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NATURAL FACTORS AND THEIR IMPACT ON THE URBANIZATION OF AGRICULTURAL LAND IN KIRKUK DISTRICT CENTER FOR THE PERIOD (1997-2018)

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Abstract:

The area of agricultural land and its productivity decreases day by day. Also, its profits obtained are reduced compared to other trades due to natural or human causes. This reduces the desire of farmers to do agriculture and change to other occupations. This, the land is left leave without agriculture or is converted to other uses. This is known as the emergence of urbanization in agricultural land which may vary according to the appropriateness of natural factors for expansion, especially in the center of Kirkuk district. Then, this districts uffers from the variation in the natural characteristics. There is also a lack in the interest in the agricultural especially after the discovery of Oil, whose revenues represent the basis in raising the national income of the population compared to agriculture. So this study dealt with three investigations specialized the first specialized in the study of the natural characteristics of the terrain, its suitability for expansion and the quality of water and types of soil suitable for urban construction.The second topic dealt with the study of the stages of urbanization expansion during 1997-2018 and the rate of change in the area of agricultural land within the third research.

Introduction:

Agricultural land suffers from a variety of problems, the first of which is the urbanization on agricultural land. Thus may reduce production and cultivated areas over time because of the gradual transformation of green areas into urban land with various uses, especially after the population increase. This happens in different cities of the world and limited land pushes them to move towards agricultural land near the center of the city. Thus, the agricultural provinces in the center of Kirkuk district turned some of them completely into urban land because of their proximity to the center of the city. Also, its geographical nature allows urban construction as well as other reasons. It is thus reflected in the deterioration of the agricultural aspect in the study area, so the problem of the study centers on the following questions:

1- Do natural factors affect the urbanization of agricultural land?

2- What are the factors that have triggered the change in agricultural land use?

3- Does the rate of urbanization in a particular province increase only?

4- What is the rate of change in the urbanization of agricultural land in Kirkuk district center?

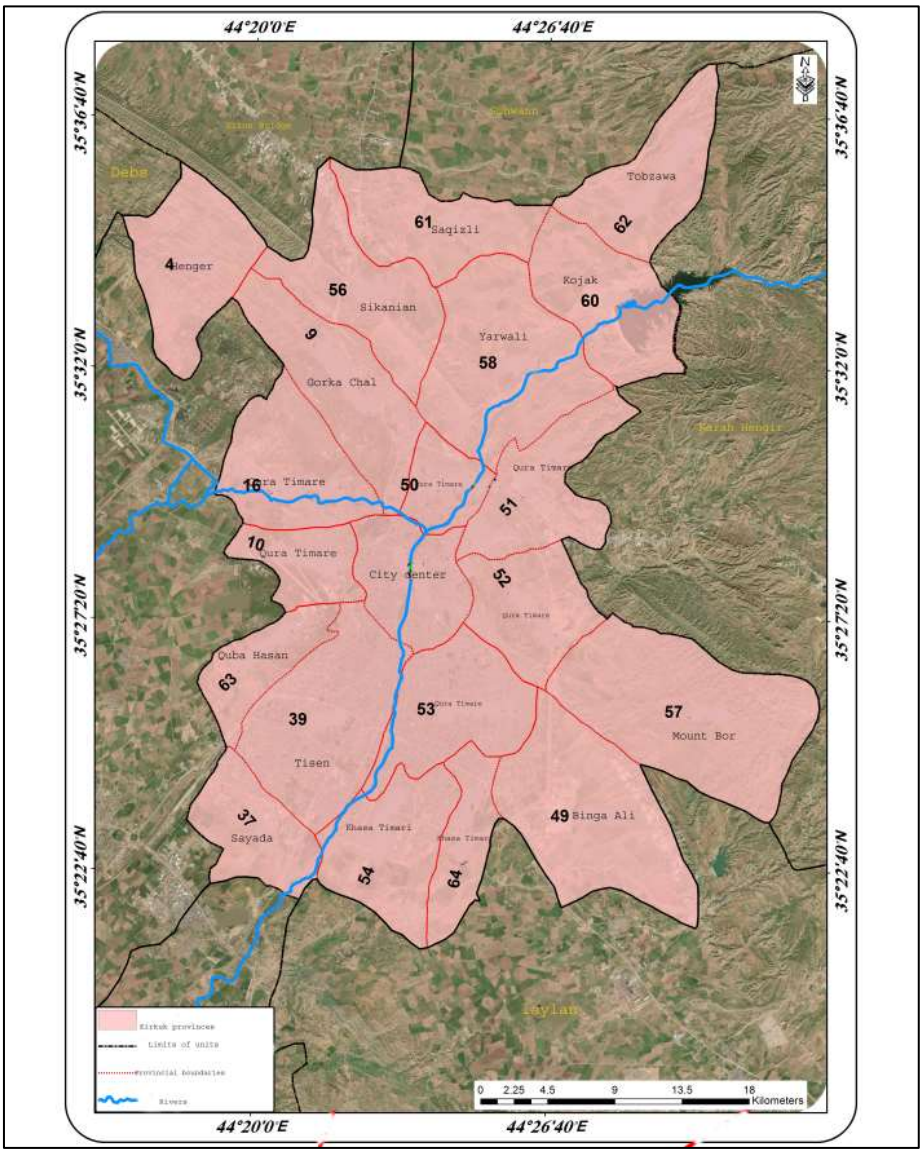
When answering these two questions, the hypothesis of study are set:

