Human Activities and Forest Decline in Ukwa-East Area of Abia State- Nigeria

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Abstract

This paper examined the impacts of man's activities on forest loss in Ukwa East Area of Abia State, using survey research design. It relied heavily on primary data generated through land sat imageries for LULC changes and rate of deforestation; and 447 valid copies of semi-structured questionnaire retrieved from 447 randomly selected household heads from 10 communities. Three research questions and three specific objectives guided the study. Descriptive statistics was used to analyze the data. The main findings are: settlement expansion is the major factor responsible for change in LULC of the area; there is significant difference in rate of outward growth (built-up area) of the area from 1986 – 2021; anthropogenic activities (timber harvesting and farming) are the main agents of deforestation in the area, leading to great lost of forested lands and soil quality. Ten communities (Akwete, Obunku, Ohambele, Umuogor, Abaki, Azumini, Akirika, Obohia, Mkporobe and Ohanku) were identified as the most deforestation endemic areas which are also prone to intensive anthropogenic activities. The rainforests landcover reduced from 177.19km2(1986) to 172.97km2 (1996), 129,95km2 (2010), 122.78km2(2020); while riparian/swamp forests decreased from 28.57km2(1986) to 22.16km2(1996), 21.55km2(2010), and 18km2(2020). Meanwhile, the built-up area increased from 13.98km2(1986) to 20.32km2(1996), 39.68km2(2010) and 68.61km2(2020).The paper concluded by recommending for immediate ban on commercial timber harvesting and furl wood collection, discouraging wrong farming methods and enlightenment campaigns on the effects of deforestation.

Keywords: anthropomorphic activities, deforestation/forest decline, LULC change, Ukwa East

1. INTRODUCTION

Anthropogenic activities (such as deforestation) are the most critical issues affecting forest resources conservation and ecosystem protection in general, mostly in the developing countries. Deforestation as an anthropogenic activity, is continuing unabated not just in the tropics, but across the globe. Rapid population growth in developing countries has resulted to increase in the demand for forest resources utilization (especially timber, fuel wood, and pulp), leading to rapid forest exploitation in the tropics. Population explosions in the urban centres have also pushed many people away from the urban centres who now establish new homes in tropical forest areas in search for better means of livelihood and environmental comfort (Ukpere, et al., 2018).

Tropical forest have been heavily exploited by these urban immigrants. Urban migrants, (unlike indigenous people), have no traditional knowledge or skills on the sustainable use of natural forests; often time causing severe damage to forest ecosystem. The rapid expansion of these newly established homes or communities into protected areas is expected and could cause fragmentation of natural forests, thereby causing further deterioration of the existing forest structure including bio-diversity loss or extinction in natural tropical forests (WRM, 2010). Such anthropogenic impacts result in the degradation of ecological services received from forest ecosystem.

The forests play vital roles in ecosystem stabilization as well as providing a variety of purposes – demand for timber for construction of residential homes, commercial house, recreational facilities, furniture, sawdust and pulp for the plywood industry etc (Randolph, 2017: USDA. 2016; WRM. 2010).

Man's impact on the biophysical environment is enormous and these include increase in population – land use pressure on available resources, land degradation and soil nutrient loss, burning of fossil fuels, and deforestation. Changes like these have triggered climate change, soil erosion, poor air quality, and pollution of drinking water sources. These negative impacts can affect human behaviour and can prompt mass migrations including triggering water wars (conflicts) across borders. Human induced alterations in land use and vegetative cover affect the radiation balance of the earth and therefore contribute to climate change. Starting from the beginning of the 19th century, vast portions of the earth's surface have been modified, including the destruction of the ecosystem and global biomes. For example, North America and Europe native forest have largely vanished, and the grasslands of the interior part of United States of America, Canada, and Russia have been converted into farmland. Marshy and Wetlands have been drained, dams built, and major water impoundments created Steppe lands have become deserts, desert have blossomed under irrigation (Gamble et al., 2003).

Anthropogenic activities are dynamic and universal processes that stimulate urban growth and development as well as propel increase in population and economic activities on space. In the same vein, man's inept activities (especially, agriculture and industry) have resulted in the degradation of nearly a billion hectares of land across the globe. This is causing a decline in many ecosystems, services worldwide and is now threatening livelihoods, leading to socio-economic instability. This is a dominant future in Abia State which Ukwa East is no exception. There is a steady increase in rate of landuse activities going on in Ukwa East which has attracted further increase in other activities. These landuse activities, apart from helping to cause the expansion of the area, is also responsible for loss of sustainable means of livelihood.

In Nigeria, evidence indicates a deteriorating human land interface and relationship in which negative changes in landscape quality keeps lowering both the productivity and aesthetic quality of the natural environment, with serious effects on the economy due to erosion (Ukpere, et al., 2018).

The above –mentioned problems have been related to population growth, as well as economic growth. One of the commonest environmental effects of human activities on land use and land cover changes is the changes in rainfall and temperature. The cutting down of trees by humans contributes to environmental changes. Within the study area, wide range of human activities on land has resulted to loss of habitats and extinction of some animals and bird species that were hitherto common in the area. Some decades ago, one can easily see virgin forests (*Nkpa* in the native dialect); but as for today these forests have almost disappeared with only few thick forest, mostly (freshwater swamp forests) find in some areas, in addition to the Rubber Plantation Reserved area along Akwette, Obehie express way which has been preserved because of government policy.

