PHYSICO-CHEMICAL PROPERTIES OF WATER FROM SONWADHONA LAKE OF TALUKA NER DISTRICT YAVATMAL.

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Abstract

An essential component of environmental monitoring is water quality inspection. Aquatic life as well as nearby ecosystems are impacted by poor water quality. specifics of every factor influencing the environmental water quality. These characteristics may be biological, chemical, or physical. Turbidity and temperature are two physical attributes of water quality. Chemical characteristics include things like dissolved oxygen and pH. Phytoplankton and algae are examples of biological markers of water quality. These factors are related to groundwater and industrial activities in addition to surface water studies of lakes, rivers, and seas. Monitoring water quality aids scientists in forecasting and understanding environmental natural processes as well as how humans affect ecosystems. In addition to helping with restoration projects, these measurements can guarantee that environmental regulations are fulfilled.

Introduction

After being collected, the water samples were promptly sent to the laboratory for investigation of a number of factors. Total Dissolved Solids (TDS), Electrical Conductivity (EC), and pH are the general parameters examined in the water samples that were gathered. Major cations, such as magnesium (Mg2+), calcium (Ca2+), sodium (Na+), and potassium (K+), as well as anions, such as chloride (Cl-), nitrate (NO3-), fluoride (F-), and phosphate (PO4--), were also examined in the samples.The standard procedures outlined in the American Public Health Association's Handbook for the Examination of Water and Wastewater (APHA, 1998) were followed for the collection, preservation, storage, transportation, and analysis of the samples. Standard checks were used to verify the findings of the chemical analysis of water samples. The data interpretation process was then completed in 2023 and 2024.January through December On-site measurements of temperature, EC, and TDS were made. At 10 am, the water was gathered from the surface at a depth of 5–10 cm. The water samples after collection were immediately subjected for the analysis of various parameters in the Laboratory. The general parameters analyzed in the collected samples of water are pH, Electrical Conductivity (EC) and Total Dissolved Solids (TDS). The samples were also analysed for major cations viz. Magnesium (Mg^{2+}), Calcium (Ca^{2+}), Sodium (Na^{+}), Potassium (K^{+}) and anions viz. Chloride (Cl^{-}), Nitrate (NO_3^{-}) and Fluoride (F^{-}), phosphate (PO_4^{--})The sample collection, preservation, storage, transportation and analysis were carried out as per the standard methods given in the manual of American Public Health Association for the Examination of Water and Wastewater (APHA, 1998). The results of the chemical analysis of water samples were checked and validated through standard checks. Subsequently, the interpretation of data was carried out in the year 2023and 2024.(Jan to Dec) Temperature ,EC,TDS were recorded on the spot. The water was collected from surface at a depth of 5-10 cm below the surface at 10 am.

Physico-Chemical Characteristics Of Water

Water's properties are determined by the amounts of different gases and ions that are dissolved in it from the surrounding minerals, rocks, soil layers, and atmosphere. In the end, this determines the ground water quality. The amount of dissolved CO2 gasses and CO32-, HCO3-, OH-, and H+ ions determines whether water is basic or acidic, whereas the presence of ion salts such as Ca2+ and Mg2+ determines whether water is soft or hard. High concentrations of Na+ and Cl- can cause water to become salty. Anthropogenic nitrate ions have the potential to become the main anion in groundwater. The amount of Ca2+, Na+, and HCO3- ions in ground water may be connected to the excess fluoride concentration caused by fluoride-bearing minerals. The chemical parameters' lowest, maximum, and average values were determined from the water samples that were gathered.

Temperature

Numerous physical, chemical, and biological activities that take place in a body of water are directly impacted by the temperature of the water. Numerous physiological functions of aquatic organisms, such as bacterial oxidation of organic materials and growth and reproduction rates, are similarly regulated by temperature. Furthermore, the solubility of some chemical compounds and gases is influenced by the temperature of the water; for the majority of aquatic species, the solubility of dissolved oxygen is particularly crucial. The absence of continuous temperature data to completely describe daily and seasonal changes makes comparisons from the research region challenging, even if temperature standards exist for different water users. For the successful spawning and egg development of a variety of warm-water fishes, the National Technical Advisory Committee (1968) established limits for maximum water temperatures that range from 75°F (23.9°C) to 80°F (26.7°C). The information that is currently available shows that water temperatures react to solar insolation and ambient air temperature in seasonal and diel cycles. Temperature extremes that occur throughout the day are somewhat influenced by stream depth; deeper streams exhibit less variance than shallow streams.

