Investigation on quality of groundwater of Malekan Plain

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Abstract

The Salinity of Malekan Plain groundwater increses towards Urumia Lake and become partically unusable even for agricaltural consumptions. Dissolution of aquifer matrix causes groundwater salinity, evaporation of groundwater and Urumia Lake Salin water intrusion. In order to the quality of groundwater of Malekan Plain a number of water samples have been analysed and their ionic ratio were compare with that of Urumia Lake waters.

With this comparison appears that ionic ratio in the end of plain is completely similar to Urumia Lake water. Also, various water diagrams have been prapared and the quality of groundwater for consumptions of drinking, agricaltural and industrial have been investigated. According to investigatation , with progresing towards Urumia Lake ,amount of salinity of groundwater is increasing, and in the border of Urumia Lake, water type is cloride.

Keywords: *Groundwater quality, Malekan Plain, ionic ratio, cloride, Urumia Lake water intrusion.*

Introduction

In arid countries and maybe in all over the world for the reason of insufficient quality and quantity of surface runoffs, it is inevitable to use under groundwaters. Malekan plain is located in southeast of East Azerbaijan into the geographical. Limitations as 37 until 37 15 norther altitude and 46 & 46 15 eastern longitude in the southeast of Urumieh lake. This plain is bounded from the north to sahand mountains and Maragheh - Bonab plain and also from the south to the leilan - chai stream and Mian – do - ab plain and from the east is bounded to Mahmood mountain range and from the west to Urumieh lake. This plain is formed from silty and clay fine grained alluvial sediments to coarse grained sand and gravel sediments related to 4th stage. The groundwaters of each region are taken into account as the most important reservoirs of freshwater. Neighbourhood of these waters with saline lakes would cause their pollution. Studying the quality of groundwaters in these regions and surveying the effect of saline lakes on the quality of their own groundwaters quality is very much important, (Bouwer. H, 1978). Locating of Malekan plain in southeastern margin of Urumieh Lake which has high salinity the existence of extensive. Agriculture activities in this plain and also high population accumulation in this region are some of encouraying causes to study the quality of groundwaters in this plain, (geological maps of Maragheho, 1975).

Discussion and conclusion

For surveying the quality of groundwaters in Malekan plain osampling was performed in 35 water resources which are existent in this plain generally from wells, springs and Karizs. To

determine the quality of groundwaters of this plain samples taken from differeht water resources was analyzed in the laboratory until determine Fundamental anions and cations. After analyzing the samples ionic fractions of each resource were computed and comparisoned with ionic fractions of Lakewater. Result obtained after computings the ionic Fractions for each sample taken from water resources of Malekan plain (generally wells, spring and karizs) and comparisoning them with water samples taken from Urumich Lake showed that ionic fractions of groundwater resources of Malekan plain have good agreement with ionic fractions of Urumieh Lakewater when approaching toward the Lake and exogene regions of plain, table 1, (jafarzadeh, 2008). Field surveys in different points of Malekan plain are indicating that there are some portions completely salt marsh in locations near the Urumieh Lake (sach as Gamshid Abad). Finally hydrogeochemical diayrams were drawn by using Rockwork for Malekan plain and ther the quality of ground water samples taken from different regions of this plain was assesed by using sholler and villcox diagrams (Hounslow. 1995). The results obtained from plotting analytic findings related to Malekan plain on sholler diagram showed that all groundwater samples except for 4 samples which are related to marginal regions of Urumieh lake have an acceptable quality for drinking (Fig. 1). Also plotting analytic findings related to water resources of Malekan plain on villcox diayram (Hounslow. 1995) showed that from totally 35 analyzed water samples, 3 numbers of samples are located in C_2-S_1 part (good and gret for agricalture) and 23 numbers of samples are located in C_3-S_1 part (permitted for agriculture). Also 9 numbers of samples were located on C_4-S_1, C_4-S_3, C_4-S_4 parts which are saline and unsuitable for agricultnre (Fig. 2). Unsuitable groundwater samples for agricultural uses are related to samples taken from water wells on margin of Urumieh lake. Above diagrams indicate that by approaching toward the lake, the quality of gronndwaters of plair show a sensible decrease.

