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Study the Variations of Agricultural Land Degradation in Zawiyat Al-Dhban District (Abu Falis) within the Arid Environment of Anbar Governorate

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Abstract. A survey study was conducted on the lands of Zawiyat al-Dhaban district (Abu Falis) and calculated some physical and chemical characteristics and the state of fertile soil in an area of 3,926 square dunums, which is part of the flood plain of the Euphrates River, which is one of the advanced and promising provinces in Anbar Governorate, which was long ago a food basket that provides the people The region has various vegetable and fruit crops, but a rapid deterioration occurred in that province and the neighboring provinces, The human being has an important role in the process of changing these soils through the state of urban sprawl on agricultural soils of that province and the removal of irrigation and drainage canals, which led to an increase in the deterioration of its qualities and a decrease in its agricultural areas and increase Salt accumulations in it, the study area is located between longitude 43°30'0"-43°33'45" east and 33°22'30"-33°24'45"North, the study aims to create maps of temporal variances from the year 2000 to 2020, using remote sensing techniques, classifying them, and creating a predictive soil map for the salinity distributions in those soils, using the free-lance method, scenes from the satellite images of the US Landsat satellite were used. You will be obtained from sensors (ETM, TM) to characterize urban areas, vegetation layer, saline land, etc., for the years 2000-2020, depending on Program (ARCGIS-V9.1), (ARCGIS-V10) optical spectrum analyzes using the method Data-oriented classification, the study dealt with soil salinity in detail as it reflects the suitability of the soil for growing crops with a value of <2 dS.m-1 under the (USDA2017.soil survey manual). Handbook No. 18), the soil units were represented in 10 sites where a complete description of them was made and some physical and chemical characteristics of the soil samples were estimated. The results showed that a serious deterioration occurred within the years of comparison, where the plant area varied from 2826.7 to 2021.8 dun.2 by 72.0 to 51.5% for the years 2000. -2020, respectively, the area of saline soils is from 1052.1 to 1743.1 dun.2 by 26 to 44.4% for the years 2000-2020 respectively, while the area of urban expansion is from 47.1 to 160.9 dun.2, by 1.2 to 4.1% for the years 2000-2020 respectively. It was found, through the survey of the provincial soils, that about 14.1%, with a total area of 553.5 dun.2, its salinity range was 1.2-2.6 dS.m-1of the area of Zawiyat Dhban district. And in order to improve the production capacity of the province's soils, the study recommends implementing practical measures that must be taken related to managing these soils, the most important of which is the immediate cessation of the operations of converting agricultural lands into urban areas, which is considered to be the destruction of the ecosystem, food security, and the violation of human rights. The right of future generations to deprive them of the best agricultural lands in those areas, and to follow careful soil management practices soils Residual of soils follow a fertilization plan to increase the amount of beneficial elements for plant growth in addition to using new irrigation methods. In order to suit the soil for cultivation in those regions.

Keywords. Zawiya Dhban Province, Soil salinity, Urban encroachment, land degradation.

1. Introduction

Environmental problems have become among the most important issues on which attention is focused now, because they threaten stability at the level of the earth's surface, and among these problems is the "soil salinity problem, salt accumulation has become influential in the degradation of soils and the decrease in agricultural production, which affects the environmental environment and agricultural development in the countries of the world..

Therefore, the problem of salt-affected soils is one of the environmental problems that agricultural lands suffer from, as Salinity levels, toxic reduce capability land to produce. [1] ,2009, indicated that saline soils are soils in which the electrical conductivity of the aqueous extract of the saturated paste of the soil sample increases at the saturation point of more than 4 dS.m-1 at a temperature of (25 ° C) and the percentage of exchanged sodium is less than 15% of its exchange capacity. Cationic soil and the degree of reaction (8.5). This type of soil requires its reclamation to reduce the percentage of salinity in it and make it suitable for growing crops, especially sensitive ones. [2] studied low soil productivity northeastern Upper Nile part in Egypt, It was found that the area is exposed to the dangers of salinity, sedimentation, pressure and waterlogging, as a result of human practices, including the absence of maintenance measures, and the spatial model of geographic information systems showed that 47.8% of the lands are affected by Slight, 52.8%, strong, moderate, equally, and recommended that preventive measures should be followed to raise the resistance to soil degradation to achieve sustainable agriculture.

[3], indicated that urban sprawl is one of the main problems that threaten the limited fertility lands in the Nile Delta region in Egypt, and it was used to illustrate the situation using satellite images of thematic landscapes and using Sat-1 2009 to study urban sprawl and its impact on agriculture in Qalyubia governorate. Techniques for detecting change for monitoring urban sprawl and geographic information systems during the period (1992-2009), the results in this study indicated that the (first class) soil decreased from 683.2 square kilometers to 618.5 square kilometers, while the moderate type soil decreased from 100.5 square kilometers. To 93.8 km2 while soils of marginal type decreased from 209.1 km2 to 198.3 km2, and the extension changed during the period 2001-2009 while most of the urban expansion was at the expense of soils.

[4] , considered that the most active land degradation processes are the state of salinity, waterlogging and alkalinity, and that land degradation reduces the potential and ability of soils to produce crops and the deterioration of biological diversity in the fields of Qalyubia Governorate in Egypt. The use of the Land Degradation Index and the GLASOD Model showed the degree of degradation, the relative extent, the level of risk and the causative factors, and that the study area is unstable in terms of the ecosystem due to the active degradation resulting from drought, soil characteristics and improper management of agricultural fields.[5] studied the use of remote sensing technology in assessing land degradation in the Mahmudiyah area in Iraq, where two satellite images were processed from the Landsat5-TM satellite for the year 1990-2007, the results showed an increase in the area of the urban areas class from 9.8 km2 in 1990 to 60.9 2 km2 in 2007, an increase in the area of unused agricultural land from 1290.5 km2 in 1990 to 1610.3 km2 in 2007, an increase in saline land from 183.2 km2 in 1990 to 328.31 in 2007, as well as an increase in the area of the vegetation type from 46.2 km2 in 1990 to 62.5 km2 in 2007, and a decrease in the area of agricultural land Exploited agriculture from 1140 km2 in 1990 to 575.31 km2 in 2007, and the increase in soil salinization and urbanization are among the main causes of land degradation in that region.

