

Urban Sprawl and the Loss of Peri-Urban Land in Kumasi, Ghana

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Abstract—Kumasi is Ghana's second largest and fastest growing city with an annual population growth rate of 5.4 percent. A major result of this phenomenon is a growing sprawl at the fringes of the city. This paper assesses the nature, extent and impact of sprawl on Kumasi and examines urban planning efforts at addressing this phenomenon. Both secondary and empirical data were collected from decentralized government departments of the Kumasi Metropolitan Assembly and residents of some sprawling communities. The study reveals that sprawl in the metropolis is rapidly consuming fringe rural communities. This situation has weakened effective management of the metropolis causing problems such as congestion and conversion of peri-urban land into residential use without ancillary infrastructure and social services. The paper recommends effective and timely planning and provision of services as well as an overall economic development and spatial integration through regional planning as a way of achieving a long term solution to sprawl.

Keywords—Kumasi, peri-urban, urban planning, urban sprawl.

I. INTRODUCTION

THE concept of urban sprawl has been described by different scholars using major themes such as economic sprawl [1], geographical sprawl [2] and transportation sprawl [3]-[5]. Other writers have interpreted urban sprawl as resulting from increasing urban densities, land use and racial segregation [6], [7] as well as population growth. From the foregoing, urban sprawl has been conceptualized as a non-contiguous and unplanned expansion of urban areas which is characterized by low density physical development and the non-existence of basic municipal infrastructure usually beyond urban fringes.

Some early researchers of urban development have attributed the emergence of sprawl to the 'monocentric city model' [8]-[10]. This model suggests that spatial structure of urban areas results from the tradeoff between the rent of land and cost of commuting. The low cost of commuting from peri-urban areas to the city center coupled with relatively low rent at the peripheries of cities in many developing countries are facilitating the growth of peri-urban areas. Other factors such as the desire of urban dwellers to flee poor governance, lack of planning and poor access to amenities [4], [11], result in the rapid sprawling of cities. Urban sprawl is a direct result of systemic failures in urban development control policies,

although its adherents argue that urban sprawl is a natural manifestation of growing cities and has the tendency of creating opportunities for people to enjoy lower land and housing prices [7], [12]. In the face of all these arguments, it is important to note that urban sprawl as a phenomenon is at variance with controlled urban land management and physical development.

This paper investigates the nature and extent of urban sprawl in Ghana with Kumasi metropolis as the case study. It aims at identifying the causes and manifestations of urban sprawl at the peri-urban areas of the metropolis as well as the challenges and opportunities of urban sprawl around Kumasi. The study concludes with analysis of efforts being made to manage urban sprawl and proposes solutions to control the phenomenon in Kumasi and other cities in Ghana.

II. URBAN SPRAWL AND PERI-URBAN DEVELOPMENT- A CONCEPTUAL VIEW

The concept of 'sprawl' was developed by Earle Draper in 1937 in the United States of America [13], and this term has been used by city planners to refer to a wasteful type of urban growth [5]. Urban sprawl is a pattern of uncontrolled development around the periphery of a city, and is an increasingly common feature of the built environment especially in the industrialized nations [14]. The phenomenon reduces the orderly physical development that produces economically efficient land use and management at the fringes of rapidly urbanizing cities. As cities expand, the main zone of direct impact is the peri-urban area. The manifestation and impact of urban sprawl are therefore felt most in peri-urban communities. At these peri-urban communities, development is patchy, scattered and spread out, with a tendency for discontinuity.

Gilham and Maclean [15] relate peri-urban development to urban sprawl as urban sprawl fundamental refers to the emergence of low density residential development usually beyond a city's limit. This is supported by [4] who describe urban sprawl as a phenomenon characterized by low density leapfrog development, concentration of population and economic activities in peri-urban areas and segregation of land uses. From a conceptual perspective, a major relationship between peri-urban development and urban sprawl is the loss of the traditional livelihood in agriculture of peri-urban dwellers resulting from competition for peri-urban land due to the rapid expansion of the city. The resultant effect of the urban sprawl phenomenon is the engagement of peri-urban dwellers in urbanized less profitable economic activities such as petty trading, commercial and other related livelihood

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activities.

Peri-urban areas continue to experience significant physical and socio-economic changes as cities continue to sprawl. Notable among these changes is increases in land values. As land prices rise, poor people are priced out of even the less desirable areas by middle-income and high income earners. The poorest are often forced into temporary settlements. Urban land is thus managed by market forces and peri-urban land is lost to the more preferred urban activities ahead of planning. Disputes over the control of peri-urban land often give rise to social conflicts which affect the transparency of urban land market and management systems.

III. THE PHYSICAL AND SOCIO-ECONOMIC MANIFESTATIONS OF URBAN SPRAWL

Available evidence on sprawl demonstrates conclusively that urban sprawl has accompanied the growth of urban areas across the world including United States of America (US) [4], [16], Europe [7], [17], [18], and India [19]. The physical and socio-economic manifestations of urban sprawl across the above mentioned regions are explored in the following paragraphs.