In other staye , type maps of groundwaters were prepared to asses the type of plain groundwaters (Fig. 3). The surveys performed on prepared type map indicates considerable chloride quantity in portions of studied plain. On the basis of different surveys of researchers (Hounslow. 1995), (Garrels & Mackenzie. 1966) as a general rule, unusual increasirg of chlroride in groundwaters could be originated from below resources:

1. Reversed ionic exchange resulted from brackish waters.
2. Natural decrease of water hardness in reversed form.
3. The quantity of resolved solid materials mare than 500 milligram per litre.

In this investigation below methods were used to know is the origin of chloride in regions which show anomally to this anion:

Qata Correctness Examination

1. Qata correctness examination by using cl and Na ions:

$$\frac{Na^+}{Na^+ + Cl^-} \times 100 < 50\% \; TDS > 500$$

2. Data correctness examination by using cl and sum of a number of anions:

$$\frac{Cl^-}{Sumanions} \times 100 > 80\% \; TDS > 500$$

On the basis obtained results all data with high chloride are approved by two methods in above. By comparisoning the values obtained from sample analyze with tables and relations present into the references (Hounslow. 1995) the origin of anomality was obtained that includes:

1. By attention to figure 4 (Hounslow. 1995) the low level of Na quantity in proportion to Cl in around of Gamshid Abad and Agdash villayes shows the reverse ionic exchange between formations and groundwater.
2. By attention to high level of Cl quantity to the sum of anions, high chlore may have a marine or brackish water or evaporative origin.

Conclusion

As a whole, the excess exploitation of groundwater aquifer caused the fall and decrease of ground water quality in coastal and regions adjacent with Urumieh saline water such as Malekan plain and this problem caused swarming saline water toward groundwater aquifer and entailed the salinity of fresh water aquifer in coastal regions which the proportion of sampled anions in coastal regions shows good coordination with Uramieh Lakewater. The survey of water quality was performed via villcox and sholler diagrams and acco rding to these diayrams water resources located in plain distal regions near the Urumieh lake are not appropriate for agriculture and for drinking. So that in Gamshidabad and Aghdash regions the type of groundwater is of chlored type equal to sea water.