[6], 2019, explained that among the causes of agricultural risks that affect agricultural productivity in Ismailia Governorate is the rise of ground water from the surface of the land, the salinity of the water used for irrigation, the occurrence of climatic changes and the salinity of the soil, which causes its deterioration at rates between 95.5-99% and stressed the necessity of setting An indicative plan for farmers to face agricultural risks that affect agricultural productivity.

[7] , 2020, assessed urban encroachment on agricultural lands in the Zlatine region for the period 1984-2018, using RS & GIS, and the results obtained showed that the volume of urban sprawl on agricultural lands increased from 665.01 hectares in the year 1984 to 22669.69 hectares during the year 2018. The study calls for setting future policies and plans to reduce the phenomenon of urban sprawl on agricultural lands in the study area. As for [8], he indicated that one of the most important causes of salinization are: failure to apply reclamation processes with the necessary efficiency and failure to apply agricultural service operations in line with the nature of the soil, high level of ground water and the use of saline water in irrigation, and recommended the need to introduce a drainage system in order to reduce concentrations Salt and the use of plants from the salt-resistant strains and work to raise the concentrations of calcium and magnesium in the soil compared to sodium and reduce the concentrations of harmful elements for the plant.

[9], explained that the use of soil salinity monitoring methods by geographic information systems (GIS) and remote sensing (RS) is important to know the spatial and temporal variations of it, as well as in evaluating land in countries with large areas such as Australia, China, the United States and India, which suffer from the impact of salinity and waterlogging.

[10], studied the phenomenon of salinization and the decrease in the area of agricultural land and its impact on the agricultural economy in the Euphrates Valley in the Deir Ezzor Governorate in Syria. Drainage and random irrigation that is not subject to a specific system, as well as not following agricultural rotations, all of these things are among the causes of salinization, as the area of agricultural land decreased by about 36 thousand hectares and the soil was located in a highly saline type, and 30 thousand tons of crops were lost annually, so it recommended The study is of the necessity of digging wells and drawing water from them to work on reducing the level of groundwater and adopting the method of sprinkler irrigation.

[11], studied the effect of the human factor on soil management in the countryside of Ramadi in Iraq, noting that the problem lies in the excessive use of water, which leads to the accumulation of salts and the rise of ground water levels.

The results of the study showed that the random use of water as a result of the farmer's ignorance of the extent of the crop's need for water and the failure to adopt the water bottle led to a great waste of good water and leaching large quantities of it into the ground water, which raises the levels of the latter, which is one of the factors contributing to the salinization of the soil. Modern irrigation, such as sprinkler and drip irrigation, following the water rationing, the actual crop need of water, establishing integrated irrigation and drainage networks, and reclaiming saline lands for the purposes of reducing soil salinity and lowering ground water levels.

[12], studied the effect of natural and human factors on soil salinity and environmental impacts on soil salinity and environmental impacts in Yusufiya district (Baghdad). The study reached a set of conclusions, including: The study area is prepared for the spread of salinity and its increase because it is located within the dry climate characterized by high degrees. Heat and less precipitation, which exacerbates the salinity problem, as well as the high level of groundwater and the rise in concentration of salts in superficial water negatively affected the soil and the increase of salinity, in addition to the misuse of land One of the obvious influences in increasing proportion from salinity within the region.

[13], dealt with a study of spatial analysis of soils affected by salinity in Al-Khasib district in Shatt Al-Arab - Basra, and the study showed the variation of salinity in that area and that the reclamation process positively affected the chemical and physical properties of the soil and increased its productivity. Drainage and maintenance, skimming the surface layer of soil rich in salts, and following deep plowing 50 cm all play a clear role in reducing the proportion of salts present in the soil by reducing the electrical conductivity, pH and sodium values of the soil.

[14] studied the morphological، physical and chemical characteristics of soil with saline levels using remote sensing in Basra Governorate، including Abu Al-Khasib area. It was the widest 60% of all soil

profile and of color 7.5YR, 5YR and 10R. The most common colors were 2.5Y, 10R, 5YR and the color ranges from light yellow to dark reddish brown and it was concluded that the salt content has a role in soil classification, mapping and maintenance of these soils. [15], discussed when geographically analyzing the salinity of soil in Al-Khaddar district in Al-Muthanna Governorate in Iraq, that the natural factors (surface, solar radiation, temperature, wind, relative humidity, precipitation), as well as human factors (lack of puncture and poorness, excessive irrigation, system Agriculture followed), all matters affect the salinity of the soil, where the aim of the analysis is to determine the quantity and quality of salts and their impact on plants and ways to reduce them. Readiness of water and nutrients in the soil.

[16], explained that agricultural drainage water is not effective for the disposal of saline wastewater from irrigated agriculture will contribute to salinization of soils in central and southern Iraq, where most drainage projects were built 50-40 years ago and due to poor maintenance, they were abandoned. Most of them or they have become out of service, which led and will lead in the future to the state of salinity in those areas will be more dangerous.

[17] studied the extent of the impact of agricultural soils in Wadi al-Shati area to the salinity problem due to agricultural development and the prevailing climatic and environmental conditions, as the results showed a high electrical conductivity of the study soils, where these values ranged between 1.08-144.67 dS.m-1 due to the severe accumulation of salts.

This study aims to show the changes in the state of land degradation for a period of twenty years and to prepare a current map to predict the distribution of soil salinity and urban expansion on agricultural lands and to explain the salty soil degradation in Zawiyat al-Dhban district, and to alert and warn the local government and decision-makers of the presence of areas threatened by soil degradation through two main factors: salinity and Urban expansion on the best agricultural soils.

