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URBANIZATION AND GROUND WATER CRISIS-PHYSICOCHEMICAL ANALYSIS

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Currently,ground water is vulnerable to pollution due to an increase of unplanned urban developments, industrial, and agricultural activities that compromise both the quality and quantity. The mechanism controlling groundwater chemistry originally regulated by the evaporation process is dominated by reason of arid condition and anthropogenic activities existing throughout the region, recommendations have been made, to avoid using the groundwater in these areas for drinking directly before the required treatment and all types of liquid and solid waste must be treated before being drained into the tank. Local authorities, NGO's and government sectors should be more effective in controlling the contamination in the urban area.

INTRODUCTION

Groundwater contamination in an urban environment is a major issue, especially in industrial urban areas. The Coimbatore city is one of the most industrialized districts and major textile mills for the entire south India. In due Course, its glory gets deteriorated due to various internal and external diseconomies which were adversely influenced by the textile industries. On parity with a textile industry, engineering industry also dominated the economy of the district in the past. As against the receding trend of the textile industry, engineering industry still holds its unique position in spite of tremendous growth experienced in the country for the past few decades by different sectors of the economy. Increased population and industrial activities make it essential to assess the quality of groundwater system to ensure the long-term sustainability of resources.A decrease in various quality characteristics clearly indicates the possibilities of pollution due to industrial activities such as leather tanning, textiles, and foundries in and around city, with population density, has also a strong impact of surface water pollution as well as groundwater. Most of these wetlands get dried in summer and serves as a dumping yard for garbage and industrial wastes. According to 2006 report, the lake was encroached by water hyacinth and polluted due to effluents released into the lake. Water-borne diseases have reported in many places of the area where proper sanitation facilities are lacking. This along with garbage dumping and encroachments has led to degradation of water bodies and depletion in the groundwater. Lack of proper waste management infrastructure and deterioration of water bodies are the main environmental problem. The industrial effluents and sewage water from surrounding area may cause the contamination of underground water resources. People are using groundwater for different purposes; hence it is important to assess the groundwater quality of such area,

in which improper sanitation facilities and lack of infrastructure are found.

Temperature

Temperature ranges from 22.9^{0}C to 24.38^{0}C, in monsoon season temperature ranges from 23.75^{0}C to 24.38^{0}C, and in winter season temperature ranges from 22.9^{0}C to 23.8^{0}C.During winter season temperature value decreases naturally compared to monsoon season, due to atmospheric changes.

pH

pH ranges from 7.06 to 7.91during period of two season. In monsoon season pH was observed from 7.06 to 7.9 and during winter season it was found in between 7.53 to 7.9.

Conductance

During monsoon season conductance was ranged from 298.3 to 765 µS/cm, and during winter season it was ranged from 291.3 to 797.3 µS/cm.

Total Alkalinity

In monsoon season alkalinity is observed from 154.5 to 207 mg/l and it was found within 164.5 to 220 mg/l during winter season. Slight increase in alkalinity was observed during winter season. Natural water mostly found in alkaline form due to presence of sufficient quantities of carbonates. The major portion of alkalinity in natural water is caused by hydroxide, carbonate and bicarbonate. Alkalinity in itself is not harmful to human beings

Total Hardness

Total hardness ranges from 156 to 210 mg/l during monsoon season and it was ranged from 166.5 to 224 mg/l during winter season. Hardness is caused by a variety of dissolved polyvalent metallic ions; predominantly Calcium and Magnesium cation, other cations like Barium Iron, Manganese, Strontium, and Zinc also contribute. The high concentration of Total Hardness in water Samples may be due to dissolution of polyvalent metallic ions from sedimentary rocks, seepage and run off from the soil. Chloride in area ranges from 111.12 to 128.51 mg/l during monsoon season and it was ranges from 99.4 to 117.86 mg/l during winter season. The high concentration of chloride in water is considered as an indication of pollution due to high organic waste of animal origin

TDS

Ranges from 149.8 to 350.8 mg/l during monsoon season and it were found between 142 to 349.3 mg/l during winter season. High total dissolved solids in groundwater may observed because of groundwater contamination, when waste water from residential and dying units were discharged into ponds, lagoons, pits; such waste water migrate down to the water and causes contamination of groundwater

Dissolved Oxygen:

DO is a very important parameter of water quality and an index of physical and biological process going on in water. In the present study, the maximum concentration of dissolved oxygen was observed in the month of July after heavy rainfall, which favours solubility of oxygen among the study sites. It may be present in water due to direct diffusion from air and photosynthetic activity of autotrophs. Concentration of DO is one of the most important parameters to indicate water purity and to determine the distribution and abundance of various algal groups

HCO3 - (mgl-1)

The primary source of carbonate and bicarbonate ions in surface water and ground water is dissolved carbon dioxide derived from the rain water. As it enters the soil or rocks, it dissolves more carbon dioxide in water. The desirable limit and permissible limit of bicarbonate in water is 200 mgl-1 to 600 mgl-1. Alkalinity of water is defined as the ionic concentration which can neutralize the hydrogen ions. The phenolphthalein alkalinity value is zero indicating absence of any carbonate and hydroxyl ions. The bicarbonate alkalinity is expressed asa total alkalinity which ranges between 218- 460 mgl-1.

Sodium (mgl-1)

Sodium plays an important role in preventing many fatal diseases like kidney damages, hypertension, headache, etc. in human body. According to WHO report, in most of countries, majority of water supply bears less than 20 mgl-1 while in some countries the sodium quantity in water

exceeded from 250 mgl-1. WHO defines the concentration of sodium in drinking water up to 200 mgl-1. Ground water with high Na content is not suitable for agricultural usage as it tends to deteriorate soil quality.

Potassium (mg-l)

According to WHO and European Economic Community (EEC, 1980) have prescribed the guideline level of potassium at 12 mgl-1 and 10 mgl-1 in drinking water, respectively. Though potassium is extensively found in some of igneous and sedimentary rocks, its concentration in natural waters is usually quite low. This is due to the fact that potassium minerals offer resistance to weathering and dissolution. The total potassium concentration in human body lies between 110 to 140 g. It is vital for human body functions like heart protection, regulation of blood pressure, protein dissolution, muscle weakness, heart rhythm disorder etc.

Calcium (mgl-1)

Calcium (Ca) is fifth most abundant element in the earth crust and is very important for human cell physiology and bones. About 95% calcium in human body stored in bones and teeth. The high deficiency of calcium in humans may cause rickets, poor blood clotting, bone fracture etc. and the exceeding limit of calcium produced cardiovascular diseases. According to WHO and ISI standards its permissible range in drinking water is 75 mgl-1, whereas PSQCA established the limit of 200 mgl-1.

Magnesium (mgl-1)

It is common element and is essential for plant in the photosynthesis reaction and animal nutrition. The high level of Mg concentration in groundwater in coastal area indicates seawater contamination [25]. The acceptable limit of magnesium according to BIS (10500: 2012) is 30 mgl-1 and permissible limit is 100 mgl-1

CONCLUSION

Rapid industrialization and urban development results in deterioration of water quality. The average values of all physiochemical and alkali metals were found within the permissible limits of the WHO guideline for drinking water and also within Indian standard limits but some sites of surface and ground water were found to have even higher as compared to standard limit that may be due to excess use of chemicals and non judious or unplanned out flow of effluent. So, there is a need to establish sewage treatment plants in major human settlements so that untreated sewage couldn't contaminate the water bodies. Hence, regular and quantified monitoring of geochemical characteristics of the surface and ground water will be useful for sustainable water management.

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