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Urban Expansion, A Threat to Food Security in Nigeria. Case of Ado-Ekiti

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Abstract: ***Ado-Ekiti is an urban centre, and capital of Ekiti State which has been experiencing significant and tremendous expansion right from the creation of Ekiti State in 1996. The consequence of this urban sprawl has led to a depletion of agricultural land, which drastically reduces as the city expands. The concern of this research is to delve into the issues of urban expansion as Its rapidly encroaching agricultural land reduces available land for agriculture and continuouslydepleting the soil fertility which is continually reducing food production output and not that alone farmers were discouraged andfarming activities gradually reducingwhich could pose problem to food production in future as well threatening food security of the nation.The objectives of this research are; to show that urbanization led to loss of agricultural land, to show that urbanization discourage farmers from their farming activities, to show that level of food production is declining over time.Methodology; Data collection for this research were both secondary and primary. The formal is the Identification of expansion at 10 years intervals from 1956-2006 from (Oriye, 2008). The latter is the field work conducted by the researcher whereby questionnaires and interview were used to collect informationfrom about 250 farmers who were randomly selected for the purpose of this research. Information were generated on land fertility, total output, and consumption from over years, also farmers' attitudes toward farming in the process of agricultural land depletion. Data were analysed using both Percentage and Pearson Correlation; percentage was used to measure the rate of increase or decrease of variables across time intervals, while the pearson correlation was used to test the relationship among the variables.Finding of this research showed that about 34km of agricultural land was taking over by urbanization between 1956 and 2006 ,it was revealed that reduction in agricultural land led reduction in soil fertility and declining output whereas consumption increases.Conclusionit was concluded that there is inverse relationship between urban land expansion and agricultural land whichis greatly declining food production and that the furtherance of it is a great threat to food security becauseby 2030, urban expansion will reduce the agricultural land to about 18km^2 if not control and therefore for agricultural land to be preserved, It was recommended that a stringent law should be made for urban land planning to make agricultural land a secluded area that restrict urban expansion.***

Keywords: Urbanization, Expansion, Depletion, Agricultural-land, Food-production, Farmers

1. Introduction

There is a long history of study and debate about the interactions between population growth and the environment. According to the British thinker Malthus, for example, a growing population exerts pressure on agricultural land, causing environmental degradation forcing the cultivation of land a poorer and poorer quality. This environmental degradation ultimately reduces agricultural yields and food availability, causes famines and diseases and death, thereby reducing the rate of population growth. The world resources are under more strain than ever before as global demand for water, energy, and food is on the rise. At the same time climate change threatens farmers' ability to access nutritious food.

Urbanization is the development of land into residential, commercial, and industrial properties. Urban and sub-urban development cause profound changes to natural water shed conditions by altering the terrain and modifying vegetation and soil characteristics, and introducing pavement, buildings, and flood control infrastructure. Hydrologic and geomorphic impacts are closely associated to an impervious area result from urban development. Reported impacts have included: Increased frequency of flooding and peak flow volumes, decreased base flow, increase sediment loadings, changes in stream morphology, increased inorganic loadings, increased stream temperature, and loss of aquatic/ riparian habitat.

Food security is a measure of ensured access to essential nutrition. It refers to a house hold's or country's ability to future physical and economic access to sufficient, safe, and nutritious food that fulfils the dietary needs and food preferences for living an active healthy style. Urban expansion inevitably covers some agricultural land while changes in land values and land markets around cities often result in land left vacant as the owners anticipate the gains they will make from selling it or using it for non-agricultural uses. This high concentration of people in cities has consequences for poverty rates and food security. The world's urban poor tend to lack the money to purchase food and lack the land and resources to grow their own. More people living in cities with limited access to food will result in an increase in level of poverty from 30 to staggering of 50% in 2020. (Corinne Kisner, 2008).