pH

As the negative logarithm of a solution's hydrogen ion concentration, pH is by definition a measure of how acidic or alkaline a liquid is. The ionization constant of water is used to calculate the pH scale, which goes from 0 (very acidic) to 14 (extremely alkaline). The natural pH range of freshwaters ranges from approximately 4.5 for acidic, peaty upland waters to over 10.0 in waters with high levels of algal photosynthetic activity. Nonetheless, the range that is most commonly found is 6.5-8.0. Changes in pH brought on by outside factors can be rather dramatic in waters with low dissolved solids, which therefore have a low buffering capacity (i.e., low internal resistance to pH change). Although pH extremes can impact a water's palatability, the corrosive impact on distribution infrastructure is a more pressing issue.The impact of pH on fish is another crucial factor to take into account. Fish will be more and more affected by values that deviate from the typical range, which will eventually result in death. Although 6.5-8.5 is ideal, the pH range 5.0-9.0 is thought to be appropriate for fisheries. By definition pH is the negative logarithm of the hydrogen ion concentration of a solution and it is thus a measure of whether the liquid is acid or alkaline. The pH scale (derived from the ionisation constant of water) ranges from 0 (very acid) to 14 (very alkaline). The range of natural pH in fresh waters extends from around 4.5, for acid, peaty upland waters, to over 10.0 in waters where there is intense photosynthetic activity by algae. However, the most frequently encountered range is 6.5-8.0. In waters with low dissolved solids, which consequently have a low buffering capacity (i.e. low internal resistance to pH change), changes in pH induced by external causes may be quite dramatic. Extremes of pH can affect the palatability of a water but the corrosive effect on distribution systems is a more urgent problem .The effect of pH on fish is also an important consideration and values which depart increasingly from the normally found levels will have a more and more marked effect on fish, leading ultimately to mortality. The range of pH suitable for fisheries is considered to be 5.0-9.0, though 6.5-8.5 is preferable.

Conductivity

It gauges how well water can conduct electricity. The ion concentration in the water has a direct bearing on this capability. Dissolved salts and inorganic substances like alkalis, chlorides, sulfides, and carbonate compounds are the sources of these conductive ions. Another name for substances that dissolve into ions is electrolytes. The conductivity of water increases with the number of ions present. Similarly, water is less conductive when there are fewer ions present. Because of its extremely low (if not nonexistent) conductivity value, distilled or deionized water may have an insulating effect. In contrast, seawater has a very high conductivity.

TDS

add up all of the ion particles smaller than 2 microns (0.0002 cm) 11. Along with other substances like dissolved organic matter, this comprises all of the disassociated electrolytes that contribute to salinity concentrations. TDS is roughly equal to salinity in "clean" water. TDS can contain organic solutes (such urea and hydrocarbons) in addition to salt ions in wastewater or contaminated areas. Although conductivity is the basis for TDS tests, some states, regions, and agencies frequently set a TDS maximum for water quality rather than a conductivity limit. The maximum amount of total dissolved solids in freshwater is 2000 mg/L, and most sources ought to have far less. Excess total dissolved solids can have harmful consequences on fish and fish eggs, depending on the ionic characteristics. At different phases of their lives, salmonids exposed to greater than normal amounts of $CaSO_4$ had lower rates of reproduction and survival. Salmonids, perch, and pike all displayed decreased hatching and egg survival rates when total dissolved solids levels were higher than 2200–3600 mg/L.

Turbidity

is a method of determining the clarity of water by optical means. The physical appearance of turbid water is affected, appearing murky, foggy, or otherwise colored. Water clarity is decreased by suspended solids and dissolved colored material, which give the water an opaque, muddy, or hazy look. Based on the water's clarity and projected total suspended particles, turbidity measurements are frequently employed as a water quality indicator. The amount of light dispersed by particles in the water column determines the turbidity of the water. The amount of light that is scattered increases with the number of particles.

