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## Unplanned Urbanization and Agricultural Land Degradation in Baghdad City from 2003 to 2017

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### Abstract

Several problems have emerged as a result of urban expansion or the connection of urban areas with rural areas. This process has led to the urbanization of rural areas, and to have overlapping edges and margins of areas, which were outside the basic design of the city. Accordingly, the present research assumes that the accelerating growth of Baghdad population has contributed significantly to the process of unplanned urbanization. Thus, the study aims to examine the factors that have led to an increase of urban sprawl at the expense of the agricultural land. The study has thus adopted the descriptive, analytical, and historical approaches relying on the simple linear regression method to predict the phenomenon of urban expansion and its impact on the agricultural land. It has also included illustrative maps used in the preparation of geographic information technology (GIS). The study has concluded that the events of Iraq after 2003, the absence of legal rules, weak legislation, and the successive large immigrations from the countryside to the city have all led directly to a great increase in the process of housing expansion at the expense of agricultural lands. The research recommended the necessity of finding final solutions to the problem of encroachment on agricultural lands, establishing new and low-cost urban housing with full facilities and services, simplifying the procedures of building licensing, and reducing fees.

**Keywords:** Basic plan, housing factor, Land use, Legislation, Urban expansion, Urban Planning

## التحضر غير المخطط له وتدهور الأراضي الزراعية في مدينة بغداد للمدة من ٢٠٠٣- إلى ٢٠١٧

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### المستخلص

برزت مشكلات عدة نتيجة التوسع الحضري المتمثل باتصال المناطق الحضرية بالمناطق الريفية التي تعد عملية ممهدة لتريف الحضر وتحضر الريف و تداخل مناطق اطراف المدينة والهوامش التابعة لها والتي كانت خارجة عن التصميم الأساسي للمدينة لكي تكون جزءاً لا يتجزأ منها؛ لذلك استند البحث الى فرضية مفادها أن النمو المتسارع لسكان مدينة بغداد اسهم بشكل كبير في عملية التوسع الحضري غير المخطط له (عشوائية التخطيط) للمدينة، وأن عملية التوسع الحضري قد أثرت بشكل مباشر في التصميم الاساسي لمدينة بغداد؛ لذا جاءت أهمية البحث من تسليطه الضوء على رصد العوامل التي أدت إلى زيادة الامتداد العمراني على حساب الأرض الزراعية، وقد اتبعت الدراسة المنهجين التاريخي و الوصفي التحليلي عبر اعتماد الدراسة على اسلوب الانحدار الخطي البسيط للتنبؤ بظاهرة التوسع الحضري وتأثيرها في الأرض الزراعية، فضلاً عن تضمينها خرائط توضيحية استعملت في إعدادها تقنية المعلومات الجغرافية GIS، حيث خلصت الدراسة الى أنه نتيجة الاحداث التي مر بها العراق بعد عام ٢٠٠٣م، وغياب سلطة القانون وضعف التشريعات والهجرات الكبيرة المتتالية من الريف الى المدينة بسبب قلة فرص العمل والبحث عن سكن لائق أدت بشكل مباشر الى زيادة كبيرة في عملية التوسع السكني على حساب الأراضي الزراعية. وأوصى البحث بضرورة إيجاد حلول نهائية لمشكلة التعدي على الأراضي الزراعية عن طريق اهتمام المؤسسات الحكومية ذات العلاقة بإقامة المساكن العمرانية الجديدة واطئة الكلفة مع كامل المرافق والخدمات؛ مما يتيح جذب اكبر عدد ممكن من السكان اليها والعمل على تبسيط اجراءات تراخيص المباني وتخفيض الرسوم.

**الكلمات المفتاحية:** استعمالات الارض، التخطيط الحضري، التثريغ، التوسع الحضري، عامل السكن، المخطط الاساس



## 1. Introduction

Studying the use of agricultural lands in the city of Baghdad, and understanding the urban expansion is an essential and important requirement for preserving the city. It further helps to formulate appropriate policies to supply the best resources, and increase the production to counter the rapid growth of population. Planners and agricultural policy makers seek to prepare appropriate plans and developmental programs to meet the needs of the city residents and the development of natural resources to reduce the differences between its parts. The increasing need for new lands for housing purposes is a major problem in front of the shortfall in the areas of agricultural lands. Such an increase leads to change the land from being agricultural to residential. This case accompanies the wheel of development, and raises the need of new lands for housing and recreation purposes. Accordingly, these agricultural areas will lose large parts for the calculation of human settlement (Taha, 2017).

What indicates the change in the use of city land is the increase of areas designated for construction within the organizational structure. Such a problematic change has significantly and influentially emerged as a result of the absence of law and legislation authority, who are supposed to be responsible for regulating the construction processes. The process of urban expansion at the expense of agricultural lands (whether those lands surround the city or are located on its outskirts) is a general problem. This problem confronts all countries that are characterized by a rapid increase in population growth due to either births or immigrations from the countryside to the city. The importance of the study is that Baghdad is one of the agricultural areas known for its ancient history, and the use of its agricultural lands is not a coincidence. Besides, important factors are available in this site, among which are the appropriate natural ingredients. Therefore, the study will address the problems faced when using the lands of the city, and try to present the most important and

appropriate directions to solve those problems (Abdullah, 2014).

Consequently, the study aims at:

- Examining the urbanization issue in rural areas;
- Investigating the urbanization causes; and
- Exploring the causes of rural areas urbanization.

## 2. The Theoretical Background

### 2.1 Urban Expansion

The process of change in land uses comes largely and essentially as a result of: **1.** the population increase in response to their main requirements. Such an increase is said to be natural due to the difference between births and deaths; and **2.** the abnormal source that is no less important than its predecessor represented by the positive immigration towards the city of Baghdad. Hence, it has become urgent to the population to have housing, transportation, commercial centers, factories, and recreational centers. The availability of these facilities varies according to the need for each of them (Yasser, 2001). The urban expansion is defined as a general multi-faceted concept that refers to the expansion of a city and suburbs. It comes at the expense of the agricultural lands and the surrounding areas. This phenomenon leads to a gradual development of the rural areas adjacent to the big cities, and so to gradual increase of its population density (Al-Tamimi, 2014). The urban expansion is also defined as the continuous increase of the population number, whether according to regular housing or not. This ultimately has led to an increase of the demand for agricultural lands, creating, as a result, an imbalance in the environment (Al-Azzawi, 2012).