With changing environmental conditions, food security has increasingly become a challenge, particularly in the developing countries. Food production in most of the developing countries is on the decline due to a range of determinant factors including ever-increasing population and rapid urbanization processes (Lambin etal,2003; Oyinloye and Kufoniyi, 2011). In addition to rapid population growth, unplanned urbanization processes and infrastructural development sinking the size of arable Fadama sites in urban centres (Ishaya and Mashi, 2008; Ujoh, 2009).Urbanization is changing human needs and straining natural resources. In order to support the life style, cities must adapt,

reconsidering food sources, water supplies, the end location of their waste, the fuel supplying their electricity, and overall environmental sustainability of densely concentrated populations. Cities consume too many resources and produce too much wastes impacting land far outside the city limits. The urban heat island effect, air, water, pollution, elevated food prices and higher rate of poverty are problems endemic to cities that contribute to health concerns, economic instability, and environmental degradation. The current trend of urbanization means that without making our cities more sustainable, there is little hope for a sustainable world. In Chicago Illinois urban agriculture stems from not only the need for food security for the city's poor but from also the desire to mitigate the climate change. (Corinner, K., 2008).

ChienXiwen, director of the office for the communist party of China Central Committee's Leading Group on Rural Work said that China's arable land had declined by 8.3 million hectares in the past 12 years partly as a result of country's urbanization. The growing urbanization of the global population will make food security even more challenging in future, delegates were told at the Save Food Congress staged at the Inter pack Trade event in Dusseldorf, Germany.

It is particularly true in China that the recognizable value of the soil resources has centred on agricultural land, since the country is feeding 22% of the global population on less than 9% of the world's cultivated land. According to the latest report released by the ministry of Land and Resources (MLR, here after), the total cultivated land area in China shrank by 2.01% in 2003 over the previous year to 123.4 million ha accordingly for 41% of the world average (MLR,2004)and the average cultivated land per capital cropped to 0.095 ha. Now only 12.8% of the total national terrestrial surface is available for agricultural production. Increasing concern over land scarcity is expressed in term of soil availability for agricultural production which is worsened due to rapid population growth and accelerated urbanization and industrialization over past decades (Yang and Li, 2000; Lin and Ho, 2003; Zhang et al., 2004). Tian and Zhuang, 2004) displays the variations in proportion of urban land-uses (cities and towns, villages, and scattered settlements exclusive) and expansion rates across the country. Perhaps for aforementioned reasons, studies focused on land-use changes the induced urbanization and city sprawl have been concentrated in East China, especially in three metropolitan areas, namely Yangtze River Delta (YRD, here after), Pearl River Delta (PRD) and Beijing-Tzanjin-Hebei (BTH) regions (Shen et al., 2001; Ho and Lin, 2004). Tan et al (2005), Using, satellite imagery, estimated urban expansion and the consequent agricultural soil loss in the BTH region between 1990 and 2000. They indicated that total urban area (including; cities, country, seats and designated towns) of the region increase by 71%, from 2135.7km^2 to 3651.8km^2 between 1990 and 2000, resulting in an 18.7 drop of farm land per capital in the BTH region. It was concluded that the metropolises (Beijin and Tianjin) and country seats, rather than middle-size cities were major contributors to the total loss of arable land. The preliminary results of land-use changes in YRD region showed clearly that the urbanized area had dramatic growth during the period from 1984 to 2003. The percent of total land area covered by the cities are concerned that accelerated urban use of productive soil landscapes may threaten food security and environment sustainability.

As cities expand, prime agricultural land is converted to residential or industrial areas. For example, in conception, a Chilean city of about 500,000 inhabitants, 1734 hectares of wetlands and 1417 hectares of agricultural land and forests were transformed into residential areas over the period of 1975 to 2000 (Pauchard et al. 2006). In Accra Ghana it is estimated that 2600hectares of agricultural land are converted every year (Maxwell et al. 2000). Similar pattern were observed in China and Indonesia (Verbug, 1999; Weng, 2002). An immediate consequence is the crowding out of peri-urban agriculture, which often plays a significant role in supplying perishable food stuff to cities. In addition, already weak tenure agreement may be challenged; and agricultural production may shift to less productive areas which could ceteris paribus, result in yield losses (FAO, 2008). Land use due to city expansion can also imply irreversible losses in biodiversity (Punchard et al. 2006).

The land claimed for construction is consistent with urbanization and industrialization over the past two decades. It is estimated that land used for urban sprawl and industrial development account for more than half of the total construction area converted from agriculture. Based on information derived from LANDSAT photograph, the study by Tian and Zhuang (2004) concluded that for the country as a whole, the soil landscapes under a variety of former uses including cultivated land, forest, grass and vegetable gardens together contributed 85.6% of the total acreage of urban sprawl between 1990 and 2000.

