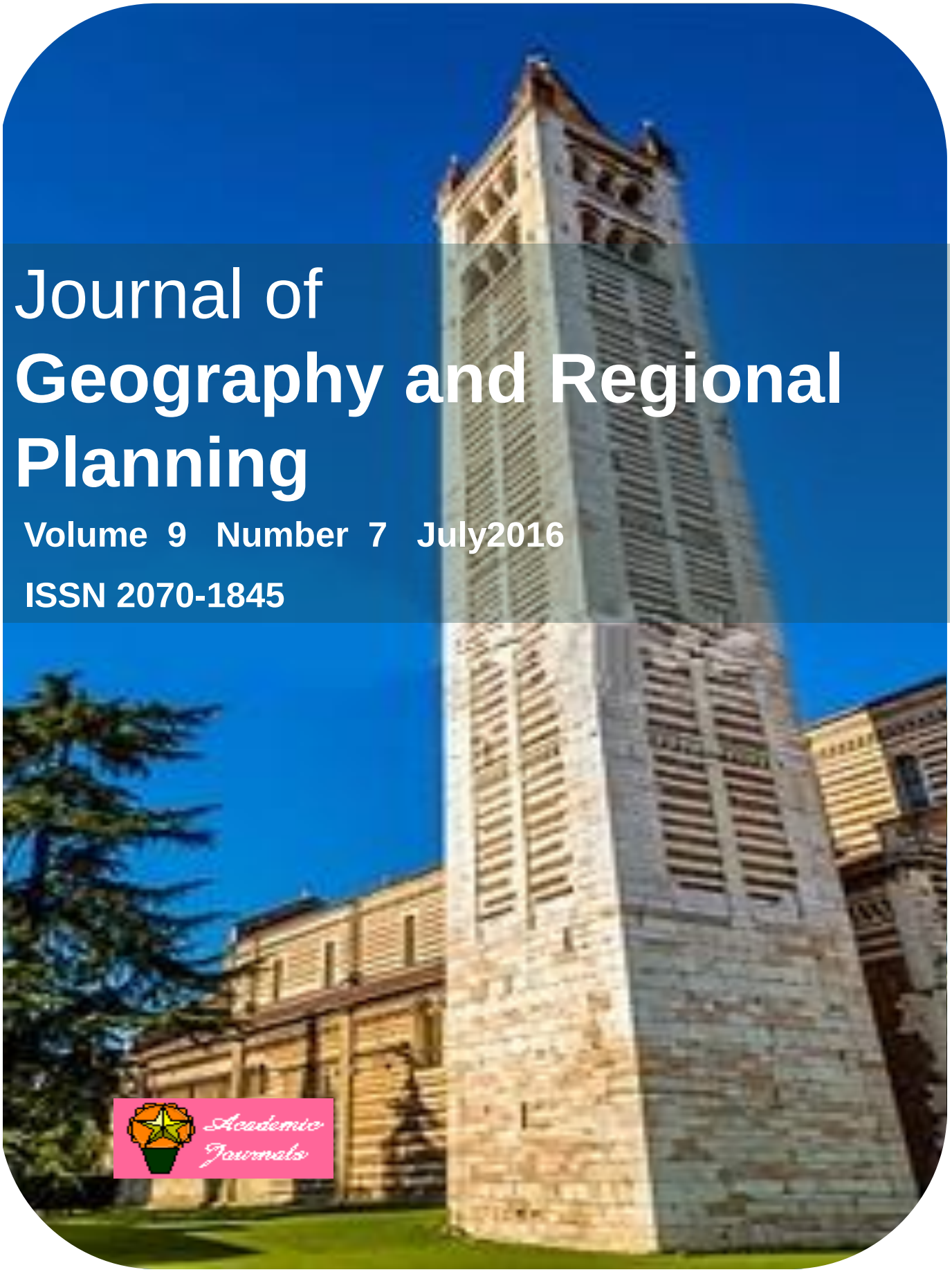

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Table of Contents: Volume 9 Number 7 July 2016

ARTICLES

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Full Length Research Paper

Assessment of the impacts of gully erosion on Auchi settlement, Southern Nigeria

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Gully erosion in Auchi has become a serious environmental disaster to the town and its neigbouring villages. It has threatened and even destroyed many of the urban infrastructure, properties, and lives as well as retarding the social and economic growth and development of the town. The research work therefore assesses the impact of gully erosion on Auchi town with the aid of data derived from satellite imageries, Global Positioning System (GPS), base map, as well as direct field observation. The approach involve digitizing the imageries along the gully path on the Arcmap to establish the extent of loss of land due to gully erosion as well as creating contour map, Digital Terrain Model (DTM), slope profile of the study area using the Digital Elevation Model (DEM) of the study on ArcGIS 10.1, Surfer10 and Global mapper softwares. Results obtained from the analysis of the imageries revealed that a total area of 37913m^2 was lost to gully erosion between year 2006 and 2012, and that the gully is expanding at an alarming rate of 6318.8m^2 per annum. By the year 2015, a total area of 15,9407m^2 is expected to be claimed by the disaster if no effective measure is taken to ameliorate the devastating effect. The research therefore, recommends channelling of runoff water to less risk areas, planting of trees and other vegetal cover, and public awareness campaign to enlighten the inhabitants on the need to control gully erosion.

Key words: Environmental disaster, impact of gully erosion, runoff water, urban infrastructure.

INTRODUCTION

Erosion and floods, especially in urban areas are fast becoming the most reoccurring disasters in many towns and cities of the world. Settlements, cities' infrastructure and farmlands are continually being destroyed by these hazards. Soil erosion is a single major process responsible for the lost of vast amount of soils worldwide as seen in the study of Murck et al. (1996).

Hughes et al. (2001) observed that one kilometre of gully would produce 10,000 cubic metres of sediment per Km^2 of land. They further emphasized that if such happens for a gully aged 100 years; the mean annual rate of erosion would be 1.5 tonnes per hectare per year.

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Onyegbule (2010) defined soil erosion as a process whereby the surface layer of the soil is detached and carried by agents of denudation and a lower in the soil is exposed leaving a topographic roughness on the resulting landscape. Jeje (2005) estimated that 531,417.6 and 329,436.5 tones of sediments were removed from gullies in Auchi and Ikpoba slope, Benin City respectively.

Gully erosion within settlements requires peculiar attention because of the threat it poses to buildings and other structures that endanger human lives. The gully in Auchi has posed numerous threats to the inhabitants of the area. Here it has caused many residential buildings and worship centres to collapse, destroying road networks and other infrastructure, and degrading land for commercial and agricultural purposes. It has been observed that more buildings are perching precariously on the edge of the stream channel. The present situation in Auchi despite the basement rock formation that comprises the Kukuruku Hills and other outcrops of rocks in Afemai land deserve urgent attention because of the destruction the gully has caused the people of the area.

Jimah (2006) emphasized that the supply of food and access to suitable farmland devoid of erosion threat is critical to sustaining the teeming population of the town. He further said that due to soil loss and depletion of food, from wind and gully erosion, thereby inducing discernment in agriculture crop productions, food scarcity, malnutrition and poverty. Jeje (2005) also identified gully erosion in Auchi, Efon-Alaye and Benin City and classified the gullies on their bases of physiographic locations such as hillslope, road aligned and valley side gullies. It has also been revealed in other studies that gullies appear to be urban phenomenon and has been occurring at unprecedented rates, creating numerous problems and resulting in huge economic, human and social losses in many cities in Southeast and Southwestern Nigeria.

More so, there are other recent reports on the impact of gully erosion in the area ranging from devastation of roads within the town and major roads linking Edo State to other states. This has attracted both regional and National attention, as they impedes the movement of goods and persons from one region to the other within the country, and further leading to loss of other valuable infrastructure. Other areas that gully erosion has devastated in Nigeria include Abariba (Abia State), Efom Alaye (Ekiti State) Nsukka and Ugwuaba area of Enugu state and Agulu Nanka gully site of Anambra State, NEST (1991). The problem of erosion, therefore, should not be seen in isolation, but likened to a cancerous cell that could become widespread and all pervasive.

Ehiorobo and Izinyon (2012) monitored soil loss to erosion in Edo State. Their work pointed out that gully erosion has been neglected because gully processes are difficult to study and difficult to control. Although gullies are usually striking, their small spatial extent generally renders them undetectable in most generally available topographical maps and low resolution imageries.

Onwuka and Okoye (2009) reported that the gully in Ekwulobia which started from flood water that flows down from Isuofia some hundreds of kilometres from Oko and Ekwulobia in South Eastern Nigeria is estimated to have a mean advance rate of 150 metres every 3 to 5 years. The years with mostly heavy rainfall and slides occurring in late October and early November are rare, but when they occur have devastating effects because they are generally atypical and so unexpected.

Akpokodje and Akaha (2010) reported that the initiation and development of gullies are facilitated by natural processes such as rainfall, topography, soil properties, and texture amongst others. Ogboi and Odeh (2012) in their study on erosion problems in Ika environs observed that erosion problems are more common in cultivated farmland, exposed/bare compounds, on poorly constructed road sites and in places of concentrated buildings and that area plagued by soil erosion has the vegetation cover removed either by cultivation or construction works or bush burning.

Ajaero and Mozie (2011) in their assessment of gully erosion menace in Agulu-Nanka area reported that Agulu-Nanka gully erosion area represents a wide area being eaten away gradually and continuously by landslide cum gully advancement processes covering the entire Aghori basin, which covers many communities in the region. Their work has also shown that, landslide resulted from floods and gully erosion in Nigeria cause death, loss of properties, and population displacement when they occur in densely populated area. Adekalu et al. (2007) and Okpala (1990) in their view, says the formation of gullies has become one of the greatest environmental disasters facing many towns and villages in Southeastern Nigeria. They further emphasized that the region is fast becoming hazardous for human habitation and that hundreds of people are directly affected every year and have to be relocated. Ehiorobo and Izyyon (2012) established that one of the main causes of rill and gully erosion in Edo State includes road construction with an inappropriately terminated drainage network, while damages done by surface runoff to the road may be limited and off site effects can be very severe. They added that the use of GPS to establish 3D control and total station instrument has proven to be effective in the measurement of morphological parameters of gullies.