Yes, the natural factors affect the urban expansion on agricultural lands by studying the topography of the lands that do not allow construction, as well as the climate, water resources and soil that interfere in the choice of the site and the materials from which it is built and its .design to make some areas of agricultural provinces more suitable for housing than others

The rate of urban expansion increases in the provinces near the city center of Kirkuk, especially in the southwestern side, which is characterized by the lack of natural determinants that allow urban construction

The current study aims to give a clear picture of the rate of change occurring in the urban areas in the agricultural districts in the Kirkuk district center for the period from (1997-2018) and its impact on the agricultural side, especially in the development and development of agriculture and achieving food security despite the fact that the urban expansion came in response to the needs The growing population, and to achieve the goal of the study, the quantitative analytical approach was adopted and the ARC GIS 10.3 program was used based on satellite visuals. As for the spatial boundaries, the Kirkuk district center, which includes twenty agricultural districts and an area of 131,528 dunums, as shown in Table (1) and the map (1) That is equivalent to 328.82 km2, and the Al Khasa Sow River passes through it, one of the tributaries of the Little Zab River, which is bounded on the north and northeast by the districts of Shwan and Alton Bridge and the district of Debs, as for the south and southeast, which are the regions of Qarah Hengir and Laylan, on the west and southwest side It is represented in the regions of Taza and Yaiji, and as for latitude, it lies between two latitude (4 0 22 35 ° - 40 36 35 °) north, and two longitudes (0 20 44 ° - 40 26 44 °).

Map 1: Location of the study area



Taken from the map of Iraq Administrative Scale 1/50000 using the program (ARCGIS10.3 for 2018).

Table (1) Geographical distribution of suitable and non-arable land in the study area for 2018.

NO.	Administrative Unit	Agricultural provinces	County No. (Popularity	Total area	%	Arable area	%	Unarable area	%	ت	Agricultural provinces	County No. (Popularity	المساحة الكلية	%	المساحة الصالحة للزراعة	%	المساحة غير الصالحة للزراعة	%
-1	Kirkuk	QuraTimare	10	4376	3,3	375	0,9	4001	4,4	-16	Saqizli	61	6697	5,1	5600	14	1097	1,2
-2		QuraTimare	16	4276	3,3	191	0,9	4085	4,5	-17	Kojak	60	7160	5,4	6160	15,4	1000	1,1
-3		QuraTimare	50	2128	1,6	-	-	2128	2,3	-18	Henger	4	9475	7,2	8500	21,3	975	1,1
-4		QuraTimare	51	5804	4,4	-	-	5804	6,3	-19	Tobzawa	62	6113	4,6	4601	11,5	1512	1,7
-5		QuraTimare	52	5666	4,3	-	-	5666	6,2	-20	Yarwali	58	8500	6,5	5096	12,8	3404	3,7
-6		QuraTimare	53	5878	4,5	-	-	5878	6,4	-21	Total	-	131527	100	39923	100	91604	100
-7		KhasaTimari	54	7511	5,7	-	-	7511	8,2									
-8		KhasaTimari	64	6511	5	-	-	6511	7,1									
-9		Sayada	37	4255	3,2	-	-	4255	4,6									
-10		Binga Ali	49	7190	5,5	4634	11,6	2556	2,8									
-11		Mount Bor	57	10181	7,7	400	1	9781	10,7									
-12		Tisen	39	8847	6,7	200	0,5	8647	9,4									
-13		QubaHasa	63	2100	1,6	200	0,5	1900	2,1									

		n							
-14		Gorka Chal	9	10431	7,9	250	0,6	10181	11,1
-15		Sikanian	56	8428	6,4	3716	9,3	4712	5,1

Source: Ministry of Agriculture, Kirkuk Agriculture Division, Planning Department, Unpublished Data, 2018.

The first topic: natural factors affecting the urbanization of agricultural land in the center of Kirkuk district.