This study borne out of the fact that the rate at which urbanization is greatly taken over the entire land formally belong to agriculture at global level is alarming and there is no doubt that this will definitely lead to shortage in food production while population is increasing and food consumption is doubling. This, the study felt would jeopardize the nation's food security and set the people in un-ending famine if care is not taken.

Aim; To show that urbanization is a cause of threaten to food security.

Objectives; To show that urbanization led to loss of agricultural land.
To show that level of food production decline over time.
To show that urbanization discouraged farmers from their farming activities.

Hypotheses; H_1- That urbanization reduced agricultural land
H_1- That level of food production decreases over time due to increasing urbanization.
H_1- That urbanization discouraged farming activities

2. Study Area

Ado-Ekiti is the capital of Ekiti State: Nigeria. It is the administrative centre of Ekiti State, Nigeria. The land in Ado-Ekiti rises Northwards from 335 metres in South East

and attains a maximum elevation of about 730 metres in the Southwest (Adebayo, 1993).

The low relief and gentle gradient characteristics of Ado-Ekiti region favours agriculture and construction activities. Ado-Ekiti is located between latitude $7^0 31^1$and $7^0 49^1$North of the equator and longitude $5^0 11^1$and $5^0 18^1$ East of the Green-wich Meridian. It is bounded in the North by Ido –Osi and Oye local government Areas, in the West by Ijero and East West local government and in the South to Ekiti South West local Government Area (Ebisemiju, 1993). It has a planimetric area of about $884km^2$. Geologically, the region lies entirely within the precambian basement complex rock group, which underlies much of Ekiti State.

The temperature of this area is almost uniform throughout the year, with very little deviation from the mean annual temperature of 27^0C. February and March are the hottest 28^0C and 29^0C respectively while June is the coldest with temperature of 25^0C (Adebayo, 1993). The mean annual total rainfall is 1367mm with a low coefficient variation of about 10%. Rainfall is highly seasonal with well market wet and dry season. The wet season lasts from April to October, with a break in August.

