

Impacts of Urban Sprawl on Livelihoods and Ecology in Peri-Urban Fringe of the Greater Accra Metropolitan Area

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Abstract

The rapid increase in population and urbanization continue to exert growing pressure on resources in most cities. Accra, the capital city of Ghana, has been attracting migrants from all over the country resulting in escalating congestion and housing shortage in the inner cities. The resultant effect of these phenomena is the sprawl of human settlements to peri-urban areas. As a result natural reserves and farmlands are being converted into residential and non-residential developments in the urban fringes. This study assesses the impact of this trend on livelihoods sustainability and the ecology in the peri-urban areas of Greater Accra Metropolitan Area (GAMA). The study employed primary and secondary sources of data and used stratified sampling in the selection of major road corridors where sprawling was pronounced and intensive. A multi-temporal set of Remote Sensing data was used to classify Landsat images of GAMA for the years 1986, 1991, 2008 and 2016 to know the extent of land use and land cover change. Environment for Visualizing Image 5.1 was used to process, analyse and integrate the spatial data. The findings revealed that between 2008 and 2016, dense vegetation had decreased by 226.98%. Settlements continued to increase to 120.29 percent during that same period. The study also revealed that the land market was lucrative and the resultant implications are on livelihoods and ecology. The study recommends proper planning policies, development of an eco-city model and affordable housing in the inner cities.

Introduction

Cities and towns in many parts of the world have been spreading and the construction of houses, offices, shopping centres and other infrastructural facilities has led to multiple increases in the physical extension of many agglomerations. This development inevitably goes hand in hand with rapid conversion of natural, agricultural and forestry landscapes, wetlands and wildlife habitats into urban and industrial areas. Numerous studies have shown that, this kind of land “consumption” has a severe impact on the natural environment, socio-spatial structures and on sustainability of infrastructure which are collectively labelled as urban sprawl (Benfield et al., 1999; Johnson., 2001; Ewing et al., 2003; Goetz et al., 2005). Urban sprawl is considered to be responsible for the endangerment of resources (Price et al., 2006), overuse and deterioration of soils and water resources (Haase and Nuisl, 2007). Urban sprawl sometimes caused by

rapid population growth is loosely defined as low-density residential and sometimes commercial development that is outside the borders of higher density urban centres.

A common definition of urban sprawl was given by Ewing (1994), who defined it as a form of low-density spatial development, always characterized by scattered and discontinuous leapfrog expansion of land uses. Planners, scholars, community activists and public officials all offer numerous possibilities as to the causes of urban sprawl which poses great challenge to livelihoods of the area affected by the sprawl of human settlement.

Unrestricted and uncontrolled population growth which leads to urban sprawl has serious impacts on livelihoods in peri-urban areas. Large tracts of arable lands designated for farming are converted into the construction of concrete and residential buildings. Farmers source of livelihoods are adversely affected as they lose their lands to real estate developers.

This phenomenon raises the cost of farm produce as farms are consequently displaced from the peri-urban areas and away from the cities.

Also, increase in the sprawl of human settlements can affect wildlife by threatening their survival. The quality of life and the local ecosystem are modified due to the consumption of space and misuse of natural resources. These species of plants and animals are endangered, their feeding grounds are destroyed and migratory paths are blocked.

Accra grew rapidly after independence as a result of the government’s industrial development strategy which led to the expansion of residential areas around indigenous communities (Larbi, 1996). Greater Accra Metropolitan Area (GAMA) consist of Ga South, Ga West, Ashiaman, Ga East, Accra Metropolis, Tema Metropolis and

Ledzokuku Krowor and Adenta. Today, the peri-urban areas of GAMA have been replaced with an enormous admixture of concrete buildings.

The current research throws more light on the impact of urban sprawl on livelihoods in the peri-urban zones of Accra and the ecological footprints of urban sprawl. The study addresses these questions; to what extend has the city sprawled from 1986 to 2016? What livelihoods are mostly affected? To what extend has urban sprawl affected the ecology?

Materials and methods

Sampling Technique for Questionnaire Survey
Household questionnaire was used as part of the research and a four-stage stratified sampling was used for the selection of the peri-urban zones of GAMA for the study.

TABLE 1
Sampling Technique for Household Questionnaire Survey

| Level 1 Sample areas/ Corridors | Stratification by Development Corridor Corridors 1. Western corridor (Accra to Winneba axis) 2. Northern corridor (Accra to Nsawam axis) 3. North-Eastern corridor (Accra to Aburi axis) 4. Eastern corridor (Accra to Tema and beyond) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-------------|-------|---------|-------|-------|----|----|----|-------|----|----|----|----------|----|----|----|---------|----|----|----|---------|----|----|----|---------|----|----|----|---------|----|----|----|-----------|----|----|----|
| Level 2 Communities within Corridors | Selection of Residential Communities within Corridor Corridor 1 Gbawe and Weija Corridor 2 Amasaman and Pokuase Corridor 3 Oyarifa and Abokobi Corridor 4 Afienny and Dawhyenya | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Level 3 Households within Communities | The households selected within the communities at the corridors (Communities and Sample size) Gbawe 25 + Weija 25 = 50 Amasaman 25 + Pokuase 25 = 50 Oyarifa 25 + Abokobi 25 = 50 Afienny 25 + Dawhyenya 25 = 50 Total Households selected = 200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Level 4 Gender Disaggregation of Households | Gender was mainstreamed in the household survey i.e. men and women were given equal representation and when a woman was interviewed in first household, the next household was a man and vice versa leading to 13 males and 12 females. <table border="1"> <thead> <tr> <th>Communities</th> <th>Males</th> <th>Females</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Gbawe</td> <td>12</td> <td>13</td> <td>25</td> </tr> <tr> <td>Weija</td> <td>13</td> <td>12</td> <td>25</td> </tr> <tr> <td>Amasaman</td> <td>13</td> <td>12</td> <td>25</td> </tr> <tr> <td>Pokuase</td> <td>12</td> <td>13</td> <td>25</td> </tr> <tr> <td>Oyarifa</td> <td>12</td> <td>13</td> <td>25</td> </tr> <tr> <td>Abokobi</td> <td>12</td> <td>13</td> <td>25</td> </tr> <tr> <td>Afienny</td> <td>13</td> <td>12</td> <td>25</td> </tr> <tr> <td>Dawhyenya</td> <td>13</td> <td>12</td> <td>25</td> </tr> </tbody> </table> | Communities | Males | Females | Total | Gbawe | 12 | 13 | 25 | Weija | 13 | 12 | 25 | Amasaman | 13 | 12 | 25 | Pokuase | 12 | 13 | 25 | Oyarifa | 12 | 13 | 25 | Abokobi | 12 | 13 | 25 | Afienny | 13 | 12 | 25 | Dawhyenya | 13 | 12 | 25 |
| Communities | Males | Females | Total | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gbawe | 12 | 13 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Weija | 13 | 12 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Amasaman | 13 | 12 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pokuase | 12 | 13 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Oyarifa | 12 | 13 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Abokobi | 12 | 13 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Afienny | 13 | 12 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dawhyenya | 13 | 12 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Level 5 Educational Background | Majority of the respondents’ level of education was Senior High/ Vocational | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Source: Field Survey, 2017

