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URBAN SPRAWL AND ITS CONSEQUENCES ON THE SUSTAINABILITY OF SEKONDI – TAKORADI METROPOLITAN AREA

BY:

GEORGETTE BAABA ATAKORAH

(10040527)

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DECLARATION

I declare that I am the sole author of this work, which was undertaken under the supervision of Professors Jacob Songsore, Joseph Teye and Alex Berimah Owusu. All secondary sources in this work have been duly acknowledged.

..... Date: 14/12/2022

Georgette Baaba Atakorah
(Candidate)

..... Date: 14/12/2022

Emeritus Professor Jacob Songsore
(Principal Supervisor)

..... Date: …18/12/2022……

Prof. Joseph Teye
(Co-supervisor)

..... Date: …18/12/2022……..

Prof. Alex Barimah Owusu
(Co-supervisor)

DEDICATION

This research is dedicated first to Almighty God and my children, Nicole Carolyn and Jayden Ian Atakorah. It has been quite a journey, but your constant encouragement and inspiration enabled me to finish this research.

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ABSTRACT

Cities worldwide are undergoing significant spatial transformation due to continued urban growth and sprawl, with forecasts indicating strong growth in the urban fringe well into the future. Urban sprawl is an ensuing spatial form that has emerged globally due to this spatial transformation of urbanisation and has consequences on the natural and built environment, thereby affecting the sustainability of cities. Sekondi-Takoradi has undergone a series of economic boom and bust years, which has influenced the rate of spatial expansion in the city. The study, therefore, examines urban sprawl in the city and attempts to fill gaps in knowledge by examining the drivers of sprawl and the social and environmental issues affecting its sustainability.

A mixed-method approach was used, which sampled 400 households and 120 commercial entities, and conducted 25 interviews and 12 focus group discussions. Among the interesting revelations of the study was the state's role in creating an enabling environment both positive and negative, which the private sector and individuals have taken advantage of and has led to the ongoing unplanned and haphazard development of the city.

This has resulted in unequal access to essential services, loss of livelihood and inequality in livelihood options, thereby affecting the social well-being of the inhabitants. Environmentally, the consumption pattern within the city and its ensuing urban heat island effect among others threaten its sustainability, both in the short and long term, with broader implications for the city region. As a result of these threats to the city's sustainability, the study recommends that buffer zones or green belts be implemented beyond which spatial expansion is not permitted to occur, thus shifting towards densification and a more sustainable urban development.

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CBD	Central Business District
DA `	District Assembly
DPA	District Planning Authority
ECG	Electricity Company of Ghana
EEA	European Economic Area
ERP	Economic Recovery Program
FGD	Focus Group Discussion
GOG	Government of Ghana
GSGDA	Ghana Shared Growth and Development Agenda
GSS	Ghana Statistical Services
GWCL	Ghana Water Company Limited
IDI	In-depth Interview
IMF	International Monetary Fund
KII	Key Informant Interview
MMDA	Metropolitan Municipal and District Assembly
MTDP	Medium Term Development Plan
NDBI	Normalised Difference Built-up Index
NDPC	National Development Planning Commission
NDVI	Normalised Difference Vegetation Index

NOAA	National Oceanic and Atmospheric Administration
OECD	Organisation for Economic Co-operation and Development
PNDC	Provisional National Defence Council
PPD	Physical Planning Department
PuMI	Peri-urban Mixed-Income
SAP	Structural Adjustment Program
SDG	Sustainable Development Goal
STMA	Sekondi-Takoradi Metropolitan Area /Assembly
TCPD	Town and Country Planning Department
ULI	Urban Low Income
UMI	Urban Middle-Income
USA	United States of America
WECD	World Commission on Environment and Development

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Introductory Background

Cities around the world are undergoing significant spatial transformation as a result of continued urban growth and urbanisation, with current forecasts indicating strong growth in the urban fringe well into the future (Cohen, 2006; UN-Habitat, 2013; Nijkamp and Perrels, 2014; Pojani and Stead, 2015; d'Amour et al., 2017; Maheshwari et al., 2016; and Danielaini et al., 2019). The total world population was 7.6 billion in 2018, with about fifty per cent residing in urban areas. The UN DESA (2018) estimates that by 2050, 6.5 billion people will be living in urban areas moving outwards, far beyond corporate boundaries. This transformation is shown through spatial differentiation, changes in the built environment, and differences in consumption patterns, living conditions and economic activities (Pacione, 2009). Even though urbanisation has had successes such as advancing business sectors, infrastructural development, facilitated access to better educational facilities and living standards etc., there have been many challenges accompanying this process (UN-Habitat, 2014; Frimpong, 2019).

One such is urban sprawl, an ensuing spatial form that has emerged globally due to this spatial transformation with implications on the natural and built environment affecting the sustainability of cities (Banai and DePriest, 2010; OECD, 2018). Though complex to define, urban sprawl means the excessive spatial growth of cities. It also refers to the outward physical expansion of cities characterised by low densities, and scattered and discontinuous leapfrog expansion of land uses (Ewing,1994). Urban sprawl involves the conversion of open spaces, vegetation and agricultural lands, and wetlands into built-up (Atu et al.,2013). Wolman et al. (2005) further clarified that urban centres grow and develop either as planned, semi-planned or unplanned. Accordingly, urban sprawl occurs as land resources are consumed to accommodate

new urbanisation, i.e. housing and other infrastructure, which are partially planned or happen in an unplanned and haphazard manner. This phenomenon has been increasingly associated with various social and environmental problems, including inefficient land and energy use, traffic congestion, food insecurity, environmental degradation, social segregation and isolation, and even obesity (EEA,2016).

Urban areas in developed countries, such as Austria, Canada, Slovenia and the United States, rank relatively high in multiple dimensions of sprawl and are driven by demographic, economic, geographic, social and technological factors, including rising incomes, preferences for living in low-density areas, technological progress in car manufacturing (OECD, 2018) just to mention a few. Additionally, sprawl is also policy-driven with the imposition of maximum density restrictions, zoning regulations and tax systems that are often misaligned with the social cost of low-density development. Furthermore, massive investment in road infrastructure has immensely contributed to this phenomenon (Bart, 2010; Hoornweg et al., 2011) which in the long run increases the carbon footprint, thus undermining the greenhouse gas benefits of the urban population density.

In the developing world, "Africa has experienced the highest urban growth during the last two decades at 3.5% per year, and this rate of growth is expected to hold into 2050" (African Development Bank, 2013; Walker, 2016). The growth of cities in the developing world is dynamic, diverse and disordered, and increasingly land and space-intensive (UNFPA, 2007; Owusu, 2013; Owusu and Oteng-Ababio, 2015; Gillespie, 2016; Cobbinah and Aboagye, 2017; Gillespie, 2017; Grant et al. 2019). This rapid urbanisation process requires a large amount of land, primarily prime agricultural land, to be converted to urban land use (e.g. residential construction), especially in the urban periphery, to contain the increasing number of people in the urban areas.

Most African cities are faced with challenges of deteriorating physical and living environments, which shows itself in the form of urban sprawl (Nnaemeka-Okeke, 2016). In Nigeria, "the governance and management of towns and cities are most discouraging as cities appear to be growing beyond the control of planners, beyond management capacities and beyond available resources" (Nnaemeka-Okeke, 2016, p. 3). Uncontrolled urbanisation has resulted in urban sprawl, which is characterised by uncoordinated housing development in the urban peripheries where many structures do not have building permits and proper layouts. Most of these structures are erected by squatters who settle in the suburbs due to their inability to rent accommodation in the inner cities. However, in the case of Ghana, sprawling is rather through the incorporation of rural settlements/villages in the peri-urban zone, which serves as dormitory settlements for inhabitants working within the city. Urban sprawl in Ghana occurs when land resources are changed to accommodate new urbanisation in a haphazard, uncontrolled, uncoordinated housing expansion in the urban-rural fringe (Peprah, 2014). This is driven by an increase in population (natural and migratory) and increased need for built infrastructure, ensuing in the filling of undeveloped land in urban areas and expansion into rural areas. Additional dynamics facilitating sprawl include increasing income, preference for a serene environment or countryside living, relatively lower cost of housing and land in the periphery and land speculation (Yiran et al., 2020).

Over the last 50 years, Ghana's urban population grew substantially from 27.9% to 55.3%, with a projected annual rate of urbanisation of 3.07% from 2015 to 2020 (GSS, 2013). Sekondi-Takoradi, the third largest city of Ghana (after Accra and Kumasi), has been one of the most rapidly urbanising areas in the country over the past decades (Kumi-Boateng et al., 2015; Yankson et al., 2017). A string of pivotal moments in the country's recent history seems to have influenced the drastic increase in the urban population in the metropolis. One such moment was in the 1980s, during the neoliberal Structural Adjustment Program (SAP) era,

which enhanced conditions for producing and exporting goods through infrastructural rehabilitation (Benhin and Barbier, 2004, Awanyo and Attua, 2018). The Takoradi harbour was one of the essential facilities earmarked for expansion to support exports. This expansion stimulated a wave of urban growth and physical expansion into the Sekondi-Takoradi metropolis.

Another monumental event that has further increased the expansion of urban activities in the Sekondi-Takoradi metropolis is the discovery of oil resources in Ghana. This discovery thrust the Sekondi-Takoradi metropolis into the global spotlight, spurring a renewed wave of urban growth, population growth and physical expansion resulting in changes in local land use (Obeng-Odoom, 2012; Yalley and Ofori-Darko, 2012; Eduful and Hooper, 2015; Fiave, 2017; Mensah et al., 2018). The twin cities are spreading out at a staggering rate with a total land area of 191.7 km sq. in 2010, and it increased to 219 km sq. in 2015 (GSS,2014a; STMA, 2015). The effect of this uncontrolled urban sprawl means excessive land consumption, inefficient energy use, loss of livelihood, traffic congestion, as well as environmental and social degradation (Hardoy et al., 2013). With over 69% of the STMA population living in urban areas, this threatens the city with social conflict, environmental degradation and collapse of basic essential services (Vallance et al. 2011; GSS, 2012).

The rate of urban growth and ensuing sprawl in Sekondi-Takoradi has repercussions for the achievement of Ghana's Sustainable Development Goal (SDG) 11, which is concerned with fostering the development of sustainable cities and communities that provide safe and affordable housing for all. Sustainable cities are urban centres which are designed to address environmental, social and economic impacts through urban planning by utilizing eco-friendly development alternatives in developing the city's infrastructure. Thus, for cities to be sustainable in the future, there is a need to maintain the natural resource base, food production and ecosystem services in the peri-urban areas surrounding cities (Simon, 2008). Furthermore,

it will be necessary for coherent and targeted policy actions and interventions steered towards addressing the economic, environmental, social and political challenges emanating from sprawl to encompass the core dimensions of the new urban agenda which emphasises the linkages between sustainable urbanisation and job creation, livelihood opportunities and improved quality of life (UN-Habitat, 2020). Thus efforts towards achieving SDG 11, " making cities and human settlements inclusive, safe, resilient and sustainable" should be viewed holistically in every urban development or renewal policy and strategy.

1.2 Problem Statement

Rapid urbanisation in Ghana over the past three decades has happened in tandem with rapid economic growth. It has helped create jobs, increase human capital, decrease poverty, expand opportunities and improve living conditions for millions of Ghanaians (World Bank, 2015). Ghana has started to see the adverse effects of rapid urbanisation in recent times, including congestion and unregulated urban expansion. The country is at a defining moment where the approach it takes to managing urbanisation and sprawl will either ensure its growth is accompanied by better productivity and inclusion that will improve the lives of its citizens, or it could create "a grave danger" if it is not adequately planned for (World Bank, 2015).

Sekondi-Takoradi, the capital city of the Western Region, is one of such fastest-growing cities and has experienced a considerable increase in its urban population over the past decade since the oil discovery (GSS, 2013, Obeng-Odoom, 2014a, Oteng – Ababio, 2018). It also happens to be the major economic centre in the Western Region with many commercial and industrial activities taking place due to the Port, which attracts migrants (both internal and external) seeking to take advantage of the economic opportunities the city has to offer. The discovery of oil has also resulted in the influx of migrants, both local and expatriates, into the city. According to the Ghana Statistical Services (2013), there are 63.1% non–migrants and 36.9% of migrants in Sekondi-Takoradi. There has been an increase in the population from 369,166

in 2000 to 559548 in 2010 (GSS, 2014a). Thus, in most urban areas population growth is primarily driven by rural-urban migration.(Hove et al., 2013; Yiran et al., 2020).

As the population increases, there is a need to meet the housing needs of the people and the intensified need for built infrastructure results in the filling in of undeveloped spaces and spreading out into rural areas. It also leads to the transformation of many residential houses in the inner city to accommodate business activities. Unfortunately, successive governments post-independence failed in their efforts to meet the housing needs of the growing population. As such, the housing sector was liberalised to permit the involvement of the private sector in housing provision. The private sector became involved in the provision of planned housing targeted at high- and middle-income earners leaving the low-income earners at their peril. Thus, private or traditional housing construction involves purchasing land from traditional authorities or family heads and constructing their own homes, often in areas where land is relatively cheaper and farther away from the city. This has led to the lateral spread of the city beyond its boundary and is characterised by unplanned and uncoordinated construction and places further stress on water, electricity and road infrastructure (Fuseini et al., 2017; Yiran et al., 2020) and generates a serious challenge for urban planning and management. The city is quickly expanding, and if land control measures are not put in place, settlements will continue to expand haphazardly into rural farmlands and communities (Gebregziabher et al., 2014). The effect of population increase on urban growth and expansion can be seen in the sharp rise in urban/built-up areas, which attests that the metropolis is developing rapidly (Stemn and Agyapong, 2014; Kumi-Boateng et al. 2015; Acheampong et al. 2018).

Also, due to increasing demand for residential and commercial properties and gentrification, land prices and rents have escalated, forcing low-income earners to relocate to the outskirts of the city (Yalley and Ofori-Darko, 2012), and this is attributed to the discovery and exploitation of oil. Yalley and Ofori-Darko (2012) further asserted that the increase in demand for housing

by expatriates and local skilled labour contributed to the increased rent and consequential ejection of tenants who could not afford to pay the higher rent being charged by landlords. This resulted in low-income earners moving out of the city to settle on the outskirts where rent and the price of land are relatively cheaper. The lack of affordable housing within the city also forces people to set up their residences in the countryside.

The critical problem of urban sprawl is the sale of lands in the urban periphery to meet the residential space needs of the population. This has resulted in the conversion of prime agricultural lands for urban land uses (residential and, in some instances commercial construction), which in the long run affects the livelihoods of farmers as well as poses a food security threat to the city-region (Lerise et al., 2004) and contributes to climate change (Mensah et al., 2018). According to Obeng-Odoom (2014a), agricultural produce is now being purchased from other districts and regions, increasing food prices due to transportation costs. Arable lands have been purchased by oil companies and real estate developers who have converted them for non-agricultural purposes. As farmers lose their livelihoods, they, in turn, encroach on the forest areas for agricultural purposes, which results in the release of sequestered carbon into the atmosphere and deforestation (Acheampong et al., 2018).

In addition to the effects of sprawl on livelihoods is that of the well-being of the people as access to adequate socio-economic infrastructure tends to be concentrated in the urban core of the metropolis with sparsely distributed facilities in the sprawling peri-urban areas (Owusu and Oteng-Ababio, 2015). The new settlements have poor roads, and an inadequate supply of utility services: water, electricity, and health facilities (Owusu and Afutu-Kotey, 2010). They are exposed to increased flood hazards, including inundation and erosion (Tasantab, 2019). The challenges are ill-addressed because development proceeds ahead of planning.

Overall, the conditions driving sprawl are exacerbated by weak urban governance structures and institutional coordination (Cities Alliance, 2017). Even though the existing legal framework establishes the Metropolitan and Municipal Assemblies (local government) as the primary agents of urban development in Ghana, these institutions are very weak (GoG/MLG&RD, 2010). This is because the current decentralised planning system still operates in a top-down fashion, and local governments lack both the capacity and the political will to plan, design, implement and monitor programmes and policies at the local level. As Doan and Oduro (2011) note, planning functions in urban Ghana are severely hampered by the inability of local governments to direct physical development in an orderly manner, hence the unregulated and out-of-control sprawl of the region.

Coupled with this is the plurality of the land tenure system, which is characterised by legal pluralism, i.e. the co-existence of both customary and statutory land administration in a complex mix and range of institutions claiming rights and authority over land, there is little or no synergy between traditional authorities and the Metropolitan Assembly during the sale of lands. Similarly, government lands are demarcated for uses that may not fall within the metropolis's planning layout, attracting settlers to the vicinity. Thus, indiscriminate sale and land use persistence has facilitated the uncontrollable and haphazard nature of the city's expansion (Cobbinah and Aboagye, 2017). Therefore, it is imperative to address the inconsistencies that exist between socio-economic elements such as traditional land tenure systems, political factors, and building the capacity of planning agencies to execute their mandate. Without effective coordination between traditional authorities and urban planning governance agencies, managing urban sprawl will continue to be challenging and the city unsustainable in diverse ways.

Studies by (Asomani-Boateng, 2002; Cobbinah and Amoako, 2012; Oppong and Yeboah, 2013; *Owusu*, 2013; Mensah, 2014; Cobbinah and Aboagye, 2017; Karg et al., 2019), have

established that Ghanaian cities, particularly Accra, Kumasi and Tamale, are rapidly sprawling and engulfing peri-urban areas and adjoining districts. However, the extent of urban sprawl and its impact on urban dwellers and these peri-urban areas of Ghanaian cities in terms of changing morphology and livelihood dynamics are yet dimly appreciated as these issues transcend the city boundaries.

This study, therefore, seeks to examine and understand the drivers and consequences of urban sprawl in the Sekondi-Takoradi Metropolitan Area. Although there is a proliferation of research on urban sprawl, most of it has been contextualised largely in developed countries where the context of sprawl differs from that of Africa (Cobbinah and Aboagye, 2017)). Research on Africa where the consequences seem ominous focuses on sub-urbanisation and peri-urbanisation (e.g., Simon et al., 2004; Mattingly, 2009; Cobbinah et al., 2015). Without an understanding and research into the dynamics and ramifications of urban sprawl, it may be difficult for African cities to achieve compact and sustainable cities. Cobbinah and Aboagye (2017) assert that few authors have attempted to evaluate urban sprawl's characteristics, causes, and effects. Consequently, questions on urban sprawl remain unanswered in developing countries in Africa. To this end, this research intends to fill this gap and contribute to the body of knowledge of the urban dynamics ongoing in Ghanaian cities by analysing and comparing the drivers and the social and environmental consequences of sprawl across six communities with varying socio-economic status from the perspectives of the urbanites in STMA and to ascertain whether oil discovery and exploitation have facilitated sprawl as asserted.

Also, other studies on Sekondi-Takoradi Metropolis have focused on changes in land cover (Stemn and Agyapong, 2014; Kumi-Boateng et al., 2015; Acheampong et al., 2018) and urban expansion (Owusu and Afutu-Kotey, 2010; Aduah and Baffoe, 2013; Obeng-Odoom 2014b) as well as oil (Obeng-Odoom, 2013; Obeng-Odoom, 2014a, Fiave, 2017), transportation (Mahama, 2012; Obeng-Odoom, 2015; Yankson et al. 2017) the effect of oil discovery and

exploration on livelihoods, housing and land prices (Yalley and Ofori-Darko, 2012; Obeng-Odoom, 2014a; Obeng-Odoom, 2014c; Adusah-Karikari, 2015; Eduful and Hooper, 2015; Yankson et al., 2017).

All these focus areas have contributed to an understanding of the various issues facing the city; however, there is the need to further understand the social vulnerability beyond changes in livelihood that residents face due to sprawl. This research will fill this gap by examining the social vulnerabilities, including social cohesion, health and crime and insecurity, and the positive livelihood changes occurring within the metropolis due to sprawl.

1.3 Research Questions:

The overarching research questions of the study are as follows:

i. What are the primary drivers of urban sprawl in the Sekondi-Takoradi metropolitan area?

ii. To what extent has the metropolitan area sprawled over the last 30 years?

iii. What are the human and environmental vulnerabilities associated with urban sprawl in the area?

1.4 Research Objectives

The study's primary objective is to obtain insight into the factors spurring sprawl and its socio-environmental consequences on sustainability in the Sekondi-Takoradi Metropolitan Area. The specific objectives of the research are as follows:

i. To provide a historical background of the successive phases of urban development from the colonial period to the present.

ii. To examine the drivers of sprawl in the metropolis.

iii. To analyse the spatio-temporal patterns of land use and land cover changes that have occurred from 1988 to 2018.

iv. To examine the social vulnerabilities of sprawl on the human population.

v. Examine the implications of sprawl on ecosystem change.

1.5 Hypothesis and Propositions

Hypothesis: Urban sprawl in Sekondi-Takoradi affects the livelihood of the inhabitants as disaggregated by socio-demographic characteristics (age, gender, level of education, community of residence, occupation).

H_o: There is no relationship between the socio-demographic characteristics of individuals and the effect of urban sprawl on their livelihoods.

H_a: There is a significant relationship between the socio-demographic characteristics of individuals and the effect of urban sprawl on their livelihood.

Proposition 1: Urban sprawl in Sekondi-Takoradi affects the social well-being of its inhabitants. Social well-being will be assessed in terms of health (spread of disease), security (theft) and social cohesion (whether family members have moved because of sprawl).

Proposition 2: Urban sprawl in Sekondi-Takoradi has affected the ecology communities. This will be determined in terms of land use and land change, increase in surface temperature using GIS/RS, and the perception of respondents on the loss of wildlife habitat, climate change, deforestation and loss of wetlands.

1.6 Significance of Study

Firstly, the fact that urban sprawl facilitates the sale and conversion of prime agricultural lands for residential purposes affects the livelihood of farmers is undisputed (Simon et al., 2004; Zhang et al. 2007; Peprah, 2014; Kuusaana and Eledi, 2015; Codjoe et al., 2016). Urban growth

that is uncontrolled and uncoordinated has both positive and negative impacts on the city region and the people's livelihoods. A broader range of livelihood possibilities, both farm and non-farm, are available to households as spatial expansion occurs, allowing them to engage in different activities to augment their incomes while sharing their land resources (Satterthwaite et al., 2010). As most studies concentrate on the undesirable effects of urban sprawl on livelihoods, this study will be useful in that it will provide the positive economic opportunities households are engaging in as a result of sprawl and that dynamics of social cohesion ongoing in the low-income peri-urban communities as the urban fabric continues to expand. This will be useful for planners to take into consideration as they design spatial plans for the city. They need to incorporate the social determinants and economic activities shaping the city in the planning process.

Secondly, it is a fact that urban spatial expansion changes land use and land cover by decreasing vegetative cover as urban (built-up) areas increase (Weng et al., 2004; Bounoua et al., 2009). Studies have shown that surface temperatures are higher in urban areas than in areas with higher vegetative cover. This study using remote sensing and GIS techniques will establish the spatial relationship between urban areas, vegetative cover and surface temperature over the 30-year period under review (1998 – 2018) to determine the increase in temperature in the urban and non-urban areas over the period. This information will be useful for relevant government organisations such as the Ministry of Environment, Science, Technology and Innovation to know the temperature changes in the microclimate of the metropolis to aid in their efforts to address climate change and environmental degradation issues.

Lastly, some theoretical ideas of the urban spatial structure have been used to discuss the order and growth of the city. These include the concentric zone model, the sector model and the multi-nuclei model. As this study provides a historical background of the successive phases of urban development from the colonial period to the present (oil boom phase), it will use these

theories to determine how the spatial structure of the metropolis has been shaped over time. Such information would be useful to PPD, MLGRD, Ministry of Roads and Highways as their planning and development interventions impact the spatial expansion that occurs in the metropolis.

1.7 Scope of Study

This study will focus on Sekondi- Takoradi Metropolitan Area, which is undergoing urban development at an accelerated rate and seeks to understand the implications of the accelerated development on the city's sustainability. Results emanating from the study represent the drivers and consequences of sprawl in the selected study communities at the point in time when the study was being undertaken. Furthermore, both structured and unstructured interviews conducted with respondents and informants during the fieldwork focused largely on the research questions. In the course of the analysis, however, efforts were made to relate the findings to ongoing issues within the study communities and the metropolis as a whole while keeping in line with the parameters of the research questions.

1.8 Definition of Key Concepts

Relevant to this study is the need to explain or define basic concepts and terms used. This is necessary because most concepts in the social sciences tend to have a variety of meanings in different contexts (Bechhofer and Paterson, 2012).

Urban sprawl: The outward physical expansion of the city which occurs in an unplanned and haphazard manner. It encompasses converting land resources to accommodate new urbanisation in a haphazard, uncontrolled, and uncoordinated housing expansion in the urban-rural fringe (Peprah, 2014).

Wellbeing: According to Dodge et al. (2012:230), "well-being is when individuals have the psychological, social and physical resources they need to meet a particular psychological,

social and physical challenge". In this study, well-being is operationalised to be the state of being healthy, and safe, having access to basic social services and having social cohesion within the family and community. These indicators are operationally defined as follows:

Health: According to the World Health Organization, health is the state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. However, for this research, health is operationalised to mean the state of being free from illness or injury. For this reason, the study looks at the disease burden suffered as a result of sprawl. The mental and social well-being of the WHO definition of health is captured under the social cohesion indicator.

Social cohesion: Durkheim (1897) defines social cohesion as the characteristics of interdependence between individuals of a society and coins social cohesion as (i) the absence of latent social conflict and (ii) the presence of strong social bonds. Lewin (1946) perceives social cohesion as individual behaviour that is a product of both the person and social environment, relating the individual's agency to what the surrounding social context affords them. Bearing these definitions and perspectives in mind, this research operationalises social cohesion to be the changes in the relationship at the family level (both nuclear and extended) whether urban sprawl has facilitated integration or disintegration of the family and at the community level examines how the indigenes perceive migrants (as cited in Fonseca et al., 2019).

Crime and insecurity: According to Ghana's Criminal Code (Act 29, 1960), crime 'means any act punishable by death or imprisonment or fine' (Government of Ghana [GoG], 2001). In essence, crime can be described as breaking the rules or regulations or deviant behaviour that violates prescribed norms or values and is frowned upon by society (Wrigley-Asante, 2016). In this study, crime means an action or omission that constitutes an offence and is punishable

by law, fine or imprisonment within Ghana. Individual perception of insecurity concerning crime is examined from the victimisation theory, which posits that victims of crime feel less safe than those who have not been victims (Garofalo, 1979; Skogan, 1990; Hale, 1996; Bissler, 2003;). Thus, crime and insecurity are operationalised to mean the action of crime or stealing that affects how safe or unsafe an individual or group of people feel.

1.9 Organisation of Thesis

There are eight chapters in this thesis. Chapter one introduces the theme, research questions, objectives and hypothesis. The pertinent literature on urban sprawl and its consequences on the sustainability of cities are reviewed in chapter two. This review considers defining key concepts, theories driving the study, policy and institutional framework shaping urban sprawl, and conceptual framework. A description of the study area, research approach and techniques of analysis are found in chapter three.

The findings and analysis of the study are discussed in chapters four, five, six and seven. The fourth chapter provides a historical background of the origins and growth of urban developments in Sekondi-Takoradi from the pre-colonial era to the oil boom and uses urban theories of spatial development to determine how the metropolis has developed over time. This is to set a stage for the various economic developments that have occurred and how that has facilitated sprawl.

Chapter five examines the function of the state, civil society and market forces in facilitating sprawl using a systems approach; and answers research question one. The underlying drivers of sprawl within the metropolis are its economic base and population/demographic growth. As these increase, there is increased demand for commercial, industrial and residential spaces which are either planned or unplanned. The choice of location is urged by proximate reasons

such as accessibility, land and housing affordability, preference for a serene environment and family relocation/migration, coupled with weak urban governance, which has occasioned sprawl within the metropolis.

Chapter six explores the extent to which sprawl has affected livelihoods, household quality and health; and presents respondents' perspectives on crime and insecurity, disease burden, the impact of sprawl on social cohesion, and emerging employment opportunities and livelihood changes resulting from sprawl. This chapter provides insight into the effects of urban sprawl on livelihood and quality of life and answers the human vulnerabilities aspect of research question three.

Chapter seven explores the extent of sprawl in Sekondi-Takoradi over thirty years (1988 – 2018). It highlights the extent of spatial expansion in the city through the various phases of economic development. It also looks at land use and land cover changes, increases in surface temperature, and other consequences of sprawl on the environment. Chapter seven answers research question two and the environmental vulnerabilities aspect of question three.

Conclusively, chapter eight links the main results of the study and the conclusions made. It deduces additional knowledge generated, its policy implications, as well as suggested future areas of research.

CHAPTER TWO

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1 Introduction

This section provides a careful review of current literature from scholarly articles, books, surveys and other sources relevant to urban sprawl. It begins by discussing the concept of urban sprawl and the policies and institutional frameworks shaping sprawl. It further discusses the drivers and consequences of urban sprawl and urban sustainability. Following this, the chapter discusses theories that explain the urban spatial structure and how it influences sprawl. The last section of the chapter presents the conceptual framework of the study.

2.2 General Overview of Urban Sprawl

Two interrelated facets of contemporary urban growth – population size and physical patterns of expansion – have received unequal attention from urban researchers. Urban expansion urged by population growth undertakes diverse forms, with distinct outcomes for quality of life, the environment and urban governance (Angel, 2006). What has arisen as a new challenge to the growth of urban areas in the 21st Century is the pressure of numbers and the pressure that comes from the forms of consuming space in a globalised world. These patterns and how they challenge the sustainable future of cities are still insufficiently understood (Hogan and Ojima, 2008, Kew and Lee, 2013).

Urban sprawl is often discussed without a permanent definition but describes undesirable patterns of development. It is generally described as haphazard, poorly planned/unplanned, uncontrolled, separated land uses and car-dependent communities, uncoordinated expansion of low-density buildings occurring at the peripheries of urban centres (Bourne, 2001; Frumkin,

2002; Bhatta, 2010; Owusu,2013; Altieri et al., 2014; Sinha, 2018; Akubia and Bruns, 2019 and Yiran, 2020).

Urban sprawl is a phenomenon that occurs globally in both developed and developing countries. Urban sprawl in the United States has its origins in the flight to the suburbs that began in the 1950s when people desired to live outside of city centres to avoid traffic, noise, crime, and other problems, and to have homes with more extensive square footage and yard space (Ewing et al., 2003). According to Jaret et al. (2006), racial segregation in the United States propelled urban sprawl as Hispanics and Blacks lived in the inner cities and Whites lived in the suburbs to avoid mingling with ethnic minorities. As the suburban areas urbanised, cities expanded in geographic size quicker than they grew in population. As demand for land in the United States continues to increase, it resulted in the areal extent growing ahead of population, leading to urban sprawl as there is an increased expansion of developed land in contrast with a decline in population density. This trend has produced large metropolitan areas with low population densities interconnected by roads. Residents of sprawling cities tend to live in single-family homes and commute to work, school, or other activities by automobile (Frumkin, 2002). Therefore, people who live in large metropolitan areas often find it difficult to travel even short distances without using a car because of the remoteness of residential areas and the inadequate availability of mass transit, walkways, or bike paths.

Although initially a North American phenomenon (Adaku, 2014), significant research points to the importance of sprawl in other regions of the world as well. Sprawl is rising even in Europe, where cities have traditionally been associated with compact urban design (Bae, 2004). Sprawl is visible in countries with high population density and high economic growth, such as Belgium, the Netherlands and Northern Italy. Countries that have gained from European Union policies also show manifestations of sprawl, especially along the coastal regions of Europe where massive population growth is resulting in the continuous development of sprawl.

However, the situation is different in China, where urban sprawl results from low-density urbanisation primarily from industrialisation and population growth, not excessive suburbanisation like in Europe and the United States. A study by Qi and Lu (2008) showed that wealthy people in China prefer to live in the central cities to enjoy a better environment and excellent public services; while those who cannot afford to live in the central cities move to the suburbs and sacrifice access to a better environment and public services. Urban sprawl on the fringes of Beijing is attributed to growing local autonomy and fiscal responsibilities, indicating the role of policy in facilitating sprawl. According to Fang and Pal (2016), China's local government is leasing out more land which generates up to 70% of the city's revenue, thereby facilitating sprawl.

In the developing world, "Africa has experienced the highest urban growth during the last two decades at 3.5% per year, and this rate of growth is expected to hold into 2050 (African Development Bank, 2013). With a predominantly youthful population, this means the rate of growth will not slow down anytime soon. Sub-Saharan Africa is regarded as the world's fastest-urbanising region, with an urban population of about 472 million, and this projection is expected to double within the next (Yiran et al., 2020). The rapid rate of expansion that Sub-Saharan African cities are experiencing has resulted in the outward expansion of cities into their surrounding rural areas (Liu, Yue and Fan, 2011; Wilson and Chakraborty, 2013; Gyasi et al., 2014; Fuseini, Yaro and Yiran, 2017; Ablo et al., 2020).

Africa's current rate of growth exceeds the capability of city authorities to provide adequate, affordable housing as urban planning and development across Africa have not kept pace with the rapid rate of urbanisation. "To bridge the housing gap, many governments have liberalised the housing sector to allow for private sector participation in housing provision, and this has contributed to the rapid expansion of most cities beyond their boundaries" (Yiran et al., 2020 page 2). The rapid development of cities often results in the uncontrolled and haphazard

expansion of a city (Johnson, 2001). This leads to the intrusion of urban land use on rural land. This occurs as cities expand beyond their formal administrative boundaries and encroach on neighbouring rural areas by absorbing all the towns and villages that lay on their growth path (UN-HABITAT, 2010; Yiran et al., 2020), thereby diminishing the spatial segregation between urban and rural areas. The transformation of the rural landscape due to urban sprawl has significant implications for agriculture and food security (Bristow and Kennedy, 2013).

The growth of cities in the developing world continues to be dynamic, diverse and disordered and increasingly land and space-intensive, requiring large amounts of land, mostly prime agricultural land to be converted to urban land use such as residential construction in the urban periphery to contain the increasing urban population (UNFPA, 2007). It is also characterised by low-density developments, which could be attributed to the lower land prices on the city's outskirts (Ablo et al., 2020).

2.3 Policy and Institutional Framework Shaping Urban Sprawl In Ghana

Urban sprawl has been on the rise in Ghana as economic development policies did not include spatial development planning in their implementation. The 1940s saw the promulgation of the CAP 84 – Town and Country Planning Ordinance (Sarfo, 2020). Since its inception in 1945, the Town and Country Planning Ordinance of 1945 (CAP 84), TCPD (currently PPD) was in charge of the "orderly and progressive development of land, towns and other areas, whether urban or rural, to preserve and improve the amenities thereof, and for other matters connected therewith" (CAP 84 of 1945:1). This marked the beginning of urban planning and preparations of plans nationwide (Cobbinah and Darkwah, 2017; Acheampong, 2018). However, the spatial planning mimicked the British Town and Country Planning Act Ordinance of 1932, which was characterised by large plot sizes with a minimum plot size of 70ft by 100ft did not encourage densification but rather intensified the development of low-rise buildings with large open spaces (Adarkwa, 2012; Owusu, 2013).

Although this land use planning framework has become obsolete and ineffective as the country is undergoing rapid urbanisation and urban growth (Owusu, 2008), it has guided development control and land use planning in Ghana for about 70 years. Founded on Ghana's previous centralised governance structure, it is as a consequence not in alignment with the current irreversible policy on decentralised governance. Planning powers were bestowed on the Minister, as such planning was done piecemeal and at the directive of the Minister (Acheampong, 2018). CAP 84 objected to providing progressive and orderly development, be it urban or rural and for the improvement and preservation of facilities in such areas where development was taking place (Sarfo, 2020). Thereby accounting for the haphazard spatial development that has occurred in the country over the years.

According to the constitutional provision of the decentralisation of governance in the country, the Local Government Act, 1993 (Act 462) was promulgated. It heightened the District Assembly's (DA) mandates to ensure the inclusive development and growth of areas under local governance. Under Act 462, the District Planning Authority (DPA) is given the authority to grant permits for physical development. It is mandatory that no development should be carried out without the prior approval of the DA. It was observed that this autonomous provision had been subsequently affected by the provision in National Building Regulations 1996 (LI 1630). While Act 462 gives the DPA the authority to alter, remove, prohibit or demolish any development undertaken without a permit or regard for the conditions prescribed for the development, LI 1630 (section 8) permits a developer to develop if they are uninformed about the decision concerning their application within 3 months. This provision creates practical difficulties, for the reason that most applications for building permits, in practice, are not approved within three (3) months and encourage the occurrence of spatial development ahead of planning in an uncoordinated manner.

In addition to Act 462 was the promulgation of Act 480 (National Development Planning System Act,1994), which presented the legal basis for planning at all levels in Ghana. It empowers the National Development Planning Commission (NDPC), in consultation with the Ministry responsible for Local Government, to recommend that the President designate any area required for special purposes in the national interest as a Special Development Area (Sarfo, 2020). This leads to vacant lands being held in urban areas for government use and pushes further residential and commercial developments within the city, thereby facilitating lateral expansion dotted with vacant lands.

Additionally, Ghana has undertaken numerous economic development policies, which include Ghana Vision 2020, Ghana Poverty Reduction Strategy (2003-2005); the Growth and Poverty Reduction Strategy (2006-2009) and the Ghana Shared Growth and Development Agenda (GSGDA I and GSGDA II implemented in 2010-2013 and 2014-2017 respectively) (Sarfo 2020). These national policies addressed social and economic issues, poverty alleviation and macro-economic stability to the neglect of spatial planning and management of human settlement. This is due lack of coordination in the development planning process. According to Acheampong & Ibrahim (2016), the various MMDAs almost always work in isolation: District Planning Unit is mandated to prepare Medium-Term Development Plans, whereas Town and Country Planning is concerned with development control and land allocation. As such, as the country's economic base is growing, there is a corresponding increase in population, which places a demand on space that is not adequately planned.

Finally, to address the lapses in the various land-use planning laws (Cap84, Act 462 and Act 480), were revised and consolidated in the Land Use and Spatial Planning Act, 2016 (Act 925) to make land-use planning laws applicable in contemporary times. It also acknowledges and makes provision for spatial aspects of socio-economic development, promotes sustainable land and human settlement development through a decentralised system of planning, aims to

improve quality of life by ensuring prudent use of land and provides regulations of national, regional, district and local spatial planning (Land Use and Spatial Planning Act, Act 925, 2016). This Act, however, also makes provision for special development areas for the government. The undue political interference in planning also contributes to the failure of District Assemblies to effectively plan the growth of human settlements in Ghana (Yeboah and Obeng-Odoom, 2010).

2.4 Drivers of Urban Sprawl

Various factors have been identified as the key drivers of sprawl in Sub-Saharan Africa. Notable among them is population growth (Bhatta et al., 2010; Osman et al., 2016) stemming from natural increase and rural-urban migration (Ablo et al., 2020). Ghana has moved from a predominantly rural country to an urban country, with over half (50.9%) of its population reported to be living in urban localities in 2010 (GSS, 2014b). Urban sprawl in Ghana occurs due to the conversion of land resources to accommodate urban growth and the uncontrolled and uncoordinated expansion of housing (Peprah, 2014). Ghana's population has witnessed not only rapid growth but also rapid urbanisation since independence. This has been fuelled by policies during the colonial period, which has been largely sustained through the post-independence era and the interplay between natural population increase and migration.

According to Adarkwa (2012), during the colonial period, two main structures were evident in the spatial economy of the country. A centre-periphery structure emerged with the centre consisting of a forest belt where the production of raw materials was concentrated, and Kumasi was the centre of this system. The second type of growth region consisted of coastal towns, which played a crucial role in import-export activities, with Sekondi-Takoradi and Accra becoming the most important centres. These three towns – Accra, Kumasi and Sekondi-Takoradi thus monopolised much of the modern social infrastructure in the country (Songsore,

1979; Songsore, 1989). The result was an increase in the population of these towns. Coupled with population growth and industrial development, land resources in these cities are changed to accommodate new urbanisations and cities sprawl when there is an uncontrolled and uncoordinated expansion of housing.

Deregulation and liberalisation of economies through implementing the International Monetary Fund (IMF) and World Bank-led structural adjustment, and economic recovery programs have contributed significantly to rapidly sprawling cities. Deregulation of the housing market allowed private developers rather than government to meet the housing needs of the increasing urban population. This authorised real estate companies and private individuals to acquire land and develop residential facilities to bridge the growing housing gap. Unfortunately, however, is the fact that liberalisation was not backed by proper planning and zoning of cities, resulting in development outpacing planning schemes (Ablo et al., 2020). Planning institutions are saddled with corruption, government interference, and limited budget and logistical support, making them ineffective in enforcing building and planning regulations. The available planning schemes do not include areas where newly developed residential facilities have been constructed. This allows developers to build without adhering to planning regulations (Yiran et al., 2020).

According to the UNFPA (2007), urban sprawl is partly fuelled by land speculators nurtured by the prospect of rapid urban growth holding on to land in and around the city, expecting land values to increase. This allows cities to expand their footprints and reduce their densities and sprawl while empty plots of land remain in inner-city areas. Speculation produces withholding of land for development which is one reason for discontinuous development. This is evident in Sekondi Takoradi, where private individuals and real estate developers buy land in anticipation of urban growth due to oil exploration and discovery in the Western Region.

An unregulated land market is pervasive in Ghana and creates an enabling environment for sprawling to occur. Leasing or selling of land occurs without any regulatory framework despite the availability of many land laws (Fuseini and Kemp, 2015; Cobbinah and Aboagye, 2017). Lands in Ghana are under the ownership of traditional authorities by their custodian role of 80% of all lands in Ghana; they have taken up the responsibility of determining when, where and what use a piece of land should be put to through their private surveyors. This has facilitated a gap in land development and management as traditional authorities set their prices for land at different locations within the town without any institutionalised framework. With varying land prices within the major cities of Ghana, people are attracted to purchase land in areas with lower land prices. This situation contributes to rapid physical development and urban sprawl.

Access to infrastructural facilities and social amenities has also spurred sprawl in Ghana. Development of dual road corridors and access to good road networks in the periphery areas and the ability to extend the needed basic social amenities such as water and electricity to the outskirts facilitates relocation to the peri-urban area (Amoateng et al., 2013; Owusu, 2013; Fuseini et al., 2017, Yiran et al., 2020). Middle-income earners who move to suburban areas have cars and require roads. However, because the peri-urban areas tend to fall outside the planning zones of the cities, there are no roads; as such, it becomes the responsibility of the residents to pool resources and clear a path to their properties. It is only after the area has densified that paved roads are sometimes constructed. A similar manner is embarked on to gain access to electricity, whereby individuals buy poles and erect them near their properties and electricity companies only connect the premises to the power supply. For water, many use groundwater by drilling boreholes on their compounds or rely on water tanker services until the water supply company extends supply lines to the area. These issues are not difficult for

the affluent to resolve since their comfort is a priority, and therefore this contributes to fuelling sprawl (Yiran et al., 2020).

The changing preferences of people also facilitate urban sprawl due to their income levels. The rising numbers of people in the middle income and their varied preferences in the location of housing are influenced by their need and preference for a serene environment, away from the noise, the hustle and bustle of the city (Amoateng et al., 2013; Oppong and Yeboah, 2013, Yiran et al., 2020). The desire to own one's own home and avoid issues associated with renting also drives people to build where the land is relatively affordable and available (Oppong and Yeboah, 2013; Adaku, 2014).

In addition, Owusu-Ansah and O'Conner (2010) report that the growing middle-class population in Ghana has led to increased housing demand with a common perception associating higher social standing with having a house in peri-urban areas. In their study, house owners explained that there is higher social standing associated with owning a house and supporting family members and friends by providing accommodation for them. Corroborating studies such as (Yalley and Ofori-Darko 2012), whose findings emphasise an increasing preference for detached and semi-detached housing and rising demand for relatively lower-cost land that can be easily purchased and developed to provide accommodation for those in need.

The drivers of sprawl are not mutually exclusive but inherently interlinked and operate and interact at different spatial scales at the global, regional, national and local levels. Specifically, population increase, unregulated land market, individual preference, access to transportation and basic social amenities, government policies, and urban planning failures drive urban sprawl in Ghana.

2.5 Consequences of Sprawl

The consequences and significance of sprawl, good or ill, are evaluated based on its socio-economic and environmental impacts. Often these are overlapping, or one may have several indirect impacts. However, the major consequences of urban sprawl can be summarised as follows:

Increased infrastructure and public service cost more to provide as urban sprawl reduces residential densities., the cost of providing infrastructure facilities such as electricity, water, and roads is higher per person or house in the urban fringe than in high-density central areas. Studies have established that people in sprawling areas generally lack access to such facilities because it is relatively costlier in providing such services than in high-density areas (Barnes et al., 2001).

Energy inefficiency: Urban sprawl causes more travel from the fringes to the central city and thus more fuel consumption. Furthermore, it also causes traffic congestion, eventually resulting in more fuel consumption (Newman and Kenworthy, 1988; Bhatta, 2010). There is also a cost associated with extending electricity and maintaining the service delivery system, as the farther from the generator, the more power is lost in distribution.

In areas where sprawl is not controlled, the concentration of human presence in residential and industrial settings may alter ecosystem patterns and processes (Grimm et al., 2000). Development associated with sprawl not only decreases the amount of forest area (MacDonald and Rudel, 2005), farmland (Hedblom and Söderström, 2008), and open space but also breaks up what is left into small chunks that disrupt ecosystems and fragment habitats (Bhatta, 2010). Roads, power lines, and pipelines often cut through natural areas, fragmenting wildlife habitats and altering wildlife movement patterns. The fragmentation of a large forest into smaller patches disrupts ecological processes and reduces habitat availability for some species.

Sprawl particularly contributes to the loss of farmlands and open spaces (Zhang et al., 2007), thereby creating a vicious cycle of poverty for the farmers who hitherto depended on the land for their livelihood. It has been estimated that about 80 percent of urban expansion within the next 30 years will occur in croplands and forests with serious impacts on water bodies and wetlands. Such rapid cropland conversions also have obvious implications for food security and climate change consequences (d'Amour et al., 2017). Loss of farmlands leads to loss of productive agricultural land, decrease in food production, loss of agricultural labour, increased food prices and food insecurity which affects not only the livelihood of the farmers but has consequences for the broader community (Simon et al., 2004, Amoateng et al., 2013, Peprah, 2014, Kuusaana and Eledi, 2015; Codjoe et al., 2016).

Urban growth and sprawl lead to increasing imperviousness of surface areas, increasing total runoff volume. So urban areas located in flood-prone areas are exposed to increased flood hazards, including inundation and erosion (Jacquin et al. 2008). Additionally, heavy rainstorms occurring in cities and towns with inadequate systems for managing rainwater can cause untreated human sewage to enter waterways (*combined sewer overflow*), thereby affecting water quality and leading to the outbreak of diseases such as cholera (Rain et al., 2011; Amoateng et al., 2013; Cobbinah et al., 2015).

Urban growth, both in population and urban extent, transforms the landscape from natural cover types to increasingly impervious urban land. This change can significantly affect local weather and climate (Bounoua et al., 2009). Weng et al. (2004) established a positive correlation between land surface temperature and impervious surfaces as the alteration of land cover modifies the urban climate, causing it to be warmer than the surrounding rural environment (Bhatta, 2010). The increase in surface temperature in urban areas could potentially result in meteorological events like modifying precipitation pattern levels (Voogt et al., 2003, Kumi-Boateng et al., 2015). It also directly affects the increased demand for energy

to power fans, air coolers, water coolers, and air conditioners, requiring power plants to increase their output, resulting in higher emissions of pollutants generated by the plants.

Urban sprawl is also cited as a factor of air pollution (Stone, 2008) since the car-dependent lifestyle imposed by sprawl leads to increases in fossil fuel consumption and emissions of greenhouse gases which contribute to global warming and has serious health implications (Stoel, 1999; Bhatta, 2010, Ackom, 2016). Air pollution remains a major challenge globally and accounts for about 7 million premature deaths every year, largely as a result of burning fossil fuels to produce electricity and emissions from vehicles ("Pollution Action Note", n.d)

Lastly, it is important to point out that the consequences of urban growth may have both positive and negative impacts; however, negative impacts are generally more highlighted because this growth is often uncontrolled or uncoordinated. Therefore, the negative impacts override the positive sides. Positive implications of urban growth include increased economic production, employment opportunities, better life because of employment opportunities and better services, and better lifestyles. Urban growth can extend better basic services (such as transportation, sewer, and water) and other specialist services (such as better educational facilities, and health care facilities) to more people. However, these benefits are overshadowed by the uncontrolled and uncoordinated manner in which urban growth occurs, resulting in sprawl (Yiran et al., 2020). Urban sprawl, in the long run, affects the sustainability of the city.

2.6 Implications for Sustainability

Sustainability involves the conservation of ecosystems and their services while simultaneously providing for the needs of humans (Goonetilleke et al., 2014; Yiran, 2020). It is fixed on nurturing adaptive potentials and creating opportunities to preserve or attain desirable economic, social and ecological systems for current and future generations (WCED, 1987; Holling, 2001; Folke et al., 2002).

