



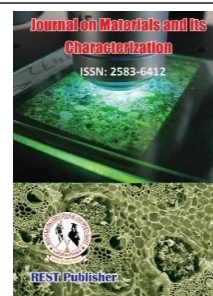
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Krishnagiri District, Tamil Nadu, Groundwater Quality Status in relation to MCDM System Pollution

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Abstract: Groundwater quality is important, because it is drinking water, domestic, for agricultural and industrial purposes determine its suitability is an important factor. In the northern and eastern parts of Krishnagiri district, Ground water drinking water and Assessment of suitability for irrigation. Groundwater samples were collected in the study area. Like is pH, TDS, TH, Sulphate, Chloride, Calcium, Magnesium By evaluating the physicochemical parameters Ground water quality assessment has been carried out. Water quality is assessed using MCDM and most models the results reveal that it is suitable for irrigation. Based on these parameters, Groundwater is assessed as suitable for its drinking and irrigation purposes. The source of most fluoride is rocks especially from shear zones due to ion leaching from biotite-rich fractions More common. The results suggest that groundwater quality in the vicinity of shear zone needs to be study in detail. The objective of this thesis is for solving Scale weights are about interval-valued GRA numbers MCDM problems with unknown information are an extension of the Gray Relational Analysis (GRA) method. Of the traditional GRA method basic idea, Determination of scale weights, basically some optimization models are established. Traditional from this analysis Basic idea of GRA method Determines the long-range solution from the short-range and negative-best solution, but the comparison of these distances is not considered significant. Krishnagiri Taluk, Pochampalli Taluk, Uthangarai Taluk, Hosur Taluk, Denkanikottai Taluk, Bargur Taluk, taken this alternative in this method and evaluation parameters is pH, TDS, TH, Sulphate, Chloride, Calcium, Magnesium. Krishnagiri Taluk is got first rank so Krishnagiri district this water best in the area.

Keywords: Water Quality, GRA, Sulphate.

1. INTRODUCTION

Groundwater, the world's largest source of fresh water after glaciers and polar ice, for domestic, horticultural, agricultural and hydroelectric purposes of the people of Tamil Nadu in socio-economic life plays an important role. Suitability of for different purposes Groundwater depends on its intrinsic quality, it is the atmosphere, soil and rock weathering and Reflects the inputs of anthropogenic activities. Ignorance of the public about the environment and attitudes towards it, Indiscriminate disposal of human waste, Agricultural chemicals and improperly refined Unplanned use of sewage discharge leading to degradation of surface and ground water. Value of ground water Its widespread occurrence and not just in availability, Also its consistent good quality. Once a contaminant enters the surface environment, it has been hidden for years, spread over large areas of groundwater, Due to groundwater consumption Not applicable for other applications. Hydrochemistry Source of water, it is volatile amount, rock and mineral types and The reaction varies depending on the time of contact with the minerals. To know its suitability for various purposes, Water quality assessment is very important. The study area is the state of India Located in the northern part of Tamil Nadu and lies between the north-eastern parts of Krishnagiri district. The study area is drained by the Barkur and Mathur rivers. These two rivers merge at the south-east corner, There the Bambar river formed and finally Connects with Ponnaiyar. The topography of the region consists of fracture zones characterized by massive rocks such as alkali syenites and Ultramafic Complexes First juvenile to dolerite A wide sequence of litho units up to intrusions is emerged in the study area. Also, an intruder The volcanic complex is Proterozoic in age, Younger Dykes and in Barkur and Motored river channel Recent sedimentary layer cover other areas of geography. Without sharp variations in the region It has a subtropical climate. The temperature varies 40 Celsius in summer to 20 Celsius in winter. In small water bodies

in Krishnagiri and Vellore districts Groundwater samples were collected from some wells. Out of 31 well sites, most of the wells are in Ponnaiyar, In the vicinity of minor tributaries of the Barker and Mettur rivers or are located nearby. At regular intervals Water Samples Collected gradually. The samples were stored in plastic bottles; they are pre-cleaned Distilled with 1 N hydrochloric acid Rinse with water 3-4 times. Using sustainable methods for water and wastewater analysis the water was analyzed. EC and pH are 0.1 and respectively Calibrated for Eleco Portable Water quality analyzer using a thermometer Measured in the field. Electrical conductivity (EC) By multiplying by a factor Total Dissolved Solids (TDS) is calculated. Total hardness (TH) CaCO₃ and is calcium (Ca). using standard EDTA Analyzed titrimetrically. Between magnesium (Mg) total hardness (TH) and calcium (Ca) concentrations The difference is calculated by taking the value. chloride (Cl) by standard AgNO₃ titration determined titrimetrically. In the present study, Krishnagiri The study area covers a in the district. District also textile, Tanneries and such as small scale dye industries have large industrial profiles. Effluents from tanneries, Agriculture and Small, For small industries Use of chemical fertilizers It greatly affects the quality of drinking water. Water resources available to the people living along the banks of the river have been greatly affected.

