Journal of The Gujarat Research Society
ISSN: 0374-8588
volume 21 Issue 7, July 2019

EVALUATION OF GROUNDWATER QUALITY IN THE CIHANBEYLI BASIN, KONYA, CENTRAL ANATOLIA, TURKEY

Dr.Greema Michael
Department of Humanities
Jain (Deemed-to-be University), Ramnagar District, Karnataka - 562112
Email Id- greema22.222@gmail.com

Abstract

The Cihanbeyli basin is located in the northern part of Konya in the Central Anatolian region, Turkey and is characterized by semi-arid climatic conditions and scarcity in water resources. The appropriateness of groundwater quality for drinking and horticultural purposes in the Cihanbeyli bowl was surveyed by estimating physicochemical boundaries, including significant cation and anion structures, pH, all-out broke down strong, electrical conductivity, and all-out hardness. For this reason, 54 examples were gathered from various sources viz. profound wells, shallow wells, and springs. Results from hydro chemical examinations uncover that groundwater is generally influenced by pungent what're more, gypsiferous lithology's. Evaporite minerals, for example, gypsum, anhydrite, and chloride salts make high commitments from the revive zones (west, northwest, and southwest parts) close to the release zone (focal and eastern parts). High estimations of all-out broke down solids in groundwater is related with high groupings of all significant particles. A correlation of groundwater quality comparable to drinking water norms demonstrated that the majority of the water tests are not appropriate for drinking. In light of sodium retention proportion esteems and percent sodium, saltiness has all the earmarks of being liable for the poor groundwater quality, delivering a large portion of the examples unacceptable for water system utilization. It is presumed that vanishing and mineral disintegration are the primary cycles that decide significant particle syntheses.

Keyword: *Cihanbeyli basin Hydrogen chemistry Groundwater quality SAR Central Anatolia*

I. INTRODUCTION

Because of the steadily expanding interest for consumable and water system water and the deficiency of accessible surface water, the significance of groundwater is expanding dramatically (Nagarajan et al. 2010). Groundwater quality, i.e., of disintegrated particle content, is generally influenced either by regular geochemical qualities, including atmosphere,

ISSN: 0374-8588
volume 21 Issue 7, July 2019

lithology, mineral enduring, nature of geochemical responses, solvency of salts, disintegration/precipitation responses, particle trade, wet and dry affidavit of barometrical salt, and vapor transpiration, or by different anthropogenic exercises, for example, horticulture, sewage removal, mining and mechanical squanders (Singh and Chandel 2006; Nisi et al. 2008; Jiang furthermore, Yan 2010). Escalated development and metropolitan improvement have caused an appeal on groundwater assets in parched and semiarid areas of Turkey and the world, while putting these assets at a more serious danger of defilement (Giridharan et al. 2008; Tayfur et al. 2008[1]; Aghazadeh and Moghaddam 2010). Subsequently, to use and secure significant water sources viably and foresee the change in groundwater conditions, it is important to comprehend the hydro chemical boundaries of groundwater, for example, pH, electrical conductivity (EC), absolute disintegrated solids (TDS), sodium assimilation proportion (SAR), complete hardness (HT), major anion (CO32-, HCO3-, Cl-, and SO42-) focuses, what's more, significant cation (Ca2?, Mg2?, Na?, and K?) focuses (Prasanna et al. 2010; Guendouz et al. 2003; Edmunds et al. 2006). The examination territory is situated in the western piece of the Salt Lake in the Konya shut bowl, in the Central Anatolian area of Turkey and lies between north scope and east longitude Height ranges between 905 m and 1,060 m above ocean level (a.s.l). The investigation zone has a semi-dry atmosphere with cold winters also, moderate to sweltering summers. The 20-year (1989–2009) normal precipitation in the Cihanbeyli bowl is 312.8 mm, also, the normal temperature is 11.69 C. For the most part, the higher the geological rise, the more the precipitation. Precipitation happens principally in the wet period, with the greatest in December and January. For the most part, the least precipitation is recorded in July and August[2]. As indicated by the Thorntwaite (1948) technique, 93.67 % of the precipitation is exposed to evapotranspiration, while the all out invasion furthermore, surface overflow involves just 6.33 % (Bozdag˘ 2010). Climatological conditions in the district demonstrate that the dissipation proportion is a lot higher than invasion. Geologic and hydrogeologic settings Information on hydrogeological qualities of lithologic units are by and large dependent on field studies and data from the writing. The Middle Triassic-Upper Cretaceous storm cellar rocks moving N–S, whichharvest out at the south, west, and northwest edges of the bowl, comprise of serpentinite, quartzite, met sandstone, gabbro, and glasslike limestone blocks[3]. Following the cellar rocks, there is a depositional whole (Paleocene–Eocene) in the district. The youthful cover units over the cellar rocks shift between the Upper Paleocene and Quaternary. Cover units comprise of carbonated and clastic dregs just as volcanic and well of lava clastic units [3]. The stratigraphical arrangement and gives brief depictions of each geographical arrangement. The Upper Paleocene-Lower Eocene Eskipolatlı arrangement is made out of combination, sandstone, mudstone, shale, and mud[4]. The Oligo-Miocene Go¨kdag˘ arrangement is made out of combination, sandstone, mudstone, claystone, what's more, gypsiferous mud. The Lower Miocene Karacadag˘ volcanic, which comprise of andesite, basalt, volcanic breccias, furthermore, tuff, crop out at the higher height in the north of the locale. The Middle Miocene-Lower Pliocene I˙nsuyu arrangement is made out of alluvial stores, aggregate, sandstone, dirt, residue, marl, and limestone (Ulu et al. 1994). The limestones of the I˙nsuyu arrangement are broken and have karst structures, which range from 1–2 mm to over a couple meters[5]. The Upper Miocene-Pliocene Cataltepe andesite is just uncovered at Karadag˘ in the southeast of the zone. The Plio-Quaternary Cihanbeyli arrangement, which is