SDG 11: making cities and human settlements inclusive, safe, resilient and sustainable, acknowledge sustainable urban development as a fundamental precondition for sustainable development. This is consistent with the Brundtland definition of sustainable development, that is, a development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). With nearly 56% of the world's population living in cities today, the number of urban dwellers has enormous potential to change the morphology of urban and rural areas (Buchholz, 2020). This threatens cities with social conflict, environmental degradation, and basic services collapse (Basiago, 1998). One of the main consequences of rapid urban development, which undermines sustainability is urban sprawl. Urban sprawl produces economic, social and environmental costs occasioned by the inefficient use or consumption of natural resources (Bovet et al., 2018)

As such, urban sustainability should be viewed from an integrated economic, social and environmental perspective (Khan, 1995). "Economic sustainability of a city is its potential to reach qualitatively a new level of socio-economic, demographic and technological output which in the long run reinforces the foundations of the urban system" (Nijkamp and Perrels, 2014). From the environmental sustainability perspective, Agyeman and Evans (2006) posit that urban sustainability encompasses the pursuit of an urban form that integrates land development and nature preservation and places the development of land in cities and the protection of natural systems into a state of equilibrium. Lastly, social sustainability embraces concepts of empowerment, equity, participation, sharing etc., thereby preserving the environment through economic growth and poverty alleviation (Shirazi and Keivani, 2017).

According to Nilsson et al. (2014) and Alawadi (2017), the development of green compact cities can lead to sustainable development. This is because the primary strategy of compact development plans is sustainable transportation, mixed land use, vertical development,

densification, green space and diversity, thereby making it able to contribute to environmental, social and economic goals of sustainability (Bibri et al., 2020; Yiran, 2020).

It is established from the literature that urban sprawl is a global phenomenon with varying underlying drivers and has economic, social and environmental consequences. Since the drivers and consequences of sprawl differ across continents, it is important to fill the gaps in knowledge and literature by examining the drivers, extent of sprawl and the social and environmental vulnerabilities associated with sprawl in an African secondary city.

2.7 Theories of Urban Spatial Structure

Over the years, various models of urban ecology have emerged that sought to conceptualise how humans exploit urban space to meet their different economic and social needs. The boundaries within such environments are continually changing-largely as an outcome of demographic and economic forces of attraction. The classical theories of urban spatial structure, including the Concentric zone model, Sector model and Multiple nuclei model, are designed to show the spatial arrangements of land use areas in a city. Although the study is not essentially concerned with testing these models, it focuses on determining the extent to which these models can be used to explain the spatial configuration of the city as it sprawls.

The Concentric zone model (Burgess, 1925) states that "cities have the propensity to develop from the centre to form a series of concentric sectors". The growth occurs due to centripetal forces from an original core, and as expansion occurs, each inner zone tends to widen its area by overrunning the next outer zone. This cycle is known as invasion-succession. As growth occurs, each inner zone tends to invade the next. However, the rate of progression of this rippling tendency depends on economic expansion in the city and the population growth rate. In contrast, when urban areas are decreasing in population, the outer zone tends to remain stationary, but the inner fringe of the transitional zone tends to recede into the commercial

district (Albrechts, 2004). This model is useful in explaining urban sprawl as lands in the periphery are being absorbed into the urban area. However, the limitation of this model is that it was not able to explain the dynamics within each zone which leads to the invasion of the outer zone.

The Sector model (Hoyt, 1939) emphasises the influences of the transportation network and can be seen as a modification of the Burgess Concentric Zone Model of city development. The application of the sector model allows for an outward progression of growth. It concurs with the existence of a CBD and suggests that zones enlarge from the city centre along railroads, highways and other transportation arteries. Hoyt further claimed that the location and extension of high-quality zones tend to proceed fastest along existing transportation lines and towards another existing nucleus of trading centres. This is useful in understanding the development and location of communities in STMA along the railway, harbour and major roads. The critique of this model is the fact that its basis is on early twentieth-century rail transport and does not make allowances for private cars that enable commuting from cheaper land outside city boundaries.

The Multiple nuclei model (Harris and Ullman, 1945) is built on the premise that frequently there are a series of nuclei in the pattern of the urban land uses rather than a single central core. This model introduces the element of sub-business districts. The emergence of polycentric urban landscapes often reflecting suburban business districts provide alternative centres to promote more activity and population diffusion from the core of the urban area. This applies to STMA in that, Sekondi and Takoradi are two separate cities that have been merged and economic and residential development have occurred after the economic and transport hubs in each of the twin cities. The critique of this model is the clarification of the characteristics of the nuclei. It requires a clearer differentiation between factors explaining the structure and dynamics of change.

In addition to the classical models, social determinants of land use, which are about how social values shape land-use patterns in cities and how man adapts to his environment, will also be used to understand the drivers of sprawl in the study area.

2.8 Conceptual Framework

This study's conceptual framework, drivers and outcome of urban sprawl, lays out the interconnects between the various actors that drive urban sprawl and the environmental and social components of sustainable development. It is modelled after two frameworks: Fang and Pal's (2016): "The Drivers of Urban Sprawl in Urbanising China – A Political Ecology Analysis" and Satterthwaite et al. (1992) "Component of Sustainable Development" which will be used to examine various aspects of the study. The underlying tenets of the two frameworks are discussed in the subsequent subsections.

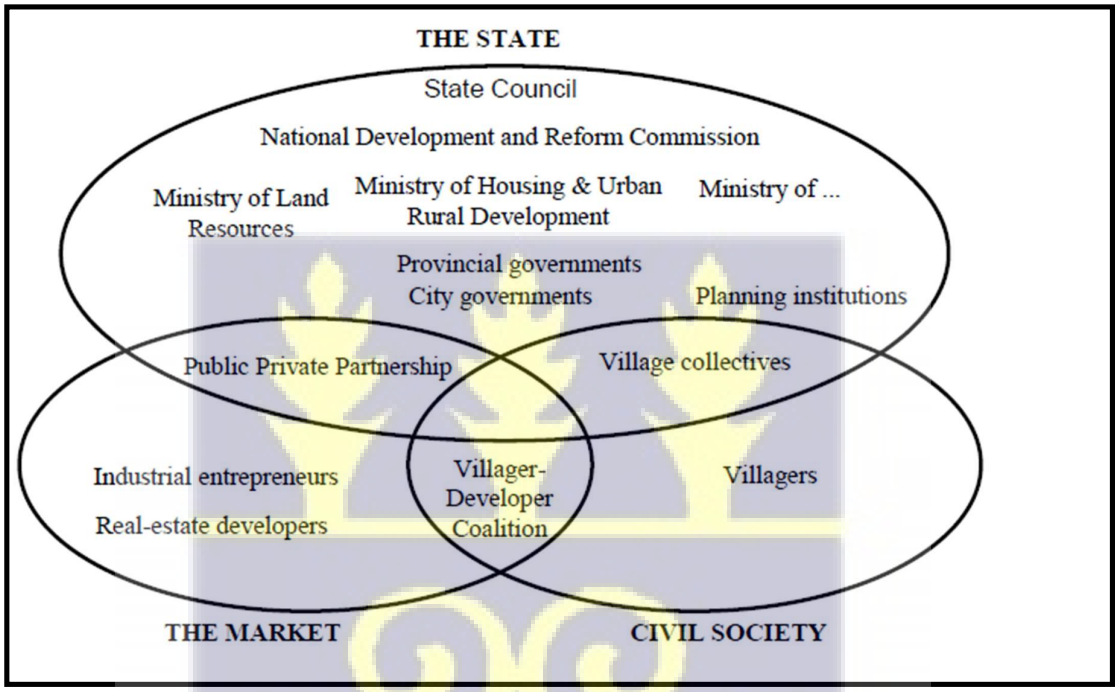
2.8.1 Framework 1: Actors Driving Urban Sprawl

The drivers of urban sprawl lay out the linkages between the various actors spurring excessive land consumption as shown in Figure 2.1. These actors are institutions that fall within the state, various private sector businesses and the civil society that drive demand for land and changes in land use. This framework was originally used in the work of Fang and Pal (2016).

Land in China was treated as means of production and was allocated by the state free of charge during the socialist era. The country had an objective to maintain its socialist principle of public ownership and accommodate the interests of foreign investors' interests. To achieve this objective, the Chinese state separated land use right from land ownership in 1980. The land reforms also led to increased demand for land, resulting in massive land development (the rate of conversion of agricultural land to non-agricultural use was two and a half times faster than previously) (Wong and Zhao 1999, Guo, 2001).

Urban lands in China are under the management of the state. In dealing with land management, the state makes several distinctions about land according to its location, ownership and use. "Land in the rural and suburban areas, except for that stipulated by-laws as being owned by the state, is collectively owned by rural residents" (China 1998, Article 8; China 2004, Article 10 as cited in Lin and Ho, 2005).

Figure 2.1: The ecology of actors involved in land conversion in China



Source: Fang and Pal, 2016

The market actors involved aim to maximize profit from the use of the land. The market actors are real estate developers and industrial entrepreneurs. Civil society actors involved villagers who collectively own rural lands without interference from the state.

Applying this model in the context of Ghana, Ghana's land tenure system is dual. A complex mix of customary and state systems (Kasanga, 2002). Customary land tenure is characterized by unwritten laws and norms that are flexible, negotiable and location-specific. It is usually managed by a traditional ruler, a council of elders, or family or lineage heads. The state land system has codified written statutes and regulations. Management is in the hands of

government bodies having delegated authority (Agbosu et al., 2007). In Ghana, the state plays an important role in the land conversion process. These institutions include the Ministry of Water Resources Works and Housing, National Development Planning Commission, and Ministry of Local Government and Rural Development, which oversee institutions such as the Town and Country Planning Department/Physical Planning Department and the Lands Commission.

Over the years, the state land management institutions have failed to manage land holdings in the city for residential, commercial and industrial purposes equitably and mostly favour government bureaucracies and well-to-do individuals with the poorer groups mostly relegated to the background. The state institutions involved in land conversion in the city are inefficient in their dealings resulting in the unplanned nature of land-use change in the peri-urban zones of the city.

Civil society plays a key role in the land conversion process. It is comprised of traditional leaders, residents, Non-Governmental Organizations and opinion leaders. According to Kasanga and Kotey (2001), the traditional or customary sector holds about 80% of undeveloped lands, thus making chiefs, queen mothers and community elders active agents in the land conversion process. In urban and peri-urban areas, increased demand for land for residential purposes results in land disputes and conflict and sometimes the presence of land guards. Increasing population growth and rapid urbanisation have propelled indiscriminate lease and sale of lands to developers leading to sprawl in the peri-urban zones. The Customary Land Secretariat serves as an interface between landowning communities and public sector agencies and provides land administrative services for owners and seekers of customary land rights.

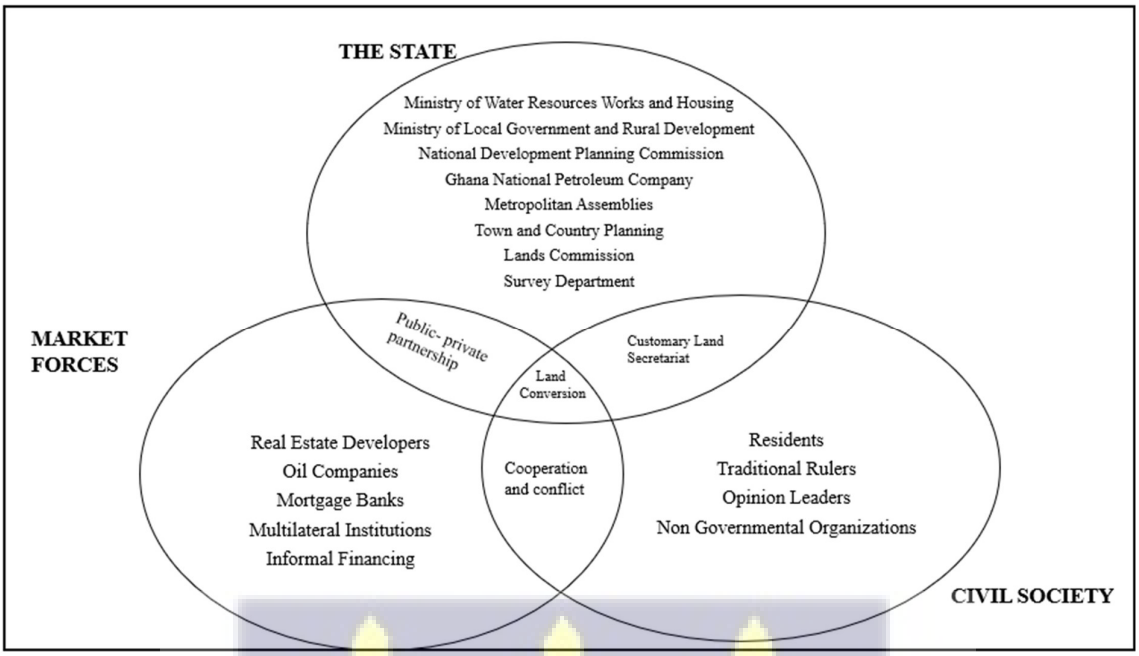
The market also plays a pivotal role in the land conversion process through land speculation by real estate developers, private companies and the like spurs urban sprawl. Real estate companies construct and develop properties for sale, lease or rent. The construction of gated

communities, especially within peri-urban zones, is commonplace in Ghana. Financial institutions and mortgage banks provide financing for those desiring to purchase homes but do not have funds immediately available. This service has made it possible for more people to own homes within the city and peri-urban areas. The discovery and exploration of oil in Ghana have also facilitated land acquisition and conversion of buildings into offices. It has also led to increased rents and land value, thus forcing residents who cannot afford the increased rent to seek accommodation in the peri-urban areas.

The market and state are linked through public-private collaborations where individuals and private organizations undertake projects that involve the acquisition and development of land for the benefit of the state. Although cooperation exists between civil society and the market - when it is a win-win situation for both parties, it is often plagued with conflict, especially when land guards are involved. The various actors involved in land conversion in Ghana are shown in Figure 2.2.

Fang and Pal's (2006) model identifies the three major actors in the land conversion process, which applies to the Ghanaian context. It also shows how China's political centralisation with economic and administrative decentralisation (similar to local governance in Ghana) has facilitated sprawl. The model, however, does not take into account the land plurality that exists in Ghana and how that affects the rapid land conversion process since traditional authorities are mainly custodians of the land in Ghana, whether urban or rural. Additionally, there is no distinction between land use rights and land ownership in Ghana as stipulated by the model. The model also fails to recognise the role of different actors which constitute civil society. NGOs are key players undertaking development interventions in communities aside from traditional authorities and residents. The dynamics unique to the Ghanaian context are incorporated in the adapted model shown in Figure 2.2.

Figure 2.2 Political ecology of actors involved in land conversion in Ghana



Source: Authors construct, adapted from Fang and Pal, 2006

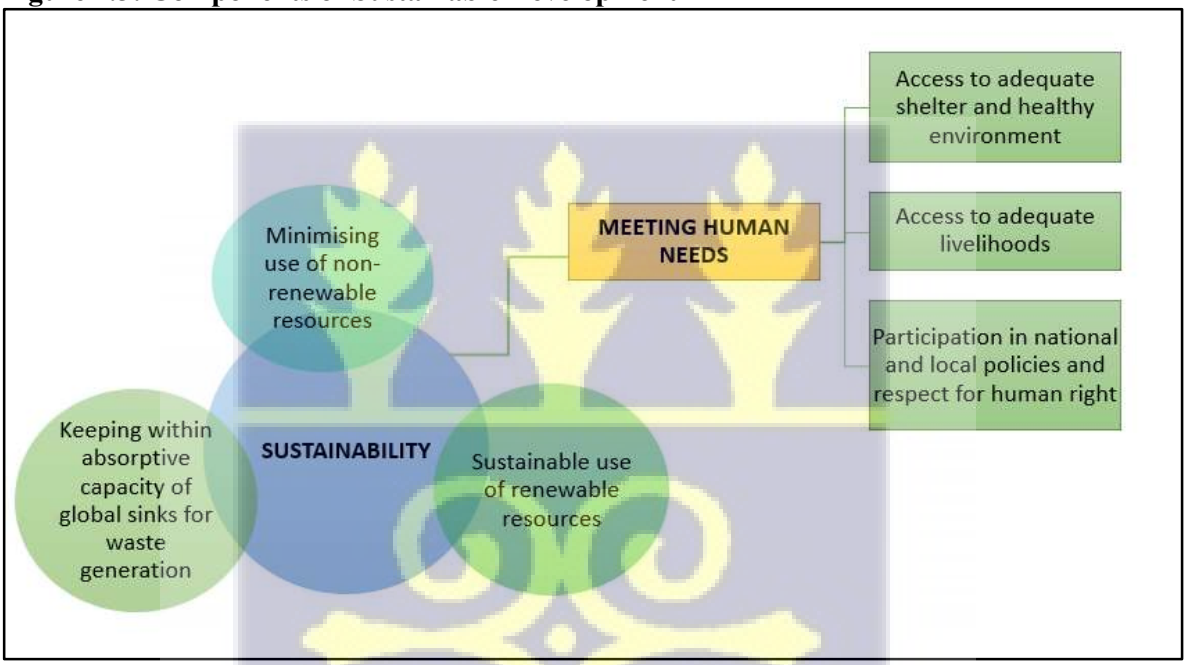
2.8.2 Framework 2: Components of Sustainable Development

Another critical dimension of sprawl to be examined is its outcome on people and the environment. As shown in Figure 2.3, there are two lenses to view the components of sustainable development as adapted from Satterthwaite et al. (1992): ecosystem sustainability and meeting human needs. The consumption pattern within the city and its surrounding rural areas threaten its ecological sustainability (Sathre, 2018). Urban dwellers are producers and consumers of most fossil fuels and other non-renewable resource consumption and generate most urban greenhouse gas emissions because of the concentration of industries and middle- and upper-income households in urban centres (Satterthwaite et al., 1992).

Extraction of non-renewable resources such as gold, bauxite and manganese, timber logging, and drilling of oil and gas for export generate revenue for the country, though also at the expense of its environment. All these resources are predominant in the Western Region, of which Sekondi-Takoradi is the capital city. Coupled with this is the growth in Ghana's

economy and the corresponding increase in energy and greenhouse gas emissions over the last few years. As the economy expands and the population grows, a lot of energy resources are utilized to meet the growing demand in industry, transport and households. Sustainable development is not about cities sustaining themselves but cities and rural areas where inhabitants' development needs are met without imposing unsustainable demands on local or national resources and systems. Therefore, efforts should be made to minimize the scale of resource use, pollution, waste, and greenhouse gas emissions (Satterthwaite et al., 1992).

Figure 2.3: Components of Sustainable Development



Source: Adapted from Satterthwaite et al., 1992: Sustainable Cities.

Meeting human needs is critical to the long-term sustainability of the city. About 70% of urban dwellers in developing country cities are low-income earners who live in 'life and health-threatening environments' because of unsafe and insufficient water, poor quality and often overcrowded shelters, inadequate provision for sanitation, waste disposal and drainage, unsafe housing sites and lack of healthcare (Satterthwaite et al., 1992). Without access to these basic services to meet human needs, the drive towards achieving sustainable development is hindered.

The components of the sustainable development model have been adapted to look at the potential outcome of urban sprawl on humans and the environment. The environmental aspect of this model focuses on minimising the unsustainable demands on local or natural resources. It looks at the impact on the environment on a macro scale to the neglect of the various degradations occurring at a micro-scale, which in the long run feeds into the broader ecosystem change. The adapted model considers the micro-scale impacts on the environment, including deforestation, changes to the microclimate, loss of wildlife and wetlands etc.

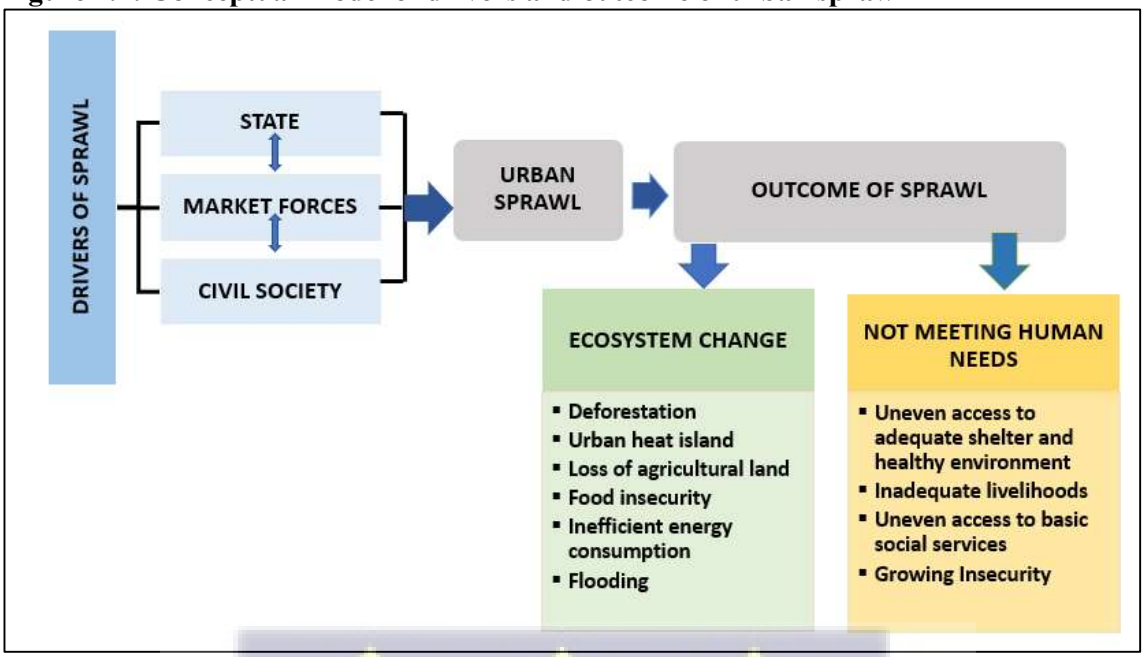
The model of sustainable development developed by Satterthwaite et al. (1992) also takes cognisant of the importance of meeting human needs by providing basic social amenities, adequate housing and livelihoods. However, it does not delve deeper to examine how ecological changes affect human health and social well-being. For this research, the model has been adapted to address the consequences of urban sprawl on access to basic social amenities and services such as water access, sanitation (access to sanitary facilities, drainage and waste disposal), and healthcare facilities; housing quality and its effect on health, the prevalence of diseases, insecurity and social cohesion.

2.8.3 Adapted Conceptual Frame Work: Drivers and Outcome Of Urban Sprawl

A synthesis of the two conceptual frameworks discussed in sections 2.8.1 and 2.8.2 and shown in Figures 2.1, 2.2 and 2.3 is presented in Figure 2.4, drivers and outcome of sprawl.

The merging of the two frameworks enables the author to tease out the specific drivers of sprawl in STMA and how it affects the populace and the environment. This will help provide a holistic view of the role of the various actors in facilitating sprawl, how urban sprawl affects the well-being of the residents and its effect on their immediate environment and how that feeds into the environmental changes in the city-region.

Figure 2.4: Conceptual Model of drivers and outcome of urban sprawl



Source: Authors construct, adapted from Fang and Pal 2016 and Satterthwaite, 1992

2.9 Chapter Summary

The chapter reviewed the literature on urban sprawl globally, in Africa and Ghana. It looked at the drivers of sprawl, the various policy and institutional frameworks facilitating sprawl in Ghana, the general consequences of sprawl and how urban sprawl affects a city's sustainability. It also looked at the classical theories of urban spatial structure and how that influences cities' spatial development patterns. The chapter concludes with a conceptual framework that looks at the drivers and outcomes of urban sprawl from the environmental and social sustainability perspective, which form the two main areas the study will focus on, which is assessing the vulnerability of respondents to the impact of sprawl in the Sekondi-Takoradi Metropolis. The next chapter outlines the research methodology used in obtaining respondents' perspectives on urban sprawl in STMA and its consequences on the city's sustainability.

CHAPTER THREE

STUDY AREA AND RESEARCH METHODOLOGY

3.1 Introduction

This chapter delimits the study area to provide the context and characteristics of the geographic unit constituting this study. The methodology guiding the study is also discussed. It begins with the study area where data was collected and gives an overview of the political-economic background of the Sekondi Takoradi. The chapter proceeds with a description of the methods of data collection. It justifies choosing the mixed methods approach, providing theoretical underpinnings of the choice of methods based on the ideology of the pragmatist. The details of the research design, sampling design, sources of data and data analysis techniques are provided in this section.

3.2 Study Area: Sekondi – Takoradi

Sekondi and Takoradi are two cities that jointly form the capital of the Western Region and have become popularly known as the twin city – Sekondi-Takoradi. It is the third-largest city in Ghana (Obeng- Odoom, 2013; Fei-Baffoe et al., 2014). It has a population of 559,548, which makes up about 23.5% of the Western Region's total population (GSS, 2014a). Though the smallest district in the Western Region in terms of land size, Sekondi Takoradi is the most urbanised, with about 96.1% of the population living in the urban area and 3.9% in the rural area according to the 2010 population census data (GSS, 2014a p.17). This means that more than one out of every five persons in the Western Region resided in the Metropolis in 2010. With an annual growth rate of 3.2%, the population was projected to reach 722,798 in 2018. Thus, the city is expanding to accommodate the increasing number of urban dwellers by absorbing and incorporating peri-urban and rural areas within its growth path into the city (GSS, 2014a).

The metropolis is located about 280 km on the West coast of Accra and 130 km East of Cote d'Ivoire and has a total land area of 192 km squared. It is bordered to the North by the Mpohor district, the Shama district to the east, the Ahanta West district to the West, and the South by the Gulf of Guinea (STMA, 2015). Sekondi is the administrative capital of the metropolitan area.

It experiences an equatorial climate with moderate temperatures, and its vegetation cover is a blend of thickets and mangroves along the coast and woodland along its northern parts (STMA, 2019). The metropolis has five major drainage basins, namely Pokuantra, Kansawura, Buwen, Anankwari and Whin. The Anankwari River, which is located to the east of the Metropolis, runs through the village of Eshiem, one of the research communities where leapfrog development is taking place because its designation and establishment as an industrial enclave. The Whin estuary, which spanned an area of 652,202 square meters, has portions of the wetlands that have been reclaimed, resulting in flooding when it rains heavily in the metropolis.

The Metropolitan Assembly is made up of four (4) sub-metros, namely the Sekondi, Takoradi, Effia-Kwesimintsim (highest population) and Essikado-Ketan (lowest population) as designated in 2007 through Legislative Instrument (LI 1928). Although Effia-Kwesimintsim was elevated to municipal status in 2017, the study area for this research uses the 2007 STMA boundary to allow for spatial analysis that has taken place consistently in the metropolis over 30 years (1988-2018).

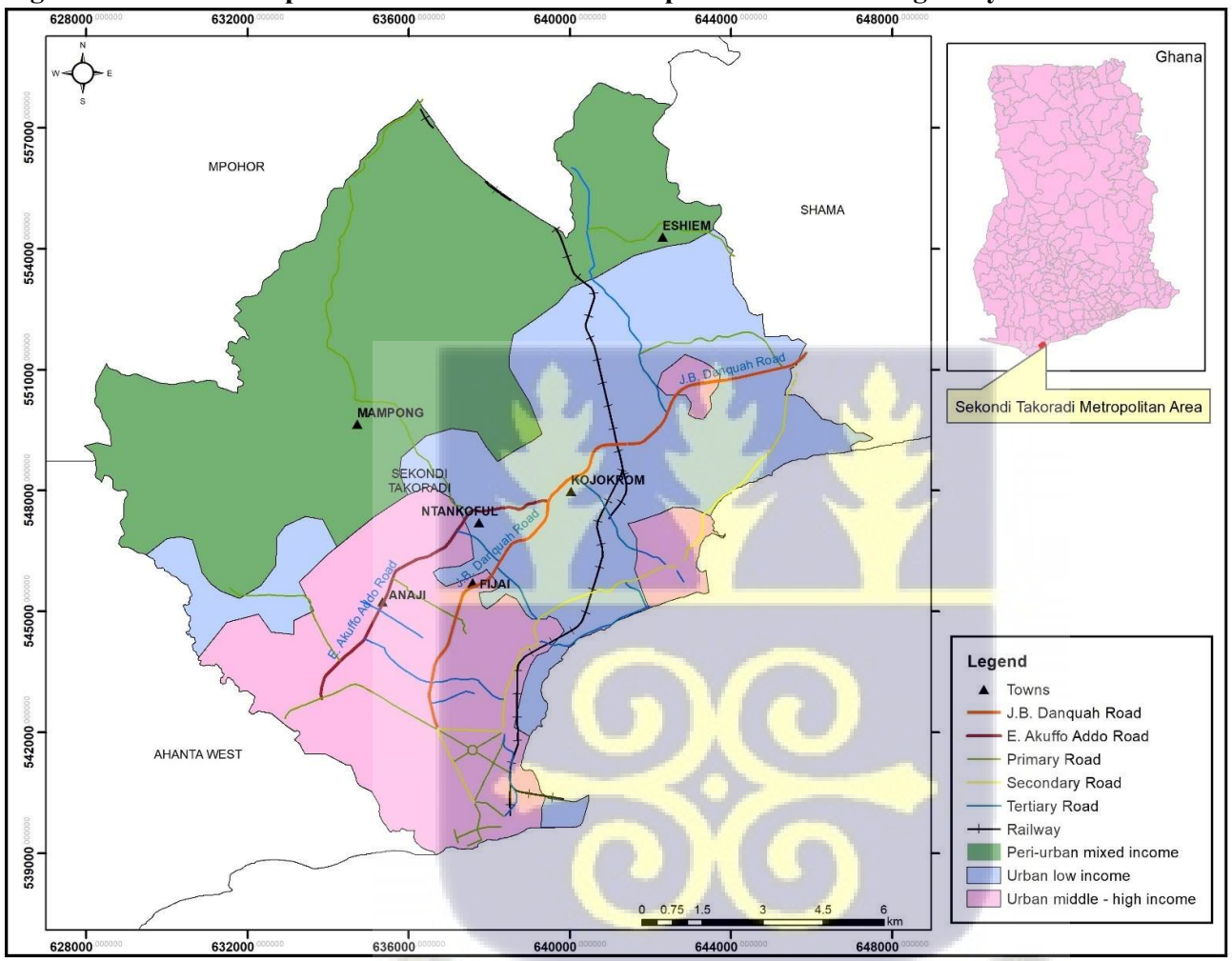
From the pre-colonial era until now, Sekondi-Takoradi has undergone various economic phases. The main economic backbone of the city has been its deep-sea harbour which has remained the backbone of the city and, in recent times, the discovery and exploitation of oil. The bustling economic activities in the various industries include mining, quarrying, electricity power generation, metal fabrication, manufacturing, agricultural and forest product processing,

tourism, and since 2007 oil industry (Denchie et al., 2020). These economic activities have attracted a steady influx of job seekers and ancillary service providers into the city, affecting the city's spatial development.

The growth of settlements within Sekondi-Takoradi has been in the periphery of Sekondi and Takoradi. In the past, when Sekondi was prominent, settlements grew close to it to take advantage of the brisk economic activities, especially commerce. Old settlements developed due to the construction of the railways, roads and harbour produced the spatial pattern of communities such as New-Takoradi, Takoradi, Sekondi, Tanokrom, Adiembra, Effia-Kuma New site and Kojokrom. However, with the recent development in the newly developed areas, most people get settled in the communities before utilities such as electricity, water and roads are directed towards these areas. Most of the communities developed without conforming to the planning scheme of the Metropolis, leading to haphazard development in some of the communities.

STMA is currently experiencing sprawl due to the availability of land in its periphery and rural areas. In sub-metropolitan areas like Essikado Ketan, where two of the study communities, Fijai and Kojokrom, fall under, has the lowest density (3.1 houses) per acre compared to 5.5 for Takoradi (STMA, 2017). One factor that has accounted for this situation is the lack of local plans to control development. Sprawl does not encourage economies of scale, thereby increasing the cost of infrastructure provision. Figure 3.1 shows the locations in the metropolis selected for this study: Anaji, Fijai, Ntankoful, Kojokrom, Mampong and Eshiem. Anaji and Fijai are urban middle-class residential areas, Ntankoful and Kojokrom are urban low-income areas, and Mampong and Eshiem are mixed-income peri-urban communities.

Figure 3.1 Political Map of Sekondi – Takoradi Metropolitan Area showing study sites



Source: Author, 2020

The study communities fall within the Effia-Kwesimintsim and Essikado Ketan Sub-metropolitan Areas where sprawl is occurring. Table 3.1 shows the 2010 population of the study communities and their projected increase by 2018.

Table 3.1: Study communities and their actual and projected population

	Census Population	Projected Population
Community	2010	2018
Anaji	31,669	39,593
Fijai	9,729	10,459
Kojokrom	37,722	47,952
Ntankoful	13,493	17,084
Eshiem	1,995	2,536
Mampong	620	788

Source: Adapted from STMA (n.d) communities and their population based on sub metro

A broad overview of the table shows that all the Kojokrom and Anaji had the highest projected population increase of 10,230 and 7,924 respectively, followed by Ntankoful with 3,591 and Fijai with 730. Fijai is an old community with a lower population projection than the other study communities since limited land is available for development. The up-and-coming sprawling communities of Eshiem and Mampong, where available farmlands are rapidly being converted into residential, commercial and industrial purposes.

Basis for the choice of the study communities

Urban expansion of STMA is a result of the incorporation of once peri-urban areas into the urban fabric. As this dynamic process continues, peri-urban communities are undergoing a process of change resulting from an invasion of non-indigenous persons into those communities. For instance, in the 1980s, Anaji was on the outskirts and has now developed into a middle-income community, and similar trends have occurred for Kojokrom, Ntankoful and Fijai. Given that the peri-urban communities have farmlands that are being converted for residential use at an accelerating rate Mampong and Eshiem were selected. Also, the designation of Eshiem as a Freezones enclave has attracted the locations of factories in the community, thereby attracting migrant workers to relocate there. The study community

sections were also guided by the input of planning officials at the Metropolitan Assembly. The communities fall within the different socio-demographic classes so that the perception of respondents living with the various classes can be obtained.

3.3 Research Philosophy

The philosophical underpinning of this research is pragmatism which is part of the Humanistic approach. The humanist approach is based on the tenets that what exists is what people perceive to exist, and knowledge is obtained subjectively in a world of meanings created by individuals. Pragmatism claims that an ideology or proposition is true if it works satisfactorily and that the meaning of a proposition is to be found in the practical consequences of accepting it and rejecting unpractical ideas.

Pragmatism will guide this study because it is all about the notion of what works best at a point in time (Hall, 2013; Creswell, 2014; Shannon-Baker, 2016). As such, it allows for research to be designed and conducted in the best way that serves to answer the research question (Saunders et al., 2009; Johnson and Christensen, 2012; Creswell, 2014; Biddle and Schafft, 2015). Therefore, instead of focusing on the research method, researchers must rather focus on the research problem and adopt appropriate approaches that can address the various dimensions of the research problem (Creswell, 2014). Pragmatism is the philosophy that permits mixing paradigms, assumptions, approaches and methods of data collection and analysis, thereby emphasising what is close to reality. As such, adopting a mixed-method approach along with a pragmatism philosophy is the best option for addressing the research problem. It gives the researcher the needed flexibility and enabled the author to adapt to changing circumstances during the data collection process such as conducting interviews virtually, especially at the onset of the COVID-19 pandemic and its ensuing lockdowns and restrictions.

3.4 Research Design

A mixed-method research approach was used as the investigative tool in conducting this research (Teye, 2012). Creswell and Plano Clark (2006) define mixed method research as a "research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of collection and analysis of data and the mixture of qualitative and quantitative approaches in many phases in the research process. As a method, it focuses on collecting, analysing and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone" (p.5).

The preference for this method is because positivist viewpoints are narrow and can misinform. As such, intricate research should be approached from different perspectives to obtain an all-inclusive perspective on the phenomena under study. Using a combination of methods enables researchers to overcome biases characteristic of single-method studies (Cresswell and Poth, 2017).

Research methods literature underscores the depth of mixed method design in that, it enriches testing and building of theories through expansion, merging, and disputation of findings (Archibald, 2016; Flick, 2017). Additionally, the importance of various data sources utilized in the mixed methods research approach has given eminence to triangulation i.e. the combination of qualitative and quantitative research findings to test its validity. From the geography viewpoint, integrating quantitative with qualitative findings provides a comprehensive insight that is not attainable when quantitative data are solely studied. Therefore, using mixed-method approaches will ensue in a dialectical understanding of the evolving paradigm. This perspective has been used in explaining changes occurring in society and has also been utilized to instigate social actions that can transform society.

Research conducted on urban sprawl has adopted a quantitative approach in both data collection and analysis. Scholars have used statistical techniques for sprawl, measuring the spatial expansion of urban built-up areas (see: Stemn and Agyapong, 2014; Acheampong et al., 2018, Xu et al., 2018, Ismael, 2021). It is important, however, to understand urban sprawl from a social construction perspective. This is because, apart from the ecological effect of sprawl on the environment, it also affects the livelihood and well-being of the residents, and this needs to be understood in a more nuanced manner. As such, for some of the research questions, quantitative techniques were the main form of analysis. For others, it was a blend of quantitative and qualitative techniques because of how the questions were framed and situated in the context of respondents' worldview, to provide the nuanced detail to support the statistical data. The justification for using the mixed method approach for conducting this study is based on the nature of the research questions and prior research conducted on the subject under study.

A sequential explanatory mixed methods strategy was employed during this research. In that, the research began with the collection and analysis of quantitative data, followed by the collection and analysis of qualitative data to help explain or elaborate quantitative results. The rationale for this approach is that the quantitative data and results provide a general picture of the research problem; more analysis specifically through qualitative data collection is needed to refine, extend or explain the general picture (Creswell and Plano Clark, 2011; Subedi, 2016). Therefore, the qualitative data provide further understanding and reasons for the pattern observed from the quantitative data.

The sequential explanatory method is also used when the study is guided by prior research or theory. This guides the researcher on the types of data to collect and the analytical methods to use (Creswell and Plano, 2006). Drawing from this perspective, the author was of the view that it was vital first to obtain respondents' perspectives on urban sprawl and its effects on their environment and way of living through a questionnaire survey; and secondly, the qualitative

data which provided nuanced details on their unique lived experiences were collected, and this provided additional perspectives to the findings.

Additionally, the study also utilised the cross-sectional design, which encompasses data collection at a point in time in the study locations using questionnaire surveys and structured and unstructured interviews. Given that the study needed to obtain data from a sample of the population in the metropolis to derive conclusions about the research problem and analyse its results least expensively, the cross-sectional approach was most appropriate given the circumstances.

3.4.1 Data Requirements and Sources

Both primary and secondary data were used for this study. Primary data was obtained from residents in the six study communities in STMA (i.e. Anaji, Fijai, Ntankoful, Kojokrom, Mampong and Eshiem) using both quantitative and qualitative data sources. Questionnaires were administered through a cross-sectional survey to gather information on the socio-demographic characteristic of the sampled respondent, drivers of urban sprawl, vulnerabilities of sprawl on humans and implications of sprawl on the ecosystem. Qualitative data were obtained from key informant interviews and focus group discussions. In addition to this were the author's observations, photographs and informal discussions.

Secondary data were obtained from published works and academic journals on urban sprawl, urban development, sustainable cities, oil, the history of Ghana, migration, agricultural livelihoods, crime and insecurity, health, etc. From the STMA physical planning department, the study sought population projections for sub-metros, the Ghana Urban Management Pilot Project reports, and STMA medium-term development plans. From the Electricity Company of Ghana, the study sought electricity consumption and its corresponding number of consumers by year. Annual rainfall and temperature data for the metropolis from 1998 – 2018 was

obtained from the Ghana Meteorological Agency; this served to verify the surface temperature data obtained from the Landsat satellite images. Subsequently, Newspaper extracts and internet sources were also used to obtain updated, archived materials, reports, various online academic resources and news bulletins.

Additional secondary data sources were obtained from Landsat satellite images to obtain spatial information on urban and non-urban areas, surface temperatures, vegetation and built-up indices. These were analysed based on time series of 4 different satellite images, of which two were Landsat 5TM (Thematic Mapper), for the years 1988 and 1998, respectively, Landsat 7ETM+ (Enhanced Thematic Mapper) for 2008 and Landsat 8 OLI (Operational Land Imager), for 2018. These images were acquired from the United States Geological Services website (https://earthexplorer.usgs.gov/) and are shown in Table 3.2.

Table 3.2. Satellite Data

Remote Sensing Data	Date Acquired	Resolution	Source
Landsat 5 TM	1988-12-29	30 m	USGS EROS Centre
Landsat 5 TM	1998-01-01	30 m	USGS EROS Centre
Landsat 7 ETM+	2008-12-29	30m	USGS EROS Centre
Landsat 8 OLI	2018-01-03	30m	USGS EROS Centre

Source: Author

3.4.2 Target Population

The target population is the entire population or group of individuals to be studied and from which the sample frame is drawn (Barnsbee et al., 2018). It defines the characteristics of the individuals who qualify for study based on the goals and objectives of the research. The target population were adult household members above 18 years old. This choice is because the study seeks to understand the consequences of sprawl on residents; as such, it is important

to obtain people's views within different age groups as they have different lived experiences and worldviews.

3.4.3 Survey

Two quantitative surveys were conducted: household and commercial. The household survey sought to obtain information about drivers of sprawl and the social and environmental vulnerabilities faced by the respondents from six communities (two urban middle-income communities, two urban low-income communities and two peri-urban mixed-income communities). The commercial surveys were undertaken along the two major roads along which the study communities are located: E. Akuffo-Addo Road and J.B. Danquah Road. This was to ascertain information on the diverse commercial activities that are taking place along these roads due to the rapid spatial expansion of the metropolis; determine the effect of sprawl on their activities.

3.4.3.1 Sample Size and Technique for Household Survey

The survey's sample size covered a total of 400 households (questionnaires) and 120 commercial activities (questionnaires), 12 FGDs and 25 interviews (7 KII and 18 IDI). The questionnaires were administered among 400 sampled households in the six study communities, two within each socio-economic class (see Table 3.3).

A stratified sampling method was used to select households to be surveyed. This is a sampling method in which the researcher divides the population into separate groups. For this study, the grouping of residential communities was based on their socio-economic status to better understand and identify different spatial dynamics occurring within the communities due to sprawl. Stratification of residential communities was at three socioeconomic levels:

i. Peri-urban mixed-income (Pre-existing agrarian settlements which are being encroached by urban sprawl).

ii. Urban low-income urban residential class

iii. Urban middle-income residential class

Overall, there were four (4) levels of stratification to select the study areas. The first level involved the stratification of transport corridors. These were: E. Akufo-Addo Road and J.B. Danquah Road. The second level involves the selection of residential communities within the corridors based on the socio-economic status previously outlined. Three communities were selected along each transport corridor:

- E. Akufo-Addo road: Anaji, Ntankoful and Mampong
- J.B. Danquah Road: Fijai, Kojokrom, Eshiem

The third level is the selection of households within the communities. In all, 400 households were selected from both corridors. The Yamane formula: $n = N / (1 + Ne^2)$ was used to derive the sample size for the study. The calculation is based on the STMA 2010 population census figure of 559548 (GSS, 2012) and is calculated as follows:

$n = N / (1 + Ne^2)$. Where n = sample size, N = population size, e = margin of error
$n = N / (1 + Ne^2)$
$n = 559548/(1+559548 \times (0.05)^2)$
$n = 559548/(1+1398.87)$
$n = 559548/1399.87$
$n = 399.714$
n = 400

The fourth level of stratification was based on the gender disaggregation of households. At this level, the research will consider the perception of both males and females based on the 2010 Population and Housing Census sex ratios of 51% female and 49% male of the STMA population (GSS, 2014a). The levels of stratification or encapsulated in a tabular form, as shown in Table 3.3.

Table 3.3 Sampling Techniques for Household Questionnaire Survey

Level 1: Corridors	E. Akufo-Addo Road J. B Danquah Road
Level 2: Communities within corridors	E. Akufo -Addo Road: Anaji, Ntankoful and Mampong J. B. Danquah Road: Fijai, Kojokorm and Eshiem
Level 3: Households within communities stratified by income class	Communities and Sample size Urban Middle Income / Urban Low-Income / Peri-urban Mixed-Income Anaji 60 / Ntankorful 70 / Mampong 70 = 200 Fijai 60 / Kojokrom 70 / Eshiem 70 = 200 Total Households selected: 400
Level 4: Gender disaggregation	Community M F T / Community M F T / Community M F T Anaji 29 31 60 / Ntankoful 34 36 70 / Mampong 34 36 70 Fijai 29 31 60 / Kojokrom 34 36 70 / Eshiem 34 36 70

Source, Author

The six study communities were each split into four parts to obtain a fair representation of the respondents. Males and females, 18 years and above and residing in the community were surveyed. The survey sought to find out whether respondents were indigenes or migrants, the reasons for relocating to their current community of residence, the changes they have observed in the community both environmentally and socially because of the unplanned spatial expansion, as well as their perception of what should be done to manage sprawl within the city.

As sprawling continues on the city's periphery, businesses and various institutions and services are established along the major roads. In this regard, purposive sampling was used to select 120 non-residential activities occurring along the corridors to be surveyed. These include commercial activities, petrol stations, pharmacies, hotels etc. This was undertaken to obtain data on the types of businesses, the factors determining the location and how that affects their livelihood.

3.4.4 Qualitative Data

Qualitative data were obtained from key informant interviews and focus group discussions. Key informant interviews were held with people who know what is going on in the community and experts who have knowledge of the research subject. They were selected based on their knowledge of the subject matter (for institutional respondents), their role in the community, and their length of residence. The purpose of these interviews was to collect information from a wide range of people, including community leaders, professionals, or residents—who have first-hand knowledge about the community and the subject matter and can provide insight on the nature of problems and give recommendations for solutions (Creswell and Poth, 2017).

A total of 25 semi-structured interviews (7 KII and 18 IDI) were conducted to understand the drivers of sprawl and the social and environmental consequences respondents face within their respective communities and livelihoods. The interviewees comprised farmers, artisans, real estate and oil companies staff, STMA staff, GWCL staff, Traditional leaders, and Assemblymen, to mention a few. The interviews were conducted until the responses were at a saturation point, after which no further interviews were conducted. This is because adequate data had been obtained to develop a robust and valid understanding of the interviewee's perspectives on sprawl and how it affects livelihoods and the environment, and the various institutional perspectives on the challenges associated with sprawl. This is in line with Fusch and Ness's (2015) perspective that data saturation is reached when obtaining additional new information or no new point of view has been attained. Triangulating the qualitative data with survey data and secondary data ensures that the data is rich in depth. Methodological triangulation ensures saturation through multiple data sources (Bekhet and Zauszniewski, 2012).

While a host of potential questions was drawn up in advance, the discussion proceeded conversationally to enable participants to explore issues they felt were important. The

interviews were conducted in Fanti for community respondents and in English for institutional respondents. However, this was based on the language the respondent felt most comfortable using, which was Fanti but, in some instances, English. Most interviews lasted about 30 – 45 minutes.

In addition to the key informant interviews, focus group discussions were also held for this study. FGDs are carefully planned discussions designed to obtain perceptions on a defined area of interest in a permissive and non-threatening environment. The discussion is relaxed, comfortable and often enjoyable for participants as they share their ideas and perceptions. Group members influence each other by responding to ideas and comments in the discussion (Chen, 2012; Marshall and Rossman, 2014).

Focus group discussions with two groups were held in each study community consisting of male and female groups. A total of 12 focus group discussions were conducted. To ensure that the views of both genders were heard. Each group consisted of 7-9 participants, and ages ranged from 18-65 years. Local resource persons put helped put together the FGDs. The Unit committee member for Anaji and Fijai; and the respective assemblymen for Eshiem, Mampong and Ntankoful spearheaded the locations where the discussion occurred. They also led the author to the chief's palaces to brief the traditional leaders about the research and to obtain their permission to engage their community members. The community that was an exception was Kojokrom because the Assemblyman had a fallout with community members over Ghana card registration that was ongoing at that time (February 2020).

Focus group discussions were held at the chief's palace in Anaji and for the remaining five communities, in shaded areas where it was relatively quiet, mostly under sheds. The researcher led discussions. All the FGD and interviews were recorded with the consent of the participants and subsequently transcribed verbatim. The interviews were analysed to identify categories and trends and build themes that link the empirical findings to the wider literature.

The benefit of combining FGD with interviews is that FGDs provide opportunities for individuals to amplify the views of others and also to contest and negotiate the meanings of assertions made by other participants. This helped bring clarity to perspectives brought up during discussions. Where there were disagreements on comments made by a participant, the author probed further to get more rich information that supported the findings from the survey. However, in the interview, which is one-on-one, the interviewer cannot challenge the interviewee, but this is possible in the focus group as participants in the community are at liberty to either challenge or support assertions made.

Additionally, the author used direct observation during the study by paying particular attention to the respondents' body language and reactions during focus group discussions, key informant interviews and surveys. The author observed expressions of frustration or annoyance from respondents when issues of oil discovery were broached. Direct observation provided the author with the opportunity to get information that would otherwise not have been easily shared by participants. The observation data complemented data produced through interviews which improved the author's understanding of respondents' feelings about the oil discovery and its effect on their livelihood, how it has/has not spurred sprawl and the social and environmental consequences they face as a result of sprawl. This is discussed further in Chapter 4 under Community Perception and Expectations from oil exploitation.

