SSRG International Journal of Civil Engineering
ISSN: 2348 – 8352 /doi:10.14445/23488352/IJCE-V7I5P105

Volume 7 Issue 5, 30-34, May 2020
©2020 Seventh Sense Research Group®

Assessment of Ground Water Quality In Thuraiyur Taluk Namakkal District

[1]Mr.Venkatesh A, [2]Mrs.Roopa D

[1]*(PG Scholar, Department of Civil Engineering, Gnanamani College Of Technology, Namakkal -637018)*
[2]*(Assistant Professor, Department of Civil Engineering, Gnanamani College Of Technology, Namakkal – 6370. 18)*

Received Date: 26 April 2020
Revised Date: 30 May2020
Accepted Date: 06 June 2020

ABSTRACT

Water quality management is very important because demand increases every day. Water is the main source of life on earth; the quality and quantity are threatened. The basic water quality parameters are pH, temperature, chloride, sulphate and hardness, using standard laboratory techniques and compared with standard standards. Remote sensing and GIS have long been recognised for water monitoring and management. The geographic information system is also used to investigate groundwater quality information using a tool to store, analyse and display spatial data. The image was classified to create a land usage/land map using the GIS software used for extracting the boundary of the study area. The capacity of this technology provides great instruments for how to implement the monitoring and management of the water quality in our field of study. The land use mapping, the geological and soil map is used to correlate the use of land, Geographical training and soil types to understand the source of the natural pollution that can reduce groundwater quality. Finally, remote sensing and computer modelling GIS technology are useful tools for providing a solution for future water resources planning and management, especially in the formulation of government.

I. INTRODUCTION

In recent decades, rapid economic and social development has brought pollution from livestock, poultry, planting and domestic waste to our living space without a point. Among the different pollutions, water pollution is also the most significant concern for sustainable management as a vital threat to the human being, to health. The reference indicated that human activities mainly influence surface water quality by the use of agrochemicals, as well as increasing the use of water resources. Many river and bodies of water are heavily polluted by anthropogenic activity in developing countries. Suitable water quality management measures require reliable quantitative information on the conduct of the water quality parameter. Many researchers have evaluated the accuracy of the various spatial interpolation methods for water quality predictions in recent years.

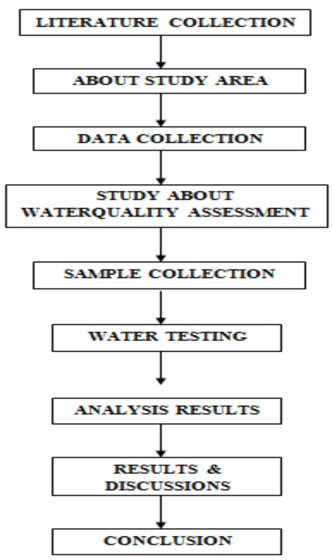
Water quality is a general descriptor of physical, chemical, thermal and biological properties of water. A single water quality standard is difficult to define to satisfy all uses and needs of the user. For instance, physical, chemical and biological water parameters suitable for human consumption differ from those suitable for irrigating a crop. Water quality is affected by materials supplied from points or non-point sources into a body of water. Point sources like a pipe or a ditch can be traced to one source. Non-point sources are widespread and linked to land and its reaction concerning the movement of water, land use and management and other human and natural watershed activities.

A. OBJECTIVE OF THE PROJECT

The following are the objectives of monitoring water quality parameters:

(i) To improve water quality to achieve a clean condition.
(ii) Restoring the quality of water.
(iii) To maintain and sustain the improvement reached well after the completion of the project with the status of water quality.
(iv) In the context of projects relating to pollution prevention, river restructuring and restoration, promote and build smart partnerships between the public and the private sector.

