



Sustainable Environment and the built Space: Integrating Ecology, Planning and Human Well-being

Proceedings of the 6th International Conference (FESCON 2026) at Chukwuemeka Odumegwu Ojukwu University,
Uli Campus, Uli, Nigeria
18 - 19 June 2026

GROWTH AND EXPANSION OF UNPLANNED SETTLEMENTS IN NIGERIA USING ENVIRONMENTAL GEOMATICS: CASE STUDY OF ABUJA PHASE 4 AND 5

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Abstract

Unplanned settlements are uncoordinated settlements on land without reference to any predetermined planning standards. The uncontrollable pattern of urban migration and rapid population growth in urban centers, typically leads to slum generation and haphazard distributions of unplanned settlements in most urban centers of developing Countries. Nigeria has a growing number of unplanned settlements within and at the periphery of the cities /urban centers such as Lagos, Kaduna Jos-Plateau and Abuja FCT among others. The creation of Abuja Federal Capital Territory of Nigeria in 1992 has led to population migration from other parts of the Country to Abuja, the Federal Capital Territory. The high cost of housing/accommodation in Abuja has led to the distributions of unplanned settlements across the land mass. The unplanned settlements are illegal settlement which provides affordable accommodations but to some extent, it has a severe impact on safety, sanity and the physical development of the Federal Capital Territory. The study of Abuja FCT as the case study revealed the rates of built-up expansions /the annual built-up expansion index of the unplanned settlements of Abuja Phase 4 and 5. The Research methodology adopted for the study includes the use of basic survey methods, together with GIS tools and Applications as part of the essential components used in the data collection and analysis. The outcome of the study revealed a total of 41 unplanned settlements distributed in the 44 Districts of Abuja Phase 4a, 4b and 5. The unplanned settlements varying in cluster sizes with the total settlement's built-up coverage in hectares which increased from 935.31 Ha to 2,610.05 Ha, for the year 2010 and 2022 respectively. Land disputes due to built-up encroachments among others are the major phenomenon and the land ownership in some parts of the Districts is tied to ancestral claims. Therefore, the built-up expansions of the unplanned settlements is increasing annually, occupying hectares of land and obstructing public/ private development projects. The measures to relocate the occupants in the future will cause crisis in the Federal Capital Territory and it calls for a sustainable intervention.

Keywords: Encroachment, GIS tools, Sustainable intervention, Unplanned settlement

1. INTRODUCTION

Unplanned Settlements generally refers to areas where housing is not in coordination with the current planning and building regulations (Anderson, 2018). The unplanned settlements are also known as informal settlements, spontaneous settlements, squatter settlements, shanty towns and self-made cities, as the

designated names in different countries. According to the UN Habitat 2005, unplanned settlements are areas where a group of houses are constructed on land where the occupants have no legal claims or occupy it illegally.

In the last 50 years the shape of cities has changed dramatically with people migrating from rural area, attracted by the opportunities, dynamic economy and easier life within the cities (G, Sartori, 2001). Majority of population in most Countries now lives in urban centers and the proportion of people looking for better lives in cities is alarming. According to UN sources, at the beginning of the 21st century, almost 50% of the world's total population will be living in urban areas.

The urban growth of most developing countries has reached situations of having internal disturbances due to the rapid growth of unplanned settlements. There is no any available data on the growth of unplanned settlements but only an estimated population figures from old census without a corresponding data of settlements with respect to landuse, building constructions and land encroachment (G, Sartori, 2001). Informal settlements (or slums, shacks) are difficult to monitor. The informal settlements rapid growth is one of the major challenges that authorities saddled with providing essential services have to face in the near future.

The world economy has shown a global decline in aids and voluntary services leaving most of the developing countries with the responsibilities of providing to the people living in the country basic amenities/ infrastructure Such as potable water, waste evacuation, energy, education and health care facilities.

1.1 Problem Statement

Growth and development in Nigerian urban areas have been generally unplanned and haphazard. Population growth is among the factors responsible for the spontaneous growth of unplanned settlement in most cities of Nigeria. The growth of unplanned settlements occur as a result of inaccessibility/un-affordability to rent or own land in the city, creates a rush and congestion of the surrounding settlements. The rushed in the movement of workers from Lagos to Abuja without adequate provision for accommodation creates the problem and the affordable houses in Abuja are grossly inadequate and the available ones are highly luxurious.

The study seeks to identify the number and location of informal settlements, the rapid rates of the settlements expansion and identify the indigenous settlements integrated within the Phase IV and V of Abuja, FCT. The Abuja Master plan (1979), was design into Phase I, II and III was designed to accommodate 230,000 585,000 and 640,000 residents respectively. The Abuja city at that time was designed to accommodate a projected population of 3.1 million people.

However, the increasing urban migration in most developed countries has contributed to the distributions of unplanned settlements in the urban areas, where the agricultural and vacant lands are mostly the target. (Sun, 2013). The unplanned settlements are increasing at an alarming rate which is a thread to development (Adel, 2016)

The un-affordability of houses in Abuja results to the emergence of sub-standard buildings, squatter settlements and shantytowns in the Abuja city of the Federal Capital Territory. Abuja Phase I-V of the Master Plan has already been designed and land title documents have been allocated to the public.

However, the problem within the city can be tackled using new methodologies derived from modern technology through the use of satellite imagery with sophisticated tools and software. Environmental Geomatic now has the capacity to provide planners and decision-makers with information that was formally restricted to the US Military and at competitive costs. The use of GIS/RS has opened new ways of monitoring and addressing the dynamics of fast growing settlements.

1.2 Research Objectives

The aim is to assess the growth of unplanned settlements in Nigeria with the view to establish built-up expansion index. Case study of Abuja Phase 4 and 5.

The Objectives are to:

- i. Identify the location of unplanned Settlements within Abuja Phase 4 and 5
- ii. Estimate the rates of unplanned settlements expansion over the periods of years
- iii. Examine the effects of encroachment and existence of conflicts between the property owners and the illegal dwellers.
- iv. Make Physical Planning recommendations for Abuja, FCT

1.3 Scope Of The Study

The scope of the study covers the unplanned settlements existing within the Abuja Phase 4 - 5 of Abuja, FCT. The study also estimate the rates of settlements expansions between the periods..

