



## SPATIOTEMPORAL ANALYSIS OF CRIME INCIDENCE IN BAYELSA WEST SENATORIAL DISTRICT, BAYELSA STATE, NIGERIA

BITRUS ENIYEKENIMI DAUKERE, SADIQ ABDULLAHI YELWA, BENEDINE AKPU  
AND BENJAMIN JULIUS ANANYA

### Abstract

The prevalence of crime is a major social issue in Nigeria. This study seeks to examine the spatiotemporal variations of crime incidence in Bayelsa West Senatorial District, Bayelsa State, Nigeria. Police crime records data were obtained from the Divisional Police Headquarters within Bayelsa West Senatorial District. Line graphs and Analysis of Variance were used for data analysis. It was found that Oporomor III had the highest crime rate with 12%, followed by Sagbama (8.8%), while Oyiakiri I and IV had the least with 0.6% each of the total crime cases reported in the study area. The findings revealed that there were variations in the frequencies of the crime incidents among the 26 administrative wards in Bayelsa West Senatorial District. The findings further revealed that 2014 recorded the highest crime cases with 23.5%, while 2015 had the lowest with only 14.7%. The study further revealed that there was no significant temporal variation of crime events from 2014-2018 across the study area. The study recommends that community policing committees be constituted in the political wards of Oporomor, Sagbama, and other wards plagued by criminal events in the Local government areas.

**Keywords:** Bayelsa West Senatorial District, Oporomor III, Crime incidence, Spatiotemporal analysis

### Introduction

Crime is any deviant conduct that violates prevailing norms, primarily cultural norms dictating how humans should act (Crews, 2009). As such, it is important to define the concentration of crime in space and time. Variations in the concentration of crime between neighbourhoods, income groups, and segments of the population have been a topic of interest in recent times (Adewuyi et

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al., 2017; Daukere et al., 2020; Musu-Gillette et al., 2017). This is as understanding the concentration of criminals and crimes can aid security agencies in crime prevention and control. Knowing where crime is concentrated enables law enforcement authorities make informed decisions on the distribution of police resources for optimal results.

Crime does not occur consistently throughout a city's neighbourhoods (Chainey, 2014). The difference in crime concentration among communities in a given location is influenced by both social and physical variables. Built-up or non-built-up areas, industrial/retail, farmland, bare soil, and vegetation are examples of physical variables, whereas social structures include family, religion, law, economy, and class. Many socio-economic factors such as household income, educational attainment, work status, poverty status and so on, as well as demographic variables such as age, ethnicity, and religion may be blamed for variances in crime in a certain region (Ackerman & Murray, 2004; Mitchell, 2011; Nwagboso, 2018; Onyepuemu, 2015; Xiong, 2016). Every crime, therefore, relates to the features of a site. Physical designs like burglar-proof or gated neighbourhood also influences the prevalence of crime through its effects on the degree of access, ease of entry and exit, surveillance, and the number of possible targets (Badru et al., 2019; Bala et al., 2015; Oyinloye et al., 2017; Umar, 2017). Accessibility, disclosure, incentive and the availability of targets are essential factors for better understanding of crime from an environmental point of view (Brantingham & Brantingham, 1984; Cohen & Felson, 1979; Wortley & Townsley, 2016; Umar, 2017; Umar et al., 2015). The perception of the physical features of a place and routine activities of its residents can influence decisions about how to distribute scarce resources, partly based on where police demands are highest or lowest (Eck et al., 2005; Greenburg & Rohe, 1984; Ibrahim & Kuta, 2015; Joseph, 2018).

There are numerous scholarly assessments of the spatiotemporal variation of crime across the world. For instance, Balogun et al. (2014) mapped crime in Benin City, Nigeria. They identified