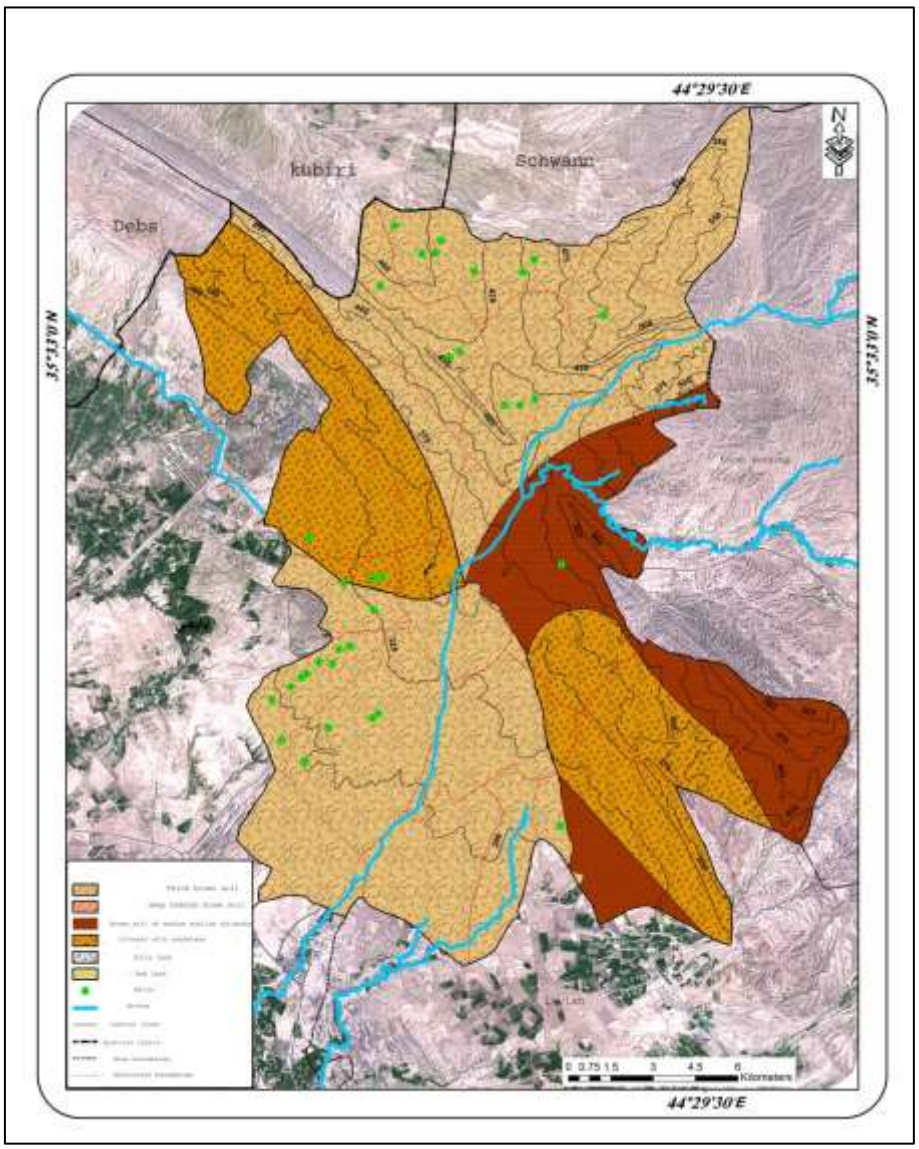
Natural factors are one of the most important basics of urbanization in agricultural land either in helping to expand or hinder the expansion process.This urbinzation reduces cultivated area and productivity of agricultural land due to the expansion of human resettlements. This happens in particular in the agricultural provinces of the province center which suffers from the disparity in natural characteristics through the two different stages that the city passes through. This is through studying the terrain and water resources and the quality of soil that does not allow construction. In this case the owners sell or leave the land empty due to the agriculture or geographical nature(Al-Qatani, 2017). For these land pieces, the study of natural characteristics should be taken into account when the city is created.

1-1: Terrain: Terrain plays a major role in attracting and expelling the population according to its characteristics. It determines the suitability of cities for urban expansion. This is because the less slope and damage the land has, the mose decisive it is in its inclusion in the expansion process. However, the increase in the slope rates reduces the possibilities of expansion, and therefore most cities expand naturally until they reach in their expansion to such terrian obstacles(Muhammad, 2013) shown in as inMap (2).

2- The semi-mountainous region: This region includes the northern and central provinces of the district center, where we note the lack of population within the provinces of Kojak, Tubzuah and Saqzali. This is because of its semi-mountainous nature and its distance from the city center. It is not given a great opportunity for urban extension unlike the flat and spacious areas (Jaber, 2004) and the areas from which the oil is extracted (Hustend, 1948) such a hills of QaraJuq, Afana Dag, Kanye Domlan and the Avata Dag series in which there are three convex twists of a dome. Thus these areas are exploited in the extraction of oil and some are characterized within these hills, especially the low-lying parts, by arability.

3- Kirkuk Plateau: The plateau is different in its heights, and this affects the extent of its suitability for agriculture and housing. This is especially where the valleys and water stream passing and the plateau extends between the hills of Batioh, Ali Dag, Dag oil to the west, the Skra Dag mountain ranges and the village of Dag to the east (Khasbak, 1973). This plateau is economically important as there are many oil fields and also it is important in terms of human resources as it has many important towns of Kirkuk (Abboud, 2010).

Geographical distribution of natural manifestations in the center of Kirkuk district:



15-

16- FAO classification (F A O).
17- Tm LANDSAT_5.
18- Ministry of Agriculture, Kirkuk Agriculture Directorate, Kirkuk Agriculture Division, Planning and Follow-up Department.

19- **Kirkuk Plain:** This plain is characterized by being the most viable for agriculture and urbanization. The vast majority of the cities of the world are located in the flat plains or at least moderate dissenting (Atwi, 2003). So most of the provinces within which they are located are subject to urban expansion from the provinces of Og Hasak Tabea and Tiseen, Sayada, Khasa Timari 54, 64, 53 and parts of Binga Ali and The Quoria Timari 10. The plain consists of the connection of the flood editing and the soil of the Ghareni (Abboud, 2010). The topographic situation in the center of the province, which consists of a low-altitude plateau descending from the north and northeast to the south, reflects the influence on the urban growth trends of the city towards the north, north-east and west. This influence is limited due to natural symptoms, which made the expansion of the directions of the south and south-west since 1922 after the discovery of oil in it(Al-Jaf, 2002). So the construction in the agricultural flat land flat in the area is significantly increasing which negatively influences productivity of the land.

