A review on water Quality Parameter

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Abstract

Water is an essential element that helps the earth flourishes. Every living being depends on water to sustain. About 75% of the earth is covered by water out of which only 2.5% is fresh water. Recently due to industrialization, the quality of water is decreasing as the time passes. The present study focuses on determination of physical, chemical and biological parameters, such as temperature, pH, EC, hardness, chlorides, alkalinity, DO, BOD5, COD, phosphate and sulphate of water samples from different sampling points.

Key words: Alkalinity, Dissolved Oxygen (D.O.), Eutrophication, Biochemical Oxygen Demand (BOD), Water Quality Index (WQI)

Introduction

The key sources of water available to people in general are ground water, surface water (rivers, streams, and ponds), ambient water (rain, snow, and hail), and springs. The quality of these bodies of water varies greatly depending on their location and surrounding factors. Precipitation infiltrates the earth and moves into the soil and pore spaces of rocks to become the primary source of ground water. Water infiltrating from lakes and streams, recharge ponds, and waste-water treatment systems are among the other outlets. The burden on both land and groundwater increased dramatically as the population grew dramatically. Because of the aquifer's filtering effect, it is thought that groundwater was the most trusted source of drinking water at the dawn of human civilization. However, in today's world, drinking water straight from the source without treatment is a difficult task. If the water has been polluted, it is impossible to recover its consistency by removing the pollutant from the source. As a result, it is important to track water quality on a regular basis and devise ways to protect it.

For public health research, groundwater analysis for physical and chemical properties can be important. These studies can also be an important part of environmental pollution research. The dissolved solids in groundwater have physical characteristics such as odor, taste, and temperature. The physical climate, the source, and the flow of water all influence the natural quality of groundwater. Various chemical, physical, and biological processes affect the consistency of water as it passes through the hydrological cycle due to reactions with soil, rock, and organic matter. Changes in groundwater quality are

caused by natural processes and human activity, either directly or indirectly. According to the World Health Organization, water is responsible for about 80% of all human diseases.

Literature Review

Standard papers, reference books, and conference proceedings were used to conduct the comprehensive literature review. The main research conducted by various researchers is outlined below.

C. Sharma, R. Jindal, Uday Bhan Singh, A. S. Ahluwalia et al [1] looked at fifteen physicochemical parameters to get a sense of how portable water is for irrigation and drinking based on WHO, ICMR, and ISI guidelines. COD and BOD have a significant positive relationship with chloride, total hardness, nitrate, and phosphate, and a significant negative relationship with DO and water current. The mean water quality index (WQI) values at sites S1–S4 were 20.79, 160.37, 36.31, and 104.70, respectively, indicating that S2 and S4 had extremely high pollution loads. WQI values at various groundwater sites (10.67 at G1, 8.93 at G2, 89.35 at G3, 62.15 at G4, 23.55 at G5, 21.95 at G6, 59.48 at G7, and 39.92. A total of 15 physicochemical variables were analyzed from four different sampling stations (S1–S4) of the river Sutlej. Water temperature varied from 12.05 C (at S1 during January) to 27.24 C (at S4 during June) This is typical for the rivers in Punjab region of India experiencing longer day length, low water level, and greater solar radiation during dry summer climatic conditions. High annual mean values of temperature were observed at S2 and S4 compared to S1 and S3. Decline in DO at stations S2 (2.80–4.45 mg L-1 in 2009–10) and S4 (4.03–6.31 mg L, 2010–11) was found to be associated with industrial effluent and domestic sewage. comparatively high DO at. stations S1 (7.04–10.81 mg L/L-1 and 7.81–11.84 mg L+1 in 2010-11) may be related to low organic load. The DO value at stations. S1 and S3 is within the WHO acceptable limit of 4–10 mg L. Unpolluted natural water has a BOD5 value of\5 (WHO 2011). Maximum values of COD were observed during summer (438.53 at S2). This may be due to low water level and increased microbial activity, decomposing dead organic matter at high temperature. High rate of water current was observed at S1, which could be attributed to volume of water, gradient of river basin and lack of vegetation in water. Turbidity was higher during the monsoon period (July–August) due to allochthonous matter such as clay, silt, and sand.

From September onwards, decrease in turbulence and turbidity was noticed, till lower turbidity values were recorded during January–February. From March onwards, an increase in turbidity could be attributed to increase in dissolved salts due to relatively low water level. TDS values (mg L-1) were ranged from 141.26 to 565.11, and maximum value of TDS was observed in summer. The river water is found mildly acidic to alkaline in nature with pH ranging from 6.8 to 8.2. Low values of pH were recorded at S2 and S4,

due to the addition of industrial waste via Budha Nallah and East Bein. At all the sites, pH showed a significant inverse correlation with water temperature and free CO2 at 5% level. Annual mean values of total alkalinity (mg L-1) showed an increasing trend from station S1 to S2.