2. Materials and Methods

2.1. Study Section

study section is within the Anbar governorate, From the north and west, the Euphrates River and from east by the Habbaniyah air base and from the south by the northern hills of Lake Habbaniyah, Longitude geographic location between 43°30'0"-43°33'45"east, and latitude between 33°22'30"-33°24'45" north, the vast majority of the study area is not utilized satisfactorily for many reasons, planted with fodder advance in agricultural exploitation, Then the wheat plant, and these soils are not devoid of growing fruits and vegetables. However, it seems to be limited, there is a case of the destruction of irrigation and drainage canals within the area due to the encroachment on these lands and the extension of urban construction on the best of those soils, the study area is located within the lower valley unit and the daylight soil unit according to [18], and Figure 1 shows the distributions of the sites of examination for the studied samples Fig. 2 shows the sites of soils in the study area under [18].

Figure 1. Inspection site distributions for the studied samples / Source: [19].

2.2. Field Work and Laboratory Analyzes

During the field work, ten sites were taken represented by the free-lance method by the auger explorers to represent the specific soil units Between depth (0-30) to (30-60 cm), as well as The presence of salt crust on the soil, soil samples were pneumatically dried and sieved with a 2 mm diameter sieve, a water sample was collected from wells of area, and it was geo-located using the GARMIN'S GPS 72 device made in Taiwan. The lands of this province were selected for scientific, technical and economic reasons, and field work required equipment, following:

Maps (Topography - Geological - Geomorphology) - Space images (2018 CNES / Airbus - Digital Globe) - GPS unit - Compass - Soil Description Guide [25]- Soil Taxonomy Guide - Shovel, ax, auger hole - hammer - pH field device - knife - hand lens (x 10) - clear plastic bottles - refrigerated box - nylon bags and soil sample markers, laboratory analyzes were performed based on laboratory methods and according to the following:

2.3. Laboratory Analysis

After drying the soil samples of the diagnosed horizons, they were subjected to the following measurements:

2.3.1. Physical Measurements

- The following physical measurements were estimated according to the methods presented in [20], and as follows:
- Conducting a mechanical analysis (Hydrometer) and determining the texture of the soil using the Soil Texture Triangle.

2.3.2. Chemical Analyzes

1. The following characteristics were estimated according to the methods mentioned in [21] as follows:

A. Electrical conductivity (ECe) using an extract of saturated soil paste according to paragrapha/2.

B. Soil reaction (pH). By using the glass electrode in the extract of the saturated soil paste according to paragraph b / 2.

C. Cation exchange. Estimated according to paragraph 18.

2. organic matter. Estimated by the method by [22]

3. The exchange capacitance of the cationic ions of the clay fraction. Estimated according to the method [23] according to the following equation: Apparent CEC = (CEC soil / Clay %) × 100.
4. The macronutrients were analyzed in the laboratories of the Ministry of Science and Technology.

2.4. Satellite Image Classification and Geographic Information Systems (GIS) Technologies
As a result of the great developments in information and communication technology and their impact on various scientific disciplines, soil science is no longer a descriptive science, but rather a science based on measurement, analysis and linking using remote sensing software RS or GIS, which had a major role in agricultural geographic studies. After it was interested in the descriptive aspect of geographical phenomena, and thus it proceeded in the applied direction, as remote sensing applications in the agricultural field are among the most important applications of these modern technologies due to the change of vegetation cover, the change of land use and the diversity of agricultural wealth, which calls for continued monitoring and follow-up of its development in order to set its management and investment programs Remote sensing techniques came to achieve all this because of the accuracy, comprehensiveness, multiplicity, spectrum and time frequency of the sensor data, as well as field work and checks. Remote sensing techniques are not an alternative to any traditional technique or method in the field in the study of agricultural resources, but rather a supportive tool and a means. Complementary applied in the agricultural sector and other sectors to achieve maximum speed results Responsive helps planners and decision-makers to develop continuous comprehensive development plans. Earth map terms were drawn using the (ESRI)[37] program. Arc GIS 10.0 software to create a map that predicts the salt distribution in study area.

2.5. Classification of Satellite Shots
Landsat American satellite images were used to observe urban areas, vegetation cover distributions, and salt-containing soils for the years 2000-2020. Programs such as ERDAS Imagine version 9.1 and (ARCGIS) version 10 were used to classify the optical spectrum using the directed classification method, where the analysis data changed to data Using the ARC GIS program, the spatial distribution of urban sprawl and saline soils for agricultural soils was monitored, field observations were made, observations were taken, and classification results were made with the help of training areas that determine the spectral characteristics of each category, relying on topographic maps, soil and physiogeography. Available data, Table 1 data for the satellite images used.

Table 1. Characteristics of satellite images used.

Band 7	Band 5	Band 4	Band 3	Band 2	Band 1	Statistical index	Year	Sequence
50.4	93.2	88.3	56.6	66.4	95.6	Mean		
22.9	31.6	20.4	21.5	11.1	16.5	Std.Dev.	2000	1
36.4	31.9	25.5	27.2	17.3	13.3	C.V.Y.		
56.5	96.4	87.5	61.2	43.6	88.727	Mean		
21.6	32.3	17.5	19.8	11.6	12.7	Std.Dev.	2020	2
36.4	31.9	26.	32.3	21.3	15.4	C.V.Y.		