### 2.2 Urban Land Uses

The uses of the land inside the city are one of the foundations of its existence and the continuity of its permanence in life. This is because the city does not exist primarily without function. Al-Hilli (2010) represented the change in a person's relationship with the land, creating a balance between them. Moreover, the human dependency on earth increases with time due to



population growth. This is because such a dependency represents the spatial dimension that man settles on, and occupies its wealth and resources for the sake of his needs, achieving ultimately luxury which he aims to reach (Seda, 2008).

### **2.3 Factors Affecting Land Use**

There are a set of factors that affect land use as illustrated below:

- a) Natural factors that the site draws in the city are among the important factors in the distribution of urban uses. This is because its impact is highlighted in some important sites, according to the surface requirements, building composition, soil, climate, and others (Al-Sammak, 1985).
- b) Economic factors, which are represented by the price of the land may have the greatest effect on determining the type of use of that land (Sabri, 1986).
- c) The behavior of individuals and their decisions. This is because the use of land inside the city is constantly changing, and the decisions of individuals in this city regarding the uses of land is the result of social processes (Jabber, 2003).
- d) The changes taking place in the prevailing investment pattern. That is; the expansion is in the form of far-flung waves abroad, and residential use is one of the most rapid urban uses to change its position due to lack of competitiveness (Taha, 2017).

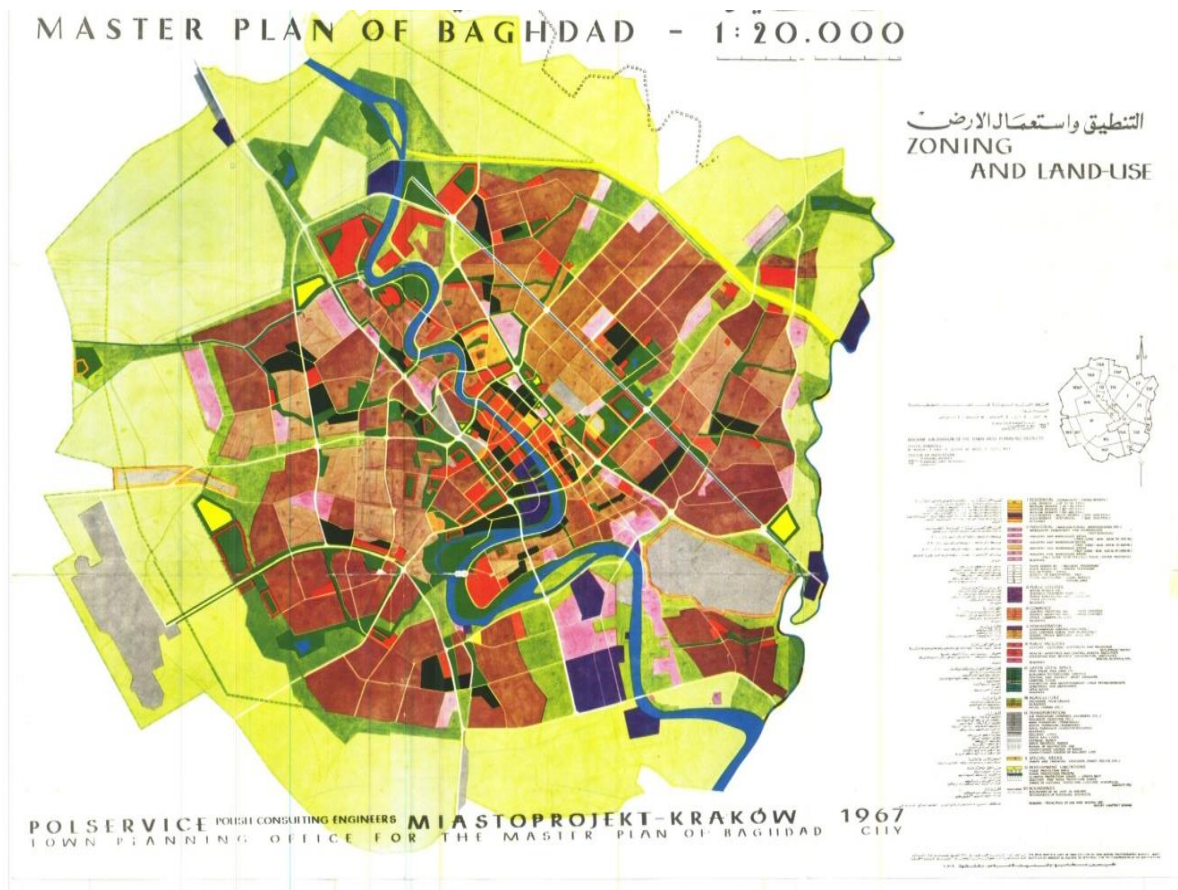
### **2.4 Housing Factor**

Baghdad has recently witnessed a steady horizontal expansion, as new neighborhoods emerged. Thus, it had a great impact on urbanization, especially in the areas surrounding the city of Baghdad. This expansion occurs in a manner that

lacks careful scientific planning. Accordingly, the residents of the new neighborhoods suffer from a shortage of the basic services (Al-Ashab, 1976). The increasing need for new lands for housing purposes is a big problem. It represents a main reason for the shortage of agricultural lands due to the process of converting them into new lands for housing and recreation. Safe and affordable housing is one of the essential necessities for every family. Without proper housing, a person cannot be a productive element in his society. In this context, housing is generally defined as a study of housing units in which people live. It is a study of the housing production market as well as of people's desires and requirements for their housing and problems (Jubara, 2004). In this respect, Brahm added that housing is creating an integrated environment via the process of urbanization and development. For example, housing is not just a shelter, but also a part of the social life in the society as a whole which affects many aspects of development and economic activities. In this context, a team of researcher concluded that housing is an organized and inhabited area of human societies to develop their material and cultural production. It is built within the limits of the capability and has an enjoyable residence which has three functions: productivity, the field of work, and the field of life (Al-Dulaimi, 2009). It is considered vital for the formation of the individual's personality and a factor that affects his psychological, physical and social health.



Fig. 1



### *The Master Plan of Baghdad City in 1967*

Source: (Baghdad Municipality: The basic design of the city of Baghdad, 1967)

## 2.5 The Master Plan

The importance of the master plan arises from the interest in studying the components of the city which are the distribution of land uses and future changes. Thus, master plan is a practical framework that deals with the two units of time. The location of these variables and any change in the components of the urban fabric must be consistent with what was determined by the basic design of the city. However, if the opposite happens, it would confuse this fabric (Seda, 2008). The basic design is defined as a type that does not regulate the uses of land and the type of buildings that

determines their characteristics and methods of transportation in a way that guarantees the highest practical degree of economy, comfort and beauty (Al-Jabri, 1987). Cammouna (2000) stated that the architectural prestige is also known as the set of design principles of the city, including the principles that reconcile human requirements with material needs (as cited in Al-Nabulsi, 2000). The basic plan includes a set of long-term planning goals, a presentation of the urban structure of the city, and a measurement of development trends. It further sets out the policy necessary to achieve those goals. It is also



necessary to determine short and long term goals and expects future changes. Furthermore, setting certain recommendations that appear in the form of plans and maps is essential for establishing the necessary standards for different uses (Hassan, 1988, p. 65).

