations located in the study area. Five back water locations were selected mostly the water using for irrigation, industrial and domestic purposes. The study shows that properties of water samples were moderate and to certain extent needs change in cropping pattern and irrigation practices. Chemical parameter analyzed such as pH, Turbidity, Colour (Hazen unit), TDS mg/Liter, DO, mg/Liter, Chlorides, mg/Liter, Total hardness as(CaCO3), Calcium, mg/Liter, Magnesium, mg/Liter, Sulphate, mg/Liter, Temperature, BOD mg/Liter, Odor/ Taste, Nitrates as NO3, mg/Liter were in few cases shows alarming, which needs proper utilization of manures, control pollution and reinvestigation in their farming practices. Since plants depend on the water quality nutrients and minerals supply, the water type is a major factor in determining what types of plants will grow in any area.***

Keywords: Water, Geomorphology, irrigation practices, Pollution, remedies

1. Introduction

Water is essential to everybody. In human body % tage of water is about 70%. Water is most widely used liquid for drinking, washing, irrigation and pharmaceutical manufacturing. Natural water's are referred to as rain water, surface water and subsoil water. Water is classified on the basis of 1) Sources such as rain water, spring water, river water, 2) The behavior of water with soap- Hard water and soft water, 3) Whether it is potable or non-potable. Mainly there are two types of water.1) Pure or fresh water means absence of impurities e.g. rain water and 2) Impure water- presence of impurities e.g. sea water, lake water, etc. Impurities in water are like suspended particles, like clay, decayed leaves, dissolved impurities like gases of oxygen, carbon dioxide, hydrogen sulphide, sulphur oxides and mineral salts of calcium, magnesium and also some biological growth of fungi, bacteria.

In recent year environmental monitoring through regular assessment of water quality has become a crucial factor in the exploitation or conservation of aquatic resources. Water the most vital abiotic component is unique in many respects. It occurs in all three stages on the earth and acts as a solvent for variety of inorganic, organic and gases substances. In hydrological cycle rain water is perhaps relatively less contaminated.

Water is a source of life. Earth is called "Blue Planet" because water covers about 75% of the globe, but most of the water is saline [1]. The world has a total 1.65 billion km^3 of water. However only 0.3 % of this quantity is theoretically usable as fresh water and only 10 % of that i.e. 0.03 % of the world's water is capable of economical utilization for good living[2].

Water is the wonder of the nature. It is essential to all living organisms. Water played the crucial role in the evolution of life from molecules to man. "No life without water" is a common saying due to all life supporting activities. It is a universal solvent and all metabolic reactions of living beings depend mainly on its presence. The culture and civilization of human societies depended on the way of water resources. Life in aquatic environment is largely governed by physicochemical characteristics and their stability[3].

Availability of fresh water has been the main centre of the growth of civilization. Fresh water, its availability and quantity is an important part of the ecology which has become scare due to frequent draught situations and increase human activity leading pollution. Generally fresh water occurs in the ice caps, glaciers and ground water. Most of the remainder is in lakes, dams, rivers, soil moisture and streams. The decreasing fresh water availability is causing concern not only in India but also all over the world. Protection and quality of fresh water resources has been identified as one of the main action for sustainable development[4]. Fresh water is one of the scare natural resources and it its conservation is assuming greater and greater significance due to an ever increasing demand of water in domestic, industrial, power, and irrigation sectors. Unfortunately in the last 40 years with growing population, ever expanding urbanization and extensive industrialization, the freshwater resources (rivers, lakes.) are being over exploited resulting in their gross pollution, loss of productivity and problems of diseases[5]. There is a continuous degradation of water quality mainly due to pollution from three major factors, domestic sewage, industrial effluents and agricultural runoff. On this background water quality assessment assumes to a great significance. Such an assessment enables-

1) Regular monitoring of health of an ecosystem,
2) Planning of corrective remedial measurements, and
3) Evolution of conservation strategies ultimately to achieve the target to their sustainable use for the benefit of man.