1.4 Choice Of The Study Area

- *Phase I of Abuja:* The Garki village has been integrated as part of the Abuja Phase I and the Phase I of Abuja is fully developed.
- *Phase II of Abuja:* Abuja Phase II is not fully developed and the study has already been conducted by the Team (BRD, ABUJA).
- *Phase III of Abuja:* The Phase III is still developing and there are vacant lands within the districts. The study has already been conducted by the Team (BRD, ABUJA).
- *Phase IV and V:* The Phase IV and V of Abuja covers some new areas development currently ongoing while some areas are still vacant.

2.0 LITERATURE REVIEW AND RESEARCH CONCEPTS

2.1 Concept Of Settlements Growth

Urbanization is a process of increasing the area of urban centers and proportion of people living in that area. Urbanization does not only denote the growth of the towns but also the growth of population. However, the process of urbanization in metropolitan cities or urban areas needs proper planning in order to ensure the sustainability of basic physical facilities like electricity, road, drinking water, communication, health and education (kullabs.com).

Migration from the rural area to urban area is on the increase and about half of the world's population is in the urban area and most of the urban areas without proper planning face the challenges of unplanned settlements problems such as illegal building constructions, poor waste management, unhygienic environment, lack of drinking water and electricity (kullabs.com).

2.1.1 Effects of unplanned Settlements in urban environments:

- i. **Lack of facility:** In the planned urban area, facilities for drinking water, health service, transport, electricity, communication, employment are available. However, in the unplanned urban area, various essential facilities will be inadequate to healthy life.
- ii. **Unhealthy settlement:** Healthy settlement is one which is neat, clean and with adequate open space, greenery, proper drainage system and safe drinking water, which makes the settlement pleasant. The settlement area becomes unhealthy if the growth and development unplanned.
- iii. **Unequal distribution of population:** There will be high concentration of population in some areas more than the other part of the urban area due to some factors like affordability of substandard accommodations, closeness to city centers and availability essential facilities like electricity, portable water and security. However, such unplanned settlements experience overcrowded users overstretching the limited facilities.
- iv. **Social disorder:** High population pressure is found in unplanned urban area and the struggle for Employment, health facility, transport, communication in limited means creates social disorder like dispute, theft and lack of discipline in the society.
- v. **Degradation in the environment:** Growing an unplanned settlement requires the use of resources like land water, and forest among others, are excessively exploited. The growth of unplanned settlement increases environmental pollution and garbage accumulation creating room for infectious diseases.

2.1.2 Mitigating measures to reduce the growth of unplanned settlements in urban centers

The suitable measure to control the effects and solve the unplanned urbanization is all attributed to proper planning: -

- i. **Development of rural areas:** Basic facilities like drinking water, electricity, health services, communication, education, etc. should be provided in the rural area. When the people get these facilities in their village, they will not be attracted to the cities. The development of the rural area can help to control the extension of unplanned settlements.
- ii. **Employment opportunities in rural areas:** Trade, industry, construction work provide employment opportunities. These job providing and income-generating programmes should be conducted in the rural areas so that the villagers will get employment and will not migrate to urban areas.
- iii. **Balanced development:** Development policy should be formulated considering the geographical situation of the country. A strategy should be adopted to start development activities proportionately in all areas. It will bring balance in the use of natural resources. It increases people's participation in development activities in every region. These efforts will assist to mitigate adverse effects of unplanned settlements.
- iv. **Development of semi-urban areas:** Development of a semi-urban area helps to check unplanned developments. It is wise to set up middle-class towns according to the geographical situation in rural areas. Employment and labour-oriented programmes focusing youths should be conducted. The change of such places into town will control the migration and the growth of unplanned settlements.

2.2 Other Researchers Focus On Settlement Growth

The expression 'unplanned settlements' is used to refer to any uncoordinated settlement on land without reference to any predetermined standards of planning. Those who have occupied such settlements are interchangeably referred to as occupants, settlers or squatters. However, it was established that unplanned settlements existed in various contexts in terms of various structure and land uses (Kiptoo, 1990).

Adepoju et al.(2013) from the National Space Research and Development Agency (NASRDA), Abuja, Nigeria conducted a research on the Mapping and Monitoring of Slum Development in Abuja, using Satellite Remote Sensing (RS) and GIS. The objectives of their research is identifying, mapping and monitoring of informal (slum) settlements in Abuja, using Nigeria Sat -2 and Spot 5 high resolution detection with the aid of GIS and RS sensors technologies. However, their study revealed that despite the demolition slums continue to re-evolve, they recommend slums upgrading and integration with the main city. They further advice that other states should carry out similar studies to provide useful data to urban managers.

The research gaps observed in the research conducted by Adepoju et al.(2013) from the National Space Research and Development Agency (NASRDA) Abuja, was that there was no sit visit to the study area to determine the slums locations, sizes, numbers and names of the slums in Abuja phase I and II. Their study used change detection map with spatio-temporal analysis of built-ups in the slum settlements, using time series of 2005, 2012 and 2013, covering 240 hectares slum coverage in Abuja Phase 2.

Onochie et al. (2018) from the Faculty of Environmental Sciences, Nnamdi Azikiwe University, Awka, Anambra State, carried out a study on Abuja-Nigeria an Environmental Embarrassment (Case of Spatial Dialectics). The research objective focused on Assessment of Housing inadequacy in FCT resulting to unplanned settlement formation. Adopting urban design principles with provision for high rise buildings and spatial integration of the formal and informal settlements linked with central city infrastructure were part of the recommendation.

The research gaps observed in the research carried by Onochie et al. (2018) encompasses none use of satellite imageries to show the unplanned settlements distribution across the study area. There were no names of unplanned settlements, no location and no evidence of site visit to assess other relevant information.

Akpu B. (2019), published a paper on Geospatial analysis of the spacio-temporal growth of the federal capital city Abuja, Nigeria in Journal of GIS and Remote Sensing. The study implore the use of spatio-temporal data and landsat data of 1992, 2002 and 2014 time series for analyzing the Abuja built-up areas. The study revealed that the built-up increased from 9,016 hectares in 1992 to 16,841 hectares in 2014. The study recommends high concentration of urban land development to the southern part of Abuja more than the northern part.