Some studies have revealed that gully erosion and other forms of land degradations has huge implication on food supply to the affected community. For example, Al-Hassan and Momoh (2006) pointed out that soil erosion has huge impact on the production of food, thereby making it difficult to sustain the growing population of the affected towns brought about by urbanization. Ezezika and Adetola (2011) have indicated that despite the region's susceptibility to gully erosion, it can be prevented through enhanced public awareness programs and better land management practices.

Although the practices are insufficient to resolve the

huge gully erosion sites, and the practices can prevent the occurrence of other ones. They added that it is important for community leaders to organize awareness programmes that provide reliable information to the community on gully erosion mitigation strategies. Anejiounu et al. (2013) pointed out that mapping of areas of soil erosion risk is important in the erosion control measures, and from the foregoing, it has been established that erosion is a major threat to soil and water resource conservation in Southeastern Nigeria. Nwido and Ebinne (2013) further opined that various attempts made at controlling erosion in the region have yet to achieve a significant result.

Given that some information exist on the causes of gully erosion in Auchi, as revealed in the previous studies of Jimah (2006) and Jeje (2005), the study, therefore, assesses the impact of gully erosion on the settlement of Auchi, Estako West local government Area of Edo State, using GIS and Remote Sensing techniques. The specific objectives pursued are:

1. Identify the location of the gully erosion sites.
2. Accurately map the extent of the gully sites.
3. Assess the impact of the gully erosion on the various land uses in the study area between 2006 and 2012,

The study covers part of Auchi where the gully erosion has devastated a large area of land. It focuses on areas that the erosion is noticeable such as Warake road, Inu Umaru Street, Igbeadokhai Street, Hausa quaters, Zango and the plain of River Orle.

Geographical location of the study area

Auchi is located in the northern part of Edo state. It is approximately one hundred and thirty kilometers (130 Kms) away from Benin City, the capital of Edo state. It is located on the intersect of latitude 7°N and longitude 6°E in the tropics. Auchi is the headquarters of Etsako west local government. It is bounded to the north by by Jattu, to the south by Aviele, to the east by Iyakpi, and to the west by Owan local government area. Auchi is the administrative centre of Etsako West local government area and the seat of the Federal Polytechnic Auchi (Figures 1 and 2).

MATERIALS AND METHODS

The data used in this study include political map of Edo State, base map of the study area, digital elevation model of the study area, three satellite imageries of the study area (spot 7) as presented in Figures 3, 4 and 5, global positioning system (GPS) and soil samples of some selected gully sites of the study area.

Some of the approaches employed in the work include the integration of Geographic Information System (GIS) and Remote Sensing with use of Global Position System (GPS), Digital Elevation Model (DEM), direct field observation and oral discussion with the inhabitants to assess the impact of gully erosion on settlement, identifying the gully locations in the study area, establishing the various causes of soil erosion as well as projecting further impact of the gully erosion if nothing is done to mitigate or ameliorate its impact. The softwares used in the work include ArcGIS 10.1, excel sheet, surfer 10 and global mapper. Relevant literature such as published articles, journals as well as unpublished research works were consulted in the course of this work, to reveal an update of issues on gully erosion.

Data processing procedures

The first phase involve the combination of GIS and remote sensing through the use of the satellite imagery to map and assess the extent, impact and the rate of gully expansion between 2006 and 2012. The satellite imageries (spot 7) of 2006, 2009 and 2012 with 1 m resolution were acquired from spot image as shown in Figures 3, 4 and 5, respectively. Three years interval was taken in order to identify a significant increase of the gully between 2006 and 2012. The size of the area devastated by the gully in 2006 was determined by importing the imagery into ArcGIS 10.1 software environment. The area was then calculated by editing and digitizing along the gully edge and path on the satellite imagery using polygon features on the Arctool box and the area lost to the gully was automatically calculated in square meter in the attribute table of the software. Subsequently, the total area lost to the gully erosion between 2009 and 2012 was determined by repeating the same procedure on the ArcGIS 10.1 environment.

RESULTS AND DISCUSSION

Results from data was processed to ascertain the extent of the gully erosion in the study area between 2006 and 2012 as presented in Figure 6 showing the rate of expansion of the gully erosion. It can be seen from the graph that in the year 2006 a total area of 102,537m^2 was lost to the gully; in 2009 a total area of 119,481m^2 was claimed by the disaster while in the year 2012 the gully has covered an area of about 140.450m^2. The graph also reveals that by the year 2015 if urgent measures are not taken to address the menace, the gully is projected to destroy a total area of more than 150,000m^2. The expected claim is presented in Figure 7.

It is pertinent to note that the rate of gully expansion is on the increase annually at 6318.8m2. The devastated areas can be seen from the imageries of 2006, 2009 and 2012. This continuous increase in gully development is mainly as a result of the observed human activities in the study area that ranges from the improper channelling of runoff water, haphazard erection of buildings on steep terrain and water ways, to dumping of refuse on waterways. Others include poor construction evident by absence of anticipated runoff in the design of roads that have been eroded by the menace of gully as the roads were constructed without drainages to channel the runoff into the nearby stream.

The result presented in Figure 8 shows areas vulnerable to the gully erosion in which many buildings, trees, open space as well as access roads falling within the perimeter marked as vulnerable area. Such vulnerable

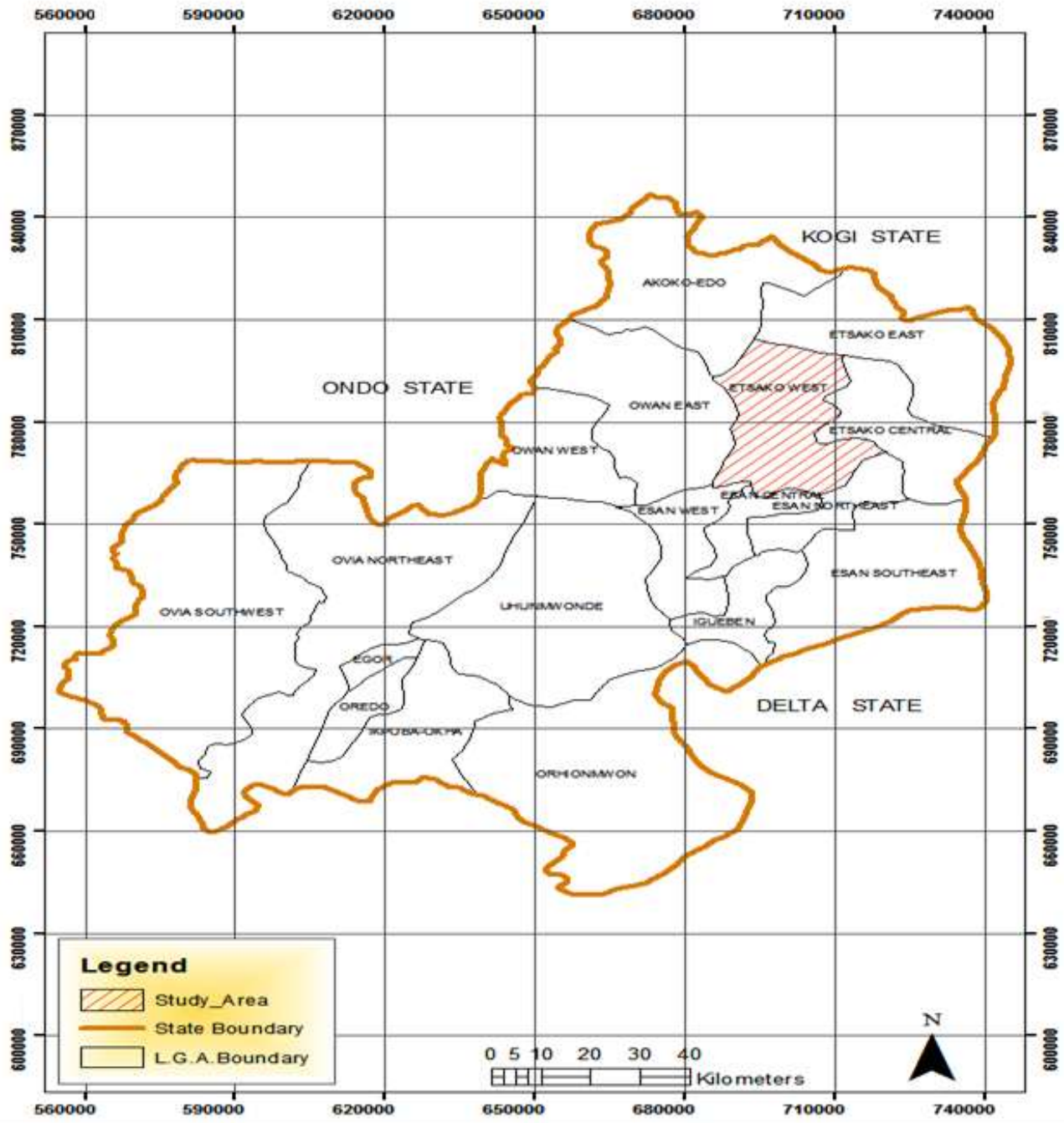

Figure 1. Edo State showing Etsako West LGA (Source: Produced from Arcmap10.1, 2013).

areas on the map are marked by buffering 1000m (1km) outward from the gully edge, taking into account the irregular shape of path created by the gully as well as its annual rate of expansion within the years under study. It could be deduced from the map that if the erosion menace is not urgently addressed, buildings and other vital infrastructure as well as vegetation that protect the top soils within the vulnerable areas will be devastated within few years.

