

ASSESSMENT OF GROUND WATER AND TANK WATER QUALITY IN THE DOWNSTREAM TANK OF COIMBATORE CITY

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ABSTRACT

Water is essential for life and access to clean drinking water is a necessity for good health. Though clean drinking water is not available everywhere because of Various Man-made discharge into the fresh stream and pollution of existing water resources. The pollution can be in the form of natural or anthropogenic activities. This study focuses on the Impact of anthropogenic activities on the water quality of 4 tanks in Coimbatore city and its contribution to the groundwater quality. Due to encroachment and other anthropogenic activities, the quality of water is being depleted rapidly. Disposal of municipal waste waste from other various industries into the tank will deplete the quality of water in the tank. This water along with the leachate may percolate through the pore spaces between the soil particles and interact with the groundwater. The contaminants will be transported and contribute to the nearby well head and affect the quality of water in the well too. Finally, the social consequences will be analyzed using Semi structure Survey.

NEED FOR THE STUDY

Groundwater is one of most important alternative source which could be used for drinking, when there is a demand for surface water. However, clean drinking water is not available everywhere, due to water scarcity and pollution of existing water resources. The pollution can be in the form of natural or anthropogenic activities. Fluoride contamination of groundwater is a growing problem in many parts of the world. The major sources of fluoride in groundwater are due to fluoride-bearing minerals such as fluor spar, cryolite, fluorapatite and hydroxylapatite in rocks. Some anthropogenic activities such as use of phosphatic fertilizers, pesticides, sewage and sludge, depletion of groundwater table etc., contribute to water scarcity and pollution. Places like Coimbatore which is rapidly developing are prone for water contamination due to disposal of waste therefore the water quality parameters of surface and groundwater have to be tested and inferred whether it could be made use for drinking purpose. Impact of this pollution on human health and other social consequences can be assessed using Semi structure survey. These problems led to study the following objectives.

OBJECTIVE OF THE STUDY

1. To determine the physical and chemical characters of the tank water and groundwater.

2. To assess the social consequences in and around the groundwater quality affected areas using SEMI-STRUCTURED SURVEY.
3. To promote the major remedial measures for the ground water contamination due to anthropogenic activities

STUDY AREA CHARACTERISTICS

Coimbatore city has totally 8 major surface water tanks along the noyal river stretch. There are 21 Anaikuts and 31 Tanks in noyal river system, Among them 8 tanks are located in Coimbatore namely, Narasampathi, Krisnampathi, Selvampathi, Kumarasamy, Selvasindhamani, Ukkadamperiyakulam, Valankulam, Singanallur tank, that serves Coimbatore district in noyal river system. All these tanks are located to the north of Noyal River. Among these tanks, our study area is 4 downstream tanks. Since the downstream tanks are comparatively more polluted, so far the study will be carried over there. Flow through all these tanks are only through gravity.

Chitrachavadi anaikut has been constructed across the Noyal River to divert water into Chitrachavadi canal which is 11.75 km long. The first five tanks are being fed by the Chitrachavadi canal.

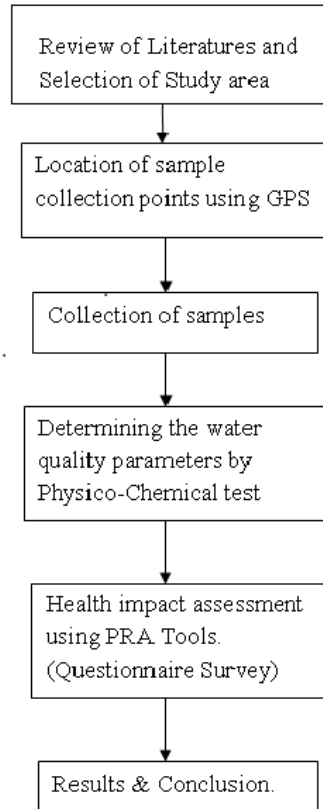
1) Valankulam tank is located to the west of Coimbatore city adjacent to sungam bye pass road and also to the east of Ukkadamperiyakulam tank, this tank lies between latitude: $10^{\circ}99.19' N$ and longitude: $76^{\circ}97.24' E$.

