

## **GEOCHEMICAL ANALYSIS AND MODELING OF GROUND WATER**

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**Abstract**— The study with respect to hydrogeology need got unusual socioeconomic noteworthiness on India may be currently that biggest extractor for groundwater in the Earth's planet. The effect of overexploitation of the groundwater resources asset may be surfacing in extensive parts of the country. In the form of aquifer water level is going under depth also decreasing the yield and quality. In the recent years, wide investigations have been suggested this field from claiming geoscience. We have talk about these in different segments, after enumerating the wide hydrological skeleton about India. The sections are a) Groundwater elements contaminations, b) Groundwater modeling and c) Groundwater studies through remote sensing and GIS technological applications. The conclusion of the investigation will help in evaluating the groundwater chemistry complexities in its whole scale and also offers insight into the ways for sustainable management of groundwater quality resource of the country.

**Keywords**—Groundwater, Earth's Planet, Aquifer, Modeling, Remote sensing, Geographic Information System (GIS).

### **I. INTRODUCTION**

India, spanning over give or take 3. 2 million km<sup>2</sup>, Exhibits totally assortment about rock types, going starting with. Late stores along those surge plain from claiming river, air borne. Sediments are continuously deposited of the sea side. A percentage of the most seasoned volcanic rock and Changeable suited about rocks of the globe. To understanding the variety of rock types there. Will be totally variety over hydrogeological settings of Groundwater origin and occurrence stream administration and a totally.

### **II. CRYSTALLINE HARD ROCK AQUIFERS**

Granite, gneisse and the suite of metamorphic rocks including khondalites and charnockites as well as consolidated Precambrian sedimentaries such as Vindhyan and its equivalents fall under this category. Weathered zone and the underline fracture system form good aquifers. The fracture system in these aquifers includes fractures; joints, bedding planes etc. and they are encountered even beyond 400 mbgl. The fractures when densely zoned and interconnected forms potential aquifer. But generally the fractures are anisotropically distributed and targeting groundwater poses a challenge. The weathered zone thickness generally varies from 10 to 30 m and holds some groundwater potential and developed through dug wells.

### **III. RESEARCH IN HYDROGEOLOGY**

Significant works are going on in this domain on wide ranging subjects, from aquifer characterization, targeting potential aquifer, rock-water interaction, groundwater contamination, recharging aquifers and use of state of the art tools. The researches carried out in the last five-six years have been captured and grouped in nine categories as below.

A large number of researches have been done on hydrogeochemical evaluation of groundwater distribution of various contaminants such as nitrate, fluoride and uranium. In a study, Manikandan et al., (2014) investigated Krishnagiri district of Tamil Nadu, India and found that higher values of fluoride were associated with Mg-Na-HCO<sub>3</sub> type facies. Further, they linked this to weathering of biotite, hornblende and apatite/ hydroxyapatites from the charnockites found in the study area. The genestic rock is a more source for distribution of fluoride in Nalgonda district,

Telangana state was discussed by Brindha et al., (2010). Dar et al., (2011) reported fluoride concentration in various from 1 to 3.24 mg/L in parts of Palar River basin in Kancheepuram district of Tamil Nadu.

The Total Dissolved Solids in the region was found to be in the maximum and minimum 70 to 467 mg/L. Mukherjee et al., (2011c) use for statistical implementation to characterized of groundwater chemistry. Rina et al., (2011), Singh et al. (2012a and 2012b) studied geochemical studies of groundwater. Avtar et al., (2012) to understand the groundwater chemistry with help of statistical tools in Bundelkhand region. Patel et al. (2016) used factor statistical analyses to evaluate the groundwater quality studies in Swarnamukhi river basin, Andhra Pradesh.

Prasanna et al., (2011), Sonkamble et al., (2012), Brindha et al., (2013), Kumar et al., (2014), Brindha and Kavitha (2014) and Rajesh et al., (2015) has to be geochemical relationship of aquifer is mainly depends up on the rock formation. The various lithology such as schist, gneiss, basalt and granite domains.