Figure 9 depicts the terrain of the study area and shows general morphology as regards the devastating effects of the gully as can be seen on the gully path down slope. The erosion path can be seen cutting across the down slope of the terrain at 100 m. It also shows that the gully erosion is more destructive down the terrain between the heights of 120 and 100 m. The Digital Terrain Model Presented can be a useful tool in the reduction and correction of runoff flows down the slope, which is an

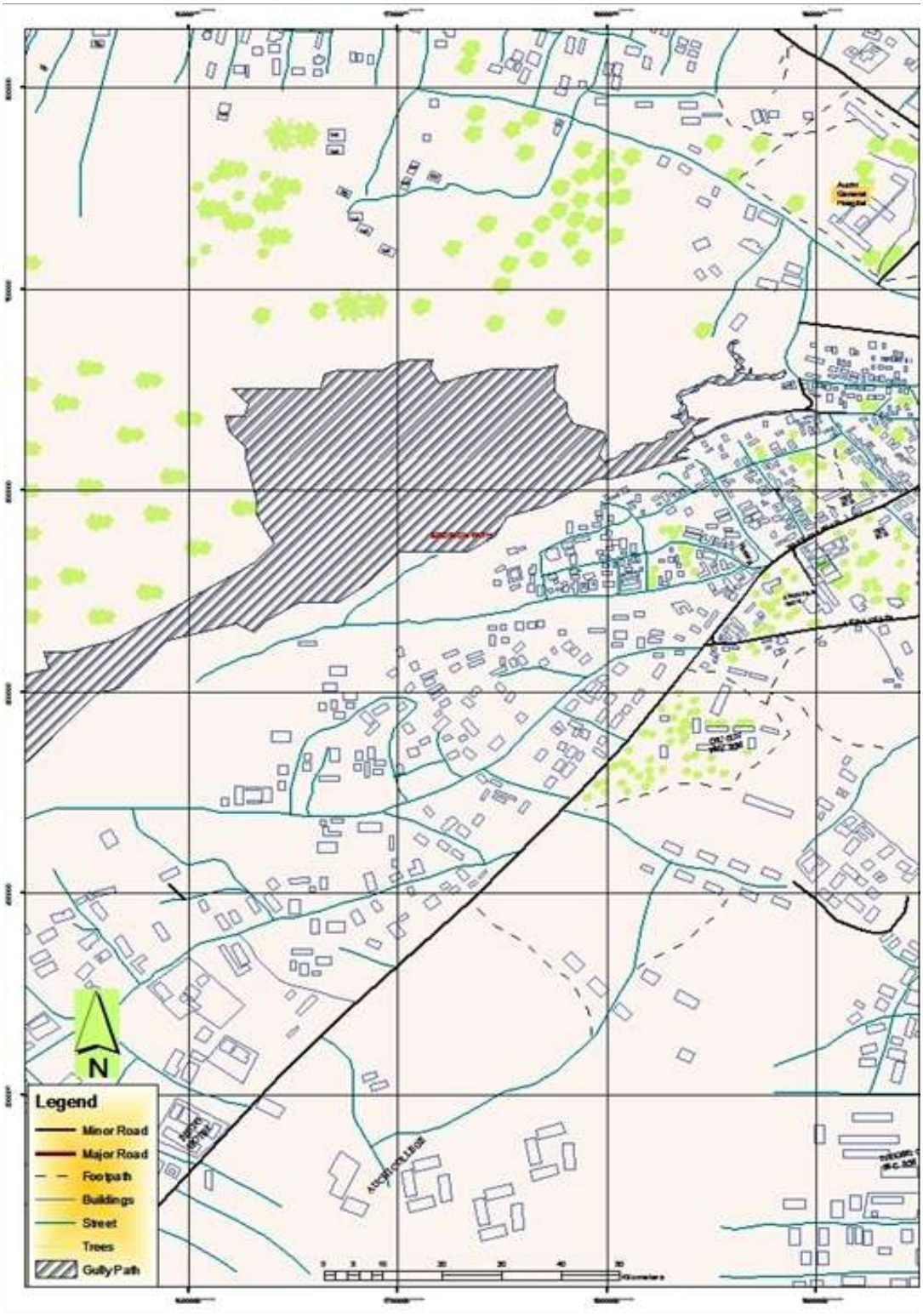

Figure 2. Auchi showing Land uses and Gully paths (Source: Produced from Archmap 10.1).

effective method of controlling and mitigating gully.

Figure 10 details the slope profile of the study area. It shows the actual sloping and indicates how the gully has eaten up earth material down slope. As can be seen, the slope is steep and is cutting across the land indicating erosion with a high intensity and thus huge devastating

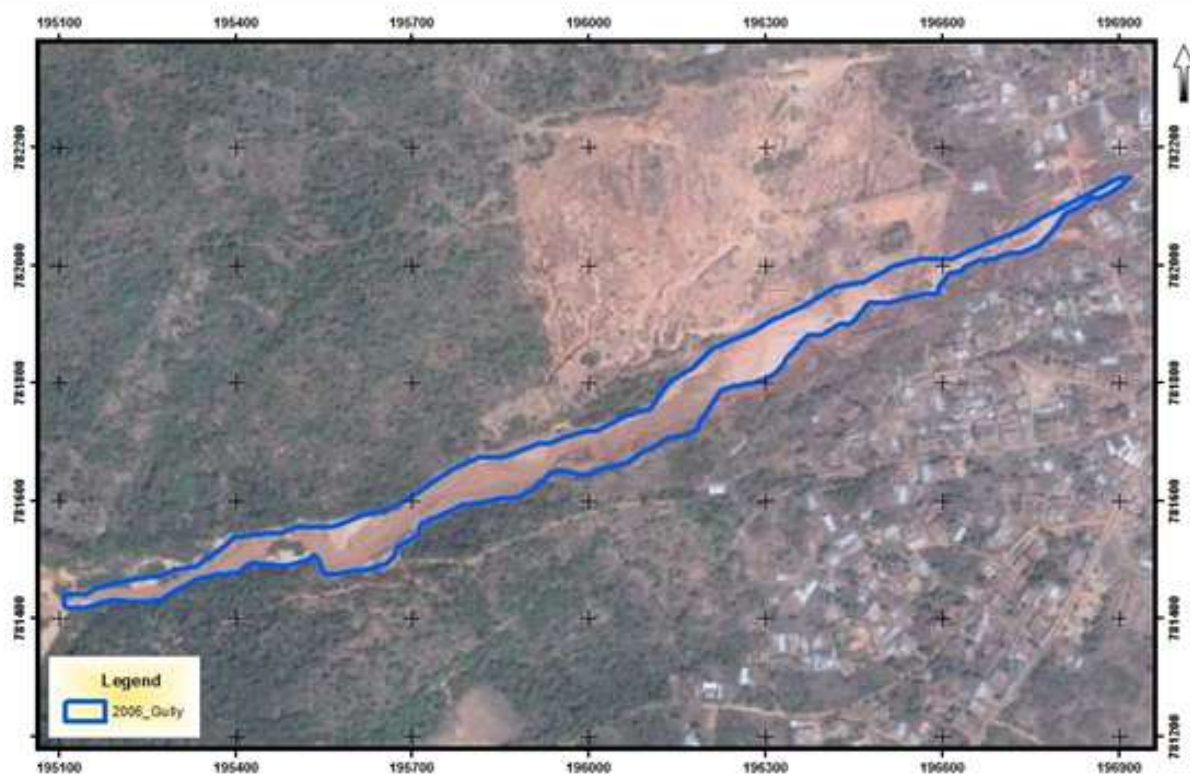

Figure 3. satellite imagery (spot 7) showing the gully in 2006 (Source: Spot image).

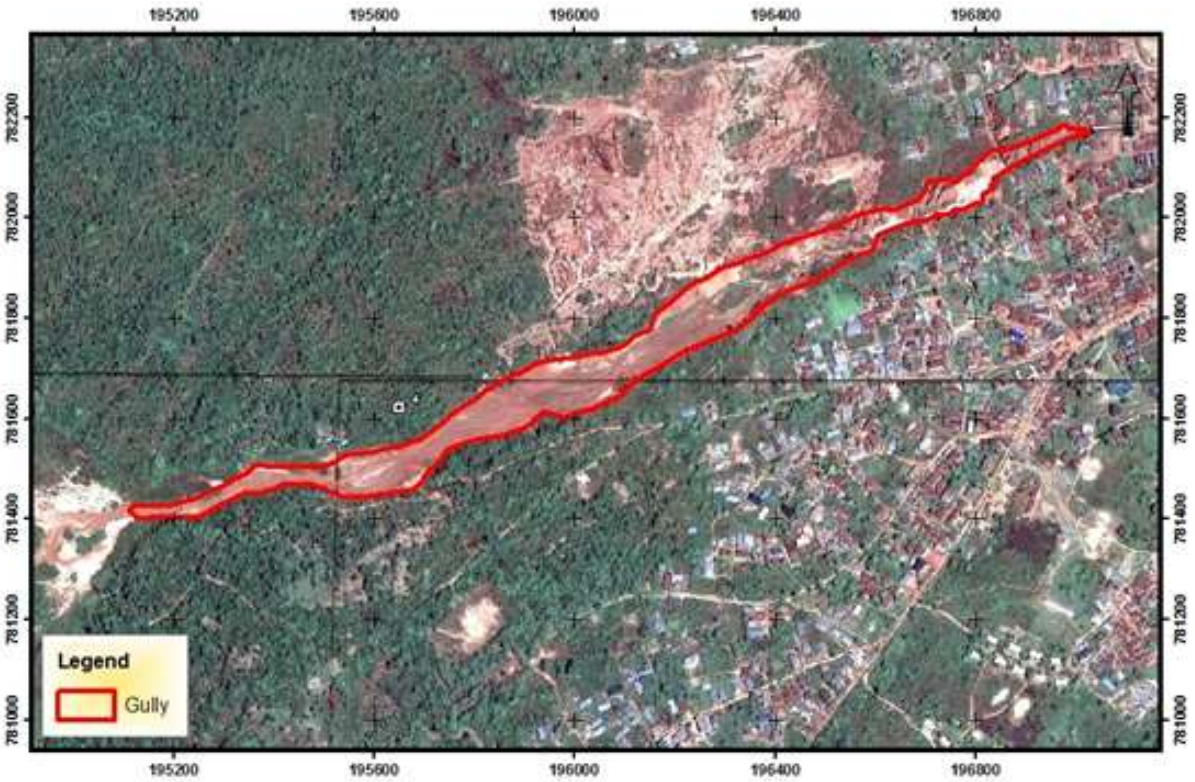

Figure 4. Satellite imagery (Spot 7) showing the gully in 2009 (Source: Spot image).