The causes of urban sprawl in the US are attributed to lower commuting cost, rising incomes, and government tax, expenditure and zoning policies as well as the willingness of households to take advantage of peer externalities, avoid traffic, noise, crime, and to have homes with enough space and greenery [4], [14], [20]. Urban sprawl in the US is characterized by peri urban development. Residents of sprawling cities find it difficult to travel even short distances without using an automobile, due to the remoteness of residential areas and the inadequacy of available means of transport such as mass transit, walkways, or bike paths [16]. The negative effects of urban sprawl on American cities include health inequalities [21], pollution and environmental degradation [22]. The smart growth model has been pursued in the US as an alternative to sprawl [16], despite several criticisms that the smart growth model reduces property values, increases the cost of housing and disrupts existing communities [23]-[25]. The smart growth model is a policy framework that promotes an urban development pattern characterized by high population density, walkable and bikeable neighborhoods, preserved green spaces and mixed-use development.

Historical trends, since the mid 1950s, show that land area of European cities has expanded on average by 78 percent, whereas the population has grown by only 33 percent. A major consequence of this trend is that European cities have become much less compact. The dense enclosed quarters of the compact city have been replaced by free standing apartment blocks, semi-detached and detached houses [18]. The areas with the most visible impacts of urban sprawl in European countries are regions with high population density and economic activity such as Belgium, the Netherlands, Southern and Western Germany, Northern Italy, Ireland and the Paris region in France. In Europe, sprawl is particularly evident where regions have benefited from European Union (EU)

regional [18]. New development patterns can also be observed around smaller towns or in the countryside, along transportation corridors, and along many parts of the coast usually connected to river valleys [18]. Hot spots of urban sprawl are also common along already highly populated coastal strips, such as in the case of Spain where artificial areas may cover up to 50 percent of the total land area. This is a concerning trend given the known vulnerability of coastal ecosystems, and because the Mediterranean region is classified as one of 34 biodiversity hotspots in the world. Moreover, local community life has been weakened, if not destroyed, by urban sprawl [5].

In examining urban sprawl in India, [19] challenged the conceptualization of urban sprawl by [26] and argue that ascribing sprawl as a pattern of land use alone does not emphasize the underlying processes, causes and hence consequences. In a developing country like India, where population densities are high with significant urbanization rates, urban sprawl cannot be characterized by land use pattern alone but processes, causes and their consequences [19]. Hence, [19] altered the definition of urban sprawl as the pattern of outgrowth emergent during the process of urban spatial expansion over time caused by certain externalities and a consequence of inadequate regional planning and governance. In India, urban sprawl is caused by lack of effective governance with operational systems and processes in local bodies of governance, which have resulted in unplanned and uncoordinated urban outgrowths.

Global assessment of sprawl reveals stark differences in terms of physical and socio-economic outcomes across the regions. In the US, the phenomenon is characterized by increasing growth in suburbanization resulting in long commuting distances and associated difficulties. Urban sprawl in Europe is however, concentrated in countries with high population growth and economic opportunities. In India, the sprawling of cities is caused by poor planning and management of urban areas.

IV. DETERMINANTS AND CHARACTERISTICS OF URBAN SPRAWL

There are several factors which govern the growth rate and are also responsible for the growth to continue in a particular direction. Some researchers have identified the following factors to be the characteristics and driving forces of urban sprawl: population growth and leap frog development, transportation system and the dominance of automobile, industrialization, commercial activities and unlimited outward expansion [4], [7], [27]. These factors are discussed further in this section.

Urban areas are characterized by high rate of population growth as a result of migration and natural increase. The presence of infrastructural services and job opportunities in urban areas tend to attract people from different places especially the rural areas, thereby propelling the growth of the cities [4], [7]. Without effective urban planning and management, rapid population growth in the cities results in increasing physical expansion in all directions at the fringes.

According to [4] urban sprawl causes segregation of land uses into different zones as a result of the self-sorting of the population, which [6] refers to as racial segregation. This situation creates heavy reliance on the trickle-down or filtering process to provide housing to low income households with limited consumer choices about where and how to live, segregated housing, stores and work place from one another as well as decreased social and civic interaction and support.

Efficient transportation systems are assumed to be the most important factor for the spreading of cities, which continue to grow with the passage of time. The unlimited outward extension of cities coupled with lower transport cost has made it possible to live increasingly farther away from city center, while enjoying all the advantages of a city location [4]. However, sprawling cities and suburbs are characterized by unproductive congestion on roads, high levels of automobile pollution, loss of open spaces, and unequal provision of public goods and services across sprawling cities' suburbs [4]. Ramirez de la Cruz [28] however attributes the weak centralized planning to the activities of the affected stakeholders. Stakeholders affected by urban planning policies have different interests which are often conflicting and opposing on political and moral grounds [28].

Additionally, industrial development facilitates the growth of cities. With the establishment of an industry, population is attracted from various directions in search of economic opportunities. Other activities such as services and commercial activities follow, and the area grows larger. Here transportation gives the direction but the impact of industrialization is strong which generates faster growth of the city, than transportation. As the area develops, commercial centers and services spring up to specialize in particular functions. Hence, commercial activity becomes another factor influencing the type and direction of growth of urban areas. Fig. 1 summarizes the major characteristics of urban sprawl.