2) The Ukkadamperiyakulam tank is located to the west of Coimbatore city on Palakkad road and close to Ukkadam, the location of this tank lies between latitude : $10^{\circ}98.275' N$ and longitude : $76^{\circ}95.70' E$.

3) The selvachinthamani lake is situated to the left side of Perur Main road and it lies between latitude: $10^{\circ}99.14' N$ and longitude: $76^{\circ}94.731' E$

4) Singanallur tank is the last tank of our study area which is situated to the Right side of Coimbatore to Trichy road, the location of this tank lies between latitude : $10^{\circ}99.598' N$ and longitude : $77^{\circ}02.071' E$. Above all, the concentration of the contaminants and the type of contaminant vary from tank to tank.

Hence, samples are collected separately at various locations of all the four tanks and the water quality parameters are also spatially interpolated.



ANALYSIS OF GROUND WATER SAMPLES

The ground and surface water samples of the post monsoon season and monsoon season were analyzed for various physico-chemical parameters as shown in the table. It was noted that most of the ground water samples were found within colourless and only few ground and surface water samples were found within greenish, yellowish, slightly greenish and slightly yellowish.

In case of odour most of the ground water and surface water samples were found within objectionable and algal. And only a few ground water samples were found within earthy and muddy. Odour is recognized as a quality factor affecting acceptability of drinking water. Both the colour and odour indicates the presence of organic and inorganic chemicals. These chemicals may originate from industrial waste discharges, domestic waste discharges, etc.,

Charts Showing Variation of Values of Ground Water and Surface Water Samples Taken at Selvasinthamani, Ukkadam periyakulam, Valankulam, Singanallurtanks for the Monsoon Season and Post Monsoon Season

Total Alkalinity values of the more ground water samples exceeded the desirable limit. But the surface water TA values found to be within desirable. TA value in drinking water is higher indicating the taste of the water becomes unlikeable.

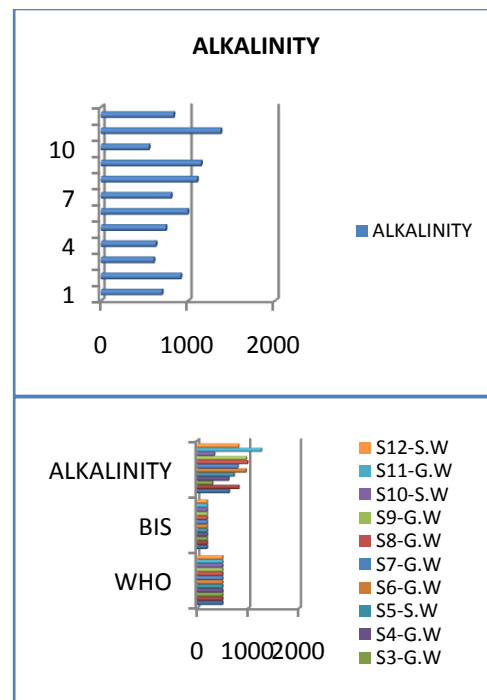


Figure 1.17 Total Alkalinity values of Surface and Ground water samples of Selvasinthamani Tank for post monsoon and monsoon season

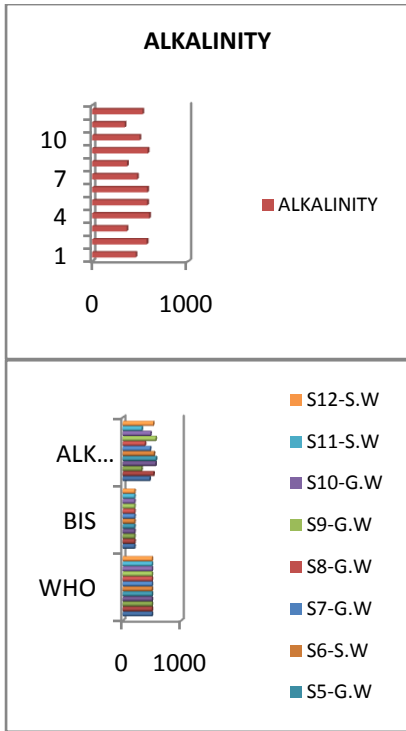


Figure 1.18 Total Alkalinity values of Surface and Ground water samples of Ukkadam Tank for post monsoon and monsoon season