Referencts

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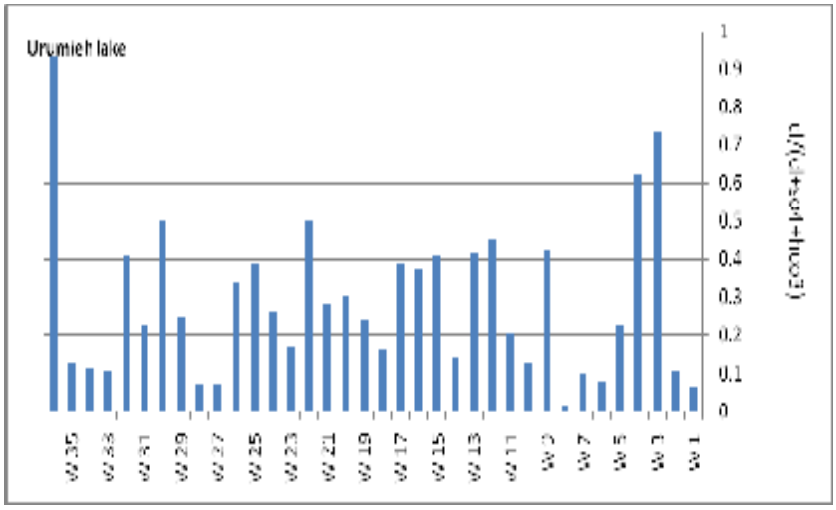
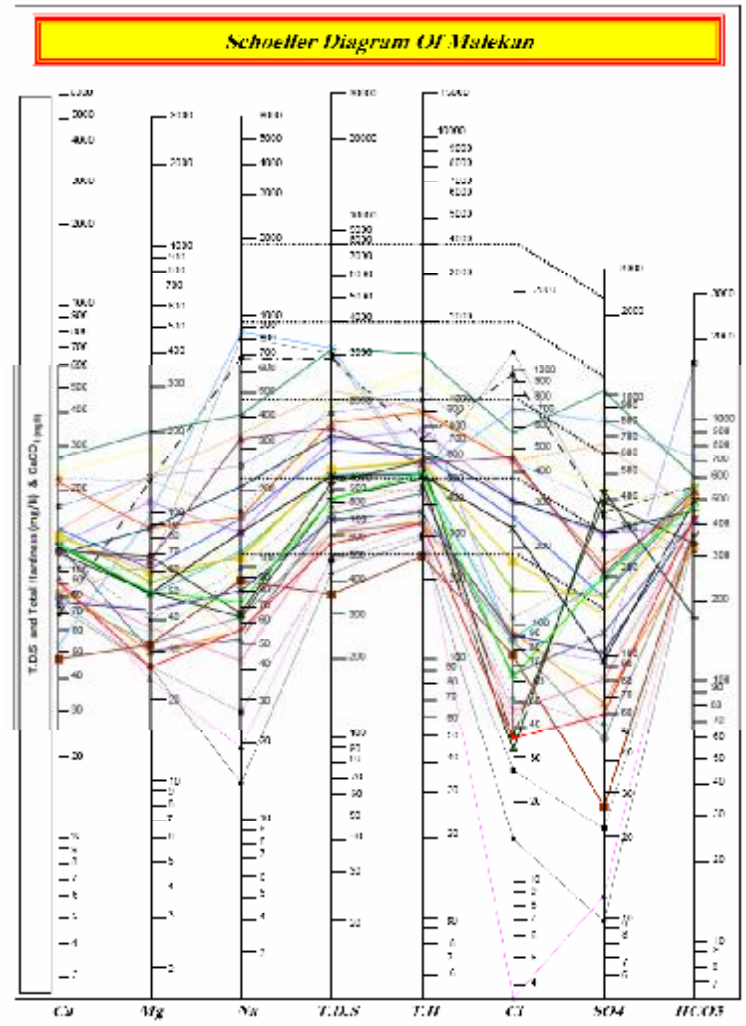
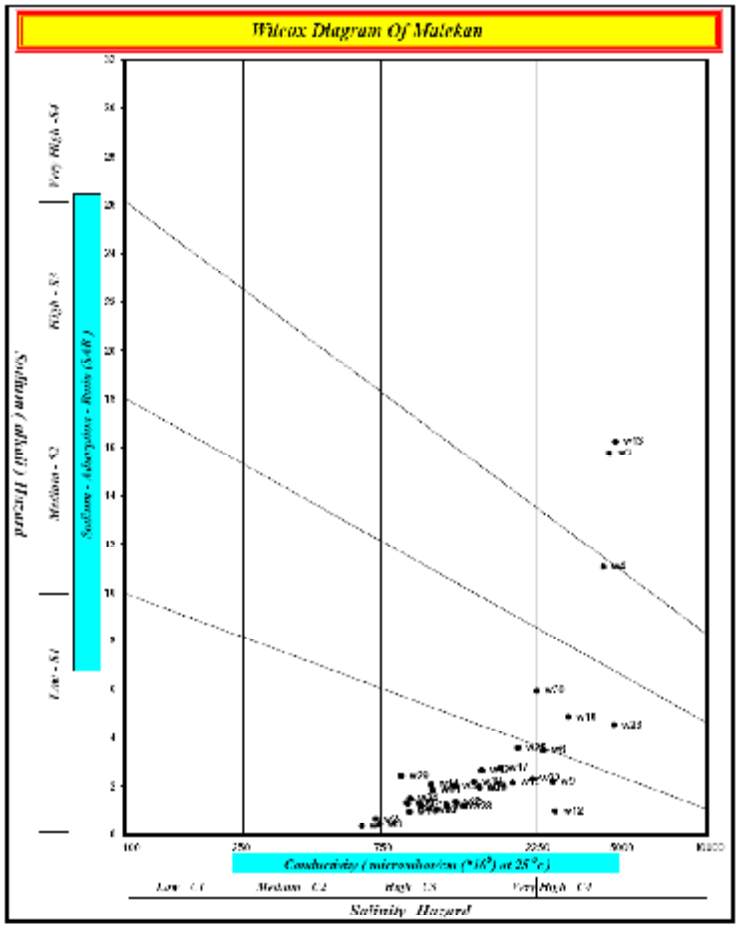
table 1. Ionic Fractions for each sample from water resources of Malekan plain