### **2.6 Reasons of Urbanization in Baghdad**

There are numerous reasons that have clearly contributed to the process of Baghdad city growth and its encroachment into the surrounding agricultural lands. These include:

- 1- population growth of cities, where rapid population growth is one of the most important challenges facing the world, especially in developing countries. This is because the population is increasing at great rates at the expense of agricultural lands (Al-Azzawi, 2012).
- 2- state policy and laws that represent one of the factors that leads to urban expansion and encroachment through the development of new residential neighborhoods near agricultural lands (Al-Tamimi, 2014).
- 3- poor planning and lack of commitment to structural plans. The lack of structural planning of cities and the extension and growth of urban communities have led to a pattern of urban growth. Here, the risk specifically lies because the expansion is often at the expense of productive lands, environmental systems, and their balance (Kenana, 2009).
- 4- social factors that play a prominent role through the desire of some urban residents to live in the outskirts of the city. Residents usually take up certain areas of agricultural land and turn them into recreational and residential lands without benefiting from them in agriculture (Abdul-Qadir, 1989, p. 90).

### **2.7. Previous Studies**

Abdullah (2014) studied the effects of urban expansion on educational services provided in the city of Fallujah. He further examined the way this expansion comes at the expense of fertile agricultural lands. The

researcher concluded that the urban expansion comes as a result of population growth and displacement towards these areas. He further recommended the necessity of stopping the wave of immigration and the encroachment on agricultural lands.

- Al-Maliki (2011) examined the causes and factors that have led to housing expansion. The research concluded that all the increase in land use is outside the basic design of the city of Baghdad. Therefore, the researcher recommended stopping to waste agricultural lands for any reason whatsoever. He also recommended finding out suitable solutions to stop the process of urban expansion, and prevent its inappropriate continuation.
- Al-Tamimi (2014) conducted a study to determine the amount of defect occurring in the use of land on the basic designs as a result of the continuous change of these uses. The study has concluded that changing the urban laws, the increase of population growth, and the lack of commitment to the basic design of the city of Baghdad have altogether led to an increase in the rate of desertification. In this respect, the researcher recommended a set of mechanisms to solve the problem of expansion following the correct planning methods.

Reviewing some of the previous studies, the researcher recognized that they all shared many matters to the subject of their study. Cases in point are the effect of the urban expansion, the extension of Baghdad city, and changing the basic designs of the fixed land at the expense of agricultural lands. The current research diverges from those studies in some important and essential issues that have not been addressed. These issues can be represented by the following queries:

1. When did the process of urbanization in those previous studies take place? What are the most important periods of time for the expansion process? What are the areas affected by the expansion process? What is the extent of the lost agricultural lands?



2. What is the risk resulted from poor planning?, and is it the lack of commitment to structural plans, or lack of cities' structural plans that leads to communities' expansion and growth?
3. What are the population growth factor that affect the design over different periods of time according to the administrative and environmental use of Baghdad city?

### 3. Methodology of the Study

The study has adopted a descriptive analytical and historical approach to clarify the factors affecting urban sprawl at the expense of agricultural lands. Besides, the study relied on a simple linear regression method to predict the phenomenon of urban expansion, and its impact on the agricultural land. The events that Iraq went through after 2003 (the absence of legal authority, the weakness of legislation, and the successive large immigrations from the countryside to the city due to the lack of job opportunities and the search for decent housing) has greatly led to a significant increase in the process of housing expansion at the expense of agricultural lands.

This research deals with the city of Baghdad as a case study. It examines the urban expansion that has extended beyond the green belt and the surrounding agricultural lands during successive periods of time.

#### 3.1 Reasons for Choosing the Study Area

The study area includes the spatial boundaries of Baghdad city and the surrounding agricultural lands that are part of the green belt surrounding the city. That is; the study includes the outskirts of the main municipal boundaries of Baghdad city, whose use has been changed from agricultural to residential or to any other use. There is a set of reasons which have led to the selection of the study area:

- a. The state promulgates laws in successive periods of time by distributing lands of agricultural use, dividing them as residential use, and giving building approvals within these lands without paying attention to the basic design or to the nature of land uses.

- b. The construction area of Baghdad is expanding enormously at the expense of the surrounding agricultural lands.
- c. Irregular abuses have appeared on the agricultural lands surrounding the city of Baghdad, which are part of the green belt. This has increased migrations and the transgression on the lands surrounding it due to the security conditions that Iraq has undergone in general.
- d. Thousands of orchards surrounding Baghdad, which contain many palm trees and citrus fruits, have been bulldozed (Hassoon, 2013, p.29)

#### 3.2 Data Analysis

##### 3.2.1 Reasons for Urban Sprawl in Baghdad

1. Population growth in Baghdad has witnessed a rapid population and urban growth due to its dominance in all of Iraqi cities. Or, it might be because of the administrative, economic and political position, which plays an essential role in the process of attracting activities, events and residents to it. This rapid urban phenomenon has coincided with the period of unrest. It was preceded by the year 2003, which led to an acute housing crisis in the city of Baghdad and consequently to the emergence of a widespread deficit in the basic services provided, as represented by lack of drinking water, energy, services, and communications; consider Table 1:

Table 1

*Population and Growth Rates in Baghdad City*

Year	Population/person/million	Growth rate
1987	3.8	4.42%
1997	4.42	1.36%
2007	7.14	2%
2017	8.7	6.2%