II. METHODOLOGY



III. ABOUT STUDY AREA

In the Indian state Tamil Nadu, Thuraiyur is a municipality in the district of Tiruchirappalli. On 17 January 1970, it was upgraded to a third-grade town of Panchayat, and in May 1998 it was upgraded to a second-grade municipality. In 2008, it was upgraded to the Municipality of Selection Grade. The area of the studies, Thuraiyur and Uppiliapuram, the district of Tiruchirappalli, Tamilnadu. Their work is based on the remote sensing and availability of physicochemical data at 13 sites in Thuraiyur and Uppiliapuram block in the district of Tiruchirappalli to conduct groundwater potential and groundwater quality evaluations using GIS. Water quality data from CGWB; NBSS soils map, Nagpur survey of India Toposheet No 58I/7,8,11,12, latitude 78°28' to 78°45'E, longitude 11°5' to 11°20' N.

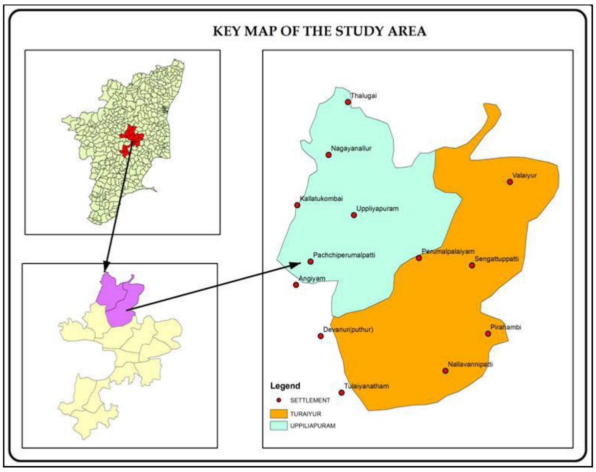


Fig 1 Study Area

IV. WATER QUALITY ASSESSMENT

The quality of the water refers to water's chemical, physical, biological and radiological characteristics. The water status is measured against the requirements of one or more biotic species and concerning any human need or purpose. It is used in particular to refer to a set of standards to be evaluated for compliance. The most common standards used to evaluate water quality concern ecosystem health, human contact safety and drinking water.

Three classes of attributes: biological, chemical, and physical, are evaluated for water quality. For each of these three classes of attributes, water quality standards are set. The Federal Environmental Protection Agency (EPA) has developed national standards for drinking water. All water supplies from municipal (public) water shall be measured following these standards. Some features of drinking water quality are considered primarily important, whereas others are secondary. The EPA Drinking Water Standards are therefore classified as primary standards for beverage water and secondary standards for drinking water. Primary drinking water standards govern organic and inorganic chemicals, microbial pathogens and radioactive elements which can affect drinking water safety. These standards set the highest levels of certain chemicals permitted in the drinking water supplied by a public water system-the highest levels of contaminants (MCL).

A. DESIGN OF ASSESSMENT PROGRAMMES

Four steps in the proper design of an assessment program are essential after clearly identifying goals: I the selection of appropriate sampling media, (ii) the identification of variability in water quality through preliminary studies, (iii) the integrated monitoring of water quality and hydrological monitoring, and (iv) periodic review and alteration of the program design.

TYPE OF OPERATION	MAJOR FOCUS OF WATER QUALITY ASSESSMENT
Common operations	
Multipurpose monitoring	Space and time distribution of water quality in general
Trend monitoring	Long-term evolution of pollution (concentrations and loads)
Basic survey	Identification and location of major survey problems and their spatial distribution.
Operational surveillance	Water quality for specific uses and related water quality descriptors (variables)
Specific operations	
Background monitoring	Background levels for studying natural processes; used as reference point for pollution and impact assessments.
Preliminary surveys	Inventory of pollutants and their space and time variability prior to monitoring programme design.
Early warning surveillance	At critical water use locations such as major drinking water intakes or fisheries; continuous and sensitive measurements.

V. GROUNDWATER

A. CHARACTERISTICS OF GROUNDWATER BODIES

Since the earliest times, under-ground water has been used for household use, livestock and irrigation. Although it was not necessarily understood the precise nature of the occurrence, successful methods for bringing water to the surface were developed, and since then groundwater has continued to increase. However, in the freshwater part of the hydrological cycle, it is common for the dominant role of groundwater to be overlooked. Groundwater is the most important element, making up approximately 2/3 of the world's freshwater reserves and, if the polar ice caps and glaciers are not taken into account, soil water represents almost all freshwater that can be used.