1-2: Climate: Climate effect is clear in urbanization, especially in temperature and rain, which interfere in the design of housing, the choice of the site and the materials from which it is built and its design to make some places fit for habitation than others(Sharif, 2000). To preventing moisture leakage as shown from table (3), the annual rate of temperatures reached 516.58 m for 1997-2018, while the annual total rainfall was 5847.8 mm, which varies from year to year. This affects the productivity of agricultural land because most farmers are trying to get a good agricultural season. The lack of rain leads to a decrease in the amount of production and the change in the use of agricultural land to other uses for profit. Thus, most construction of buildings occurs in spring and summer more than winter and autumn due to the fall of rain and the desire of the population.

Table (3) monthly rates of temperature and rain at Kirkuk station for the duration of (1997-2018)

Months	Jan	Feb	March	April	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Temperatures	9,94	12,01	16,54	22,93	29,74	35,79	38,67	38,67	33,43	26,67	18,26	12,49
Rain	66,65	40,56	39,73	29,8	10,43	0,12	0,38	0,0	0,42	11,45	31,3	47,58

This table is adopted from the Ministry of Transport, General Authority for Air Lights and Seismic Monitoring, Climate Department, Kirkuk Station, (unpublished data)

1-3: Water resources: These resources encourage the exploitation of the agricultural land in the construction of urban centers because their presence has been the cause of the emergence of population attraction centers since ancient times. They contributed to the emergence of civilizations such as the Mesopotamia valley and nile valley (Saeed, 1997). The presence of water and its quantity are a key element in the change of agricultural land, especially in areas that are suitable for construction and urbanization because their presence is not enough for agriculture but enough for the establishment of cities. Water resources in the study area include:

1- **Surface water**: the River Rafid Khasa stems from the heights near the district of Cham Chamal and continues to run through Kirkuk plateau and passes in the center of the province. It is linked to the small Zab River through the Valley of Zgiton (Salem, 2009) and has an impact on urban expansion because its water is insufficient for agriculture and its location is close to the city center. This encouraged the expansion of most of the urban centers located on the sides of the river within the provinces of Temari 50, 53, 54, Tiseen and Sayada more than in Kojak and Yaroli counties.

2- **Ground water:** The effect of groundwater is evident in areas where surface water is low as shown by map (2). However, most of them are characterized by a lack of water due to urban sprawl and some other human activities that reduce the chances of surface water leakage(Al-Khatib, 1999). Although the state provided a lot of facilities in digging artesian wells, most of them were left because of the lack of rain and the occurrence of drought in some seasons. So the urban centers that were built close to the wells are small in population, small in size and scattered in distribution due to the limited water (Ayyana, 1987). The relationship between human and water are mutual because the amount of water determines the number and density of the population. Places rich in population are primarily agricultural areas, so most villages are located along river valleys, whether they are rural or urban settlement (Sarhan, 2013). This is because of the lack of rain pushes the population to live near water sources with the aim of watering their agricultural crops and the existence of river slides soil(Adai, 2012).

4-1Soil: The urban expansion is affected by the characteristics and quality of the soil, as it is one of the aspects that must be identified and the extent of its suitability for urbanization. It has many present and future problems, especially when constructing floors that can be erected by analyzing the texture of the soil, its chemical composition and its durability (Al-Dulaimi, 2002). The study area according to the FAO classification, as can be seen from Map (2) to:

1- Brown soil with deep thickness: it is characterized by being rich in organic and mineral materials suitable for agriculture (18) and has an effect on urban expansion because deep soils have higher construction costs. It also need strong foundations compared to the non-deep soils exposed by rocks suitable for construction. However, most of them have been transformed into Residential lands and it is located in the provinces of Tobzawa, Kojak, Yaruli, Saqzli, Sakanian, and parts of especially Temari 50, 53, 64, 54, Tiseen, Sayada and OujHasak.

2- **Brown soils of medium thickness and shallow:** This soil can be used for construction to a greater degree than deep brown soils due to its being from shallow soils whose degree of suitability for agriculture is low. It includes the western side of the district center represented by parts of the provinces of Jabal Bor and Bunga Ali, Khasa Temari 51 and small areas of Khasa Temari 52, 50, Yaruli and Kojak.

3- **Lithosol soil with sandstone and gypsum:** it a mixture of soil that consists of three types (lithosol stone with calcareous soil and gypsum). However, the percentage of gypsum affects agriculture (19)) and helps to establish urban structures, especially limestone, which is coherent and strong for the erection of buildings. It bears the weight of construction equipment, as it is represented in the Quria provinces of Temari 16 and 10, Shoraw, Jebel Bor and Binga Ali, KhasaTemari 52 and 53.

The second topic: The stages of urban expansion in the Kirkuk district for the period (1997-2018.)