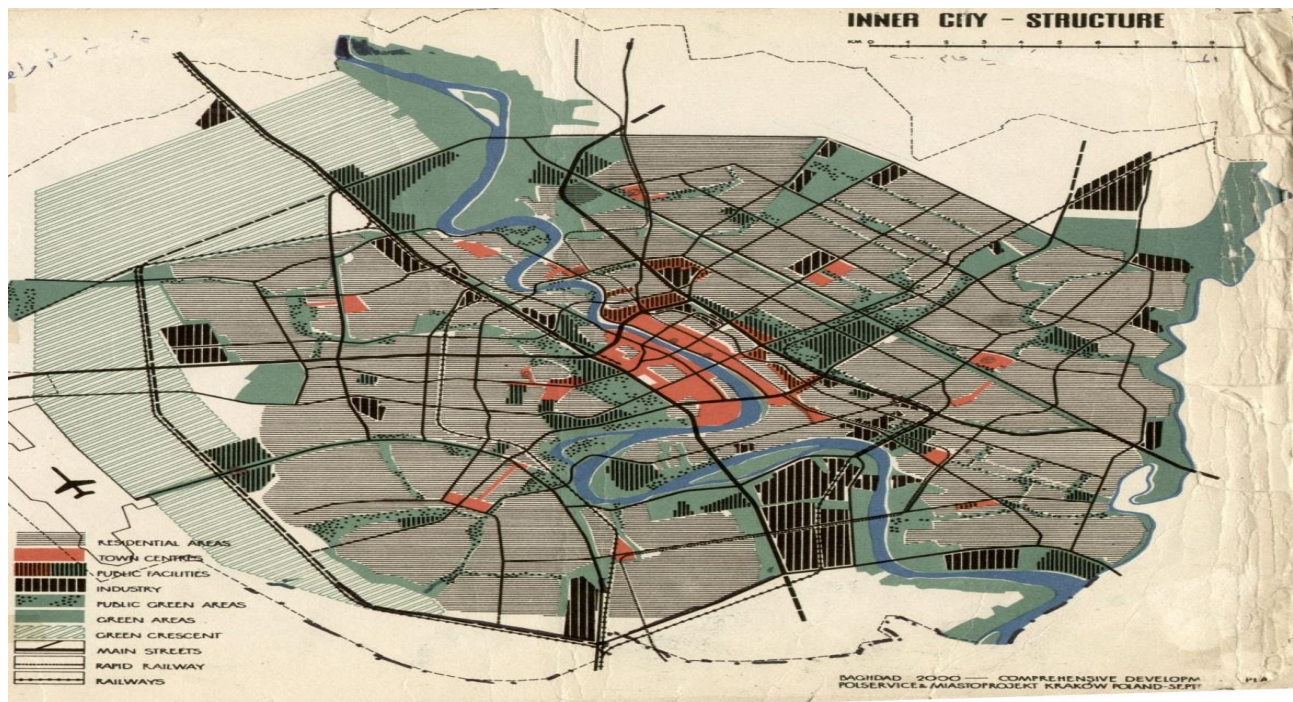
Source. (Municipality of Baghdad: A Panoramic View of Baghdad, 2014-2030, 2007)



It has been noted from the above table that the population of Baghdad increased to 3.8 million in 1987, with a growth rate of 3.8 %, whereas the population of the city in 1997 reached a growth rate of 4.42 million; i.e., 1.36%. The reason was due to the low rate of growth, and to the abnormal conditions that the country went through, such as the war with the neighboring countries. In (2007), the population growth was also observed; it had a growth rate of 2%. This was attributed to the unstable security conditions in that period. However,

the population growth has risen after the improvement of the security conditions. In brief, the city of Baghdad witnessed an abnormal displacement wave in search of job opportunities, bringing the population growth in 2017 to 8.7 million, at a growth rate of 6.2%.

*Fig. 2*



### *Areas of Baghdad according to the Basic Design of the City*

*Source:* (Baghdad Municipality Design Department: Urban Planning Department Map, 1971).

### **2-Weak Laws and Legislations**

The process of dividing and distributing land by the state due to the housing crisis is the result of weak urban laws and weak implementation. This, in turn, has affected the future and size of the urban plan for the city of Baghdad and the its enormous expansion at the expense of

the area of agricultural land and the green belt. Table 2 shows the areas of agricultural land that have been distributed by the state.



**Table 2**  
**Numbers, Areas, and Type of Land Changed according to the Resolution 117 of the Year 2000**

No.	Area /acre	Land no. and Location	Type
1	211 1653 92	7363/3/10and10/3/7376Abu Disher 2/27/3455 Abu Disher 3/3/111Abu Disher	Agriculture
2	800	3/10/5857and3/10/5820 Abu DISHER	Agriculture
3	3092	4/1/22Sabiati	Agriculture
4	320	1/695/22Sabiati	Agriculture
5	80/11	8/2and3/22Sabiati	Agriculture
6	845	1/1/23Zakia and Fadhil	Agriculture
7	685	14/8/22Sabiati	Agriculture
8	420	1/21/28/Sabiati	Agriculture
9	2000	2/5Salamyat	Agriculture
10	332 431 300 620	4/2Thaaliba 4/6Thaaliba 4/8Thaaliba Thaaliba172/10	Agriculture
11	470	4/3Wildaya and Munsaiif	Agriculture

Source: Baghdad Municipality (2007, p. 11).

It has also been noticed from the above table that there are plots of land with large areas and small areas as well. This, in turn, reflects a major imbalance in the uses of the land, especially the plots that were agricultural and green. These were distributed mainly on the perimeter of the city and this, in turn, indicates a great impact on the city, and a negative one on the planned green belt surrounding the city of Baghdad. It further necessitates the necessary environmental balance for the city. Figure 2 represents the amount of

