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Environmental Assessment of the Water of some of the Agricultural Drainage Networks of Shatt Al-Abbasiya

Safaa M. Almudhafar and Hassan Abdullah Hassan

Abstract--- *Agricultural drainage is of great importance as it helps to rid the soil of salt and excess water. Agricultural drainage also regulates soil moisture, improves ventilation conditions, increases the oxygen content below the root area and also does washing the soil. There are a total of (22) agricultural drainage along with the specific characteristics of the water of some large agricultural drainage networks within the Shatt Al-Abbasiyah. The study found that the water of the agricultural drainage networks in the Shatt Al-Abbasiyah, all chemical elements and compounds, rises in July and decreases in January. This is due to the rise in temperature during the hot season and the high evaporation rates, adding to rice cultivation with warm climatic conditions, which increases the salts of discharged water. Some farmers use agricultural drainage water for irrigation because of water scarcity, which forced farmers to use it for irrigation, which increases the salinity of the soil and the salinity of agricultural drainage networks. It was also noted that some agricultural drainage networks are less saline than some drainage networks and are within the permissible limits for irrigation for some crops such as alfalfa and barley, especially in winter.*

Keywords--- *Environmental Assessment, Agricultural Drainage, Limits for Irrigation.*

I. INTRODUCTION

Agricultural drainage is necessary for the soil, especially flat soils with micro-clay permeability in order to get rid of excess water from the plant and also to wash the soil. Agricultural drainage is the means or process by which water can be removed from the plant's needs above and below the surface of the earth, where the roots, which result in their presence, cause severe damage to plants. The disposal of excess water above the surface of the earth is called surface drainage. When the water that is saturated with soil pores due to a rise in the level of the ground water or through the accumulation of gravitational water in the upper layers of the soil is called the internal drainage. One of the reasons for the agricultural drainage is that the spaces in the natural soil about 50% of its size. Metal and organic solids are the remaining volume.

Air is supposed to occupy 20% of the volume, and the water should occupy 30% of it. However, the water is often overpowered and the soil has to be disposed of. In the study area, the drainage network suffers from houses that produce liquid waste, such as sewage. In addition to the solid waste, which helps to contaminate the drainage network elements and chemical and biological components, which reflected on the pollution of the Euphrates river on the grounds that the network of drainage ends in the Euphrates river. The drainage system in the study area is characterized by a non-integrated and inefficient approach. The agricultural drainage network in the province of

Safaa M. Almudhafar, University of Kufa, Faculty of Arts, Department of Geography, Najaf, Iraq. E-mail: almudhfars@gmail.com
Hassan Abdullah Hassan, University of Kufa, Faculty of Education, Najaf, Iraq.

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Najaf is open, undeveloped and inefficient, most of which ends with the Euphrates river with Kufa and Al-Abbasiyah villages. The study aims at clarifying the nature of the agricultural drainage network by studying the natural extension of the agricultural drainage network and studying the environmental effects of some agricultural drainage networks in order to develop solutions and proposals that develop the agricultural drainage network in the study area.

The province of Najaf occupies the south western part of Iraq, extending between longitudes (44-45) (50-42) east, and width (21-32) (50-29) north (Fig. 1). It is bordered on the north by Babylon and Karbala and from the east by Qadisiyah and Muthanna, either from the south and southwest by Saudi Arabia. On the west side is Anbar. The area of the study area is about 1400 km2, or about 5% of the governorate area of 28824 km2 [1], while the western plateau occupies 95% of the area of the province. This is why the drainage network extends within the sedimentary plain of the province (Fig. 2). Therefore, the study was limited to the sedimentary plain, particularly the agricultural drainage networks in the Shatt Al-Abbasiyah, while the western plateau region is absent due to spatial variation in the soil characteristics of both regions [2].

