

AGRICULTURAL LANDUSE IN SUB-URBAN LAFIA OF NASARAWA STATE, NIGERIA

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ABSTRACT

The main aim of this paper is to highlight the current landuse for Agriculture in the area and the specific objectives were to identify different category of landuses. The geo-referenced Google earth image of the area was digitized (on-screen) using ArcGIS 9.3 version. GPS (Germin 76csx model) was used for the data collection in the field the during the ground truthing. The GIS analysis shows that the total area (sub-urban Lafia) covering 234.43km² within the 15Km radius. The analysis for the categories of landuse shows that uncultivated area 14.98km² Built-up area 14.12km², Natural Vegetation 64.64km² and Agricultural/Cultivated area 140.69km². 95 copies of questionnaires were administered to the respondents in the area. The result revealed that about 40% for Agriculture, commercial with 32.63%, manufacturing with 13.68% and 10.53% respectively, while mining with 3.16%. The distribution of different landuses along the selected roads shows that Jos road's main activity is mining due to the availability of raw material and quarry sites located in the area. Makurdi road's main activities include Agriculture 26.7% and Commercial 33%. Doma road also partakes in manufacturing and artisanal with 7.1% and 50% of respondents engaged respectively. The respondents' age by their landuse activities shows that 66.7%, 0%, 26.7%, 6.7%, and 0% for agricultural, commercial, mining, manufacturing, artisanal and services respectively. The age between 18-35years are having more Agricultural lands than the ages between 51-65%. While males having more lands than the females with 42 and 36% for Agriculture while the females engaged in Commercials with about 45.5 and 25.8% respectively. It also shows that income earn base on landuse activities, Agriculture having 50% while mining having least paid. The paper concludes that Agriculture occupying more land followed by Undisturbed land/Vegetation and there is need for proper database collection of the lands for feature planning.

Keywords: Agricultural landuse, GIS, Google earth

INTRODUCTION

Land is one of the natural resources that are at the centre of all economic activities. An inventory of land to skillfully classify land according to various economic uses has been an important database for Government, planners and policy makers (Nasiri, 2002). Studies have shown that there remain only few landscapes on the earth that is still in their natural state. This is because the landuse/ land cover pattern of any region is an outcome of both natural and socio-economic factors. Land is becoming a scarce resource due to immense agricultural and demographic pressures over the recent years (Opeyemi, 2006).

Despite the fact that the world is becoming more and more urban, the definition of urban itself remains rather fleeting, changing over time and space and varies from one country to another (Cohen, 2004). The suburban zone is the interface, the transitional setting in which processes of urban growth and development intersect with the pressures of rural preservation (Bourne *et al.*, 2003).

In line with this the need for proper landuse planning in achieving the said development is therefore of utmost importance especially in areas where new settlements are emerging due to increasing population especially in developing countries where the growing demand for land and its natural resources creates competition and conflicts. As population growth continues, the remaining wild lands are converted to agricultural use, while at the same time land is appropriated for urban expansion. Chapter 10 of Agenda 21, Managing Land Sustainably, recognizes that to meet human requirements in a sustainable manner, we must resolve these conflicts and find more effective and efficient ways of using land (FAO, 1995).

Urbanization presents many challenges to farmers on the urban fringe where farmlands and forest lands are being converted to built-up areas thus reducing the amount of lands available for food production (Wu, 2010). This reduction in available land for agriculture has direct implication on the farming communities where their major source of livelihood is farming forest resources extraction. Land-use planning can involve diverse assemblages of public and private landowners, managers, and stake-holders, who must be identified, involved, and empowered if land-use planning processes are to be effective. Given a potentially large number of stake-holders possessing different views of landuse, regional planning necessarily must incorporate diverse land-use goals (David *et al.*, 2005).

Human development impacts upon all facets of the environment. While most apparent in urbanized areas, there is literally no place on the globe that does not bear some evidence of the impact of humankind. Consequently, all new development and redevelopment must be undertaken with consideration of its resultant effect on the environment as well as on adjacent existing development. The reality of this fact underscores the importance of planning and design principles and controls to insure compatibility and to minimize negative impacts as this development occurs. While this may seem to be an obvious understatement it is not the mentality with which most growth has occurred. However, there is a steadily growing change in philosophy apparent in modern society that reflects a heightened awareness and concern for the environment.

