

## URBAN ENCROACHMENT IN KAFR EL-ZAIAT CITY, GHARBIA GOVERNORATE, EGYPT

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### ABSTRACT

The fertile soils of Egypt are of a paramount importance in term of strategic economical decision. In the last few decades encroachment on the fertile agriculture soils was tremendously increased by urbanization.

Kafr El-Zaiat city as a big industrial center in El-Gharbia Governorate was selected to follow up the urbanization impact during the period from 1985 to 2001.

The urbanization areas were estimated in years 1935, 1985 and 2001, by using details maps of scale 1:2500 and aerial photographic maps, while the urban area in 2001 was estimated by the aid of field check. The data showed that, the urban areas were 364.71, 619.05 and 698.47 fed. In years 1935, 1985 and 2001, respectively, The annual increasing rate was equivalent to 5.09 fed.yr<sup>-1</sup> during 1935 up to 1985 and 21.8 fed.yr<sup>-1</sup> during 1985 to 2001.

The study cleared up that, increasing of population percent was 34.6% less than the increasing of urbanization percent. This was attributed to the higher input of real estate investment compared with that of agricultural investment.

The study elucidated that, the loss of the geographical area was 349.4 fed. and this means 698.8 fed. of productive area. Estimation of annual agricultural production return of such area ranged from 1,520,975 to 4,330,969 LE.

Construction of new cities on the desert lands, execution of family planning programs, aggravation of encroachment punishment besides intensifying of urbanization are the suggested solutions to safeguard against urban encroachment and losing fertile soil.

**Key Words :** Urbanization, Encroachment, Kafr El- Zaiat.

### INTRODUCTION

The urban encroachment has a serious impact on losses of highly fertile agriculture soil in Egypt. Kafr El-Zaiat City, as the biggest industrial center in Gharbia Governorate, was chosen to follow up the urban encroachment trend with time and quantity.

Abdel Hady *et al.* (1983), indicated that, vast areas of the old cultivated fertile soils of the Nile delta and valley are lost by urbanization. Such loss can not be compensated by reclamation of desert lands as they need too much money and long time to be marginally productive.

Makhanya (1993), on his work on some areas in South Africa focused on the successively loss of the highly productive land, desertification of agricultural lands, due to urbanization process is running very fast with a discernable rate.

Abd El-Halim *et al.* (1996), in their studies on Kafr El-Sheikh, Dekernis and Minia Cities, found that, the settlement areas, on good productive soils, generally increased from 180 fed. to over 2000 fed., during the period from 1947 to 1989 .



Fahim *et al.* 1999, in their study on Tanta City, found that, annual urbanization growth rate during the period from 1950 to 1987 was 9.2%. However, the period from 1987 to 1995 recorded almost twice such rate (18.8%). They also referred to an annual decrease in the agricultural land; 0.44 to 0.48 during the period from 1950 to 1987 and 0.48 % for the period from 1987 to 1995.

Khalil *et al.* (1999) reported that in El-Mahalla El-Kobra (Gharbia – Egypt), urbanization growth rate is increasing with the elapse of time as it was 10.3 % and 32.6 % yearly for the period 1950 and 1987 and reached 32.6 % from 1987 to 1995.

Recently Salem *et al.* (2001), in their study on Dammanhour city, Bahaira Governorate, indicated that, the urban areas were 127 in 1911, 630 in 1959, 711 in 1985 and 1828 fed. in year 1998 with an annual increasing rate of 10.3 fed. (1911–1959), 301 fed. (1959 – 1985) and 85.9 fed. (1985–1998). Their study cleared up that, the loss of geographical area was 1117 fed. This is equivalent to 2234 fed. of the productive area; such loss was estimated to be between 2,028,192 to 5,103,707 LE.