3.0 THE STUDY AREAS AND RESEARCH METHODOLOGY

3.1 The Study Area

The Federal Capital Territory of Nigeria was relocated from Lagos to Abuja in 1991based on National Security Issues. The master plan for Abuja and the Federal Capital Territory (FCT) was developed by International Planning Associates (IPA), where Abuja divided into Phases and Districts for different development stages. The FCT consist of Six Area Councils (Abuja Municipal, Abaji, Gwagwalada, Bwari, Kuje and Kwali Area Council).

The Federal Capital Territory (FCT), Abuja was formed from parts of former Nasarawa, Niger, and Kogi States. Abuja the Federal Capital Territory is located in the central part of Nigeria, lying between latitude

8°25'N / 9°20'N and longitude 6°45' / 7°39' E, with a landmass of approx 7,315 km², the city presently occupies 275.3 km². Divided into Phase I, II, III, IV, V presently. The indigenous languages are: Gbagyi, Gade, Gbari and Nupe. (Figure 1 and 2).

The study Area which consists of Abuja Phase 4 and 5, is located in the Abuja Municipal Area Council. The Abuja Phase 4 and 5 is sharing boundary with Kubwa in Bwari A.C (North), Kuje A.C (South) and Gwagwalada A.C (West). The Phase IV and V also has the distributions of unplanned settlements.