Water experts agree that water conservation, treatment and more efficient water use are some important things for good living[5]. Now a day's potable, drinking and fresh water has increasing demands for industrial and residential purposes. Worldwide sea, lake, dam and river water desalination has been a very effective way of producing potable water for drinking and industries. Actually it is a myth that, dam back

water desalination is so exorbitantly expensive that it is unaffordable. Even though there is need for safe drinking water in various situations prevailing in the country. It is necessary to develop a simple cost-effective, easy to operate and maintain point of use unit with feasible technology[9]. The major desalination process used worlds wide are thermal desalination, multistage flash distillation, multiple effective distillation, vapor compression distillation, membrane, reverse osmosis and electro dialysis technique. Some minor processes are freezing, distillation; solar humidification. The reverse osmosis for desalination of water can be a long term solution. This technique was developed in last 15 years. It is single most efficient and cost effective methodology to obtain desalted water to municipalities, township, large scale industries and infrastructure establishments. The use of fertilizers, pesticides, insecticides in rural areas and lime belching power, refuse dumps, industrial wastes, sewage and toxic substances in urban areas are the main sources of dam water pollution. Therefore physico-chemical analysis of backwater collected from different areas is necessary[6].

1.1 History and Location of Dam

Ujani Dam is also known as Bhima Dam or Bhima Irrigation project. It is on the Bhima river, located near Ujani village of Madha Taluka in Solapur district of the state of Maharashtra in India. It was created in 1980. The reservoir created by the dam has a water spread area of 357 km^2 (138 sq meters). The reservoir backwater attracts, every year, a large number of migratory birds. A 100-150 species of flamingo and cormorants are reported. Ujani dam back water is just 35 km away from Karjat. It is a fresh water dam constructed for supplying drinking water to various cities like Baramati, Solapur, Pandharpur, Usmanabad, Akaluj, Karmala, Karjat, etc. The project provides multipurpose benefits of irrigation, hydroelectric power, drinking and industrial water supply and fisheries development. Subsequently, the water use pattern changed from drinking to agriculture, industries, washing, bathing and gardening purpose. In the last 50 years with the industrialization and urbanization of dam catchment it is subjected to gross pollution from industrial effluents (Sugar industries, Pharmaceutical industries, brick industries) and domestic sewage of Pune city. Also lot of silt is added every year in Mula- Mutha Rivers, Bhima River as a result of Ganesh immersion.

In recent years the pollution of water in Ujani dam is quite alarming due to sewage out fall of Pune Township, chemical industries, riverbank brick making, sugar industries effluents and other waste disposals like dumping of domestic and agricultural wastes and agricultural activities. Therefore it is necessary to study the quality of water in this dam and to ascertain the extent of pollution in turn is a great benefit to the public and aquatic animals[7].

Maximum Ujani dam back water is located in Pune District and receives heavy inputs of domestic wastes and sewage. Therefore it is necessary to analyze back water, to formulate methods to monitor the pollution and develop techniques to obtain potable drinking water. Various methods were adopted for analysis[8-9].

1.2 Sample Stations

Five back water locations were selected mostly the water using for irrigation, industrial and domestic purposes. They are-

a) **Sidhateck (Station-A)**
It is situated at the holly place Sidhivanayak Ganesh temple at the initial point that receives polluted water from the catchment area of Pune city, Kurkumbh MIDC and the brick industries on the Bay of Bhima River.

b) **Bhambora (Station-B):-**
The sampling point is in the zone near to Bhambora village where bathing and washing activities go on. The area is also subjected to pollution from chemical fertilizers and agriculture sewage.

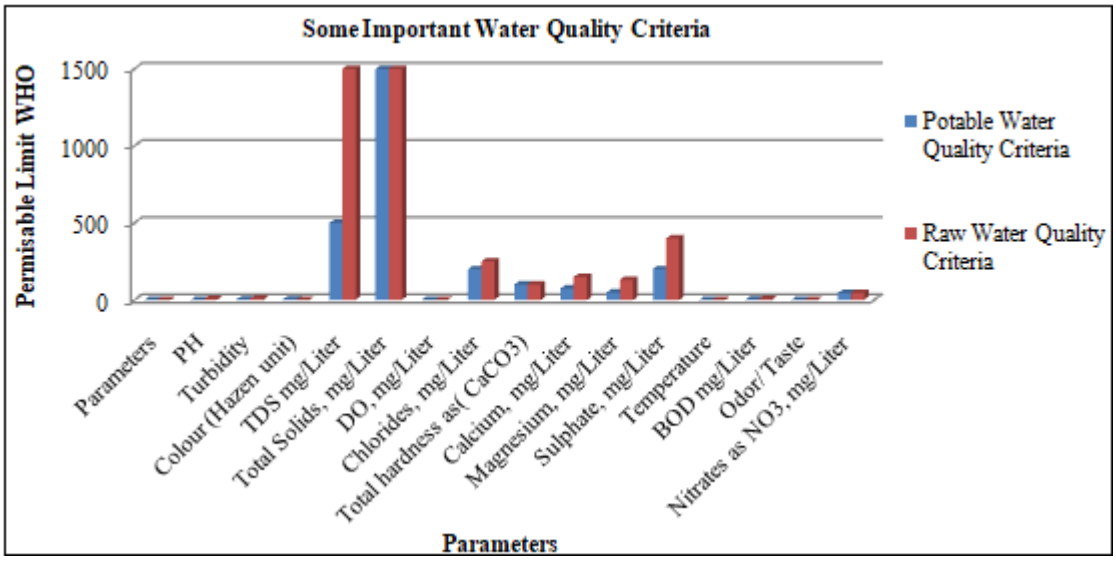
c) **Khed (Station-C):-**
This place is situated near Khed village. Maximum drinking water is supplied to various cities from this place; it is quite clean and clear water place. But now a day there is supply of drainage water and agriculture sewage.