Aim and Objectives

This paper examined the influence of human activities on forest decline in Ukwa East Area of Abia State. The objectives of the study are, to:

  i. Examine the perceived effects of anthropogenic activities (farming, industrialization, timber Lumbering, settlement expansion, road construction, commercial activities, etc) on forests in the area.
  ii. Ascertain possible significant change in landuse and landcover (LULC) in the area (2000 to 2021).
  iii. Find out the impacts of LULC change on forest resources in the area.

Research Questions

This paper therefore addressed the following questions:

1. What are the perceived effects of anthropogenic activities (farming, industrialization, timber lumbering, settlement expansion, road construction, commercial activities, etc) on forested lands in the area?
2. Is there any significant change in LULC in the area?
3. What are the possible impacts of LULC change on forest resources in the area?

Study Area

Ukwa East Local Government Area is located in Abia State, in Abia South Senatorial District in Nigeria's South East geopolitical zone. It is located between latitudes $5^0\,18'\,45''$ and $7^0\,05'57''$ N, and longitudes $7^038'45''$ and $7^057'41''$ E (see figure p.1). It is approximately 280sq.km in size. It shares boundaries with the following local government areas: Ugwunabo in the South; Ukwa West in the West; East by Obingwa and Akwa Ibom State by the North.

Its climate is tropical sub-humid. The soils are composed of lateritic clay, coarse aggregates of different sizes and a mixture of silt and loamy soil. The soil in the area is geologically underlain mostly by sedimentary deposits especially towards its west, south and earthen part and igneous in other area. In terms of vegetation Ukwa East falls within the tropical rainforest belt though, the forest is fast disappearing arising from excessive harvest of timber and final words for domestic usage. According to the NPC (2006), the population of the area grew from 31, 961 in 1991 to 58, 139 in 2006. The people of Ukwa East are mostly peasant farmers and petty traders. Other economic activities apart from secondary services include transportation and forestry related activities.
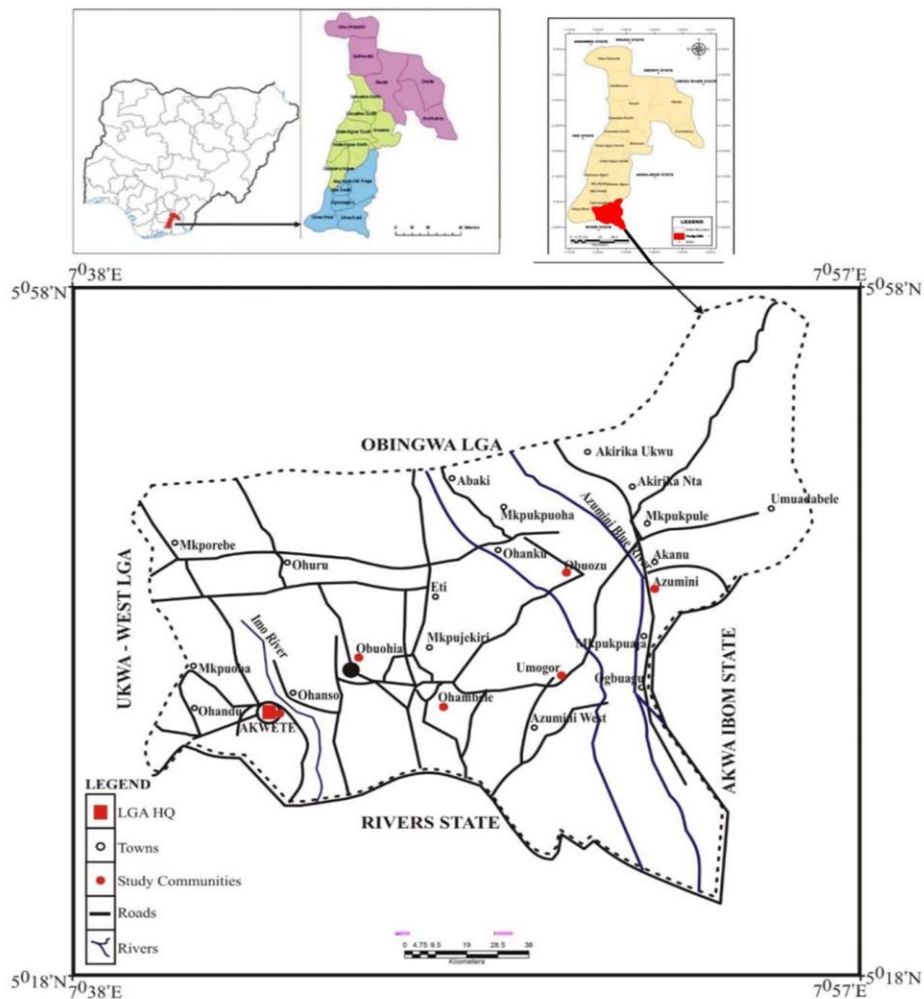
Figure 1.1: The Study Area: Ukwa East L. G. A showing the communities

Source: Digitized from the original map Ministry of Lands, Umuhia

2. LITERATURE REVIEW

Conceptual Clarification and Theoretical Review

Forest depletion and deforestation

Forest depletion describes the act of clearing forest resources faster than they can be replenished. According to Adebayo (2010) forest depletion simply means the clearing away of forest. It is the process by which an area is deprived of existing natural forest vegetation and resources. This can be caused by indiscriminate logging or total clearing of existing vegetation for arable farm or industrial purpose.

LULC Change

Land is an important natural resource that both plants and animals rely upon for survival. It is a place in which all human activity is being conducted. Landuse and landcover are two terms that are closely related and in many cases, they have been used interchangeably. Landuse change simply means the conversation for various purposes (such as agriculture, settlement, infrastructure and manufacturing, recreation uses, mining and fishery etc) (Willaims, 2015). While landcover change refer to modification of existing landcover or complete conversion of the land cover of an area to a new cover type. Landuse change is associated with land cover change while land cover may change without the alteration of land use (Lambin & Geist, 2013).

