

**GEO-INFORMATION BASED ASSESSMENT OF THE IMPACT OF URBAN
SPRAWL IN AKURE, SOUTHWESTERN NIGERIA**

By

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**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT
FOR THE AWARD OF DEGREE IN MASTER OF SCIENCE IN
ENVIRONMENTAL CONTROL AND MANAGEMENT IN THE INSTITUTE OF
ECOLOGY AND ENVIRONMENTAL STUDIES, OBAFEMI AWOLOWO
UNIVERSITY,**

ILE-IFE, NIGERIA.

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2014

CERTIFICATION

This is to certify that Usman Akeem Victor (SCP11/12/H/0179) carried out this work in partial fulfillment of the award of the degree of Masters of Science (M.Sc.) in Environmental Control and Management, Institute of Ecology and Environmental Studies, Obafemi Awolowo University, Ile-Ife, Nigeria.

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DEDICATION

I dedicate this work to God the Father, the Son and the Holy Spirit. Also to my wonderful ‘mummy’ - Mrs Sherifat Omolade Usman-Ogedengbe.

ACKNOWLEDGEMENT

My greatest thanks go to God Almighty for permitting and giving me the grace, strength and good health to accomplish this task.

I express my profound gratitude to my supervisor, Prof. Ayobami T. Salami, who is also a Deputy Vice Chancellor (academic) of this great institution, for his enormous contribution, commitment and encouragement to this work. It is a blessing to be supervised by you. I owe you a lot for being there sir!

My gratitude also goes to Dr. (Mrs.) E.O. Makinde, a lecturer in the Department of Surveying and Geo-Informatics, University of Lagos, for her enormous contribution, commitment and encouragement to this work.

I appreciate my wonderful lecturers who have been of great assistance to me. Prof. O.O. Awotoye (Director of the Institute), Prof. I.E. Ofoezie, Dr. M.B. Adewole, Dr. (Mrs.) A.A. Okoya, Dr. O.J. Mathew, Dr. Kayode Adepoju, Mr Kola Osunkunle and the entire staff of the Institute.

To my wonderful sister; I call her my mum because she is - Mrs S.O. Usman – Ogedengbe. She has been there for me right from my birth to what I am now. Thank you a lot! My profound gratitude and indebtedness go to my biological mother – Mrs Isubuola Usman and my siblings Mrs Folasade Bello, Mr ‘Hammed Usman, my lovely Mrs Ajibike Afere, Mrs Febisola Mamud and my ‘mum’ Mrs S.O. Ogedengbe for their love,

prayers, care, encouragement and concern throughout my stay on campus both for my first and second degrees in this same institution. I owe you people a lot!

To all my friends who are too numerous to list, however, I must mention a few; Lasisi Isaac Olajide, Okeleke Collins, Steven Aloko, Farayola Folake, Mary Elayelagha, Kunle Alagbe, Akinbiola Seinde, Oladunjoye Ebenezer, Akinbadewa Adedamola, Aimienoho Amowie, Imoni Cletus, Taiwo Ayoyinka Ogunro, Itunu Olaniyan and Adesina Abayomi.

TABLE OF CONTENTS

	PAGE
TITLE PAGE	i
CERTIFICATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv-v
TABLE OF CONTENTS	vi-xii
ABSTRACT	xiii-xiv
 CHAPTER ONE: INTRODUCTION	1
1.1 INTRODUCTION.....	1
1.2 STATEMENT OF THE PROBLEM.....	3
1.3 OBJECTIVES OF THE STUDY.....	5
1.4 JUSTIFICATION OF THE STUDY.....	5