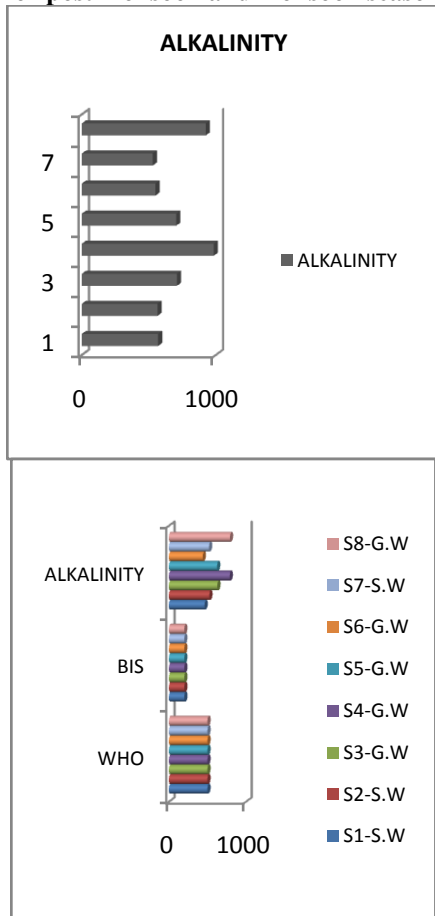


Figure 1.19 Total Alkalinity values of Surface and Ground water samples of Singanallur Tank for post monsoon and monsoon season

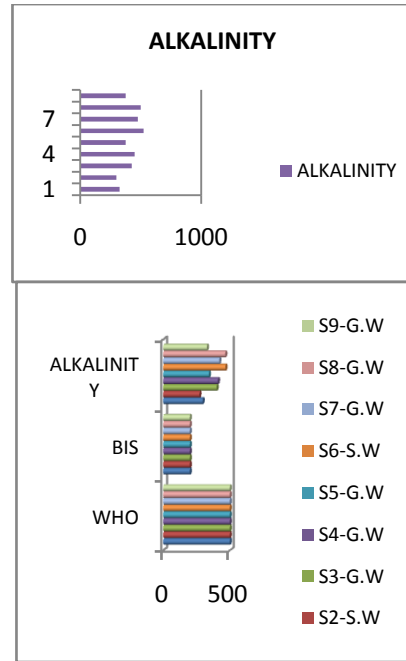


Figure 1.20 Total Alkalinity values of Surface and Ground watersamples of Valangulam Tank for post monsoon and monsoon season

Total Hardness values of the some ground water samples exceeded the desirable limit. Hardness of water is caused by the presence of salts of the multivalent cations and is largely due to calcium and magnesium ions. It indicates ground water slightly not suitable for the drinking purpose and requiring pre-treatments.

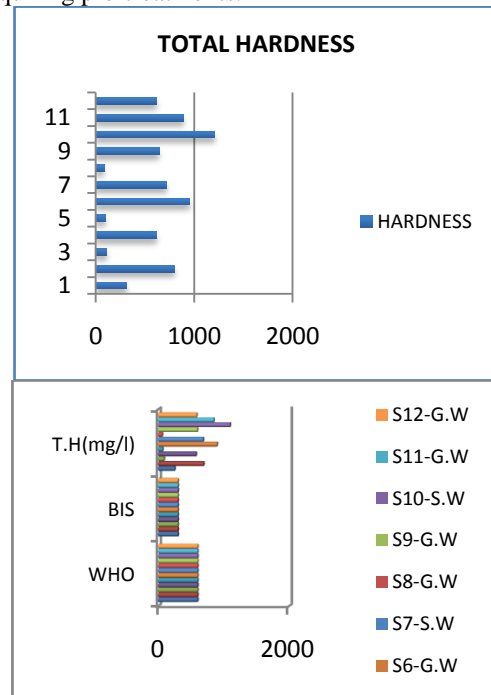


Figure 1.21 Total Hardness values of Surface and water samples of Selvasinthamani Tank for post monsoon and monsoon season