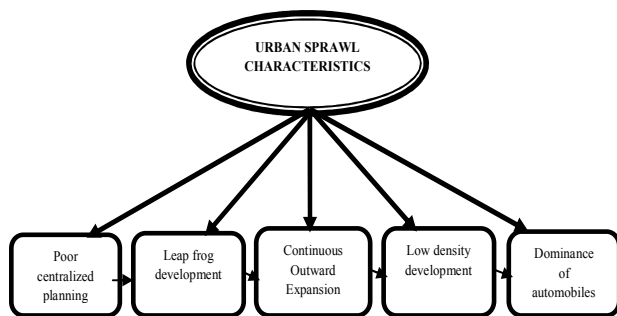


Fig. 1 Major Characteristics of Urban Sprawl

V. STUDY AREA AND METHODS

A. Kumasi Metropolitan Area in Context

Kumasi with an area of 250 square kilometers (km²) is located in the transitional forest zone of Ghana and is about 270 km north-west of Accra, the national capital of Ghana as shown in Fig. 2. It is the capital of the Ashanti region, and has a unique centrality as a traversing point from all parts of the country which has made it a major commercial centre.

Kumasi's strategic location makes it a major destination for migrants from all over the country and beyond.

The current population figure is estimated to be 1,634,898 [29], with an estimated annual growth rate of 5.4 percent. This growth rate is the fastest in Ghana; well above the regional and national annual growth rates of 2.6 and 2.4 respectively [30]. The city currently accommodates nearly two-thirds of the Ashanti region's population leading to its unprecedented growth. For instance the city has a housing growth rate of 8.6 percent per annum [31]. In terms of physical structure and growth, Kumasi metropolis has a concentric physical structure with undulating land forms creating slopes and ridges. This spatial structure of the metropolis has facilitated developments in all direction [32].

B. Approach and Methods

The study is based on a research work undertaken in 2009 on urban sprawl phenomenon in Kumasi. It has been improved to incorporate current (2011) situation of peri-urban development pattern at the fringes of Kumasi. In terms of approach and methodology, the study reviewed documents and literature relating to urban growth and management particularly in Ghana, America, Europe and Asia. While on the global scale the review concentrated on books and journal articles by scholars in urban development, the local review studied documents such as master plan of Kumasi prepared in 1962 and the current structure plan prepared in 2007 by the Kumasi Metropolitan Town and Country Planning Department.

Other documents reviewed include consultancy reports of local government institutions within the Kumasi metropolis such as Department of Urban Roads, Waste Department, Electricity and Water Companies of Ghana, Lands Commission and Environmental Protection Agency. These documents revealed the patterns of physical and socio-economic development of the city and its fringes. The review also identified the major institutional and non-institutional stakeholders involved in the rapid expansion of the metropolis. This formed the basis for the selection of the relevant institutions and/or respondents for the field data collection.

Institutional surveys were undertaken through the use of structured questionnaires, informal interviews and telephone conversations with relevant local government officials at the above mentioned institutions. In addition, quasi-institutions such as traditional authorities, assembly representatives, unit and plot allocation committees and heads of land-owning families within selected peri-urban communities were interviewed for the purposes of gathering first hand community views about the impact of urban sprawl on the peri-urban development. These interactions at both institutional and community levels unearthed the major causes and manifestations of urban sprawl around Kumasi as well as the impacts of the urban sprawl phenomenon on the changing land uses and livelihood patterns in the selected peri-urban communities.

The initial consultations with local planning and development officials identified areas spanning 10–25km from

the city center as peri-urban region of Kumasi. These areas have, over the last two decades, seen substantial changes in land use and management, housing characteristics and livelihood patterns due to the rapid sprawling of the metropolis. Four peri-urban communities were selected within the 15-kilometre range at the fringes of the city and visited. Preferably, the study intended to cover one peri-urban community along each of the five major roads connecting the city to other regions. However, land ownership problems and

lack of cooperation of traditional authorities and less rapid sprawling of some peri-urban communities limited the study to four communities along four major transportation corridors. These communities include Ayeduasi, Apatrapa, Breman and Pankrono as shown in Fig. 2. In each of these communities key stakeholders involved in land management such as chiefs and elders, queen mothers and elders, local government representatives, members of unit committees, plot allocation committees were interviewed.