CHAPTER TWO: LITERATURE REVIEW.....	7
2.1 DEFINITION OF SPRAWL.....	7
2.2 SPATIAL FORMS OF URBAN SPRAWL.....	8
2.3 FACTORS OF URBAN SPRAWL.....	9
2.4 MEASURING INDICATORS OF SPRAWL.....	12
2.5 LAND USE/LAND COVER CHANGE.....	13
2.6 GEOSPATIAL SCIENCE AND TECHNOLOGY.....	15
2.7 APPLICATIONS OF GIS IN URBAN SPRAWL MANAGEMENT.....	17
2.8 APPLICATIONS OF REMOTE SENSING IN MONITORING URBAN SPRAWL.....	20
2.9 SPATIAL DATABASES / DATABASE MANAGEMENT SYSTEMS.....	22
2.10 GEOINFORMATICS IN ASSESSING URBAN SPRAWL.....	24
2.11 REVIEW OF THE DATABASE DESIGN	27
2.12 DATABASE DESIGN	30
2.12.1 View of Reality.....	32
2.12.2 Conceptual Design.....	32
2.12.3 Logical design.....	35
2.12.4 Physical Design (Database Creation).....	40

2.12.5 Database Implementation.....	42
CHAPTER THREE: METHODOLOGY.....	43
3.1 THE STUDY AREA	43
3.1.1 Climate.....	46
3.1.2 Topography.....	46
3.1.3 Socio-Economic Characteristics.....	46
3.2 DATA REQUIREMENT, SOURCES AND METHODS OF COLLECTION...	47
3.3 DATA PROCESSING.....	53
3.3.1 Color Composite.....	53
3.3.2 Resample Operation.....	53
3.4 IMAGE EXTRACTION AND GROUND TRUTHING.....	54
3.4.1 Digitizing and Editing.....	54
3.5 IMAGE CLASSIFICATION.....	54
3.6 TECHNIQUES OF ANALYSIS.....	55
CHAPTER FOUR: RESULTS.....	57
4.1 LAND USE LAND COVER CHANGE.....	57

4.1.1 Sub Map.....	57
4.1.2 Supervised Classification.....	63
4.2 TRENDS OF URBAN SPRAWL IN THE STUDY AREA.....	77
4.2.1 Factors Responsible For Urban Sprawl and Environmental Challenges.....	81
4.2.2 Impact and Trends Of Urban Sprawl in Akure.....	88
4.2.3 Correlation Matrix of the House Ownership at Sprawl Location and the Personal Information of the Respondents.....	89
4.2.4 The Responses of the Experts.....	92
4.3 DATABASE CREATION FOR MONITORING URBAN SPRAWL (DBMUS).....	102
4.3.1 Database Design guidelines.....	104
4.3.2 Analysis: Overlay.....	108
4.3.3 Spatial Search or Query.....	108
4.3.4 Unique Identifier.....	110
CHAPTER FIVE: DISCUSSIONS.....	112
5.1 INTRODUCTION.....	112
5.2 LAND USE - LAND COVER CLASSIFICATION.....	112
5.3 TRENDS AND FACTORS RESPONSIBLE FOR URBAN SPRAWL	114

5.4 DATABASE CREATION FOR MONITORING URBAN SPRAWL (DBMUS)119

CHAPTER SIX: SUMMARY, RECOMMENDATION AND CONCLUSION.122

6.1 SUMMARY122

6.2 CONCLUSION.....123

6.3 RECOMMENDATIONS.....124

REFERENCES

APPENDIX

LIST OF TABLES

	PAGE
Table 2.1: Settlement table.....	37
Table 2.2: River table.....	38
Table 2.3: Road table.....	39
Table 3.1: Data Source	50
Table 4.1: Error Matrix of TM 1986 Data Classification.....	66
Table 4.2: Error Matrix of TM 1991 Data Classification.....	69
Table 4.3: Error Matrix of ETM+ 2002 Data Classification.....	72
Table 4.4: Error Matrix of ETM+ 2011 Data Classification.....	75
Table 4.5: Trends of Land use Changes by Percentage and Area 1986-2011.....	76
Table 4.6: Demographic Characteristics of the Sampled Respondents.....	82
Table 4.7a: The Responses of Respondents in the Sprawl Areas.....	85
Table 4.7b: The Responses of Respondents in the Sprawl Areas.....	86
Table 4.7c: The Responses of Respondents in the Sprawl Areas.....	87
Table 4.8: Correlation matrix of the house ownership at sprawl location and the personal information of the respondents.....	91