Lafia been a state capital has experienced rapid expansion since 1996 when it was designated state capital owing to the influx of formal and service workers as well as business entrepreneurs (Lafia Master Plan, 1998). A study by Ojanuga and Ewoanya (2008) in Makurdi revealed that the conversion of good agricultural land to urban dwellings and other non-agricultural uses is not peculiar to Makurdi town only as other newly created state capitals are equally affected, Nasarawa state is one of the newly created state and Lafia been its capital has witnessed remarkable expansion, growth and developmental activities such as building, road construction, deforestation and many other anthropogenic activities (Ibrahim and Umar, 2008). For the reasons of its size and status as state capital as well as the location near the Federal Capital Territory (FCT), Lafia is now the first order town in the state. The need for information on landuse to be used for proper planning in the areas of spatial, water and environmental management forms the basis of this study.

Keeping in view the functions of land, land quality and other attributes, it is important to provide a framework that will guide in defining specific landuses to landusers, enabling adequate and effective landuse planning and sustainable use of resource. Several studies have been carried out on emerging issues of landuse change over time. The work of Christopher (2003) in Tanzania found out that landuse change and biodiversity depletion with expansion of agriculture due to policy change, Tukahirwa (2002) lamented that demographic changes alters environment, while Opeyemi (2006) used landuse change detection over time with the aim of finding out the impacts of the change in Ilorin, Alao (2003) looked at challenges of forestry management in Lafia, Nasarawa state taking into cognizance of the management

status of the forest estate and agencies involved in forest management, Ibrahim and Umar (2003) reaffirmed that landuse changes in Lafia are the driving forces, and implications as well as resource management within the context of sustainable development which shows the impacts of the change, but with little emphasis on the implications of these changes on the utilization of resources through landscape structuring and classification. This study mapped out the current landuse in sub-urban Lafia which will give a general idea about the nature and characteristic of the area which in turn will enable planning and sustainable utilization of land resources.

Study Area

Lafia and its suburbs lie between latitude $8^{\circ}25'40''\text{N}$ to $8^{\circ}34'15''\text{N}$ and longitude $8^{\circ}24'25''\text{E}$ to $8^{\circ}38'19''\text{E}$ in the guinea savannah region of northern Nigeria. Nassarawa State had a total population of 1,287,876 as at the 1991 head counts which was projected to 1,494,190 by 1996. 1999, the estimated population of the state is 1,501,387. Lafia is the largest town in Nasarawa state with population of 330, 712 (NPC, 2006).