2. WATER QUALITY

For all beings Water quality plays an important role. The quality of surface water in a region Depending on the rainfall rates, By weather processes and natural processes Managed soil erosion, Urban, industrial and agricultural activities and human exploitation of water resources Anthropological Effects 1-5. Rapid increase in population, rapid industrialization, unplanned urbanization, Pollution from uplands to lowlands, fertilizers in agriculture and excessive use of pesticides Ground water quality has become an important water resource issue. Groundwater is widely distributed on Earth, Renewable and one of Most important resources. It is generally considered less polluted Compared to other inland water sources, but ground water is completely Studies have shown that it is not immune to contamination; However, it is suspended May contain no solids. Groundwater is a major problem Once contaminated; It is difficult to restore its quality. Hence the protection of ground water quality and There is a need and concern to manage. Since many water quality parameters are dependent 7,8, It is well known that direct causes of water quality deterioration cannot be posited. between different parameters There are strong correlations and of their interactions Combined effect refers to water quality. Ground water quality in industrial areas by measuring the concentration of some physico-chemical parameters, with drinking water standards Also determined by comparison. For parameters with significant correlation coefficients, to estimate the concentration of other elements The developed regression equations can be used successfully. Correlation of water quality parameters and systematic examination of regression coefficients, in addition to assessing overall water quality, by measuring the relative concentration of various pollutants in water, to implement rapid water quality management programs It also helps to provide necessary references. In this present study, the study area to assess and improve ground water quality an attempt has been made, through this correlation of various physico-chemical parameters and analyzes the regression analysis. Hydrogen ion concentration (pH): The pH value of the water source Measurement of hydrogen ion concentration of water and indicates whether the water is acidic or alkaline. Most biology and chemical reactions are affected by the pH of the water system. All groundwater samples in the present study had pH values between 7.5 -8.9. For drinking water by BIS A constant value of pH is 6.5 - 8.5, WHO ranges between 7.0-8.5. S1 and S 10 samples have pH value above Permissible limits. If the pH is outside the permissible range, it damages the mucous membrane of the cells. Total Dissolved Solids (TDS): Due to the presence of all inorganic and organic substances Total dissolved solids in water. Solids include iron, manganese, magnesium, potassium, Sodium, Calcium, Carbonates, Bicarbonates, Chlorides, Phosphates and may contain other minerals. Higher values of TDS are for humans They cause gastrointestinal irritation, but Prolonged consumption of water with high TDS It can cause kidney stones and heart diseases. In the present analysis, TDS values ranged from 627 to 2336 mg/l. The most desirable limit of TDS is 500 mg/l and The maximum permissible limit is 1500 mg/l. For all groundwater samples The TDS value was within the permissible limit of 1500 mg/l. Total Hardness (TH): Water hardness is water and carbonates, Bicarbonates, sulfates and Refers to the aesthetic quality of calcium and caused by magnesium chlorides. This prevents foaming with soap and increases the boiling point of water. of total hardness for drinking The maximum permissible limit is 300 mg/l (BIS). Hardness up to 75 mg/l is classified as soft; 76 - 150 mg/l moderate, 151 - 300 mg/l severe and more severe if above 300 mg/l. Hardness above 300 mg/l is heart and cause kidney problems (Bhattacharya et al., 2012). Total hardness ranged from 156 - 546 mg/l in groundwater samples collected from Study area. In the study area, 58% of groundwater samples were very hard, hence proper treatments are required before use. Chloride (Cl): Chloride plant in ground water or may be caused by household waste. Chloride concentration in wastewater Acts as an indicator of contamination. Soil porosity in forming chloride concentration and penetrability plays an important role. Agricultural crops with high chloride content in water bodies, Metal pipes and can harm Due to heart and kidney diseases Affected people (Chapolikar et al. 2010). Chloride content varies from 45-660 mg/l. Most groundwater samples showed Approved by WHO Chloride concentration within the limit (250 mg/l), It is less chloride Indicates pollution. Chloride concentration is slightly higher in groundwater samples S3 and S5, it causes some physical disturbances.