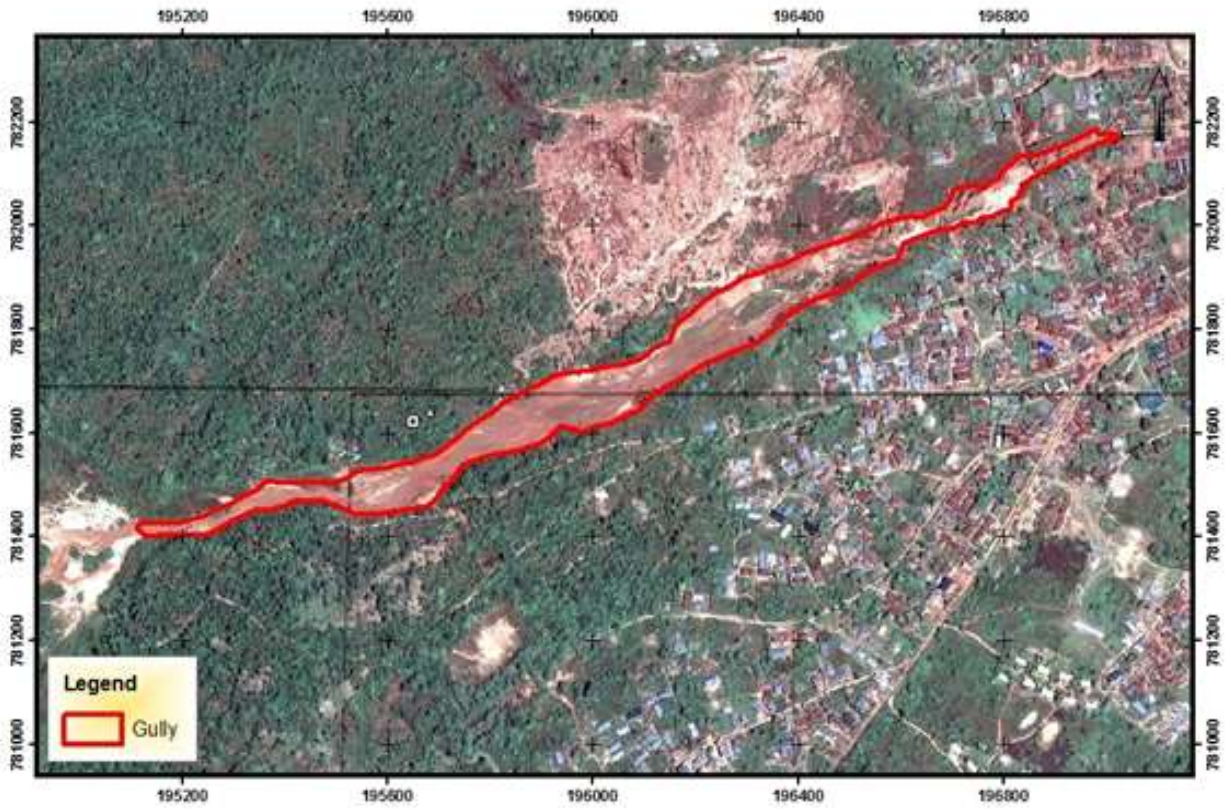

Figure 5. Satellite imagery (spot 7) showing the gully in 2012 (Source: Spot image).

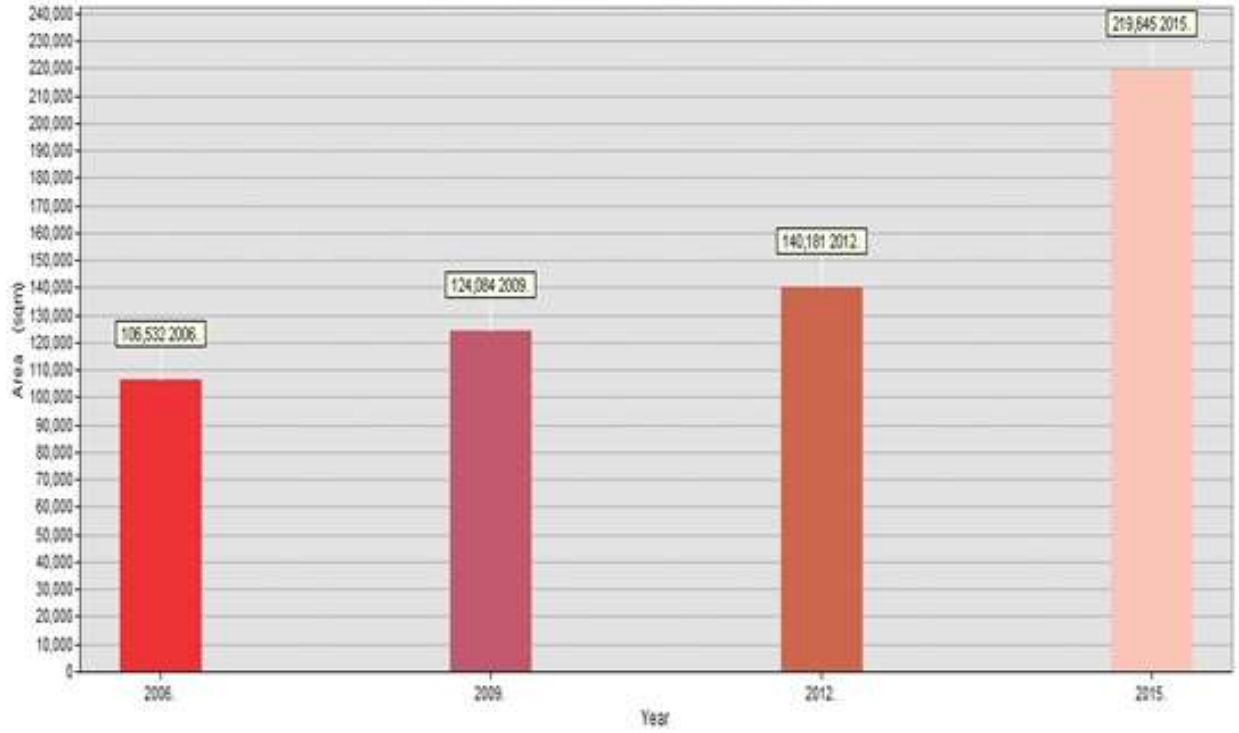

Figure 6. Graphical representation of gully expansion (m^2) of the study area.

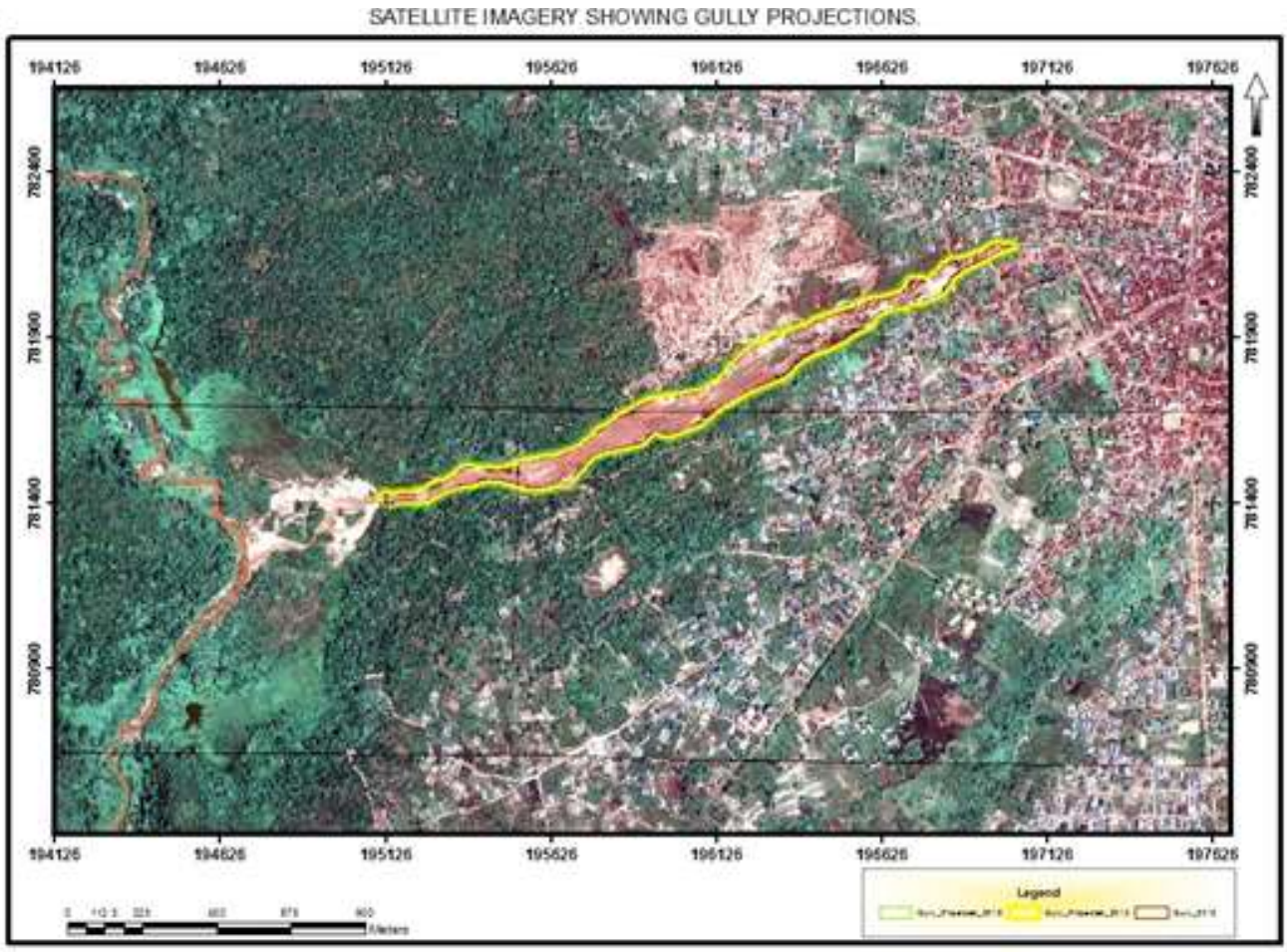

Figure 7. The area expected to be claimed by gully in 2015 (Source: Spot image).

effects. The slope profile can be used effectively in providing a basis for planning recommendations needed to address large area devastated by gully erosion and other forms of land degradation most especially where land filling method is to be adopted to reclaim land already lost due to erosion.

CONCLUSION

The result of this research has indicated that gully erosion is developing at an alarming rate expanding at 6318m^2 per annum, and between 2006 and 2012. Gully erosion devastated a total land area of 37913m^2 and it is expected to claim a total land area of 159407m^2 by the year 2015 if no effective control measure is adopted to address it. The use of softwares such as ArcGIS10.1, Surfa10 and Global mapper has proved effective in mapping and determination of the extent of gully erosion menace at near accurate level. Consequently, there is an urgent need to address the disaster so as to ameliorate its impact on the existing land uses.