d) **Bhigvan (Station-D):-**
It is situated near Pune Solapur highway. The Bhigvan city is more populated city and the drainage of city is directly passed in the dam water. Therefore this place is more polluted and dirty place.

e) **Dhalaj (Station-E):-**
The Dhalaj station is near to the dam plinth. The deepness of water is more there. It is also on the Pune-Solapur highway. Numbers of small villages are surrounded by this place. Paper and pulp industries are located in this area. It is also more polluted place.

1.3 Some Important Water Quality Criteria

Sr. No.	Parameters	Potable Water Quality Criteria (Permissible Limit WHO)	Raw Water Quality Criteria (Permissible Limit WHO)
1	P^H	7.5 -8.5	6.9
2	Turbidity	05	10
3	Colour (Hazen unit)	05	-
4	TDS mg/Liter	500	1500
5	Total Solids, mg/Liter	1500	1500
6	DO, mg/Liter	Not below 4	Not below 4
7	Chlorides, mg/Liter	200	250
8	Total hardness as($CaCO_3$)	100	100
9	Calcium, mg/Liter	75	150
10	Magnesium, mg/Liter	50	130
11	Sulphate, mg/Liter	200	400
12	Temperature	-	-
13	BOD mg/Liter	2.5	6
14	Odor/ Taste	-	-
15	Nitrates as NO_3, mg/Liter	45	45



A) Physico-chemical parameters:-

Physical properties - In this part there is measurement of the physical properties of sample such as colour, electrical conductivity, temperature, turbidity, etc. Their Physicochemical parameters were carried out on the spot immediately by using water analysis kit. The physicochemical parameters like temperature, P^H, conductivity, alkalinity, dissolved oxygen, hardness, total suspended solids, chlorides, sulphates and effect of pollutants on aquaculture were studied[13].

i) Colour -Colour in surface and ground waters results primarily from the presence of natural organic matter, particularly aquatic human matter. Humic matters consist of humic acid and fulvic acid; both cause yellow brown colour. Humic acid give a more intense colour. The presence of iron intensifies the colour through formation of soluble ferric hydroxides. Suspended particles such as clays, algae, iron and manganese oxides, give water an appearance of colour.Industrial waste waters can contains dyes, lignin, tannin, and other organic and inorganic chemicals that cause colour.Apparent colour is determined on the original sample without filtration. In some waters and waste waters, apparent colour is contributed colloidal particles or suspended material.

ii) Turbidity-Clarity of water is important in producing products in industries. Turbidity in water is caused by suspended and colloidal matter such as clay, slit; finally divided organic and inorganic matter, planktons and other microscopic organisms. Turbidity is an exception of the optical property that causes light to be scattered and absorbed rather than transmitted with no change in direction or flux level through the sample. The co-relation of suspended particles weight and size is difficult. The presence of dissolved substances, colour causing materials may cause negative influence on turbidity measurement. Now days some commercial instruments are used to measure the turbidity Therefore determination of turbidity as soon as possible after the sample is taken.

iii) Odor- Odor, like taste, depends on contact of a stimulating substance with the appropriate human receptor cell. Man and other animals can avoid many potentially toxic foods and waters because adverse sensory response. It provides the first warning of hazardous materials. Odor is recognized as a quality factor[14]. Most organic and some inorganic chemicals contribute taste or odor. These chemicals may originate from natural sources such as decomposition of vegetable matter, microbial activity, municipal and industrial waste discharges. Air pollutants such as fumes of acids &dust material also influenced on odor of water. Pure water is tasteless, odorless and colourless.