Calcium (Ca): Rock, limestone and industrial wastes Rich sources of calcium leaching into groundwater. In proper bone development Calcium plays an important role. According to WHO, calcium is allowed The limit is 100 mg/l. Concentration of calcium in the region varies from 46-210 mg/l.

3. GRA METHOD

The method of Gray Relational Analysis (GRA) first developed by Deng and is successful used to solve various MCDM problems. GRA's performance of all alternatives first must be translated into a relative order. This step is gray relative is called creation. According to these sequences, a great destination the sequence is penalized. Then, for all comparison sequences the gray correlation coefficient between the best target sequences is calculated. Finally, this gray communication Based on the coefficients, for better target order between each comparison sequence Gray correlation degree is calculated. Translated from an alternative a comparative sequence between the ideal target line and itself High levels of gray contact, that alternative is the best choice. We solve MCDM problems We propose an extended GRA method, where quantitative values are in the form of linguistic variables as interval values are expressed and information about quantitative weights is not known. Are expressed as interval values of traditional GRA Based on the basic idea, some optimization models to determine criterion weights have been established. A comparative sequence translated from a substitution then, for the computational Extended for MCDM Steps of GRA method, Sort the alternatives and select the preferred one Interval-valued triangular fuzzy estimate are presented. Summarize the GRA method Introducing Interval-valued with unknown weights describes MCDM problems The GRA method was developed to solve of the proposed method to explain compatibility, for a software company Select Computer Analysis Engineer a numerical example including the application is investigated. Gray Relational Analysis (GRA) in general Used in Asia. It is an impact assessment model; it is based on the degree of relationship between two orders Measures the degree of similarity or difference. The purpose of GRA is the study of factors affecting systems. It is independent and correlated data based on finding relationships in series. Using GRA, GRC (Gray Correlation Coefficient) is used to estimate Reference series and relationships between series.

4. ANALYSIS AND DISCUSSION

TABLE 1. Data Set

	PH	TDS	TH	SULPHATE	CHLORIDE	CALCIUM	MAGNESIUM
Krishnagiri Taluk	8.1	1850	535	145	248	63	346
Pochampalli Taluk	6.9	735	495	93	402	147	378
Uthangarai Taluk	7.6	1050	455	134	442	154	249
Hosur Taluk	7.3	1754	376	64	384	88	432
Denkanikottai Taluk	6.1	1522	549	119	267	163	102
Bargur Taluk	6.8	1171	324	104	368	93	137

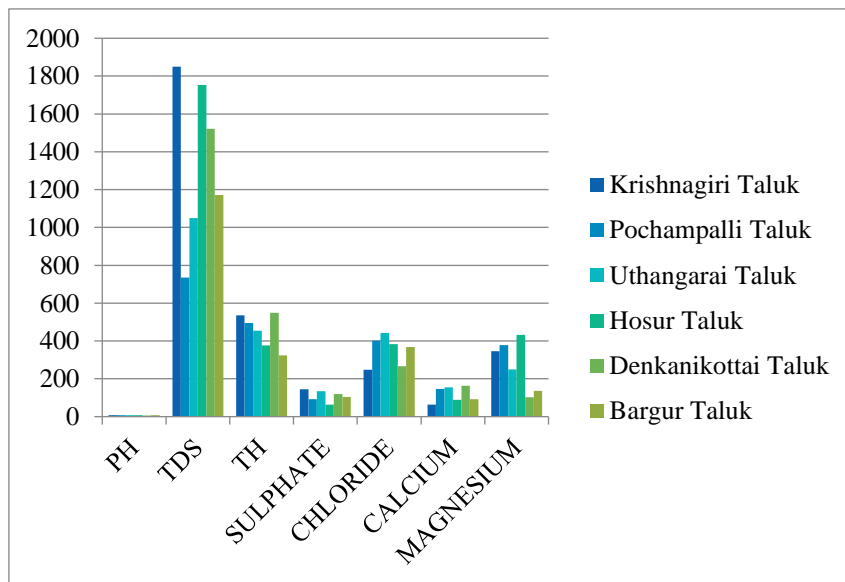


FIGURE 1. Graph for data set

Table 1 shows that the data set Krishnagiri Taluk, Pochampalli Taluk, Uthangarai Taluk, Hosur Taluk, Denkanikottai Taluk, Bargur Taluk, taken this alternative in this method and evaluation parameters is pH, TDS, TH, Sulphate, Chloride, Calcium, Magnesium. Krishnagiri Taluk pH value is high and Denkanikottai Taluk TDS value is low. Krishnagiri Taluk TDS value is high and Pochampalli Taluk pH value is low. Figure 1 is show in data set graph.