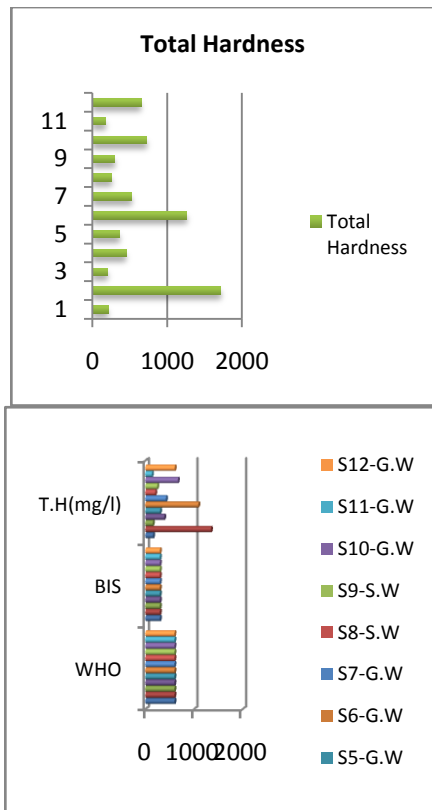


Figure 1.22 Total Hardness values of Surface and Ground water samples of Ukkadam Tank for post monsoon and monsoon season



Figure 1.23 Total Hardness values of Surface and Ground water samples of Singanallur Tank for post monsoon and monsoon season

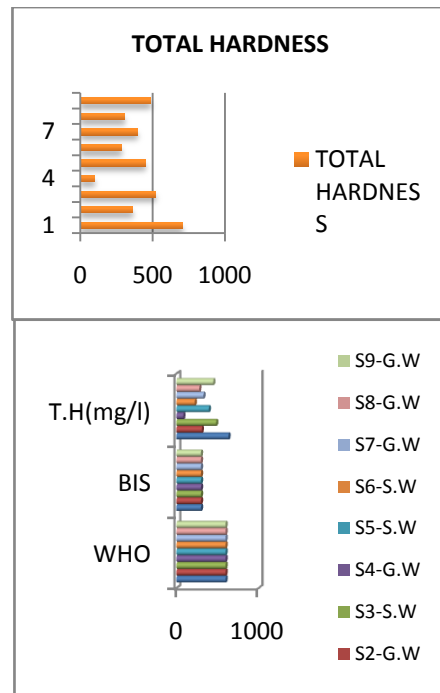


Figure 1.24 Total Hardness values of Surface and Ground water samples of Valangulam Tank for post monsoon and monsoon season

Chloride and fluoride ion concentrations of all the ground water and surface water samples were found exceeding the desirable limit. Higher chloride content may harm metallic pipes and growing plants. Higher concentration of fluoride also causes respiratory failure, variation in blood pressure, paralysis.

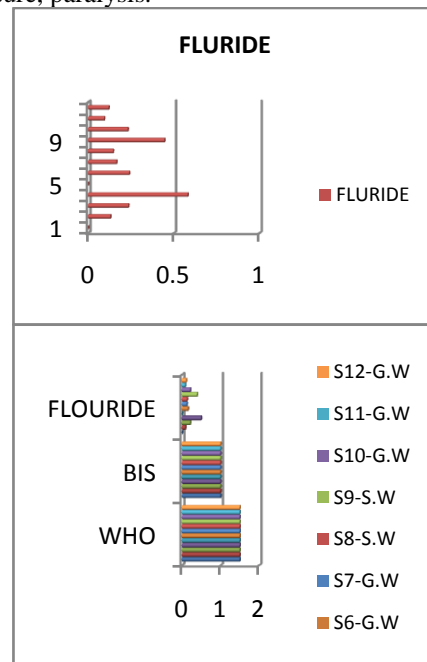


Figure 1.25 Fluoride values of Surface and Ground water samples of Selvasinthamani Tank for post monsoon and monsoon season