ISSN: 0374-8588
volume 21 Issue 7, July 2019

formed of combination, limestone with rock, sand, dirt, and gypsiferous dirt, is the horizontal vertical change with the Tuzgo¨lu¨ arrangement. The Tuzgo¨lu¨ arrangement is made out of rock, sand, dirt, residue, and gypsum. Gypsum layers broaden kilometers the horizontal way (Ulu et al. 1994). Dirts in the Go¨kdag˘, I˙nsuyu, Cihanbeyli, and Tuzgo¨lu¨ arrangements contain gypsum minerals (O¨ zsayın and Dirik 2007; Ulu et al. 1994). Quaternary travertines have an arch shape and are found upper east of the Bolluk Lake. Alluvium is uncovered through the I˙nsuyu Creek and around the Yeniceoba locale. The main structural designs are the Cihanbeyli flaw zone and the Yeniceoba issue zone, which comprise of a bunch of equal dunk slip blames and reach out in the northwest–southeast heading in the area (O¨ zsayın and Dirik 2007). All the springs are released from limestones that have a place with the I˙nsuyu development along the Cihanbeyli flaw zone and establish the I˙nsuyu Creek. The springs' stream rates differ between 11–80 l/s in the dry season and 13–95 l/s in the stormy season. The Bolluk Lake created inside a graben framed by plunge slip ordinary shortcomings (around NNE–SSW course) in the eastern and the western edge of the lake (Dirik and Erol 2000). The translucent limestones having a place with the Koc¸yaka arrangement have great porousness because of breaks and breaks, while modified serpentine and met sandstone are impermeable. In the Eskipolatlı and Go¨kdag˘ developments, the penetrable units are aggregate and sandstone, and the impermeable units are mudstone, shale, and earth[6].

II. DISCUSSION

Understanding the groundwater quality is significant for what it's worth the primary factor deciding its appropriateness for drinking, homegrown, horticultural, and modern purposes (Subramanian et al. 2005; Alam et al. 2011). Delineates the physicochemical boundaries of groundwater in the Cihanbeyli bowl demonstrating the base, most extreme, normal, and standard deviation esteems. The qualities were contrasted and the WHO (2004) and TSE (1997) guidelines[7]. Significant particles science the aftereffects of the compound investigation of the groundwater of the territory show a wide variety in various person boundaries. The pH estimation of groundwater tests goes from 6.52 to 8.88 with a normal estimation of 7.70. This shows that the groundwater in the investigation zone is by and large impartial to somewhat basic. Groundwater temperatures shift from 14 to 21 C with a normal estimation of 17.37 C. Just one (test 11) shows pH esteem over the WHO (2004) standard. For groundwater, conductivity is straightforwardly identified with the centralization of particles present in it. Higher conductivity may be credited to high saltiness and high mineral rate in groundwater tests, which are by and large because of the particle trade and solubilization measure occurring inside the springs (Sanchez-Perez and Tremolieres 2003). EC of groundwater tests shows that a higher fixation was noted in the focal and eastern piece of the investigation region. EC of water in the examination territory shifts from 521 (test 19) to 9,305 lS/cm (test 30) at 25 C with a normal estimation of 2,511 lS/cm. The arrangement of groundwater based on EC. 42.60 % of the examples are inside as far as possible, what's more, 25.92 % of the examples are not inside the allowable limit, yet they are hardly poor in quality. Of the tests, 31.48 % can be named perilous agreeing to the WHO (2004) standard. To find out the appropriateness for groundwater of any reason, it is fundamental to arrange the groundwater contingent on its hydro

Journal of The Gujarat Research Society
ISSN: 0374-8588
volume 21 Issue 7, July 2019

chemical properties dependent on the TDS esteems (Davis and Dewiest 1966; Freeze and Cherry 1979) which are spoken to in Table 5. The TDS of the groundwater quality guide was readied (Fig. 4b). The TDS of the water tests goes from 322 to 7,888 mg/l with a normal estimation of 1,803 mg/l. As per the Freeze and Cherry (1979) order, 46.30 % of the groundwater tests are new water and the rest are saline water. The admissible constraint of TDS for drinking water is 1,000 mg/l as per the WHO (2004) standard, and 53.70 % of the tests have a higher TDS esteem than this breaking point[8].