Transition Theory

This theory was introduced by A.S. Mather (1992). He developed this idea based on a basic sequence of natural destruction and conservation (the depletion-melioration model). This model argues that at an early stage, natural resources destruction is inevitable to meet the human needs. Rising demand and price of natural resources will motivate people to conserve and to restore their natural resources.

3. METHODOLOGY

This paper used survey research design. It made use of both primary and secondary sources of data with the primary source being the main trust of the paper. The primary data were generated through land sat imageries for LULC changes and rate of deforestation, and the use of questionnaire, field survey of some spot and face to face interactions with the people.

Through the use of quota sampling techniques, 447 valid copies of questionnaire was retrieved from 447 household heads from 10 purposively selected communities in the area: Akwete, Obunku, Ohambele, Umuogor, Abaki, Azumini, Akirika, Obohia, Mkporobe and Ohanku. The main reason for the purposive sampling technique was based on the fact that these are the communities that are mostly prone to anthropogenic activities (especially deforestation and intensive farming) due to rise in population. Descriptive statistics was used to analyse the data. Data generated from the satellite imagery was analysed using detection analysis Arc (GIS10.5) software to determine the percentage of land use and land cover change.

4. RESULTS AND DISCUSSION
4.1 Perceptive effects of anthropogenic activities on forest decline in the area. Data gotten from the field is presented in the table below:

Table 1: Perceived Effects of Anthropogenic Activities on forest in the Area

S/N	Item	N	SA	A	D	SD
1.	Loss of forested lands.	447	178(39.8%)	150(33.5%)	62(13.9%)	57(12.7%)
2.	Soil erosion & land degradation	447	172(38.5%)	152(34%)	76(17%)	47(10.5%)
3.	Loss of soil nutrients	447	196(43.8%)	114(25.5%)	80(17.9%)	57(12.7%)
4.	Poor crop yields	447	185(41.4%)	155(34.7%)	83(18.6%)	24(5.4%)
5.	Food scarcity, high cost of	447	18040.3(%)	120(26.8%)	89(19.9%)	58(12.9%)

	living and hunger				
6.	Loss of biodiversity and eco-system destabilization	447	190(42.5%)	145(32.4%)	55(12.3%)	57(12.7%)
	Grand %		**41.05%**	**31.17%**	**16.7%**	**11.19%**

Source: Researchers Field Work and analysis, 2024

Table 1 above showed the response of the respondents on the perceived effects of human activities on the forests of the area. Out of the 447 respondents, 41.05% strongly agreed that some of the perceived effects of human activities on forests in the area include: leads to forest decline or loss of forested lands in the area, another 31.17% others also agreed; whilst 16.7% disagreed, and another 11.19% also strongly disagreed. In conclusion, man's inept activities cause loss of forested lands in the area.

4.2 Landuse/Landcover Pattern between 1986 And 2021

Table 2: Landuse/Landcover Pattern of Ukwa East LGA (1986 to 2021)

Landuse/Land cover Type	1986		1996		2010		2020	
	Areal coverage (km^2)	%	Areal coverage (km^2)	%	Areal coverage (km^2)	%	Areal coverage (km^2)	%
Water bodies	44.42	15.86	25.02	8.93	20.36	7.27	10.94	3.91
Cropland	9.14	3.26	19.09	6.82	41.1	14.68	22.41	8.00
Thick Vegetation	177.19	63.28	172.97	61.77	129.95	46.41	122.78	43.85
Swamp Forest/Riparian	28.57	10.20	22.16	7.91	21.55	7.70	18	6.43
Built Up Area	13.98	4.99	20.32	7.26	39.68	14.17	68.61	24.50
Degraded Forest	6.73	2.40	20.47	7.31	27.39	9.78	37.29	13.32
Total	**280.03**	**100.00**	**280.03**	**100.00**	**280.03**	**100.00**	**280.03**	**100.00**

Source: Researchers' fieldwork and analysis, 2024

Table 2 shows the landuse/landcover pattern of Ukwa East LGA from 1986 to 2020. In 1986, it is revealed that the waterbodies occupied 44.42 km^2 (15.86%) of total areal cover of Ukwa East LGA (280.03km^2). Thick vegetation was 177.19 km^2 (63.28%), Swamp/riparian forest/riparian 28.57 km^2 (10.20%), built up area 13.98 km^2 (10.20%), cropland/farmlands 9.14 km^2 (3.26%) while the degraded forest 6.73 km^2 (2.40%) (Figure 4.1). In 1996, the analysis reveals that water bodies reduced to 25.02 km^2 (8.93%) while thick vegetation decreased to 172.9km^2(61.77%), built up area increased to 20.32km^2 (7.26%), and cropland/farmland increased to 19.09 km^2 (6.82 %), swamp/riparian forests decreased to 22.16 km^2 (7.91 %), and degraded forests increased to 20.47km^2 (7.31%) (Figure 4.2).