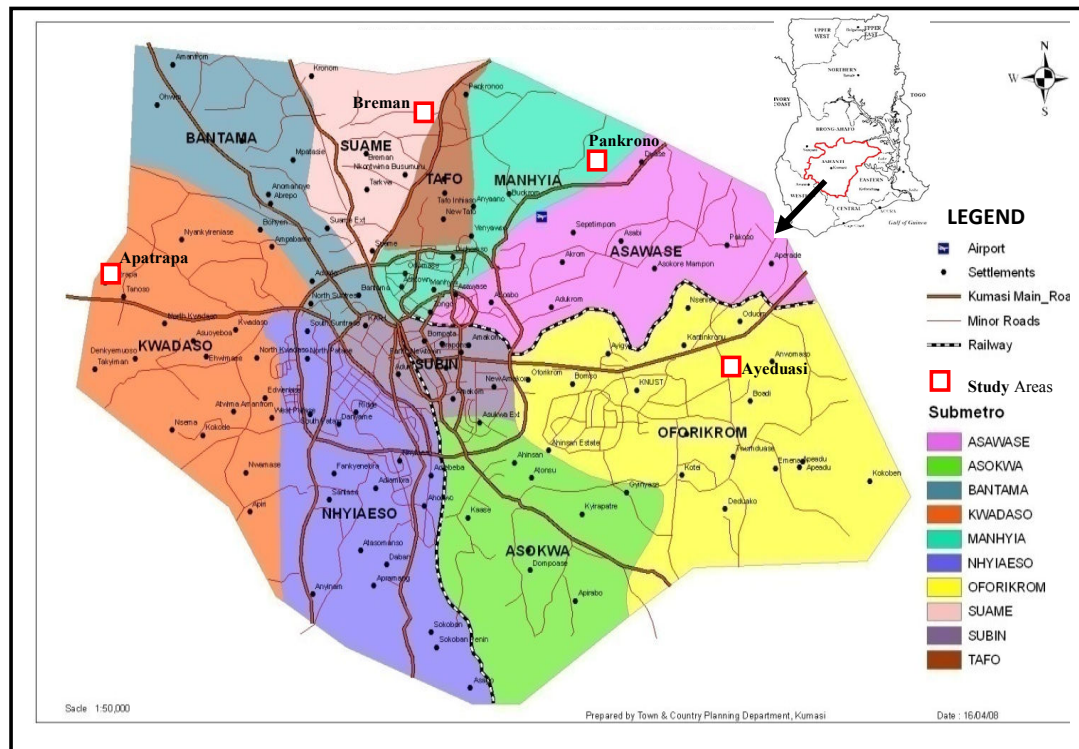


Fig. 2 Geographical Location of the Kumasi Metropolis Source: [34]

Data collected from institutional and community levels were harmonized and rationalize through stakeholders' workshop at the community and local authority levels. At these meetings the results from the data collection were presented to stakeholders for clarifications of all inconsistencies that had occurred. Fig. 2 shows the study communities and the geographical context of the Kumasi metropolis.

VI. RESULTS AND DISCUSSIONS

A. Trends of Physical Growth of Kumasi

As indicated in Table I, the development of the Kumasi metropolis has witnessed changes in its land uses from 1995 to 2010. The significance of the changes in the land uses as a result of urban sprawl has been discussed. As of 2010, the increase in the total residential land use of 3.1 percent, commercial (2.9 percent) and educational (2.9 percent) can best be accounted for by the demand for undeveloped lands (mostly available at the peripheral settlements) for development purposes. This assertion is further supported by

the rapid reduction of the undeveloped lands (-12.3 percent) as indicated in Table II. The rapid physical expansion of the metropolis explains the current peri-urban status of these peripheral settlements, hence the increasing consumption of peri-urban land as shown in Fig. 3.

B. Types of Urban Sprawl and Areas Affected in Kumasi

The Kumasi metropolis is experiencing different sprawl types and the heads of the institutions contacted as part of this study described urban sprawl in various ways. Interviewee responses conceptualized sprawl as nucleated or clustered development, scattered or dispersed development, leap frog development and ribbon or mushroom development, similar to other parts of the world.

With regard to the nucleated or clustered sprawl, development usually takes place at the outskirts of the city where there is concentration of people of particular social class or income levels. Developments in such areas are detached from the other suburbs of the city. Areas exhibiting this type of sprawl are Breman, Pankrono, Atimatim and Atafua as shown in Fig. 3. The scattered or dispersed

development is the most common sprawl type in the Kumasi metropolis. This type of sprawl is where development is patchy, speckled and spread out, with a tendency for discontinuity. Apatrapa, Asouyeboa, Buokrom, Patasi, Pakyi, Daban, Kenyase, Ayeduasi, Boadi and Kotei- Deduako are the areas undergoing this type of urban sprawl.

Leap frog development is not very common in the Kumasi metropolis as only Dompouse, a suburb in the metropolis, was identified. This sprawl type is sporadic, leaving agricultural enclaves resulting in inefficient use of land. The ribbon or mushroom development is seen as the increasing

concentration of human activities, be it commercial or residential at particular areas leading to the destruction of other land uses like nature reserve.

Additionally, the Race-Course area was mentioned as an example of mushroom housing development in Kumasi. Parts of Asawase, a suburb in the metropolis have this type of sprawl as there is an increasing influx of people seeking affordable housing as it serves as home for migrants. Fig. 3 shows the spatial manifestation of urban sprawl in the Kumasi metropolis.

