

A study of ground water quality in Poovalur area of Lalgudi Taluk, Tiruchirappalli District, Tamilnadu

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ABSTRACT

The piece of investigation presents the quality of ground water in Poovalur area situated in Trichy district of Tamilnadu. Four different locations were selected for the study and compared. Attempts were made to study and analyze the physico-chemical characteristics of the water. The parameters studied were temperature, pH, total alkalinity, total hardness, chloride, sulphate, total dissolved solids, calcium, magnesium and conductivity. By observing the result it can be concluded that the parameters which were taken for study the water quality are below the pollution level for ground water which satisfy the requirement for the use of various purposes like domestic, agricultural, industrial etc.,

Keywords: Ground water, Physico-chemical, Poovalur, Trichy

INTRODUCTION

Human needs are growing rapidly and the need for water is also growing. Much of the current concern with regards to environmental quality is focused on water because of its importance in maintaining the human health and health of the ecosystem. The availability of water determines the location and activities of humans in an area and our growing population is placing great demands upon natural fresh water resources [1]. The natural aquatic resources are causing heavy and varied pollution in aquatic environment leading to water quality and depletion of aquatic biota. Water sources were polluted by domestic wastage in rural areas whereas industrial wastages discharged into natural water sources in urban areas [2-3]. It is therefore necessary that the quality of drinking water should be checked at regular time interval because due to use of contaminated drinking water, human population suffers from a variety of water borne diseases. Fresh water is a finite resource, essential for agriculture, industry and even human existence, without fresh water of adequate quantity and quality, sustainable development will not be possible [4]. Fresh water resource is becoming day-by-day at the faster rate of deterioration of the water quality is now a global problem [5]. Discharge of toxic chemicals, over pumping of aquifer and contamination of water bodies with substance that promote algae growth are some of the today's major cause for water quality degradation. Direct contamination of surface water with metals in discharges from mining, smelting and industrial manufacturing, is a long-standing phenomenon. Today there is trace contamination not only of surface water but also of groundwater bodies, which are susceptible to leaching from waste dumps, mine tailings and industrial production sites [6]. Water quality reflects the composition of water as affected by natural cause and man's cultural activities expressed in terms of measurable quantities and related to intended water use [4]. The composition of surface and groundwater is dependent on natural factors (geological, topographical, meteorological, hydrological and biological) in the drainage basin and varies with seasonal difference in runoff volumes, weather conditions and water levels [7]. One of the major reasons of ground water pollution in India is unplanned urban development without adequate attention to sewage and waste disposals [8-9]. Pollution caused by fertilizers and pesticides used in agriculture, often dispersed

over large areas, is a great threat to fresh groundwater ecosystems. Pollution of groundwater due to industrial effluents and municipal waste in water bodies is another major concern in many cities and industrial clusters in India. Hence there is a need and concern for the protection and management of ground water quality. The major problem with the ground water is that once contaminated, it is difficult to restore its quality. The natural aquatic resources are causing heavy and varied pollution in aquatic environment leading to water quality and depletion of aquatic biota. It is well known that no straightforward reasons can be advanced for the deterioration of water quality, as it is dependent on several water quality parameters. It is therefore necessary that the quality of drinking water should be checked at regular time interval because due to use of contaminated drinking water, human population suffers from a variety of water borne diseases. Water quality is based on the physical and chemical soluble constituents due to weathering of parent rocks and anthropogenic activities [10]. The main object of the physico-chemical analysis of water is to determine the status of different chemical constituents, which are present in the natural and disturbed aquatic ecosystem. The quality of water may be affected in various ways due to pollution. The present investigation aims towards analysis of the water quality of the four different sites in Poovalur village, Trichy district, Tamilnadu, India with special reference to Total Dissolved Solids, Total Hardness, Total Acidity, Total Alkalinity, pH, Calcium, Magnesium, Sulphates, and Chlorides.

MATERIALS AND METHODS

The study was conducted in Poovalur (10° 48' 18" North , 78° 41' 7" East) in Trichy district of Tamilnadu, India. The Ground Water Samples were collected from four different locations in Poovalur, Lalgudi taluk, Trichy district, Tamilnadu, India in the Morning Hours between 9 to 11am in Polythene Bottle. Four different locations are ward no.9, ward no. 10, ward no.11 and ward no. 12 and they are named as sample 1, sample 2, sample 3 and sample 4 respectively. Analysis was carried out for various water quality parameters such as pH, TDS, Total hardness, Total alkalinity, Total acidity, Chloride, Sulphate, Calcium and Magnesium using standard method. The reagents used for the analysis were AR grade and double distilled water was used for preparation of solutions. Water Temperature and pH were recorded at the time of Sample Collection, by using Thermometer and Pocket Digital pH Meter.

RESULTS AND DISCUSSION

The physicochemical parameters of the sample waters have been given in the **Table 1**. The pH value of water is an important indication of its quality and it is dependent on the carbon-dioxide- carbonate-bicarbonate equilibrium. The pH value for the samples varies between 6.55 and 6.74. The reduced rate of photosynthetic activities reduces the assimilation of carbon dioxide and bicarbonates which are ultimately responsible for increase in pH [11]. Total alkalinity of water in terms of CaCO₃ varied from 16.04-21.535 mg/L. Out of the four samples, sample 3 tops the list with maximum alkalinity content followed by sample 2, sample 4 and sample 1.