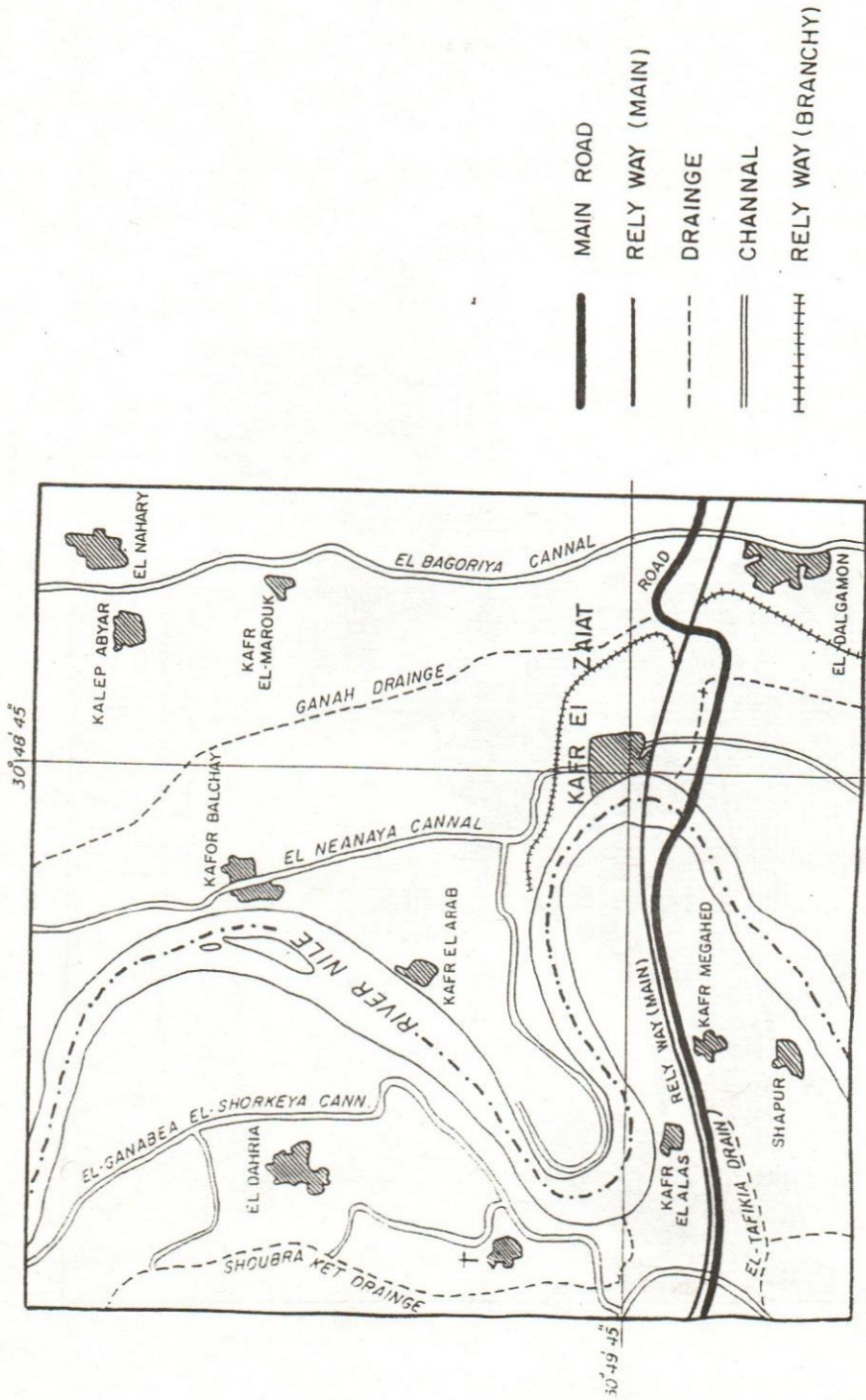
## MATERIAL AND METHODS

As an urban area is usually covered by urban activities, it is quite easy to delineate the boundary of an urban area by the aid of aerial photography. This could be done by identifying the image of city and tracing where urban growth stops and rural activities begin. An area located at the urbanization horizon of Kafr El-Zaiat city was chosen to carry out this investigation.