iv) Temperature- Temperature depends on climate, sunlight and depth of water. Wild fluctuations of water temperature affect the properties of water survival of aqua cultural animals. It was recorded with the help of standard centigrade thermometer in degree Celsius (^{0}C).The samples were taken in a container to measure the temperature immediately. Temperature readings are important in calculation of various forms of alkalinity, in studies of saturation and stability with respect to calcium carbonate ($CaCO_3$). It changes with depth, time and season also. As temperature increases there is increase in volume and solubility of dissolve salts. Hence, water temperature maintenance is very essential to obtain correct composition of water and various properties of water.

v) Conductivity-Conductivity is measure of the ability of an aqueous solution to carry an electric current. This ability depends on the presence of ions; on their total concentration, mobility and the temperature of measurement. Solutions of most inorganic compounds are relatively god conductors. Elico standard conductometer was used to measure the conductance. Conductivity depends mainly on presence of Ca^{2+}, Mg^{2+}, Na^+, K^+, HCO_3^-, SO_4^{--}, Cl^- , etc ions in the soluble form.

vi) P^H: (Potentia hydrogeni):- P^H is the value expressed as the negative logarithm of the hydrogen ion concentration. The P^H range is usually given as 0 to 14; 7 being neutral, less than 7 acidic and above 7 basic or alkaline. On field P^H was recorded with the help of standard P^H paper strips. The paper was dipped in water sample and colour developed was compared with standard colour code given. Such a

determination was fairly accurate and checked with other standard available kit. In this technique care was taken to wash fingers with distilled water prior to touching the P^H paper strip for recording the P^H of sample. In the laboratory P^H was recorded with the help of P^H meter for each sample.

vii) Salinity-Salinity is an important unit less property of industrial and natural water. Originally it was used for measurement of mass of dissolved salt. The only reliable way to determine the true or absolute salinity of natural water is to make complete chemical analysis. But this was time consuming method. Thus indirect method is used to calculate salinity. It requires some physical methods like conductivity, density, refractive index, etc and salinity was determined by precision of measurement of physical properties.

B) Chemical Parameters

A) Determination of Dissolved Oxygen (DO) - Winkler's method:- General -Dissolved Oxygen (DO) is one of the most important chemical parameters. It has great influence on the survival and growth of aquacultures. Fill the 300 mL BOD bottle with water sample. Add 2 to 3 mL of Winker's reagents A and B. A brown precipitate will be formed. Allow it to settle (it could take 5 to 10 minutes. Keep the bottle away from direct exposure to sunlight).Dissolve the brown precipitate by adding minimum quantity (add every time a few drops of acid so as to dissolve the precipitate by inversing Stoppard bottle. Sometimes black brown flakes are formed in the case of highly turbid water which does not dissolve further. Take supernatant clear brown colour sample for further titration Titrate 100 mL of the sample against sodium thiosulphate standard solution. After formation of brown colour add starch as an indicator as 2 to 3 mL. It gives blue colour. End point is blue to colorless.
If the water is turbid it is better to filter it and use filtrate as sample. When filled there should not be any air bubble in the DO bottle. When Winker's reagent **A**-$MnSO_4$ is used, add concentrated H_2SO_4. When $MnCl_2$ is used add concentrated HCl to dissolve the precipitate. Formation of colorless, whitish precipitate indicates very low or nil DO.

B) Determination of Bicarbonates (HCO_3^-):-
P^H range produced by bicarbonate ions is indicated by the methyl orange indicator. The sample containing HCO_3^- ions when titrated against an acid 0.02n H_2SO_4, the quantity of acid required to reduce the P^H from alkaline to acidic direction is proportional to the strength of HCO_3^-.The 50 mL sample after estimation of CO_2 is used for determination of HCO_3^-. In the sample add 2 to 3 drops of methyl orange as an indicator and titrate against 0.02 N H_2SO_4. End point is yellow to orange.