Thus, there is a relationship between turbidity and total suspended solids. However, the total amount of suspended elements in water cannot be directly measured by turbidity. Rather of giving a precise measurement of solids, turbidity is frequently employed as a measure of relative clarity to show changes in the concentration of total suspended solids in water.Inorganic elements, organic stuff like algae, plankton, and decomposing matter, or suspended sediment like silt or clay can all contribute to turbidity. Along with these suspended solids, additional colors, fluorescent dissolved organic matter (FDOM), and colored dissolved organic matter (CDOM) can also cause turbidity. Another name for CDOM is humic stain. The tea color created by the release of tannins and other chemicals from decomposing plants and leaves underwater is known as humic stain. Bogs, marshes, and other bodies of water with a lot of decomposing plant in the water are frequently where this discolouration occurs. Water that with CDOM may appear red or brown.

Calcium

Among the most prevalent substances found in nature are calcium ions and salts. They may originate from man-made sources like sewage and certain industrial pollutants, or they may be the consequence of soil leaching and other natural sources. Typically, one of the most significant factors influencing hardness is calcium. Calcium is a dietary element that the human body needs between 0.7 and 2.0 grams per day, but too much of it can cause kidney or gallbladder stones. Certain industrial processes may also suffer from high calcium concentrations. Calcium concentrations must therefore be taken into account by both residential and commercial water users. Additionally, calcium is crucial for the wellbeing of aquatic environments. It is known to lessen the toxicity of numerous chemical compounds to fish and other aquatic life in natural water. Magnesium, barium, strontium, and other elements are linked to fresh water's alkaline quality as a result of the rich calcium source being drained from multiple sources. However, data indicate that a high calcium level in the water has no negative health effects. However, it has a significant impact on aquatic creatures' growth and metabolism.

Magnesium

is widely distributed in ores and minerals. It is also very chemically active; therefore it is not found in the elemental state in nature. With the exception of magnesium hydroxide, which has a high pH value, its salts are very soluble. Magnesium ions are of particular importance in water pollution. They may contribute to water hardness. Concentrations of magnesium and calcium in water may also be a factor in the distribution of certain crustaceans, fish and other organisms in streams. Magnesium concentration in the water always remains lower than that of calcium content. Variations in magnesium concentration have been attributed to different biogeochemical activities in the water ecosystem

Sodium

is a highly active metal, it is not found in nature in large quantities. The anion in question has a significant impact on the aquatic toxicity of sodium; sulfate is the least toxic and chromate is the most hazardous. Drinking water with high salt levels can negatively impact

Potassium

Humans require potassium, which is rarely, if ever, present in drinking water at amounts that could be harmful to healthy people. It can be found in all natural waters and other parts of the environment. When potassium permanganate is used as an oxidant in water treatment, it can also happen in drinking water. Potassium ions would interchange with calcium and magnesium ions in certain nations where potassium chloride is used in ion exchange for softening domestic water, either in place of or in combination with sodium chloride. It has been proposed that potassium salts could be used in place of or in part in place of sodium salts while conditioning desalinated water.

BOD

The biochemical oxygen demand (BOD) is a measure of the organic load of a stream in terms of the amount of dissolved oxygen consumed by bacteria during biochemical decomposition. Large values of BOD represent a potential for oxygen depletion to levels below that necessary to support desirable aquatic species. In this study, BOD refers to the amount of oxygen required by bacteria to oxidize the organic material present in the water over a period of 5 days while the sample was maintained at a constant temperature of 20°C. Mean BOD values ranged from about 2 to 4 mg/L. Values greater than 7 mg/L were measured only rarely and were generally associated with overland runoff that flushed organic materials from soil surfaces into the streams.

Alkalinity refers to the capability of water to neutralize acid. This is really an expression of buffering capacity. A buffer is a solution to which an acid can be added without changing the concentration of available H+ ions (without changing the pH) appreciably. It essentially absorbs the excess H+ ions and protects the water body from fluctuations in pH. In most natural water bodies in Kentucky the buffering system is carbonate-bicarbonate (CO2HCO3 CO32-).

