

## **Agriculture in the Urban Fringe: Analysis of Calabar and its Environs, Cross River State, Nigeria**

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### **Abstract**

*Urban agricultural system at the fringes has played significant role in food supply for urban areas. However, with the increasing human population due to rural urban drift with concomitant increase in infrastructures, there is tradeoff of agricultural land for other developments. Thus, this research is aimed at investigating the impact of urban expansion on agricultural land. The study adopts a survey method and comparative assessment to examine the effect of other human activities on urban agricultural system before 2013 and beyond 2013. One hundred and fifty (150) questionnaires were administered to sample population to capture information such as the impact of urban expansion on agriculture, size of farms, farming systems, farm seasons and crops produced in Calabar. The findings indicate that there is decrease in agricultural land in the fringes as Calabar Urban expansion persists and increases. Before 2013, more people (36.7% of the farming population) had 3-4 plots of 150x50 feet as against 45.3% owning 1-2 plots. Most of these agricultural lands at the fringes were originally meant for farming and have been converted to building housing estates, roads, leisure resort areas (Tinapa) and schools by government and individuals. This implies that urban expansion has negatively impacted on agricultural land, thereby, reducing food productivity and rendering the farmers unemployed. This paper, however, recommends among others a policy framework towards land use plan for urban agriculture at the periphery.*

**Keywords:** Urban expansion, agricultural land, food productivity, urbanization, urban fringes.

### **Introduction**

Urbanization has been known to have started some hundreds of years ago. As a global phenomenon, it cuts across countries although the factors which led to settlements acquiring urban status vary from one country to another (Kline et.al 2004). Defining urbanization, Sada (1999) describes it as “the process by which a population and the development of infrastructure become concentrated in cities”. Bryan (2002) has added that it entails more specialization in labour, agricultural food stuff supply and city industrial specialization.

As the cities grow, their functions become diversified as well as their structure becoming complex. A city function which includes commercial, administrative and manufacturing also includes other functions that are carried out by the city but which are hitherto relegated to the background especially in the developed countries. Among these functions lies agricultural function. It is known that agriculture is still active in cities of developing countries, hence the description of cities in the developing countries as “agro-villas (Hammond, 2002; Sullivan et.al, 2004). Although, the fact remains that the greater portion of the city inhabitants engage in non-agricultural activities, agriculture is much practiced by people at outskirts of cities.

The development of modern urban centers in Nigeria can be traced to the colonial era. At this period, the motive behind their growth was mainly administrative and commercial. This era saw the greater portion of Nigerian population being dependent on agriculture. Since Nigeria had independence in 1960 and the “oil boom” that followed in the 1970s, the development and enlargement of urban centers have been tremendous. This period witnessed a greater industrial and infrastructural development in the annals of Nigerian history (Anene, 2008). It also witnessed the greatest influx of people into the urban areas as they exert a pull effect on the population.

The ever growing cities, their attendant population increase and infrastructural developments together with inherent activities in the urban area have led to the conversion of peripheral lands into what has been described as urban rural fringe or urban-rural continuum. This has reduced the land for cultivation through excessive fragmentation of land and the conversion of agricultural land into nonfarm activities. These problems in the rural-urban fringe are a serious check on agricultural productivity.

In most countries the peripheries of cities serve as buffers and are often used in agricultural areas as part of conservation programs for environmental aesthetics and increasing environmental quality of the urban place (Alig et.al, 2004; Boutin et.al, 2003, Uri, 2000). The periphery or urban buffers usually green areas of grasses and trees providing a more natural environment than much of the intensively farmed land surrounding them, whereas in some areas, they are used for cultivation of fruits and vegetables (Hammond, 2002; Ryan, 2003; Brush, 2000, Sullivan et.al, 2004). Thus, the peripheries that serve as buffer area for cultivation of crops and also recreation and moderating urban climate.

However, in most developing countries the problem of “ill-planning” has exacerbated the environmental quality and also reducing land for urban agriculture. Calabar, the capital of Cross River State is not left out in the wave of urban expansion and its consequences on agriculture. But its case is very pathetic especially when one takes into cognizance that Calabar has a one directional growth (Ntukidem, 1980). This is being compounded by the location of Pamol Rubber Plantation virtually 11 kilometers from the Central Business District (C.B.D.) of Calabar which allowed only a limited pace for agriculture and development. Another problem is its location in the peninsula between the Calabar River and Great Kwa River. On this note, the main thrust of this paper is to determine the impact of urban expansion on agricultural land and reduction in food productivity.