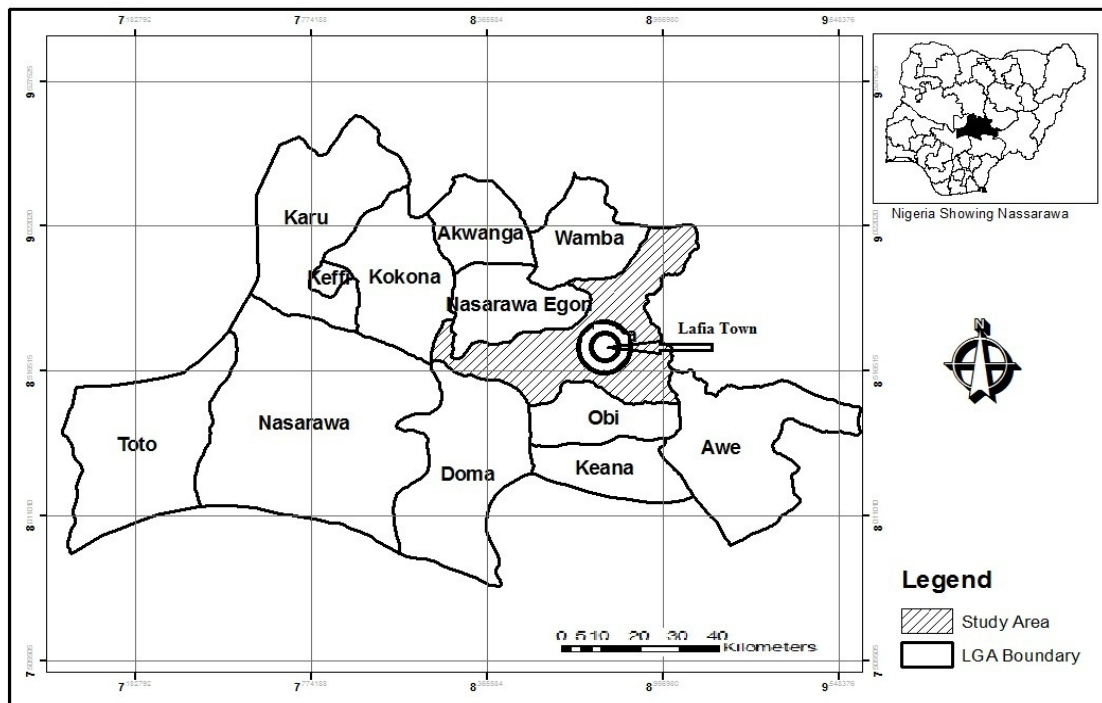


FIG. 1: NASARAWA STATE SHOWING THE STUDY AREA

Source: Dept. of Geog. BUK (2012)

Geology and Relief

The southern landscape of the state forms part of the low plains of the Benue origin. Other parts of the state are composed of undulating lowlands and a network of hills developed on granites, migmatites, pegmatites and gneisses.

Around the salt mining village of Awe are a number of worn volcanic cones. Most parts of the state that lies within the Benue (valleys are composed of sandstones). However, around Tsh saltbearing districts of Awe, Keana and Akiri, are detached synclinal areas formed by localised folding.

Climate, Vegetation and Soils

Nassarawa State is characterized by a tropical sub-humid climate with two distinct sea sons. The wet season lasts from about the beginning of May and ends in October. The dry season is experienced between November and April. Annual rainfall figures range from 1100 mm to about 2000mm. The area falls within the southern guinea savanna zone. However, clearance of vegetation for farming, fuel wood extraction for domestic and cottage industrial uses and saw milling has led to the development of re-growth vegetation at various levels of serial development. Dense forests are few and far apart. Such forests are found in lowland areas, particularly where population pressure is less on the land. The major soil units of the area belong to the category of oxisols or tropical ferruginous soils (Nyagba, 1995).

This paper is attempting to highlight some of the landuses within sub-urban Lafia town which 15 km radius according to Lafia Master Plan (1998)

The main aim of this paper is to determine the current landuse in sub-urban Lafia. This will be achieved using the following objectives which are to:

1. Identify the different categories of landuse in sub-urban Lafia
2. And to determine the level of Agricultural land ownership in the area

MATERIALS AND METHODS

Reconnaissance Survey

A reconnaissance survey was conducted (ground truthing) to familiarize the researcher with the study area before the actual field work was conducted. Google earth images was downloaded and used as the base map for the study. The landuse types and their characteristics were identified based on their physiographic characteristics.

Sources of Data

These sections were grouped into two parts, the first part dealt with the physical aspect while the second part dealt with the human aspect. Global Positioning System Germin 76csx model (GPS) was used to record the coordinates in the study area sampled. Different land marks were identified such as palace, school, farm, bare land, forest reserve, place of worship, stream or river, road, foot-path, manufacturing industry, administrative office and hospital were among those observed, recorded and categorized as agricultural lands, built-up areas, uncultivated lands or natural vegetation.

The questionnaire was administered to 95 respondents in the sampled areas North (Jos road), North-East (Shendam road), South-East (Makurdi road), South. The SPSS statistical software was used to analyse quantitative data sourced from questionnaires administered. The data were coded and assigned values as representatives. Cross tabulations were made among variables to deduct characteristics and give information and support observed features in the area studied.