The Kirkuk district center witnessed a large urban expansion on agricultural lands in the absence of governmental control, especially after the population increase due to migration and natural increase. It required the use of techniques to know the reality of urban expansion. The borders of agricultural lands were drawn for each stage to find out how and where the urban blocks expanded. The destination to which the city is expanding depends on the GIS program and the Anderson system in the classification adopted by the US Geological Survey.

2-1: The first phase until 1997.

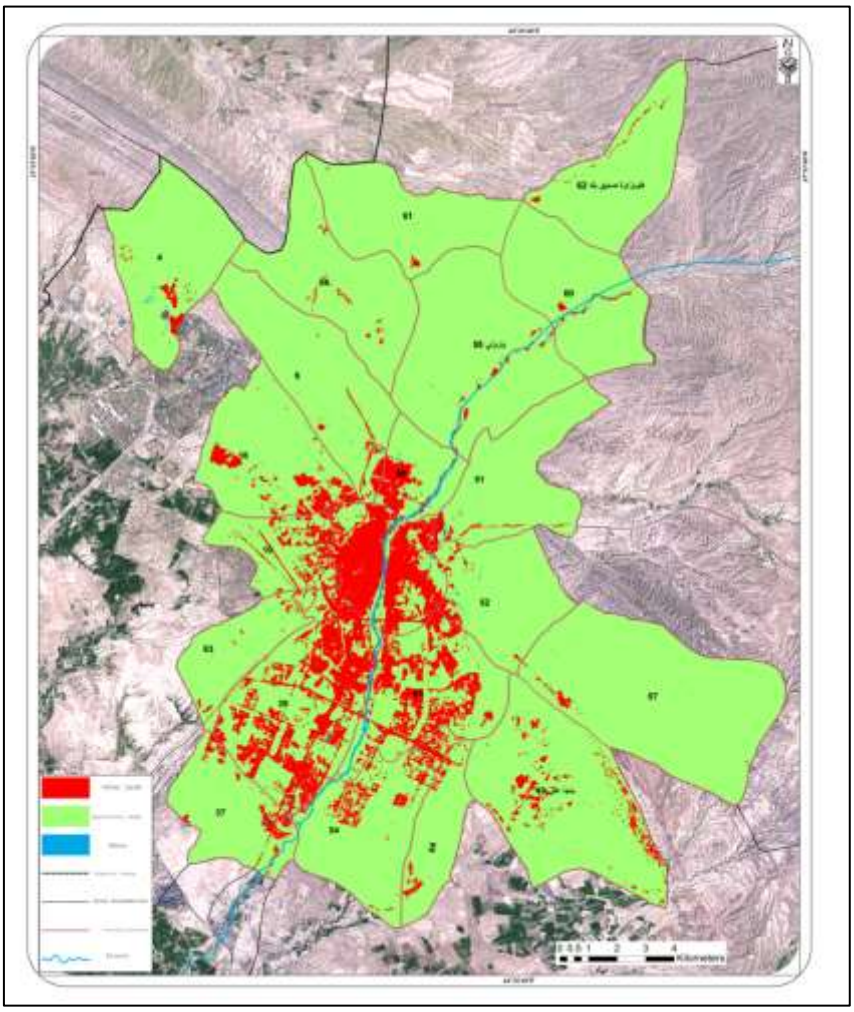
This stage witnessed slow urban growth due to social, economic and political changes represented by the imposition of the economic blockade on Iraq, which resulted in leaving the residential plots that were distributed in previous years incomplete construction(Al-Bayati, 2017). The poor conditions that the state went through during the 90s and the inability to build led to exploitation agricultural lands in providing food needs that were sufficient to meet the local need only. Table (6) and map (3) show that the 90s provinces. Khasa Temari 53, ranked first with an area of 3219 and 2507 acres, at a rate of 36.3% and 28.3%,respectively. It is of the total area of expansion in the district center due to the population increase, which reached 94,264 people and 118,368 people, at a rate of 30.6% and 38.5%, respectively. Consequently, the need for residential lands increased compared to the districts of Khasa Temari 50 and 51, as the urban expansion in them reached 650 and 520 acres of 7.3% and 5.9%, respectively, while a population increase of 28341 and 13002 people was recorded, with a rate of 9.2% and 4.2%, respectively. However, the province of Temare 64 recorded a lower rate of urbanization and a higher rate of increase in population. This area also includes Kaniyeh from the districts, Khasa Temari 51 and 54, although it was empty of residents in the 1977 and 1987 censuses,

because the housing expansion in the provinces of Benga Ali, especially Temari 53 and 54, which is located in the district of 64. This is also caused by the low land prices and the absence of natural or human determinants that prevent expansion. This has become a factor in attracting the population from other provinces, and its population reaches 19,024 people, at a rate of 6.2%, with a built-up area of 200 acres and a rate of 1.9% of the total expansion of the district center, as shown in Table (6). The residential use recorded the highest uses which amount to 5049.12 acres and 57% of the total area of other uses due to the population increase. It reached 307,826 people, because residential use is faster in its growth, expansion and movement than other uses. Also, the standard of living varies among its residents, especially between the Tiseen regions, Baghdad Road, Arafa, and A'mal Sh3be, Faelaq and the Huzaeran, according to social classes:

The first form: It is the family with a high level of income, as they resort to the countryside in search of a quiet and healthy life to get rid of the burden of urban life. This leads to construction in agricultural lands in a form that combines agriculture and urbanization in the form of orchards or small farms particularly in Sikanian, Gorchal and Yaruli and ranges in size between (4-8) acres.