P. M. Puri, J. Puri K. N. Yenkie, et al. [3] calculated the water quality index (WQI) for various surface water supplies, especially lakes, in Nagpur, Maharashtra (India), for the period January to December 2008, which included three seasons: summer, winter, and rainy season. The value of the sampling points was taken into consideration. The water quality index was determined using the National Sanitation Foundation (NSF) information system's water quality index calculator. The measured (WQI) for various studied lakes showed fair water quality during the monsoon season, medium during the winter, and bad during the summer. With the exception of the monsoon season, Gorewada Lake had a medium water quality ranking throughout the yearThe aesthetic quality of Futala, Ambazari, and Gandhisagar lakes has also deteriorated over the last decade due to the invasion of aquatic weeds such as hydrilla and water primrose, so the reasons for water quality change and the steps to be taken in terms of surface water (lakes) quality management are required.

The water quality index, as analysed by B. N. Tandel, Dr. J. Macwan, and C. K. Soni [3], is a single number that expresses the quality of water by combining the water quality variables. Its aim is to provide a clear and succinct way of communicating water quality for various applications. The current study looks at the seasonal variation of water quality indexes in a few strategically chosen surface water bodies. The index helps people understand general water quality problems, communicates water quality status, and shows how preventive practises are needed and efficient. Throughout the study duration, the shift in WQI value follows a similar pattern in all situations. During both seasons, the lake water is found to be of good quality (WQI - 67.7 to 78.5). However, owing to an increase in microbial activity as well as an increase in contaminants accumulation due to water evaporation, the water content of the lake deteriorates slightly from winter to summer.

According to Dr. M. K. Mahesh, B. R. Sushmitha, and H. R. Uma [4], a water quality index (WQI) established by the Canadian Council of Ministers of the Environment (CCME) was extended to Hebbal Lake in Mysore, Karnataka State, India, to research its effect on aquatic life and livestock, as well as to determine if it is appropriate for recreation, irrigation, and drinking. The lake's index is low in terms of drinking, tourism, and animals, marginal in terms of aquatic activity, and outstanding in terms of irrigation. Overall, the water quality is considered bad. The water quality is almost always endangered or deteriorated and the conditions often deviate from natural levels. Anabaena and Microcystis aeruginosa form blooms, Phacus pleuronectes is also recorded

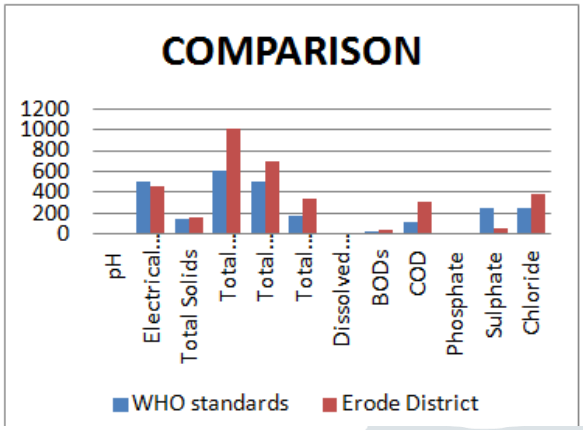
and the lake water is unsuitable to protect aquatic life. Incidence of Fish kill occurred in 2011 due to contamination of water.

The aim of this research, conducted by M. S. Islam, B. S. Ismail, and colleagues [5], was to determine the hydrological properties and water quality characteristics of Chini Lake in Pahang, Malaysia. For stream flow estimation, seven sampling stations were built at Chini Lake's major Feeder Rivers. . For water sampling, a total of ten monitoring stations were chosen across the study region. Stream flow into Chini Lake from the seven Feeder Rivers was comparatively sluggish, varying from 0.001 to 1.31 m/s 3. pH, TSS, turbidity, DO, ammoniacal nitrogen, phosphate, and conductivity were the most affected parameters both temporally and spatially. The water was rated as class II by the Malaysian Water Quality Index (WQI), indicating that it is ideal for aquatic activities and safe for body touch. Human interaction with the water was deemed secure.

In this review paper we have all the required different type of data regarding water quality and its parameter and through this the authors (Arivoli Appavu, Sathiamoorthi, Satheesh kumar Muthukannan, Joseph Sahayarayan jesudoss and Boomi Pandi) [6], trying to take our attention onto the serious matter of water quality and how it differ from the normal quality in comparison and how the domestic/anthropogenic use affect the river, the effect of chemical usage by the small industries and wastes thrown in the river the results are as follows; the average pH value was analyzed as 7.86, Electrical Conductivity was 920 μS/cm-1, parameters like Total Solids 1580 mg/l, Total Dissolved Solids 1004 mg/l, Total Suspended Solids was 690 mg/l, total hardness was 340 mg/l, chloride was 380 mg/l, dissolved oxygen was 5.59 mg/l, BODs was 38 mg/l, COD was 304 mg/l, phosphate was 6.0 mg/l and sulphate was 60 mg/l of the river water sample.