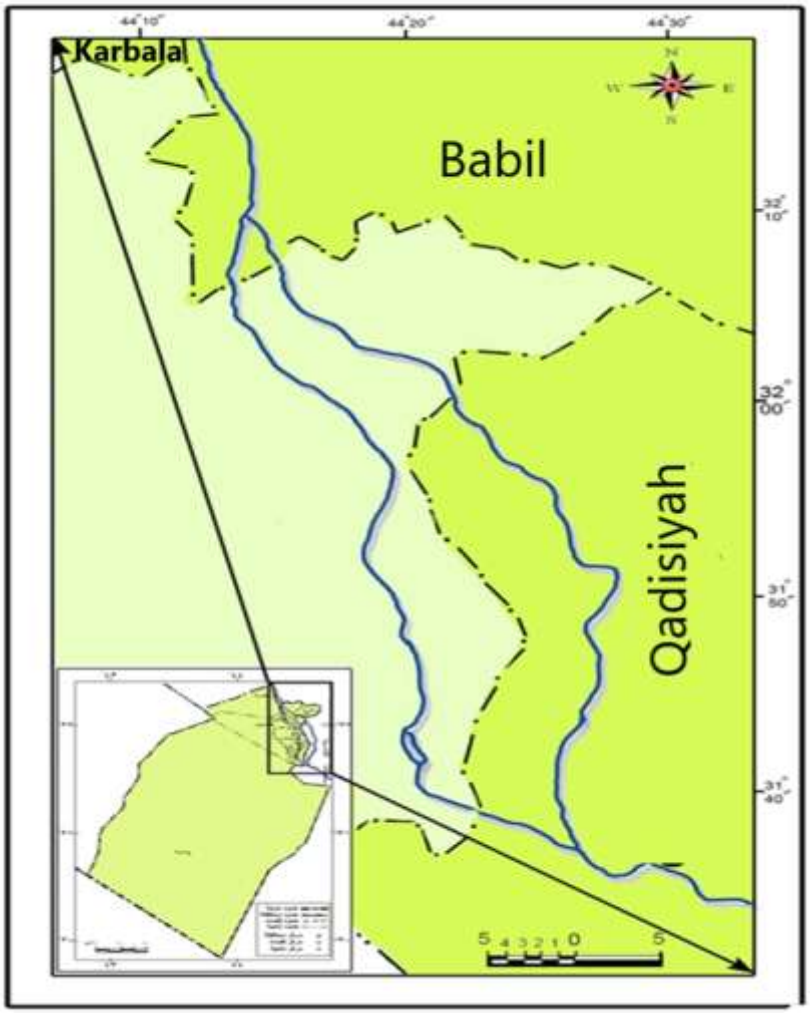

Fig. 1: Location of the Study Area of Najaf Governorate [2]

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II. MATERIALS AND METHODS

10 There are a total of 22 agricultural drainage systems (Table 1). The western drainage is one of the main drainage in the Al-Abbasiyah region, which leads from the north to the south and flows into Yahweh. It is noted that all elements and compounds rise in July and decrease in the month of January and it is noted that some elements are within the limits allowed for irrigation with a large rise of saline elements in this drainage. Al-Qusi is a main drainage located in the eastern province of Najaf, where a group of sub-sections is poured and discharged to Hor Ben Njeim.

Table 1: The Chemical Properties of Water of some Shatt Al- Abbasiyah in the Study Area

Location	*Month*	*pH*	*EC DS/m*	*T.D.S mg/l*	*Na mg/l*	*Mg mg/l*	*Ca mg/l*	*K mg/l*	*HCO_3 mg/l*	*$S0_4$ mg/l*	*CL mg/l*	*No_3 mg/l*	*T.H mg/l*
Gharbi	**January**	7.3	7.8	2660	270	69	306.1	15.1	5.9	320.7	301	5.7	440
	July	7.7	8.2	3450	312	74.5	377.5	17.8	8.33	388.1	365.7	8.9	510
Al-Qusi	**January**	8	10	3150	330	70	520	9.3	9.5	390	365	12	487
	July	8.3	13.4	3850	390	75	545	11.5	13.3	454	415	15.2	535
Muwaihi	**January**	7.3	6.5	2250	210	55	255	6	6.1	270	285	4.1	401
	July	7.7	9.1	3100	225	70	270	10.1	8.7	300	310	7.3	477
Euphrates Alchehrqa	**January**	7.2	8.4	2230	334	61	311	13	7.5	335	305	9	297
	July	7.8	9.5	2950	377	87	337	15.4	9.1	378	337	11.2	320
Al-Rayat	**January**	7.9	11	2750	265	54	285	8.5	8.4	245	285	6.1	364
	July	8.2	14.5	3143	310	72	324	11.1	9.7	290	295	8.7	397
Alabharri	**January**	7.7	7.1	2050	375	65	335	9	8	225	325	7.9	302
	July	8.1	8.9	2190	388	83	377	12.7	9.5	278	397	9.2	366

III. RESULTS AND DISCUSSION

Table 2 shows the validity of water for irrigation according to the standard of the Islamic Educational, Scientific and Cultural Organization (ISESCO).