Hardness

It is due to the presence of multivalent metal ions which come from minerals dissolved in the water. Hardness is based on the ability of these ions to react with soap to form a precipitate or soap scum. In fresh water the primary ions are calcium and magnesium; however iron and manganese may also contribute. Carbonate hardness is equal to alkalinity but a non-carbonate fraction may include nitrates and chlorides. The most important impact of hardness on fish and other aquatic life appears to be the affect the presence of these ions has on the other more toxic metals such as lead, cadmium, chromium and zinc. Generally, the harder the water, the lower the toxicity of other metals to aquatic life

Nitrate

Nitrogen is one of the most abundant elements. About 80 percent of the air we breath is nitrogen. It is found in the cells of all living things and is a major component of proteins. Inorganic nitrogen may exist in the free state as a gas N_2, or as nitrate NO_3^-, nitrite NO_2^- or ammonia NH_3. Organic nitrogen is found in proteins, and is continually recycled by plants and animals. Nitrogen-containing compounds act as nutrients in streams, rivers, and reservoirs. The major routes of entry of nitrogen into bodies of water are municipal and industrial wastewater, septic tanks, feed lot discharges, animal wastes (including birds and fish), runoff from fertilized agricultural field and lawns and discharges from car exhausts. Bacteria in water quickly convert nitrites [NO_2^- to nitrates [NO_3^-] and this process uses up oxygen. Excessive concentrations of nitrites can produce a serious condition in fish called "brown blood disease." Nitrites also can react directly with hemoglobin in the blood of humans and other warm-blooded animals to produce methemoglobin. Methemoglobin destroys the ability of red blood cells to transport oxygen. This condition is especially serious in babies under three months of age.

Chlorides

These results from the combination of the gas chlorine with a metal. Some common chlorides include sodium chloride (NaCl) and magnesium chloride ($MgCl_2$). Chlorine alone as Cl_2 is highly toxic and it is often used as a disinfectant. In combination with a metal such as sodium it becomes essential for life. Small amounts of chlorides are required for normal cell functions in plant and animal life. Chlorides are not usually harmful to people; however, the sodium part of table salt has been linked to heart and kidney disease. Sodium chloride may impart a salty taste at 250 mg/L; however, calcium or magnesium chloride are not usually detected by taste until levels of 1000 mg/L are reached.Chlorides may get into surface water from several sources including: rocks containing chlorides; agricultural runoff; wastewater from industries; oil well wastes; effluent wastewater from wastewater treatment plants, and; road salting. Chlorides can corrode metals and affect the taste of food products. Therefore, water that is used in industry or processed for any use has a recommended maximum chloride level. Chlorides can contaminate fresh water streams and lakes. Fish and aquatic communities cannot survive in high levels of chlorides. High value of chloride and calcium in drinking water are generally not harmful to human being but high concentration of chloride may affects a person who already suffers from diseases of heart and kidney. Chlorides content were ranged between 125.20 mg/L. to 350.00 mg/L pre monsoon 2012 and post monsoon 2012

The higher values of chlorides were recorded in post monsoon 2012 350.00 mg/L

Similar result was reported by Rajshekhar et al., (2007) from Nadergul reservoir. The rise in chloride in summer may be due to the rise in temperature and evaporate transpiration, which could be explained by the fact that the presence of chloride salts may interfere with other nutrients, which are being utilized in the process of photosynthesis. Similar observations were recorded by number of workers Mishra and Yadav (1978); Patil (1993); Chandrasekhar and Kodarkar (1995); Kulkarni et al., (1995). The high values of chloride might be due to low water levels during summer (Gonzalves and Joshi, 1946).

Fluoride

Fluorides are compounds containing the element fluorine. Some of the most common of these compounds include the following: sodium fluoride (NaF), sodium silicofluoride (Na2SiF6), and calcium fluoride (CaF2). Fluorine is the most reactive nonmetallic element. It will form compounds with all elements except helium, neon and argon. It will also form salts by combining with metals. Fluoride ions maybe present either naturally or artificially in drinking water and are absorbed to some degree in the bone structure of the body and tooth enamel. Fluoride at extremely high levels can cause mottling (discoloration) of the teeth. Some fluoride compounds may also cause corrosion of piping and other water treatment equipment.

Natural fluorides occur in rocks in some areas. Another source of fluorides in streams and reservoirs is releases from sewage treatment plants, since most public water supplies add fluoride to drinking water to reduce dental decay. In the present study the values obtained are min 0.63 mg/L post monsoon 2012 max 1.35 pre monsoon 2012 . similar results were reported by Reddy S.B. and Parmeshwar K.S (2016).

