

Study of the Quality of Agricultural and Drinking Water of Chahnimeh in Sistan

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I. INTRODUCTION

DISCUSSION of water quality is the key issues and important in agriculture and drinking. Using poor water quality cause reduce product in addition, it also destroys the soil physical properties, which leads to arid land. Due to irrigation with improper water, may arise for soil and agriculture a variety of problems. Iran, point of view the water status of the global average, have more in crisis and the semi-arid and arid regions of the world. Sistan region, which is located in the northern Sistan and Baluchistan province, due to of its survival is dependent to the water, which the main is the Chahnimeh.

Since the proper operation of the management of these resources, and maintaining and developing they would not be possible without the studies and scientific research. The proper implementation of programs for water resources management, identifying the precise chemical and physical properties of water, the river seems necessary. By knowing the characteristics of water quality can be better to schedule for exploiting of the resources of a regional. The quality of irrigation water in the arid and semi arid areas has the particular importance. Mahdavi [10] In the field of assessing the river in the Iran, much research has been done, but so far no research has been done in the Sistan. Purmoghadass and Rahiminejad [11] in a research as Changes in the water quality of Zayandehroud, Parameters indicators in terms of pollution, they concluded that the salinity of the river Zayandehrud, in the bottom had greatly increased, so has unsuitable for agricultural purposes. Zehtabyan *et al* [14] the river water The quality of Jajroud and to its impact on the irrigated plains of Varamin, were examined., the quality of water of the Atrac river, point of drinking, agriculture, livestock and industry, was evaluated by Ghareh Mahmoudi *et al* [7]. The purpose of this study is to determine the quality of water of the Chahnimeh, based on standard indicators for agricultural purposes and consumptions. In order to study the water quality sampling and with an annual interpretation of in the years 2001-2011 have been made.

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There are different categories In the field of soil quality, Water the quality of in the study in the Sistan province in terms of agriculture and irrigation activities are paid. To prevent problems from occurring in the agricultural of area, analysing the quality of water used for irrigation seems to be absolutely essential. In other words, water quality, one of the main pillars for sustainable agricultural land is considered. So with investigation of the changes and trends in water quality, water resources management strategies can be planned for the future and better for explaining. Since the water quality in terms of health is of utmost importance.

II. MATERIALS AND METHODS

Sistan region, with an area of 15,197 square kilometers, between 29 to 32 degrees north latitude and between 60 and 64 degrees east along the prime meridian. The North and East of Afghanistan, the South West and northwest the the city of Zahedan and Lut Desert and the city of Birjand is limited. Sistan weather is hot and dry desert. water quality data the 2001 to 2011 obtained from the Department of Water Affairs Sistan Water samples used in this study, in the Irrigation Department of the Sistan laboratory standards were analyzed to determine the chemical quality of water, which normally includes the total amount of dissolved solids, electrical conductivity, the absorption of sodium, pH, total anions (carbonate, bicarbonate, sulfate, chloride) and total Cations (calcium, magnesium, sodium, potassium). From the available statistics, the average total for each year is preparing for a moderate amount in the 10 years. Then, by using classification will cox and guidance to on how to assess of irrigation water and Vestkak and Iser (Tables 1 to 5) and chemical characteristics of water given by the Institute of Standards and Industrial Research of Iran (Table 6) and diagram quality Shuler half of the water used in agriculture and drinking water stations were studied the results of which are listed in tables. In the Will Cox method, water point of view salinity, with, profiles of EC in four groups, and the loss of sodium in the four groups, with the SAR profiles are placed. Micro Mouse with 100 (cm) of water salinity (Class C1) with a SAR value below 10 in the floor or water with a little pH (class S1). If the salinity of the 5000 (cm micro-mouse) C4 classes with the extreme

alkalinity of water with low salinity is high, the optimal level (classes S1)