### ***Conceptual Exploration***

Studies have been carried out about the emergence, characteristics and problems of urban expansion as manifested in the fringes. Most of these studies are, however, carried out in the developed countries of Europe and America due to their earlier expansion activities. But in developing countries awareness has also increased especially in this era when cities are growing at a rate much faster than before. In defining the urban fringe Ebong (1991) observes that the fringe is an intermediate zone between urban and rural land-use which shares the characteristics of each. Urban fringe is the zone in which various rural and urban characteristics are mixed together (Allen, 2003; Simon *et al.*, 2006; Woods, 2006; Masuda and Garvin, 2008). It is the area around the city where land-use may be expected to change sooner rather than later as the economy and population of the city expands which often raised land value as change is expected. Collins 1994 identifies the urban fringe as a space into which the town extends as the process of dispersion operates. He asserts that it is an area that is partly assimilated into the growing urban complex where many residents live in the country but are not socially and economically of it.

Ajaegbu (1976) in a study of the rural-urban fringes of Nigerian cities associated their development with many One Thousand Nine Hundred (1900) post colonial towns whose growth is manifested by the rural neighbourhood. He outlined the reasons for fringe formation as follows: The rapid growth of urban centers in recent years, the continued congestion in cities caused by excess immigration and inadequate space for new urban land-use which is caused by agglomeration. The attendant result of urban expansion of cities is a new set of pre-urban characteristics, the intermingling of rural settlement, housing and land-use with low to medium quality urban type of housing and urban landscape.

According to Grigs (2006) “as one phase of urbanization succeeds the other in the city, instability results from the encroachment generated within the evolving spatial system. “This implies that as the city grows there is succession of old land-uses with those whose economic rent are higher. Hence Okafor’s (1982) observation to the effect that the rural-urban fringe is a zone of interpenetration of the built up area of the city and the rural surrounding. He concludes that the fringe is usually invalidated as rural environment without being validated as urban environment.

Characteristic features of the rural-urban fringe have been deciphered by several scholars that have carried out researches on the fringe lands and how agricultural practice in the area has been influenced. Webrwela (1992) in a study of American cities identified that their expansion have embraced outlying farms, new squatter settlements and new land-uses. This creates premature subdivisions for urban development in the form of vacant derelict land that are reserved. The reserved lands have created land idleness in most fringes of United State of America (U.S.A). Which were referred to as an “institutional desert”. He further noted that the invasion of the fringes by urban land-uses is often done through the extension of housing estates, building along arterial roads and by location of new industries which are excluded from compact urban area such as cemeteries, factories and so on. He observed that the sitting of obnoxious industries in the fringes is often backed up by institutional and legal factors. Effiong-Fuller (1991) in his own study carried out around the city of Flint in Michigan observed the following problems: It removes land from agricultural productivity. Plating (division of land into plots) become unguided, un-coordinated, excess of effective demand, thus creating vast tracts of idle land, irregular settlement patterns and tax delinquent holdings. Taxes must increase in order to maintain the services necessary in such densely populated settlements, but such taxes commonly exceed the taxpaying capacity of both farmers and shop workers. Unregulated plating frequently permits tracks to be subdivided with no deed restriction, thereby running adjacent subdivisions that may have started under high deed restrictions. Fringe dwellers are frequently ill-prepared and ill-informed about buying land getting implements and cultivating gardens. The fringe areas boost land value to the point at which it no longer pays to continue agricultural operation.

In trying to study and as well describe the morphology of the fringe belt, Griggs (2006) has sought to know the land-use patterns which are found in the fringes. He highlights the competition which goes on between different land-uses in the fringe, especially that between the institutions that are particularly characteristic of the area like parks and gardens and residential land uses. He envisages a situation in which by the end of expansion or contraction period, a zone will have been added to the build-up area or added to what were outlying institutional sites respectively. Anene (2008) has discovered that farm land is absorbed into urban built-up area at a yearly rate of 1.6 hectares per 1000 people in his study of urban encroachment into rural farm land in England and Wales. Fellmeth (1973), recognizes the loss of the rural land when he observes that land once developed cannot easily be converted back to agricultural land

The urban encroachment into rural areas was found by Mayer (1981) to stimulate problems which are serious and therefore warrant research. He advised on the need to preserve open spaces where poor people will live from the competition which goes on between economic activities on land. The review of various literatures on rural-urban fringe has shown a useful insight into what is expected from the study. Therefore, this study is out to address the impact of city expansion on agricultural land at the fringes of Calabar.