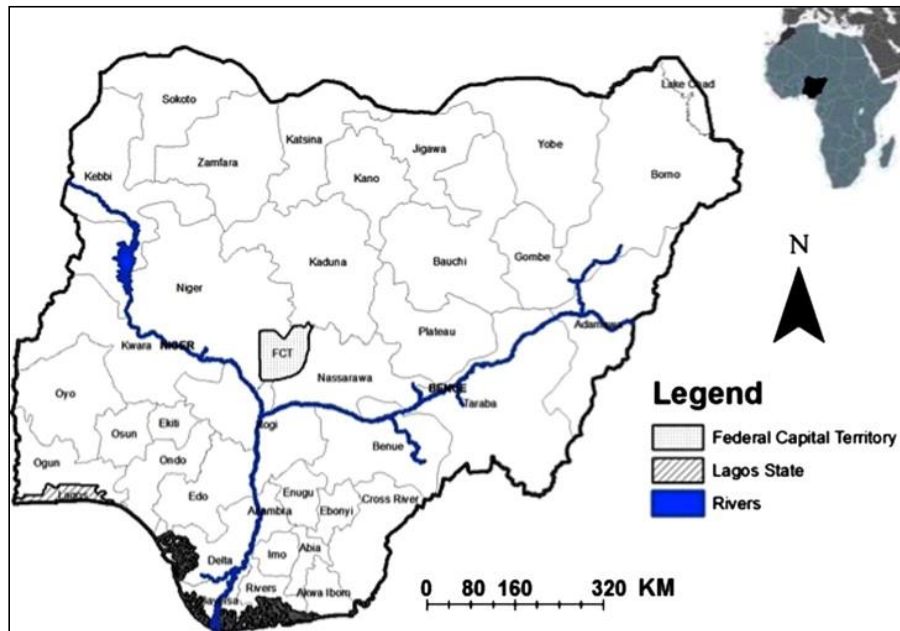


Figure 1: Nigeria showing FCT

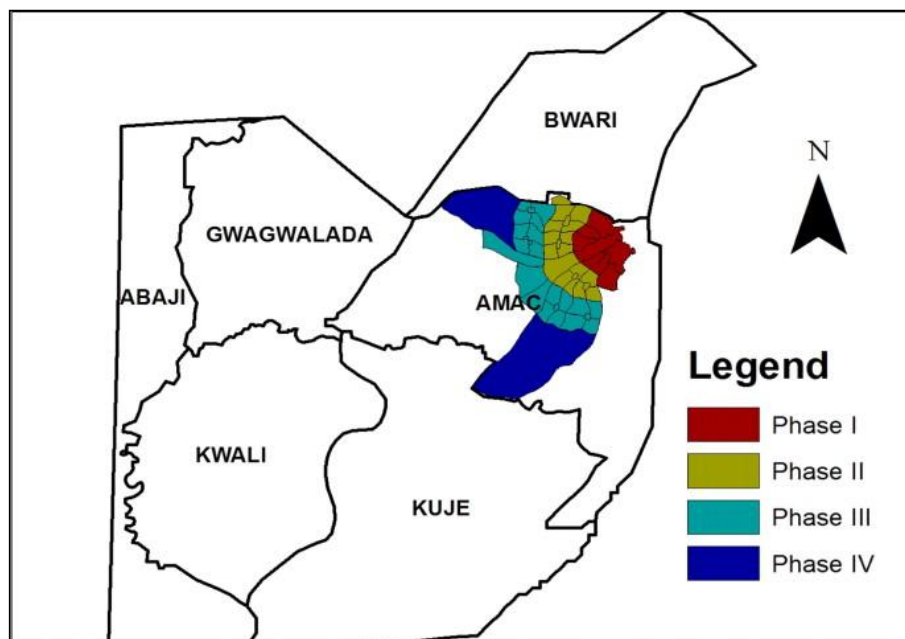


Figure 2: FCT showing Area Councils and Phase I - IV in AMAC

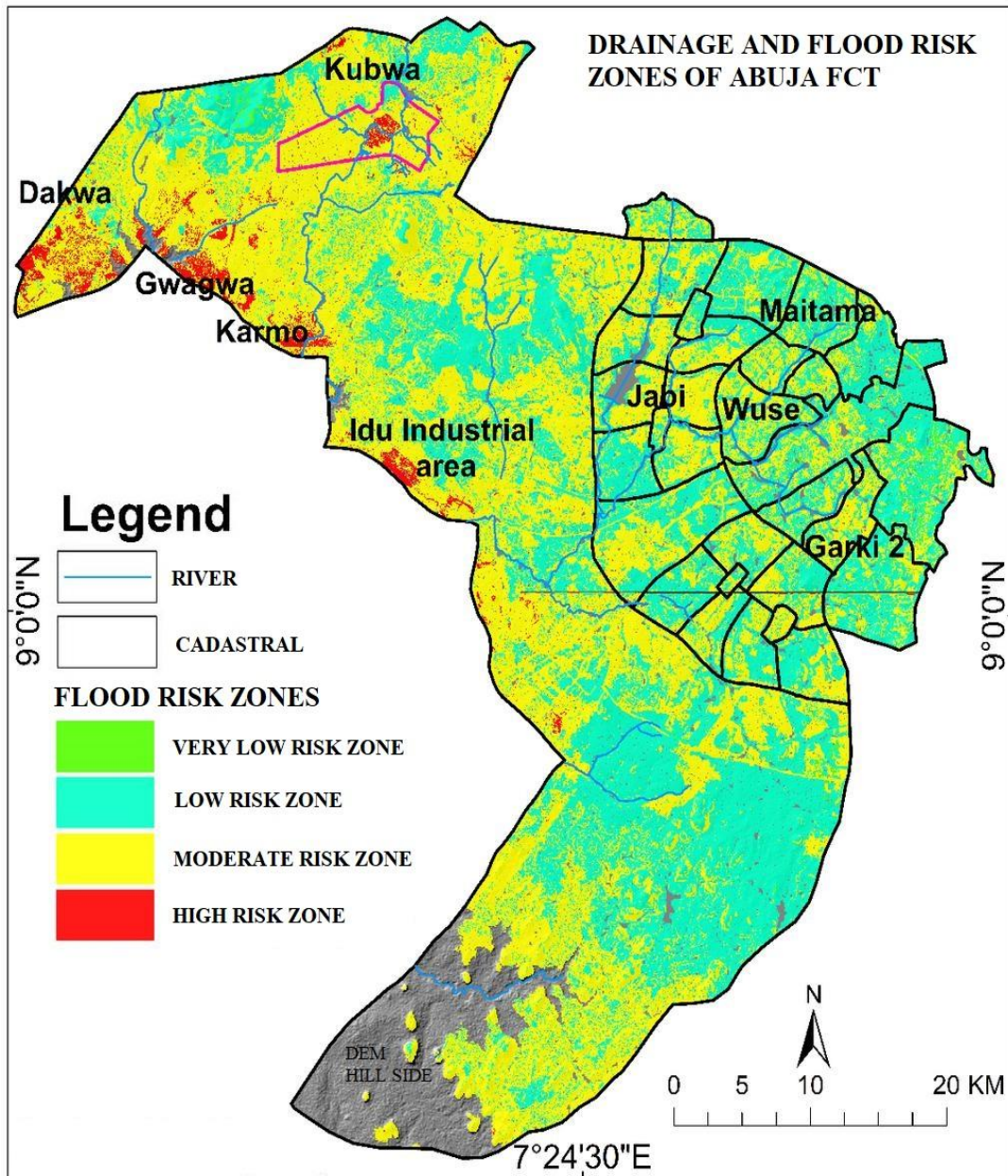


Figure 3: Detailed view of Abuja FCT showing Phase I - V in AMAC

3.2 Research Methodology

3.2.1 Sources of data

The data collection involves the use of both primary and secondary sources of data. The primary source of data involves Field investigation, personal observation, questionnaire administration, Focus Group Discussions, use of camera, in obtaining relevant information on the existing unplanned settlements within the Phase IV and V of Abuja. Data is generated through the use of Base Maps / Satellite Imageries, literature, journals, conference papers and other internet materials, which forms part of the secondary sources of data.

The tools and equipments used for the survey encompasses Global Positioning System (GPS), Google Earth software, Land Development software, Geomatica, Geographic Information System (GIS) Package and Project vehicle.

SITE VISIT TO UNPLANNED SETTLEMENTS IN PHASE II ABUJA

The research team visited the unplanned settlements distributed across the Abuja Phase IV and V of the Federal Capital Territory. During the exercise relevant data on each of the unplanned settlements communities were obtained through the research technique and focus group discussions with the stakeholders and each unplanned settlements has a Traditional Ruler / Chief. The investigation takes into cognizance the settlement's location, settlement pattern and living conditions of the inhabitants. The existing unplanned settlements in Abuja Phase IV and V comprised of the following: Gosa 1, Gosa 2, Toge, Gbessa, Nuwalege, Idon Sabo, Idon Bisa, Bassa Juwa and Lugbe village among other communities,

The location and coordinates of each unplanned settlement in the districts of Abuja Phase II is represented in Table 1.



Plate 1: Discussion with Mr. Josiah Micah of Gosa 1 settlement



Plate 2: The street view of Gosa 1



Plate 3: Street view of Gosa 1



Plate 4: The Fence of Gosa 1 Constructed by Government



Plate 5: Street view of Gosa 1



Plate 6: The Chief's Palace of Gosa 2



Plate 7: Street view of Gosa 2



Plate 8: Access to Nuwalege Settlement along Airport road



Plate 9: Street view of Nuwalege settlement



Plate 10: A view of the unplanned settlement



Plate 11: An interview with the residents of Nuwalege



Plate 12: Street view of Bassa Juwa showing railway station, close to Airport



Plate 13: Bassa Juwa unplanned settlement



Plate 14: Informal sector activities under the railway bridge, Bassa Juwa



Plate 15: Street view of Bassa Juwa within the Abuja Airport environment

B. DATA COLLECTION PROCESS

Collection of satellite imagery of year 2000, 2010 and 2022 for each unplanned settlements was achieved in collaboration with the Lithospace Nigeria Limited.

The best time for capturing the satellite imagery is between 9:30 am to 11:30 am in the morning. The essence of capturing the imagery in the morning period is to obtain imagery without glare, sunlight reflection and heat wave of the afternoon period. The built-up settlements were visible on the satellite imageries of year 2010 and 2022. However, there was no visible built-up settlement in the imagery of year 2000.