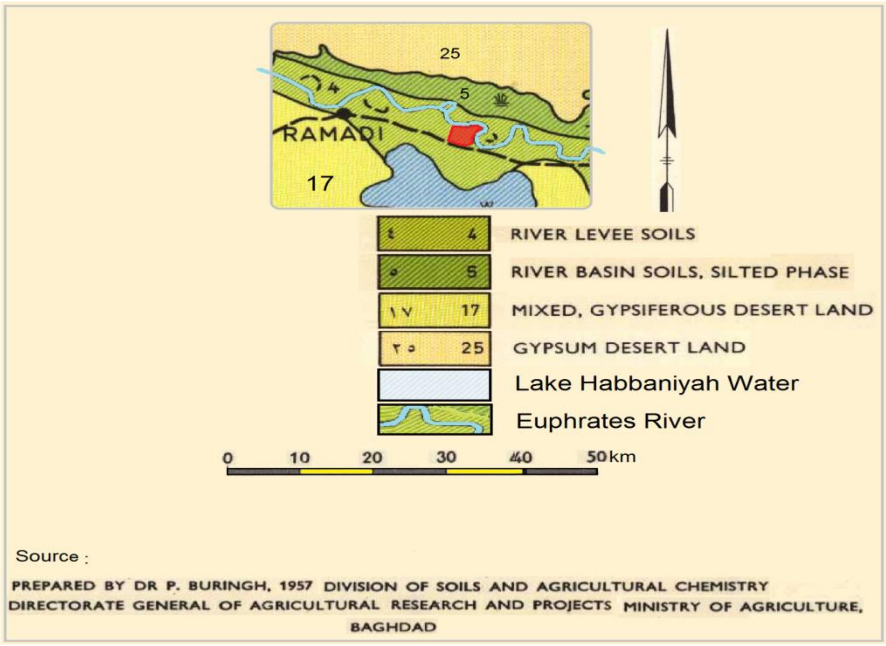

Figure 2. The soil study area under [18].

2.6. Topography of the Area

The study section consists of flat lands with a slight slope towards the Euphrates River. The height of the study section is (44-48) meters above sea level. There are also some hills in the south of the study area. As for the lands of the studied section, they are flat covered with Euphrates river sediments. [27].

2.7. Geology of the Study Area

The ages of the exposed rocks in the study area extend from the middle Miocene to the Quaternary era and include the following formations and sediments:

2.7.1. Fatha Formation (Middle Myosin)

This formation is revealed in the southern parts of the study area, especially at the southwestern end of Lake Habbaniyah (Map 4), [28]and .[29]

2.7.2. Pleistocene Deposits Include the Following

River terraces sediments: consisting of gravel of all kinds, sand, fine dust particles, small proportions of secondary gypsum and some clays, and they are in the form of layers or successive layers of river sediments, appearing along the Euphrates River in the study area, and they are in the form of heights ranging between (20-70m) .

Holocene deposits: they appear in the study area in the form of floodplain sediments, which are the sediments that formed the Euphrates River and which consist of sand, clay and clay with a small percentage of fine plaster. These deposits appear along the Euphrates River and on both sides. The thickness of these deposits varies between (12-15 m). In addition to their width, they are also variable. These areas are usually used for agricultural purposes. This is naturally due to their fertility and proximity to the water sources represented by the Euphrates River. Figure 3 shows the geological formations exposed in the study area (Source: [28].

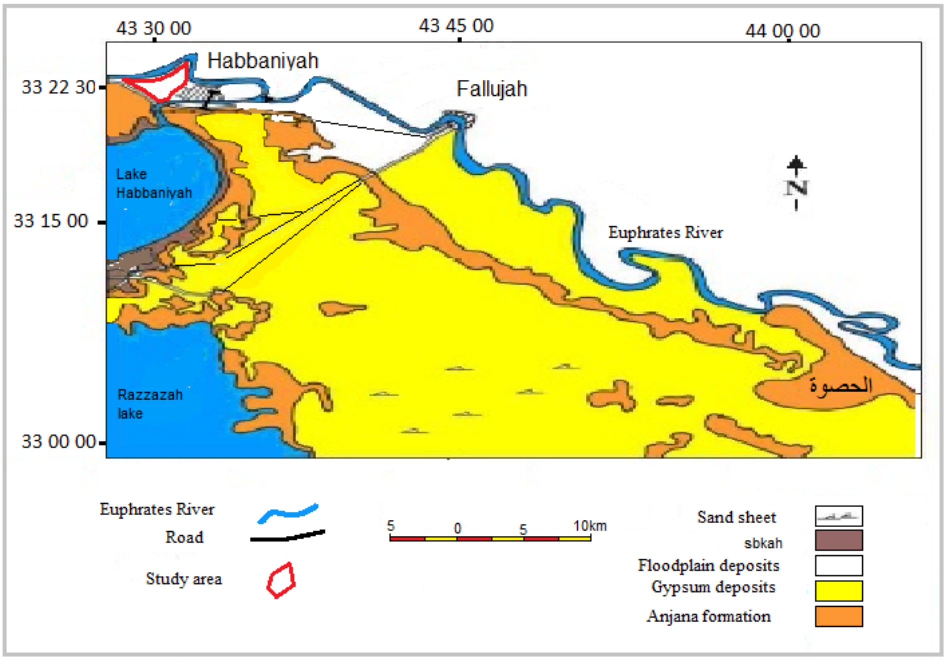

Figure 3. Geology of the study area (Source: [28].

2.8. Climate

Based on Table No. 2 explaining the climatic data for the study section from (climet.data.org-2020) website, the climate in the study area depends on the hot desert climate (the desert climate is warm.), where it prevails in the sedimentary plain and the western plateau, which constitutes 70% of the land Iraq and warm Hogo, the humidity is from the study section with the (Torik) system, there is a variation of rainfall between the driest month and the wettest month is 21 mm, and the maximum temperatures range from 43.5 ° C in July (43.5 °) to 15.1 ° C in January, and the temperature ranges from 43.5 ° C in July (43.5 ° C) to 15.1 ° C in January. Minimum temperature of 3.8 degrees Celsius. °C to 25.7 °C, the average monthly temperature ranges from 34.6 °C to 9.4 °C, the soil temperature regime in the study area is thermal, the average annual rainfall occurs during the winter months (October to April), the average annual rainfall in the study is 124 mm (Ministry of Environment Report, 2013), Figure 4 shows the climate chart for the study area [31].

Table 2. Climate chart for the study area (2020).