### ***Methodology***

This study was conducted in Calabar and its environs particularly, around the Calabar urban fringes. The study employed the primary and secondary sources of data. The primary source of data collection was through administration of questionnaires and personal interview and observation for first-hand information to ascertain the impact of city expansion on agriculture. The secondary sources of data employed in this study were textbooks and journal articles on the subject matter. Data on the impact of urban expansion on agriculture, size of farms, farming systems and farm seasons in Calabar were captured in the questionnaire. A total of 150 (one hundred and fifty) questionnaires were distributed to farmers in the study area. These were shared among the four communities of IkotEfanga, IkotAnsa, Nyahasang, Ekorinimin and Anantigha the proportion 35, 35, 40, 40 respectively. Random sampling technique was employed in the selection. Respondents were interviewed in order to assess their views on the impact of urban expansion on agriculture in the study area. The hypothesis was tested using descriptive statistics and correlation analysis.

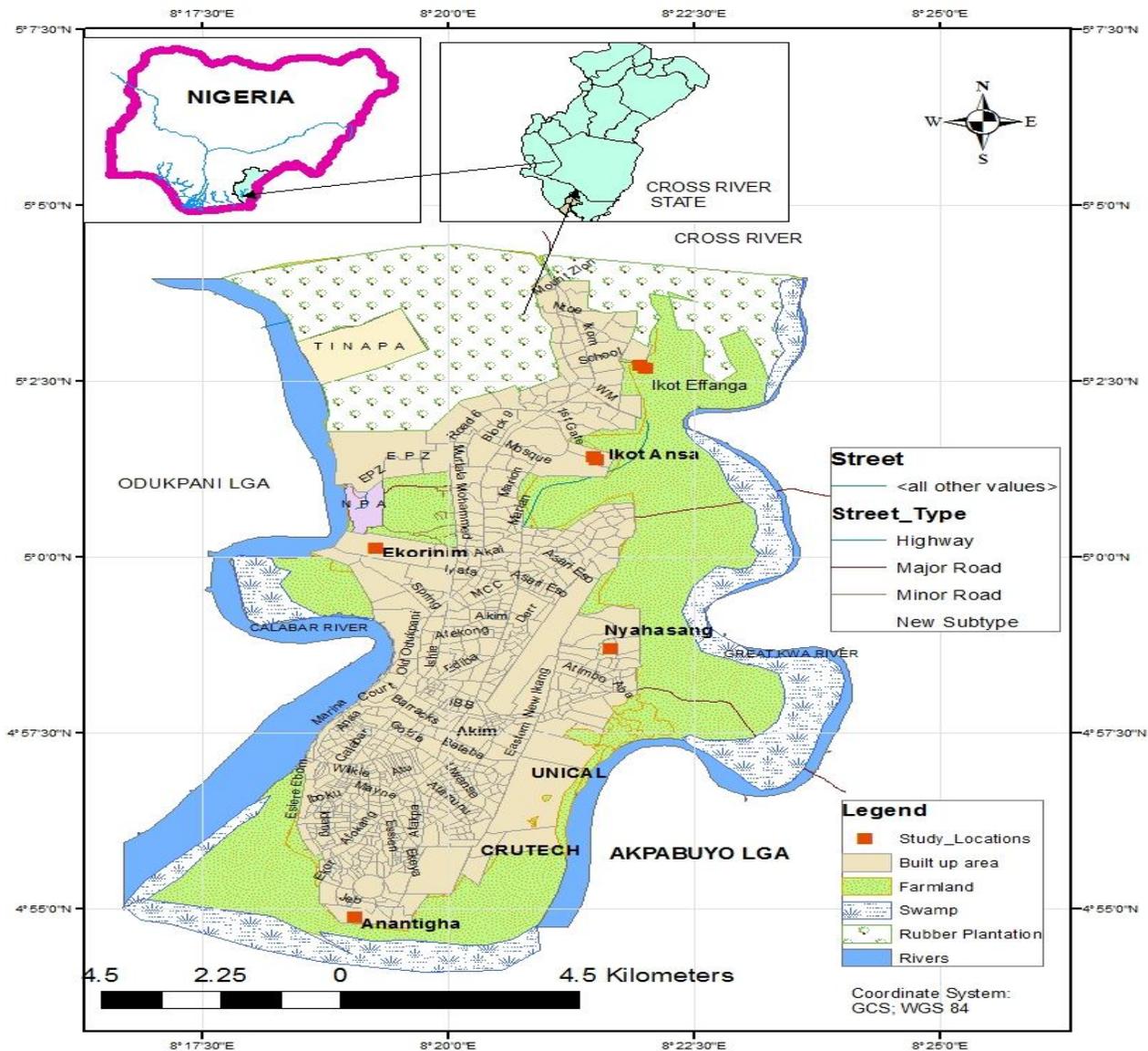


Figure 1: The Study Area

**Result**

A plot is one portion of the fragmented farm land. In this research a plot has been measured to be 150 x 50 feet. Therefore, number of plots cultivated is determined from the above measurement.

Table 1: Farm Size

Before 2013		After 2013		
Number of plots	Frequency	%	Frequency	%
Below 1 plot	25	16.7	50	33.3
1- 2 plot	31	20.7	68	45.3
3 – 4 plot	55	36.7	12	8.0
Above 5 plot	39	25.9	20	13.4
<b>TOTAL</b>	<b>150</b>	<b>100</b>	<b>150</b>	<b>100</b>

Source: Researchers’ field work survey, 2014

The Table 1 above shows the different proportions of farm sizes and the number of farmers who engage in each category. The number of farmers who cultivate less than 1 plot of land on or before 2013 total 25, while after 2013 the number double to 50 people.

Those who farm between 1 – 2 plots were 51 representing 20.7% of the sample before 2013 whereas 68 of the people representing 45.3% farm between 3 to 4 plots before 2013, while after 2013 12 people representing 8.0% cultivate the same plot proportion. The last category which involves those who farm above 5 plots has 39 or 25.9% before 2013 while 20 people representing 13.4% cultivate the corresponding size of plot after 2013.