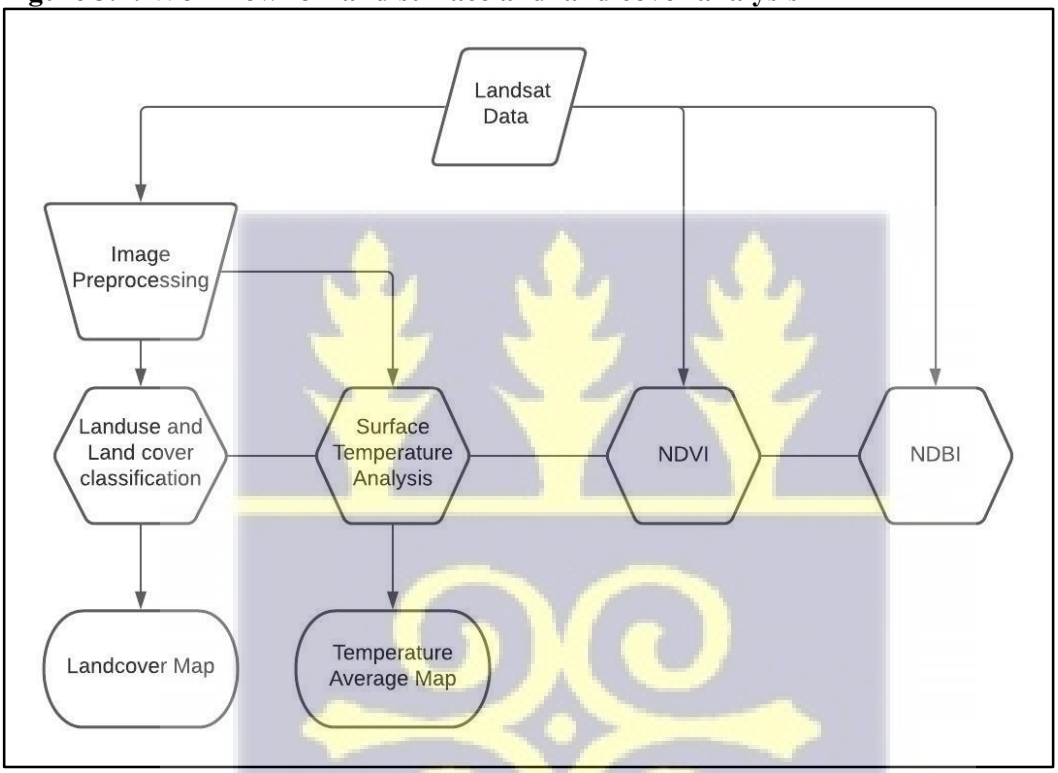
3.5 Techniques for Data Analysis

3.5.1 Quantitative Land Surface and Land Cover Data Analysis

Remote Sensing based land surface and land cover analysis were used to answer research objective iii: i.e. to analyze the spatio-temporal patterns of land use and land cover changes from 1988 to 2018, and research objective v: i.e. examine the implications of sprawl on

ecosystem change. Remote sensing application of land surface heat analysis was used to determine the changes in temperature over the 30-year period (1988 – 2018) concerning the urban heat island effect. This research utilized ENVI 5.3 to perform image preprocessing. ArcGIS 10.8 was used to perform temperature analysis, image classification, Normalised Difference Vegetation Index (NDVI) and Normalised Difference Built-up Index and generate maps of the study area.

Figure 3.2: Workflow for land surface and land cover analysis



Source: Author,2021

Figure 3.2 is the workflow of the various analysis that was conducted on the satellite images obtained. The process began with image pre-processing of the satellite images acquired in their raw form. To achieve an accurate image analysis such as vegetation indices, land cover classification and surface temperature analysis, a radiometric correction was performed to remove errors in the image arising from imaging sensors, atmospheric interferences and the earth's curvature. Image pre-processing operations sometimes referred to as image restoration

and rectification, are intended to correct sensor and platform distortions in data. The pre-processing techniques applied for this research include image calibration, layer stacking, dark object subtraction, and image sub-setting.

Land use Land cover classification

Supervised classification was used to group pixels into land cover classes: urban land cover, non-urban land cover and water. Ground truth points were taken from google earth to represent the land cover classes. Studies such as Stemn and Agyapong (2014) and Hegazy and Kaloop (2015) influenced the land cover classes used in this research. Stemn and Agyapong (2014) used urban, non-urban and water as land cover classes to detect urban expansion in Sekondi - Takoradi, while Hegazy and Kaloop (2015) classified land cover classes as agriculture, built-up, barren land and water to monitor urban growth. Both approaches were used for the land use land cover maps shown in Chapter 7 (page 169). To achieve this, image classification was performed using ArcMap. The ArcMap spatial analyst extension provides tools to undertake supervised and unsupervised classification using the maximum likelihood classification type. Training samples were selected per the control points taken from google earth to represent urban (built-up and bare land) and non-urban (vegetative cover and water) images. Zonal geometry areas in kilometres were also generated to show the numerical values of various classes in the classified images. This was to aid in identifying the rate of expansion in urban areas from 1988 through to 2018, which is shown in the resulting landcover map (see figure 7.1b, page 172).

3.5.1.1 Normalized Difference Vegetation Index (NDVI)

The Normalized Difference Vegetation Index, also known as vegetation greenness analysis, indicates the vegetation presence or absence in an area. The index is calculated by comparing

energy reflectance in the red and NIR bands. This is because healthy green vegetation is known to reflect higher in the NIR bands, and more absorption occurs in the red band. The formula for NDVI is stated thus;

$$NDVI = \frac{Band\ 4 - Band\ 3}{Band\ 4 + Band\ 3} \quad \text{..... (equation1)}$$

where Band 3 represents the red band, whiles band 4 represents the NIR band for Landsat 5 and Landsat 7.

For Landsat 8, the formula changes as shown in the equation below

$$NDVI = \frac{Band\ 5 - Band\ 4}{Band\ 5 + Band\ 4} \quad \text{.....(equation 2)}$$

where Band 4 represents the red band, whiles band 5 represents the NIR band.

The results of NDVI range between the values of -1 and 1, with higher NDVI values approaching 1 signifying dense vegetation, while lower NDVI values below zero signify the absence of vegetation or less vegetation in the area.

Based on the above formula, NDVI for the years (1988, 1998, 2008 and 2018) were performed using the raster calculator tool in ArcMap, where the various bands were applied to the formula for calculation. This yielded 4 NDVI images with their respective NDVI values, further elaborated on in Chapter 7.

3.5.1.2 The Normalized Difference Built-up Index (NDBI)

The NDBI is one of the most common indexes for analyzing built-up areas. The built-up area and bare soil reflect more Short-Wave Infrared (SWIR) than Near Infrared (NIR), hence the use of these bands in calculating NDBI. The equation below is used to calculate the NDBI for Landsat 5 and 7.

$$NDBI = \frac{Band\ 5 - Band\ 4}{Band\ 5 + Band\ 4} \quad \text{..... (equation 3)}$$

Where Band 5 represents the SWIR, whiles band 4 represents the NIR band.

For Landsat 8, the formula changes as shown in the equation below

$$NDBI = \frac{Band\ 6 - Band\ 5}{Band\ 6 + Band\ 5} \quad \text{.....(equation 4)}$$

Where Band 6 represents the SWIR, whiles band 5 represents the NIR band.

The results of the NDBI range between the values of -1 to 1 higher NDBI values approaching 1 signifying densely built-up areas and those closest to -1, low built-up areas.

Based on the above formula, NDBI for the years (1988, 1998, 2008 and 2018) were performed using the raster calculator tool in ArcMap, where the various bands were applied to the formula for calculation. This yielded 4 NDBI images with their respective NDBI values, which are further elaborated on in Chapter 7.

3.5.1.3 Surface Temperature Analysis

Land surface temperature is the radiative skin temperature of a land surface. Its estimation is dependent on the albedo, vegetation cover and soil moisture. The process of determining the land surface temperature within the study area was performed in ArcMap 10.5 on the subset images within the study area. The surface radiant temperature was derived from the thermal infrared bands in the various Landsat images (1988, 1998, 2008 and 2018). The thermal bands used for the temperature analysis were band 6 for the 1988, 1998 and 2008 images, while band 10, which is the thermal band for Landsat, was used for the 2018 image.

First, the digital numbers (measures at satellite radiance) of the various Landsat images were converted to satellite radiance using the raster calculator tool in ArcMap. The equation used is shown below:

$$L\lambda = LMIN + (LMAX - LMIN) \times DN / 255 \quad \text{..... (equation 5)}$$

Where L λ = spectral radiance

LMIN = Spectral Radiance of DN value 1

LMAX = Spectral Radiance of DN value 255

Both LMIN and LMAX are given in the MTL (metadata) file attached to the raw satellite data downloaded from the USGS website. This returns radiance surface temperature values

The next step is to convert these radiance values to kelvin using the equation below

equation below: $T_b = K_2 \,/\, In(\frac{K_1}{L_\lambda} + 1)$ ……. (equation 6)

Where T_b is Surface temperature in Kelvin,

K_1 = Band-specific thermal conversion constant 1 from the Metadata (666.09 and 774.8853 for Landsat 7 and 8, respectively).

K_2 = Band-specific thermal conversion constant 1 from the Metadata (1282.71 and 1321.0789 for Landsat 7 and 8, respectively).

Surface temperature in Kelvin was then converted to Surface temperature in degrees using the equation Tc = Tb -273 ……. (equation 7)

This yielded 4 different maps showing the surface temperature within the study area, as shown in Figure 7.5 in the analysis section. The equations were obtained from: landsat.usgs.gov.

To determine temperature changes over the 30-year period, Landsat images for the years: 1988, 1998, 2008, and 2018 were processed to compare and contrast the spatial extent of vegetated areas using NDVI and NDBI. The index mask was used to determine from the NDVI and NDBI temperature of 25º C and below or above the index mask as thermal emission for December and January of the respective years under study. Meteorological data were obtained from the

Ghana Meteorological Agency to support the temperature analysis over the 30-year period. This resulted in generating the temperature average map, as shown in Figure 7.6 (page 183).

Considerable research has been done using remote sensing to detect the thermal properties of urban surfaces. For instance, Matson et al. (1978) used NOAA 5 satellite night-time thermal infra-red imagery to obtain maximum rural-urban temperature differences ranging from 2.6º C to 6.5º C for more than 50 selected cities in the mid-western and northeastern United States. Weng (2001) also used Landsat TM data to evaluate the effects of urban expansion on surface temperature in the Zhujiang Delta of China. Due to the simplicity of using radiation temperature, several researchers still prefer to use it in analysing the urban thermal environment.

3.5.2 Data Analysis, Interpretation and Presentation

Data obtained from the fieldwork was analysed thoroughly in line with the current scientific demands of post-graduate studies (Butin, 2010; Carter, 2012; Taylor et al., 2016). The statistical package for social sciences (SPSS) version 20 was used to analyse the quantitative data and the qualitative data were manually transcribed and analysed into themes. Thus, the information gathered from the field was triangulated and contested with opposing facts (Salkind, 2010). Evidence and information received from informants during the fieldwork were evaluated critically for significance and value.

Moreover, the numbers obtained from the survey results were validated with evidence from the KIIs, in-depth interviews and FGDs (Taylor et al., 2016). As output by the SPSS (software), the risk in the numerical outcomes was placed into context against field observations, thematic outcomes, and researchers' views (Lunenburg and Irby, 2008). Therefore, the results from the data analysis, presentation, and conclusion were aligned for logicality, minimising any problems with the researcher's positionality (Taylor et al., 2016).

The analysis sections of the study where data obtained from the survey and analysed in SPSS are depicted in percentages, tables, maps, pictures and charts. Respondents' relevant quotations are also stated verbatim to enhance the quantitative data further and support the views and conclusions drawn (Lunenburg and Irby, 2008; Taylor et al., 2016).

3.6 Sociodemographic Characteristics of Respondents

Table 3.4 shows the sociodemographic characteristics of respondents. Out of the 400 respondents, 56.5 percent were females, and 43.5 percent were males. Suggesting that more females than males were sampled for the study. Comparatively, a higher percentage of respondents were between 21-30 years (30.7%) and respondents below 21 years were the least represented age cohort for the survey. Additionally, 21 percent of respondents were between the ages of 31-40 years, 41-50 years and above 50 years. Except for respondents less than 21 years, the results show that each age group was fairly represented. Thus, their responses would reflect the phenomenon of sprawl under investigation, especially if they have lived within the study area for five years. According to Brundage (2013) and Bahde (2014), a five-year or more residential experience in a community gives scientifically sufficient memory and reasonable credibility to understanding the lived experiences of a respondent.

In terms of education, the results in Table 3.4 shows that a higher percentage of respondents had received some form of secondary education (49.3%). In contrast, only 4 percent had attained vocational and technical education. Also, 21 percent and 8 percent of respondents had received primary and tertiary education, respectively. The results further show that only 17.5 percent of respondents had received no formal education. In all, the educational status of respondents was fairly good, and it is expected that, besides their age and years of living in their respective communities, respondents would have a fair idea about the phenomenon of sprawl in their respective communities.

Table 3.4 Socio-demographic characteristics of respondents

Background Characteristics	Frequency	Percent
Sex		
Male	174	43.5
Female	226	56.5
Total	**400**	**100**
Age		
Less than 21 years	27	6.8
21-30 years	123	30.8
31-40 years	84	21
41-50 years	82	20.5
More than 50 years	84	21
Total	**400**	**100**
Level of Education		
No formal	70	17.5
Primary	85	21.3
Secondary	197	49.3
Vocational/Technical	15	3.8
Tertiary	33	8.3
Total	**400**	**100**
Occupation		
Farmer	48	12
Trader	101	25.3
Food vendor	37	9.3
Corporate/Office worker	16	4
Unemployed/pensioner	61	15.3
Artisan	119	29.8
Student	11	2.8
Teachers/pastors	7	1.8
Total	**400**	**100**
Other Employment		
Additional employment	78	19.5
No additional employment	322	80.5
Total	400	100

Source: Field data, 2020

Table 3.4 further shows that though 18 percent of respondents were not gainfully employed, i.e., unemployed/pensioners/students, most respondents were economically active and engaged in various employment streams. For instance, relatively more respondents were engaged in artisanal work (29.7%) and trading (25.2%). Given how informal the local economy of STMA is, it is not surprising that trading and artisanal works were the major occupations reported by respondents. Additionally, 12 percent of respondents were farmers and 9.3 percent were engaged in food vending. Only 1.7 percent of respondents were teachers or pastors. The study also sought the need to ascertain the secondary occupation of respondents, considering that there may be additional income sources or streams of respondents. The results in Table 3.4 show that, of the 400 respondents, only 19.5 percent of respondents have additional income-generating occupations to meet the high cost of living, which is perceived to be the result of Sekondi-Takoradi being an oil city.

3.6 Chapter Summary

The chapter started with a systematic delimitation of the study area to provide the geographical units' context and characteristics. Aided by appropriate maps, current academic publications on the areas, and population data, the chapter further reflected on how the study area provided the physical and socio-economic setting to operationalize the conceptual framework of the research. The methodology section then followed, covering the research design, data sources, sampling procedure, data-gathering tools and socio-demographic information of the survey respondents (Taylor et al., 2016).

The chapter revealed that 400 households and 120 commercial entities were sampled, and 25 interviews and 12 FGDs were conducted to achieve the study's methodological aim of using a mixed-methods approach. Remote Sensing and Geographical Information System analytical tools and methodology were used to determine land use and land cover changes, surface temperature, and vegetative and built-up indices that show the extent of sprawl and its effect

on surface temperature. Lastly, the chapter discussed the means through which qualitative and survey data were presented in the analysis chapters.

CHAPTER FOUR

ORIGINS, GROWTH AND DEVELOPMENT OF SEKONDI-TAKORADI

4.1 Introduction

This chapter provides a historical analysis of the Sekondi-Takoradi Metropolitan Area. It seeks to answer the historical aspect of the overarching research question 1: *To what extent has the city sprawled over the last 30 years*; and its corresponding research objective 1: *To provide a historical background on the successive phases of urban development from the colonial period to the present.* It discusses how the city has grown in size and density in relation to a long history of regional and global trade and oil and gas from the perspectives of urban land use planning. The theoretical underpinnings of the Concentric Zone model, Sector model and Multiple nuclei models (discussed in Chapter 2, section 2.7) are used to explain the modes of development that have occurred and how it has facilitated urban sprawl.

It utilises both primary and secondary data sources, as indicated in the research design section of Chapter 3. Secondary data sources are used to discuss the city's various growth phases. The primary data presented in this chapter is qualitative information obtained from focus group discussions and interviews conducted to obtain respondents' perceptions on oil discovery and extraction and its effect on their livelihood. This is discussed under the economic boom and sprawl section of this chapter.

4.2 Origin of Sekondi – Takoradi

Secundis and Taccarary are the original Prussian names of two communities in the Gold Coast indigenised and presently known as Sekondi and Takoradi (Obeng-Odoom, 2012). The early inhabitants of the present-day Sekondi – Takoradi area were Ahanta, who migrated from the Central Region and settled along the coastline and lagoons. The area consisted of fishing villages lived in by different ethnic groups that trade with one another, with the majority ethnic

group being the Ahanta. Although there is a wide range of ethnic groups intermingling and speaking many languages, the main language which is currently spoken, aside from English, remains Fante, a language that is part of the Akan languages (GSS, 2014a). The area's trading history also included trading with Europeans, with the historical record dating back to the fourteenth century (Shillington, 2013; Obeng-Odoom, 2014a).

The Prussians establish trade contacts with Sekondi-Takoradi. Nonetheless, the Dutch were the first to settle in the city. In 1644, the Dutch built Fort Orange in Sekondi, and in 1665 they built Fort Witzen (Fort Tacaray) in Takoradi (Owusu-Ansah and McFarland, 1995; Obeng-Odoom, 2012). These two forts, along with other forts that dot Ghana's coastline, are remnants of the region's engagement with varying European groups in the trans-Atlantic slave trade, which persisted from the late 1400s to mid-1800s (Thornton, 1998; Shumway, 2014). The most important road during that time was a hammock road used for foot traffic along the coastline. It connected the fishing villages and led eastward to Cape Coast, a major trading post at that time (see Figure 4.1).

During the same time, there was significant British influence in Sekondi. However, in 1872 a series of events led to the Dutch handing over Gold Coast to the British. Foremost was the disestablishment of the Dutch West Indian Company, followed by abolishing the slave trade, both of which crippled the Dutch economically and finally led to the trading of forts with the British. The Ashanti-Fante wars and the rivalry between the two clans were also instrumental in the events surrounding the transfer of the Dutch Gold Coast to Britain in 1872.

The city, however, became prominent due to transportation in its economy, though just a few cars utilized the road network at the time. According to Obeng-Odoom (2012), there were 16 trucks and 5 cars in Gold Coast, most of which were in Accra. However, Gold Coast developed rapidly and this facilitated the expansion of road networks such as the road from Nsawam to Cape Coast to Sekondi, which were built in anticipation of an increase in the number of cars in

the country (Ministry of Education, 1991). However, the port, harbour and railway contributed substantially to the prominence of Sekondi Takoradi (Busia, 1950; Obeng-Odoom, 2012).

Figure 4.1: Map showing the location of Sekondi, Takoradi, Fort Orange and hammock road

Source: De Vos and Willems, 2013 Note: The hammock road is shown in red along the coast, which connected the communities and facilitated trading

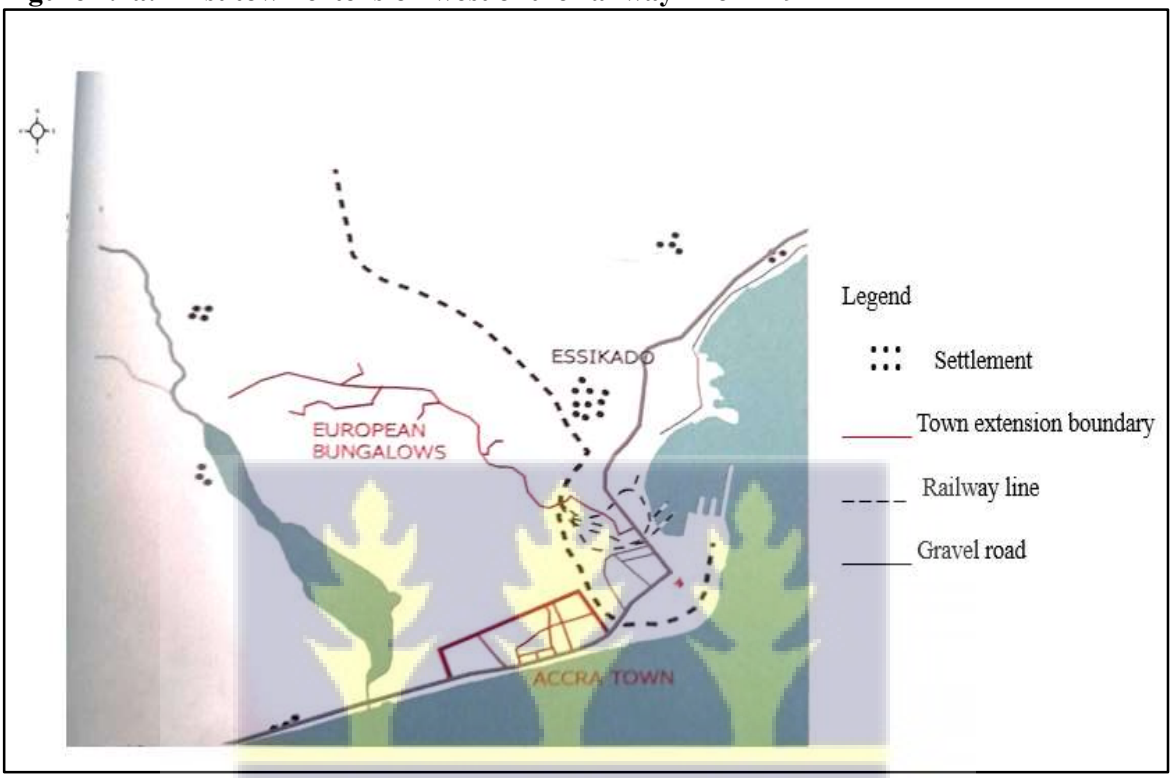
4.3 Railway, Harbour and Spatial Development

Plans for establishing a railway network and harbour in Gold Coast were first developed in 1895. Beginning with exploring possible sites to locate the harbour and surveying the possibility of railway construction between Tarkwa, the centre of gold mining activities and the Sekondi area. Sites identified fit for the harbour's construction were Sekondi and Takoradi for small craft and Amanful for a large deep-water harbour.

Since trade was quite small and funds were scarce, a lighterage port constructed at Sekondi would suffice for the needed transport volume (De Vos and Willems, 2013). The construction

of the lighterage port at Sekondi meant the fishing villages around Fort Orange and native towns like Essikado had to relocate up the hills surrounding the bay, as shown in Figure 4.2a.

Figure 4.2a: First town extension west of the railway line in 1912



Source: Adapted from De Vos and Willems, 2013 page 29

Residential and commercial areas were established near the port to accommodate the growing number of Europeans in the town. To enhance accessibility and allow motorized traffic, the old hammock road (shown in Figure 4.1) was partially modified into a gravel road. Sekondi grew at a fast rate, resulting in a first town extension west of the railway line not long after the first jetties were built. The town extension area was known as Accra Town and consisted of a European part, Kru Town and Hausa Town. The European railway workers lived in bungalows near the resettled town of Essikao, as shown in Figure 4.2a. It can be deduced from the early spatial development occurring in Sekondi – Takoradi that the construction of the railways and harbour facilitated spatial development, which is in line with Hoyt's work underscoring the

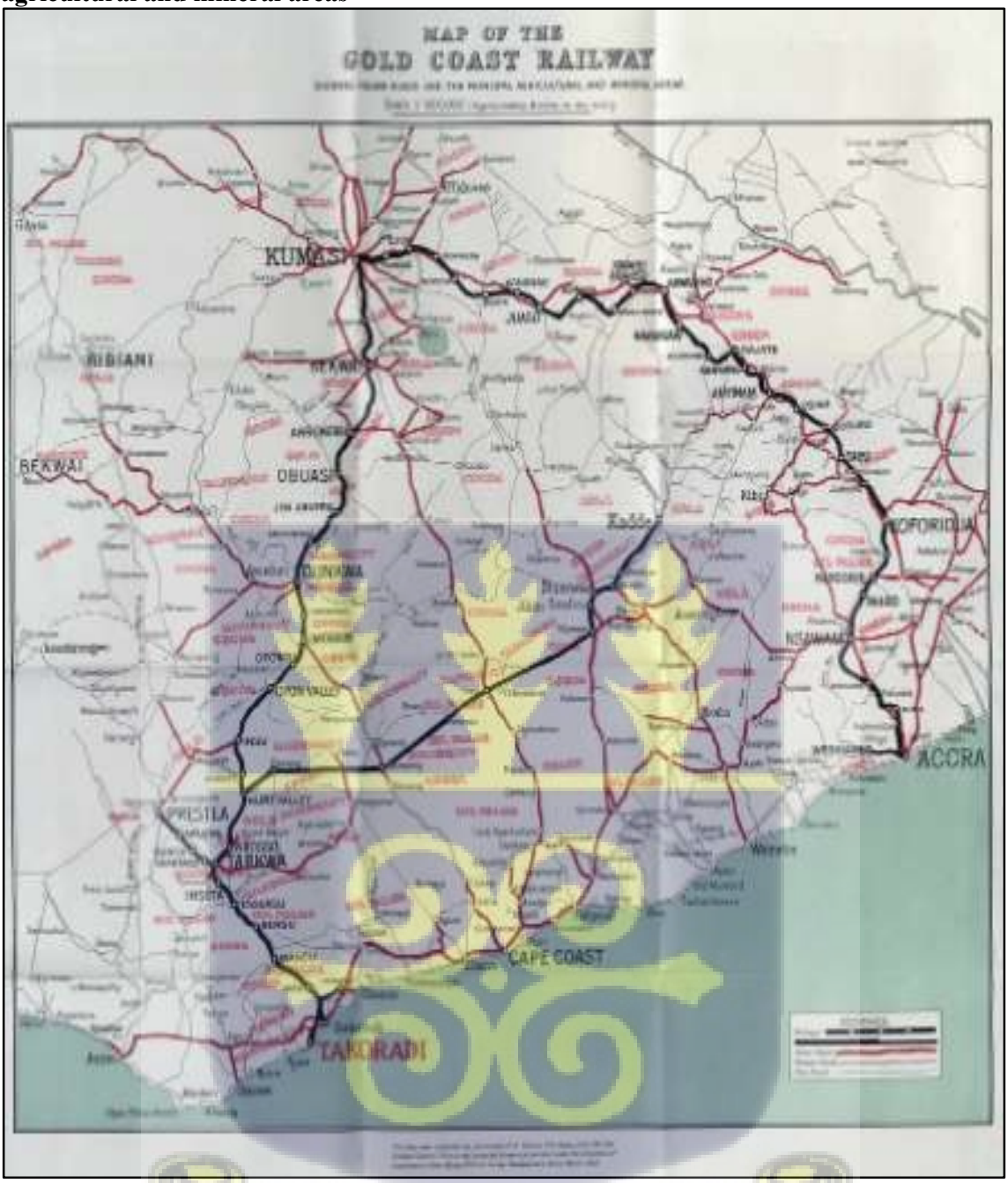
importance of transportation in propelling an outward progression of growth, which eventually led to the segregation of settlements by race (European bungalows / Accra Town) and class divide amongst residents in Accra Town.

Railway operations began in 1898 under the Gold Coast Civil Service with headquarters in Sekondi. It connected the gold mining towns of Tarkwa in 1901 and Obuasi in 1902 from Sekondi. In 1903, the lines were extended to Kumasi from Takoradi via Obuasi. Branch lines were extended from Sekondi – Takoradi, this includes the line from Tarkwa to Prestea which was built in 1911. Thus, the Gold Coast railway system connected areas with natural resources to the three cities of Kumasi, Accra and Sekondi Takoradi. By 1915, Sekondi had grown significantly, essentially as a commercial hub where some 490 miles of railways converged (Busia, 1950; Obeng-Odoom, 2012), as shown in Figure 4.2b.

By 1920, Sekondi had expanded even more westwards, filling the area between the rail tracks and Essei lagoon. A new road was constructed running from the centre of Sekondi southwest at a distance from the shore, connecting to the west of the colony as shown in figure 4.2c. There was an increase in infrastructure in the form of tramways and gravel roads, which suggests that trade in the Gold Coast was increasing significantly, pushing the port to its limits (Gold Coast, 1928).

The railway line was extended beyond Tarkwa until Kumasi became part of the national network (Jedwab and Moradi, 2011), resulting in an even larger import and export volume. The earlier assumption that the lighterage port capacity would suffice had been proven wrong. Under the leadership of Governor Guggisberg, appointed in 1919, plans were initiated to construct a much-needed deep-sea harbour at Amanful, Takoradi, after which the harbour was named.

Figure 4.2b: 1922 Map of Gold Coast Railway showing feeder roads and principal agricultural and mineral areas

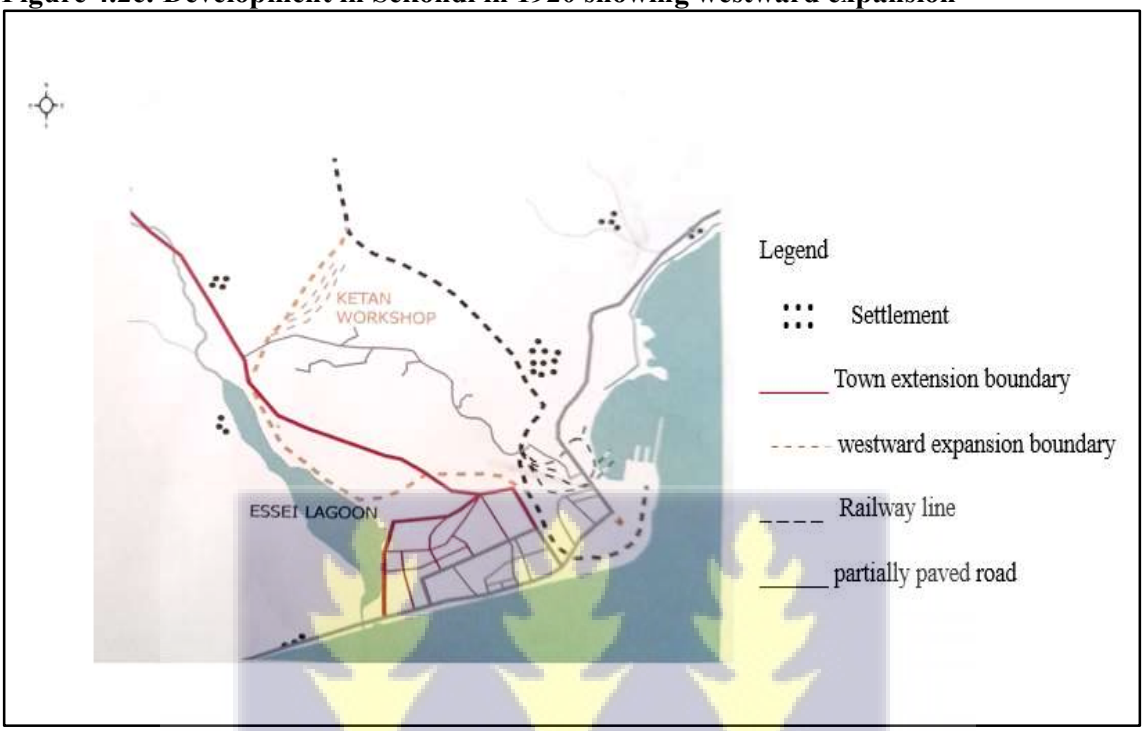


Source: National Archives, UK as shown in Nguyen, 2019. Note: Railway lines are in black and motor roads in red.

The railway line from Sekondi was extended to the new harbour site, and a direct road connection was made to the deep-sea harbour. The hammock road running along the coast was also partially paved (Gold Coast, 1928). This shows that as the town expanded northwards,

roads improved from footpaths (hammock roads) to paved roads, an indication of development facilitated by increasing commercial activities boosted by the railway and harbour.

Figure 4.2c: Development in Sekondi in 1920 showing westward expansion



Source: De Vos and Willems, 2013 page 29

Sekondi emerged as a town by 1894, while Takoradi was recognised as a town in 1926 (Busia, 1950). Takoradi harbour became West Africa's foremost artificial harbour (Hilling,1977; Obeng-Odoom, 2012). The harbour was mainly served by rail. The rail system significantly boosted cocoa production (Jedwab and Moradi, 2011). From 1938 to 1939, exports from Takoradi harbour increased by 186% and imports escalated by 133% (White, 1955). The quantity of timber carried by the railways increased from 439,000 tons in 1954 to 625,000 in 1958, showing that Ghana Railways lived up to their responsibilities in this direction. These examples show the significant impact of the harbour and rail facilities on Sekondi-Takoradi's economic development. The bustling economic activities drew migrants to the city, most of whom settled permanently. Thus, the port and railways construction ushered in urbanisation, including increased population (Jeffries, 1974).

In terms of the spatial development that occurred in Takoradi due to the harbour, the indigenous population were moved to a hilly area northeast of the harbour, named new Takoradi and Amanful was relocated south-west over the Whin River to New Amanful. Takoradi town was not entirely developed as planned. There was an obvious racial divide in the implementation of the urban developmental plan. A deliberate spatial segregation policy saw the separation of European residential areas from the native settlements. The entire road infrastructure and European area consisting mainly of bungalows for European railway staff were largely implemented as such. The European towns had well layout plans, and the houses were built to European standards and design and included social services such as a hospital, police station, church, clubhouse and playgrounds (Songsore, 2003). However, the African township of the plan was developed differently from the scheme. It was devoid of social services and rational planning, with houses sometimes packed together in one big confusion, although the African elite was beginning to adopt European housing styles. Only the eastern part of the African township was fully developed with barrack-like buildings by the colonial government, while the rest of the Takoradi triangle remained empty. The hill at the east side of the triangle was the site the British had foreseen for the African elite expected to come to the new town. Today, the southern part of this site, Chapel Hill, has evolved as such, being an area for wealthy city-dwellers.

4.3.1 Redefining the Urban Boundary

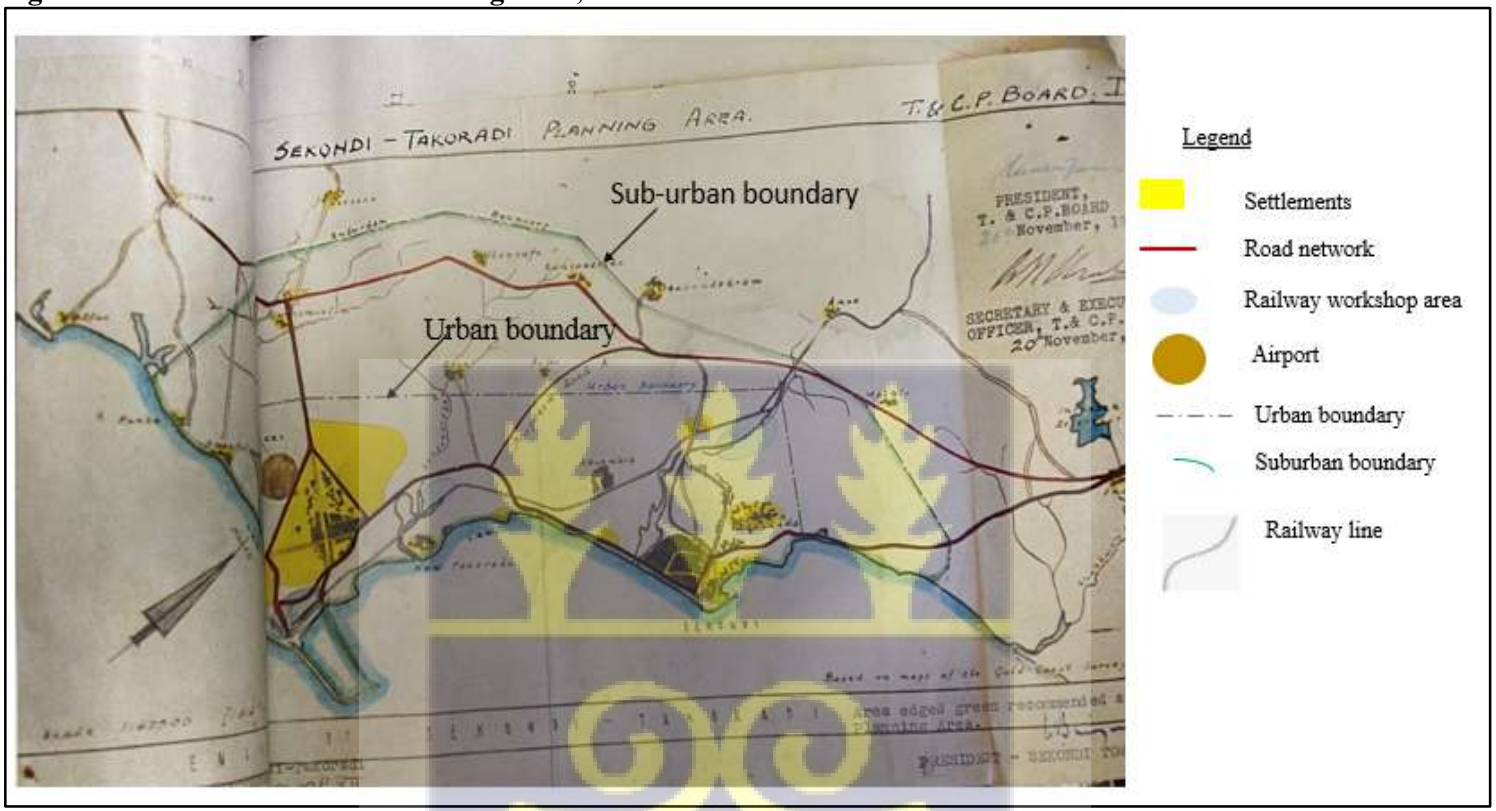
Between 1944 and 1946, the Sekondi- Takoradi draft plan was drawn as part of an urban development proposal by Sir Maxwell Fry for the soon-to-be-joined municipality of Sekondi-Takoradi. The conceptualisation of the multiple-nuclei model city is shown in Figure 4.3. The map of the Sekondi-Takoradi town planning area shows the two harbours, the railway and the two main road networks, are clearly drawn, underscoring the importance of infrastructure to

facilitate economic activities. Yellow zones indicate densely built-up areas; some areas are coloured in blue, coinciding with railway workshop areas and the airport in brown. This plan shows an urban boundary (dashed line) and a sub-urban boundary (green) for the first time.

In 1946, Sekondi and Takoradi were politically and administratively merged as Sekondi Takoradi Town Council (Obeng-Odoom, 2012). The urban boundary was allegedly delineated along the anti-malarial control zone encompassing the coastal area between Takoradi and Sekondi, thereby incorporating all British development projects, the coastal road and the inevitable inclusion of native settlements along the shore (see Figure 4.3). Indigenous villages were, however, excluded from the urban area. Most of these native villages on the map lie within the suburban boundary, which shows the ultimate possible extent of British anti-malarial control (De Vos and Willems, 2013).

The sub-urban boundary was to function as the green belt for the urban zone beyond which further building of any kind was discouraged. These boundary plans, however, did not materialize as towns continued to expand in the post-colonial period.

Figure 4.3: Sekondi Takoradi Planning Area, 1945



Source: Adapted from De Vos and Willems, 2013 page 39

4.4 Independence Phase 1: Growth Under Nkrumah (1947 - 1966)

4.4.1 Political Agitation and Independence

The fight for independence was closely associated with the role of Takoradi in Britain's attempts to defeat the Vichy State (Obeng-Odoom, 2012; Obeng-Odoom, 2014a). The conversion of the Takoradi airport in 1936 for military use made it a strategic military station where British planes departed for the Middle East and North Africa to defend against Italian advances towards the British empire (Akyeampong, 2003). The British created the Royal West African Force to increase the level of support obtained from its colonies in West Africa and enlisted 65,000 Ghanaians (Israel, 1987; Jackson, 2006, Obeng-Odoom, 2012). The Ghanaian servicemen faced racial discrimination and maltreatment while on the battlefield, a disparity in their salary compared to the earnings of the British officers. They also observed and felt that other colonies had better infrastructure in terms of quantity and quality than the Gold Coast. These, amongst other issues, agitated the ex-soldiers, and they began to sense it was time for the emancipation of the Gold Coast from the clutches of colonialism. They, therefore, started agitating for independence and encouraged others to fight for it.

During this era, there was political consciousness and agitation with the railway sector workers at the foremost of this movement. They repeatedly staged demonstrations to petition for better working conditions for themselves and other workers. The Railway Workers Union (RWU) members mainly lived in Sekondi-Takoradi, where it was headquartered (Haynes, 1991 as cited in Obeng-Odoom, 2012). According to Busia (1950), railway workers constituted the single most populous group among formal sector workers' associations in 1947. They were more (3,276) than the total number of workers in the private sector (3,050) and exceeded workers in any government department in the town. Undeniably, their activities caused the removal of the Progress Party Government (1969–1972) from power (Haynes, 1991).

Pobee Biney, the leader of R.W.U was also the leading member of the Convention People's Party (CPP), persuaded Kwame Nkrumah, leader of the CPP, to call for "positive action" on 9 January 1950. By "positive action", Pobee Biney meant a period during which all workers in Gold Coast would boycott British shops and stay home from work. The motive was to force imperial Britain to grant the colony independence (Crisp, 1977; Ministry of Education, 1991; Obeng-Odoom, 2012). Nkrumah agreed to his request, facilitating efforts to attain political independence. While serving as Prime Minister and then President, Nkrumah diminished the prominence of the local chiefs who had authority during the colonial regime by associating with the British authorities (Axworthy, 2013). Acts passed in 1958 and 1959 gave the government authority to dis-stool chiefs and proclaimed the government owners of stool lands and revenues (Arhin,1993). This disrupted indirect rule and systems put in place by the colonial government, which facilitated its governance. In turn, traditional authorities, most notably the Asantehene (head of the Ashanti), welcomed the military coup-d'état that removed Nkrumah from power. However, before his removal, Ghana achieved diverse economic growth and infrastructural development under his reign. For this study, the focus will be on the benefits of Nkrumah's interventions in Sekondi – Takoradi within the larger context of his achievements in Ghana.

4.4.2 Infrastructural Development Under Nkrumah

At political independence, the government was keen to open up the economy to stimulate economic development. To this end, massive investments in infrastructure and other forms of development were made to show political commitment to Ghanaians (Arku, 2009) and as a means for the newly formed government to avoid unrest and riots. Particularly, communication, transportation, industrialization and social services programmes became the focus of

government development initiatives. This was attained through state institutions which were responsible for providing social services and constructing economic and social infrastructure (Buah, 1998, Adarkwa, 2012).

Songsore (2010) indicates that efforts towards industrialisation were focused in the "golden triangle" of Accra–Tema, Kumasi and Sekondi- Takoradi. Ghana saw the emergence of an industrial enclave that accounted for 86 percent of all registered industrial enterprises during the post-colonial era (Songsore, 1979). Of the industries established, 59.5 percent were in Accra-Tema, 16.5 percent in Kumasi and 10.2 percent in Sekondi-Takoradi. Approximately 13.8 percent of industries were located outside the "golden triangle". Prominent industries established in Sekondi- Takoradi included the Pioneer Tobacco Company, the cement industry, the flour industry, the wood processing industry and the cocoa processing plant (Tawiah, 2006). The Accra – Takoradi – Axim – Tarkwa road was among the first-class roads constructed, and roads that were constructed during the colonial era were widened (Nguyen, 2019). The additional railway lines were constructed starting from Achiase, in the Huni Valley, to the Kade railroad to join the Accra-Kumasi line at Kotoku near Nsawam. This was to reduce the circuitous Sekondi-Takoradi, via Kumasi to Accra railroad (Adarkwa, 2012). The road network, coupled with the railways, influenced the substantial growth of towns in Sekondi-Takoradi. Analysing the development of small towns in Ghana, Owusu (2005) confirmed the importance of such interventions in developing towns located along arterial roads. He stated that these favourable locational factors (including the location on main trunk roads, a location closer to mining activities), or their combination and spill-over effects from large urban centres, contributed to the growth of towns, which eventually grew to become other large centres.

Figure 4.4 Road development in Sekondi Takoradi during Nkrumah's regime

Source: Adapted from De Vos and Willems, 2013 page 45

Nkrumah's government provided modern equipment to hospitals and put up larger ones such as the Effia-Nkwanta Hospital in Sekondi- Takoradi. The government also improved the road infrastructure in Sekondi - Takoradi. The tarred road network indicated by bold red lines in Figure 4.4 emphasizes the infrastructural advancement established by the government.

4.4.3 Increasing Population and Housing

The urban population grew rapidly after independence because of the economic opportunities available from the harbour, railways, timber industries etc. It can be estimated from the census data captured in Table 4.1 below that population increased by approximately 84% from 1931 to 1970.

Table 4.1 Population of Sekondi Takoradi 1931 - 1970

Census Year	Population
1931	22,431
1948	44,557
1960	87,000
1970	143,982

Source: Authors construct with data obtained from Apter, 1955, Ghana Census Office 1932 and 1964, Government of the Gold Coast, 1950 as cited in Nguyen, 2019, UN world urbanisation prospects, n.d.

The economic opportunities offered by Sekondi- Takoradi attracted migrants, especially school leavers seeking employment in the city. This increased the demand for housing which was a deficit, and led to the development of makeshift structures, facilitating the development of slums. To address this, the government sought to develop and implement a policy for developing sub-urban towns as initial reception centres for immigrant labour in the large city with an emphasis on sanitation and water supply (De Vos and Willems, 2013). Additionally, the government sought to provide 25,000 new dwelling units in the three large cities (Accra-Tema, Kumasi and Sekondi- Takoradi). This was during an era that saw the provision of mass social housing by various governments worldwide.

In Sekondi-Takoradi, a large development program, the Effiakuma housing estate started providing 3053 state buildings over almost 20 years. Several town layouts were made for areas in which authorities wanted more development to take place. These layouts are mostly located near Takoradi since the town was becoming more important because of the deep-sea harbour, thereby pushing Sekondi more and more into the background. Some of these developments are West Tanokrom and Airport Ridge, both northwest of Takoradi. Preceding the Effiakuma housing estate is the Adiembra Housing Estate, constructed around 1942 to provide accommodation for junior railway staff. After Adiembra Housing Estate, the Ghana Railway Company constructed additional accommodation for their workers in Windy Ridge, north of

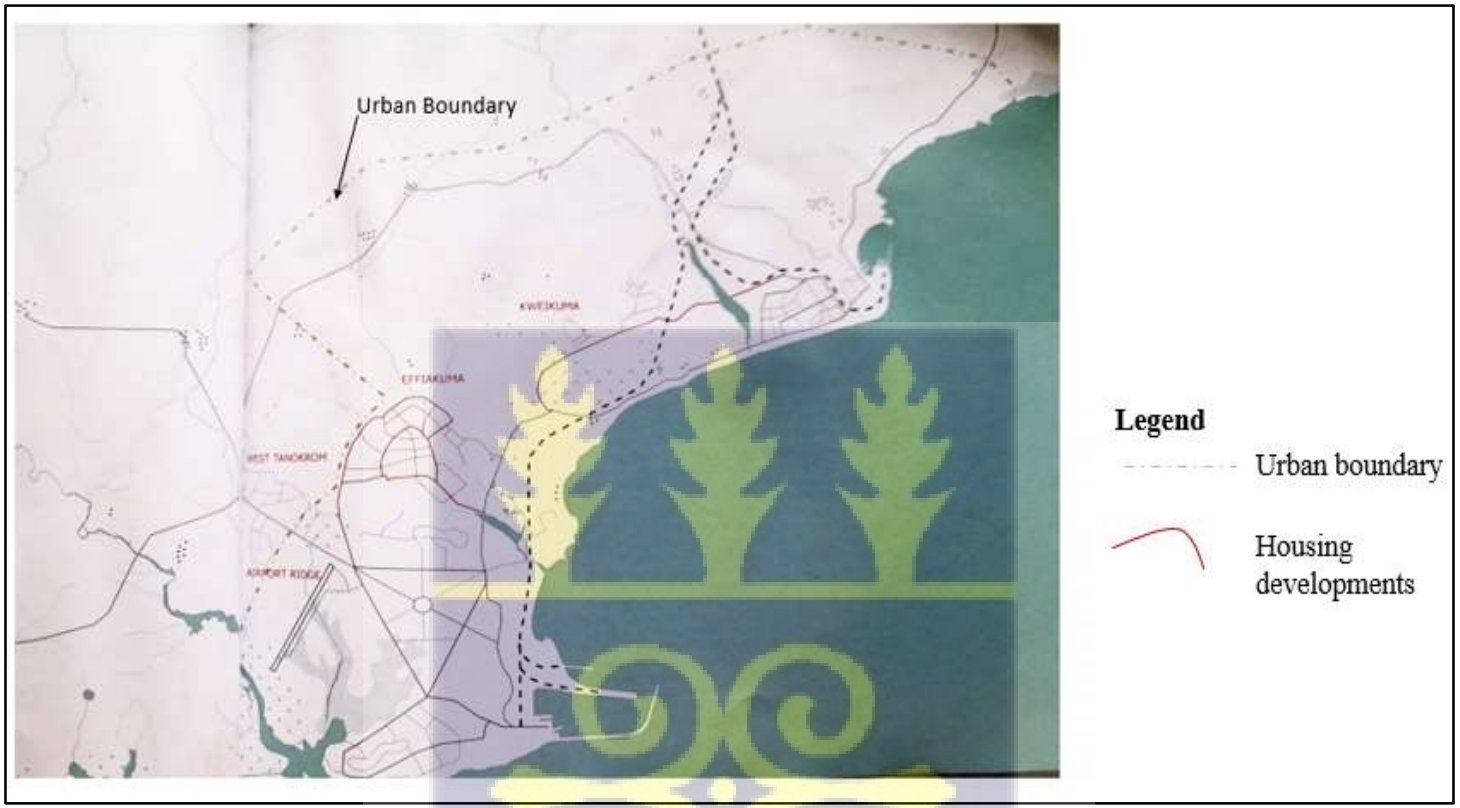
Takoradi. These were bungalows for native employees as they obtained higher company functions.