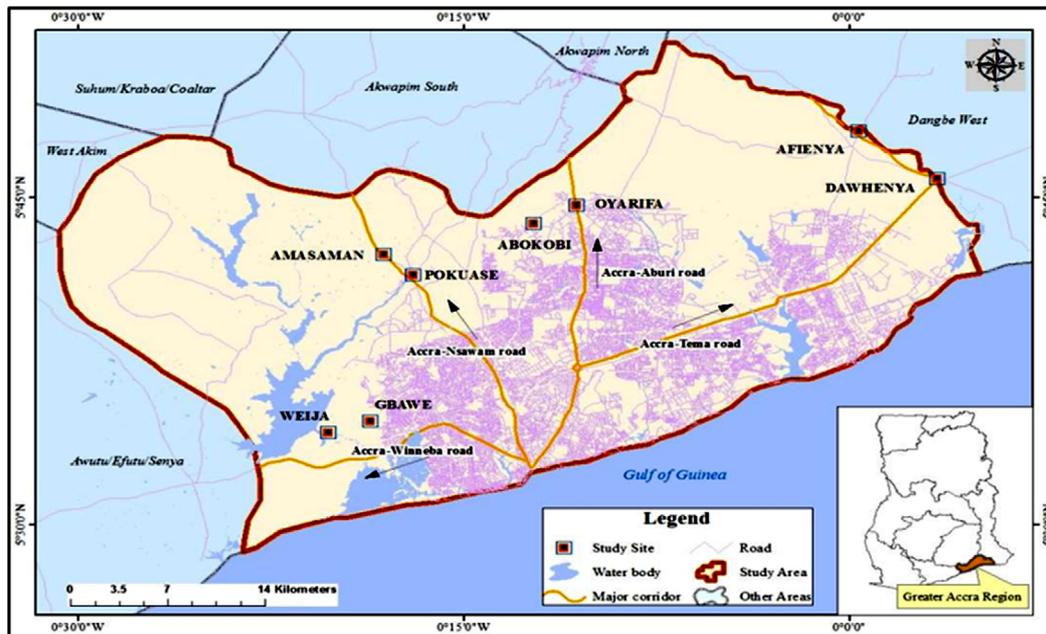


Figure 1. Map of the Study Area
 Source: RS/GIS LAB, 2017

First level involved identification of the four development corridors based on major road arteries into the city. These are the Western corridor (Accra to Winneba axis), Northern corridor (Accra to Nsawam axis), North-Eastern corridor (Accra to Aburi axis) and Eastern corridor (Accra to Tema and beyond). The second level was the selection of two residential communities within corridors. Gbawe and Weija for the Western corridor, Pokuase and Amasaman in the Northern corridor. Oyarifa and Abokobi in the North-Eastern Corridor and Afienya and Dawhyenya from the Eastern Corridor. The selection of these communities in the four corridors is due to the rapid residential developments. The third level was the selection of households within communities at these corridors. In all 50 households were selected from each of the four corridors with 25 households each. The fourth level involved selection of households for questionnaire administration. At this level gender was mainstreamed as both males and females were given equal opportunities to be interviewed.

Study Area

Data and Data analysis

The study employed the use of both primary and secondary data. Focus group discussions (primary stakeholders) were conducted in the selected peri-urban areas of GAMA due to their specialized knowledge on the issue. In-depth interviews were also conducted in the selected sprawl areas in the peri-urban areas to inquire about the extent of the impact of the sprawl on their livelihoods. Direct observation was employed.

Additionally key informant interviews among traditional leaders, Director of Environmental Protection Agency, Municipal authorities, youth groups and Real estate developers were conducted. Issues that related to the drivers of urban sprawl and its impact on their livelihoods formed part of the discussions. Secondary data sources comprised information from journals, articles, books, newspapers, publications on urban sprawl that are considered relevant to the study, satellite images, aerial photographs, Government

publications, organizations' database and websites.

Remote Sensing Data Application and Analysis

The study presents the analysis of land use and land cover change in GAMA for the period 1986, 1991, 2008 and 2016. Datasets were obtained from the United States Geological Survey (USGS) Earth Resources Observation Systems data centre. Landsat Thematic Mapper images were geo-referenced to the Enhanced Thematic Mapper images to allow for accurate pixel by pixel comparison during the change detection analysis. Cloud free images were atmospherically corrected.

The study employed land use classes such as dense vegetation, settlements, water bodies, grassland/shrubs and open areas. The images for each period were independently classified using a supervised technique based on the maximum likelihood algorithm which used a probability density function to assign a pixel to a specific class.

Change detection analysis using pixel by pixel comparison was used to identify and quantify the transitions between the classified time series images. Classified images for year 1986 were first compared against 1991 and 1991 against that of 2008. Finally, 2008 classified images were compared with 2016. This comparison was done first by considering

the rate of land use and land cover (LULC) changes in GAMA. The change detection statistics showing the transition in land use between the images were derived and noted.

Accuracy assessment was done to compare the classified image to another source of data considered to be accurate or ground truth.

Results and Discussions

Spatio-temporal analysis of land use and cover change of GAMA for the years 1986, 1991, 2008 and 2016

The Greater Accra Metropolitan Area has undergone changes in terms of land use as a result of urban sprawl. The year 1986 was a period of stabilization and recovery with growth and transition into a lower middle income economy. Many policies of the economy during the period 1991 were geared towards developments. Land use planning was not strictly complied leading to uncontrolled gradual developments on vacant land sites and encroachment of reserves areas.

In 2008, there were poverty reduction policies by the then government, such as National Health Insurance Scheme, Single Spine Salary Structure and Youth Employment Programme. These policies were meant to stabilize the economy thereby improving people's standard of living. Many people continued to put up

TABLE 2
Change Detection Statistics of GAMA from 1986 to 2016

| CLASSES | 1986-1991 | 1991-2008 | 2008-2016 |
|------------------|-----------|-----------|-----------|
| Water Bodies | 12.32 | -5.50 | -6.87 |
| Dense Vegetation | -343.80 | -42.92 | -226.98 |
| Open areas | 316.18 | 81.19 | -120.29 |
| Grassland/Shrubs | 484.70 | -419.47 | 54.40 |
| Settlement | 316.18 | 81.19 | 120.29 |