Image geo-referencing and Digitisation

The coordinates recorded were imputed in Microsoft Excel. Arc GIS 9.3 which is compatible with Microsoft Excel was used to locate the coordinate points. The image of the area saved in JPEG format was also imported into the Arc GIS environment and the selected control points were used to register the points individually until the geo-referencing is done and completed. Different symbols were used during the digitization. Points, lines and polygons were used to represent the roads, villages and group of buildings respectively. The buffer zone of 15km

radius was used to select Lafia town for this study. This criterion for selection was adopted from the Lafia Master Plan (1998).

DATA ANALYSIS

Landuse Categories.

The geo-referenced Google earth image of the area was digitized (on-screen) using ArcGIS 9.3 and four dominant categories of landuses were found in the during digitization, these includes

Uncultivated, Cultivated, Vegetation and Build up areas.

Figure 2 showing the four dominant landuse were identified and mapped with their respective area coverage. The total area (sub-urban Lafia) covering 234.43km² within the 15Km radius. The analysis for the cartigories of lanuse shows that:

- Uncultivated area 14.98km²
- Built-up area 14.12km²
- Natural vegetation 64.64km²
- Agricultural/Cultivated area 140.69km²

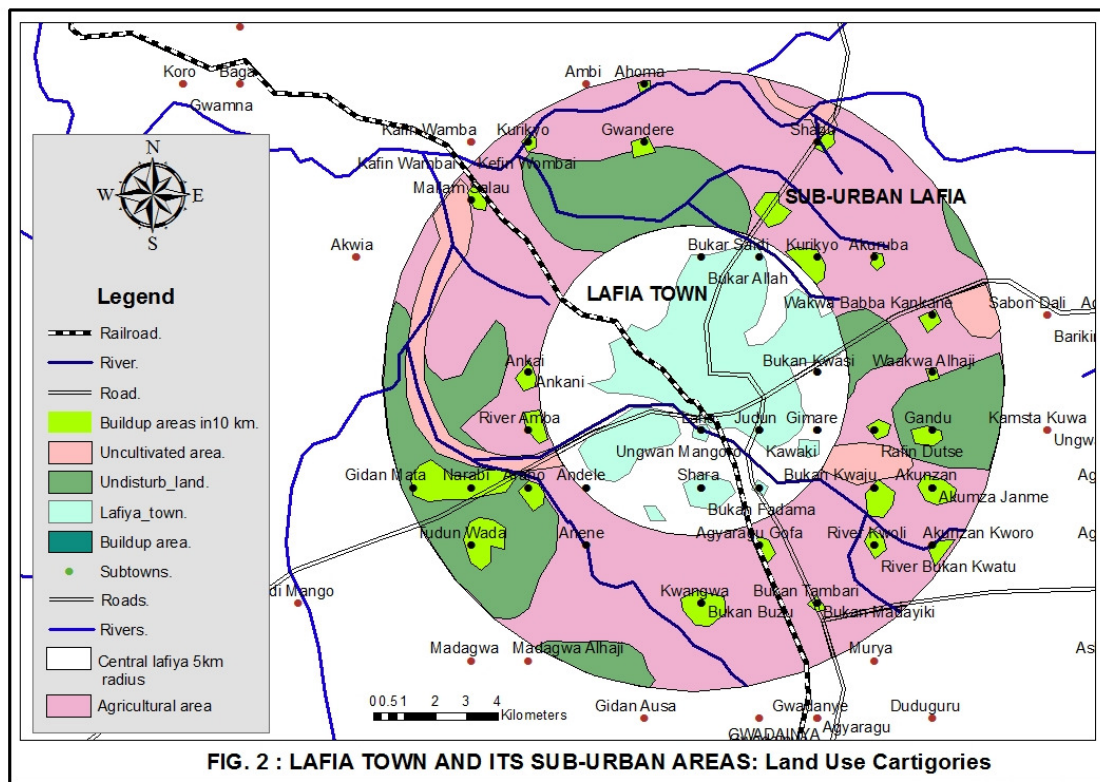
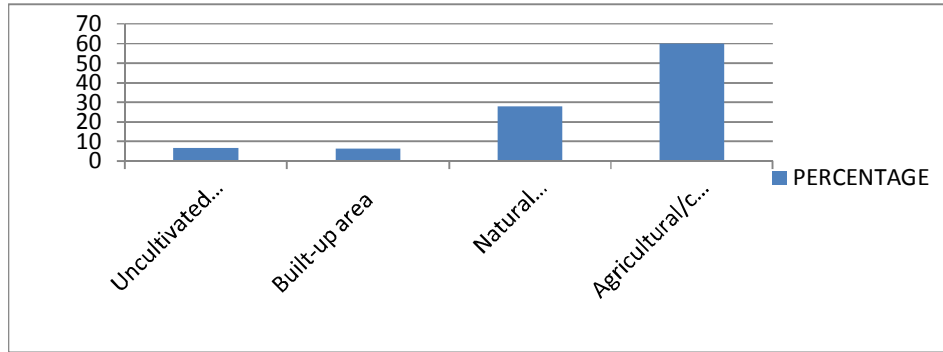