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crime hotspots, areas deficient of security outfit, areas of overlap and areas requiring constant police patrol using buffering analysis. Ejemeyovwi (2015) conducted a study using remote sensing and GIS techniques for crime mapping and attendant management in enhancement of tight security in Asaba, Delta State, Nigeria. His study revealed that Cable/Traffic light area had the highest crime record, while DBS/Government House area had the lowest among the five zones from the year 2000 to 2006. Effiong et al. (2016) applied GIS in the analysis of crime in Yenagoa Local Government Area of Bayelsa State, Nigeria. The researchers found out that the distribution of the police divisions/stations were moderate and the analysis performed showed the areas that were under-served. The crime statistics collected from the five police divisions revealed that four (Epie I, Epie II, Epie III and Atissa) out of the fifteen political wards were identified as hotspots with high population density and more economic activities. Nwaogu et al. (2016) examined the temporal pattern of crime rates in Lagos, Nigeria. The authors employed frequency and percentage to examine the yearly crime variation in the study area. The findings of the study revealed that there were annual differences in the rates of crimes. The year 2003 had the highest crime rate while 2006 had the lowest accounting for 20.1% and 12.7% respectively.

The crime rate in Bayelsa West Senatorial District has been increasing due to its own share of social, political, economic and cultural problems which have affected the well-being of the populace greatly. In the light of the above, it can be said that the existing knowledge on the spatiotemporal variations of crime incidence in Bayelsa West Senatorial District, Bayelsa State is limited and needs to be expanded. This necessitated the need to analyse the spatiotemporal variations of crime in Bayelsa West Senatorial District. The objective of the study is to examine the spatial and temporal variation of crime in the area.

### The Study Area

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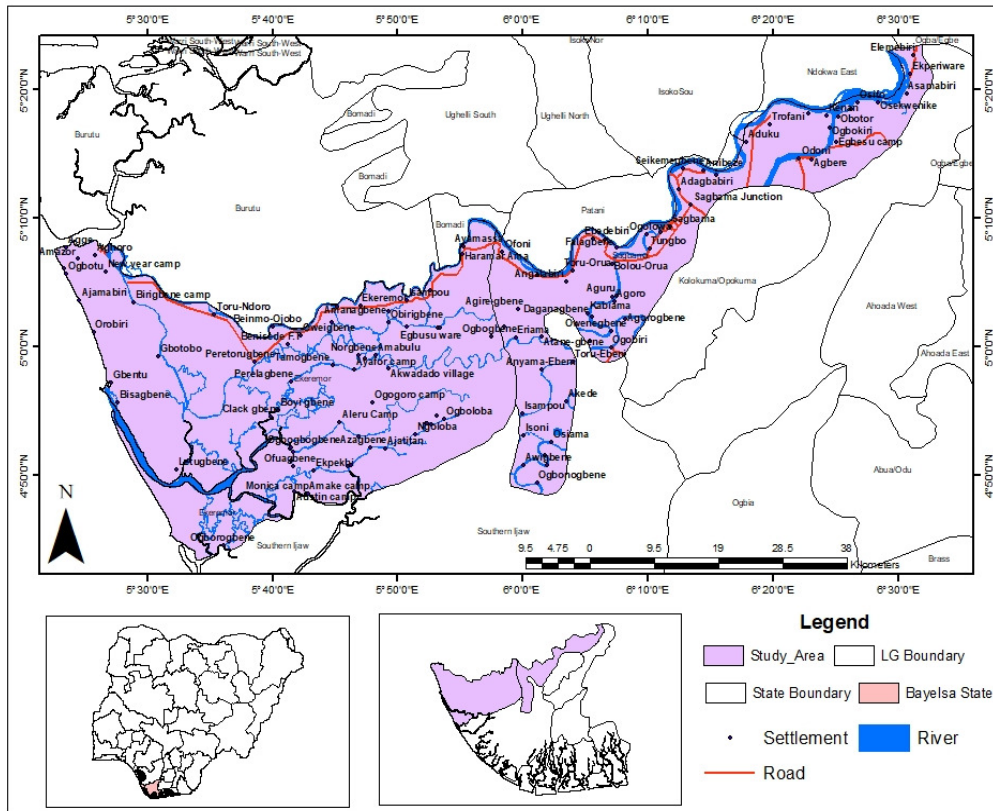




The study area is Bayelsa West Senatorial District of Nigeria. It comprises of Sagbama and Ekeremor Local Government Areas (LGAs) of Bayelsa State. The area has a total landmass of 2,771.9km<sup>2</sup> and is located between Latitudes 4°42'N and 5°23'N of the Equator and Longitudes 5°23'E to 6°32'E of the Greenwich Meridian (Daukere et al., 2020; National Population Commission, 2009). It is bordered on the north by Delta State and on the south by the LGAs of Kolokuma/Opokuma, Southern Ijaw, and Yenagoa. The Bight of Bonny, which runs through the study region, has a 60-kilometer shoreline, with several of the settlements completely encircled by water and so inaccessible by road (see Figure 1).