This distribution shows that on or before 2012, the total of 94 farmers representing 62.7% of those administered with questionnaire farm above 3 plots of land while 56 representing 37.3% farm above 3 plots. Contrarily, after 2012, 118 people representing 78.7% farm less than 3 plots while 32 or 21.3% cultivate above 3 plots. This development implies that after 2013 there has been increased conversion of agricultural land to nonfarm activities which manifest the reduction of farm size. Since the area lies in the fringe of Calabar Urban, it could be argued that the agricultural land in the area is most threatened by urban expansion as verified by Table 1. The outcome of more farmers cultivating less size of farms in contemporary period is that productivity will be low as it will be very difficult for farmers to practice mechanized agriculture.

**Table 2: Farming System**

Farming System	Before 2013		After 2013	
	Freq.	%	Freq.	%
Rotational/Bush fallowing	135	90	50	33.4
Continuous cultivation	15	10	100	66.7
Mixed farming	0	0	0	0
<b>Total</b>	<b>150</b>	<b>100</b>	<b>150</b>	<b>100</b>

Source: Researchers' field work survey, 2014

Table 2 dwells on how farmers cultivate their farms. From the table it is observed that before 2013, 135 or 90% of the total farmers practice rotational or bush fallowing system of cultivation, while only 15 or 10% do continuous cultivation. Currently, after 2013, 50 or 33.7% engaged in rotational or bush fallowing system whereas 100 or 66.7% practice continuous cultivation. Mixed farming system is never practiced by any of the farmers administered with the questionnaire in the two periods that we are looking at. The table shows that rotational method of cultivation marginalized the farming system representing 90% before 2013, whereas after 2013 continuous cultivation over-ride representing 66.7% of the total farmers sampled. The implication of more farmers practicing bush fallowing or rotational cultivation before 2013 could be interpreted by the fact that agricultural land availability was greater during this period (Table 1), with less agricultural land due to urban encroachment after 2013, the farmers adopted continuous cultivation system so as to meet up with the inherent shortage of agricultural land thereby avoid being thrown out of occupation.

In traditional agricultural system, the length of fallow period determines the availability of farm land and the fertility of the soil. For over 56.7% to practice continuous cultivation and 28% not more than two years fallow period after 2013 shows that there is shortage of agricultural land in the area of study.