3. Map of Ekiti

Figure 1: Map of Ekiti State

4. Map of Ado-Ekiti

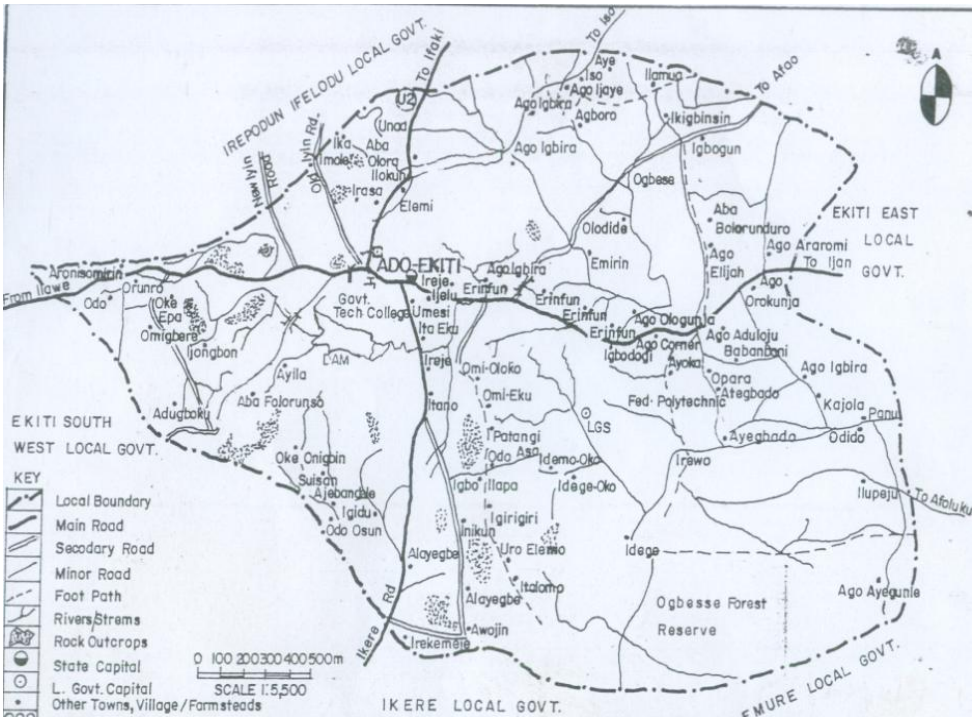

Figure 2: Map of Ado-Ekiti

5. Methodology

Source of Data: The data for this study was collected from both primary and secondary sources; primary data were collected using the sampling instruments; questionnaire (the questionnaire for this research was designed to address the issues fromm1956-2006) and interview. The targeted population were farmers, and were randomly sampled across the study area to have 250 sample size in which about 60 percent of them were not well educated as such interview were used to compliment the questionnaire so as to elicit factual information about the level of food production and consumption, Farmers' positive attitude toward farming, Farmers' attitude toward farm land reduction, Reduction in average no of farmers. Secondary data: The secondary data for this research were generated from a related research and these are the Identification of expansion at 10 years interval, Increase in area of urban centre in Ado-Ekiti for each decade from 1956-2006, (Oriye, 2008).

Data Analyses; This research data were analysed using both descriptive and inferential statistics that is, percentage and Pearson correlation respectively. Percentage was used describe the levels of either reduction or increase that occur in a particular variable say for instance soil fertility or food production output over the intervals of ten years. Pearson

correlation was used to test the relationship among the variables.

6. Results and Discussion

That Urbanization reduces Agricultural land

Identification of the Expansion at 10 years interval

Table 1: Expansion of Urban Centres in Ado-Ekiti and Depletion of Agricultural land at Ten Years Interval 1956-2006

S/N	Year	Area of Ado Ekiti ($km^{2)}$	Area of Urban Centres (km^2)	Area of Agricultural Land
1	1956	329.13	2.5	326.63
2	1966	329.13	6.9	322.23
3	1976	329.13	9.7	319.43
4	1986	329.13	13.3	315.53
5	1996	329.13	19.6	309.53
6	2006	329.13	36.7	292.43

The past studies had made it clear that urban expansion indeed overtook expanse of agricultural land (Oriye, 2011). It is also shown in this study in table i: Expansion of Urban centre and depletion of agricultural land at ten years interval from 1956-2006. It shows that urban centre increases from 2.5 km in 1956 to 36.7 km in 2006 as agricultural land decreases from 326.63 km in 1956 to 292.43 km in 2006. It is evidenced that agricultural land reduced by the difference of 34.20 km which is 11.7% from 1956 to 2006 and between 1996 and 2006 alone it was 17.10 km. In five year time, it is estimated that more than 10 km will be lost to urban expansion considering the rate of urbanization in the study area.

Pearson Correlation

Table 4: Increasing Area of Urban Centre Reduces Agricultural Land

Correlations1			
		AUC	AGL
AUC	Pearson Correlation	1	-1.000**
	Sig. (2-tailed)		.000
	N	6	6
AGL	Pearson Correlation	-1.000**	1
	Sig. (2-tailed)	.000	
	N	6	6
**. Correlation is significant at the 0.01 level (2-tailed).			

Correlation analysis in table iv: Increasing area of urban centre reduces agricultural land shows Pearson correlation value to be 1 for AUC (Area of Urban Centre) and -1forAGL (Area of Agricultural Land), it shows Significant value of 0.000, which means that both exhibit inverse relationship that is, as AUC increases, AGL decreases overtime and that the effect of AUC on AGL is not significant. Even-though the magnitude of effect is insignificant on the size of land, the hypothesis H_1: That Urbanization reduces Agricultural land is accepted by this research study.

The level food production decreases over time due to increasing urbanization

Table 2: Level of food production and consumption

Year	Farmland in(km^2)	Soil fertility (%)	Total production output (%)	Total consumption (%)
1956	326.63	85	80	50
1966	322.23	70	74	56
1976	319.43	65	68	62
1986	315.53	62	65	70
1996	309.53	55	58	78
2006	292.43	50	52	85

Source; Author's Field work (2012)

Table ii: Level of production and consumption shows the reduction in agricultural land from 326.63 km in 1956 to 292.43 in2006 which shows a loss 34.20 km in agricultural land to increasing urban centre. It also shows reduction of soil fertility from 85% in 1956 to 50% in2006. This explains the possible effect that over cultivation of land could have on soil fertility. The value of total food production was 80% in 1956 to 52% in 2006, however the total consumption increased from 50% in 1956 to 85% in 2006.