Rain falls almost every month of the year, although the tropical monsoon climate that characterizes the area causes approximately 80% of it to fall between May and September (Mmom & Akpi, 2014). The soils in the area are made up of alluvial deposits and quaternary geologic formations that are mostly low-lying and underlain by cretaceous deposits. The area contains freshwater marshes with low - lying tropical rainforests, and the different flora types are correlated to the different soil divisions (Shell Petroleum Development Company of Nigeria Limited, 2005; State Employment and Expenditure for Results [SEEFOR] Project Bayelsa State, 2016). Ekeremor and Sagbama LGAs have 420,557 and 291,516 people, respectively, according to projections from the 2006 population census to 2022 (National Bureau of Statistics, 2011). The communities are mostly linear, spanning alongside rivers, the sea, or the coastline. The Sagbama-Ekeremor-Agge road is the main thoroughfare, and most of the towns and villages are poorly structured, with poorly laid pavements (Ebenezer et al., 2014), which might obstruct regular patrols.





**Figure 1: Bayelsa West Senatorial District**  
**Source: Adapted from the administrative map of Bayelsa State**

**Material and Methods**

Data for this study were gathered from secondary sources. Secondary data on crime rate, types and their location for the period between 2014 and 2018 were obtained from the crime records of the Divisional Police Headquarters in the study area with the approval of the state commissioner of police. The choice of timeframe was premised on the reality that the period is the most accessible with the most recent data available. This reality is also due to the poor processing of criminal reports and the difficulty of data retrieval from the local police authorities. Documented crime cases collected from police units coded and entered into Microsoft Excel 2010 and exported for

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statistical analysis to the Statistical Package for Social Sciences (SPSS) version 20. Inferential (ANOVA) and descriptive statistics (Line Graphs) were used to analyse at the 0.05 per cent significance level of the spatiotemporal heterogeneity of crime in the region. Other related data were also collected from written materials such as journal articles, conference proceedings, internet, theses, and so on.

## Results and Discussions

### Spatial Variation of Reported Crime Incidence in Bayelsa West Senatorial District

The spatial variation of reported crime incidents in the research area is depicted in Figure 2. According to the findings in this Figure, Oporomor III had the most criminal events, accounting for 12% crime committed in the area, followed by Sagbama, which had 8.8% crime committed in the area. This can be ascribed to the capacity of inhabitants to report crime due to the availability and accessibility of police services. Oyiakiri I and Oyiakiri IV had the fewest crime events, accounting for only 0.6 % each crime incidents reported in the study region. These wards are distinguished by a lack of police services and fewer economic activities in comparison to neighbouring areas. The findings corroborate with previous research that established that there were significant differences on the crime rates in the Romanian regions (Manolache et al.,2011). The finding is not in agreement to where Manolache et al. (2011) found out that crime rates decreases as a region is more developed economically. Here, the result of the study area shows that as a political ward is more developed economically with high population, it will experience high crime events. For instance, according to 1991 population census as projected to 2018, Oporomor III had over 23,229 people with higher economic events recorded the highest crime events in the study area. This ward is the headquarters of Ekeremor LGA. The findings also agree with Ayuba et al. (2016) where the authors observed that the high population concentration and