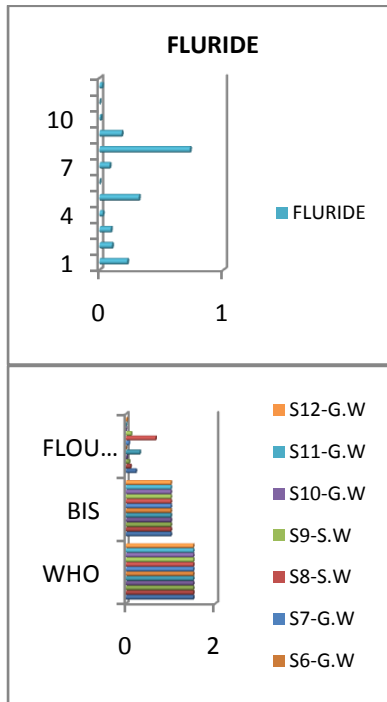


Figure 1.26 Fluoride values of Surface and Ground water samples of Ukkadam tank Tank for post monsoon and monsoon season

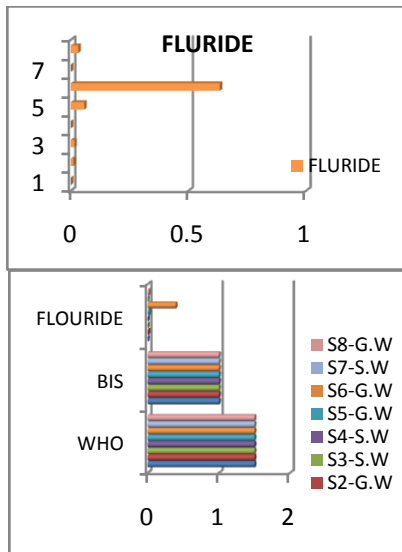


Figure 1.27 Fluoride values of Surface and Ground water samples of Singanallur tank Tank for post monsoon and monsoon season

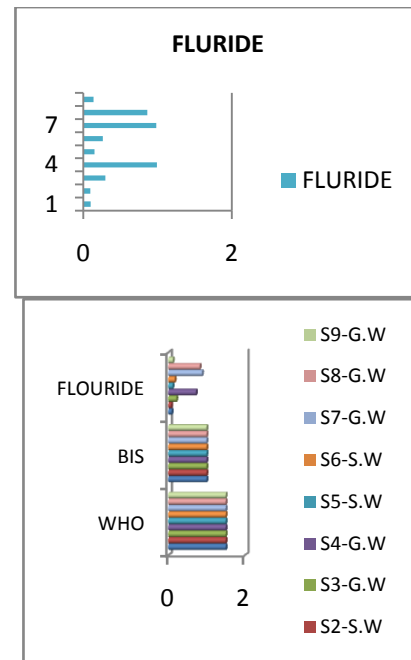


Figure 1.28 Fluoride values of Surface and Ground water samples of Valangulam tank Tank for post monsoon and monsoon season

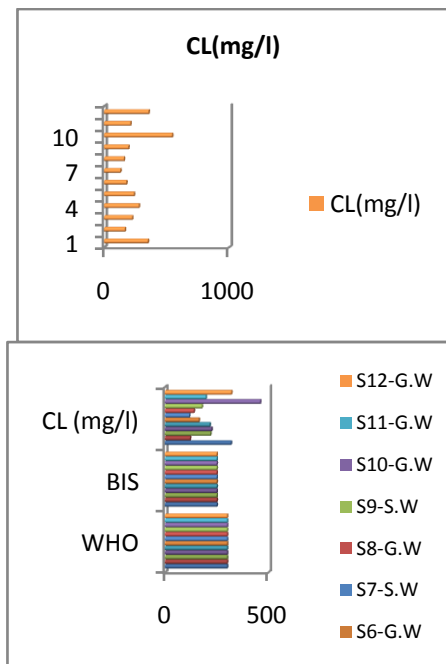


Figure 1.29 Chloride values of Surface and Ground water samples of Selvasimthamani Tank for post monsoon and monsoon season