RECOMMENDATIONS

In addressing the gully erosion menace, the following guidelines are recommended:

1. The erosion channels should be diverted from critical areas to areas with little or no risk as well as construction of concrete culverts to channel the erosion water.
2. There should be regular maintenance of roads to keep drains and culvert clean so as to prevent flooding and also installing diversion at drains and culverts where runoff velocity can cause erosion.
3. There should be massive public awareness campaign on the problems and consequences of gully erosion, as well as enacting environmental laws and serious penalties for offenders. This will go a long way in making the inhabitants adhere to environmental best practices thereby mitigating the menace.
4. The community should be encouraged and advised to contribute their quota in addressing the problem through traditional means and other cultural practices such as

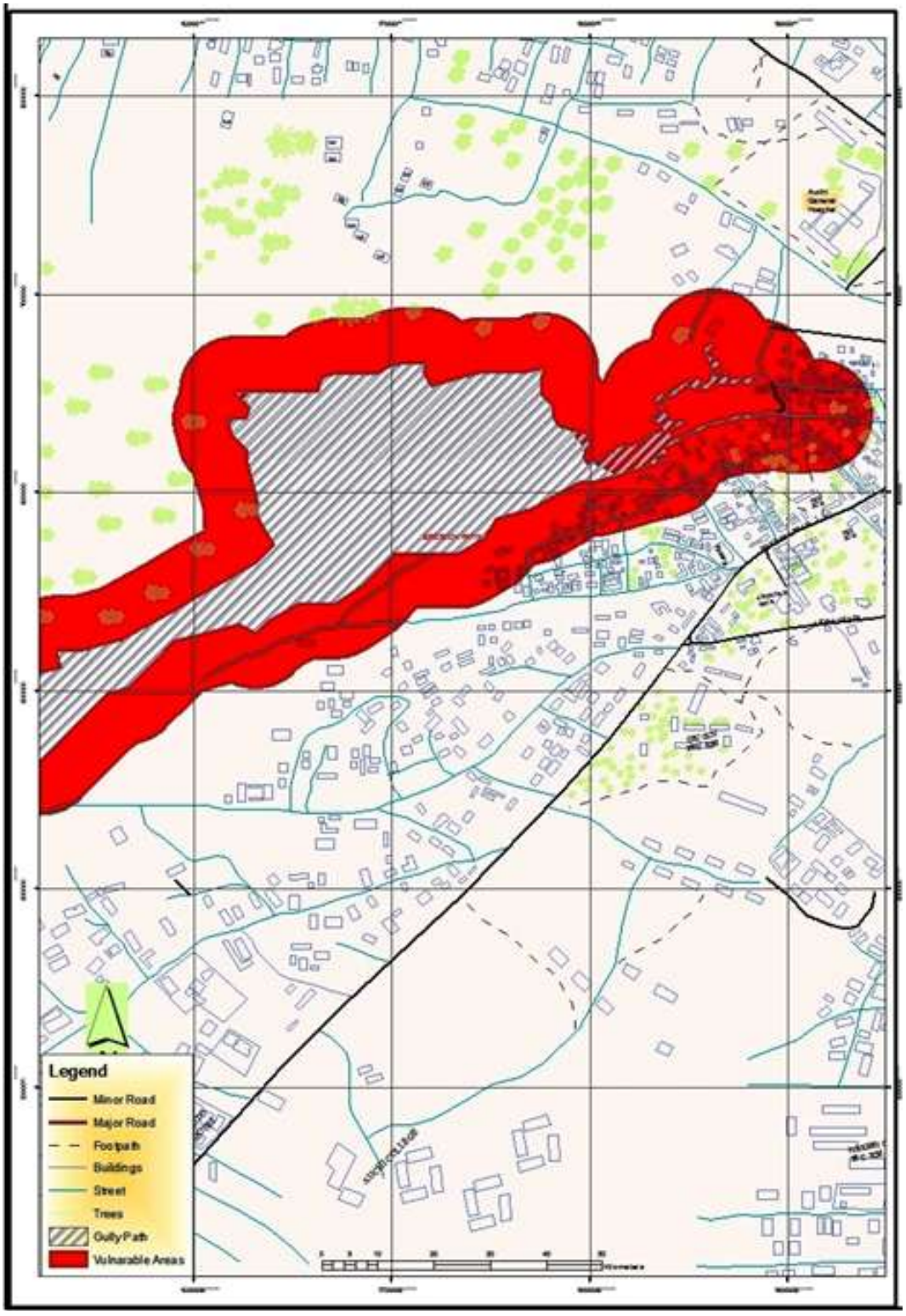

Figure 8. Vulnerable areas to erosion in Auchi, July 2013.

agro-forestry system, planting of cover crops in their farms, planting trees along the streets as well as other local factors that can mitigate the gully erosion.

Conflict of interests

The authors have not declared any conflict of interests.

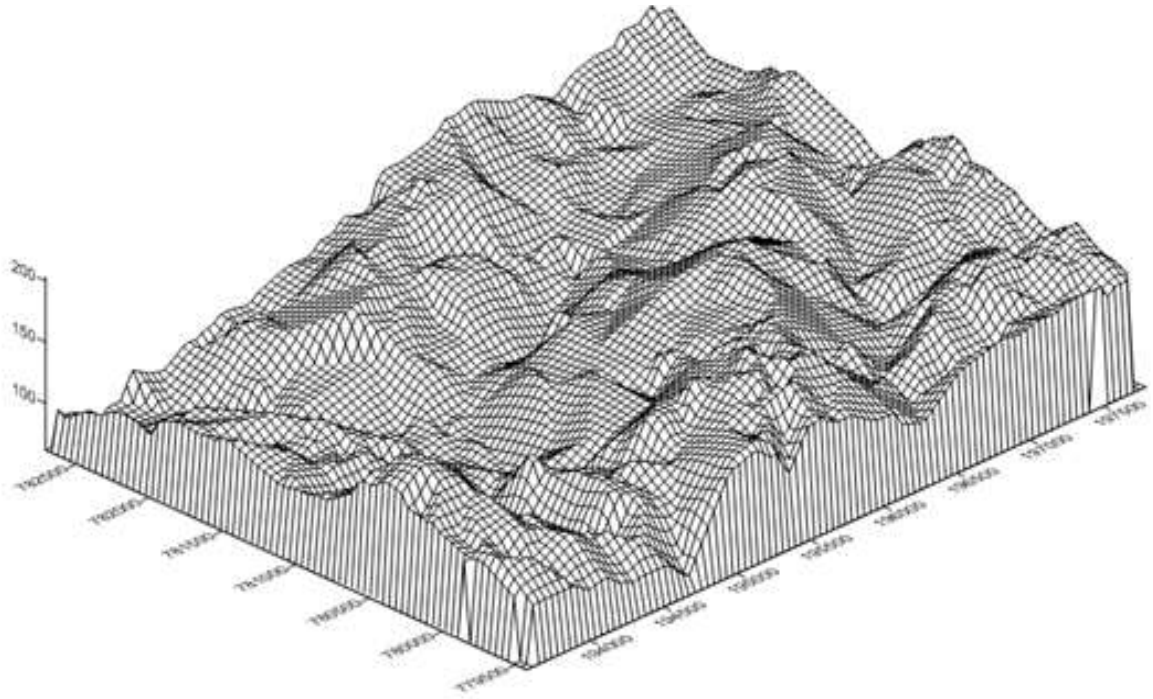

Figure 9. Digital terrain model (DTM) of the study area derived from DEM using ArcGIS10.1, excel sheet and Surfer10 softwares.

Figure 10. The slope profile of the study area plotted on global mapper using DEM of the study area.

REFERENCES

Adekalu KO, Olorunfemi AI, Osunbitan JA (2007). Grass mulching effect on infiltration surface runoff and soil loss of three agricultural soils in Nigeria. Bioresour. Technol. 98(4):912-917.

Ajaero KC, Mozie TA (2011). The Agulu-Nanka gully erosion menace in Nigeria: what does the future hold for population at risk?. Department of Geography, University of Nigeria, Nsukka.

Akpokodje EC, Akaha CT (2010). Gully Erosion geo-hazards in the South eastern Nigeria and Management Implications. Scientia Africana 10:101.

Al-Hassan I, Momoh N (2006). Impact of Gully Erosion on Built-up Areas of Auchi. Paper presented at Chemtech Conference, Edo State Chapter on the 27th July.

Anejiounu OCD, Nwido CP, Ebinne ES (2013). Long Term Assessment and Mapping of Erosion Hotspot in South East Nigeria. FIG Working week, Environment for Sustainability. Abuja, 6-10 May.

Ehiorobo JO, Izinyon CO (2012). Monitoring Soil loss from Erosion using Geoinformatics and Geotecnical Engeering. Available at: htt://www.fig.net pdf.

Ezezika OC, Adetona O (2011). Resolving the gully erosion problems in Southeastern Nigeria: Innovation through public awareness and Community-based approaches. J. Soil Sci. Environ. Manage. 2(10):286-291.

Hughes AO, Prosser IP, Stevenson J, Scott A, Lu H, Gallant J, Morgan CJ (2001). Gully erosion mapping for the National Land Water Resources Audit. Technical Report 26/10, CSRO Land and Water, Cambera, Australia.

Jeje LK (2005). Urbanization and Accelerated Erosion: The case of Effon-Alaye in Southwestern Nigeria. Seminar paper, Department of Geography, Obafemi Awolowo University, Ile-Ife, Nigeria.

Jimah MS (2006). Environmental Degradation in Edo State with Focus on Auchi. Paper presented at the Chemtech Conference, Edo State Chapter on the 27th July.

Murck BW, Skinner BJ, Porter SC (1996). Environmental Geology. New York.

NEST (1991). Nigeria's Threatened Environment. National Profile. Nigeria Environment Study Action Team, NY: John Willy and Sons. pp. 48-54.

Ogboi E, Odeh S (2012). Erosion problems in Ika evirons. Available at: www.centre.inpub.org pdf.

Okpala AO (1990). Nigerian population growth and its implications for economic development. Scand. J. Dev. Altern. 9(4):63-77.

Onwuka SU, Okoye CO (2009). "Controlling Soil Erosion Problems in Anambra State through Attitudinal Change", in Developing a Friendly and Sustainable Environment: The Global Challenge Proceedings of the Annual Conference of Environment and Behaviour Association of Nigeria (EBAN). Held at NnamdiAzikiwe University, Awka, from Nov. 12th – 14th.