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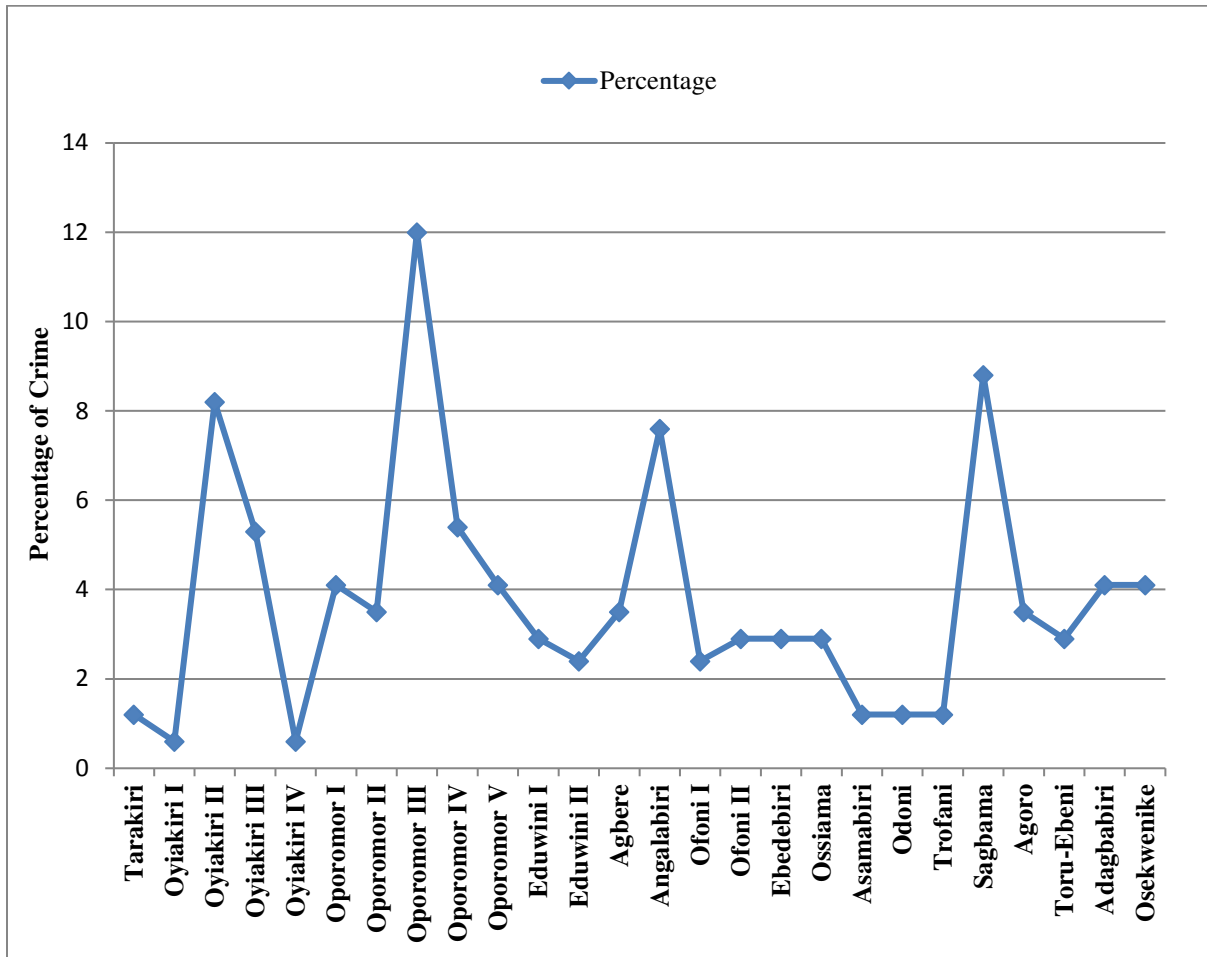




the presence of large markets in Tudun Wada, Sabon Tasha, etc. were the major causes of high crime rate in Kaduna Metropolis, Nigeria. This may also be attributed to the presence of police divisions which encourages the people to report crime due to accessibility to police services.

In addition, the political wards with no security outfit such as Tarakiri recorded only 2 crime events accounting for only 1.2% of the overall offences recorded in the study region. This low per cent crime recorded in this ward may be due to absence of roads and high transport cost to the police divisions in Ekeremor community to report crime. It was observed that Ayamasa town in Tarakiri ward reports most of their crime in Bomadi LGA of Delta State due to proximity and accessibility. It was also observed that victims in the rural areas such as Orobiri, Amazor etc. prefer to report crime to their family and friend or traditional institutions due to high cost of transport to the police stations. Further research should be carried out on the geospatial analysis of crime reporting behaviour of residents in the area to ascertain the major factors.