Iron

Iron is the fourth most abundant element, by weight, in the earth's crust. Natural waters contain variable amounts of iron depending on the geological area and other chemical components of the waterway. Iron in groundwater is normally present in the ferrous or bivalent form [Fe++] which is soluble. It is easily oxidized to ferric iron [Fe+++] or insoluble iron upon exposure to air. This precipitate is orange-colored and often turns streams orange. Iron is a trace element required by both plants and animals. It is a vital part of the oxygen transport mechanism in the blood (hemoglobin) of all vertebrate and some invertebrate animals. Ferrous Fe^{++} and ferric Fe^{+++} ions are the primary forms of concern in the aquatic environment. Other forms may be in either organic or inorganic wastewater streams. The ferrous form Fe++ can persist in water void of dissolved oxygen and usually originates from groundwater or mines that are pumped or drained. Iron in domestic water supply systems stains laundry and porcelain. It appears to be more of a nuisance than a potential health hazard. Taste thresholds of iron in water are 0.1 mg/L for ferrous iron and 0.2 mg/L ferric iron, giving a bitter or an astringent taste. Water to be used in industrial processes should contain less than 0.2 mg/L iron. Black or brown swamp waters may contain iron concentrations of several mg/L in the presence or absence of dissolved oxygen, but this iron form has little effect on aquatic life.

Lead

The primary natural source of lead is in the mineral galena (lead sulfide). It also occurs as carbonate, as sulfate and in several other forms. The solubility of these minerals and also of lead oxides and other inorganic salts is low. Major modern day uses of lead are for batteries, pigments, and other metal products. In the past lead was used as an additive in gasoline and became dispersed throughout the environment in the air, soils, and waters as a result of automobile exhaust emissions. For years this was the primary source of lead in the environment. However, since the replacement of leaded gasoline with unleaded gasoline in the mid-1980's, lead from that source has virtually disappeared. Mining, smelting and other industrial emissions and combustion sources and solid waste incinerators are now the primary sources of lead. Another source of lead is paint chips and dust from buildings built before 1978 and from bridges and other metal structures. Lead is not an essential element. In humans it can affect the kidneys, the blood and most importantly the nervous system and brain. Even low levels in the blood have been associated with high blood pressure and reproductive effects. It is stored in the bones. Lead reaches water bodies either through urban runoff or discharges such as sewage treatment plants and industrial plants. It also my be transferred from the air to surface water through precipitation (rain or snow). Toxic to both plant and animal life, lead's toxicity depends on its solubility and this, in turn, depends on pH and is affected by hardness.

Mercury

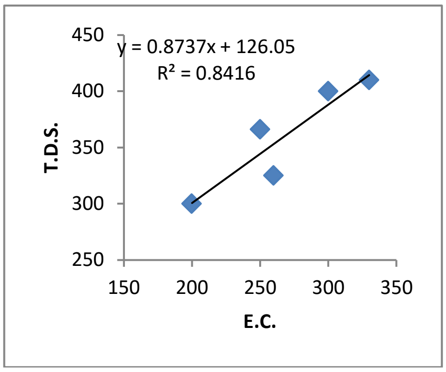
Water Levels of mercury in rainwater are in the range 5–100 ng/litre, but mean levels as low as 1 ng/litre have been reported (IPCS, 1990). Naturally occurring levels of mercury in groundwater and surface water are less than 0.5 µg/litre, although local mineral deposits may produce higher levels in groundwater.

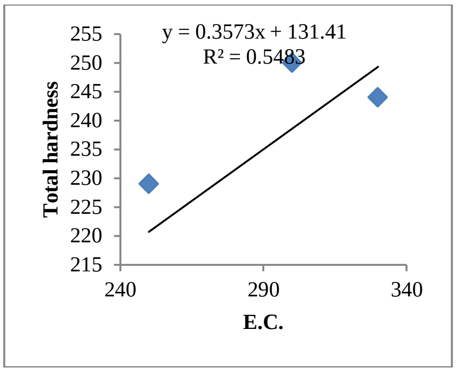
S.N.	Parameter	Site 1	Site 2	Site 3	Site 4	Site 5
1	Temp (^oC)	30.0	29.5	28.9	30.1	30
2	pH	7	7.5	7.9	6.9	7.1
3	E.C. (µs/cm)	200	260	250	300	330
4	T.D.S.(mg/L)	300	325	366	400	410
5	Alkalinity(mg/L)	190	177	180	179	200
6	Total hardness(as $CaCO_3$)(mg/L)	200	210	229	250	244
7	Calcium(as Ca)(mg/L)	75	85	98	79	99
8	Magnesium (as Mg)(mg/L)	30	33	39	37	41
9	Sodium (as Na) (mg/L)	5.22	5.11	6.45	6.99	5.99
10	Pottasium (as K)(mg/L)	0.66	0.59	0.77	0.65	0.59