Table 5: Reduction in Agricultural land, Soil fertility loss and Total output reduction

Correlations2				
		Redagl	Sf	@to
Redagl	Pearson Correlation	1	.877*	.943**
	Sig. (2-tailed)		.022	.005
	N	6	6	6
Sf	Pearson Correlation	.877*	1	.973**
	Sig. (2-tailed)	.022		.001
	N	6	6	6
@to	Pearson Correlation	.943**	.973**	1
	Sig. (2-tailed)	.005	.001	
	N	6	6	6
*. Correlation is significant at the 0.05 level (2-tailed).				
**. Correlation is significant at the 0.01 level (2-tailed).				

Correlation analysis in table v: Reduction in Agricultural land, Soil fertility loss and Total output reduction shows Pearson correlation value of 1 for Redagl (Reduction in Agricultural land), 0.877 for sf (Soil fertility) and 0.943 for @to (Total output reduction) and shows the significant values of 0.022 for sf and 0.001 for @to. The interpretation of this is that there is direct relationship among these three parameters, that as 'Redagl' covers 100% there will be 87.7% 'sf' and also 94.3% '@to'. The significant values explain the effect that 'Redagl' has on both 'sf' and '@to' these contributing effects are about 2.2% and 0.1% respectively. As such the hypothesis H_1: That level of food production decreases over time due to increasing Urbanization is accepted.

That urbanization discourages farming activities Percentage

Table 3: Farmers' attitude to farming

Year	Reduction in Agricultural land(km^2)	% Reduction in No of farmers	% farmers' positive attitude to farming
1956	326.63	5.3	72
1966	322.23	7.4	60
1976	319.43	12.5	56

1986	315.53	26.3	52
1996	309.53	42.6	50
2006	292.43	72.7	46

Source; Author's Field work (2012)

As a result of poor farm yield in agricultural production partly attributed to encroachment of agricultural land by urban dwellers which led to loss of agricultural land and over cultivation of land and consequence loss of soil fertility and partly as result of loss of interest in farmers for farming activities. Table iii: ''Farmers' attitude to farming activities shows reduction in agricultural land as described earlier, also percentage reduction in number of farmers from 5.3 in 1956 to 72.7 in 2006, and percentage of farmers' positive attitude to farming reduced drastically from72 in 1956 to 46 in 2006, the consequence of which culminate in reduction of total agricultural output.

Table 4: Urbanization discourage farming Activity

Correlations3				
		RedAgL	%RedNo.F	%FPA
RedAgL	Pearson Correlation	1	-.991**	.839*
	Sig. (2-tailed)		.000	.037
	N	6	6	6
RedNo.F	Pearson Correlation	-.991**	1	-.766
	Sig. (2-tailed)	.000		.076
	N	6	6	6
FPA	Pearson Correlation	.839*	-.766	1
	Sig. (2-tailed)	.037	.076	
	N	6	6	6
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

Correlation analysis in table vi: Urbanization discourages farming activities shows the Pearson correlation value of 1 for RedAgl(Reduction in Agricultural land), -0.991 for %RedNo.F (% Reduction in number of farmers) and 0.839 for %FPA (% Farmers' Positive Attitude) and it shows the significant values of 0.000 for %RedNo.F and 0.037 for %FPA. The interpretation of which is that RedAgl is inversely proportional to %RedNo.F which means as former reduces over time, the latter increases and also RedAgl has direct relationship with %FPA that is, as former decreases over time latter also decreases. The significant values means that RedAgl has no contributing effect on%RedNo.F but it has contributing effect ofn3.7% on %FPA, it is then clear that urbanization is a root to discouragement of farming activities. The hypothesis H_1: That urbanization discourages farming activities is accepted.

7. Summary and Conclusion

7.1 Summary

Ado-Ekiti which is the study area of this research was evidently studied to be expanding, that over the year the urban expansion is taking over the agricultural lands. This invariably is a bad omen for agricultural production.

7.2 Conclusion

After an intensive study and analysis of this research, it was established that urbanization reduces agricultural land and that the rate of reduction will almost double over- time and if it continues in the same trend by 2030 agricultural land will reduce to 18km^2. Also that the level of food production decreases over time due to increasing urbanization and considering the rate of urbanization, if peradventure agriculturaldevelopment is not seriously enhanced to improve foodproduction so as to compliment loss of agricultural land there will be a greatreduction in food production.

8. Suggestion

This research suggested that to preserve agricultural land, a stringent law should be made to restrict rapid encroachment of land-use into agricultural land and also that urban planning should make agricultural land a secluded areathat restricts urban expansion.

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