**Figure 2: Spatial Variations of Reported Crime Events**

The One-Way ANOVA statistical technique was used to determine whether there is no significant spatial variation in the incidence of crime across the 26 wards over the five years study period (2014-2018), based on the data on crime record collected. The analysis to the test is shown on Table 1. The results from the analysis (Table 1) shows a variation in the incidence of crime across the administrative wards from 2014-2018,  $F(25,208) = 1.84$ ,  $p < 0.01$ ., an F – statistics value of

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1.84 was obtained at a significance level of 0.01. Therefore, we can say that there are significant variations in crime incidences among the different administrative wards of Bayelsa West Senatorial District.

**Table 1: The Spatial Variation of Crime Events in Bayelsa West Senatorial District**

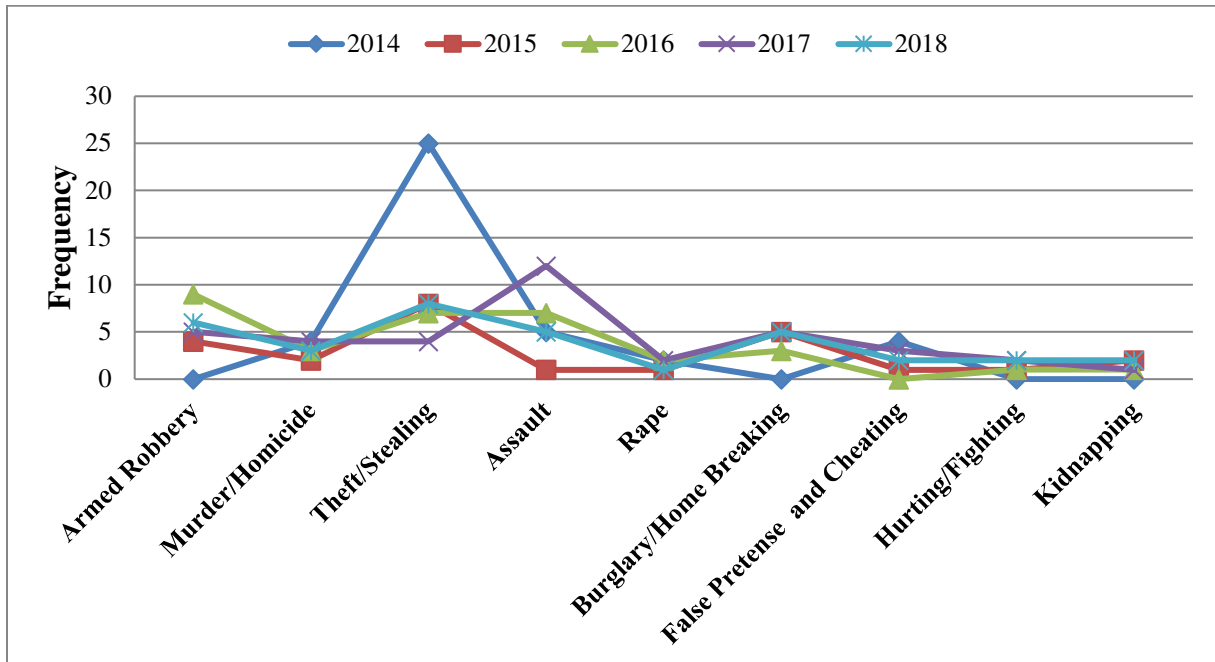
Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	62.274	25	2.491	1.836	.012
Within Groups	282.222	208	1.357		
Total	344.496	233			

\*Dependent Variable: Crime Incidences

## Yearly variation of Reported Crime Incidence in Bayelsa West Senatorial District

Descriptive statistics was used to represent the yearly variation of crime incidences in Bayelsa West Senatorial District. Figure 3 displays the yearly variation of reported crime events in the study area. It is observable from Figure 3 that crime was more prevalent in the year 2014. A total of 40 (23.5%) cases out of 170 cases were reported for the said year. In absolute terms, there was a drastic drop of the number of reported cases to 14.7% in the 2015. There was a slight increment of the number of reported cases from the year 2016 to 2017. The year 2014 (23.5%) had the highest cases of crime reported, while 2015 had the lowest number of reported cases of 25 (14.7%). This high incidence of crime in 2014 may be attributed to the increase in youth restiveness and tension in the build-up to the 2015 Presidential elections.