Table 1. Physico-chemical parameters of sampled waters

Parameters	Sample 1	Sample 2	Sample 3	Sample 4
Temperature (°C)	28	29	28	27
pH	6.7	6.74	6.55	6.7
Total Alkalinity (mg/L)	16.04	21.39	21.535	17.434
Total Hardness (mg/L)	67.31	96.15	76.92	48.08
Total Dissolved Solids (mg/L)	133.07	109.55	92.66	104.1
Conductivity μ mho/cm	0.05	0.06	0.11	0.03
Chloride (mg/L)	5.999	7.999	7.999	5.999
Sulphate (mg/L)	0.1235	0.1646	0.1029	0.1029
Calcium (mg/L)	28.35	28.35	19.23	19.23
Magnesium (mg/L)	38.46	67.3	57.69	28.85

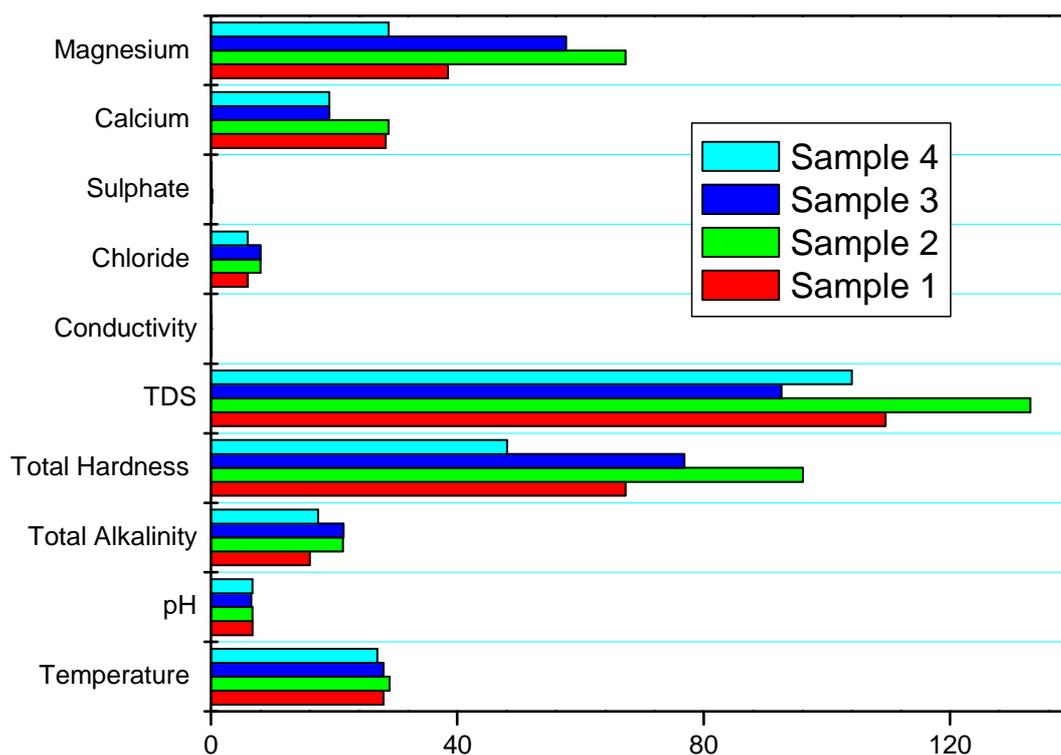
The amount of dissolved calcium and magnesium in water determines its "hardness." Total hardness found in the water samples ranges from 48.08-96.15 mg/L, which shows that water is safe for drinking purpose. Hardness has no known adverse effects on health. However, maximum permissible level prescribed by WHO for drinking water is 500 mg/L as set [12]. According to some classifications, water having hardness up to 75mg/L is classified as soft, 76-150 mg/L is moderately soft, 151-300 mg/L as hard (Dufor & Becker,1964) and more than 300 mg/L as very hard. On this basis, the results show that the samples 1 and 4 were soft and samples 2 and 3 were moderately soft.

In water, total dissolved solids (TDS) are composed mainly of carbonates, bicarbonates, chlorides, phosphates and nitrates of calcium, magnesium, sodium, potassium and manganese, organic matter, salt and other particles. The

permissible limit of TDS of drinking water is 500 mg/L (WHO, 2004). The observation shows that the TDS is within the permissible range as prescribed by WHO (2004) [13].

According to WHO, maximum permissible limit for chloride is 500 mg/L. The value observed in present study is in the range of permissible limit [14]. The sulphate content varies between 0.1029 to 0.1646 mg/L. The sulphate value was also found to be within the prescribed limits.

Biostatistical Analysis of Chemical Parameters of Water Samples in Trichy District, Tamilnadu



CONCLUSION

The result revealed that there was significant variation in some physicochemical parameters and most of the parameters were in the normal range and indicates better quality of water. It has been found that the water is best for drinking purpose in all the areas.

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