If I were to simplify and try to tell how serious it is, let hear it by an example as per the upper readings the average pH is 7.86 and it's leaning towards pH 8, we generally take 7 as ideal pH value of water it does not seem much of a difference now but average is not the correct way to describe the situation average can be in other words that there may be some area which have worse pH value more like 8 or 8.3, 8.4, 8.7 or worse, and similarly in some area the water pH value is 7 or 7.2,7.3,7.4 which is not bad but this shows that other areas are heavily impacted and using pH value of very high grade which leads to various disease and infections specially in new born and older generation have severe effect and this is a troublesome situation. In other words the situation is far worse than it seems on the upper side and the reason I picked this research paper to review is because it is not only the situation of Erode district, this is the situation of major part of our country many district, villages, colonies are affected by this. The quality of water we use for drinking and other domestic purpose is not very good to say the least.

Now we compare to the ideal standards as set by WHO or Indian Standards and see what drastic difference in those readings through table as follow:



	WHO standards	Erode District
pH	7	7.86
Electrical Conductivity	500	460
Total Solids	150	158
Total Dissolved Solids	600	1004
Total Suspended Solids	500	690
Total Hardness	180	340
Dissolved Oxygen	6.8	5.59
BODs	30	38
COD	120	304
Phosphate	0.05	6
Sulphate	250	60
Chloride	250	380

The INDIA WRIS [06] research and analysis based on various criteria relating to surface and ground water quality in areas near rivers such as the Sutlej. The study primarily focused on the hydrochemistry of water quality in Punjab, with the aim of evaluating the suitability of surface and ground water for drinking and agriculture. Groundwater samples were taken from ten Punjabi stations. pH, EC, TDS, sodium, potassium, calcium, magnesium, chloride, sulphate, carbonate, bicarbonate, nitrate, and fluoride are examples of physico-chemical parametersWhen comparing chemical constituent concentrations to WHO (World Health Organization) drinking water guidelines from 1983, it is clear that groundwater is safe to drink. pH, sodium, potassium, carbonate, bicarbonate, and chloride are all below WHO allowable limits, but calcium, magnesium, and nitrate levels are above the maximum. The measured SAR, RSC, and percentage sodium values mean that the irrigation water is of decent to outstanding quality. The water quality for irrigation was evaluated using the US Salinity Map, which indicates that the majority of the groundwater samples were suitable for irrigation.

Assessment of Water Quality

When more factories are set up around water sources in today's country, more water bodies have been harmed. Industry discharge pollutes surface water, rendering it unfit for human use without filtration. Large amounts of waste water and sewage pumped into water sources as a result of increased industrial development in urban areas have greatly led to the pollution of surface and ground water. For the assessment of pollution of water and its status of the water bodies following water quality parameters were analyzed : (1) pH (2) TDS (3) Turbidity (4) temperature (5) Hardness.

Measurement of pH :

pH stands for acidic and essential, and it is used to determine the content of water. Whereas pH is a significant parameter of water that defines the suitability of water for different uses and purposes, it also plays an important role in everyday life. The pH varies from 0 to 14, with the BIS specifying a desirable limit of 6.5-8.5. Neutral meant to be the wholesome water whichg ranges equal to 7.0. Water below 7.0 is considerable as acidic and greater than 7.0 is basic and alkaline.

Measurement of TDS :

Total Dissolved Solids in water bodies can also be because of natural sources such as sewage and industrial waste. According to BIS and ICMR the total desirable limit of TDS varies as 500 mg/l , if the desirable limit is greater than 500 mg/l then it may cause gastro intestinal irritation. Higher presence of TDS affects the taste of water.

Measurement of Turbidity:

In relation to the intensity of light flowing through the sample, the nephelometer instrument measures the intensity of scattered light by turbid particles at right angles to the incident beam of light. The Tyndall effect, which is exhibited by colloidal suspended particles, causes light scattering. Centered on this idea, a nephelometer is used to calculate the turbidity of samples. The maximum Permissible level is 5 NTU.

Measurement of Temperature:

The variation of temperature is recorded by digital thermometer which immersed in sample and temperature is recorded.

Measurement of Hardness :

Total hardness value ranges for drinking water is to be within 300 mg/l of CaCO3. Higher concentration of hardness due to entrance of foreign pollutants from industries and sewage.

Concluding Remarks:

(1). The quality of water is totally dependent on the kind of pollutants added and the nature of the self purification of water. As in today world more water bodies got ill affects by industries that are setup nearby to the water bodies. The discharge from the industries cause pollution in surface water which could not be drinkable without filtration.

(2). Same as quality of water assessment shows that the most of the parameters are slightly higher as by the entrance of foreign particles.

(3). Total hardness in water observed some proofs and evidence that denotes or shows its role in heart diseases and hardness which varies 150-300 mg/l and above may cause kidney stones formation and kidney failure. As hard water is also not suitable for any purposes as it cause skin diseases which leads to skin cancer.

(4). According to BIS and ICMR the desirable limit of TDS is 500 mg/l. If TDS value is more than 500 mg/l, it may cause gastro intestinal irritation. High TDS presence in the water decreases the quality of water and affects the taste of water.

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