The Anaji Housing Estate was initiated in the late 1980s and was constructed by the State Housing Company Limited. Instead of continuing along the coastal strip towards Sekondi, it was built along a by-pass road further inland, annexing the original Anaji village to the urban conglomerate. The dispersed nature of housing development from the colonial era through post-independence highlights how fragmentation is inherent to Sekondi – Takoradi. The physical landscape is dispersed with several pieces of built area that are not entirely connected, and with a concentration of built areas skewed towards Takoradi because of the deep seaport. Figure 4.5 shows the housing developments that occurred in Sekondi-Takoradi during Nkrumah's era. Of importance in this map is that the urban boundary indicated in the green dotted line generally overlaps with the colonial suburban boundary indicated by Maxwell Fry in 1946. The development pattern follows the Concentric Zone model as the residential growth of the city emanated from the Takoradi harbour.

4.4.4 Growth of the Metropolitan Region

As Nkrumah's development vision provided towns with a significant level of infrastructural development, it set in motion the urbanisation process in the country. During this era, the rapid growth from natural increase and migration, coupled with infrastructural development and economic opportunities, essentially gave the planning authorities no time to plan for its growth and development. As a result, several towns sprawled linearly over large areas, but there were two distinct sectors in the main city: well-planned sectors and areas of spontaneous development. As is to be expected, the planning machinery was more effective in the well-planned areas but least effective in the overcrowded and spontaneously developed sectors (Boamah et al., 2012).

Figure 4.5 Map of housing developments in Sekondi-Takoradi



Source: De Vos and Willems, 2013 page 47

This started the decline of public hygiene as the increase in residential population and densities altered estate houses initially built by the state to accommodate the increasing population into neighbourhoods with temporary structures in front and between residential buildings and along streets, thereby reducing environmental quality (Arku, 2006, Adarkwa, 2012). Sekondi–Takoradi's areal expansion has begun to show substantial increases with multi-story commercial buildings springing up around Market Circle in Takoradi, the hub of business activities and probably the most accessible point in the whole Sekondi Takoradi metropolis.

The planning of settlements and commercial areas also heightened the role of automobiles in daily urban life. It was the road, not rail, that was provided to connect newly built suburbs and commercial areas. After 1960, the urban road network was refocused on Sekondi-Takoradi's new Market circle and other "work precincts" such as the Harbour area. (Aniegye, 2011). Many informal commercial activities were located in residential areas as well, but resident transport surveys show that these did not alter the flow of traffic that was mainly oriented toward the commercial and business centres (Obeng-Odoom, 2015).

In general terms, physical development proceeded according to plans. Even though they were largely centralised, the planning authorities could adequately deal with the myriad development problems in Ghanaian towns. As will be seen in the next phase, the planning machinery was subsequently weakened by other extenuating factors.

4.5 Independence Phase 2: Period of Crisis, Stagnation, and Recovery

After Nkrumah's overthrow in 1966, the series of coups that followed diminished the economic and development gains achieved over the years. There was a general decline in economic activities, and despite its economic prominence, Sekondi Takoradi faced serious socio-economic problems, with insufficient food being one of the most prominent (Obeng-Odoom, 2012). Successive governments continued to implement Nkrumah's agricultural policy, which

involved establishing new large-scale state farms and Workers and Farmers' Brigades (Songsore, 2003). However, despite the heavy investments made, the state farms failed, mainly due to poor farm management practices and weak institutional support. Subsidies were grossly abused, while the smuggling of subsidized agricultural produce to neighbouring countries was widespread. The 1981 – 1983 droughts the country faced stand out for their severity and cause a domestic food shortage. Thus, though agriculture was a major employer in the urban economy, the city typically imported its food. (Mendelson et al., 2003).

Another key challenge encountered during this period was a shortage in housing. "The productive base of the urban economy collapsed along with the building material industry" (Songsore, 2003:13), leading to housing shortages which tended to escalate rents and intensify shelter poverty despite the efforts of the state and quasi-governmental institutions, individuals and real estate companies. The availability of housing has remained significantly low compared to the population, as shown in Table 4.2.

Table 4.2 Sekondi Takoradi Population and Housing Stock 1960 – 2010

Year / Characteristics	1960	1970	1984	2000	2010
Population	87,000	143,982	249,371	369,166	559,548
Housing	4,210	4,651	5,056	24,817	60,705

Sources: Authors construct with data obtained from Ghana (Census Office) 1960 and 1970, GSS, 1984, 2000 and 2014 as cited in Nguyen, 2019, and STMA, 2014.

Additionally, the country's over-reliance on revenue generated from exporting natural resources such as cocoa, timber, and gold crippled its economy. Cocoa and timber were the main exports transported via railway to the Takoradi harbour for export. However, due to low producer prices, cocoa started to collapse in the 1960s. This affected revenue generated from exports to support the economy and impacted the railway and harbour activities in the long run. The railways became obsolete in the 1970s due to poor management, lack of maintenance and

competition of roads. Railway goods and passenger traffic collapsed after 1974, affecting timber and cocoa export. To address the various socio-economic challenges plaguing the country, bridge poverty and revamp the economy, the Rawlings government implemented the IMF and World Bank Structural Adjustment Program to revamp the economy.

The World Bank identifies Ghana as a success story under Structural Adjustment. Since the Rawlings government instituted its Economic Recovery Program (ERP), the economy grew by an estimated 5% each year (ISSER, 1995 as cited in Yeboah, 2000). Although still high, inflation was nowhere near the pre-SAP levels. Deliberate and focused public policy was implemented to ensure economic growth during this period. According to Obeng-Odoom (2012), there was a policy to reduce the 25% income tax if investors established business entities in the city. In turn, Sekondi-Takoradi attracted many firms and, alone, contributed 21% of the total wood-processing firms in Ghana in the 1980s. The rail system also enhanced cocoa production as the rail and harbour facilities continued to attract migrants to the city.

The economic gains realized since the inception of the program undoubtedly benefitted sections of the population. In the urban areas, there were at least superficial signs of economic progress. There was remarkable improvement in the availability of goods, the briskness of economic activities, the number of motor vehicles and good quality roads. Another convincing evidence of economic growth was seen in the extent to which the middle class engaged in conspicuous consumption of automobiles, housing, cellular phones, international air travel and other western cultural attributes (Yeboah, 2000).

A survey conducted by Jeffries (1992) in Sekondi-Takoradi, Accra and Kumasi to obtain the perception of respondents on their economic situation during the ERP period indicated that "nearly all respondents employed in the formal sector felt that they were economically worse off than they had been five years previously. Although they had received wage increases, their

income would not stretch as far, given the inflation rate. Time and again, such wage-earners repeated, “we are really suffering”. Many claimed that they could not survive without relying on credit towards the end of each month, hence falling into increasing indebtedness.

According to Jeffries (1992), between 1987 and 1990, there was a retrenchment and redeployment of 46,000 public sector employees. Some of them branched into farming and others found their feet in the informal sector or unemployed. However, due to the massive rehabilitation of the transport infrastructure and an increase in the number of vehicles, the livelihoods of those employed (or self-employed) in the transport and transport servicing sector improved. He explained further that “the wayside fitters felt that they had fared quite well over the past few years or at least they had been plentiful opportunities to do well” Jeffries (1992:213).

The railway workers in Sekondi Takoradi were also dissatisfied with their pay levels. However, a food aid condition attached to the loan for the rehabilitation of the Western network to increase the flow of import and export to the Takoradi port provided the workers with a regular supply of grain, sugar, cooking oil, tinned mackerel and rice. This was designed to be consumed by the railway workers to have enough energy to implement the needed construction (Haynes, 1991). In many cases, however, much of the food was sold for cash in the markets of Sekondi-Takoradi and elsewhere, thereby helping some workers to cover the costs of essential items raised in the 1983 budget, such as hospital and school fees, kerosene for light, and transportation.

As the economy grew and efforts were made to alleviate poverty. There was a continued increase in population coupled with a corresponding change in urban form influenced by people's preferences and economic status (Yeboah, 2000). In 1988, the decentralization programme was initiated to increase local-level participation in the country's development

process. PNDC Law 207 transferred greater functions to the District Assemblies (DAs), resulting in the renaming of the Town Council in 1903 to City Council in 1976 and later changed to Shama Ahanta East Metropolitan Assembly in 1988 and was subsequently changed to Sekondi Takoradi Metropolitan Assembly in 2007. This strengthened the city to perform administrative functions through the infusion of investments to facilitate critical services and functions. As expected, administrative functions ascribed to these towns attracted public infrastructure and the population gradually making Sekondi – Takoradi and Ghana as a whole more urbanized (see Table 4.3).

Table 4.3: Sekondi - Takoradi Urban Population 1970 - 2010

Sub Metro	Population				Population Change			Contribution to Urban Growth %		
	1970	1984	2000	2010	1970-1984	1984 - 2000	2000-2010	1970-1984	1984 - 2000	2000-2010
Sekondi	63,673	70,214	114,157	228,342	6,541	43,943	114,185	0.4	1.0	2.7
Takoradi	80,309	117,989	175,436	311,206	37,680	57,447	135,770	2.6	1.3	3.2
Total	143,982	188,203	289,593	539,548	44,221	101,390	249,955	3.0	2.3	5.9

Source: Ghana Statistical Service, 2012

It can be inferred from Table 4.3 above, which shows the urban population of Sekondi-Takoradi from 1970 to 2010 at the sub-metro level that, between 1970 – 2010 urban population grew steadily by 2.3%. During the same period, Takoradi, however, witnessed a decline in the urban growth rate of 1.3% between 1970 and 2000, a possible indication of substantial growth in smaller communities within the city (GSS, 2005). However, it is important to point out that Sekondi–Takoradi's rapid population growth has not occurred evenly across all the settlements in the metropolitan area (Yankson et al.,2017). As more people moved to fringe communities, which are now incorporated into the city, the city has experienced spatial expansion and development at varying rates. Table 4.4 shows the population by the community and the population change that occurred between 1984 and 2010.

Table 4.4: Population and Percentage Change in Population by Community 1984-2010

Community	Classification	Population 1984	Population 2000	Population 2010	% Change 1984 – 2000	% Change 2000 - 2010
Kwesimintsim	Middle - low-income core**	13,852	20,024	47,211	45	138
Apremdo	Middle-low income core	4722	9437	15402	97.75	63.2
West Tanokrom	Middle -low-income core	5140	19217	33990	273.87	76.87
East Tanokrom	Middle- low-income core	4388	9296	11689	111.85	25.74
Effiakuma	Middle- low-income core	23796	34307	60932	44.17	77.6
Anaji	High - middle-income core**	2460	9274	30397	276.99	227.76
Assakae	Middle- low-income core**	2097	5553	9139	164.81	64.57
Efia	Middle- low-income core**		4917	10936		122.41
Takoradi	High - middle-income core	61,484	54,722	77,148	-10.92	40.85
New - Takoradi	Low-income core		13556	20204		49.04
Sekondi	Middle – low-income core	31916	29247	31011	-8.6	6.03
Fijai	Middle-income core			9729		
Essikado	Low-income core		11344	20212		78.17
Mempeasem	Low-income core			6314		
Ngyiresia	Low-income core	1455	4752	11861		149.6
Kojokrom	Low-income core**	876	5244	37722	498.6	783.21
Ntankoful	Low-income periphery			10990		
Eshiem	Low-income periphery			1195		
Mampong	Low-income periphery			620		

Source: Authors construct data from Yankson et al. 2017, STMA,2019, CHF, 2011. Note: Old periphery communities which are now incorporated into the core of STMA are indicated with **.

It can be deduced from the population data in Table 4.4 that Sekondi and Takoradi respectively experienced a negative population change (-8.6% and -10.92%) between 1984 and 2000 and gained marginally (approximately 6% and 41%) between 2000 and 2010. Confirmation of the

loss of population of the two to the surrounding towns. A similar occurrence was experienced in the larger cities of Accra and Kumasi.

Settlements like East and West Tanokrom, Anaji, and Efia experienced a significant population increase between 1984 and 2000 and grew slowly between 2000 and 2010. The highest levels of population change between 2000 and 2010 were experienced in the old fringe settlements, such as Kwesimintsim and Kojokrom, Efia and Ngyeresia. Anaji, an upper-middle-income settlement, also experienced high positive population change between 2000 and 2010 (Yankson et al., 2017). The growth and expansion in the fringe areas occur largely unplanned and uncontrolled, creating sprawling low-density development that is uneconomic in terms of land use and service delivery (Adarkwa, 2012). According to Adjei Mensah et al. (2019), the lateral expansion of the built-up area has huge consequences on the city's compactness, which is an important element in achieving sustainable urban development.

This assertion is corroborated by an earlier study by Aduah and Baffoe (2013), which provided evidence using the Shannon Entropy Index to indicate that Sekondi-Takoradi has low compactness due to the sprawling nature of its built environment. The sprawling nature of Sekondi -Takoradi stretches the capacity of city authorities in their effort to provide essential public facilities such as water and electricity to the newly developing communities. For instance, a community like Mampong does not have access to potable water due to its distance from Kansawurado. Furthermore, Sekondi -Takoradi faces perennial flooding due to the increase in built-up areas and the haphazard way buildings are sited and poor drainage.

The city has been experiencing population growth and urbanisation since 2000. This, according to Yankson et al. (2017), is because of political stability in Ghana, revamping of the Takoradi port, efforts to revive the railways and in recent times, oil exploitation and its related services have all contributed to the sprawling of the city as more people are migrating in search for

greener pastures. The following section takes a deeper look at the perceived economic boom occurring or otherwise in STMA because of oil exploitation.

4.6 Economic Boom and Urban Sprawl as a Result of Oil and Gas

Ghana's most recent oil discovery in 2007 ushered STMA into another economic boom, and it gained recognition as an "oil city". This new phase of the city's development reinforced its status as the third-largest city in the country and the capital of the natural resources-rich Western Region of Ghana. As such, Sekondi-Takoradi has become the hub for companies involved in the oil industry, with associated companies providing services to the oil and gas industry (Obeng-Odoom, 2009; Yalley & Ofori-Darko, 2012).

4.6.1 Community Perception and Expectation

As has occurred in most oil-producing countries, there was an increased expectation amongst Ghanaians that their living conditions would improve due to the oil. There was hope for higher income for the state and the redistribution of this wealth through investments in education, healthcare, infrastructure, and employment opportunities. This would help improve the living conditions of the citizens. Ghanaians expected more jobs to be created in the oil industry and its related services to reduce unemployment levels in the country.

The government's response (Kufuor Administration) to the discovery gave citizens high expectations about the impending oil revenues, particularly for the inhabitants of the Western Region. In the run-up to the 2008 general elections, the major political parties in the country made specific promises to the region on the intended development from oil revenues. These included the promise of job creation in the oil and gas sectors, with the proposed establishment of petrochemical, fertilizer and liquified petroleum gas cylinder industries. The establishment of these industries was expected to address the high levels of unemployment in the region and consequently reduce poverty levels. Existing universities and polytechnics would be upgraded

to provide the requisite skills and consultancies needed for the oil and gas industries. These skills and competencies were to form part of local content policy.

However, years after oil drilling began, citizens' perception is no longer the same about the oil find. Ghanaians rather insist there has been a persistent increase in the prices of goods and services; there is also difficulty securing employment opportunities in the oil industry, contrary to earlier beliefs in increased employment opportunities. This is because the oil companies employ expatriates with the requisite skills needed within the sector, and besides, the industry is capital intensive.

To validate this, the study sought to examine how respondents felt when oil was discovered in the study area. Given the economic prospects and the multiplier and trickling-down effects such discoveries have on employment opportunities and the local economy, there is a likelihood for such discoveries to generate a lot of excitement. Indeed, 61.5% of the respondents were happy because of the economic opportunities they perceived the discovery of oil would bring. Another 27% of the respondents were indifferent about the prospects of the discovery to their community, whereas 11.5 % of respondents were sceptical about the benefits it would bring to their community.

Although more than half of the survey respondents were happy about oil discovery, excerpts of the comments gathered during in-depth interviews and focus group discussions where respondents shared their opinion about oil discovery and exploitation are shared below:

A male FGD participant at UMI Anaji stated that:

"...we call ourselves an oil city, but we are not an oil city. There is no one here whom an oil company employs. It got to a point when Nigerians were coming here to work with oil companies. Recently I went to Cape Three Points, where oil is drilled; the place is still as it was before oil was discovered. I asked them about the number of people within the community who have been employed at the rig, and they said ``none of them".

The Assemblyman of PuMI Eshiem also shared that:

"No oil company has approached us or has property here. They are in the Nzema area, and those communities are the ones benefiting from the oil exploitation, not us. Over here, we have no benefit, although we are all within the Western Region. They do not employ our people; we do not benefit from oil exploitation".

A female food vendor in ULI Kojokrom disclosed during an interview that:

"*… life has become more difficult now that oil is associated with the region. Foodstuff has become expensive, and we are suffering. It is bringing hunger. We need help".*

The Fijai Chief also expressed his opinion in frustration, stating:

"*…We do not get any benefit from the oil. Tullow oil offers scholarships, but we do not benefit from them. Now the people are blaming the chiefs for not helping them secure jobs at the rigs."*

The posture of respondents during the quantitative survey, interviews and focus group discussions at the mention of "oil" was one of annoyance, frustration and disappointment. Also, there is the perception that communities closer to the oil rigs benefit from the oil proceeds, development, and employment. To ascertain the truth of this assertion, the author undertook a verification trip to Dixcove. However, similar sentiments expressed by participants of the study communities were expressed in Dixcove:

"If you look around, does it look like we have benefited from oil in any way? "We are not benefiting. The oil company has not done anything for us. Rather when we go fishing, we cannot catch any fish because of the red thing (boundary line to prohibit fishing close to the rig) they have put there" (Fisherman, Dixcove).

"They (oil company) give scholarships to students; however, the assemblyman is the one responsible for selecting beneficiaries… so you already know what will happen (the notion that

the assemblyman would give to those he knows or family members, instead of selecting beneficiaries based on merit)" (Hairdresser, Dixcove)

These comments show the dashed expectations and hope people had for a better life – mainly employment opportunities – and an improved standard of living. They rather find themselves struggling for survival as the cost of living has become higher due to oil. As Jones (2014: 1) cited in Oteng-Ababio (2018) rightly puts it, for the ordinary resident or casual visitor, "reports of Takoradi's 'booming economy' appear greatly over-stated". In other words, the net gains of the oil economy, particularly among those who live and work informally, are somewhat less dazzling than generally assumed and hyped.

Juxtaposing the situation in STMA to the Niger Delta Region in Nigeria, which is the heart of the petroleum industry in Nigeria, the people live in extreme poverty even in the face of great material wealth found in the waters by their homes. Unemployment is high, and people turn to oil theft (bunkering) to survive. Oil spillage and leakages into the rivers and creeks are killing fish and robbing people of their livelihood. A fisherman quoted in Pitkin (2013) said that *"fishing is my only means of living… my family is in trouble because these days I hardly catch fish that will feed me alone, not to talk about my entire family".*

In Angola as well, oil has not proved to be a benefit to Angolans. It has produced few jobs, increased inequality and allegations of corruption (Ben-Ari,2014). Even though economic growth in the country is spurred by oil export, only 1% of Angolans are employed in the oil industry (Ben-Ari, 2014). Oil revenue has been used for infrastructural development; however, Angola imports almost all of its food given over-reliance on oil. This shows that oil exploitation in countries at the macro level provides the needed revenue for infrastructural development, but little to nothing trickles down to ordinary citizens to improve their living standards.

4.6.2 Growth of the Metropolitan Area

Since oil discovery in Ghana in 2007, Sekondi-Takoradi has gone through a period of rapid urban change (Obeng-Odoom, 2014a; Eduful & Hooper, 2015). The population rose from 44,000 people in 1948 to 559,548 in 2010 and grew 51% over the period 2000–2010 alone (Busia, 1950; GSS 2005; 2012; STMA 2014). It also affected the values of properties in Sekondi-Takoradi. An acre of land in high-income areas of the city, such as Beach Road and Chapel Hill, already cost between US$ 130,000 and $300,000 before oil discovery (Farvacque-Vitkovic et al., 2008). After oil discovery, information gathered from the government's Lands Valuation Board (LVB) indicates that, as of 2012, an acre of land in high-income areas of the city costs between US $600,000 and $800,000. However, the 2018 land values obtained from the Land Valuation Division (See Table 4.5) indicated a decline in the price per acre of land compared to Farvacque-Vitkovic et al. (2008)'s land values.

Table 4.5 Land Values Depending on Location and Use in STMA 2018

Location	Classification	Land Value Minimum Per Acre GHC/USD	Maximum Per Acre GHC/USD
Harbour Area	High-income core	USD 1,500,000	USD 2,500,000
Beach Road	High-income core	USD 500,000	USD 650,000
Chapel Hill	High-income core	GHC 1,500,000	GHC 2,500,000
Market Circle	Central Business District	GHC 1,500,000	GHC 2,500,000
Anaji	Middle-income core	GHC 500,000	GHC 800,000
West Anaji	Middle-income core	GHC 250,000	GHC 350,000
Fijai - Accra Main Road	Middle-income core	GHC 1,800,000	
Fijai - Hospital Obiri	Middle-income core	GHC 1,000,000	
Fijai - Nana Fijaiba Road	Middle-income core	GHC 400,000	GHC 600,000
North West Ntankoful	Low income	GHC 250,000	GHC 500,000
Kojokorm Commercial	Low-income core	GHC 250,000	GHC 500,000
Kojokrom Residential	Low-income core	GHC 60,000	GHC 100,000
Eshiem	Low-income periphery	GHC 60,000	GHC 100,000
Mampong	Low-income periphery	GHC 60,000	GHC 100,000

Source: Land Valuation Division, 2018

As of 2018, an acre of land on Beach Road ranged between $500,000 and $ 650,000. This decline could be because the initial anticipation in 2008 of increased demand for land as a result of oil discovery (land speculation) led to overpricing of the land, and about a decade later, the value per acre decreased.

The oil boom has also affected the form of the city. An increasing horizontal spread of the city arises from increased building construction (Eduful & Hooper, 2015; Mensah et al.,2018). Indeed, the city's area has increased such that it has merged with many outlying areas such as Kojokrom, Kansaworodo, Ntankoful etc., which have all now become part of the metropolitan area. Thus, as Burgess (1925) posited, the peri-urban areas are being absorbed into the urban fabric through invasion and succession. This is because more people are settling in the outskirts because of cheaper rent and availability of land at a comparatively cheaper rate. In reference to Table 4.5, communities in the periphery of Takoradi, such as Eshiem and Mampong, have land values per acre ranging between 60,000 and 100,000 GHS, whereas communities closer to Takoradi (Beach Road, Chapel Hill and Anaji) range between 250,000 – 2.5 million GHS. Such a huge price difference makes lands in the periphery attractive and affordable facilitating the continued lateral expansion of the city built in a haphazard and unplanned manner with limited infrastructure and increased dependence on vehicle transportation.

Residents of Sekondi – Takoradi also experienced an increase in the cost of living following the discovery of oil and its exploitation. According to Osei-Tutu (2012), the cost of living increased astronomically following an increase in expatriate residents and oil industry employees. Landlords increased rent in response to increased demand for residential and commercial properties. Quarshie (2016), in her study in Effia-Kwesimintsim and Takoradi sub-metropolitan areas of STMA, affirms sharp increases in rent as a result of oil-induced migration and its associated demand for housing. This forced the indigenes who could not afford the increased rent to relocate from Takoradi to its environs. As more people move to the

outskirts, it leads to the development of squatter/slum settlements due to the inability of the poor to acquire land or rent, which causes them to squat in any available space (Yiran et al., 2020).

There has also been an increase in luxury hotels and restaurants, affirming Hendrix and Noland's (2014) correlation between the oil boom and the hospitality industry, which showed an unprecedented increase in 5-star hotels in Accra and Sekondi Takoradi. Hotels such as Best Western Atlantic Hotel, Planters Lodge, and Protea Hotel by Marriot, just to mention a few, have all been newly constructed or renovated to provide luxury accommodation and recreational facilities to their target clients. The hotels also provided the needed short-stay accommodation for workers on the oil rigs either en route to Accra after being on the rig for two weeks or vice versa. Also, others patronise hotel facilities for business meetings, workshops, conferences etc., given the anticipated boom in the economy leading to the establishment of company branches in Sekondi – Takoradi.

In terms of infrastructural development, taxation and royalties from oil-generated funds have gone predominantly to the road sector in Sekondi- Takoradi. A manager of an international development organisation, Global Communities, is cited in Nguyen (2019) to have stated that:

"..if there were no oil, I do not think probably that the roads would have been fixed. Maybe some kind of agency would have given the aid. But the oil discovery has spurred quite a lot of infrastructure".

Proceeds from oil have benefited the country through various infrastructural developments such as the €160 million (US $182.1million) civil and dredging works at Takoradi Port, US $1.5 million Tema Port expansion, US $622 million Bui power project, €1.8 billion (US $2.05 billion) eastern corridor roads, €74 million (US$2.05 million) Kwame Nkrumah Interchange projects (Oteng-Ababio, 2018), and US $3 billion thermal plants at Atuabo are but a few that have been initiated and sustained courtesy of the black gold (Oteng – Ababio, 2018). This

shows that proceeds from oil benefit not only Sekondi Takoradi indigenes but also provide countrywide infrastructural development.

The spatial extent of STMA has expanded over the years, and the urban boundary now includes communities designated as sub-urban during the colonial era. From Figure 4.6, it is evident that STMA will continue to develop northwards into the agrarian communities (shown in the legend as the 4th belt). Land and housing speculation, increased rent and an overall surge in population in STMA at the discovery of oil plunged the city into another phase of spatial development. The continued sprawling of the metropolis and rapid conversion of agricultural lands for residential and commercial uses has implications for the environment and livelihoods. These issues are discussed further in Chapters 6 and 7. Thus although sprawl is occurring rapidly, stringent measures are needed to ensure the social and environmental sustainability of the city for future generations.

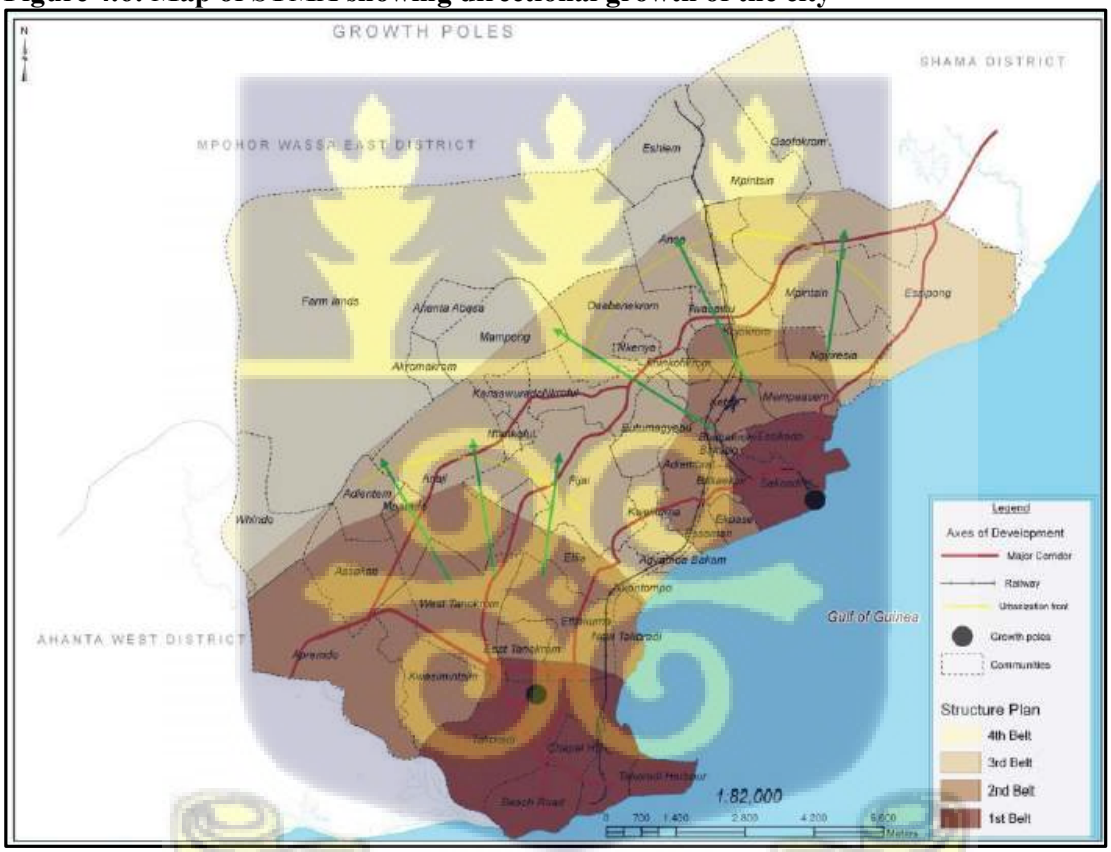
4.7 Development in STMA from the Perspective of Spatial Theories

From the pre-colonial era until now, Sekondi-Takoradi has expanded to incorporate communities in the suburban boundary (see Figure 4.3) into the city's urban boundary, with development frequently ahead of planning. A study conducted by CHF (2012) shows the new urban boundary (Figure 4.6) and the extent of incorporation that has occurred in the metropolitan area.

Reflecting on STMAs spatial development from the economic, social and public interest perspectives, it becomes obvious that STMA's spatial development has not followed a particular model but rather a blend of specific aspects of the models. From the economic perspective, competition in the land market affected the land value and influenced the CBD and residential housing location. Land values have facilitated sprawl in STMA as land in the periphery is relatively cheaper.

Within the urban boundary of STMA are low-income communities near the CBD and Takoradi harbour, which aligns with the Burgess Concentric Zone model discussed in Chapter 2 (section 2.7 page 31). Through invasion and succession, it also shows that rural areas were converted into peri-urban areas that eventually expanded and were absorbed into the urban area. Spatial development in the city developed around economic hubs, i.e. port in Sekondi and later on in Takoradi around the harbour, all of which are tenets of the spatial development of the multiple-nuclei and concentric zone models.

Figure 4.6: Map of STMA showing directional growth of the city



Source: CHF, 2011

In addition to the economic activities in the harbour, the railway sector served as the main transport axis that influenced spatial development within the city, as proposed by Harris and Ullman (1945). The railway line facilitated the development of Kojokrom and its incorporation

into the urban area. The community became a hub for economic activity because of the ease of transporting agricultural products and other wares for trading, underscoring the importance and role of transportation.

As transport infrastructure continued to expand, commercial and residential developments continued along those lines, with spatial development often occurring in an unplanned manner further away from the urban core. For instance, the designation of Eshiem (a predominantly farming community) as a Freezones enclave by the Metropolitan Assembly has spurred the sudden increase in the conversion of farmland to residential use due to an increase in migrants seeking employment in the factories that have been established. This has also boosted the transportation business in the community since more people are commuting to and from Eshiem. This spatial development form falls within the Multiple nuclei model and the role of public interest in spatial planning.

The social values of the populace have also played a significant role in its development. The cultural shift from the extended family system to the nuclear family has influenced spatial development as there is the need for more residential buildings to accommodate the preference change. Also, the culture of taking care of external family members spurs the affluent to build houses in the periphery to provide accommodation for their relatives, giving the provider status and respect in the family.

Affluence (i.e. income levels) and related lifestyles influenced the preference of people in where to live. The desire for a serene environment, neat surroundings, and association with people within a specific income level (for instance, high-income earners are found in Beach Road, Anaji and Chapel hill) influence the development that takes place within the metropolis. Residential segregation in planning terms began during the colonial era with the distinction between the European town and the African town and the difference in social amenities

available within each area. This has gone a long way to influence the class system in residential locations. In recent times, however, at the discovery of oil, the wealthy speculated on land and housing and this increased land values and rents, which in the long run fuelled the relocation of some middle and low-income earners to the peripheral communities or urban low-income areas where they can afford the rent or buy their own lands resulting in the sprawling of the city.

The city's expansion cycle of economic stagnation and urban growth influenced its spatial development, and to a large extent, STMA development occurred during stagnation and sprawl. The city has experienced a study increase in population (both natural and migrant) which has facilitated the need for educational facilities, hospitals, roads, housing, water, and electricity, just to mention a few. As spatial development outruns planning mechanisms, the sprawling communities lack adequate basic infrastructure and social amenities affecting the inhabitants' quality of life.

In a nutshell, the spatial development of STMA from the theoretical perspective brings to the fore the importance of including social and economic values and public interest in planning to efficiently anticipate future needs and desires and incorporate them into the planning mechanism to manage the city's spatial development.

4.8 Chapter Summary

This chapter focused on the various socio-economic and political phases Sekondi Takoradi has evolved through over the centuries. The main economic booster of the city from the colonial era is its deep-sea harbour, which has been the city's backbone, and in recent times, oil exploitation has attracted migrants to the city. The port, harbour, and railway location shaped the residential and commercial development that took place in the city, as they were the main transport axis within the city. The racial divide and segregation experienced during the colonial

era in the implementation of development plans continue to separate the first-class communities where the British resided from the other towns. This has continued to shape the spatial distribution of residential patterns in the city, with some communities well planned and developed than others.

In addition to this are individual values, the quest for affordable land and rent, which are shaping their areas of residential choice and have played a key role in facilitating sprawl, especially during the oil boom period, which was accompanied by land speculation, increased rents, and anticipated employment opportunities. Coupled with the challenges faced in planning by the metropolitan authority, development has outpaced planning and has given rise to underserved communities which lack basic social amenities and infrastructure. The city has expanded to include the suburban communities that are now incorporated into the urban zone. This raises environmental and social sustainability issues as vegetative and agricultural lands are being converted to other uses.

The next Chapter, five (5), explores the drivers of urban sprawl in Sekondi Takoradi to further examine the underlying reason why people are relocating/migrating to the city and examine the ongoing patterns of relocation in the city.

CHAPTER FIVE

DRIVERS OF URBAN SPRAWL

5.1 Introduction

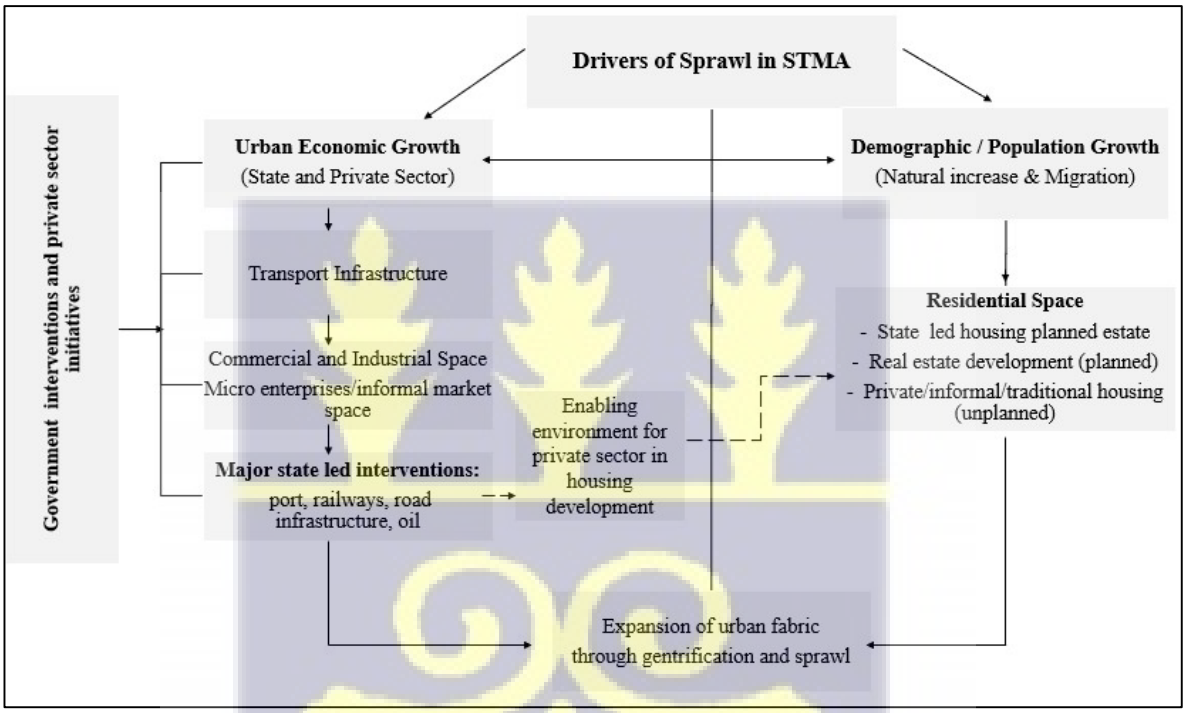
This chapter presents an analysis of the empirical data on the drivers of urban sprawl in Sekondi-Takoradi. As established in chapter 4, the population of STMA has increased exponentially between (1984 years and 2010) due to economic recovery and prosperity. This encourages inter-residential mobility and migration into the city from other areas – national and international resulting in urban sprawl in the metropolis. This chapter examines the underlying and proximate drivers of sprawl. The underlying drivers are population growth, and economic expansion and proximate drivers are intra-urban mobility, housing and land affordability, preference for a serene environment and family movement. These are examined to determine how it is enabling sprawl within the metropolis. Consistent with the model on the drivers of urban sprawl, this chapter discusses residency status, relocation patterns, and reasons for and expansion of the urban fabric.

5.2 Model of Drivers of Urban Sprawl

To understand the dynamics of sprawl in STMA, it is important to start with a model that incorporates all the activity systems that have led to the demand for more space in the city. Figure 5.1 provides a model for understanding the various drivers that have facilitated sprawl in STMA. It shows how economic stimulus and demographic expansion go a long way to pressure the state to provide more infrastructure, leading to more investments and economic opportunities, which in turn attract migrants to the area for jobs and increase the population, which in turn increases demand for residential space. The drivers of sprawl, as indicated in the model, do not operate in isolation, but they interact and give rise to pressure on space needs which leads to urban expansion either through sprawl or densification.

The main driver of urban growth and expansion of the city has been its economic base beginning from the colonial era with the construction of the port and, in recent times, oil exploitation. Guided by state interventions and their role in providing favourable conditions for private sector involvement in economic and residential expansion, the metropolis has been prime for spatial expansion over the years.

Figure 5.1 A model showing the interlinkages between activity systems and space requirements in STMA



Source: Author's construct

As economic growth occurs, there is an increase in population, especially migrants who seek to take advantage of the ongoing economic opportunities available within the city. This increase in population and economic growth both have space requirements that need to be met. For instance, as economic expansion occurs, there is increased demand for space to engage in commercial and industrial activities and a boom in the informal market sector. The location of these industrial and commercial activities influences settlement patterns, land values and rent. As the economy continues to thrive with ongoing oil exploitation, this has affected the spatial

pattern of the city. The anticipation of increased economic activities attracted both local and international migrants seeking greener pastures, which affected both living costs and standard of living. Increased rent resulted in the ejection of tenants who could not afford to pay, thereby being forced to move into the outskirts where it is relatively cheaper. Additionally, land speculation by real estate developers and individuals has also contributed to sprawl within the metropolis. Spatial expansion is continuing northwards, with a majority of the houses privately owned by individuals or rented by those who cannot afford to build.

The continued northward expansion has led to the incorporation of villages that were once designated during the colonial period beyond the suburban boundary. Thus, as the economic base and population continue to grow, the urban fabric will continue to expand vertically and horizontally, resulting in gentrification and sprawl. Overall, the trajectory in the city has been urban expansion, but in periods of crisis and adjustments, it could also be negative feedback with economic decline, which leads to net out-migration, which leads to negative feedback all around the loop.

To understand the drivers of sprawl within the context of STMA, the following sections look at the residency status of the respondents and, based on that, determine the patterns of relocation, the reasons behind it and how that has facilitated sprawl in the metropolis. As such, the underlying drivers of sprawl as depicted in Figure 5.1 are discussed alongside the proximate drivers based on the respondents' perspectives.

5.3 Residency Status of People in Sample Communities

Since movement within the city is a key driver of urban sprawl, this chapter begins with an analysis of the residency status of respondents, i.e. indigenes and migrants. Respondents were asked to indicate if they were natives of their current place of abode or relocated or migrated to the place. This analysis was done in relation to respondents' sociodemographic

characteristics, including sex, age, education and occupation across three different socio-economic places of residence – Urban Middle Income (UMI), Urban Low Income (ULI), Peri-urban Mixed Income (PuMI). The PuMI is essentially rural, but in the process of change as a result of the construction of individual private houses and gated communities by real estate companies and the migration of the urban poor who cannot afford to pay rent in the urban core into the rural communities which have been enclosed by sprawl, The results of the analysis are presented in Table 5.1.

Of the 400 respondents sampled across the three socio-economic classes, 45.5 percent indicated that they were indigenes of their respective places of residence, while 54.5 percent had migrated or relocated to the community. This suggests that a higher percentage of respondents were not indigenes of the communities they inhabit. For this study, the term indigene encompasses natives of the community as well as second-generation migrants who were born in the community.

Of the number of respondents who were migrants, there were more females (56.6%) than males (51.7%), albeit the results of the chi-square test showed no significant difference between the sex and residency status of respondents ($p>0.05$). While gender may be considered a significant variable in assessing rural-urban migration or intra-urban mobility, in the context of this study, gender was not a significant variable.

In terms of age, the results show that while a higher percent of respondents who were less than 21 years (55.6%) and those within the ages of 22-30 years (55.3%) were indigenes of their respective places of abode, the majority of respondents within the ages of 31-40 years (61.9%), 41-50 years (54.9%) and above 50 years (64.3%) were migrants. Put differently, the majority of respondents who were less than 31 years were indigenes, and majority of those above 30

years were migrants. As a result, age showed a significant association with the residency status of respondents ($p<0.05$) (see Table 5.1).

Table 5.1 Residency status by socio-demographic characteristics

Background characteristics	**Urban Middle Income (n=120)**		**Urban Low Income (n=71)**		**Peri-urban Mixed Income (n=209)**		***Total (N=400)***	
	Indigene **(44.2%)**	Migrant **55.8%)**	Indigene **(39.4%)**	Migrant **(60.6%)**	Indigene **(48.3%)**	Migrant **(51.7%)**	*Indigene* ***(45.5%)***	*Migrant* ***(54.5%)***
Sex								
Female	29 (41.4%)	41 (58.6%)	12 (30.0%)	28 (70.0%)	57 (49.1%)	59 (50.9%)	*98 (43.4%)*	*128 (56.6%)*
Male	24 (48.0%)	26 (52.0%)	16 (51.6%)	15 (48.4%)	44 (47.3%)	49 (52.7%)	*84 (48.3%)*	*90 (51.7%)*
	χ^2=0.51, df(1), p=0.48>0.05		χ^2=03.42, df(1), p=0.07>0.05		χ^2=0.07, df(1), p=0.79>0.05		*χ^2=0.96, df(1), p=0.338>0.05*	
Age group								
Less than 21 years	5 (71.4%)	2 (28.6%)	3 (42.9%)	4 (57.1%)	7 (53.8%)	6 (46.2%)	*15 (55.6%)*	*12 (44.4%)*
21-30 years	19 (61.3%)	12 (38.7%)	9 (52.9%)	8 (47.1%)	40 (53.3%)	35 (46.7%)	*68 (55.3%)*	*55 (44.7%)*
31-40 years	9 (36.0%)	16 (64.0%)	5 (41.7%)	7 (58.3%)	18 (38.3%)	29 (61.7%)	*32 (38.1%)*	*52 (61.9%)*
41-50 years	9 (39.1%)	14 (60.9%)	9 (75%)	3 (25%)	19 (40.4%)	28 (59.6%)	*37 (45.1%)*	*45 (54.9%)*
>50 years	11 (32.4%)	23 (67.6%)	2 (8.7%)	21 (91.3%)	17 (63.0%)	10 (37.0%)	*30 (35.7%)*	*54 (64.3%)*
	χ^2=8.63, df(4), p=0.07>0.05		**χ^2=20.16.8, df(4), p=0.002<0.01****		χ^2=6.30, df(4), p=0.18>0.05		***χ^2=10.96, df(4), p=0.03<0.05****	
Education								
No formal	12 (57.1%)	9 (42.9%)	4 (40.0%)	6 (60.0%)	28 (71.8%)	11 (28.2%)	*44 (62.9%)*	*26 (37.1%)*
Primary	11 (50.0%)	11 (50.0%)	5 (38.5%)	8 (61.5%)	26 (52.0%)	24 (48.0%)	*42 (49.4%)*	*43 (50.6%)*
Secondary	22 (38.6%)	35 (61.4%)	14 (40.0%)	21 (60.0%)	43 (41.0%)	62 (59.0%)	*79 (40.1%)*	*118 (59.9%)*
Voc/Tec	2 (66.7%)	1 (33.3%)	3 (37.5%)	5 (62.5%)	2 (50.0%)	2 (50.0%)	*7 (46.7%)*	*8 (53.3%)*
Tertiary	6 (35.3%)	11 (64.7%)	2 (40.0%)	3 (60.0%)	2 (18.2%)	9 (81.8%)	*10 (30.3%)*	*23 (69.7%)*
	χ^2=3.61, df(4), p=0.46>0.05		χ^2=0.24, df(4), p=0.9>0.05		**χ^2=15.17, df(4), p=0.004<0.001****		***χ^2=14.43, df(4), p=0.006<0.01*****	

Table 5.1 Residency status by socio-demographic characteristics (continued)

Background characteristics	**Urban Middle Income (n=120)**		**Urban Low Income (n=71)**		**Peri-urban Mixed Income (n=209)**		***Total (N=400)***	
	Indigene	Migrant	Indigene	Migrant	Indigene	Migrant	*Indigene*	*Migrant*
Occupation								
Farmer	3 (75.0%)	1 (25.0%)	1 (100%)	0 (0.0%)	29 (67.4%)	14 (32.6%)	*33 (68.8%)*	*15 (31.2%)*
Trader/food vendor	14 (31.1%)	31 (68.9%)	11 (34.4%)	21 (65.6%)	22 (36.1%)	39 (63.9%)	*47 (34.1%)*	*91 (65.9%)*
Student/pensioner/ unemployed	14 (56.0%)	11 (44.0%)	5 (27.8%)	13 (72.2%)	14 (48.3%)	15 (51.7%)	*33 (45.8%)*	*39 (54.2%)*
Corporate/office worker	4 (33.3%)	5 (55.6%)	0 (0.0%)	2 (100%)	1 (20.0%)	4 (80.0%)	*5 (31.2%)*	*11 (68.8%)*
Teacher/pastor	1 (33.3%)	2 (66.7%)	1 (100%)	0 (0.0%)	0 (0.0%)	3 (100%)	*2 (28.6%)*	*5 (71.4%)*
Artisan	17 (50.0%)	17 (50.0%	10 (58.8%)	7 (41.2%)	35 (51.5%)	33 (48.5%)	*62 (52.1%)*	*57 (47.9%)*
	χ^2=6.68, df(5), p=0.25>0.05		χ^2=8.42, df(5), p=0.14>0.05		**χ^2=14.65, df(5), p=0.01<0.05***		***χ^2=21.96, df(5), p=0.001<0.01****	

Source: Author's construct based on field data (2020)

Among the various socio-economic urban classes, the results further show that age was significantly associated with only the residential status of respondents in the ULI communities ($p<0.01$). For instance, a significant majority of respondents above 50 years (91.3%) indicated that they were migrants. 75% and 52.9% of respondents between the ages of 41-50 years and 22-30 years, respectively, were indigenes. The younger groups are less likely to move out of the city because of the city's increasing prosperity. They are living in dynamic communities where there are a lot of opportunities. The economic prospect of STMA makes it an attractive destination for most people, especially for its job and other related economic prospects, and this could explain why migrant status seemingly correlates with increasing age. These are people who might have moved to STMA on their own accord in search of job opportunities or either relocated for other social, cultural, economic or environmental reasons.

Overall, the level of education showed a significant association with the residential status of respondents ($p<0.01$). For instance, whereas majority of respondents with no formal education were indigenes s (62.9%), majority of respondents with tertiary education were migrants

(69.7%). Additionally, a higher percentage of respondents with primary education (49.4%) were indigenes than those with secondary education (40.1%).

Furthermore, in terms of indigenes respondents, the majority were farmers (68.8%) or artisans (52.1%). By contrast, a higher percentage of traders or food vendors (65.9%), corporate/office workers (68.8%), teachers/pastors (71.4%) and students/pensioners or those unemployed (54.2%) were migrants. Occupation type showed a significant association with respondents' residency status ($p<0.01$). Across the UMI and ULI communities, respondents' occupation type and residency status were not significantly associated; however, there was a significant relationship between the two variables among the PuMI communities. For example, in the PuMI communities, majority of the traders or food vendors (63.9%), students/pensioners/unemployed (51.7%), and all the teachers or pastors sampled were migrants. In contrast, a relatively higher percentage of artisans (51.5%) and farmers (67.4%) were indigenes.

Comparatively, the highest percentage of indigenes were found in the low-income peri-urban areas (48.3%), which are currently undergoing sprawl, and it is not surprising that these communities still have a large indigenous population. There is a marginal difference of 1.42% between respondents who were indigenes or migrants within the PuMI communities. The UMI communities, on the other hand, had the lowest percentage of respondents who were indigenes.