The material and tools for the data collection in the study involves the use of GPS which collects the coordinates of each unplanned settlement in phase IV and V of Abuja. The use of Google Earth revealed the location of the unplanned settlement distributions. Specialized software like ArcGIS, Global Mapper, Land Development, Geomatica, SnagIT, Microsoft word, Excel, charts and graphs were used in data

processing and analysis of the result. Part of the process was achieved in collaboration with Lithospace Nigeria Limited.

3.2.2 Criteria for choosing study area

- i. The Phase I of the Abuja located within the Municipal Area Council has already been developed and open space for the expansion is limited. The only settlement within Phase I of Abuja is Garki village.
- ii. The study for Abuja Phase II has already been completed and Technical Report submitted.
- iii. The study for Abuja Phase III has already been completed and Technical Report submitted.

The Abuja Phase IV and V chosen for the study is a new that similar research is yet to be conducted. There is rapid development in Abuja Phase IV and V with patches of unplanned settlements that are also expanding rapidly due to the large available spaces at the two horns (Phase IV) and at the Belly (Phase V). within Abuja of the FCT. However other opens within the environment of the study area are used as farmlands and mechanic workshops.

3.2.3 Data collection and field investigation

The Research Team visited each of the unplanned settlement in Phase IV and V of Abuja and obtained relevant data on the settlement location, pattern and the environment. The useful data were obtained through personal observation and focus group discussions the Traditional Rulers, Chiefs and relevant stakeholders the unplanned settlements. Content of the discussions encompasses: settlements name, ownership status, facilities and services availability, accessibility and existing conflicts among others, were adequately obtained through the research technique of the study.



Plate 16: Interview with The Hakimi of Apo Dutse Settlement Alh. Ishiaku

4.0 RESULTS AND DISCUSSION

4.1 Districts And Settlements Of Phase Iv And V Abuja

The master plan for Abuja and the Federal Capital Territory (FCT) was developed by International Planning Associates (IPA), There are Six Area Councils namely: Abuja Municipal Area (AMAC), Abaji, Gwagwalada, Bwari, Kuje and Kwali Area Council.

The Phase 2 are divided into 16 districts namely: Kukwuaba Cadastral Zone B00, Gudu Cadastral Zone B01, Durumi Cadastral Zone B02, Wuye Cadastral Zone B03, Jabi Cadastral Zone B04, Utako Cadastral Zone B05, Mabushi Cadastral Zone B06, Jabi Cadastral Zone B08.

4.2 Abuja Phase IV And V Satellite Imageries (2010, 2022)

The data were obtained through the use of satellite imageries using time series analysis from year 2010 to 2022. The size of each unplanned settlement in Abuja Phase IV and V was captured and measured in hectares for the periods of 2010 and 2022.

4.2.1 Data Processing Techniques

The processing technique commenced after acquiring the satellite imageries of 2010 and 2022 using ArcGIS and other relevant GIS tools for delineation and conversion to a simplified format to a language of other subsequent GIS Software. Measurement was carried out on each satellite imageries of 2010 and 2022 respectively. The measurements will first be in square meters before converting to hectares. There was overlay of each unplanned settlement for the different years 2010 and 2022, in order to determine the changes of the built-up sizes in hectares for each unplanned settlement in Abuja Phase IV and V. The individual built-up changes in hectares over the period reveals the overall annual built-up encroachment in hectares.