Kafr El-Zaiat city is a big industrial center, located on the eastern bank of Rossita branch of the River Nile. It lies essentially on crossing of longitude  $30^{\circ} 48' 45''$  and Latitude  $30^{\circ} 49' 45''$  (Map 1).

The following outlines highlight the key elements of the different steps applied for the current study: (1) Delineating and limiting the boundary of urban area on base maps, scale 1:2500, covering the selected area, published in 1935 by Egyptian General Survey Authority; (EGSA). (2) Interpretation of the aerial photos scale 1 : 2500, covering the selected area, produced in April 1985 by Military Survey Authority. Photo interpretation and delineation of the settlement and utilities, were applied and matched on base maps having scale 1:2500, thereafter transferred to produce new maps representing the urban enlargement until April 1985. (3) Field checks for the studied areas were carried out in order to limit and delineate the urban growth until February 1998 besides performing the ground truth.

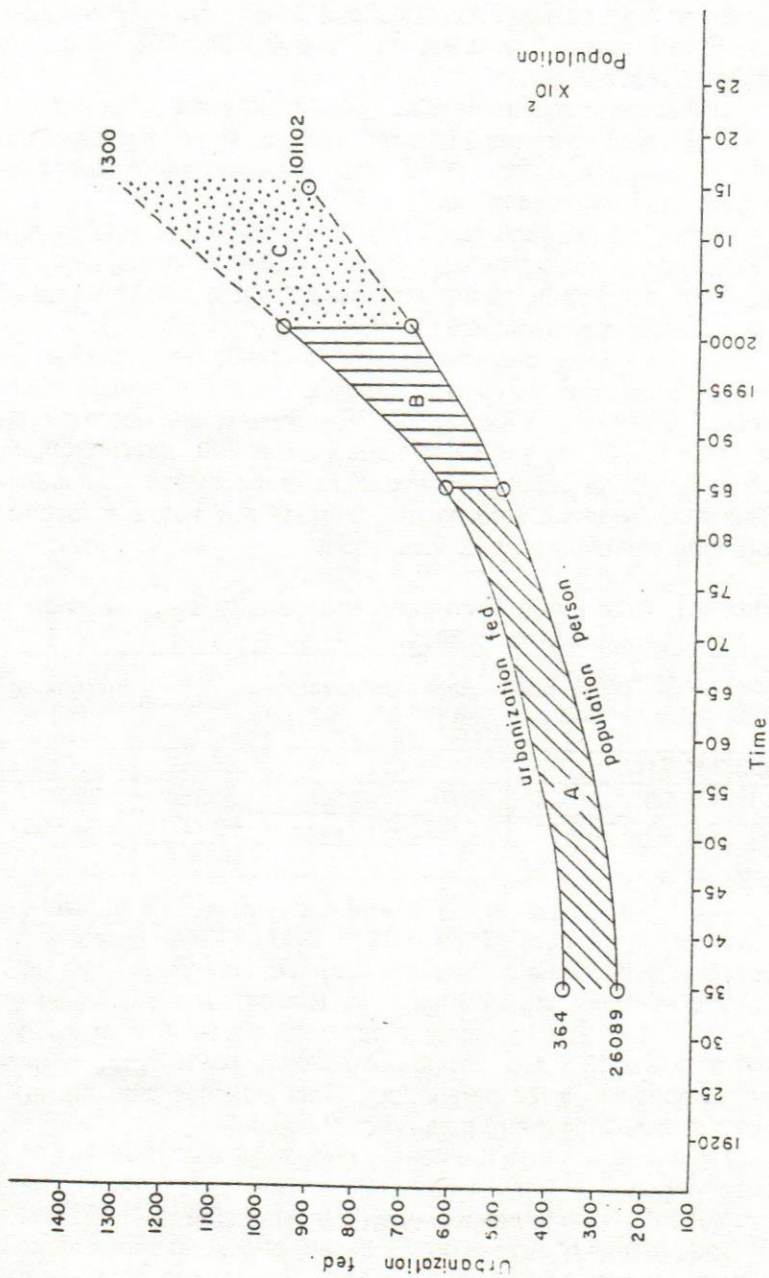
The main goal of this study was to follow up the urbanization growth of Kafr El-Zaiat city and evaluating its impact on the highly productive cultivated soil of Kafr El-Zaiat city; by using base maps and aerial photographs data. The second aim is to estimate the loss in national productive from the strategic crops as result of waste the fertile agricultural soils; resulted from such phenomenon.