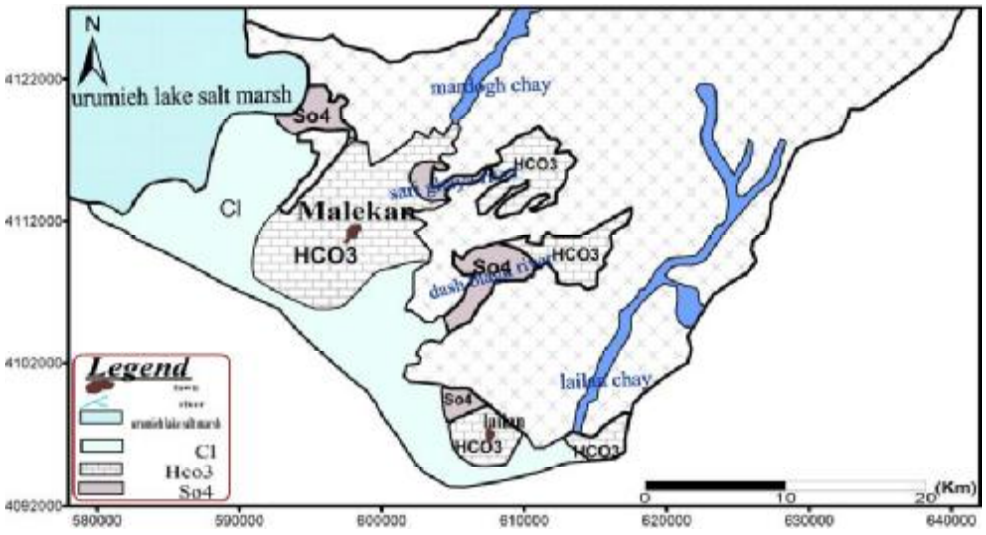




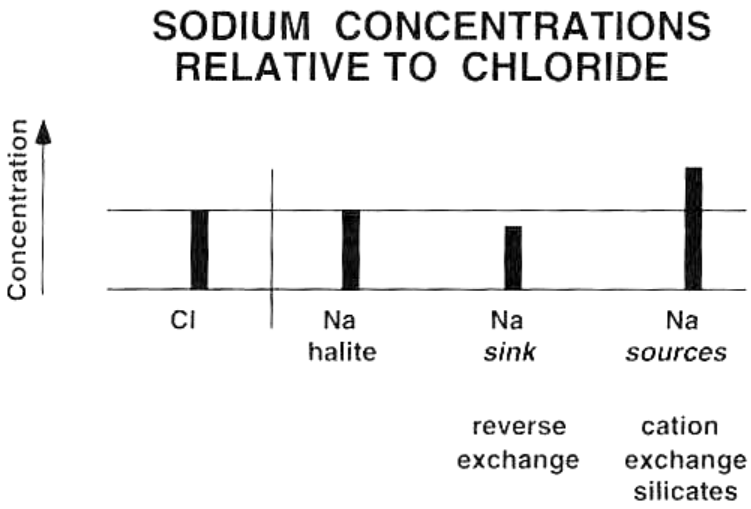
Figer, 1. sholler diagram, (Hounslow. 1995)



Figer, 2. villcox diagram, (Hounslow. 1995)



Figer, 3. Type map of Malekan plain



Figer, 4. Relation with Na and Cl, (Hounslow. 1995)