C) Determination of Chloride and Salinity-
Natural water normally has low chloride (Cl^-) contents as compared to bicarbonates (HCO_3^-) and sulphates (SO_4^{--}). High chlorides are found in inland saline lakes, marine water or sea water. High chloride level indicates pollution from domestic sewage and industrial effluents. Though chloride level is up to 250 mg/Liter. Water is safe for human consumption. A level above this imparts a salty taste to the potable water. The chlorides are estimated by precipitating Cl^- ions in water as silver chloride (AgCl) by titrating against 0.02 N $AgNO_3$. Indicator used is potassium chromate (K_2CrO_4).In a 100 ml sample add few drops of $K_2Cr_2O_4$.Titrate the sample against 0.02N $AgNO_3$ solution. End point is yellow to brick red.

d) Acidity
Acidity of water is its quantitative capacity to react with a strong base to a designated P^H. Strong mineral acids, weak acids such as carbonic acid, acetic acid and hydrolyzing salts such as iron or aluminium sulphates may contribute to the measured acidity. Dissolved carbon dioxide (CO_2) usually is the major acidic component of unpolluted surface water. Therefore samples were handled very carefully.

e) Alkalinity
Alkalinity of water is its acid- neutralization capacity. It is sum of all the titrable bases. The alkalinity of much surface water is primarily a function of carbonates, bicarbonates, and hydroxide content. The measured values also include borates, phosphates, silicates or other bases, if these are present. If alkalinity shows presence of alkaline earth metals that water is suitable for irrigation. Alkalinity measurements are used in the interpretation and control of water and waste water treatment processes.

f) Hardness
Originally, water hardness was understood to be a measure of the capacity of water to precipitate soap. Soap is precipitated mainly by calcium and magnesium ions present. Other polyvalent cations also may precipitate soap. Other organic constituent play less role in hardness of water. There are mainly two types of hardness

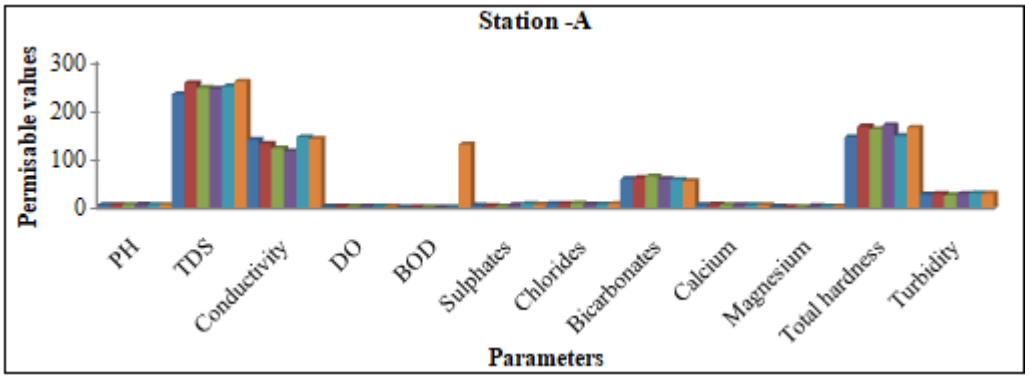
- **Carbonate hardness-** The hardness due to the sum of carbonate and bicarbonate alkalinity. i.e. equivalent to the total alkalinity is called carbonate hardness
- **Non-carbonate hardness-** The amount of hardness in excess of carbonate hardness is known as noncarbonated hardness. Hardness of water is determined by EDTA method as titrimetric method.

C) Observations at Various Stations
Samples were collected monthly from different stations. The results obtained for Temperature, P^H, Turbidity, Conductance, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), etc are shown in the tables.

Station A

Sr.No.	Parameters	Sept-2018	Oct-2018	Nov-2018	Dec-2018	Jan-2019	Feb-2019
1	Air temp. (^{0}C)	28.30	30.60	29.40	27.60	27.20	27.50
2	Water temp. (^{0}C)	26.65	26.85	26.29	26.10	25.15	25.40
3	Colour	Bluish	blue	Blue	Yellowish	Yellow	Yellow
3	P^H	7.11	7.15	7.25	7.41	7.30	7.23
4	TDS	234	257	247	245	250	260
5	Conductivity	140.56	132.67	123.12	117.11	145.67	142.00
7	DO	3.38	3.41	3.47	3.68	3.45	3.39
8	BOD	1.23	1.58	1.63	1.11	1.29	131
9	Sulphates	5.6	5.2	4.1	6.3	8.9	7.7
10	Chlorides	9.12	9.23	9.6	8.21	8.10	9.1
11	Bicarbonates	60.43	62.15	65.32	59.96	58.66	55.66
12	Calcium	7.23	7.78	7.29	6.87	6.62	6.70
13	Magnesium	3.23	2.88	2.64	4.43	3.99	3.89
14	Total hardness	145.88	167.62	162.16	170.23	148.09	165.50
15	Turbidity	28.32	29.44	27.16	29.83	30.37	30.15