TABLE 2. Normalized Data

	PH	TDS	TH	SULPHATE	CHLORIDE	CALCIUM	MAGNESIUM
Krishnagiri Taluk	1.0000	1.0000	0.9378	1.0000	0.0000	0.0000	0.7394
Pochampalli Taluk	0.4000	0.0000	0.7600	0.3580	0.7938	0.8400	0.8364
Uthangarai Taluk	0.7500	0.2825	0.5822	0.8642	1.0000	0.9100	0.4455
Hosur Taluk	0.6000	0.9139	0.2311	0.0000	0.7010	0.2500	1.0000
Denkanikottai Taluk	0.0000	0.7058	1.0000	0.6790	0.0979	1.0000	0.0000
Bargur Taluk	0.3500	0.3910	0.0000	0.4938	0.6186	0.3000	0.1061

Table 2 shown that the normalized data for Krishnagiri Taluk, Pochampalli Taluk, Uthangarai Taluk, Hosur Taluk, Denkanikottai Taluk, Bargur Taluk. These values are calculated using by formulas

TABLE 5. Deviation sequence

	PH	TDS	TH	SULPHATE	CHLORIDE	CALCIUM	MAGNESIUM
Krishnagiri Taluk	0.0000	0.0000	0.0622	0.0000	1.0000	1.0000	0.2606
Pochampalli Taluk	0.6000	1.0000	0.2400	0.6420	0.2062	0.1600	0.1636
Uthangarai Taluk	0.2500	0.7175	0.4178	0.1358	0.0000	0.0900	0.5545
Hosur Taluk	0.4000	0.0861	0.7689	1.0000	0.2990	0.7500	0.0000
Denkanikottai Taluk	1.0000	0.2942	0.0000	0.3210	0.9021	0.0000	1.0000
Bargur Taluk	0.6500	0.6090	1.0000	0.5062	0.3814	0.7000	0.8939

Table 5 shown that the deviation sequence values. Is calculated that the formulas.

TABLE 6. Grey Relation Coefficient

	PH	TDS	TH	SULPHATE	CHLORIDE	CALCIUM	MAGNESIUM
Krishnagiri Taluk	1.0000	1.0000	0.8893	1.0000	0.3333	0.3333	0.6574
Pochampalli Taluk	0.4545	0.3333	0.6757	0.4378	0.7080	0.7576	0.7534
Uthangarai Taluk	0.6667	0.4107	0.5448	0.7864	1.0000	0.8475	0.4741
Hosur Taluk	0.5556	0.8531	0.3940	0.3333	0.6258	0.4000	1.0000
Denkanikottai Taluk	0.3333	0.6296	1.0000	0.6090	0.3566	1.0000	0.3333
Bargur Taluk	0.4348	0.4509	0.3333	0.4969	0.5673	0.4167	0.3587

A zeta value is constant and the values of 0.5. Table 6 is given for a grey relation coefficient

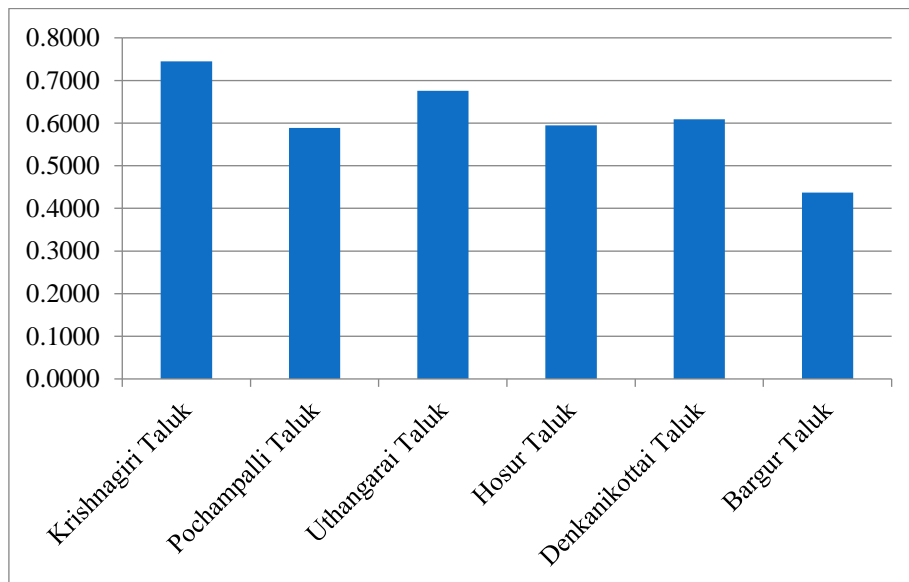


FIGURE 2. shown that the graph about GRA values.