In 2010, the analysis shows that water bodies reduced to 20.36 km^2 (7.27%), thick vegetation decreased to 129.95 km^2 (46.41%), built up area increased to 39.68 km^2 (14.17%),

cropland/farmlands increased to 41.10 km^2 (14.68 %), while the degraded forest increased to 27.39 km^2 (9.78 %), (Figure 4.3). In 2021, the analysis shows that water bodies further decreased to 10.94 km^2 (3.91%), thick vegetation reduced to 122.78 km^2 (43.85%), built up area increased to 68.61 km^2 (24.50 %), cropland/farmlands increased to 22.41 km^2 (8.00 %), while degraded forest increased to 37.29 km^2 (13.32 %) (Figure 4.4). From the analysis, it is therefore shown that the extent of water bodies, thick vegetation and swamp forest/riparian decreased over time while the built up area and degraded forest continued to increase. However, the cropland/agriculture increased from 1986 to 2010 and decreased in 2021 perhaps, due to increase cases of herdsmen-farmers clashes that is fast becoming a nightmare in the area.
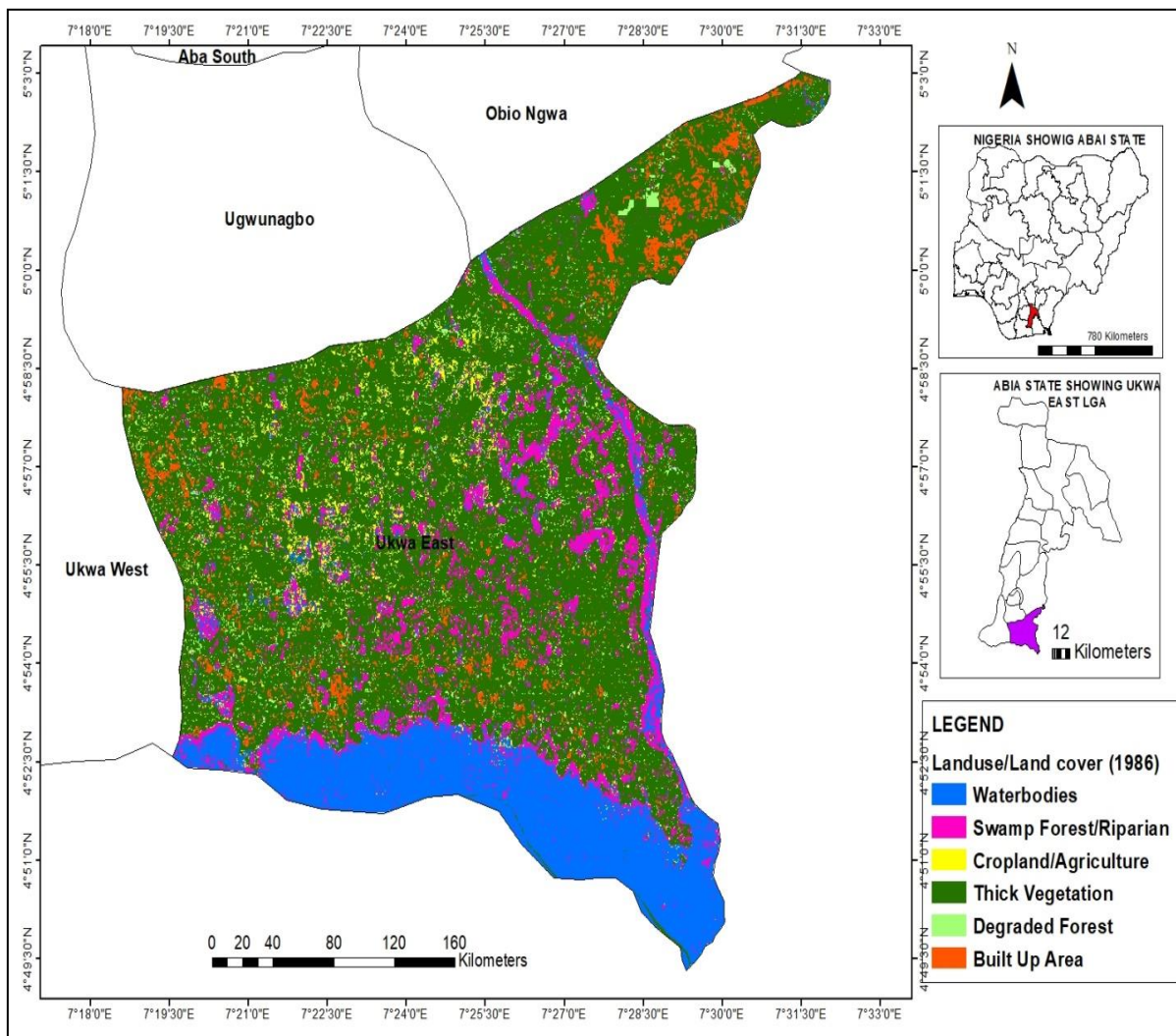

Figure 2: Landuse/ landcover Pattern of Ukwa East in 1986
Source: Digitized from Google Earth 2021

Built-up area was also relatively very scanty by 1986 due to lesser population and fewer economic activities.