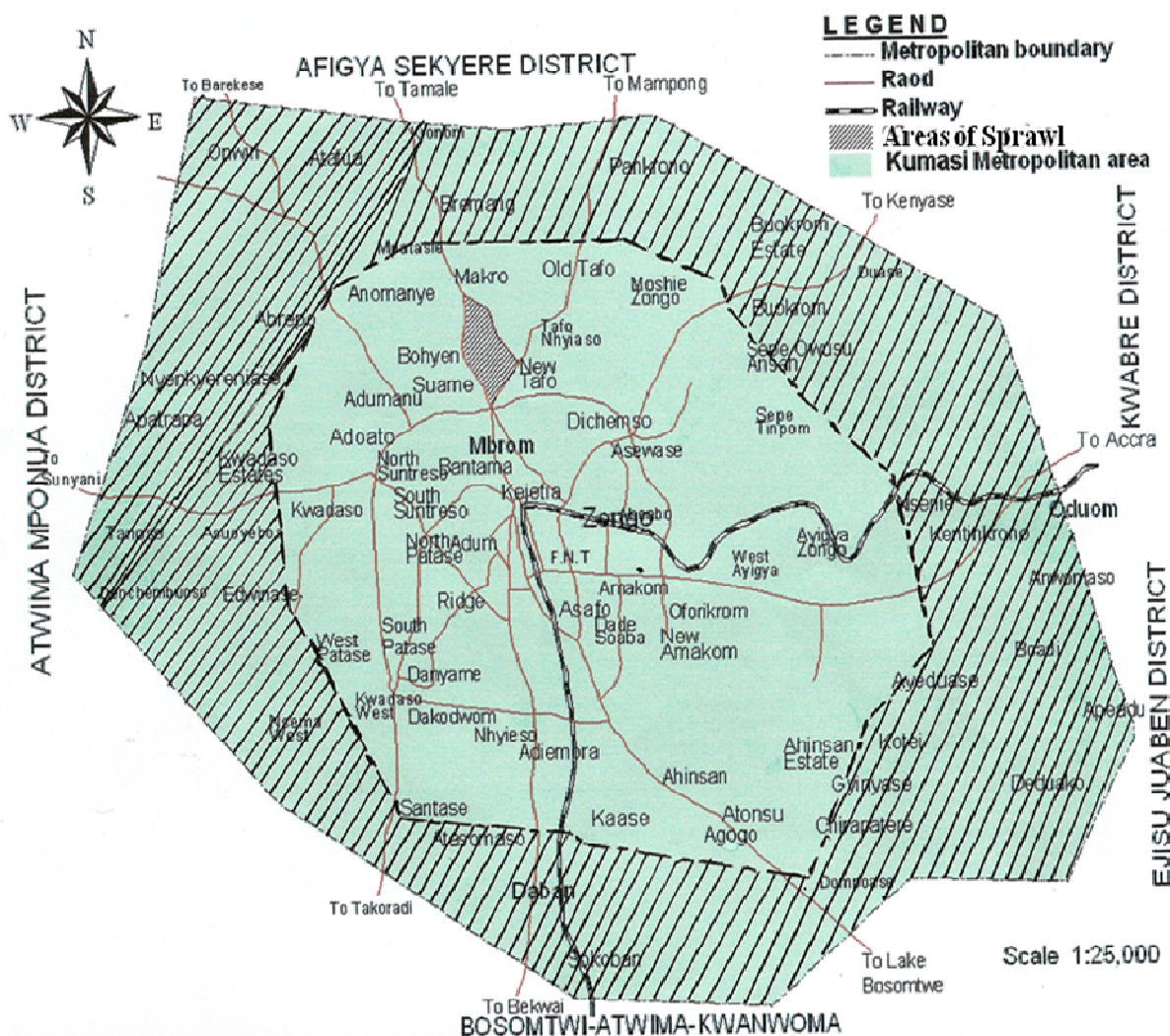


Fig. 3 Sprawl Invasion in the Kumasi Metropolis

TABLE I
 LAND USE INVENTORY OF THE KUMASI METROPOLIS

Land use	1995		2000		% Change	2005		*2010		% Change
	Area (km ²)	%	Area (km ²)	%		Area (km ²)	%	Area (km ²)	%	
Residential	109.3	43.7	109.3	43.7	2.4	109.5	43.8	110	44.0	3.1
Industrial	10.3	4.1	10.3	4.1	1.8	10.3	4.1	10.0	4.0	2.9
Commercial	6.0	2.4	6.0	2.4	1.4	6.0	2.4	6.0	2.4	2.9
Educational	43.8	17.5	43.8	17.5	2.6	43.8	17.5	43.3	17.3	2.9
Civic and Cultural	18.8	7.5	18.8	7.5	1.3	18.3	7.3	18.3	7.2	0.1
Open space	28.8	11.5	28.8	11.5	2.3	28.8	11.5	28.8	11.5	2.9
Circulation	33	13.3	33	13.3	2.8	33.5	13.4	34.0	13.6	2.9
Total land area	250	100	250	100	0	250	100	250	100	0.1

TABLE II
PROPORTION OF DEVELOPED AND UNDEVELOPED LAND IN THE KUMASI METROPOLIS

Land use	1995		2000		%	2005		2010		%
	Area (km ²)	%	Area (km ²)	%		Area (km ²)	%	Area (km ²)	%	
Developed area	187	74.8	191.3	76.5	2.3	197.5	79	204	81.6	2.9
Undeveloped land	63.0	25.2	58.2	23.5	-5.9	52.5	21.0	46.0	18.7	-12.3

Source: [35]