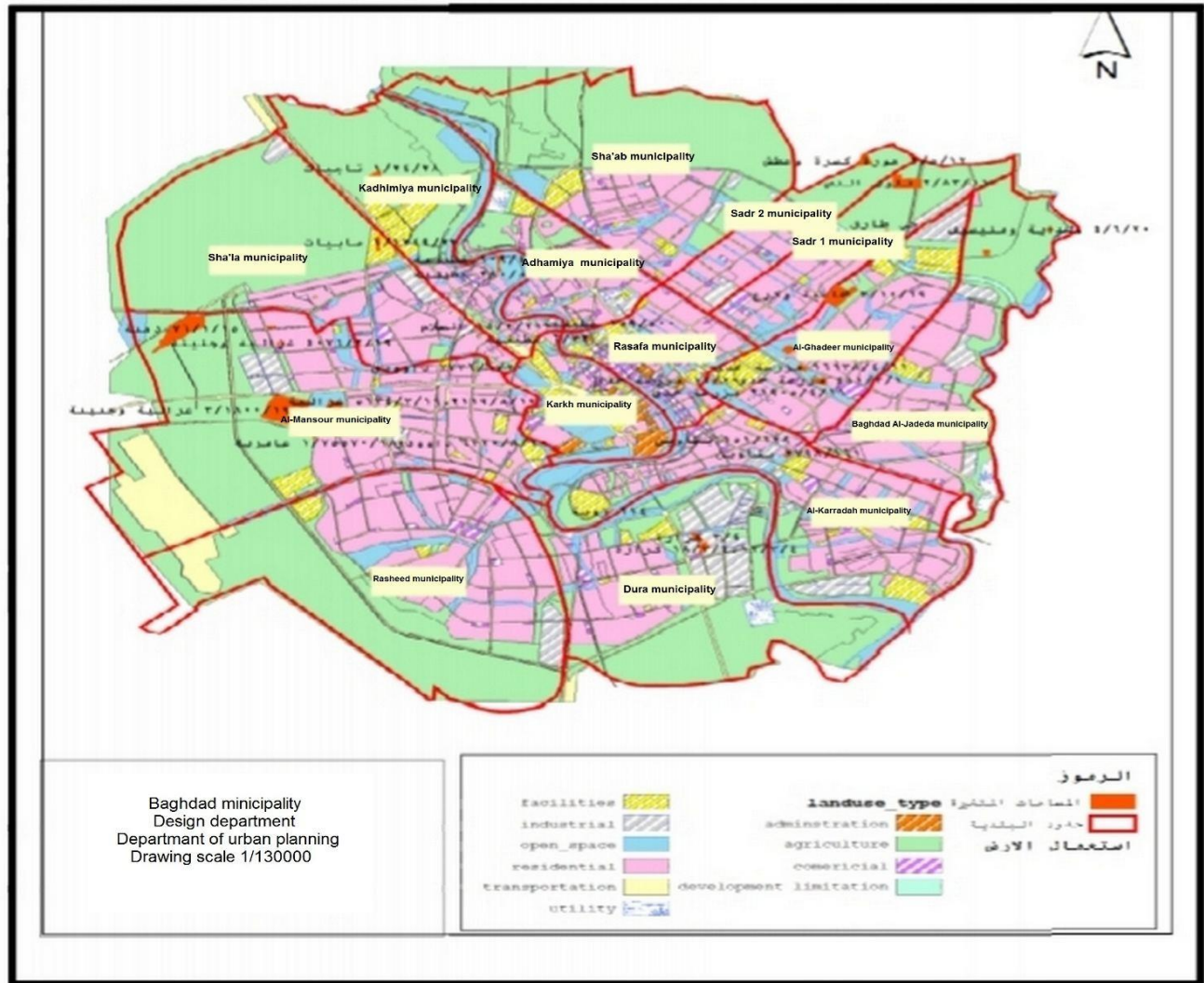
agricultural land affected by the distribution process.

Poor planning and lack of commitment to the structural plans were laid down by a group of planners and specialized companies. These were contracted to develop the basic plans for Baghdad city in comparison with the violations of the green belt and the agricultural areas that were mentioned. Moreover, the following figure which shows the size of the agricultural land transformed into urban areas.





Fig. 3



*The Sectorial Division of Baghdad* (as cited in Baghdad Municipality, 2007, p.7)

### 3.2.2 Solutions for the Problem of Baghdad City Urbanization

Below are a number of solutions that have been suggested by the researchers to reduce the process of urbanization in Baghdad; consider also Tables 3 & 4:

1. Issuing legislating laws that help regulate the process of dividing the land use within the cities and the surrounding areas, and give a

consideration to the expansion and growth of residential communities.

2. Establishing institutions specialized in urban planning within the city to be responsible for the urban expansion.
3. Directing future urban expansions towards areas that are classified as non-agricultural or of poor productivity and encouraging the policy of satellite cities. That is; farmers need to be encouraged to work on agricultural



- lands, and provided with all forms of material support.
4. Stopping the laws that are responsible for changing the gender of the land classified in the basic designs as agricultural lands and for converting them into a residential title deed.
  5. Adopting the vertical residential extension to limit the horizontal extension and preventing excesses on the agricultural lands.

**Table 3**  
*Stages of Urban Expansion at the Expense of Agricultural Lands: the first Stage for the Period Between (2003)-and- (2009)*

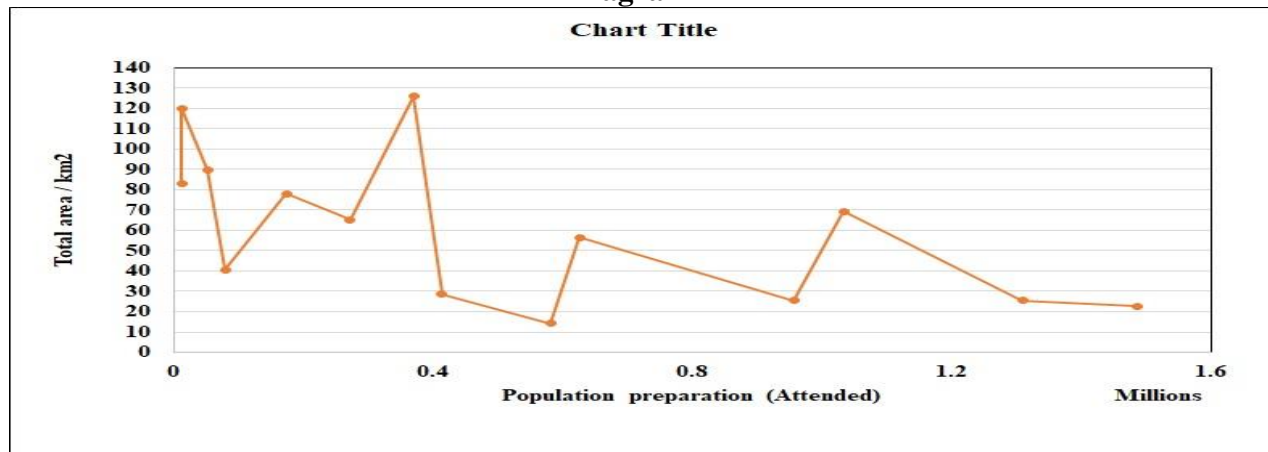
T	Name of Municipality	Total Area/ km2	Agricultural %Use Rate	Percentage of Other Uses	Population Preparation (Attended)	Resettled (Countryside)	Rank
1	Alshaeb	78.085	80.35	19.65	174,595	4,750	4
2	Alghadir	40.71	37.89	62.11	79,545	—	11
3	baghdadaljadida	69.3975	63.35	36.65	1,034,534	-----	7
4	Alrasafa	22.7325	2.85	87.15	1,486,799	-----	14
5	Karrada	65.2175	58.23	41.77	271,977	-----	8
6	alsdr1	14.1725	39.97	60.03	582,067	-----	10
7	Alsdr2	28.615	50.15	49.85	413,683	-----	9
8	Adhamiya	25.6075	35.25	64.75	956,629	32,371	13
9	Al-Mansour	1258275	68,72	31.28	371,189	-----	6
10	Alrashid	12016	89.98	10.02	13,311	57,179	2
11	Alshaela	89.8875	87.54	12.46	52,245	87,697	3
12	Alkarakh	25.5475	37.12	62.88	1,309,488	-----	12
13	Aldawra	83.12	91.74	8.26	12,764	70,110	1
14	Al-Kadhimiya	56.42	78.89	21.11	626,504	114,180	5
Total area of land use for the city of Baghdad by administrative units for the period (2003) (2009).		alrasafa	349.5375km2	850.5 km2			
		alkarakh	500.9625km2				
total population of the city of Baghdad between the time period (2003) (2009) and according to environmental use.		rural	860,220	6,702,538			
		Urban	5,842,318				