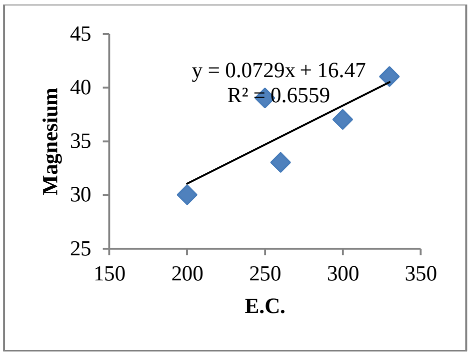
11	Iron (as Fe) (mg/L)	0.76	0.69	0.71	0.77	0.79
12	chloride (as Cl)(mg/L)	250	244	300	287	299
13	Nitrate (as NO_3) (mg/L)	45	52	59	51	56
14	Phosphate (as PO4) (mg/L)	0.05	0.02	0.06	0.06	0.04
15	Fluoride (as F) (mg/L)	1.01	0.91	0.79	0.66	0.59
16	Turbidity (NTU)	1.99	1.07	2.04	2.09	2.99
17	Lead (as Pb) (mg/L)	0.021	0.012	0.02	0.019	0.009
18	Mercury (as Hg) (mg/L)	0.0008	0.0007	0.0006	0.0007	0.0006
19	BOD (mg/L)	7.31	5.7	6.73	7.42	6.53
20	COD (mg/L)	344	378	261	299	310

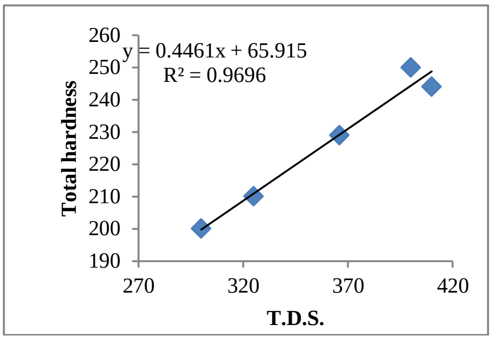
	Temp (oC)	pH	E.C. (µs/cm)	T.D.S.(mg /L)	Alkalinity(mg/L)	Total hardness(as CaCO3)(mg/L)	Calcium(as Ca)(mg/L)	Magnesium (as Mg)(mg/L)	Sodium (as Na) (mg/L)	Pottasium (as K)(mg/L)
Temp (oC	1.000									
pH	0.288	1.000								
E.C. (µs/c	0.917	0.214	1.000							
T.D.S.(mg/	0.924	-0.087	0.894	1.000						
Alkalinity(	0.960	0.143	0.983	0.957	1.000					
Total hardr	0.858	0.517	0.941	0.715	0.886	1.000				
Calcium(as	0.534	0.000	0.820	0.598	0.727	0.768	1.000			
Magnesiu	0.814	0.091	0.962	0.859	0.936	0.872	0.856	1.000		
Sodium (as	0.855	0.300	0.652	0.776	0.747	0.592	0.117	0.592	1.000	
Pottasium	0.199	-0.635	0.409	0.519	0.423	0.150	0.539	0.611	0.154	1.000
Iron (as Fe	0.877	-0.126	0.914	0.961	0.947	0.745	0.740	0.863	0.594	0.499
chloride (a	0.710	0.074	0.438	0.636	0.552	0.352	0.012	0.226	0.622	-0.213
Nitrate (as	0.715	0.018	0.583	0.766	0.684	0.440	0.141	0.625	0.922	0.476
Phosphate	0.854	0.106	0.896	0.830	0.890	0.825	0.765	0.776	0.467	0.210
Fluoride (a	0.837	-0.038	0.601	0.844	0.730	0.443	0.127	0.472	0.830	0.133
Turbidity (	0.865	-0.053	0.927	0.917	0.937	0.792	0.795	0.858	0.524	0.426
Lead (as P	-0.246	0.520	-0.253	-0.397	-0.294	-0.067	-0.341	-0.141	0.117	-0.147
Mercury (a	0.428	0.000	0.741	0.522	0.646	0.688	0.915	0.868	0.167	0.698
BOD (mg/	0.050	0.131	0.407	0.041	0.245	0.489	0.820	0.446	-0.392	0.211
COD (mg/	0.794	0.447	0.930	0.700	0.867	0.969	0.802	0.928	0.578	0.324