5.4 Patterns of Relocation and Reasons

5.4.1 Patterns of Relocation

Inferring from Table 5.1, the general trend shows more migrants (54.5%) than indigenes (45.5%) across the study communities. Of the migrants, 45.5% are from other regions in Ghana, 27.6% are from towns and villages within STMA, 23.7% are from towns within the Western Region, and 3.2% were international migrants. This finding is in line with data from the Ghana

Statistical Services (2014a), which indicates that 37.0% of the residents in the metropolis are migrants, majority of which are inter-regional. Thus, there is an ethnic mix of residents living within the metropolis, with a higher percentage of migrants living in low-income communities. A diagrammatic representation of the patterns of relocation (which has been generalised based on the average percentages of surveyed communities to show ethic patterns occurring in the socio-economic classes) is shown in Figure 5.2.

The wealthy and low-income earners are invading the peri-urban mixed-income communities, which were initially rural. It follows a pattern of invasion and succession as theorised by the Concentric Zone Model, with the affluent and middle-income earners moving and settling in. As such, the peri-urban communities are undergoing a process of change due to an invasion of non-indigenous persons into those communities. Thereby resulting in a demographic change where currently 52% of the inhabitants are migrants. In the not-too-distant future, once it is built up, the indigenous people would have to be moved away to farming communities elsewhere.

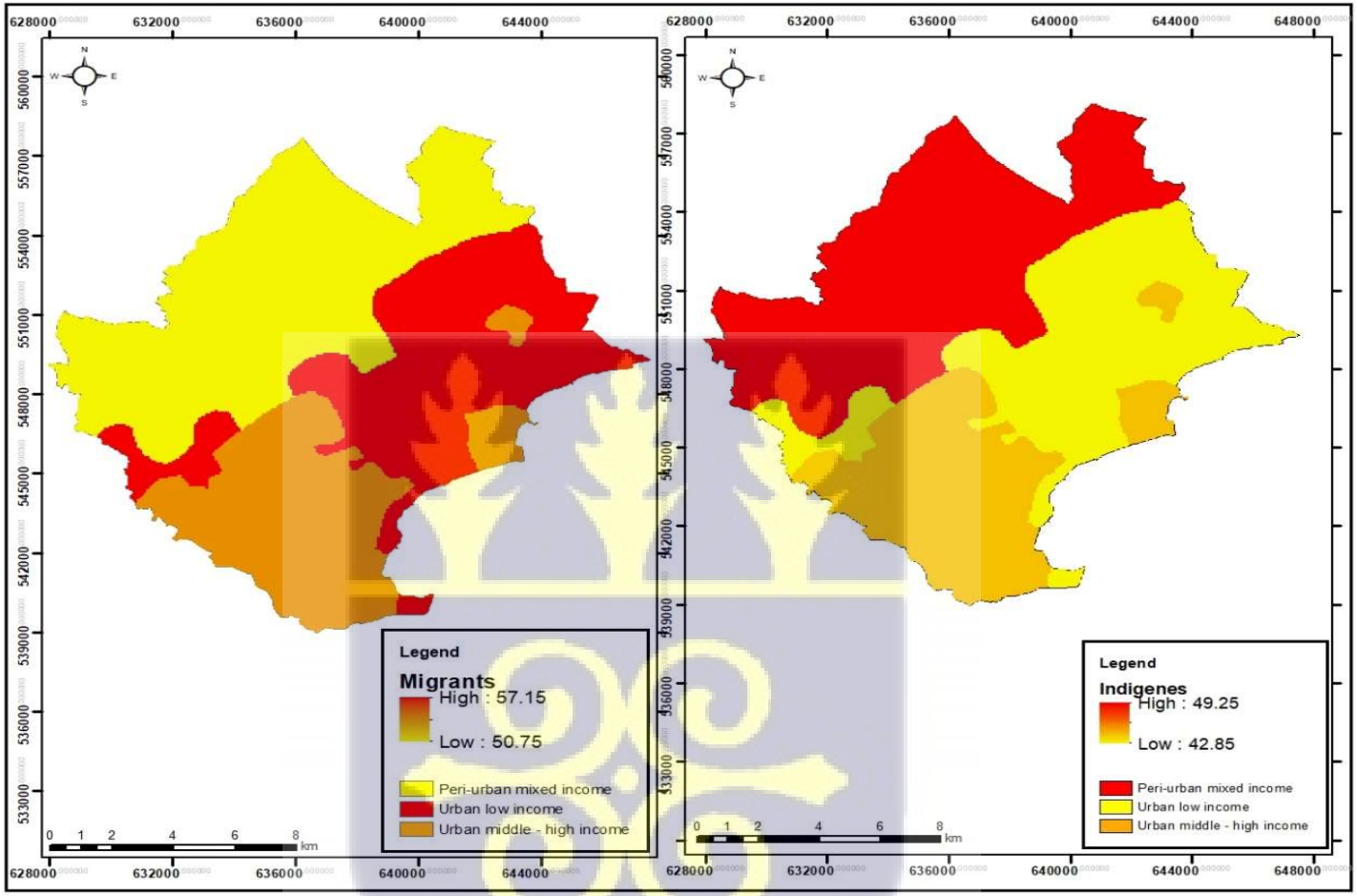
The ULI communities also had more migrants than locals in comparison to the other socio-economic classes. This is partly attributable to employment opportunities offered by the railway in towns such as Kojokrom. This attracted the relocation of high-level working-class migrants because the railway industry had been at the core of the trade union movement and was the highest employing state institution. So, it brought in people from all over the place. The presence of the railways also promoted other thriving economic activities alongside influencing settlement development along the transport axis, as theorised by the sector model. This has shaped the spatial expansion and demographic makeup of low-income urban communities.

Even after the collapse of the railway, there are still thriving informal commercial activities and a transportation hub which provides employment opportunities. Coupled with relatively lower rent and cheaper land, it is an attractive location for middle- and low-income earners. The indigenes benefit from revenue generated from accommodation rental and the sale of land; as such, those who cannot afford to live in the urban core move to the low-income urban communities, thereby accounting for approximately 61% migrants in ULI communities.

Lastly, there is a good blend of migrants and indigenes in the UMI communities, although most are migrants (56%). These communities are undergoing gentrification as residences are being transformed into commercial use. With higher land values and rent, those who cannot afford accommodation in these communities relocate to low-income or peri-urban communities. Additionally, high- and middle-income earners within UMI communities seeking a more serene environment tend to move outwards to the periphery to satisfy their social needs.

Therefore, it is evident that the dynamics of migration and urban expansion have been ongoing in the wealthy and low-income urban areas, which were originally peri-urban areas have been absorbed into the urban fabric. As this dynamic process continues, the current peri-urban areas will eventually become consolidated, and there will be a new peri-urban frontier further. Thus, through invasion and succession, the peri-urban communities become part of the urban fabric over time. Additionally, the rural annulus of the metropolis is a large segment that is undeveloped, and it is expanding and gradually transforming into the peri-urban zones of the city.

Figure 5.2: Ethnic mixture by socio-economic class



Source: Author, 2021

5.4.2 Reasons for Relocation by Respondents

Considering that majority of respondents (54.5%, N=400) indicated that they relocated to their place of residence (see Table 5.1), they were asked to indicate the reasons why they relocated or migrated to their current place of residence. While admitting that multiple push factors, often in varying forms, could influence individuals to relocate or migrate to another community, the influence of favourable physical, social and economic conditions existing at the destination region cannot be overlooked. Additionally, this will certainly explain the various factors driving urban sprawl in the selected communities. On this basis, the study examined the reasons why respondents relocated to their current place of residence.

The study allowed for multiple responses from respondents considering that multiple factors influenced respondents to relocate. The results are presented in Table 5.2. Enhanced intra-urban mobility (84.4%) was reported as the major reason why respondents relocated, followed by housing affordability (62.8%) and access to land (46.3%). Environmental and social factors such as preference for a serene environment (40.8%) and family relocation/movement (38.1%), respectively, were the least reported reasons why respondents relocated. Taking cognisance of spatio-temporal factors such as proximity to essential services and the economic implication of cost, the ease of commuting within urban spaces was identified as the most significant driver of relocation or movement within the study areas.

Table 5.2: Reasons for relocation by socio-demographic characteristics (N=218) (Multiple Responses)

Variables	Enhanced intra-urban mobility {n=184; **(84.4%)**}	Housing affordability {n=137; **(62.8%)**}	Family movement/migration {n=83; **(38.1%)**}	Preference for serene environment {n=89; **(40.8%)**}	Land affordability {n=101; **(46.3%)**}	Total N=218
Socio-economic classification of communities						
Urban middle income	61 **(91.0%)**	25 (37.3%)	32 (47.8%)	28 (41.8%)	18 (26.9%)	67
Urban low income	71 (86.3%)	45 (56.3%)	32 (40.0%)	24 (32.5%)	34 (42.5%)	80
Peri-urban mixed income	52 (73.2%)	67 **(94.4%)**	32 (45.1%)	37 (52.1%)	49 (69.0%)	71
χ^2(at 5% level of significance)	*χ^2=0.98, p=0.31*	***χ^2=149.3, p=0.0001***	*χ^2=0.28, p=0.87*	***χ^2=28.8, p=0.0001***	***χ^2=28.84, p=0.0004***	
Sex						
Male	81 **(90.0%)**	64 (71.1%)	19 (21.1%)	34 (37.8%)	58 (64.4%)	90
Female	103 (80.5%)	73 (57.0%)	64 (50.0%)	55 (61.8%)	43 (33.6%)	128
χ^2(at 5% level of significance)	*χ^2=0.14, p=0.91*	*χ^2=3.54, p=0.06*	***χ^2=8.92, p=0.03***	***χ^2=10.46, p=0.002***	***χ^2=32.8, p=0.001***	
Age group						
Less than 21 years	9 (75.0%)	2 (16.6%)	8 (66.7%)	5 (41.7%)	3 (25.0%)	12
21-30 years	42 (76.4%)	32 (58.1%)	24 (43.6%)	17 (30.9%)	14 (25.5%)	55
31-40 years	43 (82.7%)	39 (75.0%)	18 (34.6%)	13 (25.0%)	29 (55.8%)	52
41-50 years	41 **(91.1%)**	36 **(80.0%)**	14 (31.1%)	21 (46.7%)	25 (55.6%)	45
>50 years	49 **(90.7%)**	28 (51.9%)	19 (35.2%)	33 (61.1%)	30 (55.6%)	54
χ^2(at 5% level of significance)	*χ^2=0.54, p=0.89*	***χ^2=64.78 p=0.0001***	***χ^2=4.56, p=0.04***	***χ^2=12.43, p=0.03***	*χ^2=2.36, p=0.08*	

Table 5.2 (continued): Reasons for relocation by socio-demographic characteristics (N=218) (Multiple Responses)

Variables	Enhanced intra-urban mobility	Housing affordability	Family movement/ migration	Preference for serene environment	Land affordability	Total
Education						
No formal	14 (53.8%)	18 (69.2%)	17 (65.4%)	8 (30.8%)	18 (69.2%)	26
Primary	32 (74.4%)	34 (**79.1**%)	13 (30.256%)	17 (39.5%)	29 (67.4%)	43
Secondary	99 (**83.9%**)	72 (61.0%)	22 (18.6%)	36 (30.5%)	42 (35.6%)	118
Voc/Tec	5 (62.5%)	4 (50.0%)	3 (37.5%)	6 (75.0%)	2 (25.0%)	8
Tertiary	34 (79.1%)	9 (20.9%)	28 (65.1%)	22 (51.2%)	10 (23.2%)	43
χ^2(at 5% level of significance)	*χ^2=0.54, p=0.89*	***χ^2=14.34, p=0.032***	***χ^2=8.45, p=0.04***	***χ^2=3.92, p=0.006***	***χ^2=17.28, p=0.002***	
Occupation						
Farmer	9 (60.0%)	8 (53.3%)	9 (60.0%)	11 (**73**.3%)	12 (**80.0%**)	15
Trader/food vendor	82 (**90.1%**)	70 (**76.9**%)	32 (35.2%)	25 (27.5%)	63 (69.2%)	91
Student/pensioner/ Unemployed	28 (71.8%)	21 (53.8%)	8 (20.5%)	21 (53.8%)	9 (23.1%)	39
Corporate/office worker	9 (81.8%)	4 (36.4%)	5 (45.5%)	4 (36.4%)	3 (27.3%)	11
Teacher/pastor	4 (80.0%)	2 (40.0%)	1 (20.0%)	2 (40.0%)	1 (20.0%)	5
Artisan	52 (**91.2%**)	32 (23.4%)	28 (49.1%)	26 (45.6%)	13 (22.8%)	57
χ^2(at 5% level of significance)	***χ^2=3.68, p=0.043***	***χ^2=9.62, p=0.003***	***χ^2=16.45, p=0.0002***	***χ^2=19.77, p=0.0004***	***χ^2=104.54, p=0.00001***	

Source: Author's construct based on field data (2020)

Regarding variations in responses across the various socio-economic urban communities, the results show that there is no significant relationship (p>0.05) between the socio-economic classification of the communities and intra-urban mobility and family movement/migration. This is because majority of all the respondents across the various socio-economic groups indicated that accessibility and family movement/migration were why they relocated to their various communities.

The affordability of housing within the PuMI areas was the major reason why 94.4% of respondents relocated to PuMI communities. A majority of respondents from PuMI (94.4%)

and ULI (56.3%) communities identified housing affordability as one of the major reasons why they relocated to the urban fringe. Therefore, it is not surprising that the chi-square showed a significant relationship ($p<0.05$) between housing affordability and PuMI communities. This is because the rental cost in the PuMI and ULI are relatively cheaper than rent in UMI communities.

Additionally, preference for a serene environment and land affordability were identified as major reasons many respondents relocated to PuMI communities. The study shows a significant relationship ($p<0.05$) between PuMI communities and a preference for a serene environment and land affordability. This is attributed to the presence of lush vegetation, cleaner air quality and a more peaceful (quiet) environment within the PuMI communities. Since land is relatively cheaper in the city's outskirts, it attracts those seeking a serene environment and those seeking affordable land to relocate to PuMI communities to satisfy their social preferences and economic needs. Thereby creating an environment where two different social groups, wealthy and poor, co-exist, with the wealthy living in gated communities constructed by real estate developers or in walled private houses and surrounded by villagers who farm. This, in the long run, brings about social segregation within the community. The sale of land is beneficial to the locals, and as people continue purchasing land in the PuMI communities because it is cheaper and lacks control, it leads to sprawl.

The results further show that, regarding respondents' sex, there is no significant relationship ($p>0.05$) between sex and enhanced intra-urban mobility as majority of both males (90.0%) and females (80.5%) identified enhanced intra-urban mobility as one of the major reasons why they relocated. Comparatively, majority of males identified housing affordability (71.1%) and access to land (64.4%) as reasons why they relocated, but in contrast, a higher percent of females stated family movement/relocation (50%) and preference for a serene environment (61.8%) as the reasons why they relocated to their current place of residence. Culturally, the

burden of providing shelter is often a household decision-makers responsibility, and in a situation where the cost of housing and land is expensive, they are more likely to seek affordable alternatives in satellite and low-income communities. This could explain why there is a significant relationship ($p<0.05$) between males and housing affordability and access to land. Also, female spouses are more likely to join their spouses when they relocate, particularly for employment purposes – which could either be temporal or permanent. This could explain why there is a significant relationship between females and relocation for family reasons.

The majority of respondents across the various age groups identified enhanced intra-urban mobility as one of the major reasons they relocated, albeit there are some differences regarding other relocation reasons and age (see Table 5.2). It can be deduced from Table 5.2 that there is a significant relationship ($p<0.05$) between age and family relocation, preference for a serene environment, housing and land affordability. To this end, respondents who were less than 21 years (66.7%) stated family relocation as one of the reasons why they moved. This is because they are somewhat dependent on their family and tend to move when they relocate. Also, about 80% of respondents between the ages of 41-50 years identified housing affordability as the reason they relocated. For those above 50 years, the results show they indicated a preference for a serene environment as a reason for relocation.

Regarding educational level and reasons for relocation, the chi-square test shows a significant relationship ($p<0.05$) between respondents' level of education and family movement, preference for a serene environment, housing, and land affordability. For instance, majority of the respondents with primary education identified housing affordability as a major reason they relocated to their current place of residence, while this was the least reason for respondents with tertiary education (see Table 5.2). Compared with other levels of education, majority (75%) of respondents with vocational or technical education relocated because they preferred

a serene environment, while 69.2% of respondents with no formal education and 67.4% with primary education indicated access to land was one of the major reasons why they relocated.

The study further shows a significant relationship ($p<0.05$) between occupation and the reasons for relocation. For instance, most artisans (91.2%) and traders/food vendors (90.1%) stated that enhanced intra-urban mobility was one of the major reasons they relocated. Enhanced intra-urban mobility guarantees easy access within urban areas and has the tendency to follow construction sites and foster economic activities in the region, and this could explain why majority of traders and artisans relocated to their current locations. The results also show that access to land was one of the major reasons why most farmers relocated or moved to their current residence (see Table 5.2).

Urban farming of any form cannot take place independent of space, thus as most spaces within the core or urban areas are converted for residential and recreational purposes, farmers are forced to look for cheaper alternatives within the satellite communities or, preferably, look for affordable accommodation which is geographically closer to rural communities where they can easily commute to access their farmlands in the rural communities. Additionally, in most peri-urban areas that are often agrarian, the land cost is normally cheaper, making these areas an attractive hub for sprawl. These peripheries become an easy target to accommodate congestion, the high cost of housing and the indirect effects of rapid urbanization (Li et al., 2018). This makes it easy for people to acquire agricultural lands and transform them for residential and other recreational purposes, resulting in the loss of arable lands (Peprah, 2014; Biney and Boakye, 2021).

5.4.3 Urban Demographic and Economic Growth

As previously discussed in Chapter 4, the port and railways were the backbones of Sekondi - Takoradi, and these contributed substantially to the economic rise and importance of Sekondi

-Takoradi during colonial times (Busia 1950). The bustling economic activities attracted migrants to the city, most of whom became permanent residents. For instance, the railway industry employed majority of the residents as there was a heavy reliance on the railways to transport raw materials such as cocoa, bauxite, timber, and manganese to the port for export. According to Busia (1950), railway workers were more than workers in any government department in town and more than the total number of workers in the formal private sector and served as a pull for migrants.

The construction of the port and railways influenced the spatial development pattern of the metropolis as it involved the resettlement of natives living in villages and towns and also brought about racial segregation in housing locations which in the long run shaped the residential spatial pattern of the metropolis. Due to the economic boom, the port and railways also steered urbanisation and increased population (Jeffries, 1974). The economy went through a slump during the 1970s and 1980s, and this dwindled the importance of the town; however, this did not affect natural population growth but rather facilitated out-migration as citizens sought greener pastures elsewhere.

However, since 2007, the emergence of Ghana as an oil-producing nation has steered urban development in Sekondi- Takoradi and boosted its economic activities. The city has witnessed increased commercial activities in the hospitality sector, including hotels, guest houses, restaurants, etc. There is an increase in the branches of financial institutions within the city, conversion of residential houses to offices for oil companies and those engaged in oil-related business, etc. There has also been a growth in the informal market to provide the needed goods and services for the increasing population in the metropolis as a result of the economic boom. The harbour has also undergone expansion to handle the demands of offshore oil activities. The plethora of diverse commercial activities occurring in the city requires adaptive space, and as they expand, it alters the land cover of the metropolitan area, with gentrification and sprawl

being an outcome. Accompanying gentrification is an increase in rent for both commercial and residential purposes. As the demand for more space increases, those who cannot afford the increased rents relocate further from the core, which in the long term leads to sprawl (Eduful and Hooper, 2015).

During the first half of the twentieth century, Sekondi-Takoradi's combined population grew due to increasing economic and industrial activity. In 1948, the population of the merged city was 44,130, including 807 non-Africans (Busia 1950). Sekondi-Takoradi's population continued to rise over the years but grew remarkably from 396,166 in 2000 (GSS 2005) to 559,548 in 2010 (GSS 2012), with the discovery of oil being a major factor, attracting migrants seeking economic opportunities. The city is experiencing increased economic and population growth and is the pivotal urban node of growth in a rapidly growing resource economy (Eduful and Hooper, 2015). As migration and population growth are known to expand the market, the urban economy brings in more people, and more people also put pressure on a stimulus for economic growth. Thus, the urban economy and population growth are mutually reinforcing as underlying drivers that are transforming the city's urban fabric.

Consequently, the discussion above shows that there has been a strong linkage between economic activities and their influence on residential space needs from historical times. The location of economic activities, in turn, attracts workers, which increases the population within the space where these economic activities are occurring and, in the long run, impacts the form in which the residential needs of the people are met. Spatial expansion to cater for housing needs and job location is enhanced by transportation infrastructure, which links job locations to residential areas.

5.4.4 Transport Infrastructure

5.4.4.1 Development of Transport Infrastructure

The construction of transport infrastructure by the colonial and post-independence governments laid the foundation for spatial expansion in the metropolis. This is in line with aspects of the Sector theory, which emphasises the importance of transportation. In that, economic activities grow along these transport axes, and the favourable locational factors also attract residential development. The construction of the railways brought along informal markets and businesses along the transportation axis. This also facilitated the expansion of residential accommodation to now ULI communities such as Kojokrom. Thus, the railway's employment opportunities and related services increased the demand for land for residential and commercial purposes. This was attested by survey participants who revealed that employment opportunities available in the ULI communities influenced their decision to relocate.

In terms of road infrastructure, Ghana's 2008 National Transport Policy ensures the provision, expansion, and maintenance of appropriate transport infrastructure, which strategically links rural production and processing centres to urban centres while ensuring an accessible and affordable transport system. Although it is the government's responsibility, its implementation has required private sector involvement. This is evident in Sekondi-Takoradi, where oil companies have supported road infrastructure development by funding the renovation of the Shippers Council roundabout by PW Ghana Limited (Obeng-Odoom, 2015). The Government of Ghana also uses proceeds from oil extraction to fund road infrastructure in the country.

In addition to private sector efforts, the Sekondi-Takoradi Metropolitan Assembly rehabilitated between 2013 and 2017, 7.8km out of the anticipated 14km to enhance the existing road conditions within the metropolis. The areas that saw an uplift in road infrastructure include

Fijai bypass, Essipon, Adiembra, Electricity road (GSTS) and Adentem-Mpatado road. Additionally, 72km of key arterials and collectors in the metropolis were overlaid with asphalt; and finally, a 2.5km trunk road to peri-urban areas in the metropolis was constructed as well, as a 51.8km access road to newly developing areas was constructed to ease movement (STMA, 2017). Commercial activities also respond to these axes of innovation, i.e. arterial roads and exit routes and further the residential spatial developments occurring along these routes.

Given the above examples of improvement and construction of access routes and their linkage to the peri-urban and newly developing areas, this has to a greater extent facilitated the expansion of the urban fabric as roads are being extended from the urban to peri-urban and rural areas. Therefore, it is not surprising that 84.2% of the respondents across all the socio-economic classes indicated enhanced intra-urban mobility or accessibility as the major reason that influenced their decision to relocate into their community of residence.

5.4.4.2 Intra-urban mobility and Accessibility

Delving deeper into the perspectives of respondents on enhanced intra-urban mobility and accessibility, the availability of varying transport modes to commute to essential services and places; and the motorable nature of road network to major social and economic services like markets, schools, health services, recreational centres, place of work etc. is an important factor in deciding where to live. Thus, the accessibility perspectives of individuals in this study focused on the geographic scope of activities available to a given person, i.e. perception of the ease of access and use of the built environment and transport systems or access to activities of choice. As indicated in Table 5.2, 84 percent of respondents relocated to these communities because of enhanced intra-urban mobility in Sekondi Takoradi facilitated by the state and private sectors

The UMI communities of Anaji and Fijai and ULI communities of Kojokrom and Ntankoful are the study communities located along the J.B Danquah and E. Akuffo – Addo roads. These two major roads have commercial activities that provide the needed goods and services to people and make it easy to commute whether one owns a car or not. They are also bordered by burgeoning communities, where there is an increase in building and construction activities, which provides employment opportunities for the artisans. This further positions these communities as attractive hubs for people relocating there thus, resulting in sprawl. This confirms the assertion of Bhatta (2010 page 24) that "transportation facilities are essential to cities and their neighbourhoods. The development of the urban economy and job opportunities are directly dependent on transportation facilities".

Also, due to widespread car use by urbanites, residential settlements have dispersed out of the main city into the periphery. The cost of commuting is also a determining factor, as observed by Agyeman (2018), where respondents in his study thought that the relatively low commuting cost facilitated the drive towards settling in the periphery. Explaining this further, it is noted that many people who search for low-cost accommodation settle in areas linked to the city centre by good roads. However, the effect of this has been heavy traffic congestion along major arterial roads that link the city centre to peri-urban areas, especially in the morning and late evenings when people are moving to and from their workplaces located in the city centre. Similarly, findings by Doan and Oduro (2011) also prove that improved roads make peri-urban development attractive to middle-class residents because of the peaceful environment while at the same time allowing peri-urban residents to commute to the central city and other locations within the metropolitan area where their livelihoods are located. But then, these settlements along the roads happen in an unorganized and similarly uncontrolled manner resulting in sprawling conditions.

Figure 5.3: Feeder road in PuMI of Mampong, which links it to Kansawurodo and E. Akuffo – Addo Road facilitating access from Mampong to other towns and the CBD by public and private transportation.

Source: Author, picture taken in September, 2020

Therefore, there is a very strong relationship between changes in the transportation system and spatial development, which contributes to the widely recognised relationship between transport and land use. For instance, an untarred road connects the PuMI community of Mampong through Kansawurado to the E. Akuffo- Addo road and with the regular plying of taxis from Mampong to Kansawurado, there is the ease of access to commute to and from Mampong to other neighbouring towns and the CBD, thereby attracting more people to settle in the community as it is easy to commute (see Figure 5.3). A male participant in the Mampong FGD stated that:

"... there are taxis and trotro that ply Mampong to town so I can go and come as often as I want, even late in the night. There is always transport to go and come back."

Thus, irrespective of whether the road infrastructure is first, second, or third-class roads, their ability to connect to the urban centre provides the needed access route that meets the people's needs, especially in PuMI communities.

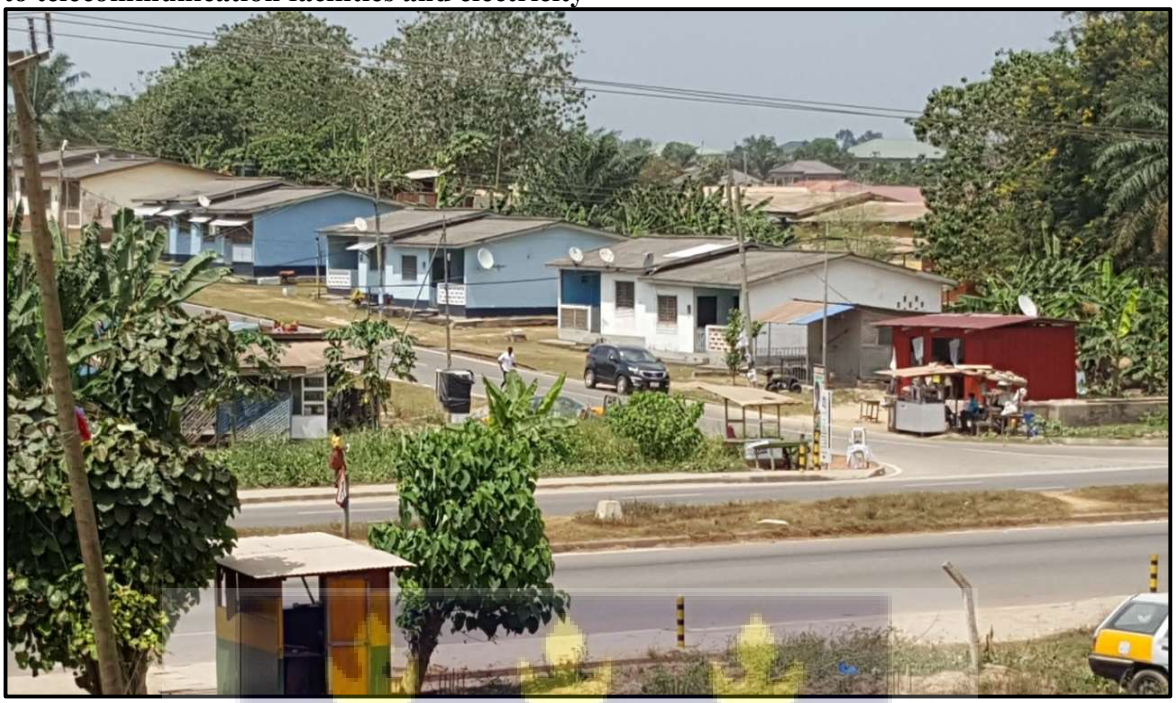
5.4.5 Residential Expansion

Economic expansion and demographic increases bring about an increased demand or need for residential space. This need has been met through direct state intervention, private sector and individual preferences based on what they can afford their values and priorities.

The provision of residential accommodation has from the post-independence period been the responsibility of the government. The State was the sole apparatus for the provision of housing aimed to provide accommodation for middle- and low-income earners within the country. State housing estates in Sekondi – Takoradi include the Effiakuma housing estate and Anaji estate. Anaji estate was built further inland along a bypass road (present-day E. Akuffo Addo Road), annexing the Anaji village. The state estates were well-planned, with roads and access to social amenities such as water, electricity, and sanitation services (see Figure 5.4).

The rationale for government intervention in the housing market revolves around providing all Ghanaians with a decent house in a suitable living environment. However, as established in section 4.4.3 (page 80), successive governments have over the years failed in their efforts to provide affordable housing to Ghanaians as most of the public sector housing meant to house the middle to low-income families end up in the hands of high-income families and those who are well connected politically. To improve its efforts in housing provision, tax incentives were given to the private sector to encourage its involvement in housing provision financing and construction. This created an enabling environment for private sector involvement in the housing sector countrywide.

Figure 5.4: Section of Anaji Estate showing tarred road and well laid out houses, access to telecommunication facilities and electricity



Source: Author, taken January 2020

Real estate companies and home financing institutions such as Home Finance Company (currently known as Republic Bank), Ghana Home Loans (now First National Bank) and other financial institutions which provide mortgages or housing loans as part of their services became actively involved in the housing sector although their target clientele is mostly middle to high-income earners. This leaves some middle to low-income earners to fend for themselves due to high-interest rates on loans or their inability to afford the expensive housing provided by real estate companies.

Real estate companies provide housing in a planned manner, in that there are demarcated roads, houses arranged in an orderly manner, water and electricity access, green spaces for recreation etc. These gated communities are built in peri-urban areas where land is relatively cheaper than in Takoradi. However, the selling and rental prices are usually high for the average Ghanaian. For instance, according to Obeng-Odoom (2014a), the monthly rent at Oil Village (serviced

apartments) ranges between $1000 and $4000, while the average Ghanaian earns less than that in a month. These estates were not constructed with the ordinary urbanite in mind; they targeted high-income earners and expatriates. As such, real estate houses are unaffordable to low and some middle-income earners, thereby leaving them in the peril of finding accommodation.

Therefore, middle- and low-income earners are left on their own to acquire land and fend for themselves. However, given economic hardships, not all can acquire land. They are left in the hands of either property owners charging exorbitant rents or are forced to move to the peri-urban areas where rent and land are relatively cheap compared to the inner city. This has led most middle to low-income earners to either construct their homes or rent in communities where land is cheaper and rent is affordable. Since access to transportation, water, electricity, educational institutions etc., are available within the metropolis, relocating to the peri-urban area is not a challenge when one will have access to social amenities that will facilitate their well-being. In instances where these are unavailable (e.g. water, and electricity), individuals adapt and find means to provide these services for themselves to enable them to live where they can afford.

Thus, the failure of the state and market to provide affordable housing to middle- and low-income earners has spurred individuals to privately build their homes which in some instances include kiosks, makeshift shelters, mud houses etc. leading to slum development in the core areas, haphazard development in the outskirts and increased demand for housing provided by private individuals in the periphery which are affordable to middle and low-income earners. Thus, the high rents and sale prices of houses in the real estate gated communities enhance sprawl as those unable to afford the accommodation they provide must look for cheaper options they can afford.

Therefore, most homes in Ghana are privately owned and financed with individuals building at their own pace and sometimes in unapproved locations since the lands are cheaper, leading to scattered and unplanned human settlements. The unplanned residential developments are further enhanced by the weak enforcement of planning and building regulations by the Physical Planning Department and the bureaucratic delays in the acquisition of a building permit. This has led to the construction of homes ahead of and outside the approved spatial plan of the city in a disorganised and haphazard manner, thereby facilitating sprawl within the metropolis.

In light of the above, findings from the field survey indicated that 62.8% of respondents relocated because of housing affordability and 46.3% because of land affordability in the peri-urban zone. Social determinants such as individual values and family cohesion also played a role in the relocation choices of individuals to meet their space needs. To this end, 40.8% of the survey respondents indicated they relocated because they preferred a serene environment and 38.1% because of family movement. These proximate drivers of sprawl are expounded on in the ensuing sub-sections.

5.4.5.1 Housing Affordability

In the context of residential housing, affordability is the ability to pay for housing. It looks at whether the form, technology, and cost of housing are compatible with the prospective housing consumer's income flow. In the context of STMA, the influx of migrants, especially owing to prevailing job prospects and economic conditions occasioned by the oil boom, has increased the demand for housing. Thus, in communities where housing conditions are favourable, in terms of cost and location, there has been an increase in population, demand for housing and, ultimately, sprawl within these communities.

Out of the 62.8% who indicated they relocated because of housing affordability, 94.4% were respondents of PuMI communities, and the majority were male (71.1%). Given the

socioeconomic status of PuMI communities compared to UMI and ULI, it is expected that the cost and availability of housing will be cheaper. Additionally, apart from its location and distance from the CBD, the housing type and structure also give further credence to why housing is often more affordable in PuMI communities than in the other study sites. For instance, depending on the type of housing, in Mampong, rent usually costs between 60 – 100 GHS ($11 - $18)[1] for one room per month; and in Eshiem, rent cost about 40GHS ($7.37) for older buildings (block and mud houses) while the newly constructed buildings cost 150GHS ($27.67) per month to rent, as disclosed by participants during focus group discussions. Compound houses seem to be the preferred option for many urban poor, and it is not surprising since it is the most dominant housing type in the metropolis. The varying prices of rent within the three socio-economic classes were obtained during interviews and FGDs. For instance, in the ULI communities, rent for a two-bedroom with a hall but without an en suite bathroom ranges between 150 to 200 GHS ($27.64 to $36.85), while in the UMI community, a chamber and hall without a toilet but with a kitchen and bathroom is 200GHS ($36.85) a month. The variations in rent within the various socio-economic classes show that a person's income also influences where they perceive affordable housing.

Comparing the various socio-economic classes, rents paid in PuMI, ULI and UMI communities are relatively cheaper than those paid in high-income (first-class) communities in Takoradi (Beach Road and Chapel hill). According to the Chief Executive Officer of a real estate company in Takoradi:

"...before the announcement of oil discovery, rent in Beach Road and Chapel Hill, for instance, varied between 1000-1500 Ghana cedis a month depending on whether they are 2-

[1] Exchange rate as of February 7, 2020. 1GHS = $ 0.18425 (www.oanda.com)

or 3-bedroom houses. All of a sudden after the announcement of oil discovery and when they (expatriates) came here, the Ghana cedis became US dollars".

In addition to the increased rent in Takoradi, landlords in Sekondi-Takoradi Metropolis demanded an advance rent payment between three and five years. The high cost of rent and the number of years of rent required by the landlord as rent advance made it difficult, sometimes impossible, for tenants of the low-income group to pay for another rent advance when their rent advance payment expires. This resulted in the ejection of tenants in the Sekondi-Takoradi Metropolis and encouraged relocation to the outskirts where rent is cheaper, thus enabling urban sprawl.

Exploring tenant ejection as a reason for seeking affordable accommodation, this study further sought to understand whether respondents had been ejected from their previous dwelling due to increased rent. Approximately 8% of the respondents had been ejected due to their inability to pay the increased rent and years of advance required. They, therefore, sought accommodation where they could afford the rent. Of the remaining 92% of the respondents, the willingness to live further from the city is because of the affordability of rent and relatively lower land values. This finding agrees with Bochnovic's (2014) argument of the bid rent theory, which emphasises that the affordability of rent and lower land values increase consumers' willingness to stay further away from the city centre.

Lastly, as income levels are rising, the middle-income Ghanaians who can afford to build for themselves a house or rent a moderate house are on the lookout for places out from the city centre. However, these various building projects by people do not always conform to the layout plan of the metropolis, resulting in the unplanned development of these areas. Most of these result from the difficulties people go through in getting a building permit that will enable them to put up structures in designated areas. These have also contributed to the expansion of the

city boundaries in an unorganized manner. The increasing number of detached and semi-detached houses under construction dot the once farmlands sold and converted into residential use in PuMI communities where there is arable land available for sale (see Figure 5.5). Evidence of the increasing number of houses being privately constructed which are affordable to the owners.

Figure 5.5: House under construction in PuMI Mampong, which is situated amid vegetation. An indication of farmlands being converted to residential use

Source: Author, picture taken in September 2020

5.4.5.2 Land Affordability

Another reason that has facilitated unplanned housing is land affordability. Findings from the study revealed that 46.3% of the respondents relocated to their current residence because of the availability and affordability of land, especially in the PuMI communities where mostly agricultural lands are being sold and converted into residential use. For instance, in the PuMI community of Mampong, the assemblyman indicated in an interview that:

"... there is no land in town to buy. If you look at Takoradi right now, you may find an uncompleted building to buy, but you will not find available land in town. That is why I am

saying that people have started to buy land here although there are no commercial activities ongoing here. But now when you look, you can see that from Kansawurado electoral area, and Mampong is where you will find land available that is why those looking for land to buy are coming to this area".

The assemblyman's comment agrees with the assertion made by Agyeman (2018) that access to land in peri-urban areas is easier than in the city centres. With large tracts of land available at a lower price for residential and commercial use in peri-urban areas, people can afford and buy lands for non-agricultural use. Also, increasing population and urban expansion have made it possible for people to move to peri-urban areas to buy large tracts of land for residential purposes. Land in the city centres is very expensive compared to land in the urban fringe. In the case of Mampong and Eshiem, sprawl is occurring due to low density and leapfrog development.

A taxi driver in Mampong revealed in an informal conversation that

"... one plot (of land) is now about 12 to 15 thousand Ghana Cedis, and individuals mainly buy it. It used to be 2500 GHS but increased because of the Kwame Nkrumah University of Science and Technology distance learning campus in Mampong. It has also attracted more people to buy lands in Mampong...".

Additionally, it was gathered during the FGDs that both individuals, government agencies and real estate companies had bought lands in Mampong and Eshiem for residential purposes. Thus, there is a rise in built-up areas in the peri-urban communities, and this development is ahead of planning and constructed haphazardly.

Lands are vested in the traditional authorities who are eager to sell their lands in order to expand and develop their communities. The same eagerness of PuMI community members for spatial

development to expand was also evident, and this was expressed in an interview with a 32-year-old petty trader in Mampong:

"... we are eager that our community should grow, we must make provision for the outsiders who are coming in by selling lands to them, renting out houses/rooms to them and the influx of foreigners are all part of the things that must take place for the town to expand."

With the cost of land in the periphery being lower than the core areas and the desire of the indigenes for their communities to expand, coupled with the availability of (farm)land for sale, this creates an enabling environment for those who want to construct their own homes to relocate to the periphery and in turn, contribute to the spatial development of the community. Owing to the economic value of land, the traditional authorities are not only the custodian of the land but have also taken on the role of allocating lands disregarding approved schemes. As such, the Government of Ghana's (2007) Land Administration Program asserts that traditional authorities lack the skill to enable them efficiently administer and manage their lands, and this has led to the situation where sector layouts are grossly violated by developers, hence affecting the beauty of the city in terms of the distribution pattern of land use and uncoordinated land development while further facilitating the urban spatial expansion of the city.

The discovery of oil and its anticipated economic boom and demand for residential space also led to land speculation in STMA. As such, there are vacant tracts of land that have been bought but yet to be developed in the core areas, and yet, people are now purchasing land in the periphery for residential purposes due to its affordability. Findings from interviews in Eshiem and Mampong indicated that real estate companies had purchased land in both communities, though they are yet to be developed and could also be sold off in the future at a profit.

Finally, on the commercial side, there was also the sale of large tracts of land to oil-related companies such as Cirrus Oil and Bulk Oil Storage Transportation (BOST). The commercial

production of oil and the on-shore activities of the companies have led to a modification of existing schemes to accommodate the current land use demands. In an interview with a management staff at Cirrus Oil, it was gathered that the company purchased 8.5 acres of land at Poasi for the construction of its terminal. This meant relocating residents and compensating them financially and constructing a library and lavatories for the community. This highlights the demand by commercial industries for land and its influence on the spatial pattern of the city. Thus, the affordability of land also influences the location of industries and the residential space needs of people.

5.4.6 Preference for Serene Environment

Individual values have also contributed to the spatial development occurring within the metropolis. The dominant mode of transport is private cars owned by the high and middle class who live away from the city in line with the Western concept of a good life. The preference for a more peaceful environment is a primary factor attracting people to the outskirt areas of urban centres. People from higher income brackets prefer to be away from the blight of the city, noise, etc., to a calmer and cleaner environment with vegetative cover (hence cooler weather), thus influencing their decision to build in the outskirts.

The study results show that 40.7% of the respondents indicated that their need for green space and a quiet community facilitated their relocation. The preferred communities were the PuMI communities and UMI communities. Specifically, PuMI communities are green environments with access roads and electricity and relatively affordable land and rent. It is also further away from the business synonymous with the city centre. For the UMI communities, especially Anaji is deemed to be a peaceful place to live because, according to male FGD, most of the lands have been sold and developed. There is no land dispute in Anaji and this has made it a peaceful community where people want to live. Although reasons behind preferences vary, preference

for a serene environment has facilitated the urge to relocate, thus increasing these communities' population and bringing about spatial expansion.

In a personal interview with the manager of a Real Estate Company, he stated:

"...people who understand real estate do not mind now living in the outskirts. I drive 30 minutes to get to work though I have sold land closer to the CBD. I considered several things which people do not consider: greenery, quiet, larger plot size, cleaner air and a cooler environment. The decision to go to the periphery is a matter of choice and understanding of what it means to live in those areas".

The testament above underscores the role a person's value and preference plays in their choice of where to live. It was observed that the majority of those relocating to PuMI communities are moving into their own homes, away from the hustle and bustle of the city, so they buy their land, build their houses and live peacefully as it is healing and relaxing to be in an environment surrounded by vegetation.

On the commercial side, Real Estate companies are buying lands in the peri-urban areas instead of within the urban core with the intention of creating an ambience attractive to people who prefer to live in serene environments. In both PuMI study communities, large tracts of land had been bought by real estate companies for development, although construction has not begun. The Real Estate companies also propose varying modes of financing to enable potential homeowners to afford their homes or land. For instance, a Real Estate Company, DLA Investments Limited, offers a 12-month payment period for an 80 x 100ft plot at zero percent interest and in an interview with the Managing Director, he indicated that they also provide construction services once a person has paid for the land and is ready to start building. To enable clients to build at their own pace, they give estimates for construction on a stage-by-stage basis, making it possible for middle-income earners to own homes built at their pace.

Thus, the advertisements by real estate agencies about the serenity of the location, services available and access to roads etc., are means through which spatial expansion is facilitated. There are more expensive parcels closer to Takoradi, which are undeveloped but bypassed, and lands and houses are developed farther away at a relatively affordable price. This is similar to situations in the Greater Accra Metropolitan Area where gated communities are fast developing in the peri-urban areas, which have now become absorbed into the urban areas like Lake Side Estate in Ashaley Botwe, Rehoboth Estates in Oyarifa, Appolonia City in Oyibi, just to name a few. The pull of the serenity of the location within which the gated communities are constructed influences the decision of those who value or desire to relocate there.

5.4.7 Family Movement/Relocation

Finally, the last proximate driver provided by respondents which impact residential space is family movement or relocation. The choice and decision to relocate or migrate for family are subject to the individual, and as one relocates to their destination, it contributes to an increase in density as well as demand for housing, land, and employment also increases and influences the spatial form occurring within the receiving town. In a culture where strong social ties exist, it influences the choice of place of residence. Returning to one's hometown or family house is a culturally acceptable practice and, as such, a welcoming place for those who return home. Social determinants, therefore, influence the residential choice of a person. As mentioned in Chapter 2, people choose to live in an area where persons of the same origin reside, thus becoming identified with a particular community and its distinctive values relating to occupation, family, etc., is a key factor.

This is evident in the study as 38.1% percent of respondents relocated because their family relocated. Clearly, social ties and networks are important push-and-pull determinants of migration. Majority of the respondents who moved or migrated for family reasons were from the UMI communities (47.8%), followed by PuMI communities (45.1%) and ULI communities

(40%). 50% of these respondents were females who relocated because of marriage or returned to their hometown.

For instance, during a personal interview with a respondent from UMI Anaji, she noted that she relocated to Anaji after her spouse got employed by an auditing firm. Previously, they were in Accra, but she had to quit her teaching job and relocate with her husband. She noted:

> *"I used to work in a private nursery school in Accra. After I got married, I had no option but to join my husband here in Takoradi. I left my job and came. Unfortunately for me, a year after I joined him here, he was transferred again to Tarkwa, but I decided to stay and work here because I had already gotten a good job and made friends in Anaji. He agreed, and it has been like that for the past four years (36-year-old, female, Personal interview)*

Another 32-year-old FGD participant in PuMI Eshiem stated that:

> *"I also came here because of marriage. I am here because of my husband, not because of how peaceful the place is…."*

The views expressed by the respondents further give credence to the fact that aside from the key social ties such as marriage which often binds and compels people to relocate or migrate, the kinds of social relations, bonds and environment play a key role in influencing decisions to relocate. This can influence urbanization and further result in urban sprawl, especially where there is an increase in demand for housing amid poor planning.

Additionally, some respondents noted that they relocated because the community is their hometown, and others stated that they relocated because their family moved here. This fosters a sense of belonging and strengthens social cohesion; and could also account for why majority of the respondents live in compound houses, which are oftentimes family homes. This finding is in line with Firey's (1949) study (as cited in Firey, 2013) which indicated that people choose

to live where people of the same origin reside and that attachment to "one's own kind" outweighed the desirability or undesirability of where they live. Social values, thus, influence land use which is not at all limited to areas with congenial physical and architectural characteristics. In the long run, the extent and rapidity of the sorting that goes on day in and day out is a function of all attitudes, decisions and actions, deed restrictions, zoning, housing market, family ties, location of a place of work etc. These diverse factors produce both planned and unplanned results in land use.

5.5 Expansion of Urban Fabric

The underlying and proximate drivers have facilitated the expansion of the urban fabric by placing demand on space to meet commercial and residential needs. A lot of areas expanding are encroaching on the village nuclei, and once it does that, it is incorporated and absorbed into the urban area. Gentrification and sprawl are the development and spatial form emanating out of the spatial expansion of the urban fabric.

Drawing on the findings of Eduful and Hooper (2015) in their study on the emergence of oil-led gentrification in Sekondi- Takoradi, it brought to light that certain neighbourhoods in Sekondi-Takoradi were undergoing intense gentrification involving office space development in response to demands of oil and oil-related activities as well as expatriates displacing local Ghanaians in areas such as Beach Road who have given out their homes for rent and relocated to middle-income communities like Anaji or in some instances, to peri-urban areas (Oteng-Ababio, 2018). In UMI communities, it is common to see visible extension works in the estate, and low-cost houses as majority of the residents have resorted to attaching additional bedrooms and stores to their original structures. The migrants or newcomers also contribute to the gentrification of old housing stock in the indigenous core, as some prospective tenants now negotiate with homeowners to complete buildings and enter into rental arrangements commensurate with their investment in completing the building. The exploitation of oil and gas

and its accompanying movement of companies to Anaji has induced the conversion of residential units into commercial and office spaces (Oteng-Ababio, 2018).

In addition to gentrification is the sprawl that is taking place within the metropolis occasioned by increased demand for individual private homes. This is spurring the horizontal expansion that is taking place because we cannot afford to build skyscrapers due to our low level of productive forces. Everyone now wants their own private house, which leads to extensive development partly because we cannot afford to build apartment complexes but can afford private housing.

The sprawling nature of the metropolis has been enabled by the limitations and weaknesses of the PPD in executing its mandate. Aside from being financially constrained and understaffed, the PPD is weak in plan implementation and enforcement of planning regulations. Their function has become limited to the preparation of layout plans and the determination of land use. When illegal developments occur, they do not have the mandate (legislative powers) to enforce any action, i.e. demolition of unapproved structures or control development, making them inefficient in managing the spatial development taking place within the metropolis. Given the challenges saddling the PPD, individuals and real estate companies alike all take advantage of the weaknesses of the PPD (in ensuring compliance with the city's spatial planning) to purchase and develop lands in areas zoned for non-residential purposes. The lengthy permitting process also enables individuals to put up buildings without permits and in unapproved areas, even though they are aware they might have to halt construction at some point until the permit is received. Coupled with this is the fact that traditional authorities do not adhere to the city's zoning plan and sell parcels of land for their benefit and enhance sprawl within the metropolis. Thus, there is no collective sense of development, so the city is never compact. In Europe, where planning was strongly developed and regulated, they tend to have more compact cities.