**Table 4**  
*Effect of Urban Expansion on the Proportion of Agricultural Land Use*

P value	Level of Significance (P Value)	Calculated (F Value)	Calculated (t Value)	Constant Term ( $\alpha$ )	Regression Coefficient ( $\beta$ )	The Coefficient of Determination ( $R^2$ )
High significant	0.003	13.800**	3.715**	79.154	3.874E-5	0.534



**Diagram 1**



*Relationship of Agricultural Land Erosion Resulting from the Increase in Population Numbers*

**Source:** The researchers' work is based on the data provided by the numerical tables 3&4

**Table 5**

*Stages of Urban Expansion at the Expense of Agricultural Lands: The First Stage for the Period Between (2009)-and- (2012)*

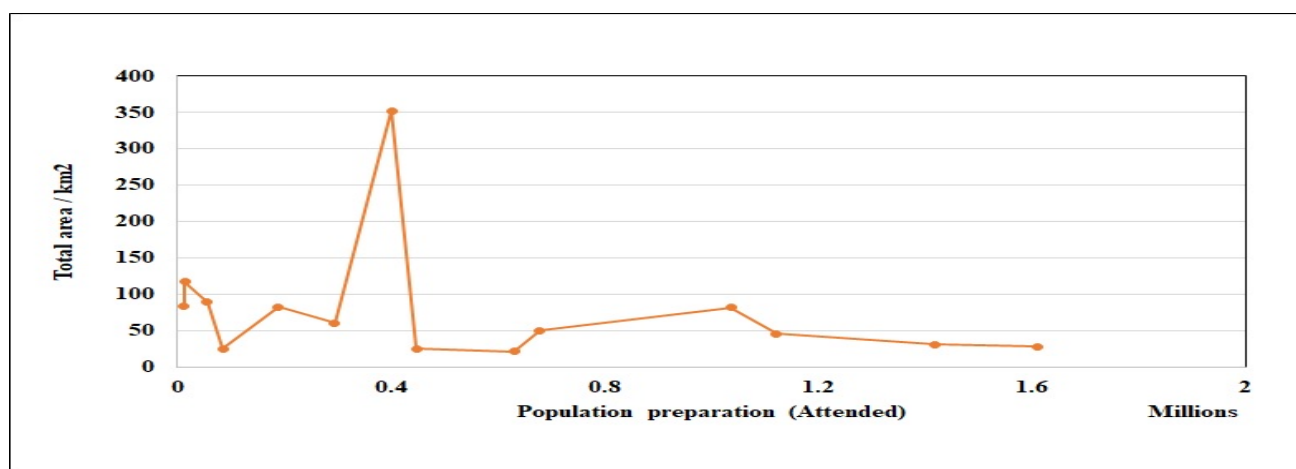
T	The name of the municipality	Total Area/ km <sup>2</sup>	Agricultural %use Rate	The Percentage of Other Uses	Population Preparation (Attended)	Resettled (Countryside)	Rank
1	alshaeb	83.085	66,51	33,49	189,264	5,092	4
2	alghadir	25.62	31.23	66.77	86,228	-----	12
3	baghdadaljadida	45.706	64	36	1,121,454	-----	7
4	alrasafa	28.566	23.11	100	1,611,717	-----	14
5	Karrada	60.72	56.57	41.44	294,828	-----	9
6	alsdr1	21,38	58.79	41,21	630,971	-----	8
7	Alsdr2	25.62	47,65	52,36	448,440	-----	11
8	Adhamiya	82.085	66.51	33,49	1,037,003	34,700	5
9	Al-Mansour	352.4521	49.14	33,51	402,376	-----	10
10	alrashid	117.6365	66,46	21.8	14,429	61,292	6
11	alshaela	893657	78.2	23.38	56,635	94,005	1
12	alkarakh	31.5476	67.64	76,8	1,419,509	-----	2
13	aldawra	84.1275	23.2	23.37	13,836	110,225	13
14	Al-Kadhimiya	504025	66.88	33.13	679,142	122,394	3
Total area of land use for the city of Baghdad by administrative units for the period (2003) (2009).		alrasafa	352.412km <sup>2</sup>	853.335km <sup>2</sup>			
		alkarakh	500.9225km <sup>2</sup>				
total population of the city of Baghdad between the time period from (2003) to (2009) and according to environmental use.		Rural	922,100	7,255,278			
		Urban	6,333,179				



**Table 6**  
*Effect of Urban Expansion on the Proportion of Agricultural Land Use: The Second Period between 2009 –and- 2012*

P Value	level of Significance (P Value )	Calculated (F Value)	Calculated (t Value)	Constant Term ( $\alpha$ )	Regression Coefficient ( $\beta$ )	The Coefficient Of Determination( $R^2$ )
Not significant	0.942	0,006	0.075	55.112	0..87E-7	0.049

**Diagram 2**



*Relationship of Agricultural Land Erosion Resulting from the Increase in Population Numbers*  
 Source: The researchers' work is based on the data provided in the numerical tables 5&6.