Source: Author's Construct, 2017

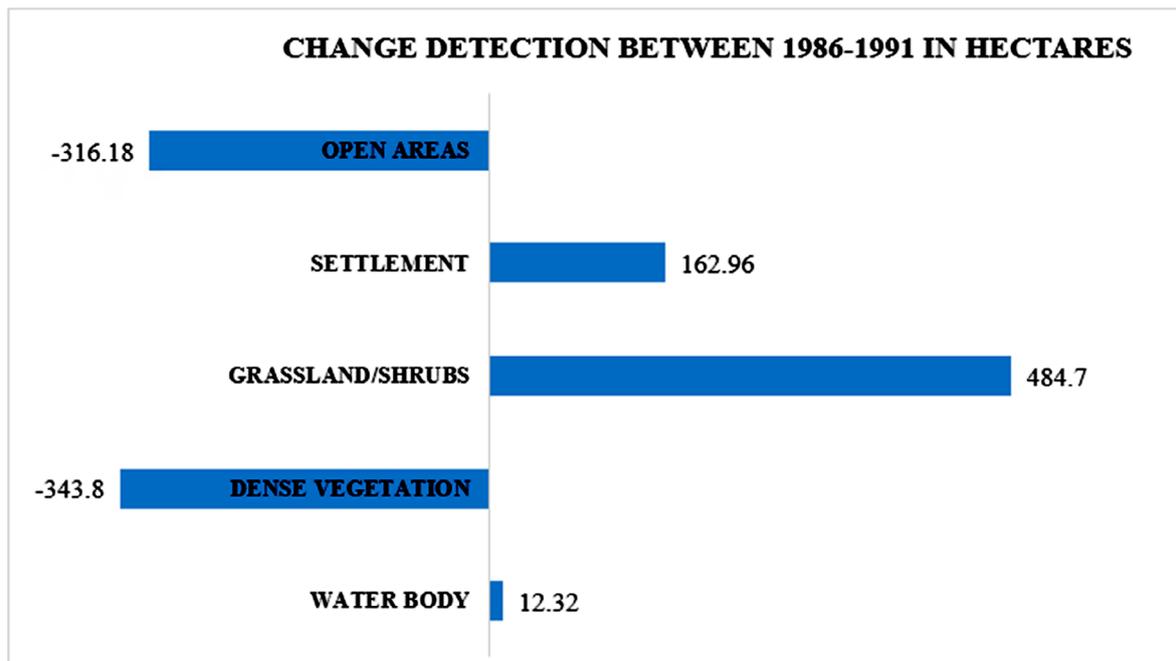


Figure 2. Land use and Land cover Change Detection between 1986- 1991 in Hectares
 Source: Author’s Construct, 2017

residential developments which contributed to urban sprawl. Residential developments continued to sprawl into the urban fringes due to urban sprawl.

The general trend of the classified images of GAMA indicates that the settlement continues to increase over the years. This is because of population growth which has resulted into urban sprawl. Table 2 shows the change detection statistics of GAMA in the land use/land cover change classes with specific percentages.

Dense vegetation also has decreased drastically as compared to grasslands/shrubs. Many people are encroaching natural reserves for the construction of residential buildings with institutions backing this illegal act. Areas around water bodies have been encroached due to the sprawl of human settlement and this has contributed to flooding in the city endangering many lives. Accuracy assessment is done due to its relevance in any image classification as it compared classified image to a data source that is found to be accurate or ground truth data.

From the figure 2, between 1986 and 1991, there were some changes in the features on the ground.

Settlement increased in size by 162.96 hectares with dense vegetation decreasing by 343.8 hectares. This clearly showed that settlement was gradually competing with dense vegetation. Vegetation was being cleared for residential purposes especially in the peri-urban areas of Accra. Open areas also decreased in size between these periods and there was no decrease in the area pertaining to grassland/shrub and water body.

However, there were developments before 1986 which necessitated the revision of the Accra-Tema Metropolitan Area boundary now Greater Accra Metropolitan Area (GAMA) as the city expanded. Development took place ahead of the change in the boundary which led to the demarcation of the Accra-Tema Metropolitan Area boundary. This was because of the increasing space requirement from one period to the other and so the metropolitan boundaries needed to be shifted as shown in Fig. 3.

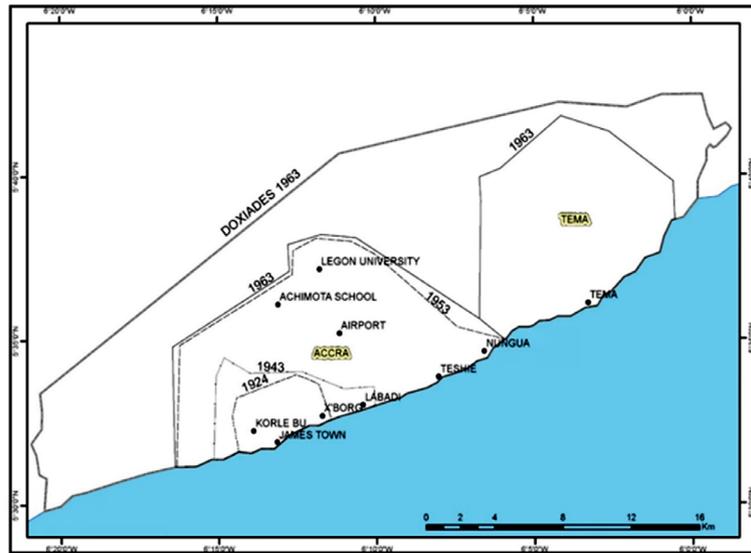


Figure 3. Changing Municipal Boundaries of Accra-Tema Metropolitan Area from 1924-1963
Source: Plan Consult, 1989