Onyegbule PE (2010). An assessment of socio-ecomic impact (effects) of Angulu Nanka Gully erosion, Anambra State Southern Nigeria. Unpublished M Sc. Thesis, Department of Environmental Science, Nnamdi Azikiwe University Uwka – Anambra State.

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Full Length Research Paper

Residential housing in Ghana's low-income urban areas: An analysis of households living conditions in the Wa Municipality

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The study examined the housing conditions of households in residential units within the Wa Municipality of Ghana. The study employed mainly interviews and focus group discussions, with questionnaire survey as a complementary technique, drawing on concepts of households' demand for housing. The analysis suggests that households' choice of living spaces is influenced by income, rent values, facilities available and nature of the residential area. Generally, households are faced with several inadequacies in housing services, with those in the older residential areas living in very precarious conditions. The unavailability of housing facilities, or their poor state, is as a result of the absence of public infrastructure including access to good roads, water and drainage systems, as well as non-compliance with municipal by-laws. The nature of the housing challenge facing the municipality calls for a move away from conventional ways of addressing the problem to new and innovative means of regulating the housing sector, particularly disentangling the production of housing units from the contribution of good, safe and secure living spaces and domestic/municipal infrastructure to the wider social processes of equitable urban development, notably the provision of adequate portable water, sanitation and waste management services.

Key words: Externalities, housing demand, insufficiencies, low-income households, urban Ghana.

INTRODUCTION

Globally, urban low-income housing units are repeatedly characterized as inadequate, lacking basic amenities and often found in inappropriate locations (Bramley et al., 2010). Their localities are overcrowded and characterized by run-down facilities, poor quality buildings and inadequate environmental facilities (Addo, 2013; Arku, 2009; Yeboah, 2005).

Yet, housing remains an essential basic need in every society and serves as the cornerstone of household wealth for low-income households and progressively

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gaining prominence due to the surge in demand for ownership, acting as a source of protection against inflation and a form of saving (Di, 2001; Di et al., 2003; Bank of Ghana, 2007). It aids as collateral for borrowing by homeowners, generating funds for other investments and wealth creation.

Thus, housing has become both a cultivator and a protector of wealth (Di, 2001). Also, housing is an integral part of a set of social conditions that determine the quality of life and welfare of urban residents (UN-Habitat, 2012). Adequate housing is an integral component of national output, and contributes to gross domestic product and socio-economic development of a nation (Afrane et al., 2014) and plays a huge role in revitalizing economic growth in any country, with shelter being among the key indicators of development (Njiru and Moronge, 2013).

Some schools of thought argue that improved housing markets will provide a number of positive externalities as well as direct consumption benefits while others contend that housing has the potential of becoming an engine of economic growth due to its high yield on invested resources, a high multiplier effect and a host of beneficial forward and backward linkages in an economy (Bank of Ghana, 2007). In spite of this, the progress of effective housing provision in many developing countries, including Ghana, has been stalled by inadequate and inefficient implementation of pro-poor policies (Osumanu, 2010).

Aribigbola (2011) opined that housing is very fundamental to the welfare, survival and health of individuals. It has been established that housing conditions play a key role in individual health status, as a wide variety of housing features may influence the physical, social, and mental well-being of occupants (Bonnefoy et al., 2003). Housing conditions are also the basis of many factors influencing residential health (Jackson, 2003; Bonnefoy, 2007) and the quality of housing conditions play a decisive role in the health status of residents. However, the decency, adequacy and affordability of housing have become a crucial source of worry for most developing countries (Yormesor, 2007) as poor housing has become an important public health risk in these countries (Firdaus and Ahmad, 2013). Many of the health problems are either directly or indirectly related to the building itself because of the construction materials that are used and the equipment installed, or the size or design of the individual dwellings (Bonnefoy, 2007).

The provision of affordable housing in urban areas has become a major concern for public and private players in the housing industry in developing countries since the second half of the 20th century (Adjei et al., 2015). But the available affordable housing units in many low-income areas remain poorly developed and uninhabitable (Bank of Ghana, 2007). It is against this background that this study sought to examine the housing conditions in residential units within the Wa Municipality of Ghana. Recent studies (Karley, 2008; Addo, 2010) of the demand for housing have assumed away several crucial features of the urban housing sector. Such studies measured housing consumption in a single dimension (for example, housing values), despite the obvious complexities of the housing sector. Others (Boamah, 2010a; Aribigbola, 2011) either ignored housing prices completely in focusing on the income-expenditure relation.

This study analyses the demand for housing using micro units (individual households and dwelling units) to establish the underlying factors that influence demand for housing, especially for low-and-middle-income households. In terms of welfare, development, and overall distributional impact, a study of the whole housing sector development is more crucial than attention to parts of the housing system.

Households' demand for housing: A conceptual overview

Housing comprises a very important feature of urban social landscapes. People everywhere and throughout time have always needed shelter, thus creating a demand for housing. 'Housing demand' has been referred to as "the quantity and quality of housing which households will choose to occupy given their preferences and ability to pay (at given prices)" (Heath, 2014). Population growth forecasts (particularly household growth) form the basis of predictions for how many homes need to be built now and in the future. Understanding demand, however, requires more than counting the number of households and the number of housing units. A house can be compared to a bundle of goods sold in a market, where each of the building characteristics combined equate to the expected overall transaction value.

Measuring demand for housing is complex as it involves an assessment of economic, social and demographic factors, which influence what type and tenure of housing will be attractive and affordable in which areas (Belsky et al., 2007). Demand also involves housing amenities, a dwelling's features that determine its economic value (Mooya and Munshifwa, 2012). Such amenities include number of bedrooms, number of bathrooms, size of kitchen, parking space, electricity, water, toilets and other facilities. Each of these amenities carries a use value (utility) and has an exchange value. One approach to housing research which is hedonic price modeling (Monson, 2009) attempts to quantify the value of each of these attributes. In most cases, however, amenities are evaluated collectively (Mooya and Munshifwa, 2012). In other words, they are evaluated as amenity bundles.

A second attribute of housing is explicitly geographic (Archer et al., 1996). The value of housing depends not only on the amenities of individual housing units but also on the geographic location of the housing unit. When people look for housing, they are not just trading off the cost of housing with their budget, they are also making an explicitly spatial decision – they are choosing where to

live. Location of a housing unit is important because site characteristics affect housing value and the location of the property relative to immediately proximate properties affects social and economic well-being. A third consideration always positions the house or apartment within the spatial configuration of daily activities (Belsky et al., 2007). People need to travel from home to school or work. They need to purchase food. They want to recreate and relax, perhaps by walking a run in a park.

One of the intriguing aspects of understanding demand for housing is the impact of local context (Whitehead and Sagor, 2015). But the problem with local context is that communities change over time. A house when built may be miles away from anything. Over time, however, the surrounding parcels of land are often developed, or redeveloped. Housing is unsuitable if it is in the wrong place or too expensive for people to afford to buy or rent. The level of demand for housing varies significantly but affordability of housing has been identified as a particular problem for low-and-middle-income households in cities.

Changes in economic prosperity, interest rates, mortgage availability, and confidence in the economy will affect the overall level of demand for housing as well as demand for different tenure types (Heath, 2014). For example, demand for owner occupation is likely to increase where housing is affordable and confidence that wages, and house prices will increase over time is high. Conversely, where affordability and confidence are low, demand in the private rented sector is likely to increase, while the main driver of demand for social housing is unemployment (Schmuecker, 2011).

Housing supply and demand in urban Ghana: A situational analysis

The implications of urban development for overall economic prosperity are well known (Desai, 2010). Employment, housing, policing, infrastructure and general social policies in towns and cities in both developed and developing countries have been shaped and institutionalized through a complex set of interactions between various urban interests, public officials and institutions. But whilst the rise of influential coalitions with the urban working class at the center was responsible for the proliferation of social protection in the 19th and 20th centuries in advanced industrial countries, there is far less information available regarding these issues for cities of the developing world.

Consequently, providing adequate shelter in cities of developing countries has been a fundamental problem for national and municipal governments for almost a century. Although progress has been made with housing problems in some developing countries since the early 1990s (Rondinelli, 1990), in many others housing deficiencies persist and are likely to become more serious as urbanisation accelerates and the concentration of poor households in towns and cities increases.

Housing insufficiency is a foremost problem facing most low-income urban households in Ghana (Boamah, 2013). In Ghana, insufficient delivery, limited access and rising affordability concerns characterize the housing industry. Most low-income households live in over-crowded or deteriorating housing units (Obeng-Odoom, 2009; Boamah, 2010a; UN-Habitat, 2010). According to Asomani-Boateng (2007), this is mainly due to economic and political reasons. Also, one of the fundamental features of housing in urban Ghana is the dearth of information and lack of accurate and reliable statistics. This is partly due to the absence of a workable framework for housing development demanding monitoring and evaluation.

Data relating to such vital issues, such as the nature and number of the housing stock, tenurial arrangements, density levels and the quality of housing, are either non-existent or their reliability is suspicious. Housing research has been inadequate and has had little impact on the data base (Government of Ghana et al., 1990). Meanwhile, housing establishment in urban Ghana has experienced several unsatisfactory situations due to rapid population growth, low income, poor economy, persisting poverty, and the lack of effective and consistent public policy formulation and implementation (Obeng-Odoom, 2010; Osumanu, 2010).

Since the economic recession of the 1970s, unemployment has remained stubbornly high and incomes have fallen, straining household budgets. In this circumstance, renting offers a much flexible choice that enables households to adapt. To address the challenge, various governments in Ghana have implemented different housing policies with the aim of ensuring adequate housing for low-income urban residents. However, most of the housing programmes could not achieve their desired result due to mismanagement, lack of coordination, corruption and the abandonment of policies (Boamah, 2010a).

Ghana's housing sector has experienced fundamental changes since 1990. Like many developing countries (Pugh, 2001), housing policy development in Ghana is increasingly taking more comprehensive approaches. These approaches had only fragmental relationships to general land policies, to the development of housing finance systems, and to the broader economic, social and institutional conditions for enhancing the qualities and supplies of housing. The housing policy has shifted from direct state provision in the period after independence in the late 1950s and early 1960s, and moved strongly toward active private sector involvement in housing production and financing. In part, this is due to the failure of public housing programmes, dwindling state resources, unimpressive performance of state-owned enterprises and the recognition that the state alone is unable to solve the housing problem (Arku, 2009). Although real estate developers are performing a major role to minimize

Ghana's huge urban housing deficits, majority of ordinary Ghanaian workers cannot afford the houses the build due to low levels of income (Bank of Ghana, 2007).