It can be deduced from the model presented (Figure 5.1) that regardless of where the feedback loop of the underlying drivers of sprawl begins, i.e. whether it is economic or demographic-driven, it has an effect on the residential choice and the physical expansion occurring. Unfortunately, given the enforcement and implementation challenges of the PPD, most private houses are developed in an unplanned manner and continue to spread horizontally. A lot of areas are expanding and encroaching on the village nuclei, and once it does that, it is incorporated and absorbed. The city, therefore, continues to expand laterally as residents have become more car-dependent with no sign of densification or compactness in sight.

5.6 Chapter Summary

As the economic base of the city continues to thrive amidst increasing population growth, demand for space for commercial and residential purposes continues to rise, and given the current manner in which planning or the lack of it is occurring within the metropolis, urban sprawl is an inevitable spatial form occurring in the city. In addition to the underlying and proximate drivers of sprawl, market forces such as land speculation and rent increases all facilitated sprawling as people sought cheaper accommodation on the outskirts of the city. The limitations of the PPD in the implementation and execution of plans, policies and regulations and the limited legal authority they have in taking action hinder them from efficiently managing the spatial development of STMA; as such, development is occurring in an uncoordinated and haphazard manner as planning lags behind spatial development.

The outward movement of people to the peri-urban areas has a rippling effect on livelihood sustainability. To examine this issue further, the next chapter (6) looks at the outcome of urban sprawl on livelihood and quality of life within the metropolis and how sprawl affects social sustainability.

CHAPTER SIX

EFFECTS OF URBAN SPRAWL ON LIVELIHOODS AND SOCIAL WELLBEING

6.1 Introduction

Urban growth, which is uncontrolled and uncoordinated, results in sprawl, and it has both positive and negative impacts on the city region and the livelihood of the people. When rural areas come under urban influence, a broader range of livelihood possibilities, both farm and non-farm, can be offered to households. As such, households can engage in different activities to augment their incomes while sharing resources and assets (Satterthwaite et al., 2010).

The previous chapter looked at the drivers facilitating sprawl within STMA, and this chapter explores the socio-economic consequences of sprawl on people and how it affects sustainability. To this end, the study sought the perception of respondents on the impact of sprawl on their livelihood and social well-being in their community. It presents an analysis of the empirical data collected on the field in response to research question iii: What are the human and environmental vulnerabilities associated with urban sprawl? It also discusses research objective iv: examine the vulnerabilities of sprawl on the human population. The Chapter tests the research hypothesis: Urban sprawl in Sekondi-Takoradi affects the livelihood of the inhabitants as disaggregated by socio-demographic characteristics (age, gender, level of education, community of residence, occupation), and research proposition 1: Urban sprawl in Sekondi-Takoradi affects the social wellbeing of its inhabitants.

Linking to the conceptual framework, the analysis will be assessing the outcome of sprawl and whether it has met human needs or not within STMA from the following: access to shelter and a healthy environment, adequate livelihoods, security and even access to basic social services.

6.2 Effect of Urban Sprawl on Livelihoods

As the city sprawls, there has been a dynamic shift in sources of livelihood from the primary sector to the service sector, and the impact of the shift could be negative or positive depending on the individuals affected. There are winners and losers in the changes in livelihoods that have occurred due to urban sprawl, and the study identified these.

6.2.1 Positive Impact of Sprawl on Livelihoods

Findings from the survey indicated an increase in commercial activities in the peri-urban areas. There has been a rise in trading activities, transport services and food vending; a shift from farming and quarrying, which were the predominant occupation of the inhabitants. Accompanying sprawl is an increase in population, which increases the customer base for those engaged in commercial activities. About 30% of the sampled businesses located along the J.B. Danquah and E. Akuffo-Addo roads are littered with shops trading in construction materials, while 12% of the sampled business along the two roads are mechanics, vulcanizers and petrol stations that are benefiting from the increased dependence on transportation. Therefore, it is not surprising that approximately 30% of the respondents are artisans, 25.3% are traders, and 9.2% are food vendors.

Another category of beneficiaries of sprawl is individuals and real estate developers who speculated land at the announcement of the oil discovery. Some of these lands are being held undeveloped in anticipation of increased demand and value for which resale would be profitable. Alternatively, these parcels of land are developed for rental purposes through which further economic gains can be obtained. Landlords in the peri-urban areas also benefit economically from increased demand for accommodation as there is an influx of migrants to their community. Lastly, traditional authorities who are the custodians of the land in their town and landowners/family heads also benefit from sprawl as there is increased demand for land in the periphery.

However, despite the winners, most of those whose livelihoods are affected by sprawl are farmers as farmlands are sold and converted for residential or commercial use. As such, the following sub-section looks at the effects of sprawl on the livelihood of the inhabitants from a socio-demographic perspective to ascertain inequalities in livelihood options in the study communities.

6.2.2 Inequality in Livelihood Options

Given that perceptions, knowledge and awareness about a phenomenon could vary across sex, age, education, place of residence and occupation, the study saw the need to examine the relationship between these variables and reported the perceived effect of sprawl on the livelihoods of respondents using cross-tabulations and chi-square test of significance. Expectedly, there could be variations in how sprawl has affected livelihoods in the study sites. As a result, the study elicited the views of respondents regarding the effect of the sprawl. So, respondents were asked to indicate if the sprawling of their community has affected their livelihood. The results are presented in Table 6.1. It is important to highlight that the perceived effect on their livelihood is also influenced by cost and standard of living which is high in STMA as a result of oil exploitation.

Table 6.1: Relationship between the effect of sprawl on livelihood and sociodemographic variables

Sex	Effect of Sprawl on Livelihoods		Total
	There has been no effect	There has been an effect	
Male	131 (75.3%)	43 (24.7%)	174 (100%)
Female	28 (12.4%)	198 (87.6%)	226 (100%)
Total	**159 (39.8%)**	**241 (60.2%)**	**400 (100%)**
	χ2=237.86, df (1), p value= 0.0001<0.05		

Table 6.1: Relationship between the effect of sprawl on livelihood and sociodemographic variables (Continued)

Occupation	Effect of Sprawl on Livelihoods		Total
	There has been no effect	There has been an effect	
Farmer	16 (33.3%)	32 (66.7%)	48 (100.0%)
Trader/Food vendor	12 (8.7%)	126 (91.3%)	138 (100.0%)
Corporate/Office worker	7 (43.8%)	9 (56.2%)	16 (100.0%)
Teacher/Pastor	6 (85.7%)	1 (14.3%)	7 (100.0%)
Artisan	78 (65.5%)	41 (34.5%)	119 (100.0%)
**Unemployed/Pensioner/student	40 (55.6%)	32 (44.4%)	72 (100.0%)
Total	**159 (39.8%)**	**241 (60.2%)**	**400 (100%)**
	χ2=103.3, df (5), p value= 0.0001<0.05		
Age			
Less than 21years	14 (51.9%)	13 (48.1%)	27 (100%)
22-30 years	63 (51.2%)	60 (48.8%)	123 (100%)
31-40 years	35 (41.7%)	49 (58.3%)	84 (100%)
41-50 years	22 (26.8%)	60 (73.2%)	82 (100%)
More than 50 years	25 (29.8%)	59 (70.2%)	84 (100%)
Total	**159 (39.8%)**	**241 (60.2%)**	**400 (100%)**
	χ2=17.75, df (4), p value= 0.001<0.05		
Level of Education			
No formal	11 (15.7%)	59 (84.3%)	70 (100%)
Primary	24 (28.2%)	61 (71.8%)	85 (100%)
Secondary	94 (47.7%)	103 (52.3%)	197 (100%)
Vocational/Technical	10 (66.7%)	5 (33.3%)	15 (100%)
Tertiary	20 (60.6%)	13 (39.4%)	33 (100%)
Total	**159 (39.8%)**	**241 (60.2%)**	**400 (100%)**
	χ2=37.34, df (4), p value= 0.0001<0.05		

Table 6.1: Relationship between the effect of sprawl on livelihood and sociodemographic variables (Continued)

Socio-economic urban class	Effect of Sprawl on Livelihoods		Total
	There has been no effect	There has been an effect	
Urban middle income	45 (37.5%)	75 (62.5%)	120 (100%)
Urban low income	27 (38.0%)	44 (62.0%)	71 (100%)
Peri-urban mixed income	87 (41.6%)	122 (58.4%)	209 (100%)
	χ2= 0.65, df (2), p value= 0.72>0.05		

Source: Field survey, 2020

It can be deduced from Table 6.1 that the proportion of respondents whose livelihoods have been affected by sprawl is higher among females (87.6%) than males (24.6%) ($p<0.05$). Given that more females than males were into farming and food vending, and also against the backdrop that farming and food vending/trading was reported as livelihoods mostly affected by the sprawl it is unsurprising that the results indicate that the livelihoods of females have been affected more than males. This is confirmed by the fact that, in terms of occupation, 91% of traders/food vendors were positively affected due to an increase in customer base and 67% of farmers were negatively affected due to the loss of farmlands, while livelihoods of teachers (85%) and artisans (65.5%) were not affected, as their occupation is not dependent on their community of residence ($p<0.05$).

Additionally, a higher number of respondents above 40 years than those less than 40 years (less than 21 years, 48.1%; 22-30 years, 48.8%; 31-40 years 58.3%) ($p<0.05$) indicated their livelihood had been affected. The age distribution of respondents with their occupation suggests that a higher percentage of respondents within these age brackets were into farming and trading, and these two livelihoods were the most affected by the sprawl. Also, amid the loss of farmlands or conversion of farmlands for housing and other developmental projects, the source of income for farmers is mostly at risk. As such, some resort to alternative sources of

income or livelihoods. In most cases, farmers lose their lands or are forced to seek lands that are farther away from their community, thus, making it difficult for them to sustain farming as a primary source of livelihood. An interview with some farmers indicated that most of their farmlands were sold out by chiefs to individuals and real estate companies. As a result, they were forced to look for other lands distant from their communities to farm.

Subsequently, the level of education of the respondents also influenced their perceived effect of sprawl on their livelihood. The study found that, respondents with primary (71.8%), secondary or no formal education (84.3%) perceived that their livelihood had been affected. This could be attributed to the fact that their livelihood is dependent on the community of residence. On the other hand, those with tertiary and vocational/technical education indicated they were not affected by the sprawling of their community. This is because they are engaged in skilled employment that is not dependent on the location within which they reside, compared to farmers, food vendors, and traders who depend on the land and people within their vicinity to make a profitable living.

This study, therefore, fails to accept the null hypothesis given that the chi-square test result showed a significant relationship ($p<0.05$) between sex, occupation, age, the level of education and the perceived effect of sprawl on livelihoods.

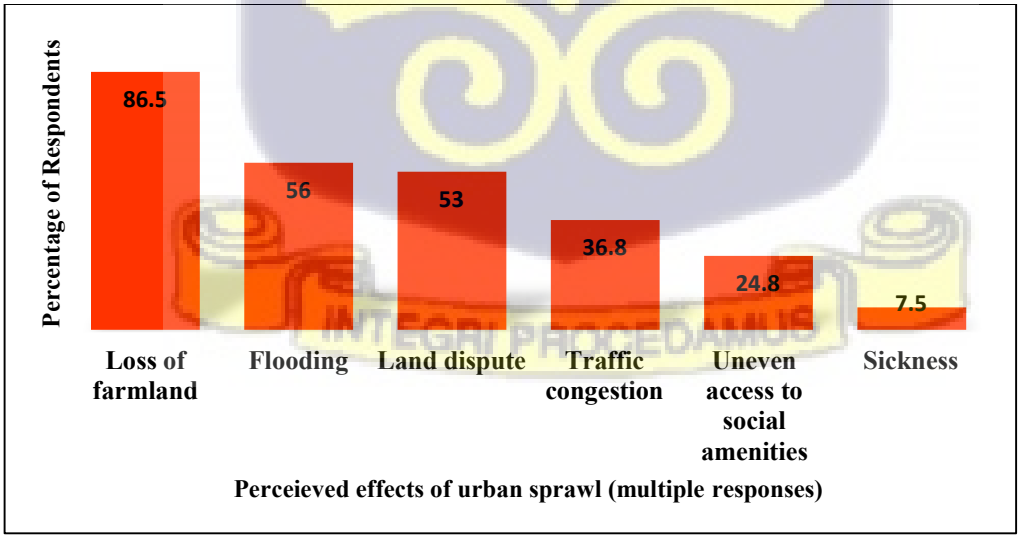
Lastly, in terms of the community of residence, the livelihoods of a relatively higher percentage of respondents from all the communities selected for the study have been affected by sprawl. ($p>0.05$). As such, the study fails to reject the null hypothesis since the results show that there is no significant relationship ($p>0.05$) between community and the perceived effect of sprawl on livelihood.

6.2.3 Negative Effects of Urban Sprawl on Peri-Urban Communities

To ascertain the perceived effects of urban sprawl on the sustainability of livelihoods in the peri-urban areas, respondents were asked about the effects of urban sprawl in their communities, and their responses are captured in Figure 6.1.

Unsurprisingly, the loss of farmland was indicated by 86.5% of respondents as an effect of urban sprawl in peri-urban areas. Flooding was indicated by 56% of the respondents. This is sometimes a result of the topography and oftentimes because of the haphazard and uncoordinated buildings within the communities. About 53% of respondents indicated that land disputes affected peri-urban livelihoods. Traffic congestion, a daily lived experience of the residents in the suburbs, was indicated by 36.8% as another effect. About 24.8% of the respondents indicated that sprawl had facilitated unequal access to social amenities (see section 6.3.1); and lastly, 7.5% of the respondents indicated that sprawl had facilitated increased disease burdens within the communities as such, there has been a rise in sicknesses (this is discussed in depth in section 6.3.2). The perceptions of the respondents are discussed in depth in the ensuing sub-sections.

Figure 6.1: Perceived effects of urban sprawl



Source: Field survey, 2020

6.2.3.1 Loss of Farmland

As indicated in Figure 6.1, the loss of farmland is the major effect communities have experienced due to sprawl. Apart from the conversion of farmlands to residential and commercial use, directives from the STMA in its 2018-2021 medium-term development plan have also contributed towards the loss of farmland in the metropolis. Designating PuMI Eshiem as an industrial enclave for the city has led to the establishment of cocoa processing and tile-making companies, which have pulled migrant workers to the community and increased the town's visibility and resulting in increased demand for housing and land. These development efforts are to the disadvantage of the farmers and validate the generally held view of Qi and Lu (2008) that urban sprawl results in a myriad of social predicaments, including encroachment of open spaces and farmlands, which challenges the sustainability of the land. Farmers experience livelihood insecurity as agricultural lands are being rapidly sold. This finding confirms Owusu's (2013) assertion that the loss of farmlands resulted in inadequate employment and increased concentrated poverty, and encouraged crime as a means of survival.

Additionally, loss of farmland and loss of farmers' livelihood ultimately leads to food insecurity, which leads to higher produce prices and, in extreme situations, hunger as farmers are not compensated for their loss. A 45-year-old farmer and entrepreneur in Eshiem explained during an interview:

> *"...sometimes the land they farm on is not for them. When someone is interested in buying the land, they go to the landowner, and the landowner informs the farmer that the land has been sold. They don't look for another land for you. When they pay the farmer off, that is it".*

So, to the farmer who is not the owner of the cultivated land, any day could be the end of their livelihood once the owner sells the land. This perspective was shared by 43% of the

respondents. It can be established from the above that farmers most often do not get compensated for the loss of their livelihood, and the responsibility to find another farmland rest upon them.

As more farmers lose their livelihood and seek alternative sources in the service sector, this has long-term implications for food security within the metropolis. There may be no cause for alarm with urban sprawl and food insecurity due to the loss of farmland in the immediate to short term. This is because there still exists a large number of food-producing rural communities in the Western Region to meet the needs of the urbanites, thereby affirming Obeng-Odoom's (2014a) assertion that agricultural produce is purchased and supplied from other districts and regions as farmlands are lost as a result of increased spatial development in Sekondi -Takoradi. This underscores the importance of resource sustainability in the city region, as no city can sustain itself by drawing only on the resources within its boundaries. As such as farmers' livelihoods are threatened, agricultural produce is obtained in their raw form from villages within the sub-region, including Abura, Krobo Abrokyire and Bokorkope and those outside the sub-region are obtained from Eikwe, Bogoso and Tarkwa. In the long run, this production and consumption pattern within the city-region threatens its sustainability. This invariably affects the price of foodstuff and brings about a net loss of food at the household level as sprawl threatens livelihoods.

6.2.3.2 Land conflict/dispute

About 53% of the respondents indicated land disputes as a result of sprawl. Stemming from multiple sales of land, conflicts usually arise between intra and inter-family and traditional authorities. Conflicts arise within families when a member leases land without consulting the family head or those with user rights. The transactions usually go unnoticed until development begins on the land, usually in the periphery (Denchie et al., 2020). Inter-family land conflict involves two or more separate households in a dispute about boundaries and ownership rights.

Such conflicts have always existed but intensified as demand for, and value of land increased after discovering oil and its ensuing land speculation. Another significant cause of conflict is the lack of a formal record of demarcation and ownership by the families involved. Irrespective of the reason for the land dispute, it results in land insecurity for farmers who are not landowners as they can be hindered from cultivating on the land when it is under dispute and lose the lands they are cultivating on without notice and compensation. This shows that the effect of sprawl on the community directly affects the livelihoods of the inhabitants.

Additionally, land disputes also bring about a sense of insecurity as 13.8% indicated the presence of land guards in their communities. Crimes committed by land guards result in injury, loss of investments and even death; their presence in a community instils fear in the residents as they carry guns, machetes and other weapons. The sense of insecurity experienced by residents because of the dangers posed by the presence of land guards affects their well-being and puts the lives of artisans building on disputed lands at risk. Although land disputes are settled either in court or by traditional authorities, the reoccurrence of multiple sales of land would continue to affect the livelihood of those who depend on it.

6.2.3.3 Traffic congestion

Traffic congestion on the J.B. Danquah and E. Akuffo- Addo is because of the dormitory nature of the residences within the sprawling communities, as indicated by 36.8% of the respondents. Most people commute to work in the CBD or other commercial areas within the metropolis, and as such, during rush hour, there is traffic congestion. Traffic congestion is witnessed through all the major access routes within the city due to increased dependence on vehicle commutes and also the fact that individuals who reside within the periphery do not carpool as such increase the number of cars plying the roads (see Figure 6.2).

Figure 6.2: Morning traffic congestion along the J.B. Danquah road showing private and commercial vehicles interlaced with tipper trucks which frequently ply the road.

Source, Author, the picture was taken in June 2021

This has implications for health as fumes from vehicles pollute the air. Reliance on private vehicles has profound implications for climate change. Also, the lengthy time one commutes to work affects their livelihood and quality of life as income earned is spent on the daily commute as transport fare or to purchase fuel. This finding resonates with the EEA (2006), which argued that traffic congestion in the peripheries results in households spending more for their daily commute and asserts that individuals owning their private cars also contribute to the congestion.

6.2.3.4 Flooding

Flooding within the research communities was also another effect of sprawl indicated by 56% of the respondents. This is mainly a result of poor drainage within the communities, the topography of the area and the haphazard manner in which buildings are sited. This corroborates findings by Rain et al. (2011), Amoateng et al. (2013) and Cobbinah et al. (2015),

which report that flooding is a major consequence of urban sprawl, especially in poorly planned urban and peri-urban spaces.

It can be deduced from Table 6.2 that there were no significant variations in the reported incidence of community flooding across the sex ($p>0.05$) and age ($p>0.05$) of respondents. Thus, the incidence of flooding was not unique to sex or age category. However, the study showed a significant relationship ($p<0.05$) between the place of residence and reported incidence of flooding as approximately 68% of the respondents indicated their community floods due to sprawl, with the majority being from the PuMI communities.

Table 6.2: Reported incidence of community flooding due to sprawl

Background Variables	Community Flooding		Total
	Community floods	Community does not flood	
Socio-economic class & community			
Urban middle income - Anaji	14 (23.3%)	43 (76.7%)	60 (100%)
Urban middle income - Fijai	39 (65.0%)	21 (35.0%)	60 (100%)
Urban low-income - Kojokrom	38 (54.3%)	32 (45.7%)	70 (100%)
Urban low-income - Ntankoful	52 (74.3%)	18 (25.7%)	70 (100%)
Peri-urban mixed income - Eshiem	70 (100.0%)	00 (0.0%)	70 (100%)
Peri-urban mixed income - Mampong	57 (84.1%)	13 (18.6%)	70 (100%)
Total	**270 (67.5%)**	**130 (32.5%)**	**400 (100%)**
	χ2=100.50, df (5), p value= 0.00<0.05		
Sex			
Female	157 (69.5%)	69 (30.5%)	226 (100.0%)
Male	113 (64.9%)	61 (35.1%)	174 (100.0%)
Total	**270 (67.5%)**	**130 (32.5%)**	**400 (100%)**
	χ2=0.92, df (1), p value= 0.34>0.05		
Age			
Less than 21 years	16 (59.3%)	11 (40.7%)	27 (100.0%)
22-30 years	85 (69.1%)	38 (30.9%)	123 (100.0%)
31-40 years	58 (69.0%)	26 (31.0%)	84 (100.0%)
41-50 years	59 (72.0%)	23 (28.0%)	82 (100.0%)
More than 50 years	52 (61.9%)	32 (38.1%)	84 (100.0%)
Total	**270 (67.5%)**	**130 (32.5%)**	**400 (100%)**
	χ2= 3.01, df (4), p value= 0.56>0.05		

Source: Field Survey, 2020

In Eshiem, for instance, the main cause of the community's flood was a result of a bridge constructed by Wang Kang (Goodwill), a ceramic tile company in the Eshiem industrial enclave. When River Anankwari overflowed its banks from the rainfall, the narrow outlet of the bridge could not allow a lot of water to flow through it, thereby flooding parts of the community within its path, and destroying farmlands and properties. Filling wetlands and construction in waterways are all human-induced factors that cause flooding in the study communities in the quest to obtain affordable land for development. The only outlier is in UMI Fijai, where flooding is due to a narrow gutter that runs through the park. An indication of poor planning and inadequate drainage infrastructure. According to the FGD participants in Fijai, when it rains, the park floods because the volume is too high for the gutter to drain and causing people to drown in it.

These findings on flooding are in line with the report of STMA (2014) that buildings in waterways and low-lying areas, reduction in flow capacity of channels due to siltation and lack of maintenance of the drainage infrastructure, urbanisation and accumulation of solid waste and overgrown vegetation have exposed the metropolis to a high incidence of flooding which in turn affects economic activities, especially in the CBD (Market Circle) which is prone to perineal floods.

It can be deduced from the above discussions that urban sprawl affects livelihoods and has brought about changes in livelihood options. Subsequently, the effect of sprawl on the community also pointed to its effect on the resident's quality of life in addition to their livelihood. As such, the next section will look at the social well-being of the inhabitants by examining the effects of sprawl on access to basic services, health, crime and insecurity and social cohesion.

6.3 Effect of Urban Sprawl on the Social Wellbeing of Inhabitants

This section of the study examines the social effect of urban sprawl on the inhabitants of the study areas by looking at their social well-being. According to Keyes (1998:122), social well-being is the appraisal of one's circumstances and functioning in society. To this end, the research explored access to basic services, health, social cohesion, and crime and insecurity (as defined in section 1.8, pages 13 and 14) as the indicators to determine the social well-being of respondents.

6.3.1 Inadequate Access to Social Amenities

Access to basic social services, including access to potable water, sanitation facilities, adequate housing and drainage facilities and health care, are requirements for residents to have for their human needs to be met sustainably (Satterthwaite et al., 1992). The study found that the sprawling communities lag in infrastructural development, and this was evident in PuMI Mampong, which does not have access to potable water from GWCL because of its location and the cost of extending the distribution line to the town. Those who have access experience frequent interruptions in the flow of water as GWCL is unable to meet the demand for water supply due to a decline in raw water availability due to 'galamsey' (illegal small-scale gold mining). Thus reducing water available for treatment and supply to the urban township. Residents resort to consuming water from wells, water vendors, or rivers to supplement water from GWCL. These water sources pose water quality threats as they are frequently not tested for faecal and total coliform and Escherichia coli; therefore, their consumption causes diseases.

On the other hand, urban sprawl has facilitated access to electricity in the PuMI communities. It has become easier to connect to the electricity grid since more people have connected electricity to their homes, making it easier for those in the new sites to connect easily. For instance, in Eshiem, the increase in the number of households connected to the transformer led to frequent power outages because it was overloaded. Thus, although access to electricity is

available in all communities, there is a need to increase the transformers in the peri-urban areas to match the number of people connected to the grid.

Another predominant challenge that is easily identifiable within the study communities is waste management. Although residents pay for its use, the skip container (communal bin) is not picked up nor frequently replaced when it is full. This enables residents to easily throw waste on the ground, making the place filthy and unhygienic, increasing the community's susceptibility to disease outbreaks (see Figure 6.3).

Figure 6.3: Uncollected solid waste in skip container in ULI Ntankoful

Source: Author, picture taken in February 2020 Note: Residents burn it to minimize the health risks posed to the community from the uncollected waste

In terms of sanitation, respondents among all the study communities also pointed to having one or two functional public toilets that they have to queue to use, except those in the UMI communities where houses have in-built toilets. As the PuMI and ULI communities are expanding, there are not enough public toilets to cater for the increasing number of people. As such, they resort to open defecation. According to the respondents, the public toilets are always

unhygienic and full of stench and flies. They also raised concerns about the queuing time and distance to the public toilets.

Also, the haphazard manner in which houses are constructed limits the construction of drains within the community. As such, residents resort to discharging liquid waste into the gutter, which is often choked and stagnant (if available) and throwing it unto the compound of households. These serve as breeding grounds for mosquitos and have health implications for the residents. Another challenge is the deplorable state of the inner roads within the communities which are mostly untarred, and the loose topsoil blows a lot of dust, causing frequent common colds and coughs (this is further expounded in section 6.3.2).

Access to potable water, reliable electricity supply, effective waste management system and access to sanitation facilities and adequate drainage systems are necessary to sustain the livelihood and wellbeing of the urbanite, and these are either not available, inefficiently managed or accessible to all within the study communities. As such, residents in sprawling communities live in an environment where their basic social needs are not met, thereby threatening the human dimension of sustainability in the city.

6.3.2 Housing Quality and Disease Burden

There are various types of housing in STMA: compound housing units, detached and semi-detached housing, flats and apartments, mud houses, kiosks and containers. Compound housing units are the most predominant and constitute 41% of all housing types (CHF, 2011). All these housing types require access to social amenities such as potable water, electricity, sanitary facilities, and adequate waste disposal to improve their wellbeing. However, as established in section 6.3.1, there is inadequate access to social amenities, which has implications for the health of the residents.

Table 6.3 shows the analysis results on housing type and the various diseases respondents have suffered in the past six months. The analysis was situated in this context, given that housing type could have an association with the various disease burdens that affect respondents in their respective communities. The study allowed for multiple responses from respondents considering that respondents could have suffered from multiple diseases over the past years. The results show that malaria (75%) was the major disease reported by respondents, followed by respiratory diseases (48.8%), diarrhoea (9.8%) and cholera (8.8%). Also, 4.3% of respondents reported typhoid as the major disease and dehydration (1.5%) was the least reported ailment.

Table 6.3: Housing type and disease burden

Type of housing	Types of diseases							**Total**
	Malaria	Respiratory diseases	Dehydration	Dizziness & Faintness	Cholera	Diarrhoea	Typhoid	
Detached housing	43	24	1	1	6	7	4	53
	(81.1%)	(45.3%)	(1.9%)	(1.9%)	(11.3%)	(13.2%)	(7.5%)	
Semi-detached housing	78	56	1	5	9	9	1	109
	(71.6%)	(51.4%)	(0.9%)	(4.6%)	(8.3%)	(8.3%)	(0.9%)	
Flat/Apartment	22	8	1	3	2	0	3	28
	(78.6%)	(28.6%)	(3.6%)	(10.7%)	(7.1%)	(0.0%)	(10.7%)	
Uncompleted building	30	29	1	5	6	6	3	45
	(66.7%)	(64.4%)	(2.2%)	(11.1%)	(13.3%)	(13.3%)	(6.7%.)	
Room in a compound house	127	78	2	3	12	17	6	165
	(77.0%)	(47.3%)	(1.2%)	(1.8%)	(7.3%)	(10.3%)	(3.6%)	
Total	300	195	6	17	35	39	17	400
	(75.0%)	(48.8%)	(1.5%)	(4.3%)	(8.8%)	(9.8%)	(4.3%)	

Source: Field survey, 2020

Concerning housing type, though a majority of respondents occupying various housing types had suffered from malaria in the past, the results show that a higher percentage of respondents in detached housing (81.1%) suffered from malaria than those inhabiting uncompleted buildings (66.7%), semi-detached housing (71.6%) and flat or apartments (78.6%). Thus, susceptibility to malaria is not unique to a particular housing type, although the incidence of

malaria is relatively lower in residents of uncompleted buildings, and this could be attributed to the use of treated mosquito bed nets.

The dominance of malaria as a major disease in the metropolis is evident in the STMA (2017) report, highlighting the top five diseases in the metropolis from 2014 to 2016 (see Table 6.4). It attributed its gradual decline to the monthly community clean-up exercise and usage of treated bed nets (STMA, 2017).

Table 6.4 Top 5 Disease Cases in Sekondi Takoradi Metropolitan Area

Disease/Year	2014	2015	2016
Malaria	98,980	74,136	67,075
Measles	37	22	25
Cholera	426	86	7
Meningitis	84	62	70
Tuberculosis	250	260	230

Source: Metropolitan Health Directorate, 2016 as cited in STMA, 2017

Consequently, the findings of the study are in line with assertions made by Simon et al. (2004), Amoateng et al. (2013) Peprah, (2014), Kuusaana and Eledi (2015), Cobbinah et al. (2015) and Cobbinah and Aboagye, (2017) that unsanitary conditions and wastewater discharge in gutters and on compounds have increased the incidence of malaria, diarrhoea and cholera cases in the raining season. As such, excerpts from an interview and FGD are shared below to buttress this point. According to a 40-year-old Engineer from UMI Fijai:

"…there are no new diseases within the community. Malaria and cholera are rampant, and this is partly because of the small size of the communal waste bin, causing it to overflow and breed flies and mosquitoes".

A 23-year-old male FGD participant in ULI Ntankoful also shared similar sentiments stating that:

"…the rubbish dump is what is bringing diseases here. There are mosquitos and lots of houseflies. Malaria is the most common disease here, and there are also cholera and typhoid. Typhoid is also one of the main diseases here".

In terms of respiratory diseases, a higher percentage of respondents living in uncompleted buildings (64.4%) and semi-detached housing units (51.4%) had suffered from respiratory diseases. However, the susceptibility of respondents to respiratory diseases is not unique to any housing type as environmental factors trigger the disease. In the various FGDs (both male and female) in the study communities, an increase in dust was cited as the cause of the frequent coughs and colds suffered. Observations made during the field study also confirmed the dusty nature of the roads in the ULI and PuMI communities, especially in Mampong and Eshiem, where once the wind blew or a car drove by, anyone is its path is covered in dust, and food items for sale were also covered in dust. A 21-year-old mason in PuMI Mampong expressed his views on this:

"…there are a lot of diseases here because of the dust. We go to the hospital often because of the dust here. The roads are not watered, so when cars ply them, there is dust in the air. It did not use to be this dusty; now that sand winning is taking place here, the dust has increased".

Indeed, during the field survey, the author had first-hand experience being covered in dust all over her body when trucks plied the road in Mampong. Therefore, living daily under such conditions would lead to respiratory diseases. Therefore, it is not surprising that approximately 87% of the respondents indicated that the air is not clean and is polluted with dust particles and vehicle fumes. Colds and coughs are easily contracted from one person to the other, so with the majority of the inhabitants living in compound houses, it could easily spread within households. This finding agrees with Frumkin (2002), who stated that the associated health hazards of urban sprawl include air pollution, which causes severe breathing problems.

Lastly, the third reported disease by respondents, cholera, was mostly reported by respondents in the ULI community of Ntankoful. This is not surprising given that sullage or greywater was dumped on the compound/yard and visually greeted a person entering the compound or walking between houses, in addition to the fact that the community shares one public toilet.

It can be deduced from the triangulated findings that irrespective of the housing type, housing services available and environmental factors prevalent within the study communities have contributed towards the prevalence of malaria, respiratory diseases and cholera as diseases frequently suffered by respondents and residents of the city at large. Thus, the diseases suffered by the respondents are not solely a result of the city's sprawling but have been exacerbated by changes in environmental factors and the lack of housing services in the sprawling communities. With about 81 health care facilities and about 443,648 subscriptions to the national health insurance scheme as of 2016, residents have access to adequate health care (STMA, 2017).

6.3.3 Crime and Insecurity

Another issue examined in terms of respondents' social well-being due to sprawl is the perception of crime and insecurity. Therefore, respondents were asked to indicate if there has been an incidence of crime and insecurity in their respective communities. The analysis was done in relation to their place of residence to ascertain if there are variations or similarities in the cases of crime and insecurity across the various selected communities, and the results are presented in Table 6.5.

A large percentage (70%) of respondents indicated that there had been crime and insecurity issues in their communities. The chi-square test results show that there is a significant relationship between place of residence and issues of crime and insecurity.

Table 6.5: Perception of crime and insecurity

Socio-economic classifications	Place of residence	Presence of crime and insecurity (Petty theft, armed robbery and kidnapping)		Total
		Not present	Present	
Urban middle income	Anaji	17 (28.3%)	43 (71.7%)	60 (100%)
	Fijai	7 (11.7%)	53 (88.3%)	60 (100%)
Urban low income	Kojokrom	18 (25.7%)	52 (74.3%)	70 (100%)
	Ntankoful	20 (28.6%)	50 (71.4%)	70 (100%)
Peri-urban low income	Eshiem	27 (38.6%)	43 (61.4%)	70 (100%)
	Mampong	31 (44.3%)	39 (55.7%)	70 (100%)
	Total	**120 (30.0%)**	**280 (70.0%)**	400 (100%)
		χ2=19.62, df (5), p value= 0.001<.05		

Source: Field survey, 2020

For example, in terms of place of residence, a higher percentage of respondents from UMI Fijai (88.3%) noted that there are crime and insecurity issues in their community relative to respondents from PuMI communities Eshiem (61.4%) and Mampong (55.7%).

The UMI and ULI reported a higher incidence of crime than in PuMI communities. Although the incidence of crime cuts across all socioeconomic classes, there were variations in the types of crimes perpetuated. Robbery appeared to be more prevalent in middle-income communities, and this could be attributed to the fact that these communities tend to own assets that criminals desire (Wrigley-Asante, 2016).

The city's expansion to the periphery also raises social vices due to middle- and high-income earners settling in the indigenous communities in the outskirts (Yiran et al., 2020). Thus, in the ULI and PuMI communities, theft appeared to be a dominant crime. Respondents in the ULI and PuMI communities alluded to the fact that before the influx of migrants, they knew each other, and it was safe; however, now, one cannot leave their home or items unsecured and return to find them. As such, as the population increases and the town expands, theft is also on the rise. According to FGD participants, these thefts are committed by male youth due to the

high unemployment rate among them. They, therefore, commit a crime to obtain financial relief. The PuMI Eshiem Assemblyman captured this during an in-depth interview:

"...we do not have armed robbery here; it is mainly petty thefts. This is because the youth do not have gainful employment, so they resort to stealing to survive. Also, the influx of migrants into the community has increased theft in the community."

Similar sentiments were expressed across other communities; however, the respondents believed that before more migrants moved into their communities, the incidence of crime was less as they knew each other within the community. However, now that there is an influx of migrants and its ensuing population increase, the neighbourliness which once existed is diminishing as they do not know the new people settling within their community.

The issue of youth smoking cannabis, taking unprescribed tramadol and committing a crime was also a dominant theme in the UMI communities of Anaji and Fijai, especially where the indigenes live, Anaji Fie and Fijai Fie. To this, a 33-year-old seamstress in Fijai stated:

"...robbery has become rampant here. We need a police station here. The boys are smoking weed. When it is 6 pm, and you walk down the path around the cemetery, you must leave your phone before you pass there; otherwise, they will take it from you."

Smoking cannabis makes them susceptible to committing various types of crimes as the tendency to steal to get money to buy more drugs increases because they are addicted to smoking weed and need to continue purchasing it. Although the GSS (2014a) report indicates that the proportion of male employees (52.3%) is more than double that of females (21.8%) in the employment sector of the metropolis, with a majority (70%) working in the private informal sector of employment;15% in private informal employment and 14% in public service. Despite these, unemployment persists within the metropolis and spurs, especially the youth, to engage in social vices.

Lastly, another form of insecurity described by respondents in the ULI community of Ntankoful is that there has been an increased use of 'black magic medicine' known as 'for girls', which the male youth in Ntankoful are using to exploit females sexually. According to a 36-year-old male in the Ntankoful FGD:

"…There is one thing that the government cannot solve, but can do something to manage the situation – "for girls". The young boys wear the rings, and they use it to impregnate about five girls at a time. Anyone they call follows them. The Zongo boys, this is what they are doing to the girls here. We have to tackle this menace; otherwise, no matter how you educate and advise your daughter, she will be sexually exploited using 'for girls' drugs".

Similarly, in PuMI Mampong, the use of black magic medicine was used by men to have sexual relations with mothers and their daughters, and this was a common occurrence within the community. For both communities, reference was made to television advertisements of how such 'medicine' has influenced their use to commit such atrocities.

Given the overall anti-science trend in Ghanaian society, people believe that rings to hypnotize and the dominance of black magic and illusions have been used as manipulative means of sexual exploitation. This increases the sense of insecurity amongst residents in both communities females are the targets of abuse. In 2019, there was an incidence of kidnapping in Sekondi-Takoradi, where four girls were abducted and subsequently murdered. It was perceived that the organs of the murdered girls were used for rituals to make money and although this cannot be proven, what remains is that the kidnapping brought about a heightened sense of fear and insecurity amongst residents within the metropolis. As an outlier of the types of crimes that are predominant in the metropolis, region, and country, there was a nationwide campaign dabbed #bringbackourtaadigirls. This started initially as an effort by the families of the four girls, then gained momentum at the community level and then the nationwide

campaign to put pressure on the police to bring justice to the families (Armah, 2019). The communal effort highlights social cohesion within families and amongst the various community members within the metropolis in the face of uncertainty, fear and hideous crimes.

6.3.4 Social Cohesion

The final aspect of wellbeing the study sought to find out was the effect of urban sprawl on cohesion within the family unit. It can be deduced from Table 6.6 that 85% of the respondents were of the view that their family members had not relocated because of sprawl. Social cohesion, as operationalized for this research, looks at the changes in the relationship at the family level and whether urban sprawl has facilitated its integration or disintegration and how the migrants and foreigners are perceived and accepted (or not) into the community. Respondents' main reason for their family members relocating was to seek better economic opportunities and not because of sprawl.

Table 6.6: Relocation of Family Members

Socio-economic classification	Have members of your family relocated because of sprawl?			
	Name of Community	Yes	No	Total
Urban middle income	Anaji	13 (21.7%)	47 (78.3%)	60 (100%)
	Fijai	10 (16.7%)	50 (83.3%)	60 (100%)
Urban low income	Kojokrom	8 (11.4%)	62 (88.6%)	70 (100%)
	Ntankoful	11 (15.7%)	59(84.3%)	70 (100%)
Peri-urban mixed-income	Eshiem	13 (18.6%)	57 (81.4%)	70 (100%)
	Mampong	5 (7.1%)	65 (92.9%)	70 (100%)
	Total	60 (15%)	340 (85%)	400 (100%)

Source: Field Survey, 2020

Of the 15% who indicated that their family members had relocated, 4.2% stated that their relationship had been affected, and they cited the following as reasons for how they feel: loneliness, losing physical and emotional connection due to irregular communication and irregular visits. The remaining 10.8% were, however, of a different opinion. In that, they could communicate with their family members by phone and maintain strong ties with them. It can

be deduced from the above that sprawl and relocations resulting had not affected the relationship between family members.

Looking beyond the family unit and examining social cohesion at the community level, it was clear from the FGDs for the PuMI communities that they perceived migrants, especially Nigerians, as more difficult to live with due to their perceived rowdiness. The opinion leader in Eshiem opined that:

"...most of the migrants are from Kumasi, Cote d'Ivoire and Nigeria, but the majority are Nigerians. The Nigerians are liars. The Nigerians are troublesome, but the Ivorians are okay to live with. The Nigerians have brought rowdiness into the community."

He further expressed the displeasure of migrants being employed at the factories established within the community at the expense of the indigenes. His statement was corroborated by that expressed of a 48-year-old trader who is a native of Eshiem:

"...the Nigerians work at Goodwill (Wan Khan) because there is also a branch in Nigeria, so most of them came to work here. They are the ones who rent the houses here. The companies here do not employ the youth here. If you go to the factories, the youth employed there are less than 10. Some of the factories are looking for specific skills, so our youth remain unemployed."

Although there was no observable hostility towards the 'migrants', social cohesion within the community is not in agreement with Chan, To and Chan (2006)'s definition that social cohesion is a state of affairs concerning the vertical and horizontal interactions among members of society as characterized by a set of attitudes and norms that include trust, a sense of belonging and the willingness to participate. This is not how respondents felt about the presence of Nigerians in their community and the fact that the native youth remained unemployed while the migrant was gainfully employed within their community.

Therefore, the perspectives of migrants were sought to understand their relationship with the indigenes and their opinion on how they were perceived. From the various interviews conducted with migrants from Cote d'Ivoire, Obuasi, and Nigeria, they all perceived the indigenes as friendly and welcoming and got along well. The outlying issue raised was that the male youth in Eshiem and the male Nigerians do not get along because the Nigerians are chasing their girlfriends and sexually exploiting them, impregnating them, and leaving them alone to return to Nigeria.

A 25-year-old migrant from Obuasi shared that the indigenes do not like them (migrants) who work at the factories because they are perceived to have come for their jobs. Some indigenes take the issue very personal while others also relate to the workers as "brother man", so they get along well. So, not all of them are hostile, just a few that have issues with each other. Those perceived to be troublesome are often dependent on those they have an issue with, but generally, they get along with each other.

It can be deduced from the above testaments that both Nigerians and Ghanaian migrants alike face challenges settling in Eshiem, and it is based on specific situations. Thus, there is observable harmony between indigenes and migrants, alluding to social cohesion among residents within the community. It can therefore be said that although the family unit remains largely integrated and unaffected by sprawl, the presence of migrants from the respondents' perspectives has not contributed positively to social outcomes within the peri-urban mixed-income communities of Eshiem to an extent. This contrast assertions made by Stanley (2003) that social cohesion contributes to a wide variety of social outcomes such as health and economic prosperity.

6.4 Chapter Summary

The chapter examined the impact of sprawl on the livelihoods and the social wellbeing of the respondents. The findings from the field survey established a relationship between the socio-demographic characteristics (age, sex, occupation) and the impact of sprawl on their livelihoods, thus rejecting the null hypothesis, which stated that there is no significant relationship between socio-demographic characteristics of individuals and the perceived impact of urban sprawl on their livelihoods.

The study also affirms that urban sprawl has affected the social wellbeing of the inhabitants. It was evident that the peri-urban mixed-income communities especially lacked essential services such as potable water, sanitation facilities, drainage and waste disposal facilities. The achievement of sustainability requires access to adequate livelihood, access to adequate shelter and a healthy environment. Thus, findings from the study indicate otherwise; further improvements in access to basic services and adequate livelihoods are needed in STMA to meet the basic human needs required as a key component to having a sustainable city.

In terms of health, the study also confirmed the new emerging trend in STMA of an increase in respiratory diseases, which respondents attributed to the high incidence of dust particles in the air in peri-urban low-income communities. The prevalence of crime across all socio-economic classes and the assertion that 'foreigners'/migrants are the perpetrators of such vices shows that social cohesion at the community level is not strong. The study, therefore, affirms the research proposition that urban sprawl affects the social wellbeing of its inhabitants.

The next chapter explores the effects of urban sprawl on the environment, and this will give us the full picture of the outcome of sprawl on the study communities and the metropolis as a whole.

CHAPTER SEVEN

ECOLOGICAL FOOTPRINTS OF URBAN SPRAWL

7.1 Introduction

This chapter examines the environmental effects and sustainability of urban sprawl in the selected communities within STMA. The study analyses changes in land cover and surface temperature within STMA from 1988 – 2018. It further interrogates respondents' views on the consequences of urban sprawl on the environment. Lastly, it explores respondents' views on institutions responsible for managing sprawl and suggestions about how sprawl can be managed in the metropolis. This chapter analyses the spatio-temporal dynamics from 1988 to 2018 and addresses the implications of sprawl on environmental sustainability based on the research proposition that urban sprawl in Sekondi-Takoradi has affected the ecology of communities.

7.2 Analysis of Land Use and Land Cover Change From 1988 - 2018

7.2.1 The Broad Pattern

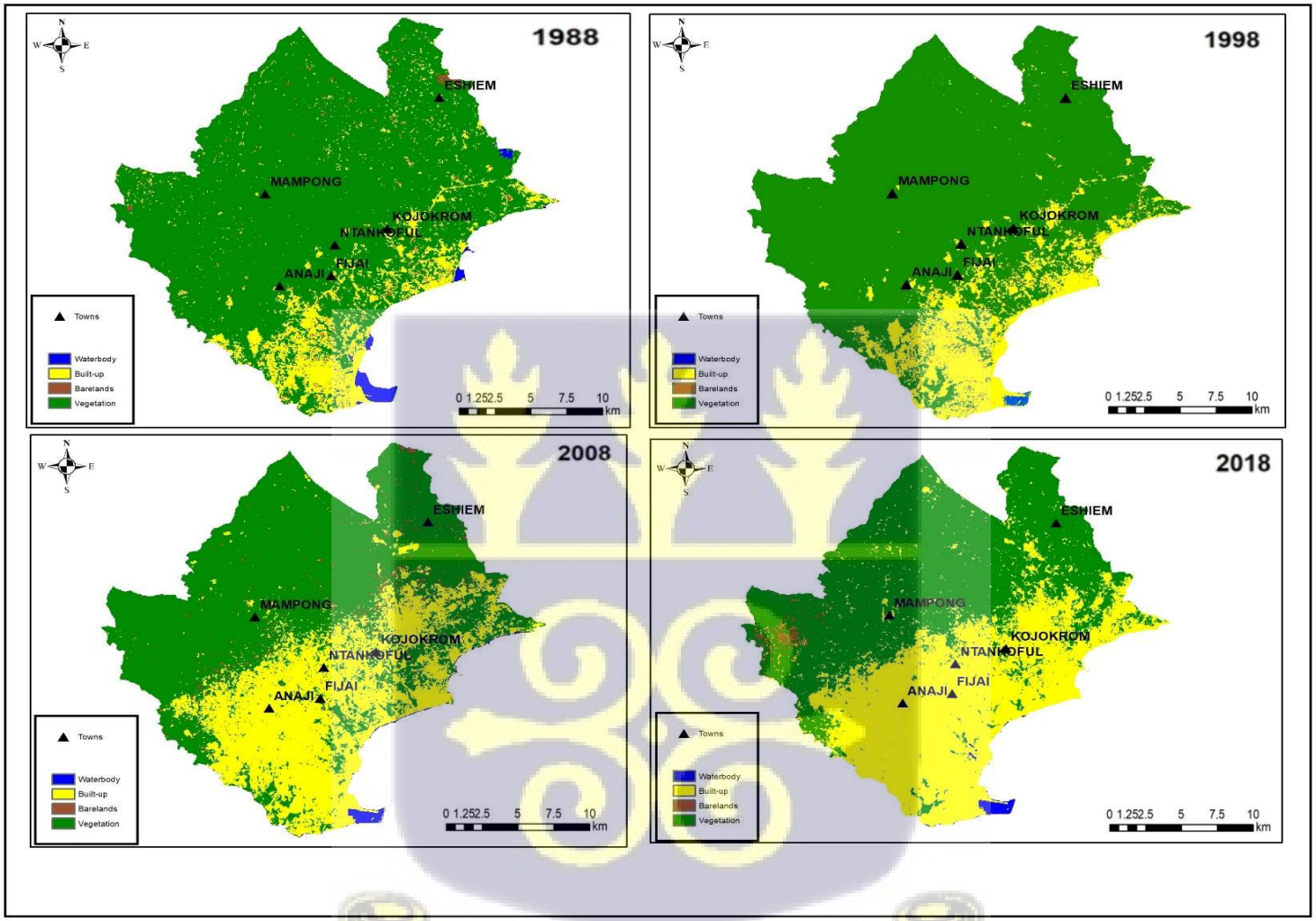
Land-use and land-cover change (LULC) is a general term for the human modification of Earth's terrestrial surface. It influences various processes on the earth's surface, generating feedback effects on the natural environment, and economic and social systems (Campbell, 2002). LULC in urban areas predominantly occurs through the removal of vegetation emanating from anthropogenic activities such as the construction of housing and roads and the paving of surfaces. These activities are influenced by an increase in population, government policies and economic development. Human-induced conversions and transformations of land use have significant impacts on the functioning structure of the earth's ecosystems. LULC modifies the ecosystem functioning through modification of the biogeochemical cycles,

hydrology and energy balance and these in turn directly affect climatic conditions (Acheampong et al., 2018).