B. CHEMICAL CHARACTERISTICS OF GROUNDWATER

Increased concentrations of dissolved salts are usually expected in groundwater in comparison to the surface water in association with geological material which contains soluble minerals. The salt type and concentration depend on the geological environment and the water source and movement. A simple hydrochemical rating divides the soil into the meteor, connate and young. Meteoric, easily most important groundwater is derived in the normal hydrological cycle from rainfall and inflammation. Groundwater originating as seawater, that since its deposition is commonly referred to as connatal water, has been trapped in maritime pores.

C. BIOLOGICAL CHARACTERISTICS OF GROUNDWATER

Microbiological processes that can transform both inorganic and organic groundwater components can, directly and indirectly, influence the quality of soil water. Usually, geochemical processes accelerate these biological transformations. To utilise the solved material and suspended solids in the water and solid material in the aquifer in their metabolism, single or multi-cell organisms are adapted. Metabolism is then returned to the water. System constraints, but they influence their rate. For example, without microbial assistance, sulphides can be oxidised, but microbial processes can greatly accelerate oxidation to the extent that they are optimally humidified and temperature conditions.

VI. ABOUT SOFTWARE

A. GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

GIS can be described as computer-based generally-used systems for digitally handling geographical data to collect, store, manipulate, analyse and display a range of spatial or geologically-referenced sets of datasets. GIS is essentially a digital map spatial database that store information about different phenomena and places.

a) ADVANTAGES

The ability to improve the organisation. To capture, analyse, manage and thus display all forms of information being geographically referenced, GIS would then integrate software, hardware and data. GIS would allow data also to be viewed, questioned, understood, visualised and interpreted in many ways that reveal links, trends and patterns in globes, maps, diagrams and reporting. The Geographical Information System is intended by examining the data in a way that is easily and fastly shared to help solve questions as 'l.' In the framework of any business information system, and GIS technology can also be integrated.

B. SATELLITE REMOTE SENSING

Remote sensing is the acquisition without contact with the object and therefore in contrast to on-site observations of the information regarding an object or phenomenon. Remote sensing is used in many fields (including geography, geology and in the majority of earth sciences). It has military, intelligence, trade, economic, planning and humanitarian uses as well as ecology, oceanography, glaciology, geology.

a) ADVANTAGES OF REMOTE SENSING

Satellite images are continuous records which provide useful information in different wavelengths. Wide area coverage allows regional surveys of several topics and large areas to be identified. Repeat coverage provides the opportunity to monitor dynamic issues such as water, agriculture, etc. Easy collection of data at various scales and resolutions. For different purposes and applications, a single remotely sensed image could be analysed and interpreted. Completeness of remotely sensed data for rapid computer processing. Distance sensing is unhindered when the sensor records the electromagnetic energy that is reflected by the interesting phenomena or emitted passively. Flooding across a wide area of a forest fire from above can take place, and rescue plans can be arranged immediately.

VII. TEST RESULTS

In polyethene bottles of two litres of water, samples have been collected with necessary care from all sites. They were screened carefully, tagged and taken to analyse pH, temperature, hardness, chloride, sulphate and other physical and chemical parameters. Analytical grade were the reagents used in this research. The samples of groundwater have been physical and chemically analysed using standard APHA methods.