TABLE III
HOUSING DENSITIES IN SELECTED SPRAWL AND NON SPRAWL COMMUNITIES

Sprawl areas	Housing densities (per acre of land)	Non sprawl areas	Housing densities (per acre of land)
Apatrapa	10	Atonsu	18
Breman	11	Old Tafo	18
Pankrono	10	Santasi	17
Ayeduasi	15	Kwadaso	17

Source: [35]

TABLE IV
TRAFFIC CONGESTION ON ROADS IN KUMASI

Road Link	Road Segment	Length (m)	Average Travel Speed (km/hr)	Total Delay (seconds)
Mampong Road	Tafo market-Suame new road	1625	2.7	2084
	Suame new road-Magazine new road	375	3.1	423.5
	Kotoko road-Kejetia	1050	4.1	899
Sunyani Road	Sofoline roundabout-North Suntreso road	960	228	123
	North Suntreso road-Bekwai roundabout	500	295	47
	Gyinasi-Kaase road	1250	10	415.3
Lake Road	Atonsu terminal-Gyinasi road	1060	3.9	938.3
	Maxwell road-Prempeh Street	1250	20.9	180.0

Source: [36]

TABLE V
FUEL CONSUMPTION BY PRIVATE VEHICLE IN SOME SPRAWL AND NON SPRAWL AREAS OF KUMASI

Sprawl areas	Fuel per 1km (litres)	Cost (GH¢)	Non sprawl areas	Fuel per 1km (litres)	Cost (GH¢)
Apatrapa	5	7.8	Atonsu	3	4.7
Breman	4	6.2	Old Tafo	3	4.7
Pankrono	6	9.3	Santase	2	3.1
Ayeduasi	4	6.2	Kwadaso	3	4.7

Source: [36]

A. Manifestations of Urban Sprawl in the Kumasi Metropolis

Urban sprawl manifests itself in the physical, economic and social contexts of Kumasi. Physically, the phenomenon is marked by the destruction of the natural environment, and agricultural land and the pollution of both the water bodies and air. Other physical issues in these sprawling areas involve: poor sanitary conditions; low housing density; and increasing commuting time which is as a result of high traffic generations on the roads in these areas coupled with poor conditions of the road. Table III shows the housing density in the sprawl areas can be as low as 10 houses per km² of land and as high as 15 houses per km² of land whereas the lowest housing density recorded in the non-sprawl communities is 15 houses per km² of land which is even higher than the highest housing density recorded in the sprawling areas. Comparing the data in Table III, there is low housing density in the sprawling areas of the Kumasi metropolis.

Traffic congestion and issues relating to poor road conditions culminate in increasing the time for commuting. This has been established as one of the major manifestation of urban sprawl in the Kumasi Metropolis and Table IV supports it. Using Congestion Index (CI), which is defined as the total delay divided by the free flow travel time, in understanding

the traffic congestion situation in Kumasi, the study reveals, for instance, the Atonsu terminal – Gyinasi road (which is within the sprawl area) has a CI of 19.7 which is approximately 16 minutes of traffic delay when one commutes by this road as shown in Table IV.

From the social perspective of urban sprawl manifestation in the Kumasi metropolis, there are a number of issues, for example pressure on existing infrastructural facilities and institutions leading to shortage of services. The most common social manifestation of pressure on existing services in these sprawl areas is witnessed early in the mornings and late in the evenings when passengers struggle to board the limited public transport services popularly known as “*trotros*” leaving long queues at most areas in the metropolis.

From an economic perspective, urban sprawl is visible to residents as it increases the cost of vehicle maintenance and service provision, and rate of energy consumption. The phenomenon is also noticeable economically in the area of inefficient use of land, energy and high cost of services. Table V indicates that on average, a private vehicle in the sprawl areas consumes 4 litres worth of fuel over a distance of 1km as compared to an average of 2 litres of fuel consumption over the same distance in non sprawl areas. This has been attributed to the delay caused by the traffic congestion.

Additionally, Table VI shows that an individual commuting a distance of 1km using public transport pays GH¢ 0.45 transport cost as compared to GH¢ 0.30 transport cost in non sprawl areas. The cost of fuel for private vehicle owners and the price paid by public transport users in these sprawl areas compared to the figures obtained in the non-sprawl areas (Table V), confirms the high rate of energy consumption, as well as the high cost of service provision in these sprawling areas.

TABLE VI
 PRICE PAID BY PUBLIC TRANSPORT USERS IN SOME SPRAWL AND NON SPRAWL AREAS OF KUMASI

Sprawl areas	Price per 1km (GH¢)	Non-sprawl areas	Price per 1km (GH¢)
Apatrapa	0.40	Atonsu	0.40
Breman	0.45	Santase	0.20
Pankrono	0.30	Kwadaso	0.25
Ayeduaasi	0.30	Kwadaso	0.25

Source: [36]

B. Causes of Urban Sprawl in the Kumasi Metropolis

Historically, the growth of cities has been driven by escalating urban population. However, the study shows that in Kumasi today, even where there is little or no population pressure, a variety of factors are driving urban sprawl. These factors are rooted in some residents desire to realize new lifestyles in peripheral environments, outside the inner city, due to high demand and cost of land in the built up areas, coupled with limited space. At the same time, sprawl has accelerated in response to improved transportation links and enhanced personal mobility in the city. The mix of forces include both micro and macro socio-economic trends such as the means of transportation, the price of land, individual housing preferences, increasing immigration trends, cultural traditions and constraints, and the application of land use planning policies at the metropolitan level.