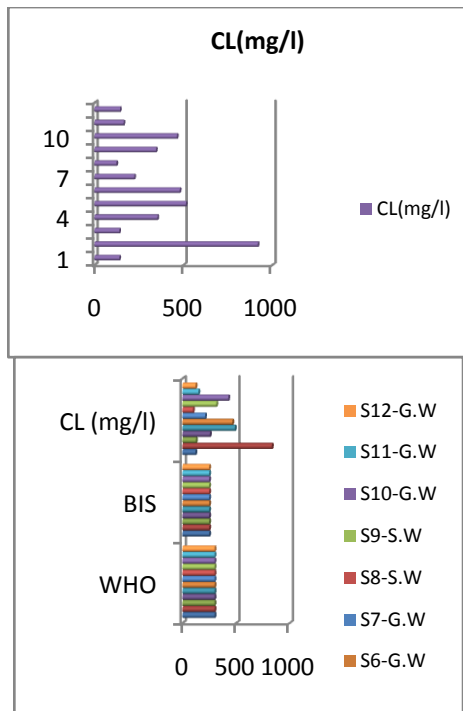


Figure 1.30 Chloride values of Surface and Ground water samples of Ukkadam Tank for post monsoon and monsoon season

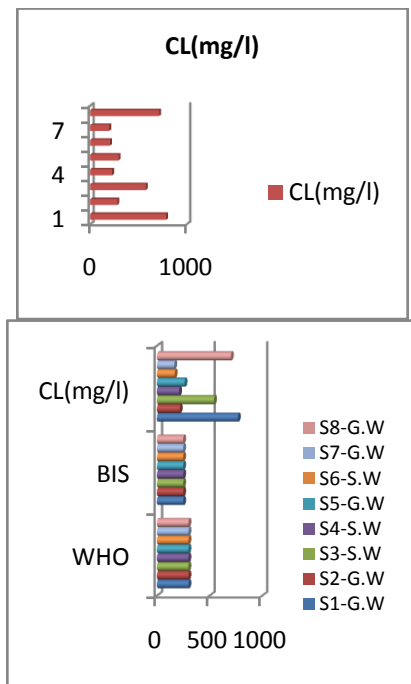


Figure 1.31 Chloride values of Surface and Ground water samples of Singanallur Tank for post monsoon and monsoon season

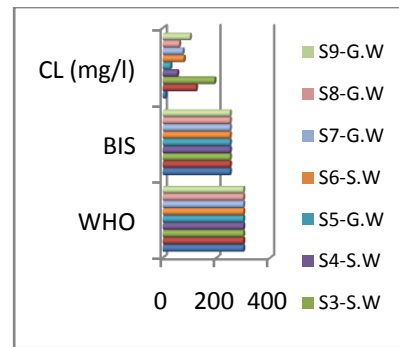


Figure 1.32 Chloride values of Surface and Ground water samples of Valangulam Tank for post monsoon and monsoon season

CONCLUSION

Physico-chemical characterization of ground water and tank water samples are taken from Coimbatore city. 26 ground water samples and 16 surface water samples of post-monsoon and monsoon period were collected from the four downstream tanks in Coimbatore namely, Selvachinthamani, Ukkadam Peariyakulam, Singanallur and Valankulam. These collected samples are analyzed for pH, Electrical Conductivity, Total Dissolved Solids, Chloride, Sulphate, Fluoride, Dissolved Oxygen, Turbidity, Colour, Odour, Total Alkalinity, Total Hardness using standard procedures. Turbidity, pH and sulphate values of all the samples were found within the desirable permissible limit. It indicates ground water suitability to drinking water. Total Dissolved Solids, Total alkalinity, Total Hardness and concentrations of chloride and fluoride ion values of the ground and surface water samples exceeded the desirable permissible limit. It indicates ground water slightly not suitable for drinking purpose. From the obtained results, it is suggested to monitor the surface and ground water quality and assess periodically in this study area to prevent the further contamination.