	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sep.	Oct.	Nov.	Dec.
Avg. Temp.	9.4	11.9	16	21.8	27.8	32.2	34.6	34	30.2	24.3	16.9	10.9
Min. Temp.	3.8	5.6	9.2	14.6	19.8	23.4	25.7	24.9	21.1	15.8	10	5
Max. Temp.	15.1	18.3	22.9	29	35.9	41	43.2	43.2	39.4	32.8	23.8	16.9
Precipitation / Rainfall (mm)	20	19	21	19	5	0	0	0	0	2	20	18

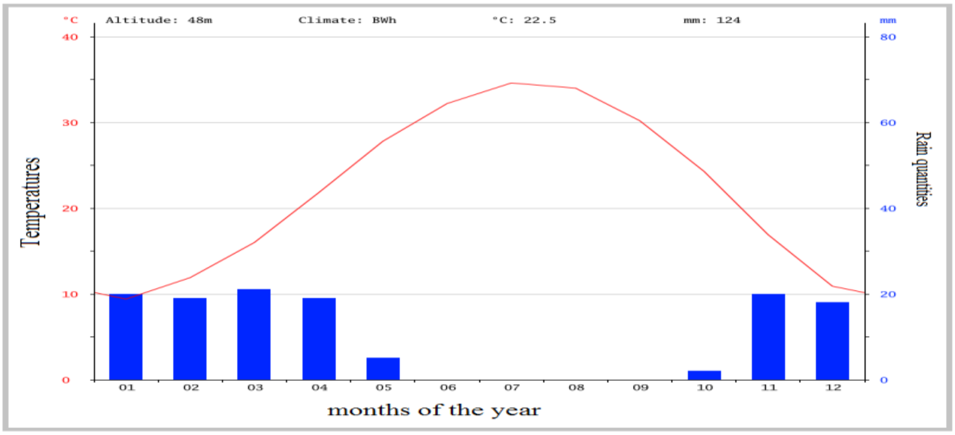

Figure 4. Climate chart for the study area (Source: climet.data.org).

2.9. Vegetation

According to the natural plant map of Iraq prepared by (Guest, 1966), Anbar Governorate is located within the sub _desert area, where the zonal the spread of vegetation within the desert area under the sub-desert classification, [33] playing an important role in the formation of organic matter. to me [34], the interconnectedness between natural vegetation and soils serves three purposes: Understanding soil inheritance, distinguishing soil boundaries, as well as predicting through a map of soils with the type and quantity of natural vegetation found, there are many plant species within the flood plain area of the Euphrates River. Field observations that the natural vegetation in the study area is of low density and weak growth, due to the lack of rain and the dry climate. 5 Some natural plants within the environment of the study area were formed.

Schanginia aegyptiaca, Alhagi mowrum, and Creea cretica predominate in soils with high salinity, while sedge plants are widespread in watery areas, and in low-salinity cultivated areas, Lagumychium farctum, Cynodon dactyon, Carthemus oxycata, Imperrica, Carthemus oxycata and Imperrica,The The plant type was diagnosed according to (Iraqi Botanical Encyclopedia) [32], As well as with the help of the herbarium of the Center for Desert Studies - Department of Desert Development - University of Anbar, and the shape represents some of the plants spread in the area.

2.10. Statistical Procedures

All results of the study data were interpreted according to scientific methods and statistical comparisons were made, and statistical relationships were standardized as required by each measurement case, depending on the version of Excel 2010.

Figure 5. Some natural plants within the environment of the study area.

3. Results and Discussion

3.1. General Characteristics of the Soil of the Study Area

The field measurements are derived in digital mapping of the soil from geographical points. These descriptions may be complete or abbreviated and the laboratory data associated with them. The aim is to predict soil classes and their properties outside the site of field observations. The size of the soil sample and the representation area or its size were taken into account when determining the sampling sites. Field and make measurements according to [35],[36] .

Values of physical and chemical properties appear Table (4), which were summarized as follows: The soil tissue varieties of the study sites in Zawiyat Dhban district are shown in Table (4), where the soil tissue varied between the clay soils of the sites (L2, L8, L3). According to [38], the sites (L9, L5, L1) were of fine-textured soils, L10, L4) that is, within fine-textured soils [25], most of the textures of the study area are considered among the varieties with high potential for agricultural production, As for the clay soils located within the study area, they need administrative methods to avoid their problems by improving drainage networks and Use soil conditioners to get good condition for producing crops. Variations in soil texture due to the condition of sedimentation, and the distance from the riverbed that distributes sedimentation during the flood period,Table 3 shows the locations of the area. The geographical study and the values of soil salinity in the territory of the province, and Table 4 shows the ranges of the values of soil salinity and its percentage from the territory of the province.

characteristic of soil salinity, it is noticed from the results of Table (3,4) that there is a difference between the soil sites of the province selected for the study of this characteristic, the results showed that the rate of 14.1% and a total area of 553.5 square dunums, the salinity range was 1.2-2.6 dSm-1 The predominant proportions of the rest of the lands were 85.9%, their salinity is limited to between 2.7 - 13.54 dSm-1, according to [34] ,[33] ,The salinity classes ranged between very slightly saline and moderately saline. These types of salinity are a specific factor for crop production, the form of the presence of salt types from calcium sulfate, sodium sulfate and sodium chloride outperforming the quality of salt distributions in the study area, and administrative methods must be used to reduce the effect of salinity degrees on the productivity of agricultural crops. Figure 7 shows the predictive map of saline distributions. In the soils of the study area, a table of 5 ranges of values of soil salinity and its percentage from the territory of the province for the year 2020, while figure 6 shows a predictive map of the salinity distributions in the soils of the study area for the year 2020, Table 5 indicate The ranges of soil salinity values and their percentage of the district's lands for the year 2020 .

Table 3. The geographical location of the study area and the values of soil salinity in the territory of province.

Sites studying	EC $dS.m^{-1}$	Coordinates		m.s.l.
		Longitude eastward	Latitude north	
1	1.21	43° 33′55.39″	33° 24′57.51″	46
2	1.33	43° 33′53.78″	33° 24′36.69″	46
3	3.99	43° 33′13.82″	33° 24′31.10″	46
4	1.48	43° 33′30.59″	33° 23′53.37″	49
5	4.48	43° 32′34.40″	33° 23′53.51″	48
6	5.38	43° 33′31.46″	33° 23′26.88″	47
7	7.58	43° 32′54.07″	33° 23′19.61″	44
8	7.47	43° 32′05.57″	33° 23′35.74″	48
9	1.60	43° 31′32.96″	33° 23′45.47″	47
10	13.54	43° 32′40.07″	33° 22′25.91″	44

Table 4. Physical and chemical properties of the select section for study.