Table 4.9a: The responses of the experts of urban planning.....	95
Table 4.9b: The responses of the experts of urban planning.....	96
Table 4.10: Urbanization Factors in Akure 2007/2008.....	99
Table 4.11: Showing GPS readings of the 10 sprawl locations.....	101

LIST OF FIGURES

	PAGE
Figure 2.1: Design and construction of a spatial database.....	31
Figure 2.2: Entity relationship diagram.....	34
Figure 2.3: Physical design of the database.....	41
Figure 3.1: Map of Nigeria Showing Akure in Ondo State.....	44
Figure 3.2: Map of Ondo State Showing Akure.....	45
Figure 3.3: Methodology Flow Chat.....	52
Figure 4.1: 1986 Akure Subset of the Landsat Image.....	58
Figure 4.2: 1991 Akure Subset of the Landsat Image.....	59
Figure 4.3: 2002 Akure Subset of the Landsat Image.....	60
Figure 4.4: 2011 Akure Subset of the Landsat Image.....	61
Figure 4.5: 2011 Akure Subset of the SPOT Image.....	62
Figure 4.6: Akure Land use Map 1986 Classified.....	64
Figure 4.7: Akure Land use Map 1991 Classified.....	67
Figure 4.8: Akure Land use Map 2002 Classified.....	70
Figure 4.9: Akure Land use Map 2011 Classified.....	73

Figure 4.10:	Land Cover Classes in Hectares 1986-2011	78
Figure 4.11:	Overlay Akure Built-Up 1986 - 2011	80
Figure 4.12:	Structure of Monitoring Urban Sprawl (MUS) personal Geo-database	103
Figure 4.13:	Relational Database Table for Urban Sprawl Monitoring	105
Figure 4.14:	Road Network Table	106
Figure 4.15:	Water Body Table	107
Figure 4.17:	Spatial Search Result Showing settlements with farming	109
Figure 4.18:	Spatial Search Result Showing Unique identifier result of a feature	111

ABSTRACT

This study analyzed land use/land cover change and examined the trends and factors responsible for urban sprawl in Akure between 1986 and 2011 with a view to developing a user-friendly geospatial database for monitoring urban sprawl in the study area.

Medium resolution satellite images derived from Landsat (TM) and (ETM+) comprising of four dates (1986, 1991, 2002 and 2011) and high resolution Spot 10m satellite image of 2011 were acquired and used for this study. Akure Topographical Map of 1966 (1:40,000) was also acquired and used. Maximum Likelihood Supervised classification algorithm was used to classify the study area into four major classes, including built-up, high forest, agro-forest and water body. Subsequently geo-spatial database was modeled and spatial analysis was performed. Reconnaissance survey was carried out and GPS was used for groundtruthing. In-depth interview and structured questionnaire were carried out to examine the trends, factors and impact of urban sprawl in the study area. Descriptive and inferential analyses of correlation were used for further analysis of the data collected.

The results of urban sprawl's impact in Akure using the GIS-based study revealed that built up area increased rapidly by 43.31% from 5,857.54 hectares in 1986 to 8,394.21 hectares in 1991 and it also increased in 2002 by 4.39% from 8,394.21 hectares to 8,762.76 hectares. It further increased by 72.02% from 8,762.76 hectares to 15,073.7 hectares in 2011. The results revealed that built-up area, agro-forest and water body were the areas experiencing the most increase. Results of the correlation analysis indicated that the relationship between 'house ownership' and demography explained most of the variation observed in the study. It was found

that gender, marital status and number of children were more responsible for urban sprawl in Akure. The analysis showed that there was a weak negative relationship ($r = -0.189$, $p < 0.01$) between gender and 'house ownership', a weak positive relationship ($r = 0.343$, $p < 0.01$) between marital status and 'house ownership' and a weak negative relationship ($r = -0.159$, $p < 0.05$) between 'number of children' and 'house ownership' in the sprawl location. Subsequently, Geo-spatial database modeled was tested by subjecting it to some spatial search, query and overlay to show its capability to answer question pertaining to all the entities of the database.

The study concluded that the rate at which urban sprawl increased in Akure due to marital status and other factors such as number of children and gender, if not reversed might constitute greater social and environmental problems that can impact negatively on sustainable development in the future.