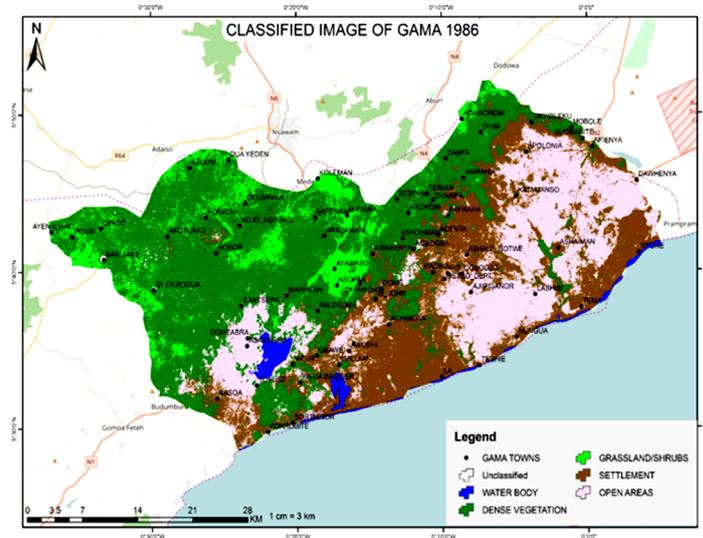


Figure 4. 1986 Land Use/Land Cover Map of GAMA
Source: RS/GIS LAB, 2017

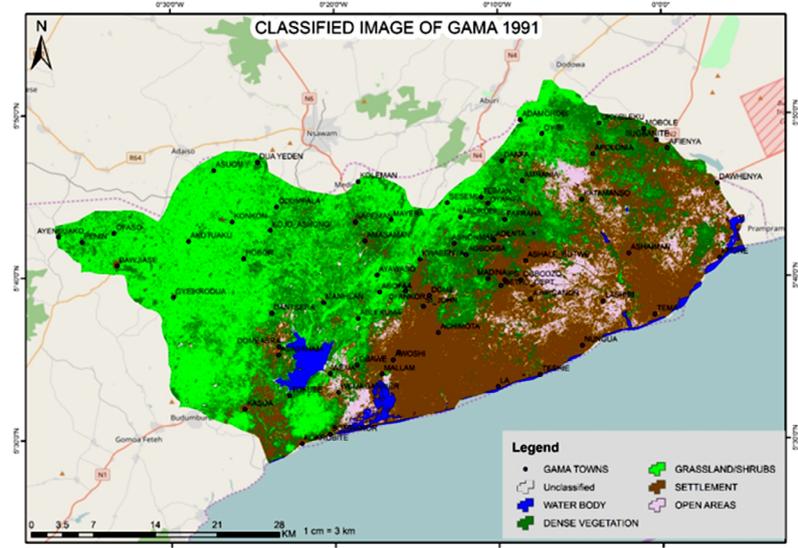


Figure 5. 1991 Land Use/Land Cover Map of GAMA
Source: RS/GIS LAB, 2017

Figures 4 and 5 show 1986 and 1991 land use/land cover map classified images respectively for GAMA and provide basis for comparison. During the 1980's GAMA began to experience rapid population growth. Areas such as Tema, Adenta, and Gbawe experienced increased residential developments. In that period, areas such as Amasaman and Oyarifa were mainly covered with dense vegetation and grasslands/shrubs with few residential developments. The country experienced economic recession in the early 1970's and mid 1980's which had negative impacts on Accra's development. This affected employment opportunities particularly in the formal sector of the economy.

However, this situation at hand affected many people's source of income and hence residential development was not much at that time. A lot of peri-urban areas of GAMA used to have dense vegetation and most people used to farm on vast lands both for domestic and commercial purposes. Figure 5 indicates Land Use/Land Cover Map of GAMA in 1991.

The land use change detection of GAMA between the year period 1986 and 1991 indicated a percentage change in the classes as shown in Table 2. The classes which include water body, dense vegetation, open areas, grasslands/shrubs and settlements has been compared to know the rate of land use change for the various time periods.

During the 1990's a lot of people migrated to the city centres to improve their standard of living and this led to congestion and population growth of Accra. This was because Structural Adjustment Programme (SAP)/Economic Recovery Programme (ERP), embarked on by Ghana under International Monetary Fund (IMF) and World Bank sought to stabilize the economy, enhance trade liberalization,

promote an economy where hard work pays, removal of subsidies in health and education, tax controls, realistic exchange rates and reform the financial sector. In addition to that, there were policies such as licensing the informal foreign exchange market into 'forex bureau', and improvement in the management and decentralization in the public sector. It was evident that the economy at that time was geared towards development and therefore restructured. The spatial planning of Accra was beset with numerous challenges with haphazard developments of building which led to urban sprawl and slum developments. Land use planning and development was not strictly enforced as many buildings sprang up in vacant land sites, open spaces and road reservations were encroached. Most residential developments sprang up around areas liable to floods and along drainage ways and this became a challenge to urban development (Larbi, 1996).

From Figure 5, peri-urban areas like Amasaman, Pokuase, Oyarifa, Abokobi and Kwabenya used to have intense dense vegetation and a little grasslands/shrubs. Settlements was not much seen at that locations during that time. There was a change in Fig. 5, which indicated decrease in dense vegetation with grasslands/shrubs occupying most lands. People started putting up residential buildings in the peri-urban areas. This showed how farmlands were converted to residential use. Peri-urban areas like Katamanso, Gbawe started to develop due to the movement of people from the city centres as a result of congestion and pressure on resources and open areas were also competing with dense vegetation as shown in the classified image. From the change detection statistics in Table 2, comparing grassland/shrubs, settlement,

dense vegetation and open areas witnessed difference in the image classes. First of all, the change detection analysis between the years 1986 to 1991 showed that dense vegetation has decreased by 343.80% which was quite massive. This was a clear indication of how urban sprawl negatively impacted on dense vegetation and so from 1986 to 1991. GAMA continued to decrease in open areas (316.18%) as indicated in Table 2 and this posed threat to livelihoods in the ecosystem. Urban sprawl is a factor that contributes to decrease in dense vegetation in the peri-urban areas of GAMA as many people clear vegetation for the construction of buildings mostly for

residential use. Activities by institutions such as real estate developers and traditional leaders contribute to the decrease in dense vegetation. These institutions are active in the sale of lands for construction of residential developments and this serve as a threat to dense vegetation as they are substituted for other land use. The creation of various road corridors increased expansion of human settlement as urban sprawl occurs around major road axis. Figure 6 shows the change detection analysis of GAMA in hectares. Settlement continued to increase in area during this period by 386.7 hectares as shown in Fig. 6.

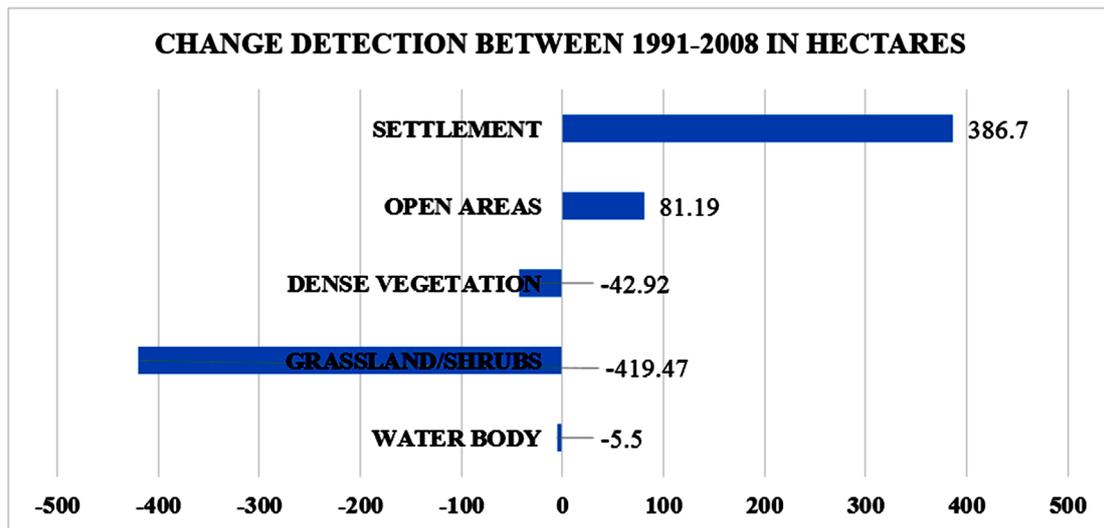


Figure 6. Land use and Land cover Change Detection from 1991-2008 in Hectares
Source: Author's Construct, 2017