Map(1) Location of Kafr El Zaiat City .







Fig(1). Relationship between urbanization, population and time



## RESULTS AND DISCUSSION

The total studied area was approximately 2000 fed. Data in Table 1, Map 2 and Fig.1 elucidated that the total settlements were 364.7 fed. in year 1935. The urban area was elevated to 619.1 and 968.5 fed. in years 1985 and 2001, respectively .

At the first stage from 1935 to 1985 (50 years) ; the loss of the highly fertile cultivated soils was 254.3 fed. With an annual decrease 5.09 fed. yr<sup>-1</sup>, the increasing percentage of the urban area was about 69.7 % according to the base area recorded in 1935 ( 364.7 fed.),

During the following stage (16 years) ; the urban encroachment of Kafr El-Zaiat city, detected by field truth by using modified aerial photographs maps, the loss was 349.4 fed. Of fertile cultivated soil. The rate of decrease of such loss is equivalent to 21.8 fed.yr<sup>-1</sup> .

The increasing percentage of urbanization amounted to 56.4 % with respect to the area recorded (619 Fed.), in 1985 (Table 1). Comparing the increasing percent of population 56.4 % with the increasing percent of population (37.27 %) in the last stage 1985 to 2001 indicated that , the urban encroachment remarkable exceeded the requirements of population increase , This may be interpreted as the return of real estate investment is much more than that of agricultural investment .

**Table (1): Urban encroachment and density of population in Kafr El-Zaiat city up to 2011.**

Year	Area (fed.)	Difference (fed.)	Rate Fed.yr <sup>-1</sup>	Increasing (%)	Population	Increasing (%)	Density of population P.fed <sup>-1</sup>
1935	364.71				36089		
1985	619.05	254.34	5.09	69.7	50554	37.27	81
2001	968.47	349.42	21.8	56.4	69.400	34.60	71
2015	1300				101102		77

Fig. 1 elucidate that, the rate of encroachment is parallel to population growth rate in the period from 1935 to 1985 (A area). However, in the period from 1985 to 2001 the deference between encroachment rate and population growth was increasing with the time (B area). The estimation of the stage from 2001 to 2015 is represented in (C area). The encroachment area estimated was 1300 fed. having population of 101102 person. In other wards dense population is 77 person.fed<sup>-1</sup>. This indicates that, the encroachment growth is more than the requirements of population.

Table 1 shows that, the density of population in 1985 was 81 person.fed<sup>-1</sup> but changed to 71 person.fed<sup>-1</sup> at 2001. This figure is considered very low in comparison to the international one (150 person fed<sup>-1</sup> ).

The process of increasing the density of population seems to be done by replacement and renewal of the housing having one or two floors to be four or five floors; on the same piece of land. The density of population must be about 250 person.fed<sup>-1</sup> at least.



Table 2 shows that the fertile agriculture soil area loss during the period from 1985 to 2001 was about 349.4 fed . This equivalent to 698.8 fed, of the productive area, considering that the fertile soils are cultivated twice a year. Consequently estimation of annual loss means of strategic crops e.g. Cotton, Rice, Maize, Wheat, Onion and Potato, amount to about 4737.8 Canter-M Cotton, 12445.6 Ardab of wheat , 2669.4 Ton Rice, 16792.2 Ardab of maize, 8923.7 Ton Onion and 6904.1 Ton Potato. These products worth about 4,330,969 LE to 1,520,975 LE. Salem *et al.* (2001), reported that, in Damanhour city, the total loss every year about 2,028,192 to 5,103,707 LE, due to the urban encroachment. (1117 fed).