In 2021, built-up area in settlement grew astronomically occupying 68.61% as against what it was in 2010. This was followed by farm lands and spare vegetation; and then, swamp forest and riparian vegetation. Thick vegetation is hardly seen except in few sports. Figure 2 to 3 shows the

rate of settlement expansion or outward growth of the built-up area of Ukwa East. The trend increase further from 2010 to 2020 as reflected in figure 4 and 5.
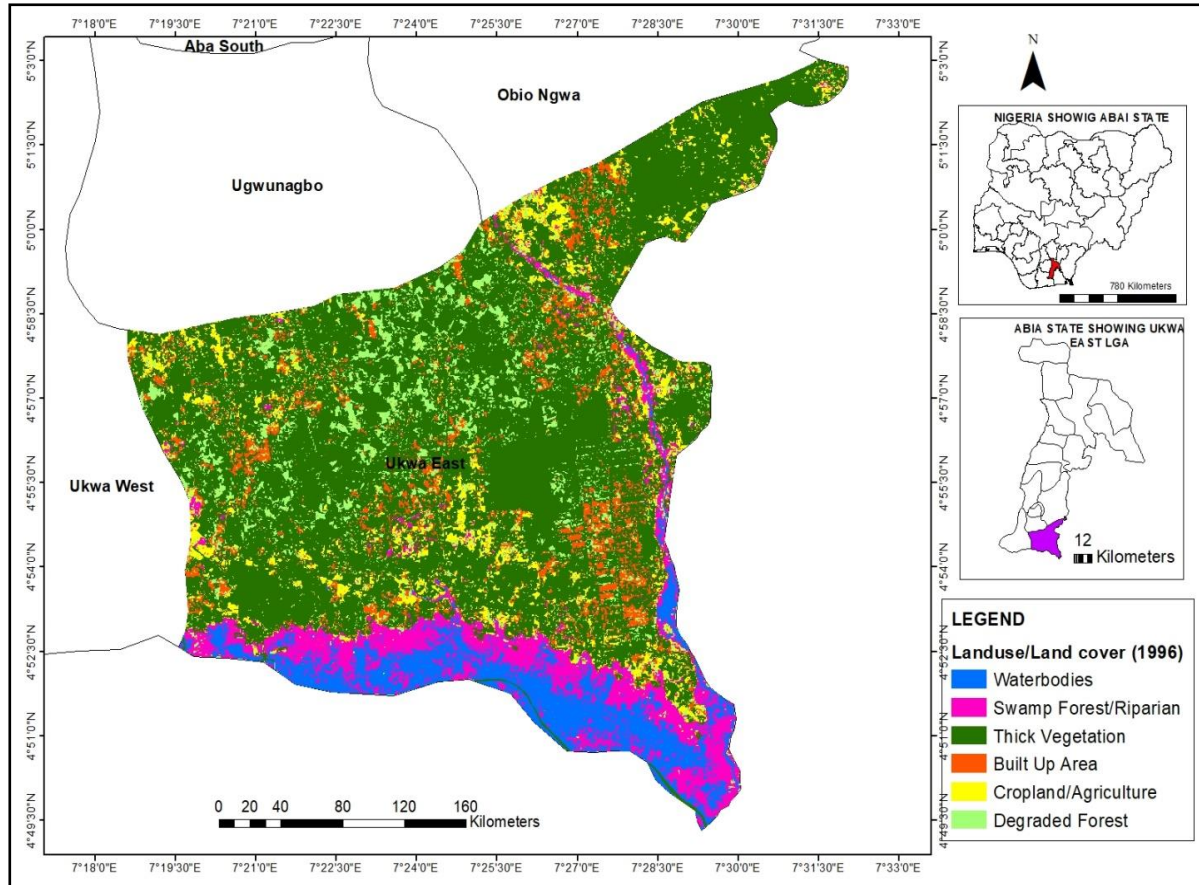

Figure 3: Landuse/landcover Pattern of Ukwa East in 1996
Source: Digitized from Google Earth 2021

Built-up area was also relatively very scanty even by 1996 due to lesser landuse activities. Although, there was remarkable increased in the size of the built-up area in 2010, it was very high by 2021, where the built-up area/settlements grew astronomically occupying 68.61% as against what it was in 2010. This was followed by farm lands and sparse vegetation; and then, swamp forest and riparian vegetation. Thick vegetation is hardly seen except in few sports. Figure 4 and 5 shows the rate of settlement expansion or outward growth of the built-up area of Ukwa East.
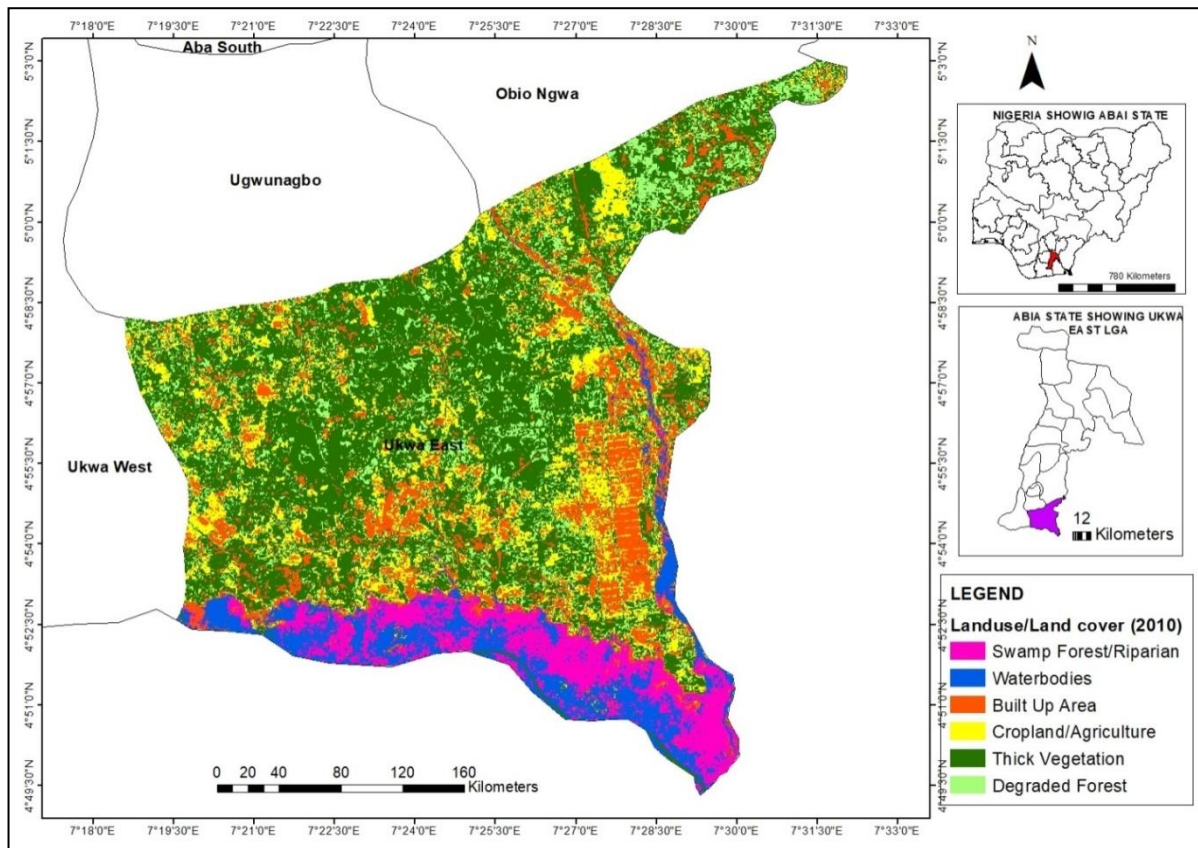
Figure 4: Landuse pattern of Ukwa East in 2010
Source: Digitized from Google Earth, 2021