The second form: It is the low-income family that accesses agricultural lands because of the cheaper prices compared to the city center. This is the reason for building random, irregularly shaped urban structures that suffer from neglect and deterioration as in provinces of Temari, Panja Aliand Sayada in Kirkuk, with an area between ((150-) 200 m). As for the commercial use that spreads along the main external roads that pass within some agricultural districts that connect between Kirkuk - Erbil, it is considered the reason for the revitalization of commercial traffic as are sult of the establishment of rest points for travelers with an area of 317 acres. It increases at a rate of 3.6%. It was practiced by a small number of the population due to the lack of industries that were limited to handicrafts and simple industries as a result of the imposition of the blockade and the inability of the state to keep pace with technological development. It reached an area of 459.28 acres by 5.3% and with regard to other uses that include basic services for the population, especially in some cases owned by farmers, which require the removal of agricultural lands from them and their compensation by the state, with an area of 3039 acres, at a rate of 34.3%.

Map 3: Geographical distribution of urban expansion on agricultural land in Kirkuk district center in 1997.



This map is adopted from Visible satellite TM LANDSAT_5 on 02/05/1997.

No.	Agricultural provinces	County number its) (fame (	Urban expansion in acres	%		%	No	Agricultural provinces	County number its) (fame	Urban expansion in acres	%	Population	%
1.	QuriaTemari	10	300	3,4	8123	2,6	-12	Ninety	39	3219	36,3	94264	30,6
2.	QuriaTemari	16	250	2,8	1571	0,5	-13	Good dome	63	19,9	0,2	476	0,2
3.	KhasaTemari	53	2507	28,3	11836 8	38,5	-14	Korka toured	9	17,9	0,2	300	0,1
4.	KhasaTemari	51	520	5,9	13002	4,2	-15	Sikanyan	56	22	0,2	1500	0,5
5.	KhasaTemari	52	436	4,9	9214	3	-16	Sag	61	40	0,5	770	0,3
6.	KhasaTemari	50	650	7,3	28341	9,2	-17	Kojic	60	30	0,3	775	0,3
7.	KhasaTemari	54	496	5,6	8647	2,8	-18	Hengir	4	40	0,5	1654	0,5
8.	KhasaTemari	64	200	2,3	19024	6,2	-19	Tobzawa	62	15	0,2	446	0,1
9.	Huntress	37	20,6	0,2	736	0,2	-20	Yaroli	58	11	0,1	227	0,1
10.	Panja Ali	49	40	0,5	237	0,1	-21	Total	-	8864,4	100	307826	100

.	Mount Bur	57	30	0,3	151	0,0

Table (6) Geographical distribution of urban expansion in agricultural land in Kirkuk district center in 1997

(1)Ministry of Planning, Kirkuk Statistics Directorate, Planning Department, Unpublished Data, 1997
(2) TM LANDSAT_5 on 1997/05/02

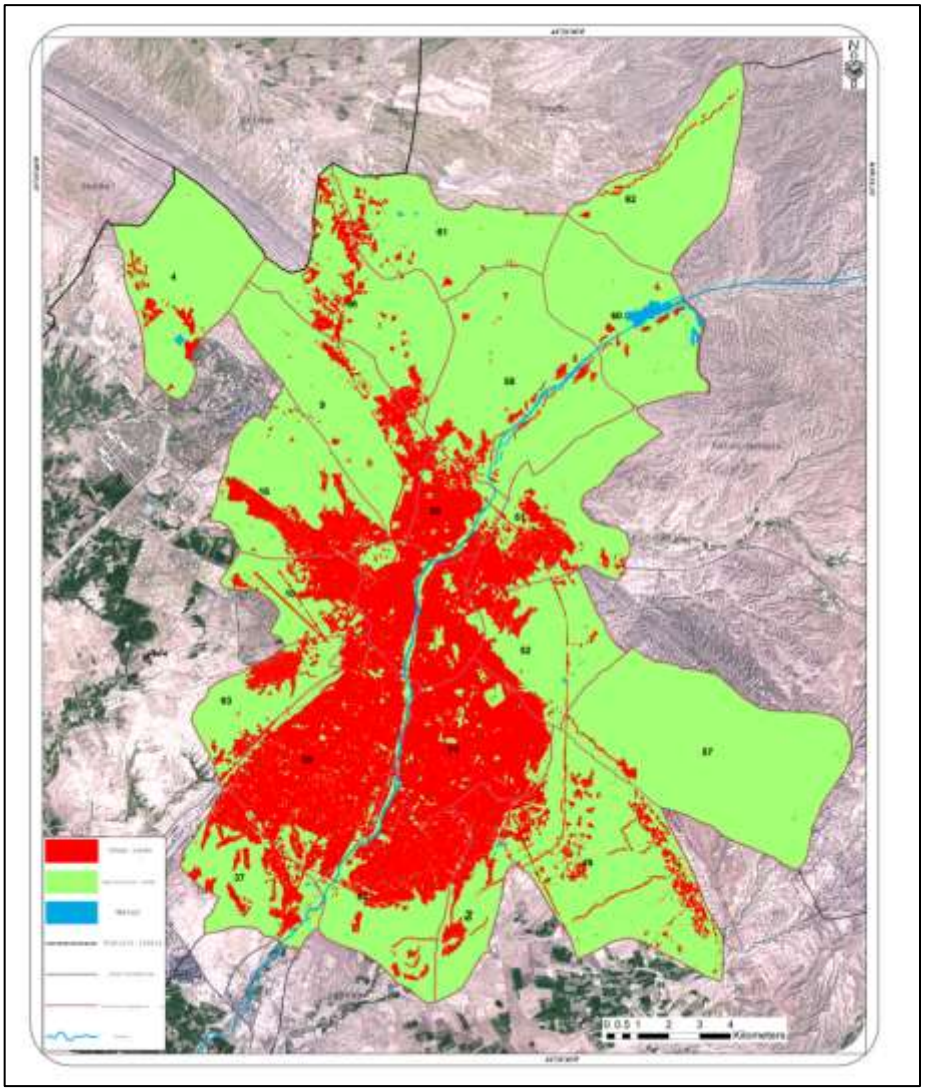
No	Type of uses	Area/acre	%
1.	Residential uses	5049,12	57
2.	Industrial uses	459,28	5,2
3.	Commercial uses	317	3,6
4.	Other uses	3039	34,3
5.	Total	8864,4	100