Site No.	depth	pH	EC $dS.m^{-1}$	Texture	Positive and negative ions mg/L									
					Soil dissolved ions(ppm)							macro nutrients(ppm)		
					Ca^{+2}	Mg^{+2}	Na^{+}	SO_4^{-2}	Cl^{-1}	HCO_3	CO_3^{-2}	NO_3^{-1}	PO_4^{-2}	K^{+}
1	0-30	7.38	1.40	SC	310	145	376	321	368	141	8.5	14.6	0.53	18.6
	30-60	7.4	1.23	S	276	128	330	255	346	135	10.0	12.0	0.46	15.5
	average	7.4	1.31	SC	293	136.5	353	288	357	138	9.2	13.3	0.49	.0
2	0-30	7.61	1.36	C	289	137	383	309	361	130	11.8	15.8	0.44	16.7
	30-60	7.5	1.20	C	276	121	317	280	302	128	6.5	11.3	0.42	14.3
	average	7.5		C	282.5	129	350	294.5	331.5	129	9.15	13.5	0.43	15.5
3	0-30	7.7	5.38	C	1240	556	1493	1465	1559	286	20.5	36.0	0.79	53.0
	30-60	8.1	2.96	CL	701	308	810	783	828	195	15.2	17.0	0.52	28.3
	average	7.9	4.17	CL	970.5	432	1151	1124	1193	240	17.8	26.5	0.65	35.6
4	0-30	7.6	1.29	C	308	129	322	312	337	133	5.0	11.2	0.43	16.1
	30-60	7.8	1.15	C	279	116	293	282	289	118	0.0	10.0	0.41	12.0
	average	7.7	1.22	C	293	122	307	297	313	125	2.5	10.6	0.4	14.0
5	0-30	7.4	3.13	C	775	325	811	855	884	218	19.0	26.3	0.58	38.6
	30-60	7.2	3.47	CL	858	361	908	927	963	227	21.0	31.0	0.59	42.0
	average	7.3	3.3	CL	816	343	859	891	923	222	20.0	28.6	0.58	40.3
6	0-30	7.9	6.08	SiC	1524	640	1621	1688	1781	294	28.3	40.0	0.55	52.4
	30-60	8.1	6.80	CL	1716	719	1803	1925	1983	316	33.0	43.5	0.60	61.0
	average	8.0	6.44	SiC	1620	679	1712	1806	1882	305	30.6	41.7	0.55	56.7
7	0-30	7.6	11.13	SC	2850	1180	2929	3203	3271	471	51.0	52.9	0.75	91.6
	30-60	7.7	8.38	SC	2112	889	2205	3365	2421	391	43.2	49.4	0.67	87.2
	average	7.6	9.75	SC	2481	1034	2567	3284	2846	431	47.1	51.1	0.71	89.4
8	0-30	7.5	11.95	C	3085	1271	3139	3491	3569	436	41.3	56.0	0.73	96.5
	30-60	7.6	6.94	C	1769	735	1823	1960	2021	322	38.5	45.8	0.66	60.2
	average	7.5	9.4	C	2427	1003	2481	2725	2795	379	39.9	50.9	0.65	78.2
9	0-30	7.7	1.73	SiC	435	176	419	415	428	180	14.6	12.3	0.51	20.3
	30-60	7.7	1.33	S	332	133	320	319	327	135	10.0	9.81	0.46	15.8
	average	7.7	1.53	SiC	383.5	154.5	369.5	367	377.5	157.5	12.3	11.0	0.48	18.0
.0	0-30	7.8	13.76	C	3512	1448	3615	4091	4160	535	54.0	48.5	0.76	113
	30-60	7.7	23.8	C	12475	5052	12573	14670	14768	721	69.5	59.8	0.92	214
	average	7.7	18.78	C	7993.3	3250	8094	9429.5	9464	628	61.7	54.1	0.84	163

Table 5. The ranges of soil salinity values and their percentage of the districts lands for the year 2020.

Range of soil salinity values $dS.m^{-1}$	Percentage %	Area Dunam2
1.2-2.6	14.1	553.5
2.7-3.9	16.7	655.6
4.0-5.3	19.9	781.2
5.4-6.7	21.5	844.0
6.8-8.0	17.5	68.0
8.1-9.4	3.7	145.0
9.5-11.0	2.9	113.8
12.0-13.0	1.6	62.8
>13	2.1	82.4

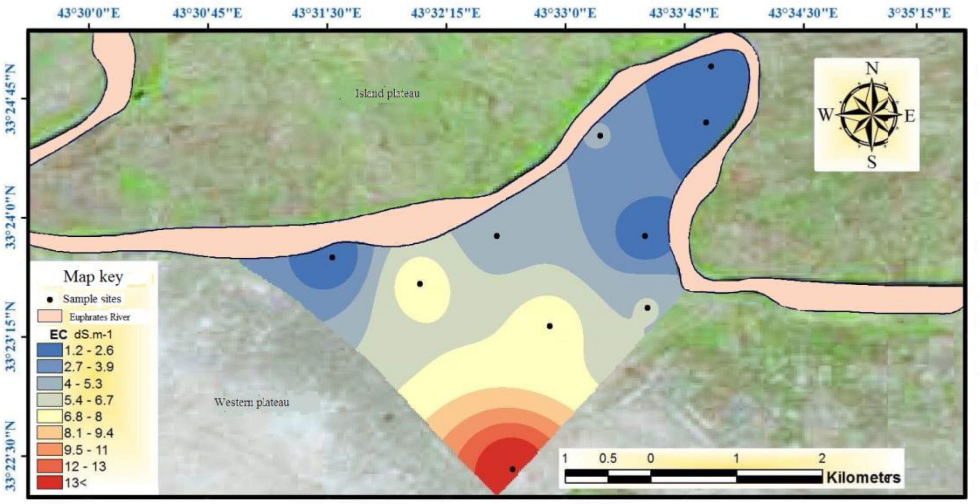

Figure 6. predictive map, including the variables of the distribution of salts in the studied section for the year 2020