In Kumasi, urban sprawl has resulted in high land prices in the core and along the arterial roads of the city forcing developers to seek lower prices in the more peripheral areas. The price of land at the outskirts is much lower than the price of land zoned for housing or development of services in the city center. Peripheral land therefore becomes a highly attractive target for investors and developers and has resulted in the conversion of agricultural or nature reserves to housing and commercial development in the metropolis as shown in Table I.

Socially, the study revealed that urban sprawl in the Kumasi metropolis is driven by the desire of families especially with small children moving to suburban areas and to rural areas outside the city. Increasing numbers of people in Kumasi regard a new house, ideally a semi-detached or detached house in the suburban/rural areas outside the city as a prime investment in their lifetime. Many wealthier households in and outside the metropolis also actively seek a good investment opportunities at the peripheries. Properties on the city peripheries are considered by interviewees to be better investments because land prices are generally lower than in

the city center, and the value of the property is expected to rise more rapidly outside the city core. The persistence of the suburban ideal underpins the apparently ever increasing demand for houses in the sprawling suburbs and peripheral areas in Kumasi, and forms a vital stimulus to urban sprawl.

In addition to the apparent attractions of the peri-urban communities, the interviewees noted many negative aspects of the inner city center, including a poor environment (poor sanitation and waste management challenges), social problems (poor governance and management) and safety issues (crime and social conflict), as contributing to urban sprawl in the metropolis. Kumasi city center is perceived by many as more polluted, noisy and unsafe than the suburbs and this was mentioned by the heads of institutions and the interviewees from the sprawl areas contacted as part of the study. The built-up environment in close proximity to the Central Business District (CBD), for instance Asawase and Aboabo which are located in the north eastern part of the city center are also considered unattractive because of increasing concentration of migrants and poor urban planning, with areas lacking green open space and sports facilities. Poverty, single parent households, drug abuse and minorities with integration problems are also often identified with inner-city of the metropolis by the Kumasi Metropolitan Assembly. These negative factors drive many families with few children out of the city to the peripheries, therefore exacerbating the urban sprawl situation.

C. Challenges and Opportunities of Urban Sprawl in Kumasi

The impact of sprawl is significant and affects the activities of resident population and the city management institutions in Kumasi. It must however be emphasized that the magnitude of the effects differ from one management institution to another. With respect to the decentralized government institutions involved in the study, there are varieties of obstacles urban sprawl pose to their operations which in turn affects the entire development and management of the Kumasi metropolis.

The Kumasi Metropolitan Town and Country Planning Department mentioned the pressure urban sprawl puts on both the material and human resources available. The increasing pressure on the Kumasi Metropolitan Town and Country Planning Department resulting from urban sprawl has caused a situation where developers dictate the pace of development, direction of growth and the entire operations of the Department. The Department further attributed its inefficiencies in managing the city to urban sprawl.

Urban sprawl has led to land use patterns which are unfavorable to the development of sustainable transport modes, increase the use of private cars that results in increased trip lengths, congestion, increased fuel consumption and air pollution. As homes and businesses spread farther and further apart, local governments are forced to provide for widely spaced services and infrastructure to higher costs and an increased tax burden, despite agitations of researchers like [33] that productivity is much more enhanced with dense development since ideas move quickly when people are in

close proximity.

Sprawl has also created segregation of different socio-economic or social isolation in general in the Kumasi metropolis. The low-income groups are abandoned in the core regions like Asawase, Bompata, Fanti New Town and Asafo because they cannot afford a car-based lifestyle. The much congested and deteriorated central towns end up being favorable grounds for criminals and other social unrest activities. The creation of management challenges in the areas of rapid rate of unauthorized development, increased cost of service provision, maintenance of facilities and ineffective waste management were among the principal consequences urban sprawl poses to the Kumasi Metropolitan Assembly. Urban sprawl has also caused the Assembly to lose revenue since developers cannot be traced and taxed.

There is increased unplanned demand for water and electricity as a result of sprawl affecting the structural distribution and supply of these services. Additionally, the increasing demand has exerted pressure on the infrastructure available leading to early and frequent breakdown of infrastructure. The high cost of service provision has posed serious problems associated with increasing expansion and extension works of utility companies (Electricity and Water) in the face of a rapidly growing metropolis. This is because urban sprawl influences the demand pattern of the utility companies causing inadequate supply of services. At the peripheral areas like Breaman, Ayeduasi, Apatrapa and Deduako, urban sprawl has resulted in the loss of open space, rural character and farmland. Due to the larger area consumed by sprawling suburbs compared to urban neighborhoods, more farmland and open spaces are displaced per resident. Urban land to meet the needs of the growing population is under utilized by the conversion of agricultural or rural land at the fringes of the city by developers.

Despite the numerous challenges urban sprawl pose to the planning, development and management of the Kumasi metropolis, there are a number of opportunities that are available in Kumasi that can be harnessed to ensure efficient management of the metropolis. Availability of undeveloped land as shown in Table II, existence of strong traditional systems and regional planning (Greater Kumasi Metropolitan Area) are the opportunities for containing urban sprawl and ensuring efficient use of land resources in the Kumasi metropolis.

