Seasonal Physico-Chemical Study of Misir Pond Water in Birkona, Bilaspur Chhattisgarh

1. Sandeep Kumar Tandon, 2. Dr. Renu Nayar
    1.Department of Chemistry, Govt. Pt Madhav Rao Sapre College Pendra Road,
    2. Department of Chemistry, D.P. Vipra College Bilaspur

Abstract:-Life on the earth is never possible without water. Water is one of the essential constituents of the environments. This study was designed to assess the quality of Misir pond's water in Birkona panchayath village, Bilaspur District in Chhattisgarh state has been evaluated on a seasonal basis from May 2019 to January 2020. The water Samples were analysed, for various physico-chemical characteristics like Transparency, Temperature, pH, TDS, Conductivity etc. The following ranges were obtained for the parameter assessed such as Transparency(15-27cm), pH(7.9-8.5), Temperature (24-28C) , TDS(176-266), Electrical conductivity(259-573µs/cm) .The experimental values of various physico-chemical parameters of water samples results were largely within the WHO and ICMR standards limits.

Introduction :

Life on the earth is never possible without water. Water is one of the most essential constituents of the environments. Less than 1% water is present in ponds, lakes, rivers, dams, etc., which is used by man for industrial, domestic and agricultural purposes. Ponds are useful in many ways and it is one of the methods of artificial infiltration of underground water. Water quality in an aquatic ecosystem is determined by many physical, chemical and biological factors (Nayar R. et. al 2019) [1]. The term water quality was developed to give an indication of how suitable the water is for human consumption [2].

Most of the population of Birkona resides in villages and their main occupations are agriculture and animal husbandry. Ponds are the source of fresh water for villagers and they mainly depend upon pond water for drinking and bathing of their livestock's, production of fisheries, irrigation etc [3]. At present the water quality of village ponds is declining at alarming pace due to encroachment by villagers, dumping of domestic waste, loading of the periphery by cow dung cakes, consequences of infilling, land drainage, changes in their many traditional uses and dumping of industrial waste in urban areas [4]. There is also a lack of legal and institutional framework for small water bodies,

therefore, they are ignored in comparison to large water bodies (i.e. lakes, rivers). All these factors are responsible for degradation of village ponds. The temporary ponds are most affected as they are inconspicuous and poorly known due to their temporary nature and small size and have been frequently destroyed by anthropogenic activities [5]. Due to use of contaminated water the human and livestock's population are continuously exposed to variety of water borne diseases. Need of the hour is to give particular emphasis on conservation and management of village ponds as an important national/international issue which should be given equal or higher importance as national development or economic development of any country[6]. Therefore, the present study was planned to assess the status and quality of pond water of Misir pond birkona Bilaspur Chhattisgarh .

Review of literature

Water is very important part of human life. Surface and Ground water is being used in rural area, mostly open well and tube well. Surface water is very good and fresh as drinking water. But the important drinking water quality parameters characteristics like temperature, transparency,pH, TDS, are reviewed and arranged in the subsequent paragraphs.

Chakrabarty and Sarma (2011) analysed drinking water quality with respect to parameters like Temperature, pH, Electrical conductivity, Total Solid (TS), Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Turbidity, Dissolved Oxygen (DO), Total Hardness (TH), Calcium Hardness (CH), Magnesium Hardness (MH), Chloride (Cl), Sulphate (SO4), Sodium (Na) and Potassium(K) in Kamrup district of Assam, India. Fortysix different sampling stations were selected for the study. Statistical analysis of the data was presented to determine the distribution pattern, localization of data and other related information. Statistical observations implied non-uniform distribution of the studied parameters with a long asymmetric tail either on the right or left side of the median. Descriptive statistics in the form of mean, variance (V), standard deviation (SD), standard error (SE), median, range of variation, and percentile at 95%, 75% and 25% (P95%, P75%, P25%) were calculated and summarized.

Similarly Ugwn, et.al. (2012) have 14 analysed the impact of growing population in the city of Abuja in Nigeria by studying the seasonal physico chemical characteristic of the usma river. The study revealed that all parameters measured were within the permissible level except total suspended solid which exceeded for all seasons.

Sreeja et.al. (2012) 13 assessed the physico-chemical parameters of the kodayar river, Tamilnadu. At seven sampling stations from June 2010-June 2011.Various parameters both physical and physico-chemical parameters such as

temperature, EC, TDS were evaluated the data obtained from the sample analysis was compared with the limits prescribed by various agencies such as WHO & ISI.

Venkatesharaju K., et.al. (2010). Study of seasonal and special variation in surface water quality of Cauvery river stretch in Karnataka. Thus the present study was concluded that river water of the study area was not polluted in respect to physico- chemical assessment. But bacteriological studies attributed river water was not fit for drinking purposes due to higher coliforms counts, which require continuous monitoring and treatment process if the water is to be used for drinking purposes. Some steps and awareness programs must need to educate local villagers to safeguard the Precious River and its surrounding.

Materials and Method

Study period:

Water samples were analysed from to time morning 8.00 a.m.to 10 a.m. on and from May 2019 to January 2020.

Analysis of the sample:

Water samples were analysed by digital parameter on the study site .Pond sample also analysed in four different direction [North, West ,East South]

Seasonally samples were collected to analyse Physico Chemical parameters of the selected pond. at the site, Transparency was Measured by Secchi Disk, Thermometer and a digital pH meter were used to record the Temperature and the pH of the pond water respectively. Conductance of water was determined using by digital conductivity meter and TDS was measured by Digital TDS Meter.