**Figure 3: Yearly Variations of Reported Crime Events**

**Source: Police Divisions/Author’s Analysis (2019)**

The total crime cases reported in the study was subjected to ANOVA tool as shown in Table 2. The test depends on pairwise comparisons between the calculated marginal means of crime events and the temporal variance in crime occurrences for the years in question (2014-2018).

The result indicates that there is no significant temporal variation of the reported crime incidences for the year 2014 to 2018 in the study area,  $F(4, 40) = 0.17, < 0.95$ . Therefore, it is safe to posit that there were no significant variations in the crime events over the period of 2014-2018 in the study area. This finding differed from that of Ajayi and Ajayi (2014) which indicated a presence of significant temporal variation in the incidence of each crime type across the five parks over time in Ibadan Metropolis, Nigeria.





**Table 2: Temporal Variation of Crime Events in Bayelsa West Senatorial District**

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.667	4	3.167	.166	.954
Within Groups	763.333	40	19.083		
Total	776.000	44			

\*Dependent Variable: Crime Incidences

## Conclusion

Understanding where criminal occurrences concentrate in micro-geographic units such as villages or wards in terms of reported crime incidence over time might assist in focusing attention on certain places that require additional attention and police patrols to reduce the threat of crime thereof. This research investigated the spatiotemporal trend of crime rates in the Bayelsa West Senatorial District, Bayelsa State, Nigeria. Oporomor III had the highest crime rate, while Oyiakiri I and IV had the lowest total number of recorded crimes in the study area. Findings revealed a significant spatial variation in the crime level in the different administrative wards of the study region. It was also found that from 2014 - 2018; there was no significant temporal variation in crime reports across the study area. Further research should be carried out on the geospatial analysis of crime reporting behaviour of residents in the area to ascertain the major factors.

## Recommendations

The following recommendations are therefore made based on the findings:

1. The administrative wards of Oporomor III and Sagbama according to the results, had a high rate of violence. Residents or stakeholders should be active in these towns' protection

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by being given a role in monitoring their communities in order to report, deter, or track offenders. To do so, the Inspector General of Police (IGP) should direct the Commissioner of Police, Bayelsa State Command, to create community police committees in the affected towns. The committee members should include Divisional Police Officers, indigenous rulers of such wards, native vigilantes, as well as other stakeholders.

2. To boost safety and expand police patrols in the region, the police authority should deploy more police posts and officers in Oporomor III and Sagbama wards, as well as other negatively impacted wards.

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## Authors' Profile

**Bitrus Eniyekenimi Daukere** is a Lecturer in the Department of Geography, Nigerian Army College of Education, Ilorin, Nigeria, where he teaches courses in Human Geography, Geographic Information Systems and Remote Sensing, and serves as the examinations officer of his department. He has published in reputed journals and has a particular interest in issues relating to spatial crime analysis, environmental criminology, applied spatial statistics and geographic information analysis as well as urban geography. Visit [linkedin.com/in/daukere-bitrus-eniyekenimi-paul](https://www.linkedin.com/in/daukere-bitrus-eniyekenimi-paul) to connect with him. Email: [dauksenies2010@gmail.com](mailto:dauksenies2010@gmail.com).

**Sadiq Abdullahi Yelwa** is a Professor of Environmental Geography in the Department of Environmental and Resources Management, Usman Danfodio University, Sokoto, Nigeria. His research interests cut across Environmental Resources Management, Biogeography, Environmental Impact Assessment and Environmental Application of GIS and Remote Sensing in Solving Environmental Problems.

**Dr. Benedine Akpu** is a Lecturer in the Department of Geography and Environmental Management, Ahmadu Bello University, Zaria, Nigeria. She is a Reader and her Research interests include: Urban Studies, Remote Sensing and GIS and Environmental Management.

**Benjamin Julius Ananya** holds an MSc in Population and Manpower Planning and is currently a Lecturer II in the Department of Geography, Nigerian Army University Bui, Borno State, Nigeria. His areas of interest include Development studies, environmental studies and security.