By 2010, the size of the built-up area has more than doubled owing to abrupt rise in population that also culminated into rapid rate of economic activities in the area with 14.17%   as against 7.26% as at 1986.
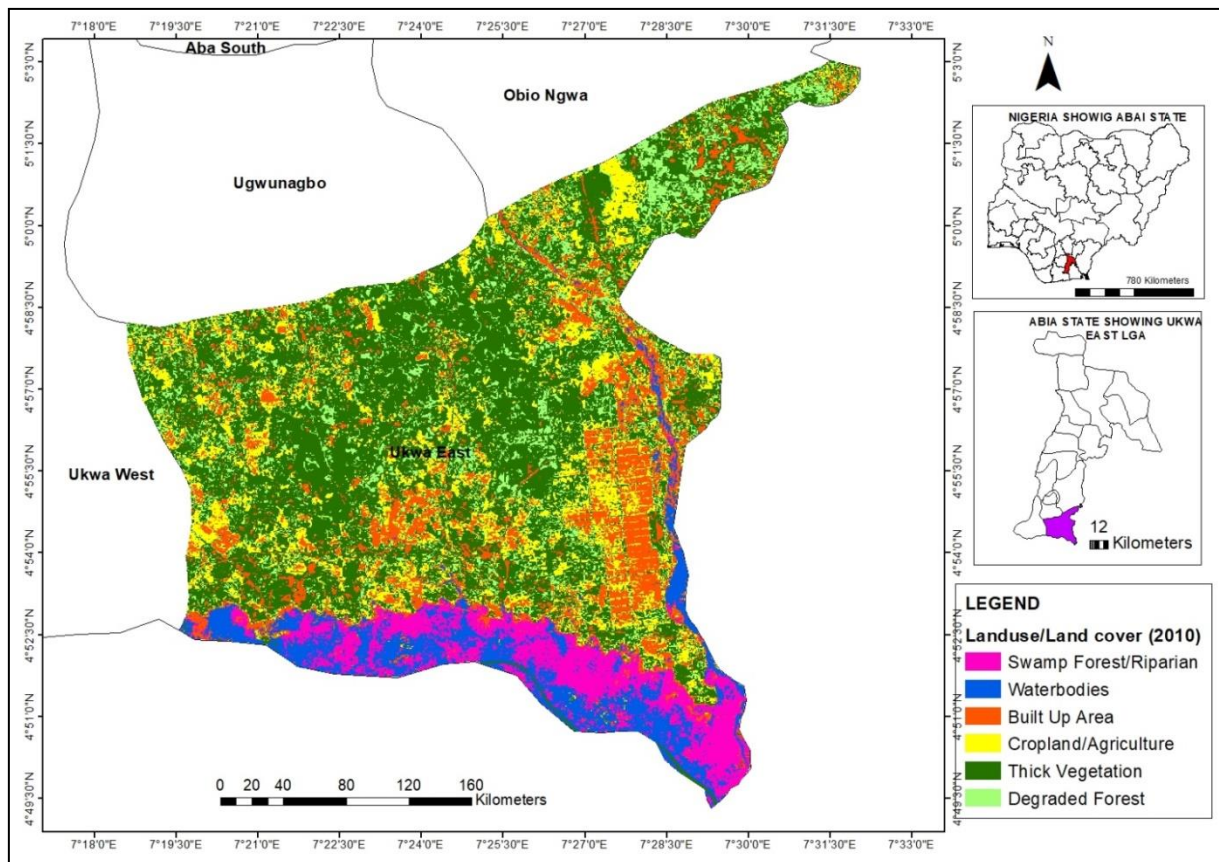
Figure 5: Landuse pattern of Ukwa East in 2021
Source: Digitized from Google Earth 2022