The delivery of housing has largely been based on informal financing for many years. Several efforts in the past, including the establishment of the First Ghana Building, the defunct Bank of Housing and Construction (BHC) and the former Social Security Bank, to institutionalize a mortgage industry were hampered by macro-economic instability and the absence of long term financing opportunities (Bank of Ghana, 2007). The formal finance sector has proved largely unwilling or unable to deliver the form and quantity of financing required for long term housing investment (Boamah, 2010a). Until the 1980s, research and policy dealing with informal settlements neglected the rental sector (UN-Habitat, 2003). The results of this neglect were two-fold: the ignorance about landlords and tenants and their operation and living conditions, and disinterest in rental issues on the side of government (Osumanu, 2010).

Compared with other advanced countries, Ghana's housing sector is at a rudimentary stage. High property prices, particularly in the urban centers, fueled by a rapidly growing middle-class, as well as rapid and uncontrollable urbanization have turned the housing industry into one of the critical developmental issues facing policymakers (Bank of Ghana, 2007). Of importance to policy is the pricing and sources of funding required to meet the huge demand for housing in the country which was estimated at about one million units by the close of 2015 (Ministry of Works and Housing, 2005). More recently, developments in the Ghanaian economy indicate a boom in the construction sector, including the housing sector. The gradual improvement in housing supply notwithstanding, the sector remains characterized by high costs of rental units and house prices. This has generated debates on the major underlying forces driving Ghana's housing market. It is argued that the boom in the housing sector is largely driven by the surge in remittances (Bank of Ghana, 2007).

According to Osumanu (2010), housing finance is affected by institutional and systemic features determined and controlled by heavy government regulation of lending institutions and of the financial system in general. As financial liberation proceeds, housing finance systems are becoming more and more integrated with financial markets in general, and many institutions are relying on broader capital markets as a source of funding rather than on direct personal or household deposits. Osumanu (2010) has observed that a cursory view of socio-economic policies in Ghana indicate that development activities, like housing provision, are left to the private sector with the government providing suitable policy directions and regulation since urban housing development is such an important economic and social activity that cannot be left to the forces of the market alone.

The shortfall between the demand for housing each year and the number of housing completions is often referred to as the 'demand gap' (Heath, 2014). There has been a long-term gap between the estimated annual demand for housing in the towns and the numbers of houses constructed each year in each municipality as well as nationally. In Ghana currently, the growth of urban households is in excess of housing development resulting in a deficit (Boamah, 2010b). It was estimated that the housing deficit in the country was about 1.57 million units as at 2011 (Ghana Statistical Service, 2012).

Available data also indicates that about 80 to 90% of urban households cannot afford a mortgage to purchase the cheapest developers' built unit, and 4.9% of the country's urban households live in impoverished housing (huts, kiosk/containers, tents, living quarters attached to offices/shops, uncompleted buildings, etc.) (Ghana Statistical Service, 2014). The rapid pace of urbanisation in the country continues to generate greater demand for shelter, especially among poor households who lacks the income to pay for decent housing. Demand far exceeds supply in the housing market and this has given room to abuses of tenants and or would be tenants by house owners in towns and cities across the country. Accordingly, house owners blatantly breach the rent law and abuse tenants in pursuit of their self-interest (Songsore, 2003). The most serious problems are among the poor and lower-middle income families who constitute the vast majority of urban dwellers in the country. Although the Rent Control Department (RCD) was established under the Rent Act of 1963 for mediating between house owners' and tenants' interests, it has not fared well in performing its functions due to capacity problems.

Backlog demand for housing in Ghana can be divided into five categories of households: unsuitable; over-crowded; concealed; sharing; and rental affordability (Bramley et al, 2010). Since the late 1970s, the most common type of backlog demand has been concealed households - family units or single adults living within other households, who may be regarded as potential separate households which may wish to form given appropriate opportunity. The second most significant category has been households which are subject to overcrowding. Key to the affordability problem is inadequate sources of long term funds and the high cost of available formal housing financing sources (Afrane et al., 2014).

Karley (2008) had earlier remarked that housing delivery in Ghana is characterized by high cost and/or cumbersome land acquisition, lack of mortgage financing, utility infrastructure issues, inability to procure building materials at lower costs and inadequacy of labour. As a result, the recent housing policy draft recommends multi-habitation as an urban low-income housing strategy. However, a couple of studies indicate that households living in multi-habited houses are faced with a myriad of challenges including conflict over inadequate shared

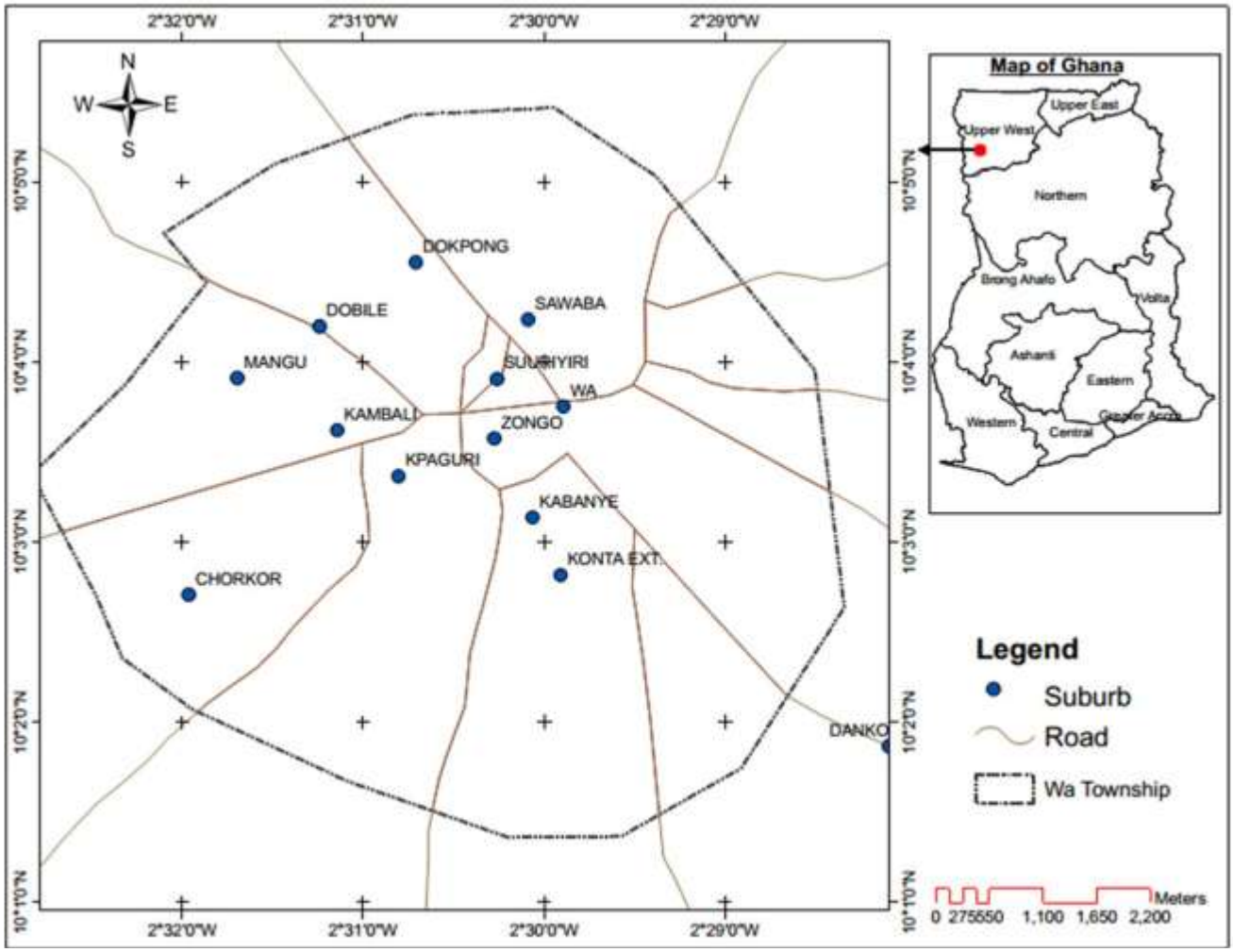


Figure 1. The study context.

facilities (Osumanu, 2010; Addo, 2015).

MATERIALS AND METHODS

The locational context of this study is Wa, the regional capital of the Upper West Region of Ghana. Wa lies between latitude 1°40'N and 2°45'N and on longitude of 9°32'W (Figure 1), thus covering an area of approximately 1,180 square kilometers, which is about 32 and 2.56% of the region and nation respectively. According to Ghana Statistical Service (2012), Wa's population was estimated to be 135,638 (Female 65,887 / Male 69,751) by the year 2010, with a growth rate of 2.7% per annum. The spatial distribution of the population displays a typical character of a young municipality – a heavy concentration of population in Wa town surrounded by smaller towns and rural settlements.

Using the 2010 Population and Housing Census (Ghana Statistical Service, 2012) figures, Wa's population is 50 times higher than the next populous settlements (Busa, Sagu, Charia, Kperisi and Boli) each with populations below 3,000 people. The significance of this type of distribution is that Wa town provides the highest level services (first level services and functions) in health, education, finance, administration of justice and security, commerce and transportation, amongst others, to its hinterland and patent services for resource mobilization, peace building and community needs identification. As a relatively young and fast growing municipality in Ghana, Wa is deemed appropriate for this study since intervention measures can be easily targeted to achieve desired results.

Aside the use of documented sources, the research generated first-hand information from the field. The study employed the mix design involving both qualitative and quantitative approaches taking into consideration the data demands. Household heads were used as the primary target of data collection. This approach was deemed appropriate because the object of the research was to explore attitudes or reactions of a group or community in response to some commonly experienced aspects of their environment. Through such interactive discourse, participants were able to offer insights on the perspective of the enterprise, revealing clues to the social contexts that shape their opinions (Scammell et al., 2009).

In all, 100 household heads were interviewed using questionnaires. A two-stage sampling methodology was adopted in the selection of households for the interviews. The first stage was the clustering of residential areas according to town planning into three core zones. Zone One covered the unplanned residential areas, which includes the old residential areas surrounding the Central Business District or the business hop of the town. Zone Two

Table 1. Socio-demographic characteristics of respondents.