**Table 3: Major Crops Cultivated**

Crops	Before 2013		After 2013	
	Frequency	Percentage	Frequency	Percentage
Yam	25	16.7	5	3.3
Corn	15	10.0	10	6.7
Plantain/Banana	20	13.3	4	2.7
Melon and Tomato	5	3.3	2	1.3
Cassava	75	50.0	105	7.0
Vegetables	10	6.7	20	13.3
Others	0	0	4	2.7
<b>TOTAL</b>	<b>150</b>	<b>100</b>	<b>150</b>	<b>100</b>

Source: Researchers' field work survey, 2014

As can be observed Table 3 identified the crops cultivated and their intensity of cultivation in the area of study. It is observed that before 2013 cassava was the main crop cultivated representing 50.0% of the total sample; yam followed with 16.7% plantation and banana 13.3%; corn 10% vegetable 6.7% while melon and tomato have 3.3%. the frequency of crop cultivation after 2013 also shows that cassava maintained the lead as the dominant crop cultivated having 105 or 70% of the total sample; vegetables followed with 13.3% corn 6.7% yam 3.3%; plantain and banana 2.7%; melon and tomato 1.3% while other (mostly okra) acquired 2.7%. The lead maintained by cassava after 2013 explains that it is easier to cultivate and as well can thrive on a less fertile soil and still give a good yield. The appearance of okra under other crops shows that the crop is favourably cultivated in the study area.

**Table 4: What Activities Compete with Agriculture for Land?**

ACTIVITY	FREQUENCY	PERCENTAGE
Roads /Buildings	120	80.0
Industrial set-up	15	10.0
School and Recreation	10	0.60
Others	5	0.40
<b>TOTAL</b>	<b>150</b>	<b>100</b>

Source: Researchers' field work survey, 2014

Table 4 identifies other activities that compete with agriculture for the use of the land in the area of study. The intense of competition for road building is 20 representing 13.3%, housing has 90 or 60%, and industrial set-up has 25 or 16.7% while school and recreation bears 10 representing 6.7%. The other activities not mentioned mostly grazing acquire 5 or 3.3% of the competition. The table shows that housing possessing 90 or 60% of the total sample competes more with agriculture for the use of the land. Although, other activities make use of the land, it could be said that agricultural displacement in the area is mainly due to housing development.

**Table 5: Land Acquired by Government**

Response	Frequency	Percentage
Yes	105	70
No	45	30
<b>TOTAL</b>	<b>150</b>	<b>100</b>

Source: Researchers' field work survey, 2014

Table 5 shows that 105 or 40% of the farmers sampled agreed that the government acquired their farm land while 45 representing 30% said that the government did not acquire their land. The above discovery which implies that about 70% of the respondents lost their land to the government could be due to land-use decree of (1978). This vividly shows that there will be less land for planting in the area of study.

**Table 6: Do You Think That Expansion of Calabar into the Fringes, Cause Shortage of Land for Agriculture?**

Response	Frequency	Percentage
Yes	125	83.3
No	25	16.7
<b>TOTAL</b>	<b>150</b>	<b>100</b>

Source: Researchers' field work survey, 2014

Table 6 gives the frequency of farmers who hold to expansion of Calabar into the fringe as the main cause of land shortage in the area of study as 125 or 83.3% of the total farmers sampled. Those who don't believe that expansion of Calabar into the fringe cause land shortage were 25 representing 16.7%. Land once developed cannot be re-converted into agricultural land. Also, when government acquires land, people are banned not to use the land. These factors combine to reduce land availability for agriculture as indicated by 83.3% of the total sample. Also, the reasons given to buttress this idea that land is reduced in the area are manifestations of an urban periphery hence it could be ascertained that the expansion of Calabar urban cause land shortage for agriculture in the area of study.

**Table 7: Reasons for Answering Yes in Table 6**

Reason	Frequency	Percentage
Housing Estates	52	41.6
Industrial set-up	20	16.0
Office blocks	15	12.0
Reduced fallow	38	40.4
<b>TOTAL</b>	<b>150</b>	<b>100</b>

Source: Researchers' field work survey, 2014

The Table above explains the frequency of the reasons given by respondents who said 'Yes' to buttress the assertion that expansion of Calabar in to the fringes cause shortage of agricultural land. 52 or 41.6% cause the emergence of housing estates as the reason for agricultural land shortage; 20 or 16.0% identified the growth of industries in the area as their reason while 15 or 12.0% observed that the development of office blocks cause agricultural land shortage. The last reason given by 38 farmers representing 30.4% is the reduction of fallow period. Since all of the reasons given usurp land, there is truth in the area of study.