The pH affects the availability of nutrients used by the crop in the soil, its effect on the movement of organisms and their effectiveness in the soil, and the transformation of nutrients into a state that is readily available for absorption. Such as carbonate, phosphorous, and sulfates when the level of the acidic function of the soil is low, This high property results in the oxidative state of iron, manganese, copper and zinc, which becomes less accessible to the plant, The data of Table (4) showing some of the chemical characteristics of the sites of the study area, where the soil acidity function (pH) ranged from 7.3 to 8.0, i.e. between neutral and moderately alkaline, according to the [34],[33] .
The soil total nitrogen content in the soil was the highest at 56.0 mg. Liter-1 at site (L8) and that site (L8) gave the lowest value of 0.035% on average, The observed difference between sites in the values of this fertility characteristic is due to the difference in the content of these sites of organic matter.

3.2. State of Soil Fertility

Percentage of organic matter varied between the areas near the edges of the Euphrates River and the distant regions, as the horizon rate for all study areas ranged between 2.30 and 0.25% for the soil, and The values are low in organic matter content. (Esu, 1991). This confirms previous reports and studies presented by Buringh, 1960 and Al-Ta'i, 1969 and Yahya, 1971, when they studied the soils of these areas and elsewhere within the physiographic unit (the unit of lower valleys) in the western desert of Iraq.
The lack of organic matter in the studied section due to the hot climate and the lack of precipitation (125 mm annually), and the two elements have a major role in the spread of organic matter in the soil

(1941, Jenny). And to the influence of climate elements on the density of the vegetation cover of the area, and through field observations, it was found that the natural vegetation spread very little and there were short herbs.

As for the total nitrogen status, its values for the sites of the study area ranged between 54.1 and 10.6. These values are considered high, and the result is consistent with the previous study presented by Moses *et al*. (2017) when studying the distribution of some medicinal plants in the areas of the physiographic unit of the lower valleys, in which the study area is located.

The amount of available phosphorus in the soil was between 0.84 and 0.40, and these values are considered low. All soils of the studied areas were classified as low according to the classification [37].

As for the potassium condition, it was classified as high, as its condition in the study area ranged between 163 and 14.

3.3. Determining the Areas tf Variations tf Agricultural Land Degradation tn the Study Section

Land Deterioration s a slow process resulting from poor management, and the result is to obtain dangerous economic and environmental effects, the most important of which is the impact on the living of the population within the region and the effect on the increase in the cost of the agricultural process., fluctuation, or final loss of the resource, as is the case in the loss of the most important agricultural soils, the reduction of agricultural areas and the destruction of For the ecosystem in those regions, one of the most important manifestations of this deterioration in the two provinces is soil salinization and degradation of land productivity. The salts in the soil solution have harmful effects on plant growth, including physiological drought in which the plants are unable to absorb water There is a decrease in the availability of macro and micronutrients.

Table (5) and Figures (6), (7) and (8) show the percentage of change in land cover and land use in the Zawiyat Al-Dhban District, and it was as follows:

- The percentage of saline land in the year 2000 was about 1052.1 dunums, or 26.8%, and this area increased in the year 2020 to 2294.08 dunums, or 44.4%, and the rate of change was 17.6%, while the green area for plants in the year 2000 was about 2826.7 dunums, or 72.0 This area decreased in 2020 to 2021.8 square dunums, at a rate of 51.5%, and the percentage change was 20.5%. Figure 8 shows the change in the area of land cover for the period 2000-2020.
- The possibility of urban encroachment on agricultural lands was in the year 2000 with an area of 47.1 square dunums (1.2%), and that area increased to reach 160.9 square dunums (4.1%) in 2020, with a relative increase of 2.9%.

The prediction map for salinity degrees showed that the percentage5.6% and the area of 846.7 dunums was less than (4) dSm-1, and that the percentage of 35.5% and the area of 5367.6 square dunums had a salinity between (4-8) dSm-1 and that the percentage was 39.9, The area of 6032.8 dunums was more than (8), dS.m-1, Table 6 and Fig. 8 show the variations of areas and percentages of land cover and land use for for duration 2000-2020 in the study area. Figures 9 and 10 represent a map of the calibrations in the land cover and the affected soil distributions. By salinity and urban expansion for the year 2000-2020.

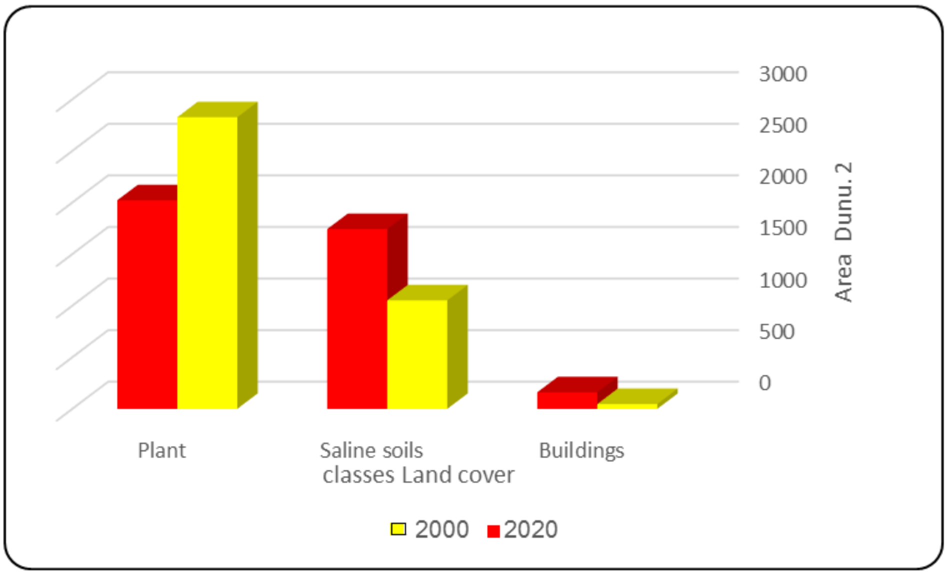

Figure 7. Change in the area of land cover for the period 2000-2020.