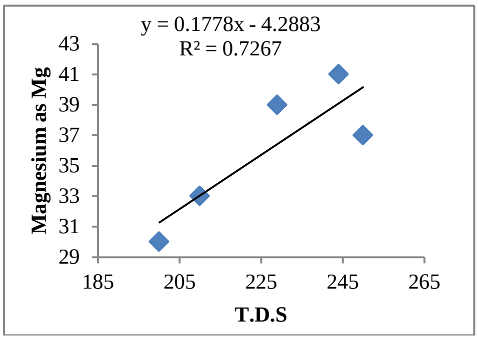
	Iron (as Fe) (mg/L)	chloride (as Cl)(mg/L)	Nitrate (as NO3) (mg/L)	Phosphate (as PO4) (mg/L)	Fluoride (as F) (mg/L)	Turbidity (NTU)	Lead (as Pb) (mg/L)	Mercury (as Hg) (mg/L)	BOD (mg/L)	COD (mg/L)
Temp (oC)										
pH										
E.C. (µs/cm)										
T.D.S.(mg/L)										
Alkalinity(mg/L)										
Total hardness(as CaCO3)(mg/L)										
Calcium(as Ca)(mg/L)										
Magnesium (as Mg)(mg/L)										
Sodium (as Na) (mg/L)										
Pottasium (as K)(mg/L)										
Iron (as Fe) (mg/L)	1.000									
chloride (as Cl)(mg/L)	0.613	1.000								
Nitrate (as NO3) (mg/L)	0.561	0.391	1.000							
Phosphate (as PO4) (mg/L)	0.931	0.649	0.314	1.000						
Fluoride (as F) (mg/L)	0.753	0.913	0.718	0.657	1.000					
Turbidity (NTU)	0.989	0.595	0.457	0.971	0.693	1.000				
Lead (as Pb) (mg/L)	-0.570	-0.570	0.178	-0.612	-0.431	-0.593	1.000			
Mercury (as Hg) (mg/L)	0.586	-0.700	0.300	0.516	-0.014	0.608	0.000	1.000		
BOD (mg/L)	0.257	-0.363	-0.400	0.416	-0.405	0.367	-0.180	0.730	1.000	
COD (mg/L)	0.704	0.167	0.512	0.722	0.341	0.735	0.071	0.814	0.516	1.000

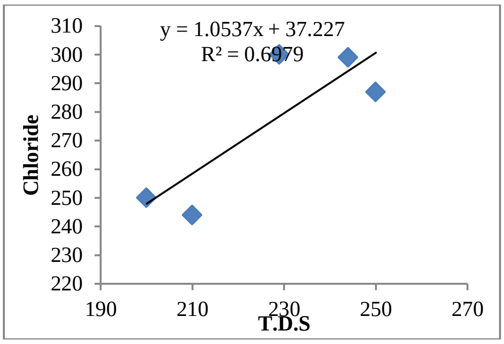












Conclusion

The major conclusions derived from the hydro-geochemical studies, water quality trends and water quality prediction modelling of Jamwadi Dam is fresh to brackish and alkaline in nature, which is good for drinking and agricultural purpose. The major cations (Ca, Na, Mg and K) and major anions (Cl, HCO3, SO4 and CO3) of the study area are well within the permissible limits for the entire area. In major places, total hardness is generally within the limits in the groundwater, which makes the groundwater of the study area suitable for drinking. The concentration of Fluoride is within the permissible limits for drinking in the entire basin during the study period.

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