**Table 7**  
*Stages of Urban Expansion at the Expense of Agricultural Lands: The First Stage for the Period between 2012-and-2017*

T	Name of Municipality	Total Area/ km2	Agricultural %Use Rate	Percentage of Other Uses	Population Preparation (Attended)	Resettled (Countryside)	Rank
1	Alshaeb	88.0875	58.9	41.1	218,437	5,573	4
2	Alghadir	43.2075	25	75	99,519	-----	11
3	baghdadaljadida	66.41	61.6	38.4	1,294,313	-----	3
4	alrasafa	21.235	0	100	1,860,146	-----	13
5	Karrada	62.7175	55.94	44.6	340,273	-----	7
6	alsdr1	19.92	26.04	73.96	728,229	-----	10
7	Alsdr2	30.245	37.9	62.1	517,562	-----	9
8	Adhamiya	28.1075	19.76	80.24	1,196,846	37,982	12
9	Al-Mansour	128.33	56.61	43.39	464,397	-----	5
10	alrashid	96.125	53.24	46.76	16,653	67,090	8
11	alshaela	97.385	68.05	31.95	65,364	102,898	1
12	alkarakh	28.8	0	100	1,638,311	-----	14
13	aldawra	65.6175	66	34	15,969	120,652	2
14	Al-Kadhimiya	58.9175	56	44	783,824	133,971	6
Total area of land use for the city of Baghdad by administrative units for the period between (2003) and (2009)		alrasafa	359.93 km2		855.105km2		
		alkarakh	495.175 km2				
Total population of the city of Baghdad between the time period (2003) and (2009,) and according to environmental use		rural	1,009,325		8,318,695		
		Urban	7,309,369				



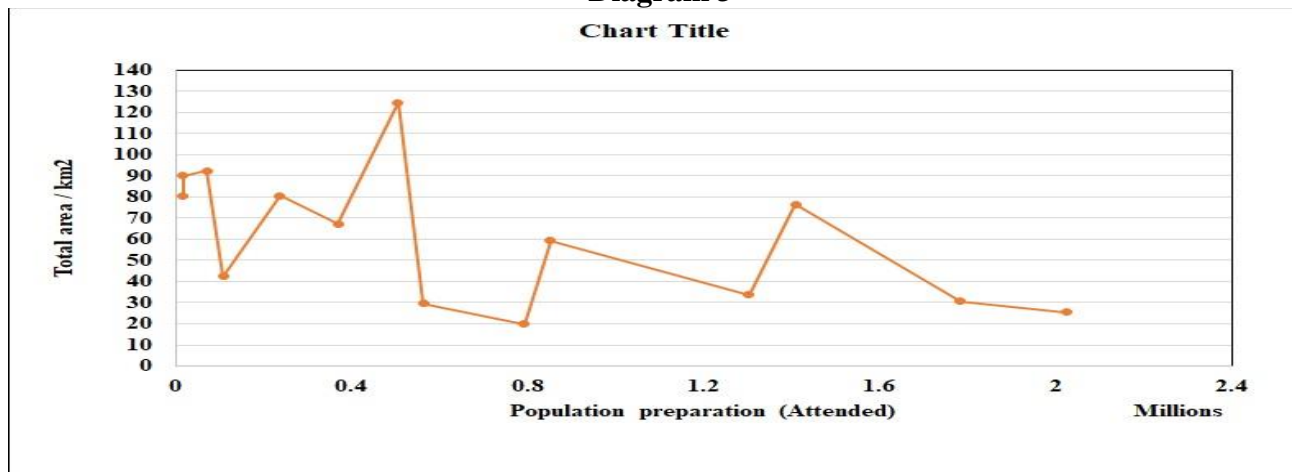
**Table 8**

*Effect of Urban Expansion on the Percentage of Agricultural Land Use: The Third Period between 2012-and 2017*

Nature of Relationship	Significance Level p	Calculated F Value	Calculated t Value	Fixed Limit $\alpha$	Regression Coefficient $\beta$	The Coefficient of Determination $R^2$
High morale	0.005	11.728**	3.425 **	59.512	2.685E-5	0.501

**Diagram 3**

Chart Title



*Relationship of Agricultural Land Erosion Resulting from the Increase in Population Numbers*

Source: The researchers' work is based on the data provided in the above numerical tables 7&8

**Table 9**

*Stages of Urban Expansion at the Expense of Agricultural Lands: The First Stage for the Period between 2017-and- 2020*

T	Name of Municipality	Total Area / km2	Agricultural Use %Rate	Percentage of Other Uses	Population Preparation (Attended)	Resettled (Countryside)	Rank
1	alshaeb	80.5775	36.15	63.85	237,759	5,873	7
2	alghadir	42.305	18.08	81.92	108,322	-----	11
3	baghdadaljadida	76,565	25.54	74.46	1,408,803	-----	9
4	alrasafa	25.4325	1.95	98.05	2,024,687	-----	13
5	Karrada	67.315	20.75	79.25	370,372	-----	10
6	alsdr1	19.8175	25.84	74.16	792,645	-----	8
7	Alsdr2	29.66	36.48	63.52	563,344	-----	6
8	Adhamiya	33.7775	8.17	91.83	1,302,714	40,027	12
9	Al-Mansour	124.58	40.51	59.49	505,476	-----	5
10	alrashid	90.16	45.72	54.28	18,127	70,703	3
11	alshaela	92.3925	40.9	59.1	71,146	108,438	4
12	alkarakh	30.5475	-	100	1,783,229	-----	14
13	aldawra	80.6175	59.63	40.37	17,382	127,148	1
14	Al-Kadhimiya	59.42	46.86	53.14	853,158	141,185	2
Total area of land use for the city of Baghdad by administrative units for the period (2003) (2009)		alrasafa	375.45km2	858.1675km2			
		alkarakh	482.7175km2				
total population of the city of Baghdad between the time period (2003) (2009) and according to environmental use		rural	1,063,673	9,019,600			
		Urban	7,955,928				



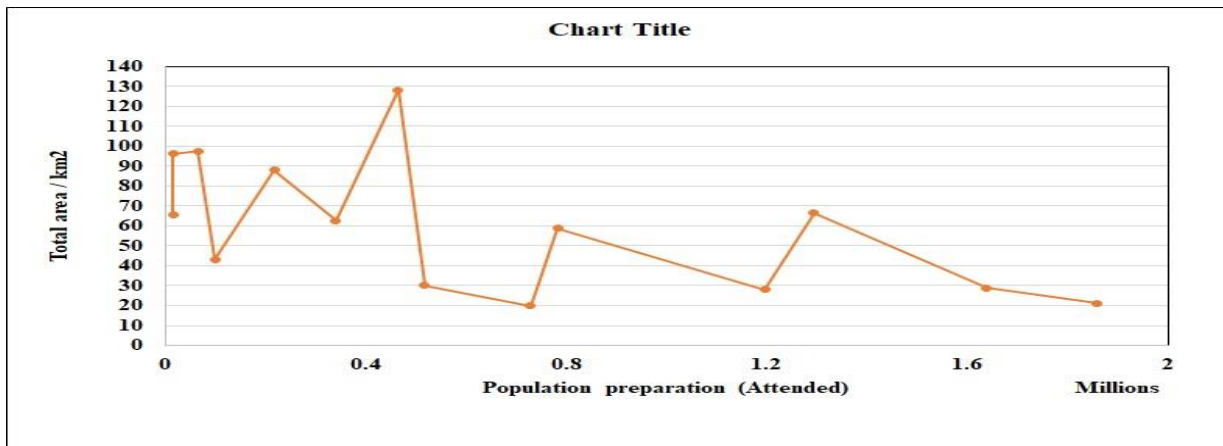
**Table 10**

*Effect of Urban Expansion on the Percentage of Agricultural Land Use: The Fourth Period from 2017 –and-on*

Nature of Relationship	Significance Level p	Calculated F Value	Calculated t Value	Calculated t Value	Regression Coefficient $\beta$	The coefficient of determination $R^2$
High morale	0.00	15.493**	3.963 **	43.334	1.991E-5	0.564

Note. It means that the relationship is very high with 99% confidence.