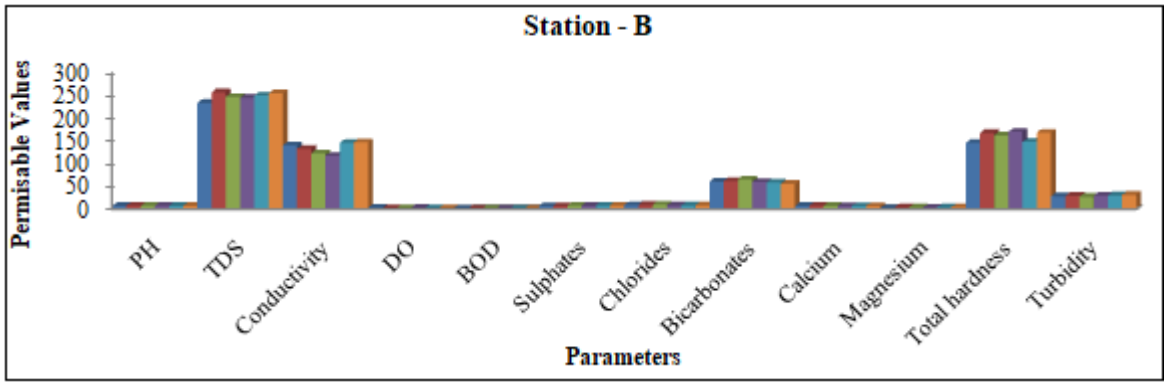
All chemical parameters are per month average and expressed in mg/L.



Station B

Sr.No.	Parameters	Sept-2018	Oct-2018	Nov-2018	Dec-2018	Jan-2019	Feb-2019
1	Air temp.(^{0}C)	28.30	30.60	29.40	27.80	27.20	28.10
2	Water temp.(^{0}C)	26.65	26.85	26.29	26.10	25.20	25.63
3	Colour	Bluish	blue	Blue	Yellowish	Yellow	Yellow
4	P^H	7.2	7.85	7.45	7.41	7.23	7.10
5	TDS	234	257	247	245	250	255
5	Conductivity	140.56	132.67	123.12	117.11	145.67	147.13
7	DO	3.38	2.41	2.47	2.68	2.45	2.47
8	BOD	1.23	1.11	1.13	1.11	1.29	1.15
9	Sulphates	6.46	6.52	7.41	7.23	7.89	7.90
10	Chlorides	9.12	9.23	9.6	8.21	8.10	8.15
11	Bicarbonates	60.43	62.15	65.32	59.96	58.66	55.64
12	Calcium	7.23	7.78	7.29	6.87	6.62	6.90
13	Magnesium	2.23	3.88	3.64	3.43	3.99	4.23
14	Total hardness	145.88	167.62	162.16	170.23	148.09	168
15	Turbidity	28.32	29.44	27.16	29.83	30.37	31.62

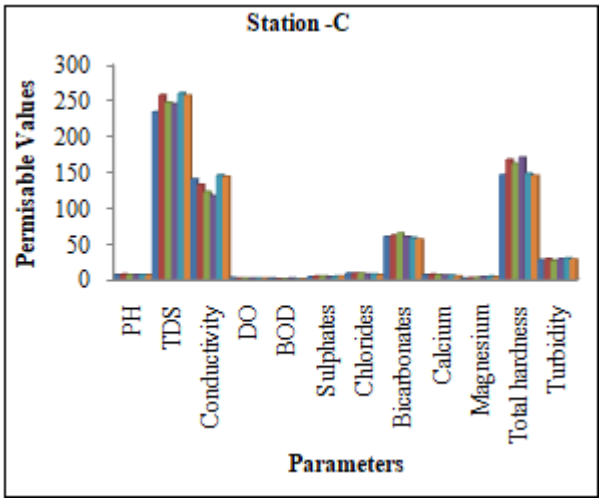
All chemical parameters are per month average and expressed in mg/L.