CHAPTER ONE

1.1 INTRODUCTION

According to Carruthers and Ulfarsson (2002), urban sprawl is defined as unplanned, uncontrolled and uncoordinated single- use development that does not provide for a functional mix of uses and or is not functionally related to surrounding land uses, and which variously appears as low-density, ribbon or strip, scattered, leapfrog or isolated development. Peiser (2001), defines urban sprawl as the gluttonous use of land, uninterrupted monotonous development, leapfrog discontinuous development and inefficient use of land. Glaeser *et al.* (2001), define urban sprawl as a pattern in an urbanized area that exhibits low levels of some combination of eight distinct dimensions: density, continuity, concentration, clustering, centrality, nuclearity, mixed uses and proximity.

Sprawl has been criticized for eliminating agricultural lands, spoiling water quality, and causing air pollution (Allen *et al.*, 2003). Population increases, so does the need for new housing, schools, and transportation networks. In the urban world today, industrial, commercial, and residential districts are markedly different from years past. Decentralization is a trend indicative of urban sprawl and present day industrial, commercial, and residential areas are no longer necessarily a part of the urban core (Nechyba *et al.*, 2004). Rather, these types of development are often found in low-density areas that are separated from major urban areas by large tracts of homogeneous land. Hence, there is need for larger transportation networks and in turn a greater dependency on automobiles, which produce more air pollution. New roads are put

in place, precious farmland is often left unprotected from commercial or residential developers (Hathout, 2002). The greater the imperviousness of an area the more water runoff one can expect, which is the catapult for flooding (Wilson *et al.*, 2003). Without regulations on urban growth, the problems of urban sprawl are likely to continue

The urban sprawl is believed to be one of the by-products of urbanization. Cities are generally regarded all over the world as providing the engines of economic development both for the cities themselves and their surrounding rural hinterland (UN-Habitat, 2004). This is the major reason why cities are regarded as depots of opportunities for the urban dwellers to exploit for their economic and social development; as well as magnetic poles that attract rural dwellers via rural-urban migration from their surrounding rural hinterland. Without any doubt, an urban centre would only serve as engine of development if it is economically healthy, properly planned and managed in a way that would allow for efficient and functioning operations of infrastructural facilities among others. Due to uncontrolled urbanization, one major feature of urbanization in Nigerian cities is urban sprawl.

Urban sprawl is characterized by haphazard housing development in the urban suburbs, where majority of the structures are without planning permit in uncoordinated layouts. Often times, these structures are products of squatters that choose to settle at the suburbs as a result of their inability to afford residential accommodation in the city. The improper coordination of the physical development promotes high level of inaccessibility within the area. The area lacks essential social and welfare infrastructure like water, electricity, health care and educational facilities among others. The unsanitary conditions in the area pose continuous threat to healthy living of the inhabitants: It is an area regarded dangerously unsafe for living because of its associated social vices. Above all, urban sprawl presents a repulsive outlook of the city space



that calls for re-planning. Unfortunately, there is no Nigerian city that can be exonerated from the stigmatization of urban sprawl. This has prompted Farunkanmi (2003), to draw the attention of town planners to the implications of sprawling city that if the governing authorities fail to inject the essential infrastructural facilities, such neglect would pose serious and dangerous implications for human health, progress and development. Urban sprawl poses a lot of challenges to town planners, city managers, governments and stakeholders. It becomes expedient to identify the causes or factors responsible for urban sprawl in Nigerian cities.

1.2 STATEMENT OF THE PROBLEM

The rate of urbanization in developing countries is on the increase. In Nigeria, the political and administrative decentralization which led to the establishment of more state capitals and local Government headquarters has influenced the direction of rural-urban migration to these new state capitals and local Government Area headquarters (Adegboyega, 2008).

Many of such towns that suddenly become state capitals or Local Government area headquarters have become new nodes of development and new destination for rural-urban migrants. Many of the towns and cities in these categories were unprepared for such sudden change and the rapid physical expansion as a result of the influx and the demand for housing and other infrastructures are with little or no re-course to planning regulations. Thus haphazard physical expansion becomes the new order, with serious