As indicated in Table II, Kumasi has about 18 percent of its land area undeveloped. This presents an opportunity for the city authorities to restrict growth into the undeveloped areas and further ensure that developments in these areas are well planned and compact. Additionally, the existence of strong traditional system within the metropolis and the peri-urban communities is an opportunity to combat leap frog development. The involvement of the various traditional institutions, who act as custodians of the land, in the planning and management of the metropolis especially the peri-urban communities, has the potential of ensuring efficient use of land and effective management of the Kumasi metropolis. The Greater Kumasi Metropolitan Area planning which is being

embarked upon by the city authorities is an opportunity to contain the phenomenon of urban sprawl in the metropolis. As shown in Table II and Fig. 3, the increasing growth of Kumasi is consuming peri-urban communities in the surrounding districts including Ejisu-Juaben, Bosomtwi-Kwawoma, Atwima Nwabiagya and Amansie West districts. The Greater Kumasi Metropolitan Area planning is a regional planning effort that focuses on the growth and management of Kumasi in collaboration with the surrounding districts. This seeks to create opportunities such as employment, efficient transport infrastructure, among others in the surrounding districts in order to absorb the increasing population from Kumasi especially population growth resulting from migration.

D. Rethinking Urban Sprawl: The Kumasi Challenge

The central focus of this paper is the understanding of the underpinning factors propelling the increasing sprawling of cities and policy measures to mitigate it. The growth of the built-up area of Kumasi during the first decade of the 21st century shows clearly there has been an underestimation of the total growth of the city as indicated in Table I. Since the 1980s, Kumasi has spread further into the neighboring districts (Ejisu-Juaben, Bosomtwi-Kwawoma, Atwima Nwabiagya and Amansie West districts) along the arterial roads. The demand for infrastructure, basic services and housing in the Kumasi metropolis is increasing. Issues of sanitation, waste management, crime, social conflict, governance and management are worsening and require urgent consideration.

The implementation of planning schemes in the Kumasi metropolis has not been satisfactory for a variety of reasons, which have resulted in the mushrooming of slums and squatters, unauthorized and haphazard development, environmental degradation, lack of basic amenities and transportation problems in areas like Aboabo and Asawase. The Kumasi Metropolitan Town and Country Planning Department mainly prepares land use schemes/plans. However, the Kumasi Metropolitan Town and Country Planning Department in collaboration with the other decentralized government departments of the Kumasi Metropolitan Assembly need to plan for meeting the demand for infrastructural facilities and ensuring the delivery of basic services. This has been poor in the current planning practices as the heads of institutions contacted as part of the study indicated. The outcome of this situation is poor state of sanitation, haphazard physical development and the pollution of the environment.

The state of urban sprawl in the Kumasi metropolis suggests that the implications of urban sprawl are not well understood in Ghana, especially in the Kumasi metropolis, which can potentially be a threat for effectively managing urban sprawl. Hence, it is essential to understand the phenomenon of urban sprawl especially from the perspective of a developing country like Ghana. Further understanding would aid in evolving any policy and management options for effectively addressing the problem of urban sprawl. Unlike the developed countries where there is a strong institution for policy enforcement, the problem of urban sprawl in Kumasi and many cities in Ghana

is observed to be an outcome of ineffective planning, inadequate policy enforcement and lack of effective city management. The inability of the city administration and planning machinery to visualize probable areas of urban sprawl and its growth is persistent with lack of appropriate spatial information and indicators [33].

In addition, the study revealed the inability of administration and planning to capture the feedbacks arising out of different decisions, essentially with lack of dynamic spatial models with feedback mechanisms. Thus, in the present context, with the escalating problem of urban sprawl, the challenge for future research is to arrive at an integrated spatial planning support system to effectively plan, review and evaluate different policy options while capturing the dynamics involved. The contribution of research by way of spatial planning support system would only be a short-to-medium term solution to this problem.

VII. CONCLUSION

Although the characteristics and dynamics of urban sprawl are similar in both the developed and the developing countries, the impacts are detrimental in the developing countries especially on the natural, economic, social and physical environment of cities. Individual housing preference, cultural traditions and constraints, poor planning and management, relatively low cost of peri-urban land have resulted in increasing physical expansion of the city with low housing densities. This situation is causing increasing traffic congestion, high cost of vehicle maintenance, inefficient use of land, pressure on available infrastructural facilities, increasing energy consumption and increasing cost of commuting within the city. Additionally, the rapid rate of urban sprawl in the city leaves no doubt about the increasing conversion of farmlands/agricultural lands in the Kumasi metropolis. It is therefore not surprising the Kumasi metropolis has undergone rapid and drastic changes in both population growth and physical expansion.

However, as discussed there are available measures to contain the urban sprawl phenomenon. Policy interventions require concerted efforts from all key stakeholders and should be executed collaboratively rather than concentrating on the causes of the problems associated with urban sprawl. It is of great relevance that efforts should be directed at controlling and overcoming urban sprawl, and see how the negative effects can be turned into positive impacts.

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