Figure. 4: Abuja Phase I,II AND III

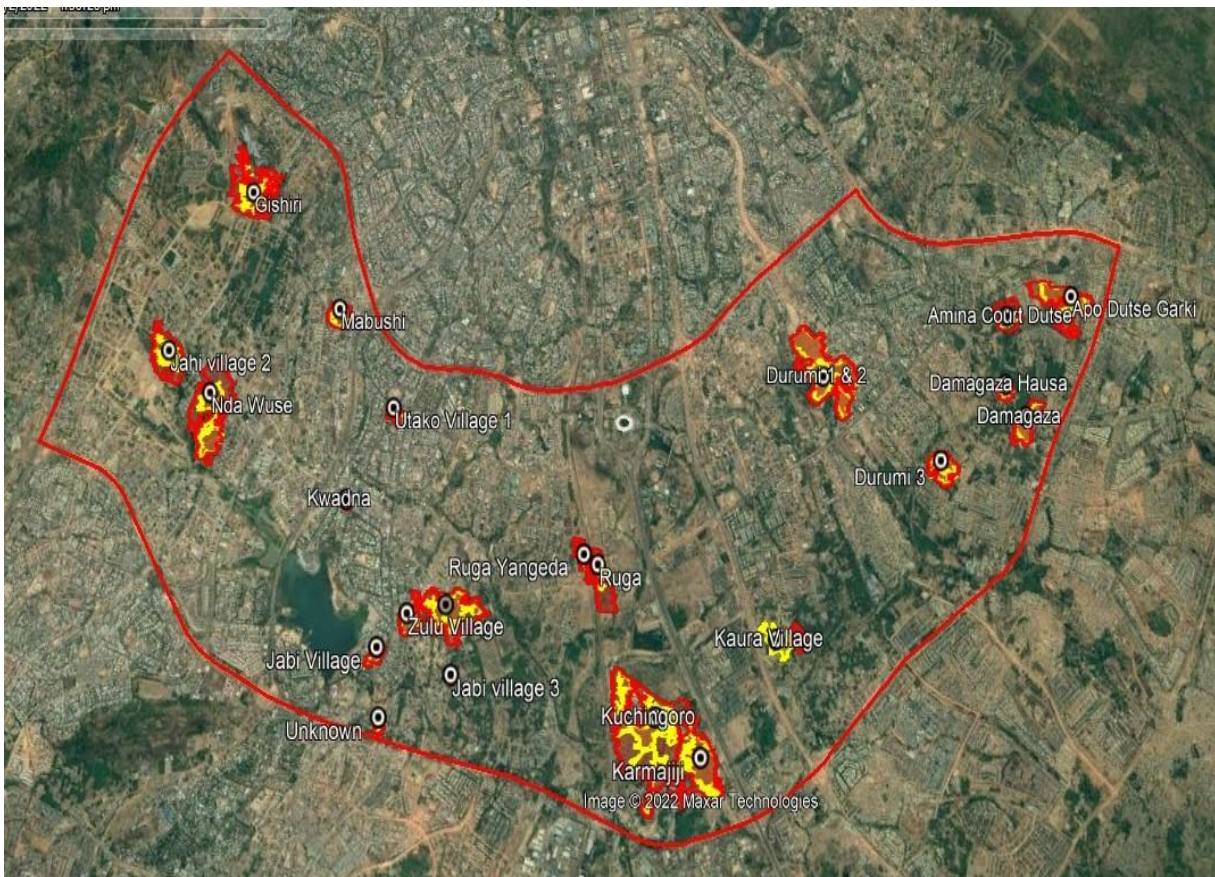


Figure 5: Overlay Of Phase II Abuja 2010 / 2022 Unplanned Settlements

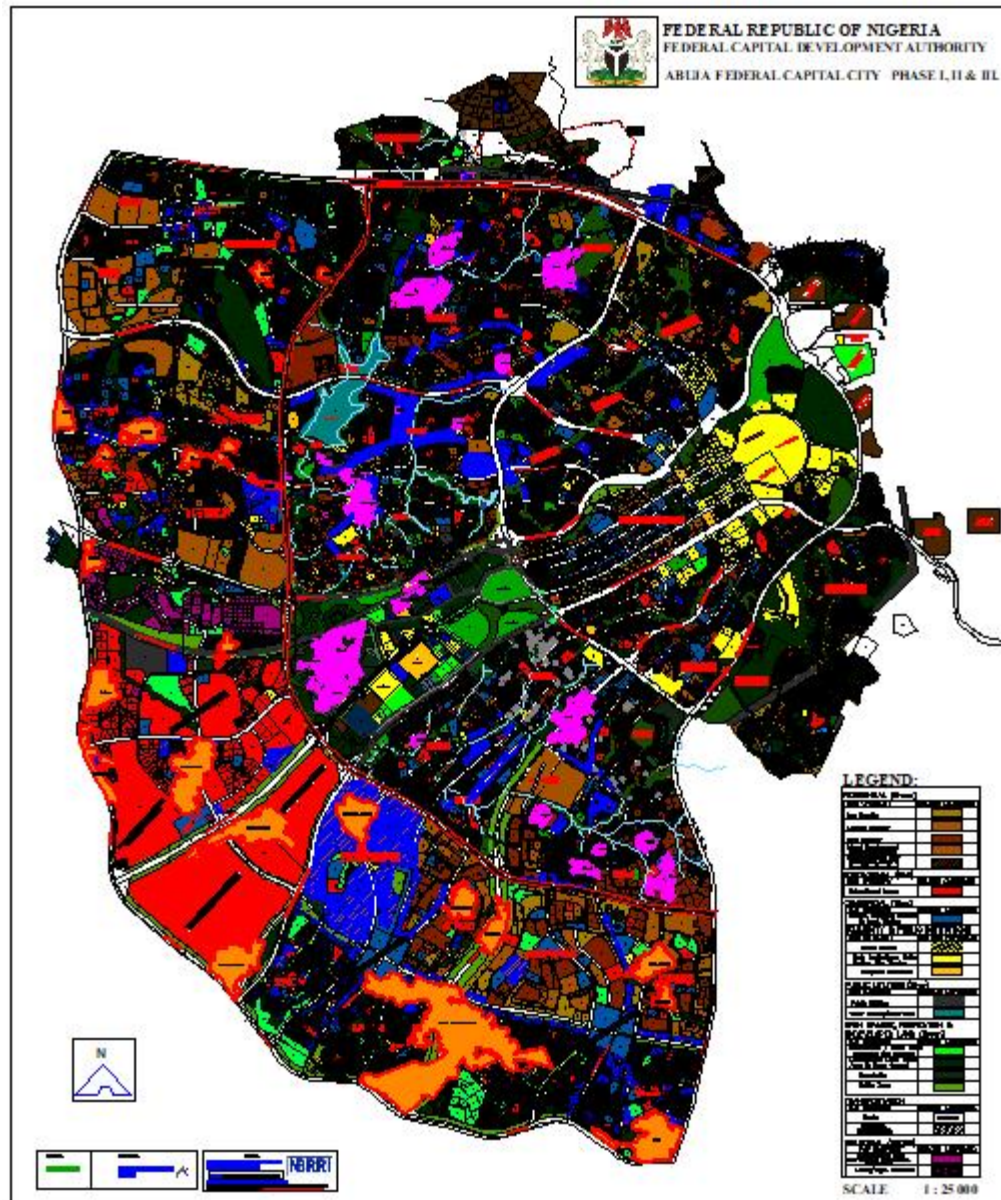


Figure 6: The Unplanned Settlements Of Phase II Overlay On The Abuja Landuse Plan

4.3 The Unplanned Settlements Built-Up Of Abuja Phase IV And V

The Abuja Phase IV and V consists of fifteen (15) districts and the National Park in the Federal Capital Territory (FCT). The districts are: Katampe, Mabushi, Utako, Wuye, Durumi, Gudu, Jabi, Jahi, Kado, Dakibiyu, Kaura, Duboyi, Gaduwa, Dutse and Kukwaba National Park.

However, there exist unplanned settlements in some of the District and the unplanned settlements are expanding annually as a result of migration and high cost of decent accommodation within the FCT.

The increase in the sizes of the unplanned settlements in the FCT is alarming and if measures are not taken, land reclamation by the government or the property owners may lead to a crisis similar to ENDSARS Protest, that will shutdown the entire FCT.

The study revealed about 22 unplanned settlements distributed across the Phase IV and V of Abuja. The built-ups of some unplanned settlements are expanding in sizes with encroachment into available vacant land. The other unplanned settlements located within the city center are surrounded by planned layouts with modern constructions.