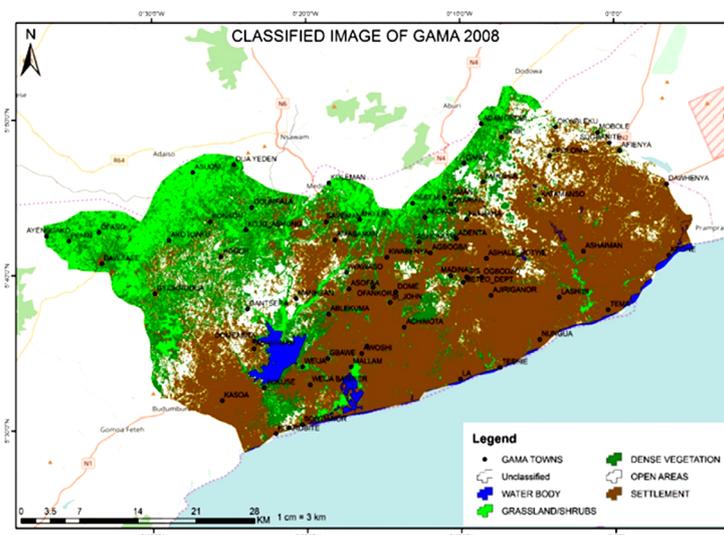


Figure 7. 2008 Land Use/Land Cover Map of GAMA
Source: RS/GIS LAB, 2017

There was an increase in open areas (81.19 hectares) and this was because dense vegetation experienced a decrease in size during this period by 42.92 hectares as shown in Fig. 6. Comparing this period to that of 1986 to 1991, it was observed that water bodies decreased in size (5.5 hectares). This was because, many people started encroaching wetlands by putting up their residential buildings around them. Most of the residents do not have building permits. Grassland/shrubs also decrease in size by 419.47 hectares due to residential developments. The spatial result of Figure 6 can be expressed in the Land Use/ Land Cover Map of GAMA in 2008 as shown in Figure 7. Residential developments as a result of urban sprawl caused an increase in settlement from 162.96% between 1986 and 1991 to 386.70% between 1991 and 2008 per the change detection statistics in Table 2. Grassland/shrubs during this time period decreased by 419.47% which indicate the rate of increase in built-up areas for residential use in the peri-urban areas. Areas such as Dawhyenya, Katamanso and Kpone witnessed massive residential developments due to urban sprawl as shown in Fig. 7. Many people who preferred a serene environment relocated from the inner cities to the peri-urban areas and that increased the rate of urban sprawl. There was a percentage change (5.50%) in water body during this period as shown in Table 2. In view of that, many people started developments around wetlands, water bodies and areas liable to flooding and a typical example of residential developments around the Weiya dam. Furthermore, the road axis of Accra to Nsawam has witnessed massive residential developments because it is a highway to Kumasi and its environs as shown in Fig. 7. Many people were seen engaging in road

side and home base businesses to support their income. Dense vegetation continued to decrease affecting livelihoods in the ecosystem.

The introduction of poverty reduction policies such as National Health Insurance Scheme, Youth Employment Programme, Single Spine salary structure and others by the then government sought to stabilize the economy thereby improving people's source of income and standard of living. During this period, investor confidence was boosted for the economy and many people started up residential developments in the peri-urban areas. The establishment of the Central University College at Dawhenya on the Accra-Tema and beyond axis attracted residential and hostel development by entrepreneurs especially real estate developers for students and staff of the university. Commercial drivers on the other hand have taken advantage of residential development to improve their standard of living by conveying passengers to their destinations for a fee in the peri-urban areas. Figure 8 represents the change in area (Hectares) between 2008 and 2016.

From the figure 8 between 2008 and 2016 settlement increased drastically due to population growth.

Activities of institutions such as traditional leaders and real estate developers promoted the sprawl of human settlement. They mostly sell lands to people for the construction of residential buildings. Traditional leaders are custodians of the lands and hence active in the land conversion process. Most real estate developers buy large tract of lands in the peri-urban areas and build residential houses for sale with the aim of getting profit. The area of settlement increased by 299.73 hectares with other features decreasing as shown in Figure 8.

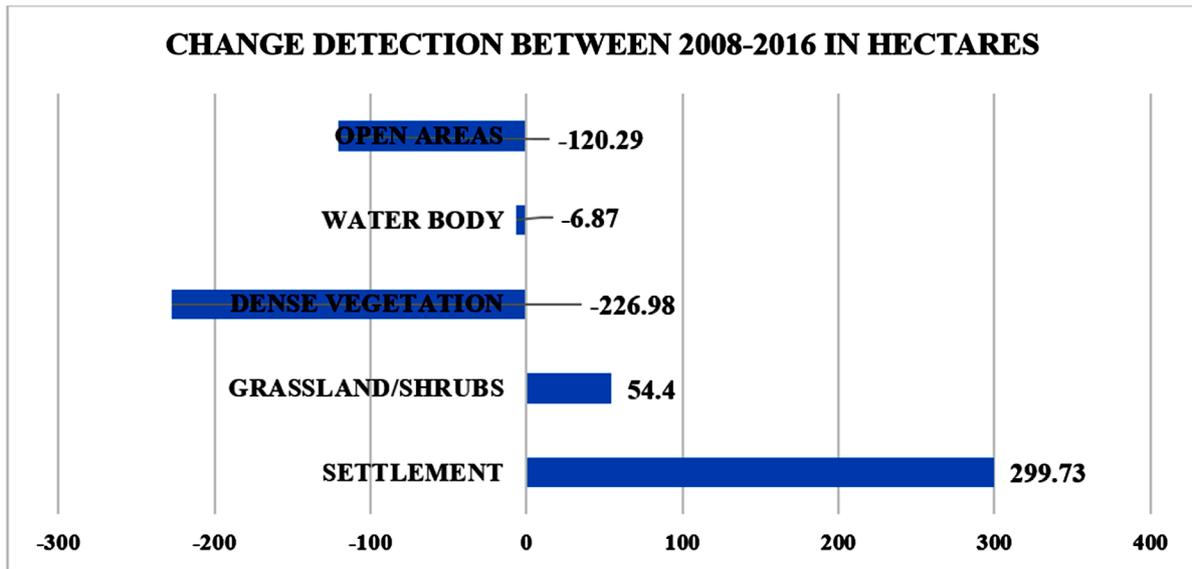


Figure 8 Land use and Land cover Change Detection between 2008 and 2016 (Hectares)

Source: Author's Construct, 2017

However, there were decreases in the areas of open area by 120.29 hectares, water body (6.87 hectares), grassland/shrub (54.4 hectares) and dense vegetation (226.98 hectares) as clearly shown in Figure 8. This showed a picture of how urban sprawl impacted positively on settlement at the expense of the features such as water body and dense vegetation.

Finally, the change detection analysis shows how urban sprawl impact on the sustainability of livelihoods. For instance, farmers resort to other livelihood strategies when their

farmlands are converted to residential use which affect their source of income. Most lands are family lands and farmers working on lands which do not belong to their family have to move from the lands when the time is due to be sold for construction of residential and non-residential developments.