**Table 8: Would you Accept the View that the Encroachment of Calabar Urban Influences Agriculture?**

Response	Frequency	Percentage
Yes	137	91.3
No	13	8.7
<b>TOTAL</b>	<b>150</b>	<b>100</b>

Source: Researchers' field work survey, 2014

From the Table 8 above, it is found that 137 of the farmers sampled representing 91.3% agreed that the encroachment of Calabar urban affects agriculture, while 13 or 8.7% said not to the question. For 91.3% to say yes shows that the traditional patterns of agriculture in the study area has been greatly influenced either positively or negatively as Calabar urban expands into its rural neighbourhoods

**Table: 9 Test of Hypothesis Using Correlation Coefficient Derived from Tales 4 And 7**

S/N	X	Y	$x-\bar{x}$	$y-\bar{y}$	$(x-\bar{x})^2$	$(y-\bar{y})^2$
1	120	52	82.5	14.5	6806.25	196
2	15	20	-22.5	-17.5	506.25	289
3	10	15	-27.5	22.5	756.25	506.25
4	5	38	-32.5	0.5	1056.25	0.25
$\Sigma$	150	150	165	55	9125	991.5

Source: Researchers' Data analysis, 2014.

$X=37.5$ ,  $\bar{y}=37.5$ ,  $r=0.022$ , critical value=1.16, confidence level= 0.05%, Df = 89

### Discussion

The Pearson's Product Moment correlation coefficient in table 9 derived from Tables 4 and 7 shows the significant evidence of the relationship between urban expansion and decreasing agricultural land in relation to farm sizes, farming systems and seasons with the independent variable (urban expansion) and dependent variable (decreasing agricultural land). The result of the analysis shows that the correlation coefficient  $r=0.022$  (calculated) and the critical value=1.16 (tabulated) at a confidence level of 0.05% and degree of freedom (df)= 89. The tabulated value is greater than the calculated and hence, the stated null hypothesis was rejected, therefore, the alternative hypothesis was accepted that: there is a significant relationship between urban expansion and decreasing agricultural land at the fringes. This means that urban expansion from the construction of roads, building of houses, schools, recreational centres and markets towards the city fringes has actually taken away the agricultural land, thereby, lowering food productivity and rendering the farmers unemployed.

The reviewed literature from the studies of scholars and observed responses carried out by this study as analyzed in tables 4,5,6,7 and 8 supported the results of the analyses that urban expansion has a negative impact on agriculture in the urban fringes of Calabar and its environs.

### ***Conclusion***

In conclusion, this research work has shown that encroachment into the urban fringes within Calabar and its environs in form of urbanization through city expansion from road construction, building of houses, recreational centres and parks, leisure resort as well as schools has a significant impact on agricultural land. The study also found out that the major economic activity in the fringes was basically farming producing food stuff such as vegetables, bananas, plantain, yam, cassava, tomatoes etc to the city of Calabar. It was observed that this land which was originally used for farming has been converted to other uses through government acquisition for construction purposes as in the case of the TINAPA Resort and estates as well as private acquisition. This has, however, resulted to reduction in agricultural land, thereby lowering food production and rendering the farmers unemployed.

### ***Recommendations***

This research has proven that urban expansion towards the fringes of Calabar and its environs has an impact on agriculture, farming seasons and systems, thereby, reducing food productivity into the city. However, the following recommendations were put forward, owing to the fact that the greatest threat to agricultural land in the fringes is the expansion of city centres.

1. Urban planners should redirect the growth of urban housing upwards (that is erecting storey buildings than its lateral spread).
2. Since urban centre involves expansion there should be a land value assessment before the town is sited. This will help to avoid the use of fertile agricultural land for physical urban development.
3. Rapid urbanization in the cities of developing countries has been attributed to influx of people to the cities. Hence regional planning is advocated to improve living conditions in the rural areas so that the rate of emigration will be reduced thereby checking the expansion of cities into rural agricultural land.
4. The fringe areas cannot exist without the urban centre. Therefore, it is recommended that the rural-urban fringe should be integrated into the city plan so that the development into the agricultural lands at the periphery can be monitored. The recommendations given above if duly followed will help to alleviate the menace of urban expansion on agricultural activities in the fringes.

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