As noted earlier, in 2021, the built-up area (settlement expansion) grew astronomically occupying 68.61% as against what it was in 2010. Water bodies and swamp/riparian forests decreased; while built-up area, cropland/farmlands (agriculture) and degraded forest increased. The trend analysis is reflected in figure 6 below.
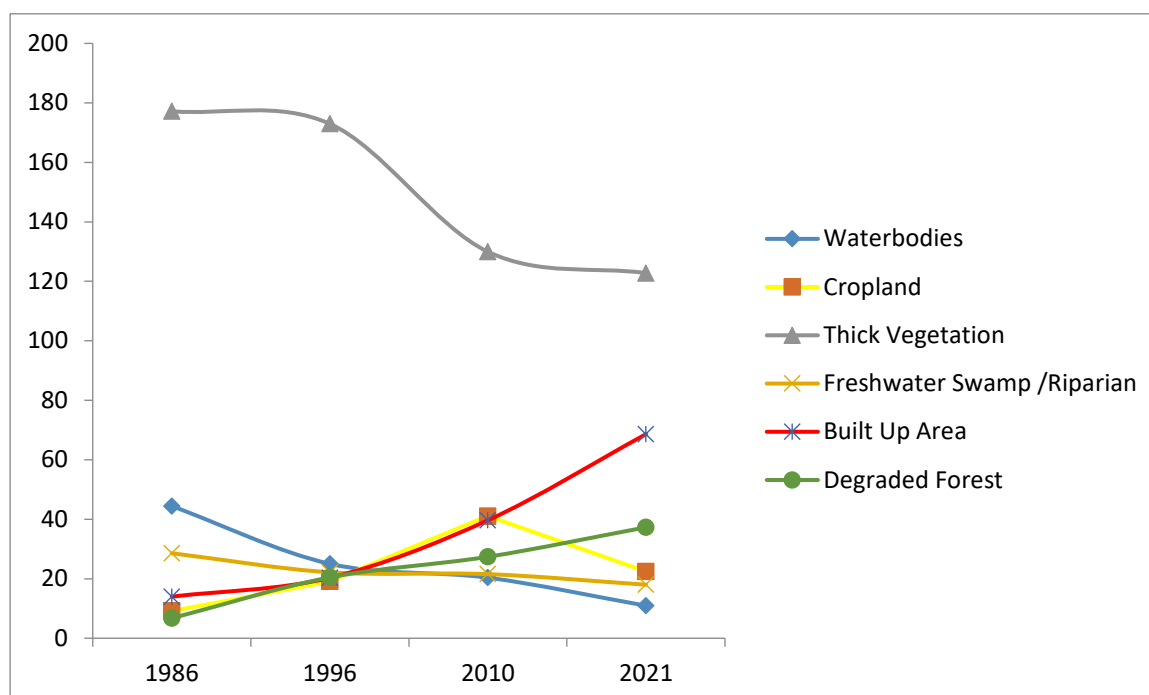
Figure 6: Trend of Landuse/landcover Change in Ukwa East LGA from 1986 to 2021
Source: Researchers' analysis, 2024
Water bodies decreased, swamp forest/riparian decreased and built-up area, cropland (agriculture) increased and degraded forest increased.

4.3 Landuse and lanccover Change and Percentage Change (1986-2021)

Percentage change in LULC of the area is shown in the table below.

Table 3: Landuse/landcover Change and Percentage Change (1986 to 2021)

Landuse	1986	1996	Change (km²)	Percentage Change (%)
Waterbodies	44.42	25.02	-19.40	-43.67
Cropland	9.14	19.09	9.95	108.86
Thick Vegetation	177.19	172.97	-4.22	-2.38
Swamp Forest/Riparian	28.57	22.16	-6.41	-22.44
Built Up Area	13.98	20.32	6.34	45.35
Degraded Forest	6.73	20.47	13.74	4.91
Total	280.03	280.03		
Landuse	1996	2010	Change (km²)	Percentage Change (%)
Waterbodies	25.02	20.36	-4.66	-18.63
Cropland	19.09	41.1	22.01	115.30
Thick Vegetation	172.97	129.95	-43.02	-24.87
Swamp Forest/Riparian	22.16	21.55	-0.61	-2.75
Built Up Area	20.32	39.68	19.36	95.28
Degraded Forest	20.47	27.39	6.92	33.81

Landuse	2010	2021	Change (km^2)	Percentage Change (%)
Total	280.03	280.03		
Waterbodies	20.36	10.94	-9.42	-46.27
Cropland	41.1	22.41	-18.69	-45.47
Thick Vegetation	129.95	122.78	-7.17	-5.52
Swamp Forest/Riparian	21.55	18	-3.55	-16.47
Built Up Area	39.68	68.61	28.93	72.91
Degraded Forest	27.39	37.29	9.90	36.14
Total	280.03	280.03		
Landuse	**1986**	**2021**	**Change (km^2)**	**Percentage Change (%)**
Waterbodies	44.42	10.94	-33.48	-75.37
Cropland	9.14	22.41	13.27	145.19
Thick Vegetation	177.19	122.78	-54.41	-30.71
Swamp Forest/Riparian	28.57	18	-10.57	-37.00
Built Up Area	13.98	68.61	54.63	390.77
Degraded Forest	6.73	37.29	30.56	454.09
Total	280.03	280.03		

Source: Researchers analysis, 2024

The landuse/landcover change and percentage change in Ukwa East LGA is presented in Table 3 Waterbodies decreased between 1986 and 1996 by -19.40 km^2 (-43.67%) while thick vegetation and swamp forest/riparian also decreased by -4.22 km^2 (-2.38%) and -6.41 km^2 (-22.44%) respectively during these periods. However, built up area, cropland/agriculture and degraded forest increased by 6.34 km^2 (45.35 %). 9.95 km^2 (10.86%) and 13.74 km^2 (4.1%). Analysis also shows that between 1996 and 2010, waterbodies decreased by -4.66 km^2 (-18.63%), thick vegetation and swamp forest/riparian also decreased by -43.02 km^2 (-24.87%) and -0.61 km^2 (-2.75%). Meanwhile, built up area, cropland/farmlands and degraded forest increased by 19.36 km^2 (95.28 %), 22.01 km^2 (115.30%) and 6.92 km^2 (33.81%) respectively.