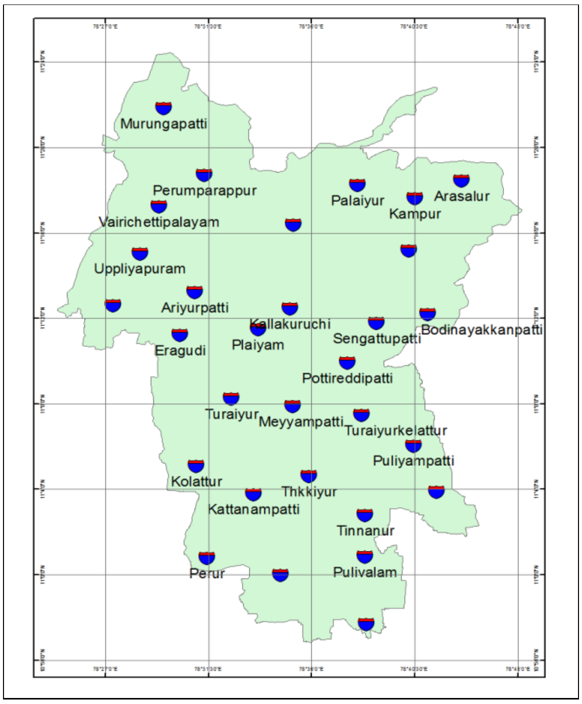


Fig 3 Water Samples Collecting Area – GIS Map

A. HARDNESS

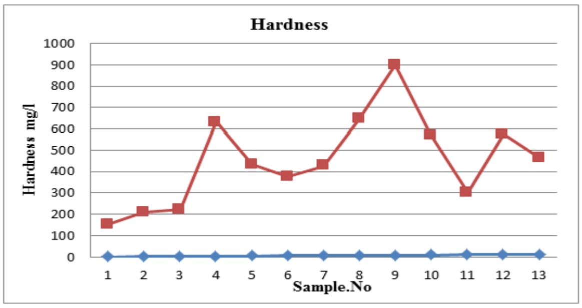


Fig 4 Hardness Chart

Water hardness is due to salts from Ca and Mg. Distance values of groundwater samples at city locations were recorded from 150 to 900 mg / l (Figure 4). The maximum value of 900 mg / l is recorded with kampur and the minimum value of kolattur (150 mg / l). Most soil water samples have crossed this permissible level. The water supply structure is encrusted in addition to that permitted level with adverse effects on domestic use.

B. CHLORIDE CONTENT

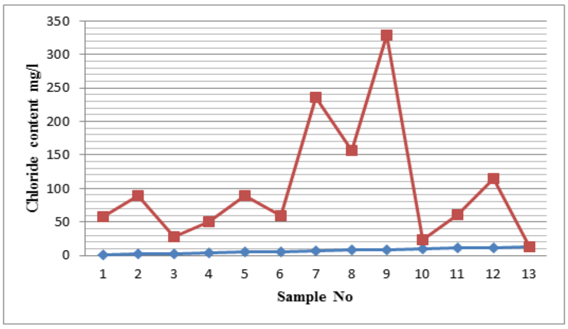


Fig 5 Chloride Content Chart

Chloride values for city settings range from 50 mg / l to 330 mg / l (Figure 5). In ariyurpatti region, the highest value is 330 mg / L. In contrast, in Thkkiyur area, the smallest value is 50 mg / L. Rural samples of groundwater show chloride within the acceptable limits except for ISI standards for ariyurpatti (250 mg / l). In drinking water, excessive chloride is not particularly harmful, but its potential for corrosiveness is the criteria of chloride value. Porosity and permeability of the soil also contribute to the development of chloride.

C. SULPHIDE CONTENT

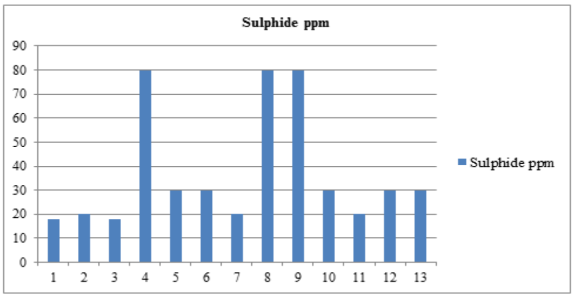


Fig 6 Sulphide Content Chart

Groundwater samples for the sulphate values for the city are between 80 and 18 mg / l (Fig. 6). The max. (80 mg / l) value in tinnanur is recorded, and the minimum sulphate (18 mg / l) value in perur area is recorded. The sulphate values are well within the allowable limits of ISI standards for all soil water samples.