By contrast, real estate developers and traditional leaders gain huge sums of profit from the land market due to urban sprawl. The spatial result can be expressed in Fig. 9.

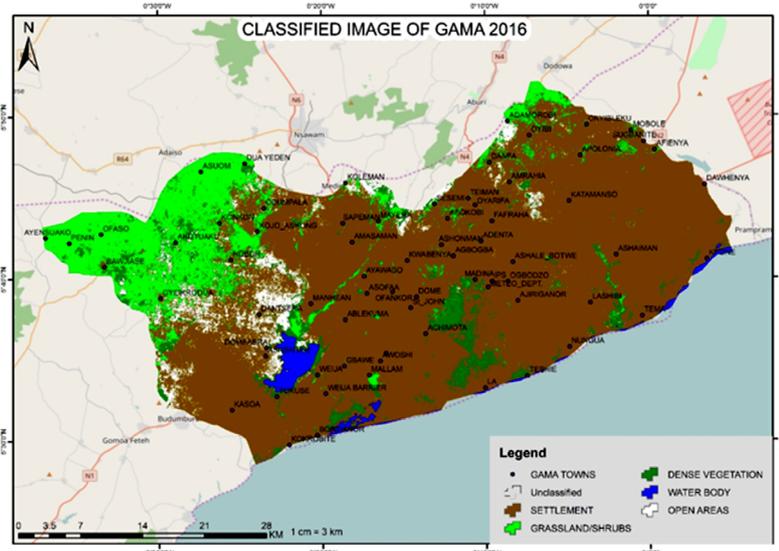


Figure 9. 2016 Land Use/Land Cover Map of GAMA

Source: RS/GIS LAB, 2017

The change detection statistics between the years 2008 and 2016 as shown in Table 2, indicated that dense vegetation and grassland/shrubs have decreased by 226.98% and 54.40% respectively. Settlement has increased as high as 299.73% with a decrease in the percentage of water body and open areas which represents 6.87% and 120.29% respectively as shown in Table 2. The peri-urban areas of GAMA have witnessed massive residential developments. This is because many people are of the view that prices of lands in the peri-urban areas are affordable as compared to those in the inner cities and resort to buy large tract of lands for residential purposes. Real estate developers take advantage of that and purchase lands for residential developments for people on a payment plan and in return get huge profits from their activities. The decrease in dense vegetation also affects livelihoods in the ecosystem and people's livelihood sustainability.

The establishment of non-residential developments such as West Hills Mall at Kasoa near Weija on the Accra-Winneba axis has motivated many people to put up their residential buildings in the peri-urban areas since many people can get access to goods and services without driving to the Central Business District of Accra. Many residents along this axis use to farm a lot due to the availability of lands for farming but with residential development as a result of urban sprawl, this has caused land use change.

Peri-urban areas such Katamanso, Ashiaman and Adenta have witnessed massive residential developments as indicated in Figure 9. Dense vegetation in these areas is absent as a result of residential developments as clearly shown in Figure 9.

From the results of the change detection

statistics shown in Table 2, it should be noted that natural reserves should be kept away from encroachers and those who go contrary to the rules should be sanctioned to serve as a deterrent to others. Urban sprawl if left unchecked will completely erode livelihoods that is directly affected by its impact.

Patterns and drivers of Urban Sprawl

The survey revealed that all respondents in the four road corridors of GAMA answered in the affirmative when asked whether they had experienced drastic change in land use for the past years. Respondents were further asked to identify the changes they have seen in the land use. About 47% of the respondents who are the majority said farmlands or sites have been converted to residential use. Twenty percent of the respondents indicated that few people are into farming. About 32% of the respondents indicated loss of open spaces and only 1% of them indicated deterioration of infrastructure. Additionally it was discovered that the conversion of farmlands or sites into residential use was as a result of haphazard housing developments in the peri-urban areas of GAMA. This trend is common in African cities such as Addis Ababa in Ethiopia which has seen land use change due to the rapid growth of the city, ineffective land use control and this situation has led to settlements spreading uncontrollably into the fringe farmlands (Kassa, 2013).

The few people who are into farming support the fact that peri-urban lands are dwindling in size due to residential developments and farmers mostly farm on lands available that have not been developed yet along river banks, drains and catchment areas (Appiah et.al, 2014). Land use change as a result of residential developments has reduced the

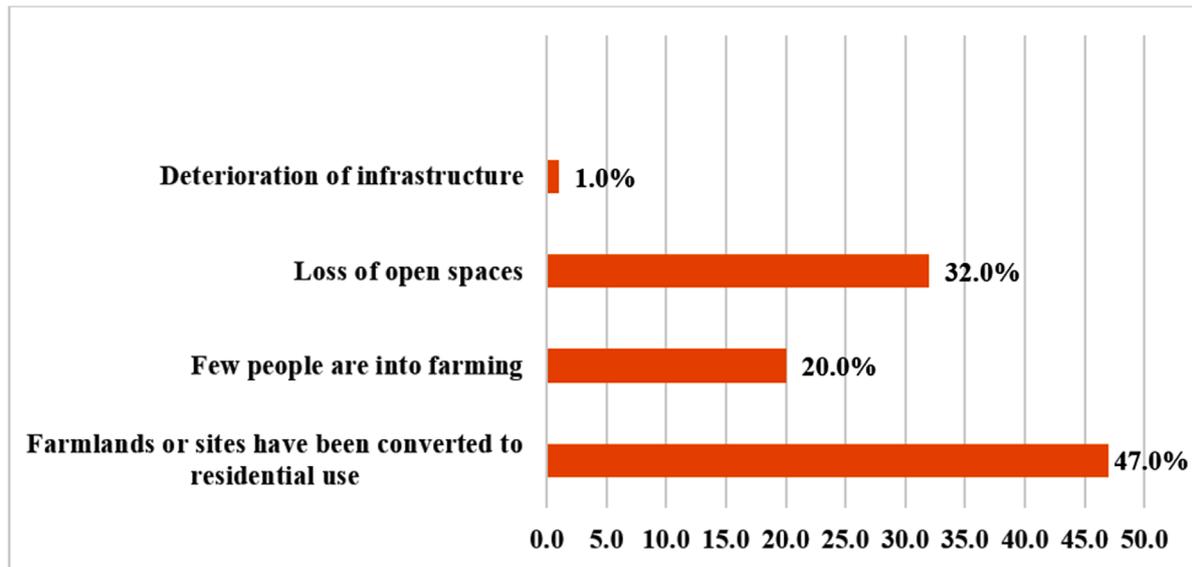


Figure 10. Changes perceived by respondents with respect to land use and land cover related issues
Source: Field Survey, 2017

number of farmers in the peri-urban areas. The lands are needed most for residential developments. These changes confirmed why all the respondents said they have experienced land use change. Figure 10 indicates the changes in land use that the respondents perceived.