Station C

Sr.No.	Parameters	Sept-2018	Oct-2018	Nov-2018	Dec-2018	Jan-2019	Feb-2019
1	Air temp.(^{0}C)	28.30	30.60	29.40	27.80	27.20	28.98
2	Water temp.(^{0}C)	26.65	26.85	26.29	26.10	25.2	25.34
3	Colour	Golden	blue	Blue	Yellowish	Yellow	Yellow
3	P^H	7.2	7.85	7.45	7.41	7.23	7.14
4	TDS	234	257	247	245	260	256.90
5	Conductivity	140.56	132.67	123.12	117.11	145.67	144.00
7	DO	3.38	2.41	2.47	2.68	2.45	2.67
8	BOD	2.13	1.58	1.63	2.11	1.29	2.02
9	Sulphates	4.46	5.52	5.41	4.23	4.89	5.17
10	Chlorides	9.12	9.23	9.6	8.21	8.10	7.12
11	Bicarbonates	60.43	62.15	65.32	59.96	58.66	56.91
12	Calcium	7.23	7.78	7.29	6.87	6.62	5.44
13	Magnesium	2.23	2.88	3.64	4.43	4.99	4.32
14	Total hardness	145.88	167.62	162.16	170.23	148.09	145.33
15	Turbidity	28.32	29.44	27.16	29.83	30.37	28.96

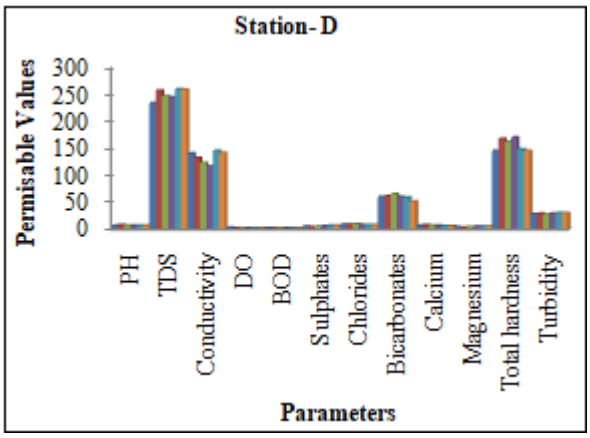
All chemical parameters are per month average and expressed in mg/L.



Station D

Sr.No	Parameters	Sept-2018	Oct-2018	Nov-2018	Dec-2018	Jan-2019	Feb-2019
1	Air temp. (0C)	28.30	30.60	29.40	27.80	27.20	29.10
2	Water temp.(0C)	26.65	26.85	26.29	26.10	25.2	26.87
3	Colour	Bluish	Blue	blue	Blue	Yellowish	Yellow
3	PH	7.2	7.85	7.45	7.41	7.23	7.12
4	TDS	234	257	247	245	260	259
5	Conductivity	140.56	132.67	123.12	117.11	145.67	141.63
7	DO	3.38	2.41	2.47	2.68	2.45	2.14
8	BOD	2.23	1.58	1.63	2.11	2.29	2.26
9	Sulphates	5.46	4.52	5.41	6.23	7.11	7.59
10	Chlorides	9.12	9.23	9.6	8.21	8.10	8.01
11	Bicarbonates	60.43	62.15	65.32	59.96	58.66	51.87
12	Calcium	7.23	7.78	7.29	6.87	6.62	5.99
13	Magnesium	4.23	3.88	4.64	5.43	4.99	5.34
14	Total hardness	145.88	167.62	162.16	170.23	148.09	145.84
15	Turbidity	28.32	29.44	27.16	29.83	30.37	30.76

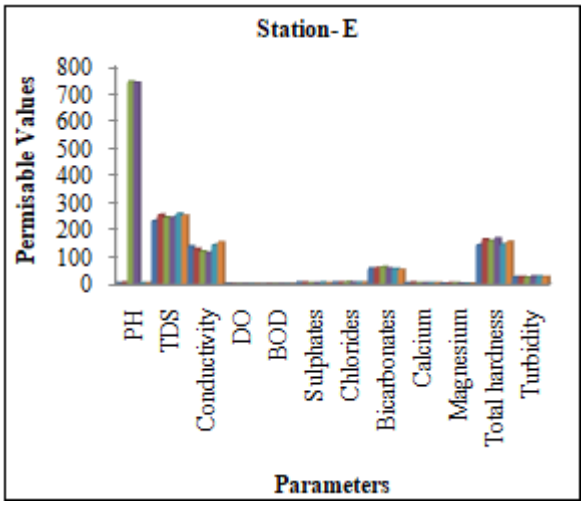
All chemical parameters are per month average and expressed in mg/L.



