

Water is the most vital element in nature, next to air, for the substance of life. Water is available in nature in several forms like snow, moisture in air, surface water and groundwater. It has been established that the total quantity of water on this planet is constant though it may be constantly under movement and changing from one physical state to another as depicted in the hydrological cycle and man has not found out other ways of creating more water. Thus the total availability of water is fixed and the present problem is to estimate the availability of existing water resources and their utilisation. Accurate estimation, economical extraction and intelligent utilisation of water resources are crucial in the development of any country.

In Tamil Nadu 34 rivers are flowing including minor rivers and river Cauvery is one of the major rivers. Noyyal river is a tributary of Cauvery and it is a seasonal river which has good flow only for short periods during the northeast and southwest monsoons. Noyyal river basin is an important water resource for four districts (Coimbatore, Tiruppur, Erode and Karur) of Tamil Nadu, which has high employment generation and foreign exchange potential. More than thousands of small and large scale industries are situated around the Noyyal river basin. These industries are consuming huge quantity of groundwater for their productions and discharge their effluents into the river basin. So, the river water had become brackish and considerably harder in the last 10 to 15 years. To reduce the water scarcity problem in Noyyal river basin groundwater quality has been assessed and groundwater potential zones and artificial recharge sites has been identified in this research.

The base map of the study area was created by using Survey of India (SOI) toposheets. These maps were scanned and geo-referenced with precise latitude and longitude values using Geographical Information System (GIS) software. The contour map and drainage map were prepared using SOI toposheets on 1:50000 scale. The other thematic maps like geomorphology, soil, geology and lineament were prepared based on the published maps from state ground and surface water resources data centre, Tamil Nadu. Land use/land cover changes between the years 1992 and 2005 were prepared from satellite imageries by using supervised classification according to National Remote Sensing Agency (NRSA) classification using Erdas imagine 8.4 software.

The secondary data like rainfall, water level, transmissivity and resistivity data were collected from state ground and surface water resources data centre, Tamil Nadu.

To assess the present status of groundwater quality, sixty three groundwater samples were collected from four districts during the months of January 2007 and June 2007. These water samples were analysed for various physio chemical parameters like pH, Total Dissolved Solids (TDS), Electrical Conductivity (EC), chlorides, calcium, magnesium, sodium, nitrate, hardness, iron, sulphate, fluoride and alkalinity by adopting American Public health Association (APHA) procedures and the results were compared with Indian Standard (IS) procedures. Factor analysis was also carried out for the analysed data.

The various thematic maps were given weightage and assigned ranking depending upon the potential importance for the assessment of groundwater. The groundwater potential and artificial recharge sites were identified by integrating available maps like geology, geomorphology, slope, drainage density, lineament density, land use/land cover map, rainfall and water level by using weighted overlay analysis.

Vertical Electrical Sounding (VES) tests were conducted at fifty two locations using Schlumberger configuration. Based on the results the variations in weathered thickness and depth to basement in the study area were determined to identify the groundwater potential zones and artificial recharge sites.

A model was created using fuzzy logic for identifying artificial recharge sites. Geology, lineament density, land use/land cover, geomorphology, soil, drainage density, slope, rainfall, and groundwater level were given as input to identify the suitability of artificial recharge sites in the study area.

The physiochemical analysis of groundwater revealed that, there were variations in different parameters in different periods (premonsoon and postmonsoon). Most of the groundwater sources were highly polluted and they were not suitable for drinking and irrigation except in few locations. It was mainly due to the discharge of untreated effluent from dyeing and bleaching industries, which were located in an unorganised manner throughout the river basin.

The result concludes that most of the study area was covered by moderate to good category for both groundwater potential zones and artificial recharge sites based on GIS analysis and moderate category for both groundwater potential zones and artificial recharge sites based on electrical resistivity methods.

It is suggested that, proper rainwater harvesting and artificial recharge methods should be implemented in the moderate to very good potential zones to overcome the water scarcity problem in the study area.