Respondents were further asked to rank the reasons that motivated them to move to their community of residence. The reasons provided were access to land, preference for serene environment and housing affordability. The study revealed that out of the 200 respondents, 140 of them ranked accessibility as the most important reason for moving into the community representing 70%. Thirty one (15.5%) of the respondents ranked housing affordability as the next reason for relocation into the community and 29 of them (14.5%) ranked preference for serene environment as the last reason for their movement into the community.

Access to lands in the peri-urban areas are easy as compared to the city centres. This is because large tracts of lands are available for residential use in the peri-urban areas

as compared to lands in the city centres that are mainly used for commercial purposes and other related activities. Population growth and urban expansion have made it possible for people to move to the peri-urban zones to buy large tracts of lands for residential purposes as lands in the city centres are very expensive as compared to the lands in the urban fringe. It was discovered during the survey that prices of lands in the peripheral areas such as Oyarifa, Dawhenya, Amasaman just to mention a few ranges between GHC 3,000 and GHC 15,000 which is less expensive than the prices of lands in the inner cities. Urban sprawl which had led to unplanned and uncoordinated urban expansion into the peri-urban areas have made lands easily accessible in the peri-urban areas of GAMA. The results of the study also indicated that real estate developers buy large tracts of lands in the peri-urban areas and resell it to people to develop into residential buildings or they build for people to buy. It was also discovered from the survey that the patronage of estate houses in the peri-urban areas was high. This was because a lot of the respondents indicated that buying houses

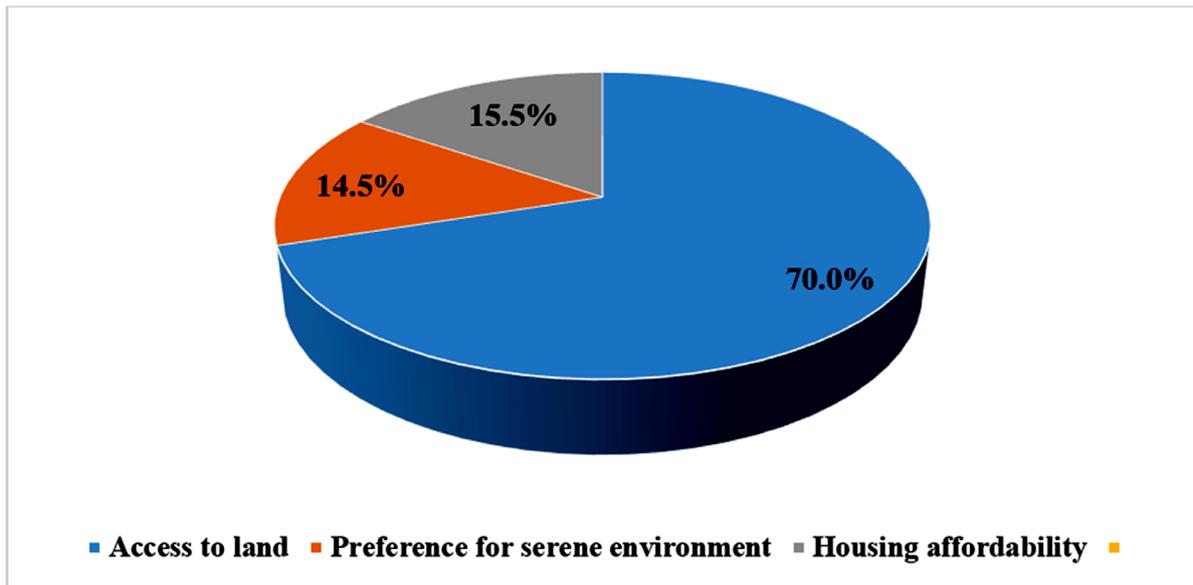


Figure 11 Reasons for Relocation
 Source: Field Survey, 2017

from real estate developers provided security for them as compared to acquiring lands from families and traditional authorities. This cannot be done in the city centres where lands are already scarce.

Again many people want to live in their own homes and not in rented apartments and therefore relocate to the peri-urban areas where they can have access to lands for residential use. A lot of houses in the inner cities are not affordable as compared to the ones in the peri-urban zones and therefore serves as a motivation for people to relocate to the peripheral areas. Unplanned residential developments in the peri-urban areas was due to people’s inability to afford accommodation in the inner cities. Their inability to rent accommodation in the city centres served as a motivation for them to relocate to the peri-urban areas. It also was observed from the survey that lands in the Central Business District of Accra had high values and due to that many people were motivated to move to the peri-urban areas where the land values were not high as compared to the city centres. Figure 11 shows the respondents reasons for

relocating to sprawling areas.

Effects of Urban Sprawl on Peri-Urban Livelihoods

Respondents were asked how urban sprawl has impacted livelihood sustainability in their communities or towns. About 40% of the respondents indicated that land disputes were major effects of urban sprawl in the peri-urban areas. Twenty three percent of the respondents also indicated loss of farmlands as the effect of urban sprawl. Approximately 20% of the respondents viewed unequal access to social amenities and 17% indicated traffic congestion as the effects of urban sprawl. The majority of the respondents who viewed land disputes as the major effects of urban sprawl could be attributed to number of land litigation issues that occurred in the peri-urban areas. This goes to confirm Peprah’s (2014) view that conflicts on land use emanate when cities begin to sprawl into the peri-urban areas.

In an interview with a traditional leader at Dawhenya it was pointed out that lands in the peri-urban areas of Accra are mostly in the hands of families and stools. It was further

explained that land disputes occur when a piece of land is sold to different people by a family member at the same time and this brought about conflict between people involved and cases like these mostly ended up in the law court to claim rightful ownership of the land. A situation was cited where the same piece of land was sold four times to individuals by the same family members which resulted in conflict between the individuals and land guards. The land dispute led to the death of one of the people who bought the lands. This situation become worrisome when individuals have started developing the lands and have put assets on it. The informal land market in the peri-urban areas are associated with problems like land conflicts and litigation, bottlenecks and uncertainty.

The survey captured some respondents who were of the view that one of the effects of urban sprawl was loss of farmlands. Residential development in the peri-urban areas led to the conversion of farmlands to residential land use. The results of the study confirmed the argument by Qi and Lu (2008) that urban sprawl resulted in series of social problems such as encroachment of farm lands and open spaces which is against the principle of sustainable development. This confirmation was not different from the assertion by Owusu (2013) that loss of farmlands lead to limited employment and concentrated poverty. Food security is also under threat when farmlands are lost for residential developments (Peprah's 2014). Food insecurity due to loss of farmlands to residential developments may lead to hunger and high cost of food produce.

Furthermore, the respondents who indicated unequal access to social amenities as the effect of urban sprawl were of the view that most peri-urban areas were neglected in terms of

infrastructural development. The respondents indicated that some of the areas in the zone were faced with a challenge of extending electricity, potable drinking water, effective waste management, roads and other social amenities that will sustain their livelihoods. Similar argument were made by Barnes et al., (2001), that the sprawl of a settlement poses a significant threat to inhabitants in the peri-urban areas as ground water supplies, aquifers as potable sources of water are altered for residential development and non-residential developments which sometimes results in high treatment cost and poor water quality affecting livelihoods sustainability.