D. P^HCONTENT

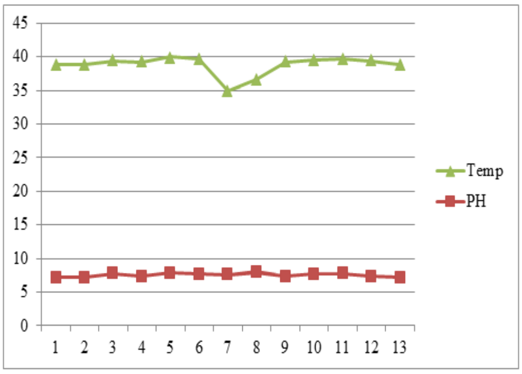


Fig 7 P^h Chart

The pH is used to determine whether an acid or alkaline solution is used. PH values for groundwater samples at the city sites are found between 6.0 and 7.40 (Figure 7). In the Meyyampatti area the highest value is 7.40, while in the Murungampatti area, the lowest value is 6.95. The allowable drinking water pH limit is 6.5-8.5 (ISI standards).

Groundwater samples of the temperature values of the city areas range from 36.5^0C to 40^0C (Figure 7). In sengattupati area, the highest value is 40^0C, whereas 36.5^0C in palaiyur region is the lowest value. The permissible thermal limit should not exceed 5^0C above the temperature of the reception water (ISI). The sample of the groundwater is found to be within the acceptable ISI limit.

VIII. CONCLUSION

Groundwater samples were collected from ten city and seven rural locations of thuraiyur taluk and analysed for pH, temp, hardness, chloride, sulphate, using standard procedures. The maximum parameters for city location groundwater sample from palaiyur area are at the permissible level as per ISI standards and which is more suitable for drinking purpose as compared to other location water samples and water sample collected from ariyurpatti location is highly polluted as compared other water samples. From the obtained results, it is suggested to monitor the groundwater quality and assess periodically in this study area to prevent further contamination.

REFERENCES

[1] Crabtree, R.W., Cluckie, I.D., and Forster, CF, A Comparison of two quality models, Wat.Res, (1986) 53-61.

[2] Jain, C.K., Bhatia, K.K.S., and Vijay, T., Groundwater quality in the coastal region of Andhra Pradesh, Indian J. Environ. Hlth ,39(3)(1997) 182.

[3] Junk,W.J,Bayley,P.B.,Sparks,R.E., The flood pulse concept in river-flood plain systems. In: Proceedings of the International Large River Symposium, (Ed:Dodge, D.P.,),Canadian Special Publication of Fisher.Aqua. Sci (1989) 106:110-127.

[4] Mondal, D.K., Kaviraj, A., Saha, S., Water quality parameters and fish biodiversity indices as measures of ecological degradation: A Case Study in Two Flood plain Lakes of India.J. Water ResourceandProtection. 2(2010) 85-92.

[5] Petts,G.E.,Perspectives for ecological management of regulated rivers. In: Alternatives in regulated river management,(Ed:Gore,J.A.,andPetts,G.E.,),CRC Press, BocaRaton, Florida,?(1989),3-24.

[6] Rabee,A.M.,Malik,B.,Kareem,A.,Dhamin,A.SA.,Seasonal variations of some ecological parameters in Tigris River water at Baghdad region, Iraq. J.Water ResourceandProtection, 3, (2011) 262-267.

[7] Alekhya. K, Ramadass.G and Vidyasagarchary.D, Ground Water Quality Assessment in Jagtial District, Telangana State - A Case Study, SSRG International Journal of Agriculture & Environmental Science 5(5) (2018) 7-14.

[8] Rai, A.K., Paul, B., Kishor, N., A study on the sewage disposal on water quality of Harmu River in Ranchi city Jharkhand, India." Int.J.Plt.Animl.Environ.Sci., ,2(1)(2012) 102-106.

[9] Razak, AA, Asiedu, A.B., Mensah, R.E., and johnson, KA, Assessment of the water quality of the Oti River in Ghana, WestAfricanJ.AppliedEcol.,(2009) 15:45-60.

[10] Shivayogimath, C.B., Kalburgi, P.B., Deshannavar, U.B.,andVirupakshaiah, DBM, water quality Evaluation of River Ghataprabha, India, Int. Res. J. Environ.Sci. 1(1)(2012) 12-18.

[11] Sujitha, P.C., Dev, M.D., Sowmya, P.K., Priya, M.R., Physico• chemical parameters of Karamana River water in Trivandrum, District, Kerala, India, Int. J. Environ. Sci., 2(2)(2011) 472- 490.