4.4 Unplanned Settlements Distribution Within Abuja Phase IV And V

Table 1: 22 Unplanned Settlements Of Abuja Phase IV And V

S/ N	SETTLEMENT	BUILT-UP (Ha) 11/2010	BUILT-UP (Ha) 12/ 2022	BUILT- UP INCREA SE (Ha)	COORDINATES	DISTRICTS
ABUJA PHASE 4A						
	Tunga Azhima 2	Planned Settlement			311104.00 m E 1007008.00 m N	GWAGWA D10
1	Dei -Dei	22.32	29.46	7.14	1007736.48mN 309534.91 m E	DEI-DEI E06
2	Saburi	15.7	76.29	60.59	310651.37 m E 1008284.07 m N	KAGINI D09
3	Kagini	83.3	85.05	1.75	313085.15 m E 1010038.62 m N	KAGINI D09
4	Karsana Atepi	8.0	40.67	32.67	312927.85 m E 1008182.49 m N	KARSANA WEST D12
5	Karsana Agric	12.91	58.86	45.95	314282.45 m E 1008945.14 m N	KARSANA (CENTRAL)
6	Karsana Village	7.55	24.75	17.2	316667.29 m E 1006216.39 m N	KARSANA SABON GIDA D07
7	Zaudna	23.57	59.39	35.82	312837.94 m E 1006072.26 m N	GWAGWA D10
8	Gwagwa	70.59	128.39	57.8	314922.23 m E 1005067.31 m N	GWAGWA D10
9	Tasha 1	53.7	88.72	35.02	315393.00 m E 1004695.00 m N	GWAGWA D10
10	Karmo Sabo (part)	42.25	100.76	58.51	319653.00 m E 1003264.00 m N	IDOGARI D03
12	Karmo Tsoho	17.0	29.37	12.37	320112.00 m E 1002574.00 m N	IDU D04
13	Gyadna	22.8	64.0	41.2	318766.00 m E 1002872.00 m N	IDU D04
14	Angwan Shaho	9.31	22.16	12.85	319457.00 m E 1001823.00 m N	IDU D04
15	Juwa 1	32.44	33.13	0.69	314235.58 m E 1004585.61 m N	GWAGWA D10
	TOTAL	421.44	841.0	419.56		8 Districts out of 11 Districts
ABUJA PHASE 5						
1	Juwa 2	58.6	171.38	112.78	314237.55 m E	JIWA

2	Tunga Azhima 1	26.64	88.0	61.36	1004045.99 m N 310166.10 m E 1006491.60 m N	E21 JIWA E21
3	Tasha 2	24.1	51.52	27.42	316213.74 m E 1003895.21 m N	INDUSTRIAL AREA C16
4	Wukara	10.67	23.47	12.8	312032.28 m E 997801.63 m N	AVIATION VILLAGE E05
5	Bassa Juwa	46.69	103.15	56.46	311157.51 m E 996973.38 m N	AVIATION VILLAGE E05
6	Nuwalege	4.24	64.83	60.59	309620.00 m E 992555.00 m N	AVIATION VILLAGE E05
7	Kuyamyi	9.75	26.20	16.45	312297.45 m E 990325.53 m N	KYAMI E23
8	Toge	7.93	19.58	11.65	311981.34 m E 989402.97 m N	KYAMI E23
9	Gosa 2	11.67	58.70	47.03	312538.30 m E 989173.88 m N	KYAMI E23
10	Gosa 1	16.39	14.97	-1.42	313653.00 m E 988312.00 m N	WAWA E24
11	Iddo Bobota	1.44	81.28	79.84	305293.59 m E 990961.59 m N	AVIATION VILLAGE
12	Sauka (Kure- Kegbo)	8.59	79.11	70.52	307658.12 m E 990429.78 m N	AVIATION VILLAGE E05
13	Gbesan	11.76	170.21	158.45	308358.47 m E 987771.68 m N	AVIATION VILLAGE E05
14	Angwan Sayawa	1.60	12.79	11.19	316911.42 m E 988328.37 m N	LUGBE CENTRAL E07
15	Lugbe1 (Angwan Gboko)	0.91	31.15	30.24	317983.58 m E 989716.20 m N	LUGBE CENTRAL E07
16	Lugbe 2Village	131.52	148.02	16.5	321221.27 m E 992068.83 m N	LUGBE EAST E29
17	Tudun Wada Village	72.16	177.92	105.76	320542.17 m E 995303.64 m N	LUGBE NORTH E25
18	Jidu 2	7.91	122.40	114.49	320707.54 m E 996882.34 m N	LUGBE NORTH E25
19	Gbaupe	13.80	55.0	41.2	317595.00 m E 984893.48 m N	LUGBE SOUTH E09
20	Barewa	4.30	16.02	11.72	312320.00 m E 985229.00 m N	BAMISHI L13, GAUBE L22
		470.67	1,515.7	1,045.03		
ABUJA PHASE 4B						
1	Waru 2	0.00	44.33	44.33	333368.25 m E 986566.78 m N	WARU POZEMA D16
2	Ketti Village	19.90	123.89	103.99	323500.34 m E 987395.18 m N	KETTI D17
3	Takushara	9.06	43.36	34.3	330362.61 m E 982093.85 m N	BURUN D20
4	Burun Village	4.46	19.06	14.6	328318.00 m E 982960.00 m N	BURUN D20
5	Gude Village	5.58	13.12	7.54	326770.47 m E	GUDE D24

6	Jaïta Village	4.20	9.59	5.39	980152.25 m N 323381.66 m E 977068.20 m N	JAITA D28
	TOTAL	43.2	253.35	210.15		5 Districts (From the 18 districts)
41 Unplanned Settlements						54 Districts
	7. KETTI NORTH D31			14. GWARI D22		
	8. KETTI EAST D18			15. KPOTO WEST D25		
	9. SHERETTI D14			16. KPOTO EAST DD26		
	10. SHERETTI CHECHE D1			17. BUDE WEST D23		
	11. WARU- POEZEMA D16			18. CHAFE D27		
	12. BURUN WEST D19			19. MAMUDA D29		
	13. GIDARI BAHAGWO D21			20. PARFUN D30		

UNPLANNED SETTLEMENTS BUILT-UP COVERAGE			
ABUJA PHASE 4 AND 5	2010 Ha	2022 Ha	INCREASE Ha
ABUJA PHASE 4 A 7,027.96 Hectares	421.44	841.0	419.56
ABUJA PHASE 5 38,977.03 Hectares	470.67	1,515.7	1,045.03
ABUJA PHASE 4 B 13,500 Hectares	43.2	253.35	210.15
TOTAL	935.31	2,610.05	1,674.74