Sekondi-Takoradi, the third most urbanised city in Ghana, has undergone changes in its land cover due to rapid urbanisation (Obeng- Odoom, 2013; Fei-Baffoe et al., 2014). The population of Sekondi Takoradi in 1970 was estimated at 135,760. This figure increased to 272,150 in 1984, 369,166 in 2000 and 559,548 (GSS, 2014a) and is projected to increase to 954,519 in 2020 UN DESA (2018). As a result of the increase in the population, there is a considerable change in the city's land cover and land use. Vegetative land is being converted to other uses associated with urbanisation and industrialisation. The metropolis is also a major industrial centre for the country with the first harbour of the country. Thus, a number of industrial activities occur in the metropolis. Oil discovery and production have also added to the complex land-use changes that are occurring in the metropolis.

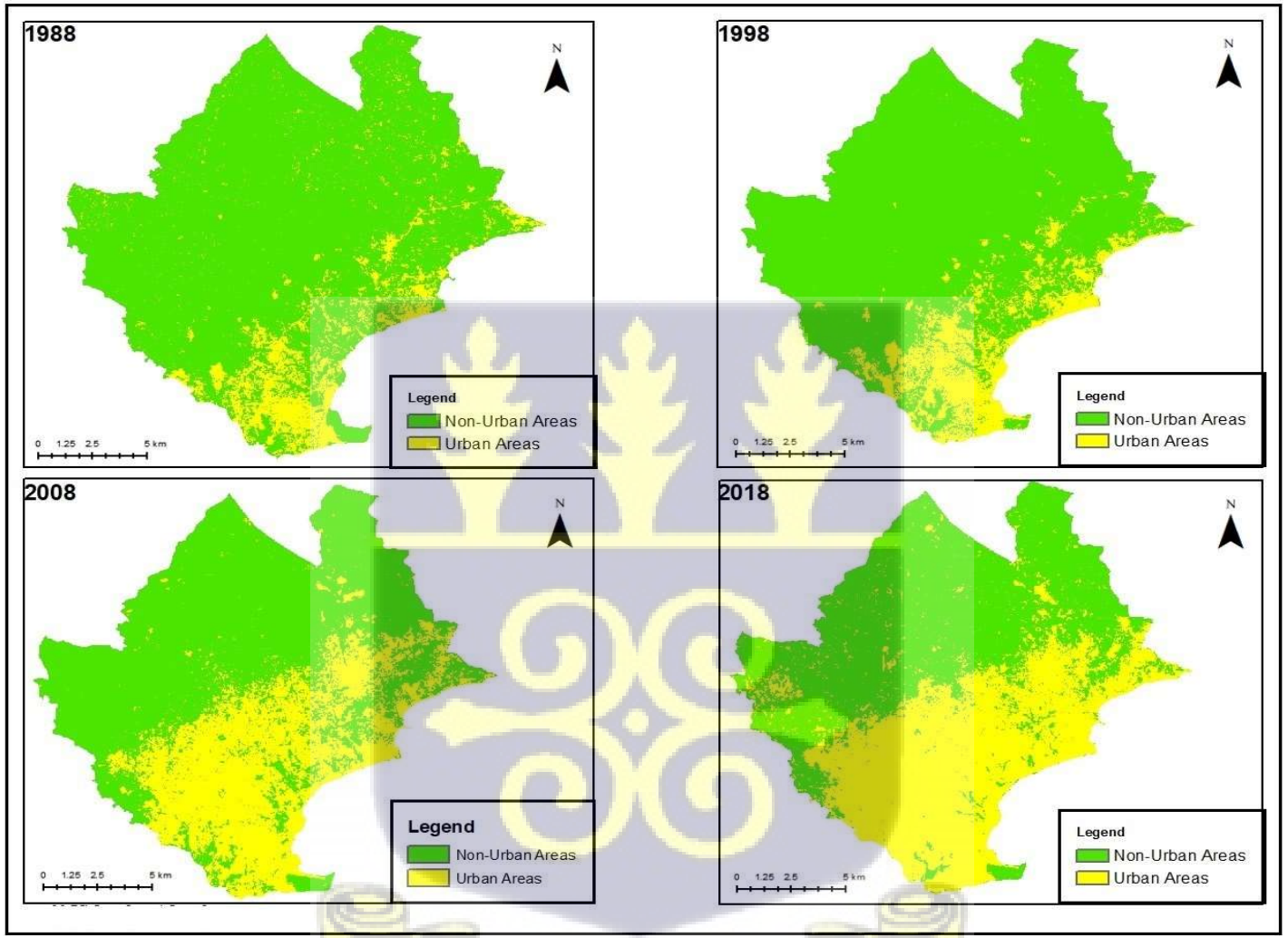
The study, therefore, explores the extent to which vegetated and agricultural lands have been converted other urban land uses in the Sekondi-Takoradi from 1988– 2018 (a 30-year period) to understand the extent of change and its effect on the environment. The classified remote sensing images presented in Figure 7.1a and its corresponding Table 7.1 are used to show and discuss the changes in land cover and spatial expansion in the metropolis in the period under review. This is further classified to show urban (built-up and bare land) and non-urban (vegetation and water bodies) areas to show the extent of the spatial expansion occurring in the metropolis (see Figure 7.1b).

Figure 7.1a Composite map of land use and land cover change in STMA 1988 – 2018



Source: Author, 2021

Figure 7.1b Composite Map of Urban and Non-Urban Areas in STMA 1988 – 2018



Source: Author, 2021

Table 7.1: Area of Land Cover from 1988 - 2018

Categories		1988		1998		2008		2018	
		Area (km²)	Area %	Area (km²)	Area %	Area (km²)	Area %	Area (km²)	Area %
Urban	Built-up	24.077	12.55	29.84	15.55	68.283	35.59	84.43	44
	Bare land	2.993	1.56	2.694	1.4	4.319	2.25	1.556	0.81
Urban Total		**27.07**	**14.11**	**32.534**	**16.95**	**72.602**	**37.84**	**85.986**	**44.81**
Non-Urban	Vegetation	162.74	84.82	158.853	82.8	118.086	61.55	104.85	54.65
	Waterbody	2.059	1.07	0.482	0.25	1.181	0.61	1.033	0.54
Non-Urban Total		**164.799**	**85.89**	**159.335**	**83.05**	**119.267**	**62.16**	**105.883**	**55.19**
Total Area		191.869	100	191.869	100	191.869	100	191.869	100

Source: Author (generated from Landsat classification)

It can be deduced from Figures 7.1a and 7.1b. that Sekondi Takoradi Metropolitan Area has experienced rapid urban expansion and a northerly direction of further inland growth. In 1988 urban land area was 27.07 km², 14.1% of the study area, while the non-urban area was approximately 164.8 km², i.e. 85.9%. The LULC for 2018 shows that urban land area increased to 86 km², which is 44.8% of the metropolis. Between 1988 and 2018, STMA experienced an increase in urban land areas. The built-up area increased by approximately 251% (see Table 7.2), and bare land increased marginally from 2.7km² in 1998 to 4.3km² in 2008 and further declined to 1.5km² in 2018. The increase in bare land in 2008 could be attributed to the discovery of oil in 2007 and its ensuing land speculation. As built-up areas continued to increase, bare lands and vegetative cover were utilised to meet the increasing urban development. Subsequently, the marginal reduction of water bodies when compared with the excessive rise in the built-up area also indicates that individuals and developers are encroaching on wetlands and waterways for building purposes. Wetlands and waterways are being filled with sand to make them conducive for the construction of buildings.

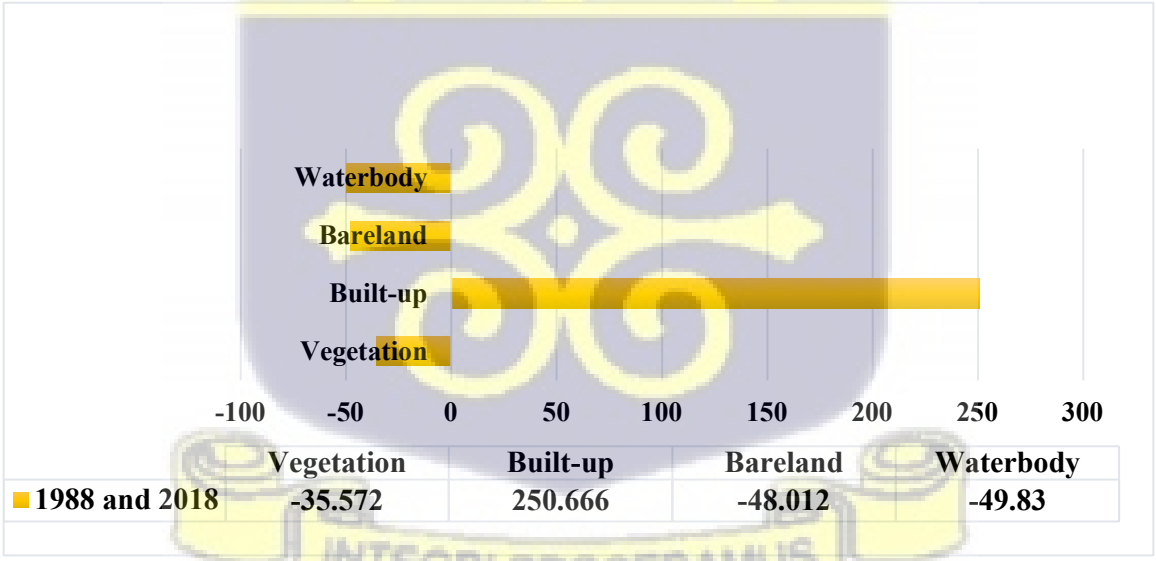
Consequently, vegetative cover decreased over 57 km² over the 30-year study period from 162.74 km² to 104.85 km², implying a 36% decrease (see Table 7.2). Urban expansion in the metropolis literally consumes everything within its path to support the lateral expansion of the metropolis, resulting in the continuous decrease of non-urban areas. The reduction of the non-urban land area and increase of urban built-up (see Figure 7.2) environment indicate a substantial increase in impervious surface area, a major contributing factor to urban floods and urban heat island effects.

Table 7.2: Rate of Land Cover Change in Percentage

Categories		1988 and 1998	1998 and 2008	2008 and 2018	1988 and 2018
Urban	Built-up	23.935	128.83	23.647	250.666
	Bare land	-10	-9.989	-63.972	-48.012
Non-Urban	Vegetation	-2.387	-25.664	-11.209	-35.572
	Waterbody	-76.59	145.021	-12.531	-49.83

Source: Author (generated from Landsat classification)

Figure 7.2 Land Cover Change Detection between 1988 and 2018



Source: Author, 2021

The rapid decrease in vegetative cover dates back to the 1980s. According to Benhin and Barbier (2004), a significant problem during the 1980s and early 1990s was deforestation

caused by clearing land and exporting timber due to SAP policies. The economic boost from the SAP spurred a new wave of urban development and urban expansion (Obeng-Odoom, 2012). Due to this expansion of urban areas, Sekondi Takoradi saw a steep rise in population in the mid-1980s, although its population had been on a downward spiral the previous decade (see section 4.5 page 84).

Furthermore, as previously discussed in section 4.6.2 (page 94), the discovery of oil has played a significant role in changing the land cover of the metropolis. All these economic changes contributed to altering the non-urban land cover of the metropolis to accommodate urban expansion and its ensuing increasing population. The extent to which the urban land area changed is further examined in the subsequent section.

7.2.2. The Normalised Difference Built-up Index (NDBI)

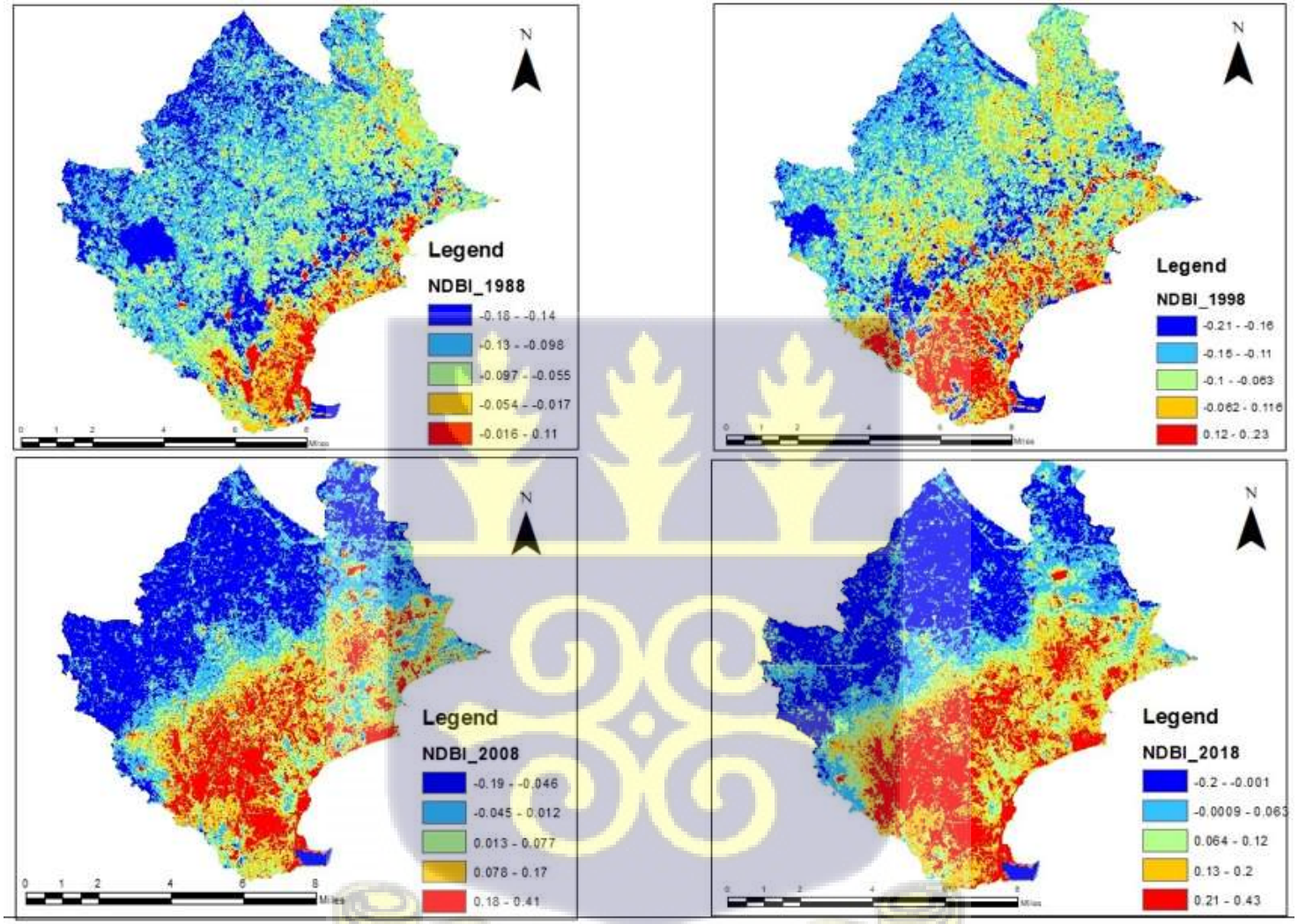
The Normalised Difference Built-up Index is used to automatically map built-up features and indices ranging from -1 to +1 from the satellite image. The NDBI is one of the most common indexes for analysing built-up areas. To further assess the rate of change in the built-up areas over the 30 years, the NDBI was performed using the raster calculator tool in ArcMap for 1988, 1998, 2008 and 2018. This yielded 4 NDBI images with their respective NDBI values, as shown in Figure 7.3. The results of the NDBI range between the values of -1 to 1, with higher NDBI values approaching 1 signifying densely built-up areas and those closest to -1, low built-up areas.

The results show that NDBI values increased progressively within the period under review. Signifying a gradual increase in the presence of built-up areas within the study area. This could also be assessed visually on the NDBI maps produced, with the areas in red showing a higher built-up index (i.e. densely built-up area) and blue showing the vegetative area, which is sparsely built up. From the images, the built-up areas are located in the southern portions of

the study area. These are areas where factories, buildings and commercial activities are located within the Sekondi-Takoradi region. The legend shows that the highest NDBI value in 1988 was as low as 0.11. This increased to 0.23 in 1998 due to the gradual urban influx and construction of manufacturing industries, among other urban developments. In 2008, the NDBI value increased further to 0.41 due to urban development, especially the construction of markets, stadiums, and residential and commercial properties. The hosting of the 2008 African Cup of Nations (CAN 2008) at the Essipong stadium led to housing speculation, which led people to build houses in anticipation of renting them to football spectators travelling to Sekondi-Takoradi, as shared by the Managing Director of a Real Estate Company in an interview:

> *"...even the hosting of CAN 2008 alone changed the dynamics of Sekondi-Takoradi. A tournament that was supposed to be held for one month, yet, people-built houses from scratch because of CAN 2008. Some did not even finish the construction before the tournament was over, and later, they struggled to sell the property. It was something they did not need but once again that lack of understanding of the real estate market and falling for speculation, so at best all those changes that occurred are purely speculative".*

Figure 7.3 Composite Normalised Difference Built-up Index map 1988 – 2018



Source: Author, 2021 Note: Densely built-up area (red) and vegetative area/ sparsely built-up (blue).

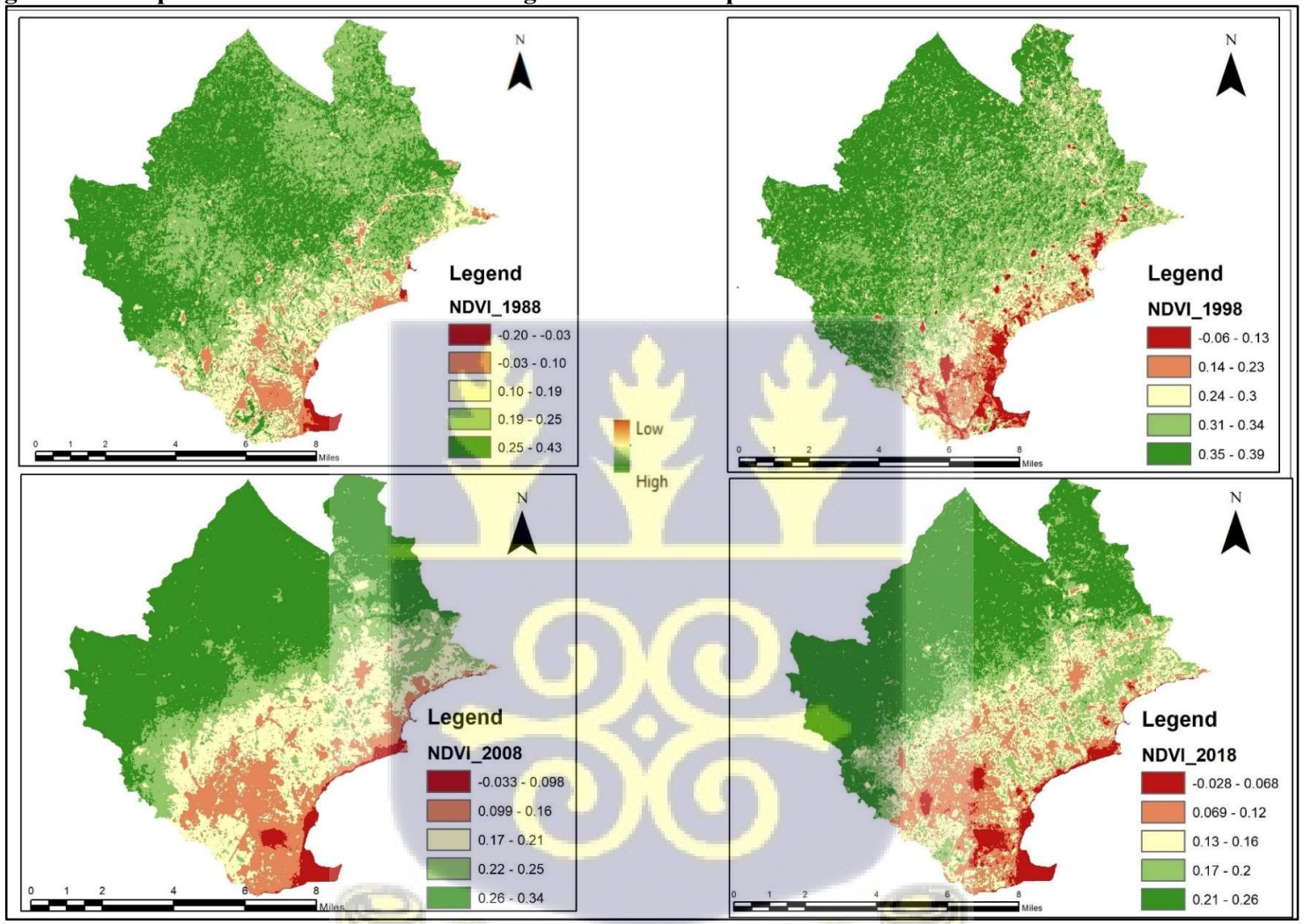
This brings up an interesting notion that not all the built-up areas are occupied, and some are left derelict, much to the disadvantage of the environment. The same situation occurred in 2018, with a massive increase in the built-up area, progressively entering the vegetative zones in the north due to land speculation resulting from the exploration and exploitation of oil.

7.2.3. The Normalised Difference Vegetative Index (NDVI)

As shown in Figure 7.4, the vegetative index indicates that as the value of the built-up area increases over the 30-year period, anthropogenic activities have resulted in a decrease in vegetative cover to meet human needs as the population increases and the economy develops. Although NDVI is typically shown in a green-and-white continuum, to show the NDVI values in this analysis, the author uses a gradient of colours to distinguish between the different levels of NDVI values clearly. The NDVI values range between -1 and 1, with higher NDVI values approaching 1 signifying dense vegetation, while values below zero signify less vegetation or absence of vegetation in the area.

From the NDVI analysis, 1998 has a very high vegetation cover, with the highest value being 0.43. This could be explained by the less developed nature of the study area as of 1988. The study area was dominated by forest and other vegetative covers with fewer buildings and urban development. This began to change gradually, such that in 1999, due to anthropogenic factors such as the construction of roads and buildings for settlement, depletion of vegetation and forest cover occurred to facilitate urban development.

Figure 7.4 Composite Normalised Difference Vegetative Index map 1988 – 2018



Source: Author, 2021

Values from the NDVI map of 1998 show the highest value of 0.43 in 1988, decreasing to 0.39. and the lowest NDVI value reduced from -0.03 to -0.13. The story remains the same in 2008, with NDVI decreasing again from 0.39 in 1998 to 0.34 due to the same urban development and construction. Finally, in 2018, the NDVI value decreased further from 0.34 to 0.26, with most vegetation that occupied the northern portions of the study area in 1988 drastically reduced in 2018.

However, it is important to note that not all vegetative cover was directly converted to urban land use between 1988 and 2018. Some forest areas in PuMI communities like Mampong and Eshiem are seen to have shifted to urban land use as of 2018. The sale and conversion of agricultural lands for residential purposes have spurred urban development in communities such as Eshiem and Mampong since vegetative land is available to be converted from agricultural use to residential development. A 60-year-old man confirms this during the focus group discussion in the UMI community of Anaji:

"Farmers who live at Anaji go to Mampong to farm because there is no land available for farming in Anaji. Farmers are struggling".

The Assemblyman of Mampong indicated during an interview said that:

"...If you look over here, it all used to be farms, but now they have been sold, and all the farms have moved far away from here".

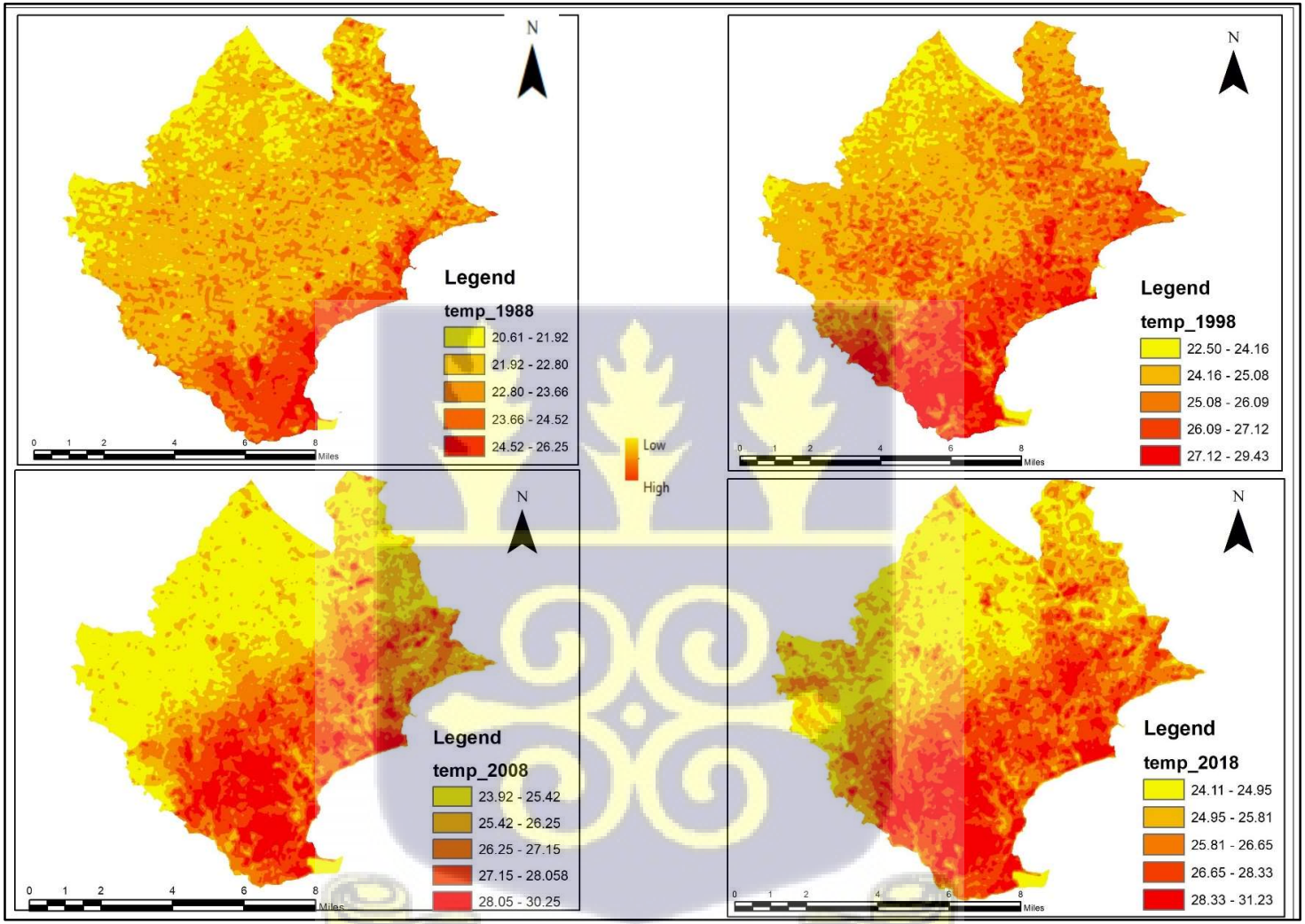
The testaments above confirm that urban activities have encroached into nearby agricultural areas, further facilitating the expansion of agricultural activities into forest areas. The expansion of urban land use is greatest from the South-Western part of Sekondi-Takoradi, where the harbour is situated, and this has significantly influenced the spatial orientation and pattern of urban land development in Sekondi Takoradi. It can be observed that urban land development has increased predominantly in a northerly direction.

The findings make the changes in land use and land cover of the city not the result of natural or biophysical means but rather due to replacement conditions such as clearing of agricultural lands or forests to contain increasing population, filling of water bodies for infrastructural development, construction activities etc. as indicated by Adjei Mensah et al. (2019). These activities deplete biodiversity, which is critical for sustainable development. The availability of urban forests and green vegetation helps provide many ecosystem services such as improving the microclimate of an area and making urban air quality better. Thus, as vegetative cover declined and was replaced by urban developments, it facilitated the modification of the city's microclimate.

7.3 Increase in Surface Temperature (Urban Heat Island Effect)

To understand further the extent of sprawl on temperature, surface temperature analysis was conducted for the years 1988,1998, 2008 and 2018. Figure 7.5 shows the surface temperature map of Sekondi Takoradi for the period under review. It shows that the surface temperature of STMA ranged between 20.61ºC and 26.25ºC in 1988, changing to a minimum of 22.50ºC to 29.43ºC maximum in 1998. This shows an increase in both minimum and maximum levels. Also, in 2008 there was a further change in the minimum temperature from 22.50ºC to 23.92ºC and maximum from 29.43ºC to 30.25ºC in 2008 and further increasing to 31.25ºC as the maximum and 24ºC as a minimum in 2018. What is clear from Figure 7.5 is that the maximum temperature has been increasing over the years, and even the minimum temperature has generally been increasing.

Figure 7.5 Land Surface temperature in STMA from 1988 - 2018



Source: Author, 2021

Over this period, the maximum surface temperature for the most intense built-up area generally increased from 26.25ºC to 31.23ºC, and in the areas with vegetative cover, which are less built up, the temperatures have also increased from 20.61ºC to 24.11ºC. Overall, one observes a general trend towards temperature increase.

Meteorological data covering the 30-year period was used to verify the minimum and maximum temperatures generated by the Landsat images. It can be deduced from Tables 7.3a and 7.3b that the minimum and maximum temperature values for the respective years corroborate the surface temperature generated from the Landsat satellite images.

Table 7.3a: Sekondi Takoradi Minimum Temperature

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1988	22.3	24.1	24.1	24.4	24.1	23.2	22.4	22.0	22.7	23.0	22.7	22.5
1998	23.6	25.1	26.0	25.9	24.5	23.6	22.8	22.0	22.9	23.6	24.1	23.8
2008	21.2	24.3	24.3	24.5	24.1	23.8	23.3	22.6	23.1	23.8	24.0	24.0
2018	24.0	25.1	24.9	25.0	24.1	23.8	N/A	N/A	23.5	23.6	24.5	24.3

Source: Ghana Metrological Agency

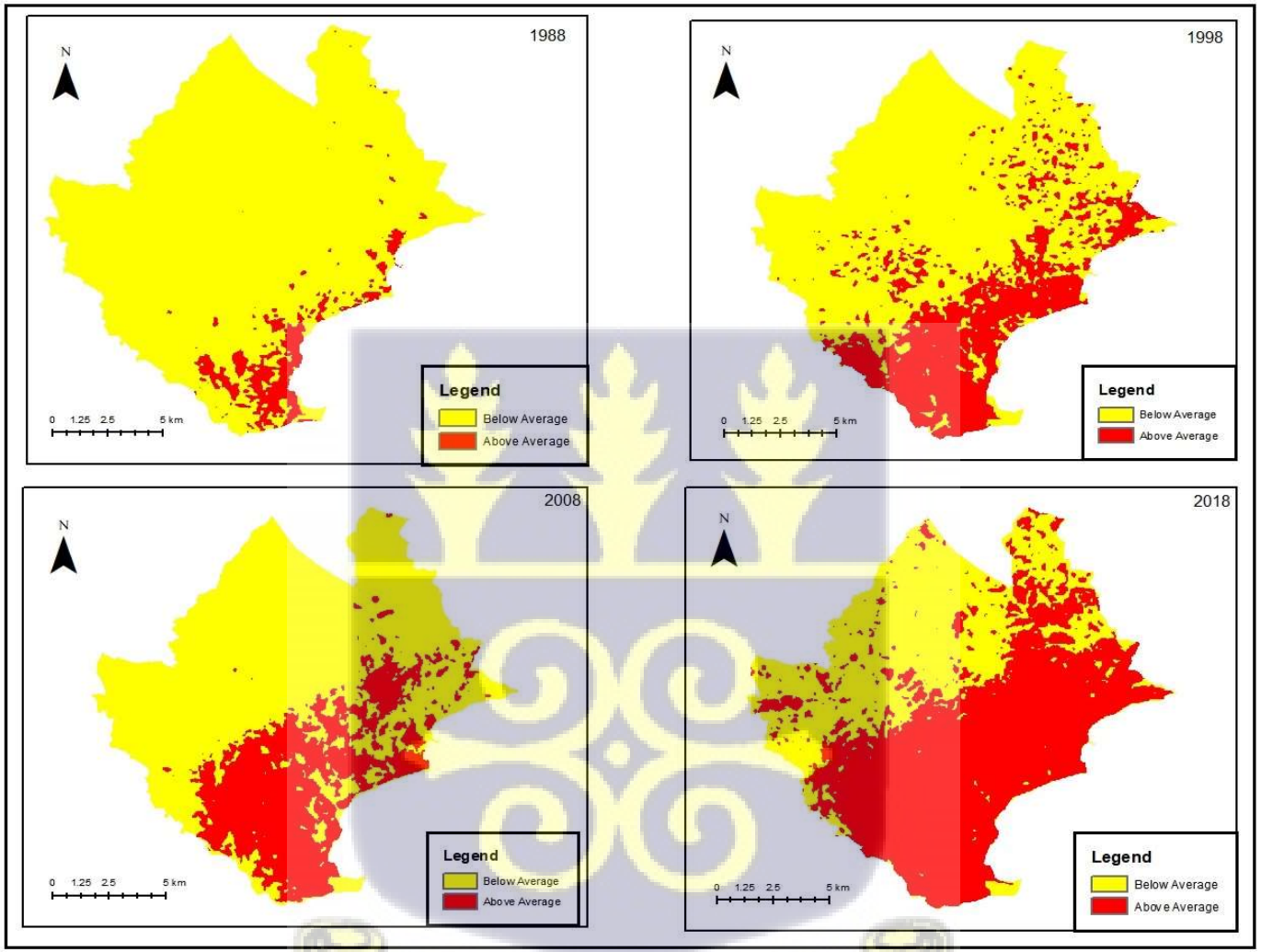
Table 7.3b: Sekondi Takoradi Maximum Temperature

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1988	31.2	31.9	31.6	31.8	31.4	30.0	28.9	27.9	28.3	29.8	31.0	30.9
1998	31.6	32.7	33.0	32.7	31.5	30.1	28.6	28.0	28.6	29.8	31.8	31.7
2008	31.3	32.1	32.1	31.8	31.4	30.1	29.3	28.6	29.0	30.5	31.2	31.8
2018	30.9	31.4	31.5	31.3	30.6	29.5	N/A	N/A	28.6	30.2	31.9	32.3

Source: Ghana Metrological Agency

To further ascertain areas that fell below or above the average temperature of 25ºC, the statistics generated indicated that 6%, 27%, 29% and 58% of the land surfaces were generating above-average temperatures for 1988, 1999, 2008 and 2018, respectively (see Figure 7.6). It is evident from Figure 7.6 that the portions of STMA experiencing above-average temperature fall within the urban land areas where 96% of the population of STMA live (GSS, 2014a).

Figure 7.6 Surface Temperature below or above 25º Celsius



Source: Author, 2021

Thus, as the city is expanding and there are more paved surfaces and buildings, less vegetation cover as the temperature in the urban area is above average. On the other hand, temperatures in non-urban areas are below average because of increased vegetation cover. According to Ghana Statistical Services (2014) report, the types of construction materials used by residents include cement block/concrete (84.1%) and cement (87.7%), and metal sheets (45.2%). These materials retain heat and expose occupants to high indoor temperatures.

To this end, the study sought to find out residents' perceptions and coping mechanisms about the weather they are experiencing. Of the 400 respondents surveyed, 81 (20.25%) indicated that the weather is warm, 169 (42.25%) were of the view that the weather is hot, and 147 (36.75%) indicated that the weather is extremely hot. In contrast, less than 1% of the respondents indicated that the weather was cold. Though the interpretation of hot and extremely warm classifications was subjective, most respondents indicated that the weather was hot or extremely (scorching) hot. The respondent's perception is shown graphically below in Figure 7.7.

Respondents' perception of the weather contrasts with respondents' perception during an earlier period of their life. For instance, a food vendor from the PuMI community (Eshiem) said in an interview said that:

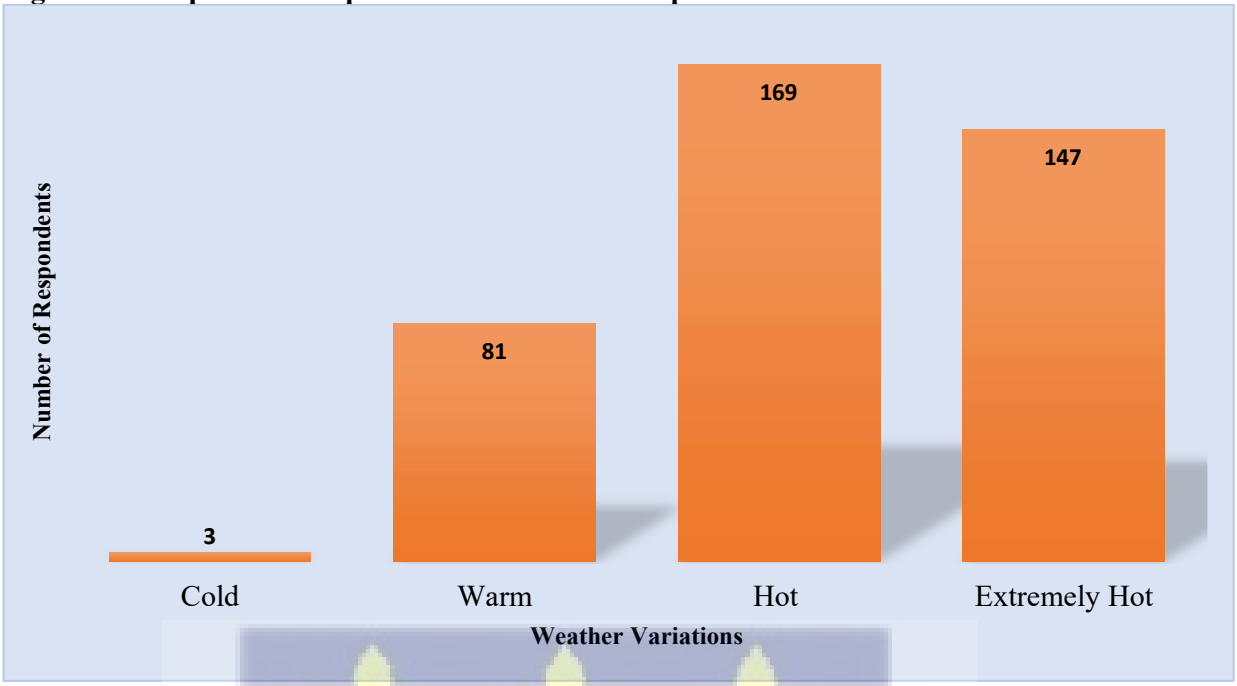
"*…the weather was pleasant when we were younger, now that the trees are all gone, it is very hot now."*

Another focus group discussion participant in the UMI community (Fijai) indicated that

"*…at first it used to be hot, but now it has become cool".*

This brings out the relative nature of individuals' perceptions of the weather. Lived experiences vary from one person to the other.

Figure 7.7 Respondents' Opinions about STMA temperature



Source: Author, 2020

In ULI (Ntankoful), a 36-year-old woman disclosed in the FGD that:

"...we used to have forests in the past, but now it has changed. All of it has become plots of land for development. The weather is hot because of the reduction of trees, and we cannot sleep because of the heat. With this heat, it will be great to have air conditioners to cool ourselves; the ceiling fan also makes the room hot at certain times."

Likewise, the Eshiem Assemblyman also said:

"*The trees used to give us shade, and children played under it, but now that it has been cut down, there is an increase in temperature here. It has become hotter. The weather was pleasant when we were younger. Now that the trees are all gone, it is very hot now".*

Given respondents' perceptions about the increase in temperature, the research further sought to find out how respondents are coping. In response to the question: which of the following do you use to keep cool when the weather is hot? Respondents indicated that they used various

aids to enable them to keep cool during the hot weather. 74% indicated that they used ceiling or stand fans to keep cool, 11.5% used handheld fans, and 10.5% of the respondents either sat out in the open for fresh air to keep cool, left their windows open for air or took their bath early to cool down. 2.25% of the respondents used air conditioning to keep themselves cool.

With ceiling/standing fans being the predominant response among all six study communities, it was interesting to find out that 53% of the respondents believed that using an electronic machine to keep cool during hot weather has increased how much they pay monthly for electricity consumption. While 32.5% indicated otherwise, stating that they had additional electrical gadgets at home, it was difficult to attribute just the ceiling fan or air-condition as the main reason for their increased electricity consumption. The use of fans and air conditions directly affects the amount of energy needed to power them, thereby increasing energy consumption. This, in turn, requires an increase in electricity output, resulting in higher emissions of pollutants generated by the plant. Thus, an increase in surface temperature and humans' adaptive mechanisms further contributes to the degrading of the environment.

7.4 Other Consequences of Urban Sprawl on The Environment

7.4.1 Perspectives of Respondents on Ecological Effects of Sprawl

The study further sought to examine the ecological effects of sprawl on the community. Respondents were asked to indicate the various ecological effects of sprawl in their community. The study allowed for multiple responses from respondents, considering that there could be several ecological effects on the community. The analysis was done with sociodemographic variables such as sex, age and community or place of residence. The results are presented in Table 7.4.a, b and c.

Table 7.4a Community Perception on the Ecological Effects of Sprawl

Socio-economic classification	Community	Loss of wetlands	Loss of wildlife	Deforestation	Climate Change	N
		(N=400)	(N=400)	(N=400)	(N=400)	
Urban Middle Income	Anaji	21 (35.0%)	06 (10.0%)	29 (48.3%)	38 (63.3%)	60
	Fijai	27 (45.0%)	14 (23.3%)	37 (61.7%)	27 (45.0%)	60
Urban Low Income	Kojokrom	30 (42.9%)	14 (20.0%)	45 (64.3%)	32 (45.7%)	70
	Ntankoful	28 (40.0%)	25 (35.7%)	50 (71.4%)	36 (51.4%)	70
Peri-Urban Mixed Income	Eshiem	21 (30.0%)	07 (10.0%)	45 (64.3%)	31 (44.3%)	70
	Mampong	37 (52.9%)	23 (32.9%)	59 (84.3%)	37 (52.9%)	70
Total		**164 (41.0%)**	**89 (22.2%)**	**265 (66.2%)**	**201(50.2 %)**	**400**

Source: Field survey, 2020

Deforestation (66.2%) was reported as the major ecological effect of sprawl, followed by climate change (50.2%) and loss of wetlands (41.0%). The least ecological effect reported by the respondent was the loss of wildlife (22.2%).

Respondents from the PuMI community of Mampong perceived deforestation and the loss of wetlands as the main effect of sprawl. As a burgeoning peri-urban community, respondents are witnessing first-hand the felling of trees for construction and farming activities and the reclamation of wetlands for residential use. On the other hand, respondents from the UMI community of Anaji perceived change in the microclimate due to sprawl. This is because Anaji is highly built up, with little vegetation cover and bare lands, thus experiencing increasing surface temperature and macro climatic conditions such as changes in rainfall patterns. It is also the community with the least respondents that perceived deforestation as an effect of sprawl.

Regarding community perception of the loss of wildlife as an effect of sprawl, respondents from the ULI community of Ntankoful indicated such, although this pales in comparison with their perception of deforestation and climate change.

Table 7.4b Perception on the Ecological Effects of Sprawl by Age

Age	Loss of wetlands (N=400)	Loss of wildlife (N=400)	Deforestation (N=400)	Climate Change (N=400)	N
Less than 21 years	14 (51.9%)	09 (33.3%)	19 (70.4%)	15 (55.6%)	27
22-30 years	52 (42.3%)	25 (20.3%)	81 (65.9%)	56 (45.5%)	123
31-40 years	37 (44.0%)	20 (23.8%)	57 (67.9%)	45 (53.6%)	84
41-50 years	29 (35.4%)	19 (23.2%)	46 (56.1%)	39 (47.6%)	82
More than 50 years	32 (38.1%)	16 (19.0%)	62 (73.8%)	46 (54.8%)	84
Total	**164 (41.0%)**	**89 (22.2%)**	**265 (66.2%)**	**201 (50.2%)**	**400**

Source: Field survey, 2020

Deforestation, one of the easily identifiable evidence of forest cover loss, was stated as the major perceived ecological effect by respondents. Although there were no major variations in responses across the various age groups, there were slight differences. For example, a higher percentage of respondents who were above 50 years (73.8%) perceived deforestation as an ecological effect compared to those who were between the ages of 41-50 years (56.7%), 22-30 years and 31-40 years (67.9%). Whiles, arguably, age could be a major determinant in influencing how individuals perceive phenomena, especially when subjected to it over some time, in the context of this study, relatively, a higher percentage of respondents who were less than 21 years perceived deforestation as a major ecological effect compared to those who were within the ages of 41-50 years (56.1%). Clearly, factors such as education, literacy and access to information could explain these variations and outcomes.

Climate change activists like Greta Thunberg have also spiked interest in climate change through youth protests on climate change issues globally and creating awareness locally.

Climate change (50.2%) was also reported as a major ecological effect of sprawl. The results further show that a higher percentage of respondents who were above 50 years (54.8%) and

less than 21 years (55.6%) reported climate change as an effect of sprawl compared to those who were between the ages of 22-30 years (45.5%) and 41-50 years (47.6%).

Even though only 22 percent of respondents stated loss of wildlife as an effect of sprawl in their respective communities, it can be argued that this is expectedly a consequence of deforestation and loss of wetlands where most animal species inhabit. Through deforestation and the conversion of most wetlands for residential and industrial purposes, most wildlife loses the places they inhabit.

Table 7.4c Perception on the Ecological Effects of Sprawl by Sex

Sex	Loss of wetlands (N=400)	Loss of wildlife (N=400)	Deforestation (N=400)	Climate Change (N=400)	N
Female	90 (39.8%)	44 (19.5%)	150 (66.4%)	114 (50.4%)	226
Male	74 (42.5%)	45 (25.9%)	115 (66.1%)	87 (50.0%)	174
Total	**164 (41.0%)**	**89 (22.2%)**	**265 (66.2%)**	**201 (50.2%)**	**400**

Source: Field survey, 2020

In terms of perception by sex, there was no difference in the male and female perception of deforestation and climate change as effects of sprawl. There were 2.7% more males than females who perceived the loss of wetlands due to sprawl and 6.5% more males than females who perceived the loss of wildlife as an ecological effect of sprawl.

The next sections discuss the ecological consequences of sprawl in STMA from the respondents' perspective and secondary data sources.

7.4.2 Deforestation

Sekondi Takoradi has three main vegetation types, namely: mangrove, coastal shrub and savannah woodland. The mangrove and coastal scrub are found in the southern and middle parts, while the savannah woodland is found in the northern part (STMA, 2019). All three vegetation types are under threat as a result of urban expansion. From Table 7.4a, 66.2% indicated deforestation as the main consequence of sprawl on the environment. The community

with the highest responses to deforestation is Mampong, one of the PUMI communities with available land purchased for residential use and farming. FGD participants in UMI Anaji confirmed that vacant lands are no longer available in their community, so those looking for land to buy go to Mampong.

Additionally, farmers in Anaji, Fijai and Ntankoful travel to Mampong to farm, further attesting to the conversion of vegetative cover to farmlands. To probe further, about 85% of respondents indicated that forest areas had been cut for farming, and construction of commercial and residential properties, amongst others (see Table 7.5). This raises pertinent sustainability questions as the city continues to expand, absorbing the rural areas in its growth path, further threatening the remaining vegetative cover in the northern part of the city.

Table 7.5 Have forest areas been cut down for farming or construction of buildings

Response	Frequency	Percent
Yes	341	85.25
No	27	6.75
Don't know	32	8
Total	400	100

Source: Field survey, 2020

The survey results confirm the LULC change detection (Table 7.2), which indicated that the built-up area increased by approximately 251% and vegetation decreased by approximately 36% over the 30 years. According to the respondents, coconut trees which were predominant in their communities, have declined, and trees such as Ceiba (Onyina), Wawa, Iroko (Odum), and Sapele have been cut down for export and are no longer easily seen in the study communities. From the sustainability perspective, the study found that the respondents were more concerned about their town's commercial and residential development than taking steps to maintain their environment. The comment below from an opinion leader in Mampong supports this finding.

"....when you talk of deforestation, ideally when we cut the trees, we should plant another to replace it. However, the environment in which we find ourselves, our community cannot continue being small. It must grow; there should be an increase in the population. If we are eager that our community should grow, we must make provision for the outsiders who are coming in by selling lands to them, renting out houses/rooms to them, and the influx of foreigners are all part of the things that must take place for the town to expand".

This notion emphasised the fact that the expansion of their community took precedence over the extent of forest cover lost. The PuMI communities with land available for farming and residential purposes are the perfect communities where zoning and reforestation are undertaken to reduce the loss of vegetation cover. However, although STMA physical planning department staff have been visiting the community, no such zoning or demarcations have been made in Mampong and Eshiem, for instance. Thus, spatial expansion continues at the peril of vegetation.

7.4.3 Loss of Wetlands

Urban sprawl has resulted in the encroachment of wetlands, and most of them have lost their purposes to residential developments, as indicated by 41% of the respondents. Many places that used to be wetlands have been filled up for residential developments. As such, migratory bird paths no longer exist due to encroachment and species that are dependent on wetlands for survival are threatened. Residential buildings in such areas are also liable to flooding.

The largest wetland area in the metropolis, the Butua Lagoon, is under serious threat as the city is overwhelmed by investors looking for land to site their businesses (Peprah, 2010). The Whin river and Essei Lagoon are the other wetlands within the metropolis. Wetland reclamation for development and waste disposal has led to the loss of many lagoons and wetlands. Excessive

mangrove harvesting as fuelwood and building materials has affected the mangrove ecosystem along the Whin river estuary.