Traffic congestion as indicated by the respondents were as a result of the long hours spent on roads by vehicles commuting to the inner cities. According to one trader at Pokuase, she has to spend long hours on the road before getting to the city centre to conduct her business and this has affected her income. Similarly, a study by Qi and Lu (2008) confirmed that urban sprawl in China is a critical land use problem as it contributes to traffic congestion, long hours of commuting and high levels of fuel consumption which affect livelihood sustainability in the peripheries. The respondents confirmed that the long hours spent on driving generate environmental problems such as air pollution which serves as a threat to their health. However, sustainable transportation is key to sustainable development since many people will not waste precious time commuting long distances to their work place.

A study by European Environmental Agency (2006) confirms the argument that traffic congestion in the peripheries due to urban sprawl creates a challenge for household spending for moving from their homes to

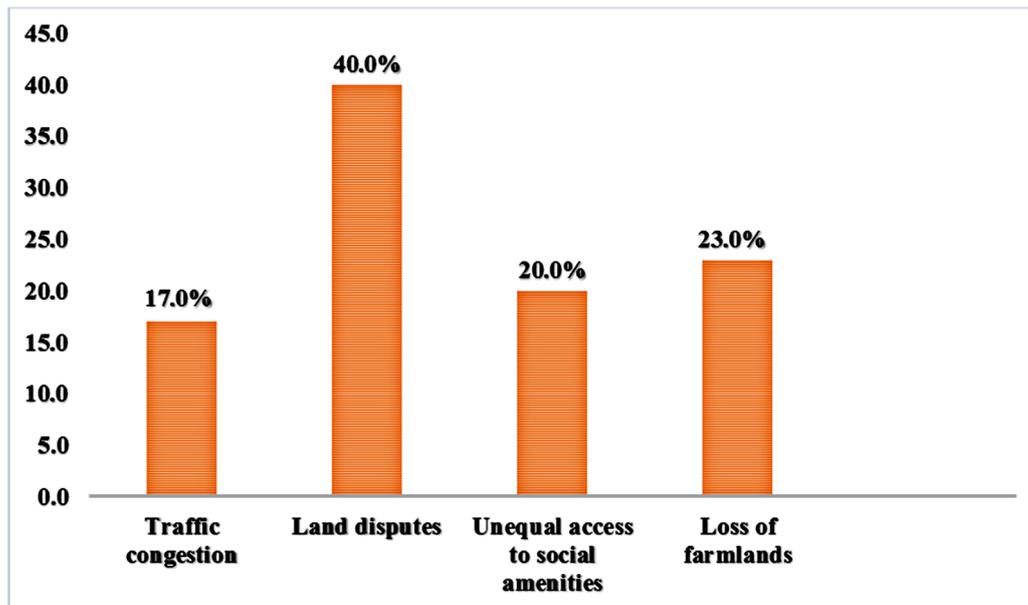


Figure 12. Effects of Urban Sprawl in Peri-Urban Areas

Source: Field Survey, 2017

work over long distances and the use of public transport and mass transit system are hindered due to the use of private cars by most inhabitants. This situation is not different from what is happening in the peri-urban areas of GAMA and it was discovered to a large extent during the survey that the effects of urban sprawl in the peri-urban areas was a serious challenge and needed a critical attention by government and city authorities. The results from the survey contradicts Cowell's (2011) assertion that urban sprawl was a positive phenomenon in the United States since it enhances higher standard of living due to the preference for household privacy in homes located away from the inner cities.

Consequences of Residential Developments on the Ecology

The survey revealed that 42.5% of the respondents indicated that urban sprawl in the peri-urban areas resulted in clearance of vegetation for residential purposes.

Moreover the respondents were of the view that cutting down of trees to get space for residential developments often affected

the ecology badly because trees serves as windbreak. This resonates with Stone et al's., (2010) view that, trees play significant role in minimising floods and storm water runoff in the cities and cutting them down to get space for residential developments have negative impact on the ecology. According to an interview with a woman who used to be a traditional birth attendant, she indicated that she used go to areas not far from her house to uproot plants to prepare medicines for pregnant women to enable her generate income but due to urban sprawl all these indigenous medicinal plants and rare species are lost and one needed to go to the interior to search for these species. Also 31.5% of the respondents indicated that increased population in the sprawling areas brought about heat and emission of fumes from cars commuting on the high ways. It was observed during the survey that many people have private cars and spent long hours driving on roads to the inner cities to transact their businesses and this contributes to climate change through the emission of exhaust gases. Again, the results of the survey was in line with Frumkin (2002) argument that

automobile traffic and long hours spent on roads to the inner cities from the sprawling areas contributed to climate change due to the emissions of greenhouse gases such as methane, nitrogen oxides and volatile compounds from motor vehicles. For instance a respondent at Dawhyenya indicated that he spend more than two hours in traffic before reaching the Central Business District in Accra. This serves as a threat to human health

including direct heat and respiratory disorders. Additionally, as the survey revealed, urban sprawl resulted in the encroachment of wetlands and most of them lost their purposes to residential developments and the responses were represented by 12.5% of the respondents. Plate 1 and 2 depict one of the incidents observed during field work at the Sakumono Ramsar site.



Plate 1. Encroachment of Lands around the Sakumono Ramsar Site using a Pillar to signify ownership of a supposedly protected area



Plate 2. Encroaching Portion of the land at the Ramsar site with a Wall

Conclusion

Peri-urban areas of GAMA are experiencing increase residential developments. Using remote sensing satellite imagery classification from 1986 to 2016, it is evident that there has been percentage increase in settlement by 120.29%. The study has provided empirical evidence that demand for private ownership of houses and high prices of land in the city of Accra and activities of real estate developers lead to an outward movement of people to the peri-urban areas and a rippling effect on livelihoods sustainability. Below are some specific recommendations to curb urban sprawl:

Proper Planning Policies

The institutions involved in land management in the country should properly control and monitor the trends in land use/ land cover change and devise comprehensive planning strategies to control the haphazard, unplanned and uncoordinated urban expansion into the peri-urban areas. City planners and Local Government Authorities such as Town and Country Planning Department should provide proper planning strategies to enhance the city's development. Policies such as division of areas into zones to ensure orderly pattern of development is appropriate.

Affordable Housing

Residential developments in the inner cities of Accra should be made affordable to enable people to rent. It was discovered from the survey that there was housing shortage and high rentals of houses in the inner cities of Accra. These rather encourage people to move to the peri-urban areas.

The government should intervene by paying

much attention and directing resources in order to maintain the affordable housing projects

Development of Eco-City Model in Ghana

The eco-city model is designed in such a way that residential areas are mixed with green space, parks and gardens, trees of different species and must be complemented by water features like water fountain and small ponds. A well planned eco-city will provide aesthetic environment and protect the environment from climate change.

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