figure 3 indicates that the bulk of the landuse in sub-urban Lafia (about 60%) is agriculture. Most of the area is covered with cultivation. About 28% of the area is made up of Natural vegetation with little human interference consisting of canopied trees, thick foliage and two nature reserves. Settlements made up of large and small villages make up 6% as built-up area. Uncultivated land takes up about 6% of the landuse type in the area. This implies that

agriculture is the major landuse type in sub-urban Lafia which can be attributed to available land for cultivation and occupational nature of farming of the people in the area.



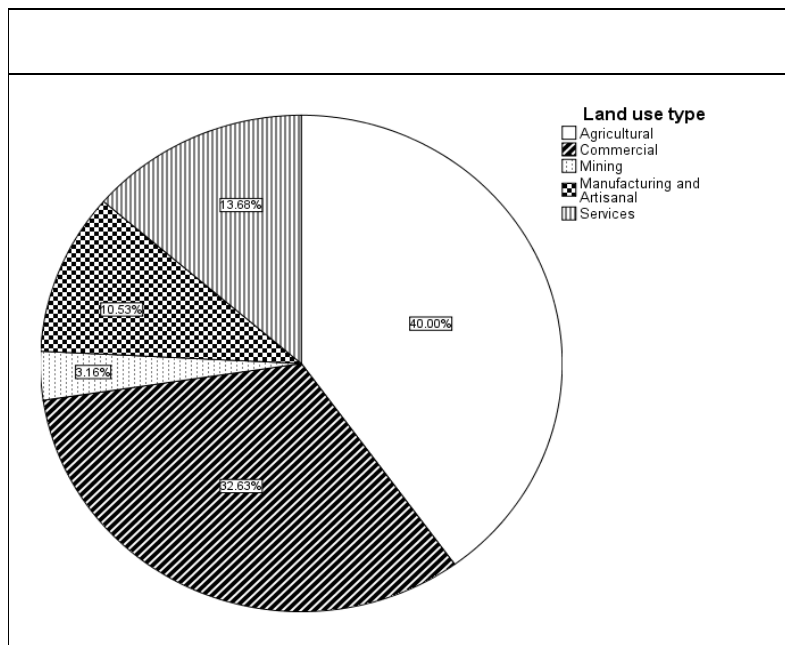
Source: Author's fieldwork, 2011.

Figure 3: Showing different categories of landuses in sub-urban Lafia

Landuse Characterization Based on the Respondents

From the analysis figure 4 shows the different categories of landuse sub-divided based on respondents activities. Five main categories were regrouped from uncultivated area, built-up area, natural vegetation and/or agricultural/Cultivated area. The classification includes:

- i. Agricultural activities that is mainly farming
- ii. Commercial that comprises trading and sale of agricultural produce
- iii. Mining that is mainly mineral excavation
- iv. Manufacturing and artisanal that included mechanic works, carpentry, vulcanising and block manufacturing and;
- v. Other Services



Source: Author's fieldwork, 2011.