Physico-chemical parameters of these samples were determined by

using standard procedures

Table:1- Standard Method of Physico-Chemical Parameter

S.No.	Parameter	Method
1	Temperature	Measured with a mercury the Thermometer
2	Transparency	Measured by Secchi Disk
3	pH	Measured by Digital pH Meter
4	TDS	Measured by Digital TDS Meter
5	Conductivity	Measured by Digital Conductivity meter

Temperature

The water temperature was recorded with the help of standard mercury thermometer (graduated) with a precision of ± 0.1°C). The measurement was simply carried out by dipping the thermometer bulb directly upto water surface and the reading was taken down.

Transparency

The transparency of water was measured in the field by immersing a Secchi Disc of 20 cm diameter in water and observing it visuality. The mean of "Just disappearance and reappearance" of the disc under the water was calculated with the help of equation given below.

Secchi Disc light penetration = A+B / 2

Where,

A = Depth of which Disc disappeared

B = Depth of which Secchi Disc reappeared

The extinction co-efficient was calculated by using the following formula

K = 1.7 D

Where,

K = Extinction co-efficient

D = Secchi-Disc reading and

1.7 = constant factor

Hydrogen ion concentration (PH)

Hydrogen ion concentration (PH) of water determines the acidity, alkalinity and neutrality of water. The PH of water sample was determined by using an digital PH meter.

Total Dissolve solid (TDS)

Total Dissolve solid was measurerd by digital TDS meter.

Conductivity

The conductivity is determined by using digital conductivity meter.

Results and Discussion: -Table: 2

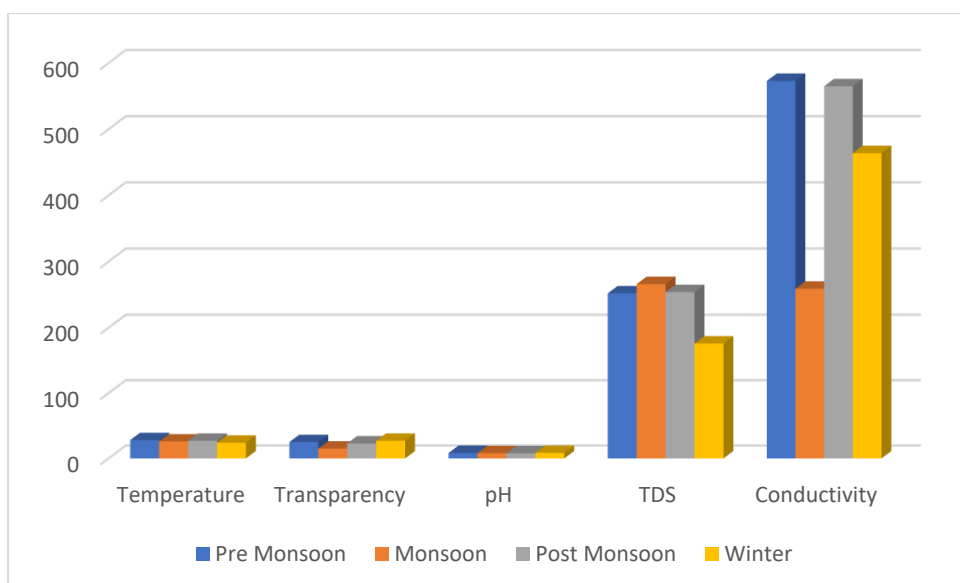| Parameter	Pre Monsoon	Monsoon	Post Monsoon	Winter
Temperature	28	26	27	24
Transparency	25	15	23	27
pH	8.4	8.1	7.9	8.5
TDS	252	266	254	176
Conductivity	573	259	565	464

Figure 1: seassonal Variation in Physico-Chemical parameters of water samples from in of Misir pond during month May 2019-Jan2020

Temperature in the water is important for its effects on the chemistry and biochemical reactions in the organisms. Based on the results it was noted that the temperature fluctuated in between 24°C to 28°C. The lowest value (24°C) was found in site S-W and the highest temperature value (28°C) at site S-N. Water and waste waters are of course subject to the effects of ambient temperature and can be very warm during summer.

Transparency is the measure of suspended minerals, bacteria, plankton and dissolved organic and inorganic substances. It is often associated with surface water sources. In most waters, turbidity is due to Colloidal and extremal fine dispersions. The values varied between 15 cm to 27 cm except for S-N the results showed the transparency of North direction is very turbid and 15 cm recorded in month of May.as maximum suspended particles are present in North direction.

pH is a measure of free hydrogen ion and hydroxyl ions in the water. pH is an important indicator of water that is changing chemically. For drinking water, a pH range of 7.9-8.2 is recommended. He maximum value of pH was recorded as 8.2 at station S-N which is higher than the permissible limits of WHO and showing basic nature of water in north direction of Misir pond and the minimum value of pH was recorded as 7.9 at station S-E.

The Total Dissolved Solids fluctuate from 176 mg/l to 266 mg/l. the maximum value (266 mg/l) was recorded in the month of July.

Conductivity is the ability of an aqueous solution to conduct the electric current. Conductivity is a useful tool to evaluate the purity of water conductivity of water was ranged from 259-273 µs/cm.

Conclusion

The variations in the water quality parameters are evident in all the Physico – chemical parameters examined. The present study concluded that Misir pond water of study area was moderately polluted in respect to analysed parameters. pH, TDS were found within permissible limit but the higher values of Conductivity in present study attributed pond water was not fit for drinking purpose in reason of not clean. It needs to aware local villagers to safeguard the precious pond and its surrounding.

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