Table 1 - Classification of water for agricultural purposes based on sodium adsorption ratio and electrical conductivity, According to Wilcox method

m.m/cm)E.C (S. A.R	
	Classification		Classification
100-250	Excellent C1	<10	Excellent S1
250-750	Good C2	10-18	Good S2
750-2250	Middle C3	18-26	Middle S3
>2250	C4 Inappropriate	>26	Inappropriate s4

Table 2 - Classification of irrigation water from the sodium to Wilcox

Unacceptable to harm	harmful to Good	Good to Excellent	Type standard
over 75	75-60	less than 60	Sodium percentage

Table 3 - Classification of irrigation water to FAO

Type of water	electrical conductivity(EC)	Total dissolved solids (TDS)(mg/lit)
low salinity	3000-700	2000-500
moderate salinity	6000-3000	4000-2000
high salinity	>6000	>4000
salinity is too high	>14000	>9000
salt water	>42000	>30000

Table 4 - Restrictions on the use of Cl ion in the surface and sprinkler irrigation methods(m eq/li)

irrigation methods	limit			Ion
	to severe	low-to moderate	Unrestricted	
Surface	≥10	4-10	≤4	Cl
Sprinkler	≥2.85	2.85	≤2.85	Cl

Table 5 - Guidelines for evaluation of irrigation water

				Components of irrigation water
Is too	small to medium	No problem	units	
				Salinity
≥3000	700-3000	≤700	Mhos/cm	(EC)
≥2000	450-2000	450	Mg/L	TDS
		EC		Permeability
≥200	200-700	≤700		sodium absorption ratio
				0-3
≥300	300-1200	1200 ≤		3-6
≥500	500-1900	1900 ≤		6-12
≥1300	1300-2900	2900 ≤		12-20
≥2900	2900-5000	5000 ≤		20-40
				Specific ion toxicity (effects on sensitive plants)
				Na
			SAR	Surface irrigation
≥9	3-9	≤3	Eq/L	Sprinkler
≥9	9	≤9		Cl
≥10	4-10	≤4	Eq/L	Surface irrigation
≥3	3	3≤	Eq/L	Sprinkler
				Co3
≥8.5	1.5-8.5	≤1.5		Exclusively for Sprinkler
	6.5-8.5			pH

Table 6 - Maximum allowable standard chemical characteristics of drinking water

Maximum allowable in terms of mg/lit	Type of Combination
1500	TDS
200	Ca
150	Mg
6.5-8.5	pH
400	Cl
200	Na

III. RESULTS AND DISCUSSION

The results of water quality parameters, such as sodium, the absorption of sodium, chloride, sulfate, total hardness, acidity and salinity, in the years 2001 to 2011 are described in Table 7.

Table 7 - Results of water quality parameters studied

Year	SAR	Na	Mg	Ca	Cl	pH	TDS	EC
80	5.67	8.4 5	3. 34	1. 09	5. 24	8. 33	844	1390.
81	7. 01	10. 44	3. 08	0. 95	6. 01	8. 45	925	1543
82	6. 62	6.9 3	1. 72	1. 01	3. 98	8. 35	613	1033.
83	7. 56	10. 31	2. 58	0. 90	5. 70	8. 51	932	1523.
84	6. 64	7.8 6	1. 98	0. 86	4. 01	8. 35	705	1176.
85	5. 46	6.8 2	2. 39	0. 97	3. 42	7. 98	667	1118.
86	6. 56	7.2 4	2. 19	0. 87	3. 30	8. 31	470	1108
87	6. 41	7.5 2	1. 88	0. 82	3. 03	8. 33	710	1106.
88	4. 65	4.7 4	1. 318	0. 83	1. 81	8. 04	349	759.1
89	3. 71	4.7 0	1. 9	0. 93	2. 10	8. 26	561	863.6
average	6. 00	7.4 0	2. 16	0. 92	3. 76	8. 28	704	1145.
Drinking classification							good	
Agricultural Class							C2-S1 good	

1- Electrical conductivity (EC)

The electrical conductivity depends on the amount of salt water is ionized water. Electrical conductivity depends on the amount of salt in the water is ionized water. According to the results in Table 7 which shows the water quality of Chahnimeh of Sistan, according to FAO classification, the low salinity water is placed in the groups. Also, according to Will Cox's method are in the group of C3 (acceptable water with moderate salinity).