- Abuja Phase 2 Built-up increase of 12 years from 2010 to 2022 = 242.36 Hectares
 ✓ Built-up average annual expansion index of 12 years
 = $242.36/12\text{yrs} = 20.2$ Hectares annual increase.
- Abuja Phase 3 Built-up increase of 10 years from 2010 to 2020 = 799.17 Hectares
 ✓ Built-up average annual expansion index of 10 years
 = $799.17/10\text{yrs} = 79.9$ Hectares annual increase.
 (Poor visibility by Cloud Cover – 2010 to 2020 instead of 2010 to 2022)
- Abuja Phase 4 and 5 Built-up increase of 12 years from 2010 to 2022 = 1,674.74 Hectares.
 ✓ Built-up average annual expansion index of 12 years
 = $1,674.74/12\text{yrs} = 139.6$ Hectares annual increase.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The data were obtained through the use of questionnaires, focus group discussion, GIS, Satellite imageries, camera and capturing the coordinates of the settlements using GPS. The unplanned settlements names was obtained during the site visit and the location and sizes of the unplanned settlements in phase III Abuja, was achieved through the use Global Positioning System , GIS and Remote Sensing using time series for the

year 2010 and 2020. The average annual expansion index for the unplanned settlements in phase III Abuja is 80 Hectares and probably it will be more than 800 Hectares in the next 10 years (2030).

A. The Problems Of Unplanned Settlement And Encroachment

The Development Control Department of the Abuja Metropolitan Management Council is saddled with the responsibility of legal construction and development within the Federal Capital Territory. The monitoring of the encroachment and illegal developments is the sole responsibilities of the various Site Offices of Development Control located in each District. However, such monitoring activity is not fully covered by the Development Control Site Offices. The deficiency in that aspect, paved way for the continuous growth of illegal developments in unplanned settlements.

The Traditional Rulers of the unplanned settlements issue land to interested migrants to acquire land and develop for residential or commercial purpose. However, some of the migrants were allowed the ownership of the building for a period 5 to 6 years, after which the ownership of the property will be transferred to the indigenes and the migrant status will be converted to tenant. The indigenes devices this means to own the property which will attract compensation from the Government when there is the need for relocation or resettlement.

The people living in the unplanned settlements including the indigenes have no legal title documents or government allocation papers. The freedom of occupying any available land for residential and commercial developments pushed the encroachment into areas reserved for road construction, hindering speeding development of the city. Fig. (9,19 and 22).

Land dispute is among major causes of conflict and ethnic clashes in the urban areas of Africa. The unplanned settlements of phase III hand increased the built-up size horizontally from 429.70 hectares in 2010 to 1,226.93 hectares in the year 2020. Moving the huge population out the area will cause crisis and social unrest, affecting lives and properties in the unplanned settlement.

Most unplanned settlements lack basic essential facilities such as portable water, stable electricity, poor sanitary environment and indiscriminate liquid and solid waste disposal and making the entire unplanned settlement vulnerable to infectious diseases.

The cost of living in the unplanned settlements is relatively cheap, the houses are affordable which are mostly constructed with substandard building material that may likely fail and cause buildings collapse in the future.

The rates of atrocities, crime and juvenile delinquencies are very alarming in some urban centers, creating urban disturbance and such incidence occur due to the presence of unplanned settlements which serve as a hideout or place of residence for the criminals

Housing congestions and room overcrowding is very common in most unplanned settlements. The transmission of infectious and communicable diseases such typhoid, dysentery, malaria, tuberculoses and covid 19 diseases, is possible in the congested environment.

B. General Overview And Stakeholders Request

The Traditional Rulers see the study as welcome development and requested that their challenges presented during the interview with the stakeholders should be forwarded to the Government for positive intervention.

Majority of the indigenes do not have certificate of occupancy and they are willing to move if alternative land is provided with essential utility and services. The stakeholders requested that alternative resettlement

land should be in place before displacing them to different areas. They wish to move together as a community with their cultural tie, traditional and relationship.

The Government approved indigenous settlements should be properly demarcated or fenced to prevent encroachment from other private property developers or neighbouring communities.

There is the absence of some basic facilities in some of the settlements such as schools, clinics, good roads, police post, portable water and effective waste management. The community is seeking for government intervention and assistance for the provision basic facilities and services

There is annual expansion index of 80 Ha and if measures are not taken the size will double in the next 10 years. The increment poses a thread to the speedy development government projects such roads construction, pipes and electrical installation across the Federal Capital Territory.

5.2 Recommendations

1. The inhabitants of the settlements are tax payers in one way or the other and it is the responsible of the government to provide essential facilities and services like police post, schools, water, electricity, road and effective waste management.
2. Government should introduce inclusive approaches such as integration and intervention policies.
3. The police posts, clinics and schools can be constructed with NBRRI demountable interlocking blocks in case future of resettlement.
4. Mass Housing can be constructed vertically the form of high-rise buildings using NBRRI interlocking blocks. The mass housing will provide accommodation for the low and medium income earners within the Abuja City center. The vertical construction will save a lot of horizontal space.
5. There should be adequate sensitization and awareness campaign to the general public on the effects, problems and repercussions of illegal constructions and unplanned settlements encroachments.
6. The Department of Development Control and Urban & Regional Planning of the Federal Capital Development Authority should increase their staff strength and manpower to ensure effective monitoring / inspections of developments in FCT.
7. Relevant authorities or stakeholders should form collaboration with NBRRI in terms of affordable building / road construction materials, integrity test, monitoring / inspection of projects, capacity development and sensitization programmes.

Generally, it is expected that results of this study will serve as useful information to curtail and prevent the unlawful land encroachment within the FCT and other parts of the Country. Future conflict between the property owners and illegal dwellers within the Abuja F.C.T, can be tackled with the aid of effective monitoring and actions from the Department of Development Control. The document will be made available to City Managers, Town Planners, Civil Engineers, Architects, Environmentalist, International Aid Organization and other relevant Authorities, for regulations and control of unplanned settlement in Nigeria.

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