Furthermore, it is revealed that waterbodies decreased between 2010 and 2021 by -9.42 km^2 (-46.27%), thick vegetation decreased by -7.17 km^2 (-5.52%), cropland/farmlands by -18.69 km^2 (-45.47%) and swamp/riparian forest decreased by -3.55 km^2 (-16.47%). The built up area, and degraded forest increased by 28.93 km^2 (72.91 %) and 9.90 km^2 (36.14 %).

Generally, between 1986 and 2021, waterbodies decreased by -33.48 km^2 (-75.37%), thick vegetation decreased by -54.41 km^2 (-30.71 %), swamp/riparian forest decreased by -10.57 km^2 (-37.00%), built up area increased by 54.63 km^2 (390.77%), cropland/farmlands increased by 13.27 km^2 (145.19%) and the degraded forest increased by 30.56 km^2 (454.09 %).
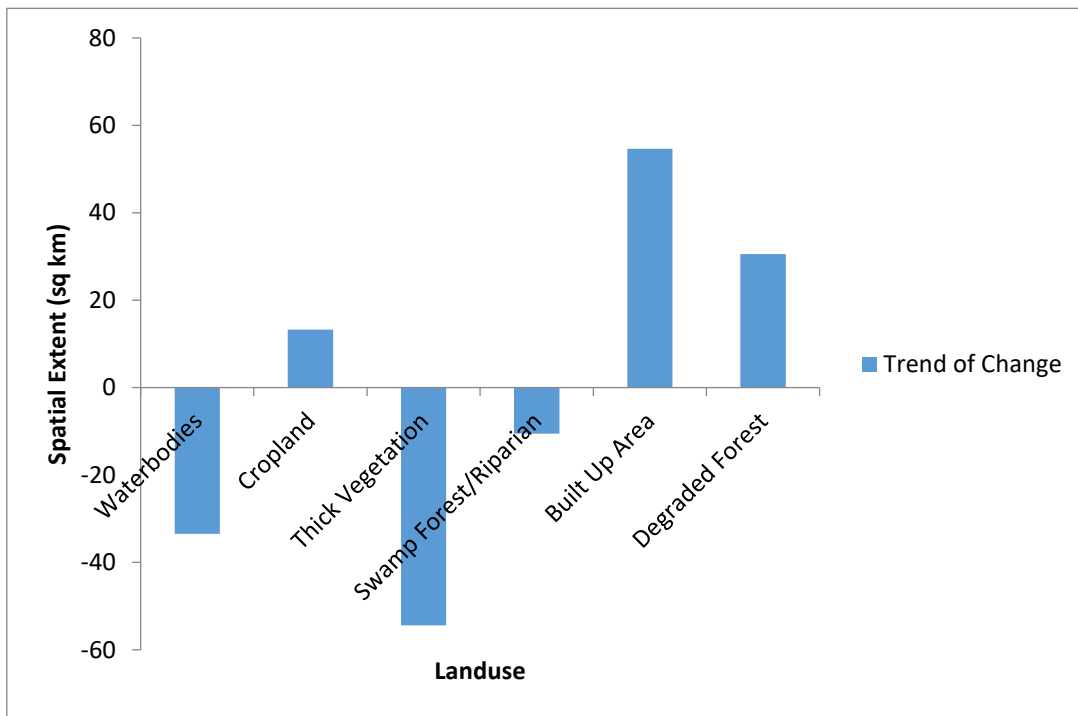
Fig. 7: Trend of Change of Landuse/landcover in Ukwa East LGA from 1986 to 2021
Source: Researchers' analysis, 2024

It is therefore revealed from the analysis of percentage change that waterbodies, thick vegetation and swamp forest/riparian reduced over time while built up area, cropland/agriculture and degraded forest increased in terms of areal extent between 1986 and 2021. The increase in the built up area could be attributed to the migration of people into the area for oil exploration and other human activities which must have led to various developmental projects and continue to eat into the thick vegetation for further degradation. The reduction in the thick vegetation must have also led to the increase in the degraded forest in the study area whereby they may be preparing them for some activities like construction, farming and so on.

The total classified areal landcover of the area is approximately 280.03Km², out of this, water bodies were 44.42Km² in 1986 and reduced to 25.02Km² in 1996 and later reduced to 20.36Km² in 2010 and 2021 it later reduced to 10.94 Km². in 1986, was forest and riparian vegetation was 28.57Km², in 1986, it reduced to 22.16Km² and in 2010 it later declined to 21.55Km² and later decline to 21.55Km² in 2021.

Conclusion

The paper concluded that anthropogenic activities (farming, firewood and timber harvesting) is responsible for forest loss/decline in the area. The communities mostly prone to disforestation in the area are: Akwete, Obunku, Ohambele, Umuogor, Abaki, Azumini, Akirika, Obohia, Mkporobe and Ohanku.

Recommendations
Based on the findings of the study, the study recommends thus:
1. Adequate measures aimed at regular monitoring of different landuse practices such as indiscriminate deforestation should be adopted.

2. Adoption of afforestation policy through government agencies e.g forest reserve or forestry.
3. Incorporate environmental planning strategy to check landuse and ensure development control initiatives in the study area.

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