Figure 4 : Respondents landuse activities in sub-urban Lafia

It indicates that the bulk of the residents of sub-urban Lafia (40%) are engaged in agricultural activities, commercial with 32.63%, services, manufacturing and artisanal follow with 13.68% and 10.53% respectively while mining is 3.16%. This implies that the major landuse activity in suburban lafia is agriculture.

Respondents Location by Their Landuse Activities

Table 1: Distribution of respondents Location by their landuse activities

Landuse Activity	Location of Respondents											
	Kwandare road		Shendam Road		Makurdi road		Doma road		Jos Road		Shinge road	
	Num ber	%	Numb er	%	Numb er	%	Numb er	%	Numb er	%	Numb er	%
Agricultural	6	35.3	12	63.2	4	26.7	2	14.3	3	21.4	11	72.9
Commercial	6	35.3	6	31.6	5	33.3	4	26.7	6	40.0	4	26.3
Mining	0	.0	1	5.3	0	.0	0	.0	2	13.3	0	.0
Manufacturing and Artisanal	2	11.8	0	.0	3	20.0	1	7.1	2	13.3	2	13.3
Services	3	17.6	0	.0	3	20.0	7	46.7	0	.0	0	.0
Total	17	100	19	100	15	100	14	100	13	100	17	100

Source: Author's fieldwork, 2011.

Table 1 shows the distribution of the different landuse activities by the respondents in the area revealed that the residents of sub-urban Lafia engaged in different types of activities with regards to location as shown in the table. Agriculture account for 63.2% of activities on Shendam road, there is fertile and abundant land which supports agricultural production in the area. All the other locations partake in commercial activities. However, Jos road's main activity is mining due to the availability of raw material and quarry sites located in the area.

Makurdi road's main activities include agriculture (26.7%) and commercial (33%) where block manufacturing and mechanic workshops are located. The area is undergoing rapid development; it has a market, some government agencies all located along this route. Doma road also partakes in manufacturing and artisanal and services with 7.1% and 50% of respondents engaged respectively.

Distribution of Respondents Age by Their Landuse Activities

Table 2: Distribution of respondents age by their landuse activities

<i>Landuse Activity</i>	<i>Age of Respondents</i>							
	<i>18-35</i>		<i>36-50</i>		<i>51-65</i>		<i>66 and above</i>	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
Agricultural	11	36.7	14	33.	10	66.7	3	37.5
Commercial	10	33.3	12	28.	4	26.7	5	62.5
Mining	0	.0	3	7.1	0	.0	0	.0
Manufacturing and Artisanal	4	13.3	5	11.	1	6.7	0	.0
Services	5	16.7	8	19.	0	.0	0	.0
<i>Total</i>	<i>30</i>	<i>100</i>	<i>42</i>	<i>100</i>	<i>15</i>	<i>100</i>	<i>8</i>	<i>100</i>

Source: Author’s fieldwork, 2011.

Table 2 shows the distribution of respondents’ age by their landuse activities. The age range of between 51-65years engage in landuse activities with 66.7, 0, 26.7, 6.7, and 0 for agricultural, commercial, mining, manufacturing, artisanal and services respectively. This is followed by the ages of between 18-35years with 28.9, 32.3, 0, 40 and 38 for agricultural, commercial, mining, manufacturing & artisanal and services respectively. The age range of between 51-65 has 26.3, 12.9, 0, 10 and 0 for agricultural, commercial, mining, manufacturing & artisanal and services respectively while from the age of 66 and only are engaged in agriculture (7.9) and commercial (16.1) activities respectively. This can be attributable to land ownership by inheritance and length of time spent in the area.

This indicates that the age ranges of 36-50 and 18-35 have the highest percentages of engagement in the different categories of landuses in the study area as the age groups are considered the most active.