Table 2: Water Validity for Irrigation According to ISESCO Standard [3]

Measurement	*Minimum Limit*	*Maximum Limit*
Electrical conductivity EC DS/m	0	3
Total dissolved salts T. D. S mg/l	0	2000
Calcium Ca^{+2} mg/l	0	20
magnesium Mg^{+2} mg/l	0	50
Sodium Na^{+1} mg/l	0	40
Bicarbonates $Hco3^{-1}$ mg/l	0	10
Chlorine Cl^{-1} mg/l	0	300
Sulfates $So4^{-2}$ mg/l	0	200
Nitrates $No3^{-1}$ mg/l	0	10
Potassium K^{+1} mg/l	0	2
Acidity pH	6	8.5

Table 3 shows Water categories according to their validity for different agricultural uses in accordance with the standard of the US National Advisory Committee.

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Table 3*:* Water Categories According to their Validity for different Agricultural uses in Accordance with the Standard of the US National Advisory Committee [4].

Salinity desmins/m	***Validity***	***Agriculture***
0.75	Valid for irrigation of all agricultural crops in all types of soils	Cultivation of all agricultural crops
1.5-0.75	Suitable to irrigate some crops that bear relatively salinity in soils with good drainage	Valid for growing wheat, barley, rice, corn, tomatoes, vegetables, pomegranates and olives
3-1.5	Valid for irrigation of saline-tolerant crops provided that the soil is well cared for and disposed of	Valid for cultivating cotton, palm, beets and others
7.5 -3	They can be used to irrigate some crops while taking care of the soil	Valid for planting palm and jute
>7.5	They cannot be used to irrigate crops even when soil with good drainage is available	…..

Table 4 shows permissible limits for chlorides (CL^{-1}) by classification (Scafield) for irrigation water. Table 5 shows classification of water hardness.

Table 4: Allowable limits for chlorides (CL^{-1}) by classification (Scafield) for irrigation water [5]

Water Class	**CL^{-1} mg / L**
Excellent	Less than 142
Good	142-250
Allowed	250-425
Doubtful	425-710
Inappropriate	More than 710

Table 5: Classification of Water Hardness [6]

Description of water condition	**The limits of hardness (T.H) mg / L**
0-75	Soft water
75-150	Relatively hard water
150-300	Hard water
More than 300	Very hard water

Through the interpretation of Table (1) of the water drainage networks of the agricultural Al-Abbasiyah and through the field observation it was noted that all elements and compound rise in July and decrease in January, and this is due to high temperatures during the hot season and high evaporation rates added to the cultivation of rice harvest of water with the conditions of the hot climate. Which increases the percentage of salts of the discharged water in addition to that some farmers are using agricultural drainage water for irrigation because of water scarcity, which forced many farmers to use for irrigation and then drainage, causing an increase in salinity of soil and salinity of agricultural drainage networks. As noted through the interpretation of the tables that there are some drainage systems be less than the salinity of some drainage systems and are within the permissible limits for irrigation but for some crops, but not all crop such as alfalfa and barley, especially in winter.

IV. CONCLUSIONS

The agricultural drainage network in the study area is characterized by its low efficiency and low capacity to discharge water that exceeds the plant's needs from agricultural land and is not connected to a main sewage network. The study area is characterized by high temperatures during the summer season, which causes increased

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evaporation, whether water on the surface of the soil or water, which is transferred to the open drainage network, causing the concentrations of saline elements to increase very significantly. The water of the drainage on the Shatt Al-Abbasiyah is going to the Al-Qusi drainage, which ends up in Hor Ben Njeim. Some agricultural drainage networks also end up in sub-tables. The water of the agricultural drainage networks is abundant in the aquatic plants, whether on the banks such as reeds, or in the water of the plants, such as the shamplan or Nile flower, which causes deterioration in the specific characteristics of this water. Some farmers irrigate agricultural crops through agricultural drainage water, increasing salt content in the soil. The increase of most elements and chemical compounds of the water of the drainage network is higher than the permissible limits for irrigation according to international standards, especially the high concentrations (electrical conductivity, dissolved solids, magnesium, calcium, sodium and total hardness). Some of the agricultural drainage water is within the permissible limits, especially in January, as it can be used to irrigate some high salinity crops while taking care of good soil drainage.

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