Keesari et al., (2014) studied the groundwater chemistry of isotopic composition in dry region of western India. The spatial variation of bromide in the hard rock aquifers in groundwater has been studied by Brindha and Elango (2013). They opined that the sources of bromide are granitic rocks (Rock water interaction) and fertilizers (Anthropogenic activities).

The environmental significant study, Thivya et al., (2016) evaluated uranium concentration in groundwater, the effect of lithology on geochemistry and factors controlling its distribution in granitic aquifers of Madhrai district, Tamil Nadu. Mondal and Singh (2011a and 2011b) reported with the geochemical quality analysis of groundwater in a tannery belt in Southern India. It was found that the quality of groundwater around the tannery cluster deteriorated mainly due to the extensive use of salts.

#### **IV. GROUNDWATER MODELING**

Modeling is widely used for application of hydrogeological study. It is used for study about the environmental impact of the groundwater system. Senthilkumar and Elango (2013) used groundwater predicate modeling to evaluate and future prediction of groundwater element concentration. Rao et al., (2014) studied numerical modeling for monitoring long-term groundwater resources in the Godavari basin of India. Shekhar and Rao (2010) discusses about the issues related to groundwater modeling in Palla well field of Delhi.

#### **V.REMOTE SENSING AND GIS APPLICATION**

Groundwater identification through satellite image and its relatively thematically maps such as geomorphology, lineaments, lineament density, drainage, drainage density, land use/land cover, slope, elevation, digital elevation model, relief etc..., these are also used GIS technology. Anbazhagan and Jothibas (2014) study carried out to understand the groundwater prospective zonation mapping in the Uppar Odai sub-basin in Amravati River basin, India. The above mentioned thematic maps prepared from IRS P6 LISS III satellite data. This was further integrated with resistivity data for creation of groundwater possible map. Chowdhary et al. (2009) had applied high end technology is remote sensing and GIS used to locate the groundwater possible zones in Medinipur district of West Bengal.

Magesh et al., (2012) was used integration analysis of the remote sensing data on geographical information system platform for the exploration of groundwater in Theni district, Tamil Nadu. Deepika et al., (2013) identified the groundwater prospective zones of Gangolli bairn of Karnataka. Similarly with the help of remote sensing and GIS, Avinash et al. (2011) research work was carried out in Gurgur river basin of Karnataka, India. Varade et al. (2012) research work was carried out to locate the site selection for artificial recharge structures such as gully plugs, earthen check dams, continuous contour trenches, percolation tanks, cement bandhara, afforestation and farm ponds in Nagpur district of Maharashtra using remote sensing and GIS technology.

In addition to remote sensing and GIS techniques using by Vittala et al., 2013 and in Punjab by Mukherjee et al. (2011b). Remote sensing in a GIS platform was tried in alluvial aquifer studied was successfully completed by Ganapuram et al., (2009) and Saha et al. (2006).

Gopinath et al. (2014) had applied geospatial technology in drought monitored by NDVI mainly using Terra satellite products in southern parts of India. Rajaveni et al. (2015) researched on delineating groundwater perspective zones in Nalgonda district of Telangana state. Mukherjee and Veer (2014) has applied artificial neural network and image processing for development of water resource management plan in parts of Hindon basin. Further, Mukherjee et al., (2015b) discussed about application of geospatial and geostatistical techniques for groundwater potential zone delineation.

## VI. CONCLUSION

It is concluded that the high concentration of fluoride element in groundwater is mainly restricted to arid and semiarid regions of the some basins. Further, fluoride contamination in groundwater has been generally observed in hard rock region of southern India. Hard rock areas also demonstrate overexploitation of the groundwater resources in certain places. Remote sensing and GIS technology is a successful tool for groundwater exploration mainly in hard rock areas of the country. The efficiency of geochemical contamination future prediction modeling and numerical modeling for groundwater resource management studies has been established in different environments in India.

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