III. CONCLUSION

The predominant elements in controlling groundwater hydro geochemistry are synthetic enduring and vanishing in the examination territory. The hydro chemical examination demonstrates that groundwater saltiness is variable, with zonation along the groundwater stream course from the energize zone to the release territory. The water types advance from HCO3, HCO3 – Cl, or HCO3 – 2SO4 types with low TDS, under 1,000 mg/l, in the revive regions. The 2SO4 – HCO3 water type has a normal TDS of 1,842 mg/l in revive and release regions. The 2SO4 furthermore, 2SO4 – Cltypes have a normal TDS of 2,896 mg/l in the focal locale. At last, The Cl and Cl – 2SO4 types have a normal TDS of 2,965 mg/l in the focal and eastern parts, which are the groundwater release territories. Both evaporate minerals, for example, gypsum, anhydrite, and chloride salts make high commitments from the revive territories (west, northwest, and southwest parts) at the release zone (focal and eastern parts). In view of bunch investigation, two primary gatherings of groundwater types can be recognized: (1) the high saltiness water type in the focal and eastern piece of the bowl and (2) the low saltiness water type in the revive territories. The significant particle science information uncovered that the groundwater in the examination territory is "difficult to extremely hard" and "new to harsh" in nature. In light of TDS and HT, 53.70 and 51.85 % of the groundwater tests surpassed the WHO (2004) and TSE (1997) guidelines, separately. Twenty examples surpassed the TSE (1997) standard for sodium, while 12 examples surpassed the TSE standard for potassium. Of the groundwater tests, 18.50 and 20.37 % surpassed the greatest passable cutoff for Ca2? Also, Mg2? Individually. Likewise, of the examples, 53.70, 44.44, and 22.22 % surpassed the greatest reasonable breaking point for drinking water of SO42-, Cl-, and NO3, separately. In view of the Wilcox (1955) grouping, 53.71 % of the groundwater tests have a place to the "astounding to great" and "great to passable" classes. Of the examples, 31.48 % have unacceptable water system water quality. The scientific information plotted on the US the saltiness chart shows that 40.74 % of the groundwater tests fall in the field of C3S1, demonstrating medium-high saltiness and low sodium. Of the examples, 16.67 % fall in the field of C2S1, showing medium saltiness and low sodium. Besides, 14.81 and 12.96 % fall in the fields of C4S2 and C4S1, separately, showing high saltiness and low to medium sodium. In conclusion, 9.26 and 5.56 % of groundwater tests fall in C4S3 and C4S4 fields, separately, and are not reasonable for water system. In light of the order of water system water as indicated by RSC esteems, all the examples have a place with the great class. As indicated by PI esteems, all the examples are appropriate for water system purposes. Kelly's list shows that 83.33 % of the examples are appropriate for water system, and 16.67 % of the tests are inadmissible for water system. In view of the order of water system water as per MH esteems, 64.8 % of the examples can be ordered as unacceptable for water system. Therefore, a larger part of the groundwater with the arrangement of bunch 1 isn't appropriate for drinking also, water system because of high convergences, all things considered.

IV. REFERENCES

[1] M. Bodrud-Doza, A. R. M. T. Islam, F. Ahmed, S. Das, N. Saha, and M. S. Rahman, “Characterization of groundwater quality using water evaluation indices, multivariate statistics and geostatistics in central Bangladesh,” Water Sci., 2016, doi: 10.1016/j.wsj.2016.05.001.
[2] S. Dahiya, B. Singh, S. Gaur, V. K. Garg, and H. S. Kushwaha, “Analysis of groundwater quality using fuzzy synthetic evaluation,” J. Hazard. Mater., 2007, doi: 10.1016/j.jhazmat.2007.01.119.
[3] W. M. Edmunds and P. Shand, Natural Groundwater Quality. 2009.
[4] S. Ponsadailakshmi, S. G. Sankari, S. M. Prasanna, and G. Madhurambal, “Evaluation of water quality suitability for drinking using drinking water quality index in Nagapattinam district, Tamil Nadu in Southern India,” Groundw. Sustain. Dev., 2018, doi: 10.1016/j.gsd.2017.10.005.
[5] K. S. Rawat and S. K. Singh, “Water Quality Indices and GIS-based evaluation of a decadal groundwater quality,” Geol. Ecol. Landscapes, 2018, doi: 10.1080/24749508.2018.1452462.
[6] I. Tubau, E. Vázquez-Suñé, J. Carrera, C. Valhondo, and R. Criollo, “Quantification of groundwater recharge in urban environments,” Sci. Total Environ., 2017, doi: 10.1016/j.scitotenv.2017.03.118.
[7] D. Machiwal, V. Cloutier, C. Güler, and N. Kazakis, “A review of GIS-integrated statistical techniques for groundwater quality evaluation and protection,” Environ. Earth Sci., 2018, doi: 10.1007/s12665-018-7872-x.
[8] J. H. Hoover, P. C. Sutton, S. J. Anderson, and A. C. Keller, “Designing and evaluating a groundwater quality Internet GIS,” Appl. Geogr., 2014, doi: 10.1016/j.apgeog.2014.06.005.