Table 6. Differences in areas and percentages of land cover and land use for the period 2000-2020 in the studied section.

Class land cover	2000		2020	
	Area (Dunu.^{2})	percentage	Area (Dunu.^{2})	percentage
Buildings	47.1	1.2	160.9	4.1
Saline soils	1052.1	26.8	1743.2	44.4
Plant	2826.7	72.0	2021.8	51.5
Total	3925.9	100	3925.9	100

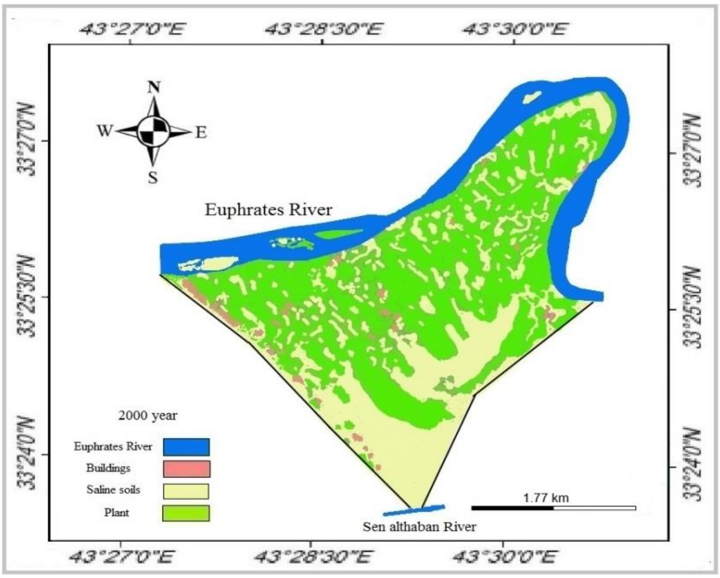

Figure 8. Land cover map, variations of soil salinity and urban encroachment for the year 2000 in the studied section (ERDAS Imagine version 9.1 and ARC-GIS). - Edition 10.

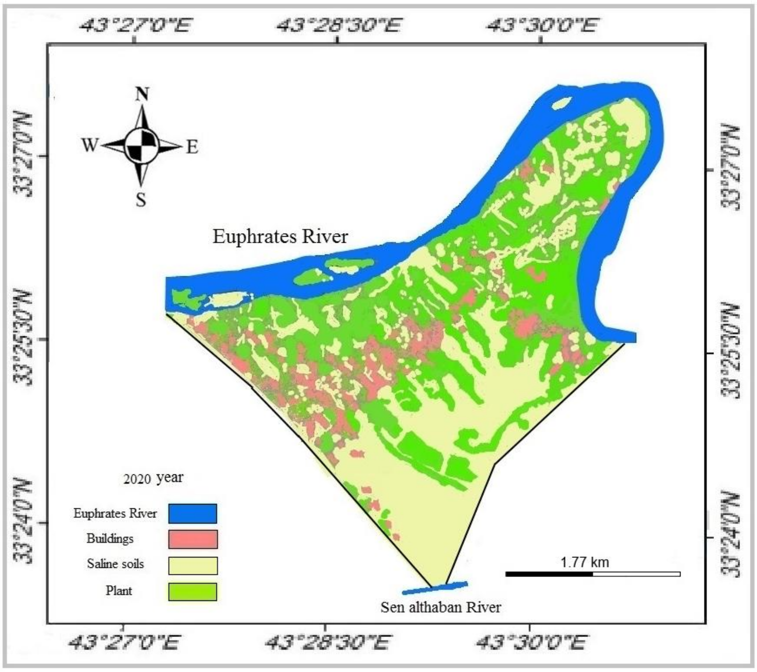

Figure 9. Land cover map, variations of soil salinity and urban encroachment for the year 2020 in the studied section (ERDAS Imagine version 9.1 and ARC-GIS). - Edition 10.

3.4. Statistical Analyzes

dispersion of salinity values in different locations was measured in Microsoft Excel version 2010 program, to describe the data and identify its characteristics and have importance in Statistical inference processes and the use of results, and their importance is about measuring the degree of difference between the different values of the quantitative variable studied. The arithmetic mean of the values of soil salinity was calculated for all sites, reaching (71.5). The values of the sum of the deviations From the arithmetic mean between (3.69-12.22) for the sites (7 and 4) respectively, as for the value of variance (68.11), the standard deviation (84.09) and the coefficient variation coefficient, which was Its value was 6.25%, to center the values and to know the degree of difference of those values from each other.

Conclusions and Recommendations

- The significant increase in values, which reached 14.1%, total area of 553.5 dunums, and the range of salinity was 1.2-2.6 dS.m -1 of the Zawiyat Dhban district, while the predominant percentages of the rest of the lands were 85.9%, their salinity limited to between 2.7 - 13.54 dS.m -1, which indicates that the soil salinity in the district is very high.
- It was found that there are different distributions in the electrical conductivity values in different parts of the studied areas.
- Based on the data, below are some important recommendations for decision-makers and farmers to make appropriate and necessary plans:

* The necessity Do periodic soil tests Zawiyyat Dhban district، as an example، and in the neighboring provinces so that salts do not accumulate in them، which increases their deterioration.
* Educate the investors of these lands to take the necessary measures to sustain that resource The most important of the soil through the use of modern methods، washing the soil on an ongoing basis، and adopting appropriate methods of cultivation.
*Cultivation of field crops that fit the soil tissues within the study area and planting crops that tolerate salinity.
* Directing soil science researchers to develop plans to get rid of the salinity problem in those affected areas.

* work of the relevant government institutions (Ministry of Agriculture) with the help of farmers to maintain its sustainability.
* Preserving the important soil resource, enacting laws to stop urban sprawl, and activating deterrent legislation to preserve the soil that provides food for the residents of the region.

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