At the community level, encroachment of wetlands is also evident in the PuMI community of Mampong. During the field survey, the author identified buildings situated on wetlands that have been filled (see Figure 7.8). Occupants of the houses complained of frequent floods whenever it rained because the wetlands had been filled to construct residences. Respondents from Mampong (52.9%) indicated the loss of wetlands as the ecological effect of sprawl.

Additionally, in ULI communities such as Ntankoful, where the 'new site' is undergoing rapid construction, a 38-year-old male disclosed during the FGD that:

"…when it rains, it floods a lot here. The main road floods and something should be done about it. STMA needs to hear this, there is a wetland here, and people are filling it. When they drive by, they see it by the roadside. This is where it floods the most when it rains. It even goes into people's homes".

Figure 7.8: Houses built on filled wetlands in Mampong

Source: Author, picture taken in February, 2020

This situation was not unique to the ULI and PuMI communities but similar to UMI Anaji, where a waterway has been filled for commercial and residential use and floods whenever it rains.

With an increased demand for land and the need for affordable land comes the infilling of wetlands to meet this need. As this practice is currently ongoing in the PuMI communities, the onus is on the traditional authorities and the PPD to work together to ensure wetlands are not sold to individuals as land for residential purposes. Continuous filling of wetlands puts the ecosystem out of balance and affects the ecological sustainability of the city region.

7.4.4 Loss of Wildlife

Another ecological effect of sprawl is the loss of wildlife. Wildlife includes plants and animals in their natural habitat without disturbance, but due to the competition for space for residential developments, habitats for wildlife species have been encroached on due to deforestation and the loss of wetlands. Respondents recalled animals such as elephants, antelopes, tortoises, fruit bats, crabs, snails, and rabbits being dominant in the city but are now hardly seen or fewer in number. Respondents across all the study communities mentioned the extinction of vultures in the various FGDs. For instance, a 40-year-old female in ULI Ntankoful disclosed that:

"…We *used to have lots of vultures here. I have not seen any in a long while and would like to see one. Crows are also scarce now. In the past, there were monitor lizards here (mampam). We ate them so now they cannot be easily found".*

Another 53-year-old male in UMI Anaji stated that:

"…There *were many animals here: Antelope, grasscutters, monkeys, snakes, crabs and vultures. We had lots of vultures, but we ate them all. The vultures are used for kebabs for us to eat. Right now, if you look here, where will the vultures settle? There are no dumpsites or coconut trees for the vultures to rest on when they come here. Now we have dustbins, and the*

vultures cannot go into the dustbin to find food to eat. Also, there were Fulani herdsmen here herding cows, but as the town continued to develop, all the cattle are now grazing farther away from here".

It can be deduced from the testaments of the respondents that human consumption of animals and modification of their natural habitats to built-up areas have facilitated the loss of wildlife in STMA. As the city continues to sprawl, the animals that are currently not under threat of extinction may be on the brink, given the rapid rate at which the city is expanding.

7.4.5 Climate Change

Regarding climate change, about 50% of the household survey respondents perceive that the urban microclimate has intensified due to sprawl; with approximately 63% of these respondents residents of UMI Anaji, which is now predominantly built up and has a minimal vegetative cover.

The respondents also indicated that the increased population in the sprawling areas brought about the heat (increased temperatures as established in section 7.3), changes in rainfall patterns and intensity which increase the incidence of flooding; and traffic congestion which increases emissions of fumes from cars. Thus, as discussed in Chapter 6 (see Table 6.3 page 157), approximately 48.8% of the respondents indicated that they had suffered from respiratory disease in the last six months, 8.8% from cholera, and 1.8% of the respondents indicated they suffer from dehydration because of the heat. Respondents indicated that the physical climate change vulnerabilities they are experiencing are flooding, changes in rainfall patterns and air pollution.

Farmers expressed concern about the changes in rainfall patterns and how that affects planting seasons and yield. It was reported that rainfall has become increasingly variable, making

farming difficult. They perceived the low yield to result from erratic rainfall, largely described as a delay in the onset of rain, shorter duration and abrupt cessation of rainfall (Owusu et al., 2019). As discussed in Chapter Six, farmers' livelihoods have been impacted the most by sprawl due to the loss of farmlands and changes in the metropolis's microclimate.

The results from the study discussed above are in sync with the proposition that urban sprawl in Sekondi-Takoradi has affected the ecology of communities. The communities are experiencing increased surface temperatures due to increased built-up areas and loss of vegetation cover through deforestation. Increased surface temperatures have altered the micro-climate of the city, and this results in erratic rains and changes in rainfall patterns which affects the livelihoods of farmers who are also at risk of losing their farmlands as they are being sold for residential purposes, and has also increased the incidence of flooding due to the unplanned nature of the sprawling city. The study established that wildlife habitats have been altered or lost due to deforestation. Additionally, as the city continues to expand spatially, residents are looking for cheaper lands to buy, as such wetlands have been filled for construction purposes, thus distorting the ecosystem balance within the city region.

7.5 Institutional Responsibility

Given the above discussions on the ecological effects of sprawl, respondents were asked which institutions were responsible for addressing these issues and what measures they perceived could be implemented to reduce the ecological effects of sprawl. About 45% were of the view that the local government, i.e. Metropolitan Assembly's Physical Planning Department, to ensure that buildings have permits and layout schemes and deter people from building in ecologically sensitive zones. However, even though the existing legal framework establishes the Metropolitan and Municipal Assemblies (local governments) as the main agents of urban development in Ghana, it is saddled with diverse challenges encompassing financial, and

technical expertise, inadequate training and capacity building, limited or no coordination amongst the various institutions etc. which hinders them from efficiently discharging their duties.

Subsequently, 28% of the respondents indicated traditional leaders capable of protecting the ecology from sprawl development. This is due to the active role they play in the sale of land. Chiefs see themselves as legitimate owners of lands since they fall within their jurisdiction (Ubink and Quan, 2008). A situation that makes it very difficult for such lands to be controlled by state institutions. They lease sections of such spaces to private developers for residential or commercial uses without considering the environment. Lack of coordination between state institutions and traditional leaders underlies the irregularities and indiscriminate land sale, contributing to the haphazard and uncontrolled development occurring in STMA. This confirms the findings of Amoako and Adom-Asamoah (2017) and Abass et al. (2018) that gaps created by the conflict between state institutions and traditional authorities have laid the fertile ground for land use exploitations by unconcerned citizens, encroachers and developers. If these conditions persist, then sprawl will continue. Therefore, it is imperative that coordination between relevant government institutions and traditional authorities be facilitated to accelerate the conservation of the environment and efforts to minimize the indiscriminate sale of land and curb sprawl.

Another 8% of the respondents indicated that individuals were capable of protecting the city from sprawl. They believed that private individuals, representatives of real estate agencies, mortgage companies and other actors active in the land market should take steps to ensure they exercise environmental responsibility during land acquisition and financing. However, an individual's tendency to consciously be environmentally responsible is a personal choice. It rests on identifying moral obligation or blame in decision-making at individual levels and structural levels. Proper zoning of land and its enforcement would serve as the springboard for

such decisions and choices. Therefore, all actors and institutions indicated by respondents to have a role and responsibility to preserve the ecology of STMA cannot function in a vacuum. There is a need for improved coordination amongst the key stakeholders, awareness creation about the impact of urban development on the ecology etc.

Probing further to obtain perspectives of respondents on ways through which sprawl could be curbed to conserve the environment, 38% indicated that the sale of forest lands should be restricted; 28% indicated the enforcement of residential zoning, especially in newly developing areas in the peri-urban zone, popularly referred to as "new site" in each of the study communities. Implementing residential zoning on new land buildings will be easier than demolishing, and zoning already developed communities.

Additionally, 13% believed that encroachers should be fined for constructing commercial or residential properties in wetlands or waterways. Others, comprising (4%) of the respondents, were of the view that nothing can be done to preserve the ecology. It has already been destroyed because of sprawl. Therefore, to prevent further destruction, institutions such as STMA, traditional authorities, Environmental Protection Agency, Non-Governmental Agencies etc. should embark on awareness creation by educating the public on the importance of conserving the environment, providing education on the need to protect plants and animals in their natural habitat without disturbance.

Findings from the survey confirmed what Doan and Oduro (2011) argued that lack of education and coordination and enforcement of regulations had facilitated the haphazard and uncontrolled development of STMA. Strengthening governance and improving institutional coordination to spatially plan and enforce implementation/adherence to the plans are pertinent. Addressing urban sprawl requires concerted efforts from all key stakeholders and can be achieved if executed collaboratively with the overarching goal of improving the sustainability of our cities.

7.6 Chapter Summary

Environmental sustainability is essential to the growth and development of any country. The vegetation cover of Sekondi Takoradi is declining rapidly as there is increased demand for housing due to increased population and human activities. Over the 30-year period under study, there was a tremendous increase in the urban land area while the non-urban land area declined. The consumption patterns within the city threaten its sustainability. As vegetation and wetlands continue to decline, it has an adverse effect on the microclimate and wildlife, which in the long run affects the livelihoods and well-being of residents. Therefore, it is important to minimize the rate of deforestation, control the spatial extent of the built-up area, and promote efficient resource use as measures towards environmental sustainability. Therefore the results from the study are in sync with the research proposition that urban sprawl in Sekondi-Takoradi has affected the ecology of communities.

Also, from the respondents' perspective, the STMA Physical Planning Department, traditional authorities, and individuals are well-positioned to tackle sprawl in the metropolis. Careful coordination amongst these stakeholders, especially between traditional authorities and local government, is required for issues about the sale of land, zoning and enforcement of regulation to be effectively managed. It is only when their efforts are aligned and coordinated that the rapid horizontal expansion of the city can be managed. Additionally, the Metropolitan Assembly must be financially empowered and autonomous to execute its mandate without interference from central government institutions. Respondents were of the view that payment of encroachment fines, restricting the sale of land in forest areas for agricultural, commercial and residential purposes, and enforcement of residential zone, especially in “new sites”, would help curb sprawl and the haphazard nature of which the city is expanding if such measures are properly enforced, as they would serve as steps ensuring towards sustainability of the city.

CHAPTER EIGHT

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

8.1 Introduction

This final chapter of the thesis presents a summary of the main findings of the study; the conclusions arrived at based on the findings of the study objectives, the policy recommendations proposed by the study, the contribution of the study to knowledge, and the areas that can be taken up in future studies on urban sprawl and sustainability. Contributions made by the study seek to strengthen existing knowledge of the literature by bringing to the fore the perspective of a developing country context and by providing another dimension to the problem of urban sprawl in a fast-expanding oil hub.

8.2 Summary of Key Findings

8.2.1 Overview of Methodology

This research aimed at examining the effects of urban sprawl on the social and environmental sustainability of Sekondi- Takoradi. This study is necessary because previous studies that had examined urban sprawl focused solely on either the environmental impact of sprawl or the impact of sprawl on livelihoods, housing and transportation. Therefore, it was deemed important to undertake a study that will look at the environmental and social effects of sprawl to obtain a holistic perspective of the dynamics of urban sprawl within the study communities.

The specific objectives of the study included (i) to provide a historical background of the successive phases of urban development from the colonial period to the present, (ii) to examine the current drivers of sprawl, (iii) to examine spatio-temporal patterns of land use and land cover changes that have occurred from 1988 to 2018, (iv) to examine the vulnerabilities of sprawl on the human population, and (v) Examine the implications of sprawl on ecosystem change. The methodological orientation of the study took into account past and recent

methodological paradigms within research on urban sprawl. Specifically, the study adopted a mixed-method approach that combines quantitative and qualitative methodologies. The quantitative approach is the traditional research approach used in this field of research, and in this case, researchers sought to investigate the effects of sprawl on the environment (see Clifton et al., 2008; Fertner, 2016; Katsoulakos et al., 2016). Qualitative research on urban sprawl is traced from the works of Yar (2017) and Fertner (2016). Based on these perspectives, a combination of surveys, focus group discussions, and key informant interviews were used as the main investigative tools to provide an in-depth understanding of the research problem.

The study was relevant in many respects. First, it sought to provide insight into how the various phases of urban development have contributed to the current spatial expansion and organisation occurring in the metropolis. Gaining an understanding of the spatial developments over time served as a springboard to understanding the current drivers of sprawl within the metropolis.

Secondly, it aimed at contributing to the body of knowledge on the social vulnerabilities facing the residents within the metropolis. By looking at the effects of sprawl on health, crime and security and social cohesion, the study gained insight into the differential impact on three studied socio-economic classes. It also highlighted the perceived and experienced discrimination faced by migrants in the peri-urban communities. The study also determined new employment opportunities available to residents in the face of changes in livelihood occurring due to sprawl.

Thirdly, it sought to determine the effect of sprawl on the environment as the city was rapidly urbanising and determined that it has led to a loss of vegetative cover, an increase in surface temperature, which has implications for the microclimate of the metropolis; loss of wetlands and wildlife all of which affect the ecology of the region at large.

8.2.2 Successive Phases of Urban Development

The study's first objective was to examine the phases of urban development from the colonial era to the present. It ascertained that the main economic booster of the city, which attracted migrants in search of economic opportunities, is the deep-sea harbour which has been the backbone of the city. The construction of the port and railways ushered in rapid urban change as the city began to expand to accommodate the increasing population. Spatial segregation that occurred during the colonial era in implementing development plans continues to separate the first-class residential communities where the British resided from the other towns. This has continued to shape the city's spatial development, with some core communities being more well-planned and developed than others.

A housing deficit has remained a challenge for successive governments post-independence to solve, with the state being the prime developer, then shifting to involve the private sector in housing development. This has been unsuccessful in addressing the housing deficit of the poor in the metropolis and has rather resulted in the creation of slums within core communities and unplanned residential developments in peri-urban areas to accommodate the increasing housing demand from population increase. The dispersed nature of housing development from the colonial era through post-independence highlights how fragmentation is inherent in Sekondi-Takoradi. The physical landscape is therefore dispersed with several pieces of built-up areas that are not entirely connected.

Oil discovery and exploitation breathed a new life into the economic activities ongoing in the city, and this resulted in speculation for land and increased rent accompanying the influx of migrants seeking greener pastures. The anticipated boom in economic activities further exacerbated the spatial dispersion of built-up areas as middle- and low-income earners are (re)locating to the city's periphery where land and accommodation are perceived to be available and affordable. Coupled with challenges faced in planning by the metropolitan authority,

development has outpaced planning and given rise to communities that are built in a haphazard and disorganised manner, underserved with basic social amenities and infrastructure.

8.2.3 Drivers of Urban Sprawl

The second objective aimed at finding the underlying drivers of sprawl within STMA. Using a model, the study found that economic stimulus and demographic expansion increased the demand for space. The city's main driver of urban growth has been its economic base from the construction of ports, and railways through oil exploitation, which brought about an increase in population. The state created the enabling environment for private sector engagement in commercial activities and residential development. It also provided infrastructure such as roads which has improved accessibility within the city. This influenced the decision of 84.4% of the respondents to relocate to the periphery as the availability of transport infrastructure has facilitated ease of movement and individual preferences based on what they can afford, their values, and their priorities. Additionally, the increased demand for residential space was met through direct state and private sector interventions.

The study found out that most of the new homes are privately owned and financed with individuals building at their own pace and sometimes in unapproved locations since lands are cheaper, leading to scattered and unplanned settlements and urban sprawl. This is further enhanced by weak regulatory enforcement by the metropolitan Physical Planning Department. The field survey indicated that approximately 62% of the respondents relocated because of housing affordability, 46.3% relocated because of land affordability, 40.8% preferred a serene environment, and 38.1% migrated for family reasons. These proximate drivers of sprawl have in recent times been worsened by land speculation and increased rent upon the discovery of oil in the Western Region. This has facilitated sprawl as people are forced to seek cheaper options on the outskirts of the city.

8.2.4 Spatio-Temporal Patterns of Land Use and Landcover Change and Ecological Effects of Sprawl

The findings in this section encompass objectives three and five, which sought to analyse changes in land use and land cover and surface temperature within STMA over 30 years (1988 – 2018) and further examined respondents' views on the consequences of urban sprawl on the environment. The study area analysis revealed an increase in urban land and a decrease in non-urban land over a 30-year period. Consequently, the metropolis has experienced an increase in surface temperature due to the increase in urban areas.

In terms of the effect of sprawl on the environment, the study found that deforestation was reported as the major ecological effect of sprawl, followed by climate change and the loss of wetlands. The least ecological effect reported by respondents was the loss of wildlife. However, there are variations in how respondents across the three socio-economic classes perceived these environmental effects, which were influenced by their lived experiences. For instance, respondents from PuMI communities that are currently experiencing loss of vegetative cover indicated deforestation as the major impact of sprawl on the environment, while those from UMI communities viewed climate change as the consequence of sprawl on the environment since the community is developed and has already lost vegetation cover.

Lastly, the study also determined from the perspective of the respondents that the STMA Physical Planning Department, Traditional Authorities, individuals and other relevant stakeholders such as NGOs are well positioned to tackle sprawl in the metropolis once they are equipped with the relevant knowledge and coordination of enforcement amongst especially traditional authorities and the PPD.

8.2.5 Vulnerabilities of Sprawl on Human Population

The final objective of the study sought to examine how sprawl affects the livelihood and social wellbeing of the respondents. Findings from the study established a relationship between age, gender, and occupation on their livelihood due to sprawl, thus rejecting the null hypotheses. In addition to this, the study ascertained that urban sprawl within the metropolis affects the social wellbeing of the inhabitants as there is inadequate access to social amenities such as electricity, waste disposal, sanitary facilities, and burgeoning peri-urban mixed-income communities like Mampong do not have access to potable water from GWCL. In terms of health, the study confirmed the new emerging trend in STMA of an increase in respiratory diseases, which respondents attributed to the high incidence of dust in the air in the ULI and PuMI communities.

With majority of the respondents living in compound housing, a strong sense of community and belonging exist although conflicts between households in the compound house are inevitable, as such social cohesion at the family level was not affected because of urban sprawl as they resorted to communicating with family members who have relocated. At the community level, indigenes in the PuMI community of Eshiem viewed migrants from other regions within Ghana and Cote d'Ivoire as easy to live with while indicating that the Nigerians were more difficult to live with as they were confrontational. Further probing of this assertion led to the unravelling of tension between the male Nigerians and the male youth in Eshiem as the local males are losing their female counterparts to the male Nigerians. Also, although indigenes perceived Ghanaians from other regions as easy to live with, the migrant Ghanaians also felt discriminated against by the indigenes. Thus, at the community level, the sense of belonging was not felt by migrants because of their lived experiences within the community. The prevalence of crime across all socio-economic classes and the assertion that 'foreigners'/migrants are the perpetrators of such vices shows that social cohesion at the community level is not strong.

8.3 Conclusion

The following conclusions are arrived at based on the discussions from the findings. Regarding the first objective, spatial development from the colonial era developed around economic hubs, i.e. port in Sekondi and in Takoradi. The construction of the railways also influenced spatial development along the transport axes. This shows that the development of the city followed aspects of the classical spatial theories. In that development along transport axes are in line with the sector model, the merging of Sekondi and Takoradi, aspects of the multiple–nuclei model and development around economic hubs, aspects of the concentric zone and multiple nuclei models. Additionally, the values of individuals also contributed to the cities' ongoing spatial development. In the era of the oil boom, people relocated to the outskirts based on their preference for a serene environment, family reasons, and affordable land and housing.

For the second objective, the study concludes that the state, private sector and civil society have all contributed to the city's sprawling. The state provides the enabling environment for economic activities and private sector engagement in the city's economic growth. The expansion of the city's economic base thrives amidst increasing population, and increasing demand for space for commercial and residential use. The limitations of the state institution (PPD) to implement and execute plans, policies and regulations, and their limited legal authorities to take action have hindered their efforts to manage spatial development in the city efficiently which has enabled the private sector and civil society to speculate on land, build in unauthorised locations and in the peripheries where land is relatively cheaper. As such, development in the city is occurring in an unplanned, uncoordinated and haphazard manner.

In terms of meeting human needs, the study concludes that urban sprawl affects the livelihood and social wellbeing of the inhabitants. It established a significant relationship between age, sex and occupation and the effect of sprawl on their livelihood. With farmers mostly affected by sprawl, their livelihoods become inadequate and are forced to seek alternative livelihoods,

while those engaged in trading, artisanry and transport-related services are taking advantage of the emerging employment opportunities. The study also established uneven access to basic services and an unhealthy environment as access to adequate sanitary facilities and liquid and solid waste disposal was a persistent challenge that posed a health risk. In a nutshell, urban sprawl affects the livelihood and well-being of the inhabitants, which threatens social sustainability within the city.

Finally, in terms of the outcome of urban sprawl on the environment, the study concludes that the consumption pattern within the city threatens its sustainability. The decline in vegetation and wetlands adversely affects wildlife and the city's microclimate, which has broader implications for the region and the country. These are indicators that there is a threat to the sustainability of the city. The anarchy in the development of STMA will, in the long run, affect the natural resources within the boundaries of the city but would shift the burden into other regions, further threatening their sustainability. Since "no city can sustain itself by drawing only on the resources within its boundaries" (Satterthwaite et al., 1992), without effectively managing the city's natural resources in relation to spatial development, the sustainability of the city-region remains under threat.

8.4 Policy Recommendations

Based on the findings, the following recommendations are highlighted for policy consideration.

The study has demonstrated that the rapid rate at which the city is spatially expanding and its ensuing land transformation calls for the need for institutions involved in land management in the city to control and monitor the spatial trends properly and to devise comprehensive planning strategies to control the haphazard, uncontrolled, unplanned and uncoordinated urban expansion into the peri-urban area. To achieve this, city planners and local government authorities such as the Physical Planning Department (PPD) of the Sekondi Takoradi

Metropolitan Assembly should be adequately staffed to implement the local plans for the metropolis and at the sub-metro level, the implementation of the sub-metro plans to support the agenda of the spatial development framework of the city. The decentralised approach of implementing spatial plans at the sub-metro levels will improve oversight and ensure proper urban planning, and by this, an orderly pattern of development can be achieved. The PPD is saddled with numerous challenges, from funding deficit to understaffing and limited legal authority vested in them to take action against violators. Therefore, the metropolitan assembly must be financially empowered and autonomous to enable it to execute its mandate without interference from central government institutions. These challenges need to be critically looked at and addressed to enable the PPD to discharge its duties effectively.

Legal pluralism dominates land ownership and management in Ghana. The co-existence of the traditional and statutory systems often results in overlapping rights, contradictory roles and competing authorities. Lack of coordination between the traditional authorities and the metropolitan assembly in the sale and use of lands within their purview has encouraged spatial development outside the city's spatial plans. There needs to be a closer working relationship between traditional leaders and the respective sub-metro local government staff to verify and advise the traditional leaders or family heads whether the land being sold is within the approved residential zone within the sub-metro's plan. Ensuring close coordination between the PPD at the sub-metro level and traditional authorities and family heads would facilitate faster contact with the respective staff than going all the way to Metropolitan Assembly's office for verification. Enforcing such a decentralised measure must also be accompanied by parameters such as periodic staff rotation to avoid familiarity, bribery and corruption to overlook and approve the sale of lands in unapproved areas.

The sale of land, zoning and enforcement of regulations require careful coordination amongst stakeholders, especially between traditional authorities and the local government. It is only

when their efforts are aligned and coordinated that the rapid horizontal expansion of the city can be managed. Holding periodic workshops or community events by the Metropolitan Assembly where discussions about spatial planning are taken up, ideas are shared, and the local spatial plan of the metropolis (or sub-metro) is displayed for stakeholders' participation could be perceived as a joint effort which would get the buy-in of all stakeholders in their effort to adhere to it. For instance, views shared during the study indicated that payment of encroachment fines, restricting the sale of land in forest areas for agricultural, commercial and residential purposes, and enforcement of residential zone, especially in "new sites", would help curb sprawl and the haphazard nature at which the city is expanding. When the 'voices' of non-state actors are heard and included in the decision-making process, it goes a long way to bring ownership and accountability towards the success of the measures put in place.

Issuing interim building permit receipts or tickets by the Physical Planning Department will enable people to commence construction while processing their building permits. This could be done in the third month as, legally, landowners have the right to commence building within three months of applying for the building permit (LI1630 National Building Regulations). Since the procedure is laborious and expensive, the provision of interim approvals to enable a land owner to build in approved areas under the oversight of the PPD far outweighs the impact of haphazard buildings occurring in both approved, and unapproved locations because of delayed building permits.

To address the threats to the city's environmental sustainability, it is recommended the Physical Planning Department of the Metropolitan Assembly demarcate buffer zones to be implemented within the city beyond which spatial expansion is not permitted. As this is a long-term strategy to implement, the PPD can begin with the enforcement of land-use zoning laws, beginning with peri-urban communities where new developments are commencing, and gradually extend it to rural areas and as feasible to the metropolitan area, create a buffer beyond which future

developments cannot occur. This would encourage infilling of the urban and peri-urban areas instead of further horizontal expansion. By enforcing a buffer boundary for the metropolis, the assembly would also be empowered to enforce its vertical housing development mandate within the metropolis, which is currently struggling to fulfil. Therefore, it is recommended that high-rise buildings in vertical forms be built by private institutions and individuals to provide the needed residential and commercial use to accommodate the increasing urban population and reduce the number of people moving to the peri-urban areas to promote sprawl.

It is also recommended that Real Estate Companies explore means such as pay-to-build, where the potential homeowner contributes at determined intervals for construction to occur at a suitable pace for both parties. Since successive governments have failed in the attempts to provide affordable housing for middle and low-income earners, it is important to find alternative means to the standard practice of down payment and upfront payments for estate houses in gated communities that are affordable to high-income earners and middle-income earners who have access to credit facilities. The provision of affordable and flexible means to own a home would address the need to relocate to the peri-urban areas in search of cheaper lands to build on or cheaper rents. With vacant lands still available within the urban core, the private sector can explore win-win models which will enable them to bridge the housing gap within the metropolis and the nation at large.

8.5 Contribution to Knowledge

The study has shown the dynamics of sprawl in an emerging oil hub in a developing country. It affirms vegetation loss, loss of wildlife and wetlands, and displacement of agricultural producers and validates the urban heat island effect and changes in the city's microclimate as other studies have indicated.

In addition to the above, there are also winners in terms effects of sprawl on livelihood. Real estate developers, construction industry workers, traders, artisans, and food vendors benefit from the sprawling city, even though losers are in the majority. The study, therefore, confirms there are positive economic impacts of sprawl in the city, even though losers are in the majority.

The study has contributed to the body of knowledge by using GIS and Remote Sensing techniques to map the extent of sprawl and changes in temperature over a 30-year period which makes up the economic boom and bust years the city has gone through. Thus, showing that the city's economic base strongly influences demographic increase and demand for space.

Lastly, the lack of synergy between state and non-state actors in urban planning and control hinders planning efforts in the city, which goes a long way to affecting social and environmental sustainability.

8.6 Further Research

The study has unearthed some issues to be explored further in subsequent studies, particularly in Ghana and other developing countries. One of such is a study on social cohesion in peri-urban communities from the perspectives of the indigenes and the migrants who have relocated there. A comparative analysis of multiple peri-urban communities within a country or across countries would bring to the fore diverse social issues that a researcher cannot obtain from only observing the interactions among study respondents. Such a qualitative study will bring out the lived experiences of the respondents to better understand their worldview.

The author also suggests a study on the effects of economic opportunities available in peri-urban communities in Ghana and other African countries to ascertain whether the economic benefits associated with sprawl within STMA are experienced in other peri-urban areas. Indeed, this study will be relevant as very few researches focus on the positive outcomes of sprawl.

Lastly, further studies on the development of green compact cities in developing countries should be explored to ascertain feasible measures that can be adapted to suit developing countries' contexts. This is important because green compact cities can lead to sustainable development, which most developing countries need to take steps towards.

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APPENDICES

APPENDIX 1

GUIDE FOR FOCUS GROUP DISCUSSIONS

1. Which of the challenges facing your community should be the priority focus of leaders?
2. What has happened in the community since the oil discovery?
3. What are the challenges you are facing since the city is developing?
4. What are the benefits you are enjoying from the growth and expansion of the city?
5. Please share your perception about how the growth and expansion of your community have affected sources of livelihood.
6. Why are people buying land in this community?
7. Roughly how much is the rent for a chamber and hall or two-bedroom house in your community?
8. Tell me about access to water supply services in your community. How do you get water? How much do you pay for it? Are you able to afford it? What is the alternate source of water?
9. Tell me about access to toilet facilities in your community.
10. How do you dispose of solid waste in your community?
11. What are some of the sicknesses people are suffering from now? Did they suffer similar illnesses in the past? What do you think is bringing about these sicknesses/diseases? Do you have a hospital in your community? Do you use NHIS?
12. How are livelihood activities changing because of the growth and expansion of the city?
13. Would you please give an example of a land conflict you have witnessed? How was the issue resolved? Are there land guards in your community?
14. Has your community flooded before? Which part of the community and why, in your opinion, is it prone to flooding?
15. What are some of the animals you used to see when you were younger? Do you still see them around? Has something changed? What has changed?
16. Has the forest cover changed over the past ten years? In which way? What do you think has contributed to this change?
17. How about the temperature? What have you noticed over the years?

18. What other changes have occurred in your environment? What are the crime and safety issues that are encountered in this community?
19. Are people forced to leave their families behind to look for other jobs to care for their families because the city is developing?
20. What are your perceptions about the migrants who now live in your community?

APPENDIX 2

INTERVIEW GUIDE FOR KEY INFORMANT INTERVIEWS

Ghana Water Company Limited

Please indicate your name, company name and position _____

1. Is potable water available in Anaji, Fijai, Kojokrom, Ntankorful, Eshiem, and Mampong?
2. Are people moving into these communities because of access to potable water?
3. In your opinion, how has the production of oil in the region affected water services delivery?
4. What measures has GWCL/CWSA put in place for water services delivery to newly developed areas as the city expands?
5. How is the growth of the city impacting services provision?
6. What is your opinion about the growth and expansion of the city in terms of water services delivery?
7. What do you think should be done to improve water service delivery given the city's rapid expansion?
8. What are the challenges encountered in providing access to potable water to sprawling areas?

Real Estate Developers

Please indicate your name, company name and position _____

1. How many acres of land have you acquired for this estate?
2. What are the key factors that influence your decision in acquiring land for development?
3. Did oil production in the region play a role in your decision in selecting land in STMA for development?
4. Who are the target buyers of the land and houses?
5. Where are the areas within STMA you have constructed houses or bought land?
6. Why did you choose this/these locations?
7. Can you elaborate on the development process, from searching for land to selling houses?
8. To what extent did the local government influence the decision to acquire land?
9. From whom did you purchase the land?
10. To what extent did competitors (other real estate developers) influence your decision in land acquisition?
11. What are the factors that influence your decision to develop the land or otherwise keep it undeveloped?
12. Was there a farm on the land?
13. What happened to the farmers? Were they compensated? In which way? Did you follow up to see how they are faring?

14. In which ways has housing development affected the natural environment of the city?
15. What measures have you undertaken to compensate for the environmental degradation and loss of habitat?

Oil Companies

Please indicate your name, company name and position _____

1. In your opinion, what role has oil production played in the urban expansion of Sekondi Takoradi?
2. What, in your opinion, is the driving force accelerating the growth and development of the metropolis?
3. In which communities of STMA do your staff reside?
4. What is the underlying reason for choosing these communities?
5. Is the building company-owned or rented?
6. Have you bought land to build company properties?
7. Have you bought plots of land that were being used for farming?
8. How have you in the past compensated farmers for their lands purchased?
9. Do you have any alternative livelihood arrangement options for farmers?
10. Please share with me some of the corporate social responsibilities you have implemented in communities within STMA.
11. What is your perception about how residents anticipated employment opportunities in the oil and its service-related industries and their hopes were dashed?
12. Has your company rented or purchased houses for their staff?
13. Where do the staff on the rig reside when they are off the rig?
14. In your opinion, what can be done in the city to make it sustainable as it continues to sprawl?

Physical Planning Department

Please indicate your name, company name and position _____

1. What is your institution's approach to controlling development in STMA?
2. What do you do about areas that should not be built up but have buildings on them?
3. Do you have meetings with traditional authorities about the sale of land?
4. Do the traditional authorities have a copy of the city plan? Do they adhere to the city plan? What happens when they do not?
5. How do you ensure that the city plan is adhered to?
6. Would you please explain the responsibility of PPD in managing the spatial development of STMA?

7. What are the challenges faced in carrying out your responsibilities?
8. Could you suggest possible coordination or engagement with other key players to improve governments' capacity to manage urban development in STMA?
9. What role do you think oil production has played in the growth of the city?
10. What do you perceive to be interventions that can be implemented to manage the spatial development of STMA effectively?
11. How do you think development is affecting the lives of people?
12. What is your perspective as a planner on access to basic services and the sprawling of the city?
13. How is urban development affecting the environment?

Traditional Leaders

1. What are some of the challenges your community is facing as spatial development is occurring?
2. Please tell me about the sale of land in your community and how issues regarding multiple sales are handled.
3. How has your community or its residents benefited from the oil discovery and exploitation?
4. Please tell me about the crime and insecurity concerns that are ongoing in the community.
5. What do you think can be done to solve the issue?
6. What is your opinion about how your community is developing, from a planning perspective?
7. Can you suggest ways this can be improved?
8. What is your opinion about a collaboration between the metropolitan assembly and traditional authorities to address your community's ongoing and future spatial development issues?
9. What is your perspective on changes in the livelihoods of the residents as a result of sprawl?
10. What can be done to improve the livelihoods of those affected?
11. In your opinion, what should be done to limit the rapid sprawling of the city?
12. How do you think the city can become sustainable environmentally?

Opinion Leaders / Assemblymen

1. How long have you lived in this metropolis?
2. Are the people living in your community natives? Where are some of the migrants coming from?
3. From the time oil was discovered, how has your community changed?
4. What is your opinion about how the PPD is managing the haphazard development of the city?
5. Are traditional authorities responsible for the ongoing haphazard development? Why do you say so?
6. Have oil companies contributed to the haphazard development and expansion of the city?

7. How about real estate companies? Would you say they have contributed to the spatial development of your community?
8. Are water and electricity available to every household in the community?
9. How is solid waste collected in the metropolis? How do people dispose of waste in the community?
10. When was flooding experienced in the area? Which parts of the community flood and why?
11. How has the development of the city affected livelihoods?
12. What are the types of employment people are engaging in now?
13. What is happening to the farmlands in the area?
14. What happens to the farmers and their families when their land is sold?
15. Are you aware of any new sicknesses that people are suffering from now that they didn't suffer in the past?
16. What are some of the major land cover changes you have observed?
17. What is causing this change?
18. What is your opinion about the temperature experienced in the city now?
19. How was the temperature five years ago compared to now?
20. What are some of the wildlife animals you no longer see in your community? What do you think happened to them?
21. Can you suggest a few interventions which would improve lives when implemented?

22. How do you see a future where there is a collaboration between the traditional authority, Assembly and TCP?
23. Is there any other perspective on the sprawling of your town that you would like to share with me?

APPENDIX 3

IN-DEPTH INTERVIEW GUIDE

Farmers

Please indicate your name and your community name: _____

1. How many years have you lived in Mampong / Eshiem?
2. What is the main source of your livelihood?
3. What else do you do apart from farming to make money?
4. Tell me about how farming has changed for you since your community began to expand.
5. Have you experienced a situation where your land was taken from you and sold as a plot for residential construction?
    - Tell me how that made you feel.
    - Were you compensated?
    - How did your family manage?
    - How were you able to obtain another land for farming?
6. Can you share stories about the experiences other farmers you know have had because of the expansion of your community?
7. Tell me more about your own personal stories, and the benefits you have obtained from the growth of your community.

Food Vendor, Trader, Artisan, Driver

Please tell me your name:……Age……. Phone number……

1. What is your occupation?
2. How long have you been engaged in this occupation?
3. What was your previous occupation?
4. What has happened in the community since the oil discovery?
5. What are the challenges you are facing since the city is developing?
6. What are the benefits you are enjoying from the growth and expansion of the city?
7. Please share your perception about how the growth and expansion of your community have affected sources of livelihood.
8. What employment opportunities have become available because the town is expanding?
9. Are there people benefiting from the expansion that is occurring? In which way?
10. How about you, how has the change affected you?

11. What is your perception about the sale of farmlands as the town develops? How is it affecting farmers? Can you share a situation you know about in terms of farmers' livelihoods and the sale of land?
12. What are some of the environmental changes you have observed in your community as your town and STMA, in general, is expanding?
13. Tell me about crime and insecurity in your community.
14. As your community is expanding, can you share your perception about how the migrants and indigenes relate and live with each other?
15. Please share with me some of the ongoing issues in your community that you wish could be addressed to improve your community.

Migrants

Please tell me your name:……Age…… Phone number……

1. Where were you living before moving to this community?
2. How long have you lived here?
3. What is the reason why you moved to this community?
4. How do you perceive the indigenes in the community?
5. What is your perception of the migrants in this community?
6. What is the relationship between the indigenes and migrants like?
7. Have you ever felt discriminated against because you are not an indigene?
8. In which ways should the relationship between the community members (both migrants and indigenes) be improved?

APPENDIX 4

HOUSEHOLD SURVEY QUESTIONNAIRE

DEPARTMENT OF GEOGRAPHY AND RESOURCE DEVELOPMENT

UNIVERSITY OF GHANA

Research Title: Urban sprawl and its consequences on sustainability in Sekondi-Takoradi Metropolitan Area

The data being collected is for a PhD research for academic use. The information shared is confidential and the participant's identity will not be disclosed and their privacy will be respected.

(Obtain participant consent after reading the above before commencing the survey)

Please select the applicable answers.

Community…… Number……

Verbal consent is given Yes [ ] No [ ]

SECTION A: BACKGROUND INFORMATION OF RESPONDENT

A1. Sex: 1. Male [ ] 2. Female [ ]

A2. Age ……

A3. Educational level:

1. No formal education [ ]	2. Primary [ ]
3. Secondary [ ]	4. Vocational/Technical [ ]
5. Tertiary [ ]	6. Other, please specify……

A4. Occupation

1. Farmer	2. Trader
3. Food vendor	4. Corporate/Office worker
5. Unemployed	6. Other ……..

A5. Do you have another job apart from this?

1. Yes [ ] 2. No [ ].

If yes, please specify the type of job …….

A6. Type of housing in which you live:

1.	Detached housing [ ]	2.	Semi-detached housing [ ]
3.	Flat/Apartment [ ]	4.	Uncompleted building [ ]
5.	Room in a compound house [ ]	6.	Kiosk/ Container [ ]
7.	Other ……..		

A7. Do other households share this dwelling with you?

1. Yes [ ] 2. No [ ]

A8. What is your present occupancy status?

1.	Owner-occupier [ ]	2.	Renting [ ]
3.	Perching [ ]	4.	Rent-free [ ]
5.	Other:		

SECTION B: DRIVERS OF URBAN SPRAWL

B1. Were you born in this community?

1. Yes [ ] 2. No [ ]

B2. Have you always lived in this community?

1. Yes (*skip to question B4)* [ ] 2. No [ ]

B3. If No, where were you living before moving here?

1. Community within STMA [ ] 2. Community within Western Region [ ]

3. Another Region within Ghana [ ] 4. Foreign Country [ ]

B4. How long have you been living in this community?

1. …….. Days 2. ……... Weeks

3. ……Months 4. ……Years

B5. List in ranking order three reasons why you moved to this community.

On a scale of 1 – 3, with 1 being the highest and 3 the lowest.

	Reason	Rank
1	Accessibility	
2	Housing affordability	
3	Preference for serene environment	
4	Land affordability	
5	Family movement/relocation	

B6. What is the reason why other people are moving into this community?

On a scale of 1 – 3, with 1 being the highest and 3 the lowest.

	Reason	Rank
1	Accessibility	
2	Housing affordability	
3	Preference for serene environment	
4	Land affordability	
5	Family movement/relocation	

B7. Have you ever rented a room or house?

1. Yes [ ]
2. No [ ] *(skip to B12)*

B8. Could you afford to pay your rent?

1. Yes [ ] 3. Sometimes [ ]
2. No [ ] 4. Other ……

B9. Have you ever been ejected from where you were living?

1. Yes [ ] 2. No [ ] *(skip to B12)*

B10. Why were you ejected?

1. Increased rent [ ] 2. Oil workers/companies wanted to rent it [ ]

3. Converted the house into a business [ ] 4. Other …….

B11. How did being ejected make you feel?

……

……

B12. How did you feel when oil was discovered?

1. Happy because of economic opportunities [ ]
2. Sceptical about its benefit to the community [ ]
3. Indifference [ ]
4. Other ……
……..

B13. Has your community changed since oil was discovered?

1. Yes [ ] 2. No [ ]

3. Not sure [ ] 4. Other ……

B14. How has your community changed? *Tick all that apply.*

1	Foreigners moving into the community	
2	Farmlands have been converted into houses	
3	Farming is taking place in the forest	
4	Forest is being cut down for housing construction	
5	More cars	
6	Traffic congestion	
7	Wealthy people are moving here	
8	People are migrating out of the community	

B15. What is the average cost of a plot of land in your community?

……Ghana cedis ……U.S. dollars

B16. Are there land guards in your community?

1. Yes [ ]
2. No [ ]
3. Sometimes [ ]
4. Don't know/ not sure [ ]

B17. Is there conflict over land in your community?

1. Yes [ ]
2. No [ ]
3. Sometimes [ ]
4. Don't know [ ]

B18. How are land disputes settled?

1. Court [ ]
2. Traditional authority/chief [ ]
3. Conflict still ongoing [ ]
4. Don't know [ ]
5. Other……

B19. Which group of people usually win the land dispute?

1. Real estate companies [ ]
2. Oil companies [ ]
3. Middle - High-income earners [ ]
4. Other ……

B20. Rank the group of people that are buying land in your community. *On a scale of 1 – 5, with 1 being the highest.*

	Group	Rank
1	Individuals	
2	Real estate developers	
3	Financial institutions	
4	Traditional leaders	
5	Oil Companies	
6	Non-Governmental Organizations	

B21. Has the sale and purchase of land changed the way land is used in the community?

1. Yes [ ]
2. No [ ]
3. Don't know/ Not sure [ ]
4. Other ……

B22. How has it changed?

1. Undeveloped land in the midst of residential houses [ ]
2. Increase in the number of estate buildings [ ]
3. Water and electricity access to the community [ ]
4. Farmers lose their land [ ]
5. Other ……

SECTION C: VULNERABILITIES OF SPRAWL ON HUMANS

C1. What was the general source of livelihood in this community?

1. Farming [ ]
2. Petty trading [ ]
3. Public Service [ ]
4. Quarrying/Sand winning [ ]
5. Fishing [ ]
6. Other …….

C2. What is the source of livelihood in the community now?

1. Petty trading [ ]
2. Farming [ ]
3. Carpentry [ ]
4. Transport services (taxi, trotro) [ ]
5. Quarrying/Sand winning [ ]
6. Other……..

C3. List and rank 3 factors that are causing livelihood change in this community. *On a scale of 1 – 3 with 1 being the highest.*

Factors	Rank

C4. What happens to the farmers and their families when their land is sold?

1. Compensated/given another land to farm [ ]
2. Left alone after payment of land is made [ ]
3. Other

……

C5. What are the effects of sprawl in your community? *Tick all that apply.*

Traffic congestion	
Land dispute	
Unequal access to social amenities	
Loss of farmlands	
Low enrollment in schools	
Flooding	
Sickness	
Other *(specify)*	

C6. Have your family members moved further away from your community because of the spatial development in your community?

1. Yes [ ] 2. No [ ]

C7. Has that affected your relationship with them?

1. Yes [ ] 2. No [ ]

C8. In which way?

……

C9. How has the discovery and exploration of oil affected your life? *Tick all that apply.*

1. Employment opportunities	
2. Improved access to social amenities (water, hospital, school, road)	
3. Higher food prices	
4. Insecurity (Armed robbery and kidnapping)	

5. Cannot afford to buy land due to high prices	
6. Educational institutions have become expensive	
7. Improved standard of living	
8. Other ……	

C10. Who are those most impacted by sprawl in this community?

……..

C11. How do you plan for your livelihood in the next ten years? (Coping strategies)

……

……

C12. Are you aware of any new sicknesses/diseases that people are suffering from now that they didn't suffer in the past? *If answered No, please skip to C15.*

1. Yes[ ] 2. No [ ] 3. Don't know [ ]

C13. List 3 of these new sicknesses/diseases.

C14 Indicate which of the following sicknesses you or a member of your household has suffered in the last 6 months? Tick all that apply.

1	Malaria	
2	Respiratory diseases	
3	Dehydration	
4	Dizziness and Faintness	
5	Cholera	
6	Diarrhea	
7	Typhoid	
8	Other *(specify)*	

C15. Which sickness have you or a member of your household suffered from in the last 2 weeks?

……

……

C16. Has the growth and expansion of your community facilitated diseases in this community?

1. Yes [ ] 2. No [ ] 3. Don't know

C17. Does your community flood when it rains?

1. Yes [ ] 2. No [ ] 3. Don't know [ ]

C 18. Is agricultural produce scarce because of the conversion of farmlands to buildings?

1. Yes [ ] 2. No [ ] 3. Don't know

C19. Has the exploration of oil facilitated the scarcity of agricultural produce in STMA?

1. Yes [ ] 2. No [ ] 3. Don't know

SECTION D: IMPLICATIONS FOR ECOSYSTEM CHANGE

D1. What is your opinion about the temperature experienced in the city now?

1. Cold [ ]
2. Warm [ ]
3. Hot [ ]
4. Extremely hot [ ]

D2. Which of the following do you use to keep cool when the weather is hot?

1. Ceiling/standing fan [ ]
2. Handheld fan [ ]
3. Air conditioner [ ]
4. Other……..

D3. Has the use of cooling machines increased how much you pay for electricity monthly?
Skip to D5 if the answer is No or Don't know.

1. Yes [ ] 2. No [ ] 3. Don't know [ ] 4. Other……..

D4. How much do you pay for electricity each month?

1. ……old Cedis equivalent 2. ……GHS

D5. What are the effects of urban sprawl on the ecology of this community?

1. Loss of wetlands [ ]
2. Loss of wildlife [ ]
3. Deforestation [ ]
4. Climate Change [ ]
5. Don't know [ ]
6. Other ……

D6. Have forest areas been cut down for farming or the construction of buildings?

1. Yes [ ] 2. No [ ] 3. Don't know [ ]

4. Other ……..

D7. What are some of the animals that used to be in this community that are no longer found /extinct?

……..

……..

D8. Which plants/trees are no longer found within your community?

……

……

D9. What is your perception of the quality of air within your environment?

1	Clean, clear and free from pollutants (smoke, dust, fumes & other gases)	
2	Moderate pollution (occasionally mixed smoke, dust, fumes & other gases)	
3	Very polluted	

D 10. How has the ecological change affected your livelihood?

……

……

D11. Which institutions are involved in protecting the environment from urban sprawl?

1. Metropolitan Assembly [ ]
2. Environmental Protection Agency [ ]
3. NGOs [ ]
4. Individuals [ ]
5. Wildlife Societies [ ]
6. Other ……

D12. How effective are these institutions in protecting the environment?

1. Very effective [ ]
2. Effective [ ]
3. Neutral [ ]
4. Ineffective [ ]
5. Very ineffective [ ]
6. Other……

D 13. What should be done to improve the ecology?

1. Restrict the sale of forest land [ ]
2. Enforcement of residential zoning [ ]
3. Payment of encroachment fine [ ]
4. Nothing should be done [ ]
5. Other ……
6. Don't know [ ]

APPENDIX 5

COMMERCIAL SURVEY QUESTIONNAIRE

DEPARTMENT OF GEOGRAPHY AND RESOURCE DEVELOPMENT

UNIVERSITY OF GHANA

Research Title: Urban sprawl and its consequences on sustainability in Sekondi-Takoradi Metropolitan Area

The data being collected is for a PhD research for academic use. The information shared is confidential and the participant's identity will not be disclosed and their privacy will be respected.

(Obtain participant consent after reading the above before commencing the survey)

Please select the applicable answers.

Transport corridor……. Questionnaire number……

Verbal consent is given Yes [ ] No [ ]

SECTION A: BACKGROUND INFORMATION OF RESPONDENT

A1. Sex: 1. Male [ ] 2. Female [ ]

A2. Age ……

A3. Educational level:

7. No formal education [ ]	8. Primary [ ]
9. Secondary [ ]	10. Vocational/Technical [ ]
11. Tertiary [ ]	12. Other, please specify…….

A4. Type of commercial activity:

……

SECTION B: EFFECT OF SPRAWL ON COMMERCIAL ACTIVITY

B1. Has locating your business along this road made it profitable?

1. Yes [ ] 2. No [ ]

B2. In which way?

B3. List in ranking order three reasons why you located your business along this road. *On a scale of 1 – 3, with 1 being the highest and 3 the lowest.*

	Reason	Rank
1	Accessibility to customers	
2	More people are moving into communities along this road	
3	Land availability	
4	Other	

B4. What is the reason why other commercial activities are located along this road? *Tick all that apply.*

	Reason	Rank
1	Accessibility to customers	
2	More people are moving into communities along this road	
3	Land availability	
4	Other	

B5. How long has your business been located here?

1. 0 – 6 months [ ]
2. 6 – 12 months [ ]
3. 1 – 5 years [ ]
4. 5 years and above [ ]

B6: As the communities bordering the road expand, how has that affected your business?

1. Increase in customer base [ ]
2. Business is profitable [ ]
3. Decrease in customer base [ ]
4. No change in business performance [ ]