

Study of Physico-chemical characterization of Birla Talab in BITS Pilani, Jhunjhunu (Raj.)India

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ABSTRACT

Water is important component of all living beings. The present investigation attempts to study comparative analysis of seasonal variation in physico-chemical properties of Birla Talab (pond/ tank of water) of BITS, Pilani in Jhunjhunu district of Rajasthan. Water quality has been determined in term of selected parameters such as Temperature, pH, EC (Electric conductivity), TA (Total Alkalinity), TH (Total hardness), TDS (Total dissolved solids), DO (Dissolved oxygen) and Chloride. Analysis of above mentioned parameters were carried out by using various standard methods. In conclusion, this study is baseline data toward future ecological study, conservation and management of the of Birla Talab.

KEY WORDS: Fresh water, Water sample, physico-chemical parameter, sustainable development.

1. INTRODUCTION

Pure water is the basic need for all living forms. A fresh water body, which fulfills a variety of human needs, is full of value, only when if it is not abused and polluted. Fresh water is finite resource, essential for agriculture, industry and even human existence, without fresh water of adequate quantity and quality, sustainable development will not be possible^[5]. Water is not only major component of environment but also universal solvent and a medium on which all organisms depend for their existence.

Over population is one of the major problem city faces currently. Fresh water resource is becoming day-by-day at the faster rate of deterioration of the water quality is now a global problem^[7]. Polluted water creates problems for all kind of life. The assessment of long-term water quality changes is also a challenging problem. During the last decades, there has been an increasing demand for monitoring water quality of many rivers, ponds and irrigation tanks by regular measurements of various water quality variables. Water quality is defined in relation to the use intend to put the water and for each use there are indicators which show the degree of purity. The world's water resources are under pressure and must be managed for human survival. It is, therefore, necessary to have most relevant information for arriving at rational decisions that will result in the maximum benefit to most people.

2. MATERIALS AND METHODS

Jhunjhunu district is located in the extreme north eastern part of Rajasthan State. Birla Talab is situated at Pilani of Jhunjhunu district between 28°13' North latitude and 75°4' East longitude. It is also called the Shree Ram Mandir Talab. It is constructed in 20th century A.D. and governed by Sita-Ram Trust. At the center of Talab a big statue of lord shiva is located. A

very beautiful green park are also present around the Talab.

Water samples were collected in 1 litre capacity polyethylene bottles during morning. The study was carried out for the period of 12 months between July 2012 to june 2014 at Vastrapur and Ropada lake. Water samples were collected between 7.30 to 9.00 hrs in the morning. Total 8 physico-chemical parameters were analyzed by standard methods^[1,11]. Analysis of some of the parameters such as the water temperature was performed at the site by using pocket meters.

3. RESULTS AND DISCUSSION

Physico-chemical parameters of three seasons (monsoon, winter and summer) between July 2012 to June 2014 are given in Table.1.

3.1 Temperature: Water temperature is very important parameter, because it influences the biota in a water body by affecting such as behaviour, respiration and metabolism. Rise in temperature speed up the biochemical reactions and reduce the solubility of gases. The water temperature was always found lower than the atmosphere temperature. In present investigation, the temperature values were maximum during summer and minimum during winter. Low temperature recorded in winter may be due to high water level, lesser solar radiation, low atmospheric temperature and high temperature in summer because of low water level, high solar radiation and clear atmosphere. Many workers observed similar trends while working on different water bodies^[4].

3.2 pH: pH is considered as an important ecological factors and is the result of the interaction of various substances in solutions in the water. It is the scale of intensity of acidity and alkalinity of water and measure the concentration of H⁺ ions. In the present investigation the pH values ranged from 7.4 to 7.9. Higher value of

pH in summer season may be due to influx of dairy effluents and low level of water. pH also influences other factors like conductivity, bicarbonates, chloride, salinity, phosphate, hardness and magnesium.

3.3 Electric conductivity: Electric conductivity is a numerical expression ability of an aqueous solution to carry electric current. This ability depends on the presence of ions, their total concentration, mobility, valence, relative concentrations and temperature of measurements. The fluctuations in EC are due to fluctuation in total dissolved solids and salinity^[8]. In the present investigation values of EC is ranged from 1.30 to 1.68.

3.4 TDS: The sum of all the chemical ions dissolved in the water is called total dissolved solids or TDS. TDS is controlled by the natural source of pond water and by nearby land use activities. In the present investigation the total dissolved solids fluctuate from 283.72 mg/l to 394.67 mg/l.

3.5 Chloride: Chloride occurs in all types of natural waters. The high concentration of chloride is considered to be an indication of pollution due to high organic waste of animal origin^[10]. The chloride contain

normally increases with the increase mineral contents, chlorides are relatively harmless except when converted to Cl₂, ClO⁻ and ClO₃⁻ - which are toxic^[5]. Chloride value obtained in the study was ranged from 83.81 mg/L to 108.18 mg/L. The chloride in water was found within the acceptable limit.

3.6 Alkalinity: The observed average value of total alkalinity ranged from 150.41 mg/L to 193.22 mg/L . The total alkalinity is found in the range. Higher values of alkalinity registered during summer might be due to the presence of excess of free CO₂ product as a result of decomposition process coupled with the mixing of domestic waste. The low alkalinity during rainy season may be due to dilution^[13].

3.7 Dissolved Oxygen: Dissolved Oxygen is one of the most important parameter of the water quality, directly affecting survival and distributing flora and fauna in an ecosystem. In the present study dissolved oxygen values ranged from 5.51 to 7.12 mg/L of which maximum value (7.12 mg/L) was noted in winter season and minimum value (5.51 mg/L) in summer season. The quantity of DO in water is directly or indirectly dependent on water temperature, partial pressure of air etc^[3].

Table.1. Chemical analysis of various parameters (mean values) of water in Birla Talab during 2012-14. (All values except temperature, pH and EC is in mg/L)

Parameter	First year			Second year		
	Monsoon	Winter	Summer	Monsoon	Winter	Summer
Temperature	21.5	15.1	28.7	20.9	14.2	29.7
pH	7.4	7.8	7.7	7.4	7.9	7.8
EC	1.31	1.49	1.66	1.30	1.44	1.68
TDS	283.72	393.98	297.43	288.15	394.67	296.95
Chloride	83.81	95.96	107.55	84.07	96.43	108.18
Alkalinity	150.41	166.2	191.95	154.69	174.11	193.22
Hardness	87.77	95.6	118.63	85.86	95.03	115.6
Dissolved oxygen	5.87	7.12	5.52	5.85	7.11	5.51

3.8 Hardness: Hardness is an important in decreasing the toxic effect of poisonous elements. Hardness is often referred to as the soap consuming property of water. Hardness may be divided into two types, carbonate and non-carbonate. Carbonate hardness includes portions of calcium and magnesium, and certain amount of bicarbonates^[2]. Hardness below 300 mg/L is considered potable but beyond this limit produces gastrointestinal irritation^[3]. In the present investigation hardness values ranged from 85.86 to 118.63. Total hardness values of all samples were found in the below the desirable value. Higher values of hardness during summer due to low water level and high rate of evaporation of water and addition of calcium and magnesium salts^[9].

4. CONCLUSION

Understanding the quality of water is as important as that of its quantity, since, it is the main factor determining the suitability of water for drinking, domestic, agricultural and industrial purposes^[12]. The

seasonal variations were observed because of the climatic impact in some of the properties. All parameters were found within permissible limits. No sign of pollution at Birla Talab.

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