Distribution of Respondent’s Gender by Their Landuse Activity

Table 3: Distribution of respondents gender by their landuse activity

<i>Landuse activity</i>	<i>Gender of Respondents</i>			
	<i>Female</i>		<i>Male</i>	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
Agricultural	12	36.4	26	41.9
Commercial	15	45.5	16	25.8
Mining	1	3.0	2	3.2

Manufacturing and Artisanal	1	3.0	9	14.5
Services	4	12.1	9	14.5
<i>Total</i>	<i>33</i>	<i>100.0</i>	<i>62</i>	<i>100.0</i>

Source: Author's fieldwork, 2011.

Table 3 shows the distribution of respondents' gender by their landuse activity. The male gender tends to partake more in agriculture (about 42) as against the females where only 36% are engaged. However, the females mostly engage in commercial activities (45.5) as against the male with only 25.8. With the exception of manufacturing & artisanal this is done mostly by male with 14.5. This implies that regardless of gender, the distribution of by landuse based on sex is almost the same in the study area which simply means that there is no gender segregation with regards to landuse activities in sub-urban Lafia.

Table 4: Distribution of respondents Education background by their landuse activity

<i>Landuse activity</i>	<i>Education Background</i>			
	<i>Formal</i>		<i>Informal</i>	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
Agricultural	14	32.6	24	46.2
Commercial	14	32.6	17	32.7
Mining	1	2.3	2	3.8
Manufacturing and Artisanal	3	7.0	7	13.5
Services	11	25.6	2	3.8
<i>Total</i>	<i>43</i>	<i>100.0</i>	<i>52</i>	<i>100.0</i>

Source: Author's fieldwork, 2011.

Table 4 showing the distribution of respondents Education background by their landuse activity classified as formal or non-formal, which shows that apart from services that often needs some high level of technicalities and formal educational background 25.6% only have formal education. All other activities are distributed regardless of status of education. This is attributable to non-technological know-how of some work categories been engaged in.

Importance Of The Landuses To People's Livelihood

Table 5 above shows the distribution of income earned based on landuse activity the respondents engaged in. Agriculture tends to be the highest paid activity as attested to by 50%. Mining is the least paid activity with only about 5 earning #100 #500. This implies that most of the landuse type activities pay off but agriculture is the highest paid this is possibly why the demand for agricultural product is very high. When compared with mining which is the least paid economic activity, simply because of the small quantity of mined and processed products for the market.

Table 5: Distribution of respondents landuse activity by income earned from activity per day

<i>Landuse activity</i>	<i>Income earned by Respondents</i>					
	<i>#100-#500</i>		<i>#600-#1000</i>		<i>Above#1000</i>	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
Agricultural	27	42.9	8	30.8	3	50.0
Commercial	20	31.7	10	38.5	1	16.7
Mining	3	4.8	0	.0	0	.0
Manufacturing and Artisanal	5	7.9	5	19.2	0	.0
Services	8	12.7	3	11.5	2	33.3
<i>Total</i>	<i>63</i>	<i>100.0</i>	<i>26</i>	<i>100.0</i>	<i>6</i>	<i>100.0</i>

Source: Author's fieldwork, 2011.

CONCLUSION AND RECOMMENDATION

Despite the fact that sub-urban Lafia is becoming more and more urban, the indigenous landuse type of farm holdings and villages is still in existence there is land for agricultural activities. The availability of land in the area which supports agricultural production makes farming the major landuse type and occupation of sub-urban Lafia. Agriculture is also the highest income earner among the different categories of landuse studied in the area. The different categories of landuse activities in sub-urban Lafia being mapped in this study shows little and in some cases no environmental degradation. This study would therefore draw the conclusion that as already established, there is abundant land in sub-urban Lafia, which despite urban sprawl, and is still available for agricultural and other uses. Hence with proper planning the best and optimum use will be achieved.

On the basis of findings, conclusions, it is recommended for:

1. Proper database and collection of the lands for feature planning.
2. Agricultural intensification in a sustainable manner should be encouraged as land is available and there is market for the produce.
3. Other landuses that are non-agricultural should be sustainably utilized especially in the case of a mining activities are taking place and areas with natural vegetation should also be reserved with strict laws enacted to maintain them.

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