Station E

Sr. No.	Parameters	Sept-2018	Oct-2018	Nov-2018	Dec-2018	Jan-2019	Feb-2019
1	Air temp. (^{0}C)	28.30	30.60	29.40	27.80	27.20	26.25
2	Water temp.(^{0}C)	26.65	26.85	26.29	26.10	25.2	24.21
3	Colour	Green	Bluish	Blue	Blue	Blue	Blue
4	P^H	7.2	7.85	745	741	7.23	7.32
5	TDS	234	257	247	245	260	254
5	Conductivity	140.56	132.67	123.12	117.11	145.67	156.00
7	DO	3.38	2.41	2.47	2.68	2.45	2.68
8	BOD	1.23	1.58	1.63	2.11	2.19	2.13
9	Sulphates	8.46	8.52	7.41	7.23	7.89	7.22
10	Chlorides	9.12	9.23	9.6	8.21	8.10	7.90
11	Bicarbonates	60.43	62.15	65.32	59.96	58.66	54.83
12	Calcium	7.23	7.78	7.29	6.87	6.62	6.89
13	Magnesium	5.23	6.88	6.64	5.43	4.99	5.00
14	Total hardness	145.88	167.62	162.16	170.23	148.09	156.81
15	Turbidity	28.32	29.44	27.16	29.83	30.37	29.38

All chemical parameters are per month average and expressed in mg/L



2. Results

Water quality is responsible for high survival rate good growth, high production and less disease problems. Physical chemical and biological factors play an important role in development of agricultural production, production of fishes. Therefore maintenance of water quality is very important.

The amount of dissolve oxygen (DO) in water is an important indicator of quality of water. Water fully saturated with air at 1 atmospheric pressure and 20^{0}C temperature contains about 9 ppm of oxygen. Dissolve oxygen is necessary for aquatic and semi aquatic life. The DO level requirement for most of the aquatic organism is around 5ppm.

In recreation the solubility of oxygen in fresh water decreases with increase in temperature. Water is considered to be polluted when the DO concentration drops below the level to sustain normal biodata. In presence of oxygen biodegradable material forms CO_2, HCO_3^-, NO_3^-, SO_4^{--}, and PO_4^{---}. Even some anaerobic bacteria decomposes materials in water and forms CH_4, NH_3, H_2S and other products which decreases oxygen concentration and forms polluted water. DO is observed less in Ujani dam back water. It is polluted water. Sewage and industrial wastes are the main pollutants in this water.

Total dissolved solids (TDS), Chlorides and hardness of Ujani dam water is more. Natural water normally has low contents as compared to bicarbonates (HCO_3^-) and sulphates (SO_4^{--}). High chlorides (Cl^-) are found in Ujani dam back water. High chloride level indicates pollution from domestic sewage, and industrial effluents. Though chloride level as 250 mg/liter is safe for human consumption. A level above this imparts a salty taste to the potable water. Ujani dam back water is not salty water but chloride content is more as compare to other lake waters.

Salinity of water depends upon the chlorinity of the water. High level of chlorides in potable water reduces its palatability. High salinity of water creates a major problem for agricultural productivity.

The alkalinity to natural waters is mainly imparted by three predominant bases; carbonated (CO_3), bicarbonates (HCO_3^-) and hydroxides (OH-).Bicarbonate (HCO_3^-) Value is low in non-polluted while higher in case of polluted water samples. It is higher in Ujani dam back water. Washing activities and detergents have marked influence on alkalinity of water. These activities are more in Ujani dam water. It is alkaline water.

CO_2 alkalinity is very low for fresh water, natural ponds, and lakes. It is due to pollution free water. If industrial effluents are directly added in river water, the alkalinity of such samples will be very high. Water samples with high planktonic biomass and productivity are usually more alkaline in nature. Ujani dam back water is more alkaline in nature. It is not good for domestic and industrial purposes. There is genuine need of control the pollution of Ujani dam back water at all stations.

3. Conclusion

Final conclusion is determined from the average values of Physico-chemical parameters and chemical parameters as P^H, residual chloride, DO, TDS, DO, BOD, Sulphates, Calcium, Magnesium, Total hardness and Turbidity values indicate that Ujani Dam water is not suitable for drinking as well as domestic purposes.

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