**Diagram 4**



*Relationship of Agricultural Land Erosion Resulting from the Increase in Populations Number*

Source: The researchers' work is based on the data provided in the above numerical tables 9&10

### 3.2.3 Statistical Analysis

**Table11**

*Correlation Coefficients between the Percentage of Agricultural Land Utilization and the Number of Urban Residents according to Time Periods*

Time Period			
2003-2009	2009-2012	2012-2017	2017-2020
0.731**	0.222	0.708**	0.75**-

Note. It means that the relationship is very high with 99% confidence.

The above table demonstrates that:

1. In the first, third and fourth time periods, there was a positive correlation of high significance between agricultural land use and urban population. The larger the urban population was, the greater the urban expansion was at the expense of agricultural

land, in addition to the weak measures taken by the governments.

2. In the second period, the relationship was weak, and this indicates that the government's actions were strong against the process of exploiting agricultural lands.

### 4. Conclusions

It has been concluded that

1. Based on the analysis of the data, it has become clear that there is a direct and significant relationship between the use of land and the number of urban residents. That is; the greater the number of urban residents is, the greater the proportion of agricultural land exploitation for residential use purposes is. Such a relationship can be attributed to the limited number of housing units and the increased competition between different types

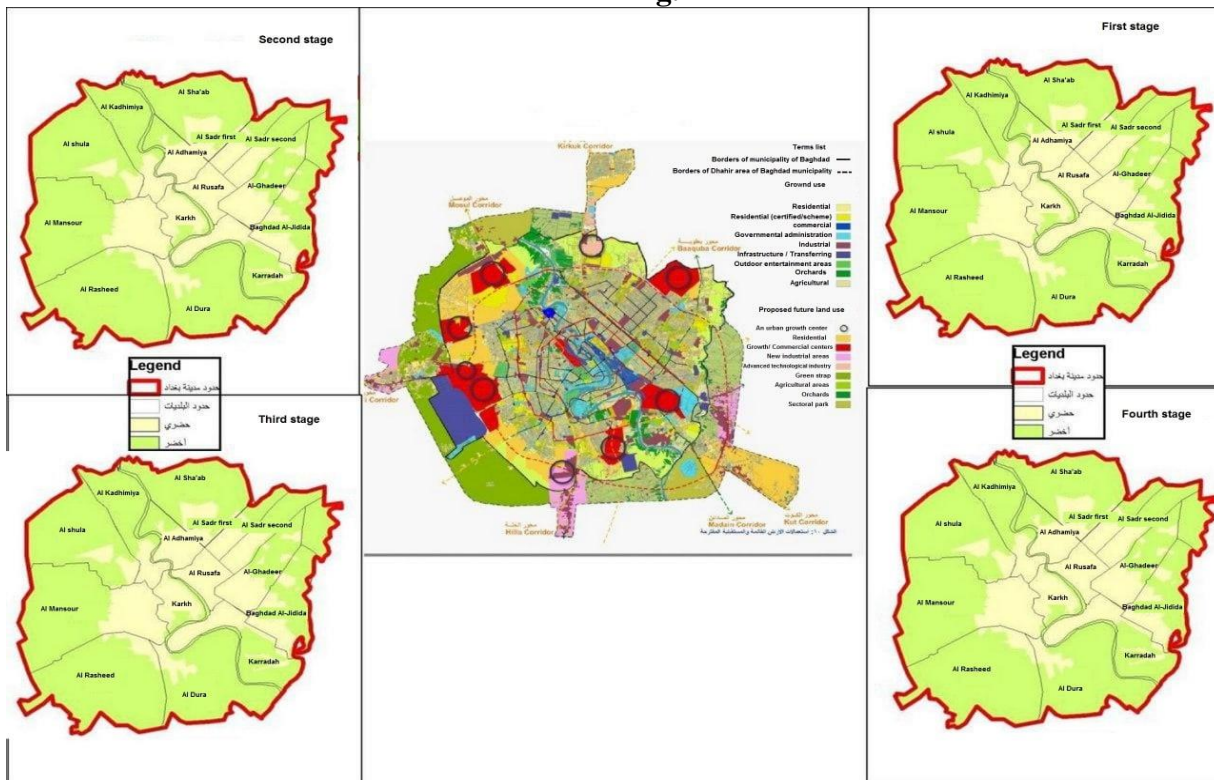


- of land uses; a matter that has overridden the basic design for the city of Baghdad
2. There are large lands with residential use outside the city's master plan.
  3. The emergence of the phenomenon of urban expansion of the city has greatly affected the general landscape of the city.
  4. There is a great shortage in the municipal departments. Besides, the lack of an information system for the process of studying

the phenomenon is due to the poor planning and to the limited number of necessary studies.

5. The limited effect of the governmental decisions issued on converting the gender of agricultural land into housing. This, in turn, has led to a destruction of large areas of agricultural land for the benefit of housing expansion.

Fig. 4



**Stages of Urban Expansion at the Expense of Green Cover**

Source: The map of the researchers' work is based on the data provided in the above numerical tables 3, 5, 7, & 9

**5. Recommendations**

The study has reached a number of recommendation as illustrated below:

1. Finding final solutions to the problem of encroachment on agricultural lands. Such a step can be done by concentrating on building new and low-cost housing units with full

facilities and services to attract the largest possible number of residents to them.

2. Facilitating building licensing procedures and reducing the fees.
3. The authorities should take firm and strict measures against any violations. Moreover, they should set timetables to limit the encroachment on agricultural lands.



4. Encouraging reverse immigrations by finding serious development projects in rural areas, creating job opportunities, and by particularly supporting the agricultural sector and farmers to be stabilized on their lands and not immigrate to cities.
5. Working on the necessity of implementing special legal projects to protect agricultural lands by enabling the administrative agencies in the study area to directly interfere to deter such violations.

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