Table (6) various uses in agricultural land in Kirkuk district center for 1997

2-2 The second phase: 1998-2018.

This stage is characterized by a rapid growth of urban expansion due to its high population density and migration resulting from political conditions. This happens after the events of 2014 AD, as the city expanded in all possible directions, so agricultural lands witnessed an almost complete decline in some provinces as agriculture is no longer an economic resource due to the high prices of materials. Therefore, many farmers divided their agricultural lands into residential plots and sold them (Al-Azzawi & Abd, 2014). Table (7) and Map (4) show that the provinces of Temari 53 and Tiseen came first with an area of 11,129.9 acres and 8287.9 acres, with a percentage of 32% 9 and 24.5% of the total district center, with an increase of population reaching 240,610 people and 215,218 people, and by 30.8% and 27.6%, respectively. This is because of the doubling of the urban population, while the urban and demographic situation differs between the provinces of Temari 51 and 64. These provinces recorded an urban expansion with an area of 2148 and 1219.9 acres, at a rate of 6.3% and 3.6%, with an increase in population of 37,112 people and 64,337 people, and by 4.8% 8.2% of the total population of the district center. This is because the urban expansion in a district of Khasa Timari 64 belongs to residential use only a comparison Khasa Temari district 51. This district belongs to other uses and witnessed interest in owning land for residential purposes. The land is divided among families without planning, which led to random urban growth. In the past, on agricultural lands, where the presence of the rug is less The green clolor and the area of housing units is reduced to between 200-350 km2 while the area of the buildings belonging to other uses increases. However, the provinces of Jabal Bor, Tubzuah and Yaroli has the lowest population of 90 inhabitants and 20 0 inhabitants and 380 people respectively because the urbanization of Mount Bor belongs to the oil reservoirs either Tobzuah and Yaroli due to military uses or transportation or recreational roads. In particular, the province of Yaroli, which includes the city of games and some housing projects that are planned but are under Implementation? Also, the lack of financial return is one of the most important reasons that push farmers to change the land from agriculture to other uses because the living conditions of the farmer from limited income lead to change the use and the migration of labor to the city center. This is caused by the availability of economic benefits that encourage development, including the provinces of Tobozua Kojke and Hengir, which saw a decrease in population density. Table 7 shows that residential use amounts to 13303.64 and by 39.3% and increases the seriousness of the problem of expansion in the residential area without studying the construction of housing units that takes

Map (4) Geographical distribution of urban expansion on agricultural land in kirkuk district center for 2018



This image is taken from TM LANDSAT_5 2018/05/15.M.

Table (7) Geographical distribution of expansion Al-Amrani in agricultural land in Kirkuk District Center for 2018.

No	Agricultural provinces	County number)its fame(	Urban expansion in acres	%	Population	%	No.	Agricultural provinces	County number)its fame(	Urban expansion in acres	%	Population	%
1	QuriaTemari	10	1195	3,5	27909	3,6	-12	Ninety	39	8287,9	24,5	215218	27,6
2	QuriaTemari	16	1148,9	3,4	15740	2	-13	Good dome	63	140	0,4	1546	0,2
3	KhasaTemari	53	11129,9	32,9	240610	30,8	-14	Korka toured	9	167	0,5	7321	1,2
4	KhasaTemari	51	2148	6,3	37112	4,8	-15	Sikanyan	56	308	0,9	8316	0,9
5	KhasaTemari	52	1897,9	5,6	29139	3,7	-16	Sag	61	140	0,4	1230	0,2
6	KhasaTemari	50	2568,8	7,6	64337	8,2	-17	Kojic	60	110	0,3	797	0,1
7	KhasaTemari	54	1946,4	5,8	62415	8	-18	Hengir	4	204	0,6	1907	0,2
8	KhasaTemari	64	1219,9	3,6	48295	6,2	-19	Tobzawa	62	80	0,2	200	0,0
9	Sayada	37	379	1,1	11692	1,5	-20	Yaroli	58	120	0,4	380	0,0
1	Panja Ali	49	250	0,7	5976	0,8	-21	Total	-	33849,7	100	780230	100
1	Mount Bur	57	409	1,2	90	0,0							