**Table (2): Main production of feddans of some crops and their LE prices 2001.**

Crops	Unit	Mean production (fed)		Mean price (L.E)		The loosing	Area loss (fed)	Area production (fed)	Total Loss (L.E)
		Principle	Second-ary	Principle	Second-ary				
Cotton	Quintar-M	6.78	7.2	350	8.4	4737.9	349.4	698.8	1700515
Wheat	Ardab	17.81	12.1	105.1	39.8	12445.6	349.4	698.8	1644563
Rice	Ton	3.82	8.9	582.6	8.7	2669.4	349.4	698.8	1609309
Maize	Ardab	24.03	9.4	85.1	14.0	16792.7	349.4	698.8	1520975
Onion	Ton	12.77		223.4		8823.7	349.4	698.8	1993549
Potato	Ton	9.88		624.3		6904.1	349.4	698.8	4330969

In order to protect the fertile agriculture soils against encroachment, recommended to: (1) Construct the new cities on desert lands. (2) Execute of family planning programs. (3) Aggravate of punishment encroachment and/or the trickery of leaving soils uncultivated. (4) Increase the density of population on one fed to be 250 – 300 person . fed<sup>-1</sup> by increasing the floors of existed houses by one or two floors.

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### الزحف العمراني على مدينة كفر الزيات، محافظة الغربية، مصر نشيدة ابراهيم عبد العال معهد بحوث الأراضي والمياه والبيئة- مركز البحوث الزراعية

تعتبر الأراضي الزراعية الخصبة أهم رصيد إستراتيجي في مصر، وفي الوقت الحالي زادت الهجمة الشرسة على الأرض الزراعية بواسطة الزحف العمراني . وقد اختبرت مدينة كفر الزيات الصناعية بمحافظة الغربية ، لدراسة اتجاه ومقدار الزحف العمراني خلال الفترة من ١٩٨٥ حتى ٢٠٠١ .

وقد قدرت مساحة العمران في مدينة كفر الزيات في السنوات ١٩٣٦ ، ١٩٨٥ ، ٢٠٠١ وذلك باستخدام الخرائط المساحية التفصيلية ٢٥٠٠/١ وكذلك تفسير الصور الجوية لسنة ١٩٨٥ ، كما تم حساب مساحة العمران سنة ٢٠٠١ بواسطة الفحص الحقلى ، وذلك بتوقيع الزيادات على خرائط التصوير الجوى على الواقع في الحقل. وأوضحت النتائج أن المساحة كانت ٣٦٤,٧١ ، ٦١٩,٠٥ ، ٩٦٨,٤٧ فدان في السنوات ١٩٣٥ ، ١٩٨٥ ، ٢٠٠١ مع معدل زيادة سنوية ٢١,٨ فدان (١٩٨٥ ، ٢٠٠١) . مع معدل نقض سنوى يساوى ٥,٠٩ فدان / سنة خلال الفترة من عام ١٩٣٥ حتى ١٩٨٥ و ٢١,٨ فدان / سنة خلال الفترة من عام ١٩٨٥ حتى ٢٠٠١ .

كما أوضحت الدراسة ان الزيادة في النسبة المئوية للسكان كانت ٣٤,٦ % تقل عن الزيادة في النسبة المئوية للزحف العمراني ( ٢% ) . وهذا يعزى الى زيادة العائد من الاستثمار العقاري بالمقارنة بالعائد من الاستثمار الزراعى .

كما أوضحت الدراسة أن الفقد في المساحة الجغرافية كان ٣٤٩,٤ فدان اى ٦٩٨,٨ فدان مساحة إنتاجية ، وهذا يسبب خسارة سنوية في الإنتاج يتراوح بين ١٥٢٠,٩٧٥ الى ٤٣٣٠,٦٦٩ جنية مصرى .

ولكى نحافظ على الأرض الزراعية الخصبة المنتجة يوصى بالآتي : الاهتمام ببناء المدن الجديدة في الصحراء، تبني برامج تنظيم الأسرة لوقف معدلات الزيادة السكانية ، تغليظ العقوبة على التعدي على الأرض الزراعية، والعمل على زيادة الكثافة السكانية في المدن والقرى.