TABLE 7. GRA values

Krishnagiri Taluk	0.7448
Pochampalli Taluk	0.5886
Uthangarai Taluk	0.6757
Hosur Taluk	0.5945
Denkanikottai Taluk	0.6088
Bargur Taluk	0.4369

Obtained by using formulas to calculated the GRG values, the result of the method was shown above.

TABLE 8. Rank

Krishnagiri Taluk	1
Pochampalli Taluk	5
Uthangarai Taluk	2
Hosur Taluk	4
Denkanikottai Taluk	3
Bargur Taluk	6

Table 5 shown that the values about the rank. Krishnagiri Taluk is first ranking and Uthangarai Taluk is water quality values. Figure 4 shown in ranking.

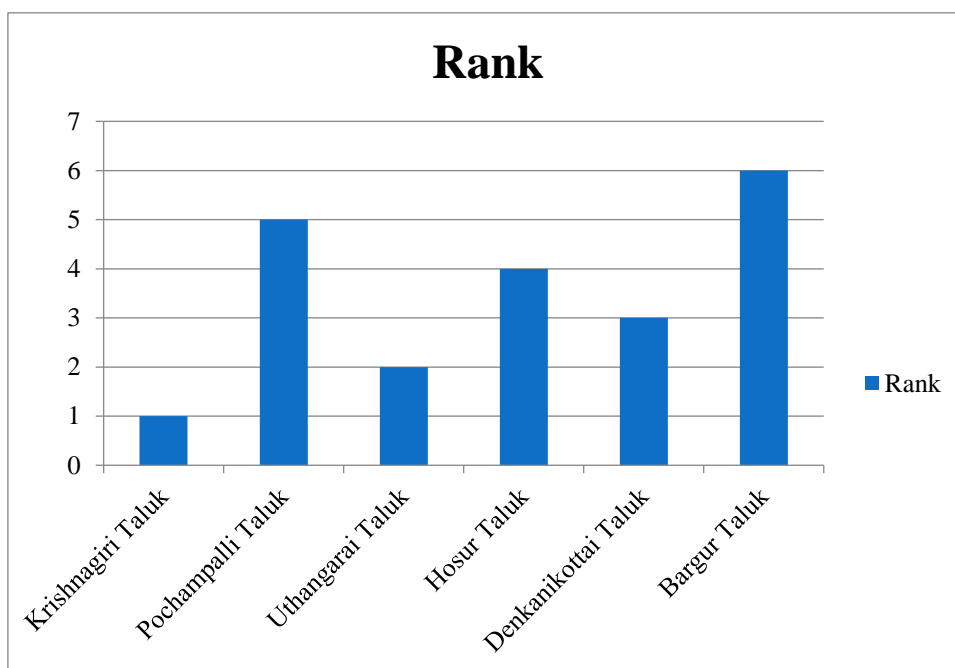


FIGURE 3. shown that the graph about rank

5. CONCLUSION

Cation chemistry of groundwater It shows that Cl is Except in some places Very high. The order of abundance is Na? [Mg²⁺? [Ca²⁺? [K? Ion chemistry of groundwater Except few samples show high chloride. Rock dissolution in the study area, Agricultural, domestic and other industrial effluents have contributed to the increase of Cl and Na Statistical analysis revealed that Permissible limits of the World Health Organization and Comparing the analysis results with BIS standards, In the sample 40% is non-potable water. governing the hydro geochemistry of groundwater and Makes it unfit to nearby Effluents from tanneries can drink etc Parental control and Anthropogenic Influence It is the main source of all hydro geochemical processes in the study area. This assumption is to solve environmental health problems in society Very helpful for water resource managers. The quality of water in the study area is safe for drinking, For home use, Also not suitable for irrigation. In the groundwater zone High concentration of fluoride is due to rock-water contact between the groundwater and the easy weathering of biotite and apatite formed by cutting the country rocks and the fluoride-bearing minerals. This result confirms the need to monitor groundwater contamination and treat fluoridated water. Areas adjacent to cut zones should also be monitored for fluoride in groundwater. From the result it is seen that Krishnagiri Taluk is

got the first rank where as is the Bargur Taluk is having the lowest rank. This paper showing, Krishnagiri Taluk better water quality in Krishnagiri district, Tamil Nadu.

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