Source: (1) Ministry of Planning, Statistics Directorate Kirkuk, Planning Department, Unpublished Data, 2018
(2)TM LANDSAT_5 on 2018/05/15

No.	Type of uses	area in acres	%
-1	Residential uses	13303,64	39,3
-2	Industrial uses	3000,06	8,9
-3	Commercial uses	4087	12,1
-4	Other uses	13459	39,8
-5	Total	33849,7	100

Table (7) various uses in agricultural land in Kirkuk district center for 2018.

The third topic: the rate of change in the urbanization of agricultural land for the period (1997-2018)

Urbanization is a phenomenon that appears in all countries of the world, including Iraq, where the population is increasing at an annual growth rate of 3.4%. This means a decrease in the area of agricultural land in front of urban extension (Al-Azzaw, 2005). For the study area, there is a change in the area of agricultural land because of its change to other uses, especially residential, which appeared significantly after 2003 due to the absence of the rule of law and population increase, which led to the expansion of the agricultural land. The purpose of studying the change in the use of land is to know the extent of the danger to agricultural land from urban sprawl in the coming years through the equation of the rate of change and the direction of change (Al-Azzawi & Abd, 2014). Thus, the rate of change from 1997-2018 is seen in table (8) 281.68% while the population recorded 153.46%, i.e. the trend of urbanization is constantly increasing, with the highest number in the provinces of Saeder, Mount Bor and Sicanian, which reach 1739. 80%, 1263.33% and 1300% respectively, while the rate of population change was 1488.58% and 40.39% and 454.4%, respectively, due to the expansion of educational uses and oil and commercial deposits in agricultural lands compared to the provinces of Panja Ali and Gorchal. The highest rate of change in the population was recorded at 2421.51% and 2340.33%, respectively. It recorded urban expansion up to 525% and 832.96%, respectively. This is because the area of residential uses is less than the educational and commercial areas, as it does not exceed the area of the residential unit built in In 2018, about 350 square meters. In addition, there are also construction of apartments or buildings in the provinces of Panja Ali and Gorchal, which includes the highest percentage of the population and with a lesser area. Other uses are at a rate of 1189.27%, followed by industrial uses with an area of 553.20%, because trade and industry crafts were the most attractive to the population in order to improve their standard of living.

Table (8) The percentage of change in the urbanization of agricultural land in the center of Kirkuk district for the duration (1997-2018)

Population	Urban growth	County number (its (name	Agricultural provinces	No	Population	Urban growth	County number (its name)	Agricultural provinces	No.
128,31	157,46	39	Ninety	-12	243,57	298	10	QuriaTemari	-1
224,78	603,51	63	Good dome	-13	901,90	359,56	16	QuriaTemari	-2
2340,33	832,96	9	Korka toured	-14	103,27	343,95	53	KhasaTemari	-3
454,4	1300	56	Sikanyan	-15	185,43	313,07	51	KhasaTemari	-4
59,74	250	61	Sag	-16	216,24	335,29	52	KhasaTemari	-5
2,83	266,66	60	Kojic	-17	127,01	295,20	50	KhasaTemari	-6
15,29	410	4	Hengir	-18	621,81	292,41	54	KhasaTemari	-7
-55,15	433,33	62	Tobzawa	-19	153,86	509,95	64	KhasaTemari	-8
67,40	990,90	58	Yaroli	-20	1488,58	1739,80	37	Sayada	-9
153,46	281,86	-	Total	-21	2421,51	525	49	Panja Ali	-10
					-40,39	1263,33	57	Mount Bur	-11

%	Type of uses	No.
163,48	Residential uses	-1
553,20	Industrial uses	-2
1189,27	Commercial uses	-3
342,87	Other uses	-4
281,86	Total	-5

Table (8) The percentage of change in the various uses in the Kirkuk district center for the duration (1997-2018) taken from Tables 6 and (7)

Conclusions:

1- Provinces characterized by the presence of nature determinants are unknown an opportunity for urban extension in contrast to the flat provinces that appear in the central and southern parts of the province center. This is also caused by the availability of water resources that encourage urban construction. These resources are not enough for agriculture, but enough for the establishment of cities such as the river, but the non-deep soil is more suitable for urban

2- The urbanization of agricultural land has gradually spread, most of which was in 2018 due to the change of system of government and development. Technological aspects population increase but the highest rate of change recorded in commercial uses, amounting to 1189.27% due to the shift of most people to trade in order to raise the standard of living.

Recommendations:

1- This work recommends to reduce the construction of housing units in agricultural land by issuing strict laws that prevent abuse and imposing fines on them. This aims to support the agriculture sector by granting good seeds and financial loans to farmers.

3- Vertical construction in agricultural land i.e. the construction of multi-role buildings is recommended.

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