2- Sodium absorption ratio (SAR)

The most important criteria in the classification of water quality, agriculturally the amount of sodium in it is because not only affects plant growth, but the degree of suitability of water for irrigation and its effect on the permeability specified of soil makes. The sodium absorption ratio (SAR) of irrigation water, can be used as an index to determine the risks of sodium used in the soil. Classification of water-absorbent sodium (SAR) salinity or electrical conductivity of water is important. In other words, with increasing salinity, and optimal SAR allowable in the water is low. according to Will Cox's Classified, Chahnimeh of Sistan point of view the sodium in water with low sodium is located in group with a low hazard.

3- The total amount of dissolved substances (TDS)

TDS is an important factor in the water quality and a great effect in the transport, chemical conversion and the material is ionized. Also the concentration of soluble salts in the aquatic animal and plant communities there. University of California-based classification method of irrigation water in the Chahnimeh the average TDS water is low to low degree of difficulty.

4- Acidity (pH)

Pure water, viewpoint of theory of acidity is neutralized. in the normal conditions, pH between 7 to 8 in natural waters and the waters of the bicarbonate solution in water remains. Table 4 shows that the average of pH is 8 and doesn't problem viewpoint of acidity and the alkalinity . Study of Chahnimeh water, well water alkalinity and the acidity of the show. Alkaline water with the acidity above 9 and taste soapy water, acidic water with the acidity less than 6 are tart. Ph of water, water quality is an important factor in the indirect effects, such as changes in concentration of ammonia, cyanide, heavy metals and toxins from its direct effects, is more significant. Ph level of the drinking water standard is 5/8-5/6 the amount of acidity and alkalinity of the water being of this problem does not exist.

5- Cl

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From the other anions that are found in all natural waters is Cl. In case concentration of Cl in water may be toxic to the plant growth, Chlorinated compounds are almost entirely soluble in water and thus contribute to the salinity of the soil. Cl constraints in Table 4, for using in surface irrigation and sprinkler listed. According to the results of the studies in Table 4 and Table 5, the chloride data in Chahnimeh, the amount of chlorinated water for unrestricted Sprinkler and surface irrigation as well as the limits are low to moderate. Also The amount of chlorine in Chahnimeh station point of view used in surface irrigation and Sprinkler water with low-to middle-class is a bad outcome. The drinking water well located in desirable.

6- The quality of drinking water

One of the methods classifications of water, chemical and physical properties of a drinking man, and the cation and anions were measured using a diagram Shouler. The parameters results in Table 7 on the diagram shown in Figure 2 and reflects Shouler. This diagram shows the average results of the chemical quality of water in Chahnimeh of Sistan is in range fine. Shouler diagram depicting the stations selected for the potability of water quality is good.

Chahnimeh water in terms of agriculture, based on the index, Will Cox, M class S1C3 (sodium, low risk and acceptable water with high salinity) that are required to manage salinity. Also according to FAO and the University of California classified, this water in sequence is in group of the water with low salinity and water with degrees of using with low to moderate problems. As a result, the Chahnimeh water quality and agriculture in terms of standards of electrical conductivity, acidity, the absorption of sodium and the total amount of water soluble is of low to moderate degree of the problem. Kalantari [9] in analyzing of river water quality parameters such as Maroon river measuring acidity, temperature, electrical conductivity and oxidation potential and recovered in the sampling and measurement of major elements, sub-samples of biological agents in laboratories, concluded that Maroon river water concentrations of chemical elements are very favorable. Solemaninejad and Rahnamai [12] in analyzing of water quality Seimare river, using chemical and physical parameters observed, that the river was not suitable for drinking and food industries, but in terms of salinity and alkalinity, were used for all soils and plants with moderate salt tolerance can be used in conventional irrigation.

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