Characteristics	Frequency	Percentage (%) (sample size, N = 100)
Age of respondents		
20-30	61	25.3
31-40	73	30.3
41-50	52	21.6
51-60	36	14.9
60 and above	19	7.9
Gender		
Male	137	56.8
Female	104	43.2
Educational status		
Never been to school	40	16.6
Primary School	11	4.6
Junior High School	17	7.1
Senior High School	39	16.2
Tertiary	132	54.8
Others	2	0.8

was made of the planned suburbs, including SSNIT Residential Area and Konta Extension which has most government bungalows. Zone Three comprised the Newly Developing Areas; part of which is made up of the surrounding villages which have been absorbed into the urban agglomeration as a result of urban sprawl.

Since households in Zone One are more extensive than in Zones Two and Three, 40% of the total sample was apportioned Zone One and 30% each to Zones Two and Three respectively. Within the selected residential areas, blocks were created based on the number of houses and interviewers selected households to interview by systematically walking through the blocks and interviewing one household in every tenth (for Zone One), every fifth (for Zone Two) and twentieth (for Zone Three) house. The questionnaires were administered to household heads or their representatives. In a house where there were multiple households, only one household was interviewed. Again, in each selected house, where the household interviewed was not the owner of the house, an attempt was made to interview the owner of the house.

RESULTS AND DISCUSSION

The preference of housing, its finance and management, to some extent lies on the shoulder of the head of the household. As presented in Table 1, a total of 100 households were sampled for the study. Almost 57% of the sampled households were headed by males and about 30% of them were aged between 31 and 40 years. Those within 20 to 30 years were 25.3%, and 21.6% were between 41 and 50 years. The household heads aged 60 years and above were about 8% making them the least group of respondents and somewhat reflecting the general population structure of Ghana (GSS, 2012).

The age distribution illustrates an averagely young household, who may have children of pre-school and teen ages, stimulating high demand for housing. Again as shown in Table 1, about 83% of the respondents have acquired education at various levels from primary (4.6%) and secondary (23.3%) to tertiary (55%). About 17% of the respondents had no formal education but almost 80% of this category of respondents had acquired various forms of vocation which they learnt informally.

The study revealed that 50% and 22% of the respondents live in single rooms, and in chamber and halls (a bed room and a living room) respectively, which are found in compound and straight building (*"L shaped"*) houses in Zone One and 28% live in apartments, which are self-contained (bed rooms, living room, bath room, kitchen and toilet).

Respondents who live in apartments, found mainly within Zones Two (31%) and Three (64%), are public sector workers and traders. The indigo colours in Figure 2 represent the location of apartments in the municipality. While public sector workers residing in Zone Two occupy apartments at the expense of their employers, their counterparts and others in Zone Three pay for living in those apartments. It is also the case that some public sector workers residing in Zone Three receive refund from their employers after rent payment. Living in an apartment in Zone Three cost averagely between GHS 3,000.00 (approximately [1]US$ 790.00) and GHS 3,600.00 (approximately US$ 950.00) a year depending on the number of bedrooms and other facilities available. Households living in single rooms with access to toilet and bathroom pay GHS 500.00 annually whilst those

[1] US$1.00 is approximately GHS3.80.

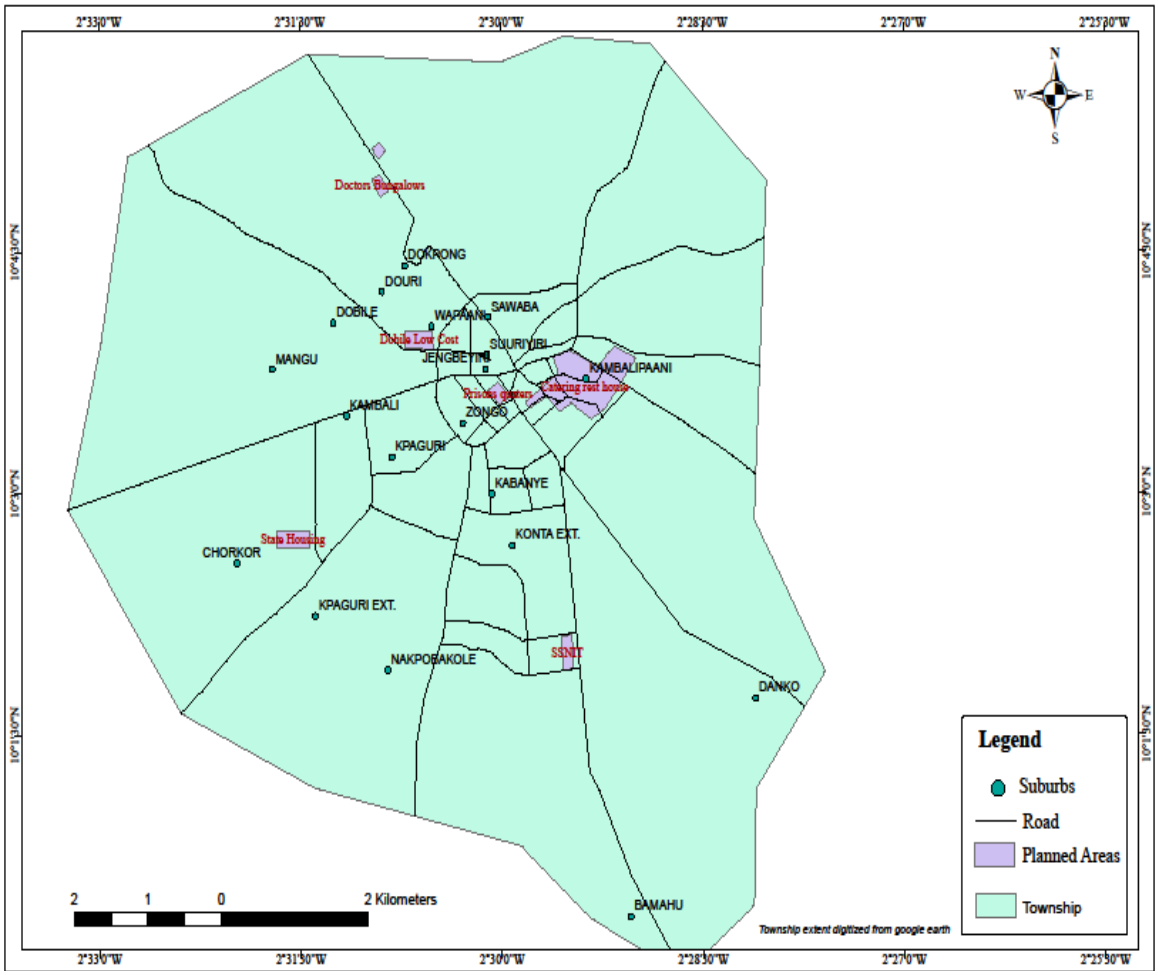


Figure 2. Residential layouts in the Wa Municipality.

Table 2. Household monthly income and residential facilities.

Monthly income	Accommodation	Available facilities
GHS 2,000.00 and above	Apartments	Two to four bedrooms, toilet, bathroom, kitchen, electricity, water
GHS 600.00 GHS 2,000.00 -	Chamber and Hall (sometimes with shared facilities)	One bedroom, toilet (WC or pit latrine), bathroom, kitchen, electricity, water
Below GHS 600.00	Single Rooms	Communal toilet, bathroom and kitchen, and electricity

without toilet facilities pay averagely between GHS 350.00 and GHS 400.00 per annum. Respondents living in chamber and halls without private toilets and bathrooms pay close to GHS 600.00 as yearly rent but those with such facilities pay double that amount. Households living in single rooms, mostly without facilities, wish they could afford better accommodation but are unable to do so because of financial difficulties.

As indicated in Table 2, the study corroborates others (Boamah, 2010b; Obeng-Odoom, 2010; Osumanu, 2010) that household income is a major determinant of residential facility. This also confirms the findings of the Ghana Living Standards Survey (Ghana Statistical Service, 2008) that living in bungalows, semi-detached houses and flats or apartments is not common among Ghanaian households. According to the survey, only about 10% of households in the country live in these types of dwelling which is mainly occupied by the working class. Generally, rent values influence the type of accommodation households opt for since most landlords charge high rates and prospective tenants have no bargaining rights. This is because the landlords do not usually

Table 3. Respondents' view on the material used for building (%).

Building type	Material type		
	Cement block	Mud with cement plaster	Mud only
Apartments	100	0	0
L-shape houses	86	6	8
Compound houses	64	36	0

Figure 3. Cracks on the cement block wall.

register their property with the Department of Rent Control, which is authorised to regulate rent values in the municipality.

All houses found in the municipality are roofed with zinc, aluminium or slate roofing materials but the construction materials differ from one area to another (Table 3). The study shows that 64% of houses found in Zone One are built with mud and plastered with cement. Some houses built with mud and cement plastering had cracks on them, both inside and outside of the buildings (Figure 3). This has major consequences on the occupants. The cracks, according to respondents, paved way for ants and termites to enter their rooms to create discomforting situations including contamination of food and water.

Households living in mud houses complained of some effects including mite infiltrations and respiratory problems, such as asthma and other allergies. Mite infestations are promoted in damp conditions and are also associated with allergies and asthma. In addition, the aluminium roofing sheets, which dominated, were in a deplorable state with some respondents disclosing that their roofs leaked whenever it rained soaking the ceilings. The soaked ceilings create offensive odour in rooms resulting in respiratory problems. A key informant at the Building Inspectorate Division of the Wa Municipal Assembly revealed that landlords normally buy low-cost aluminium sheets with very short lifespan which rust early causing a lot of health problems for occupants.

As a young and growing municipality, availability of housing facilities (electricity, water, toilet, kitchen and bathrooms) in Wa is moderate. But the distribution of these facilities varies according to residential zones and accommodation type (Table 4). As expected, Zone Two, which has more apartments, has better facilities than the other zones. Compound houses generally lack direct piped water connection. As a result, occupants are compelled to access water from other sources. The reason given by house owners (without piped connection) for not connecting their houses with water was that the main pipe lines serving the areas were far from their buildings, making the cost of connection high. For houses in Zone Three without direct water connection, the supply system provided by the Ghana Water Company Limited (GWCL), the company in charge of urban water supply in the municipality, does not cover those areas. As a result tenants resort to other sources of water supply available to them.

Only 12% of households in the municipality have their water supply provided by the GWCL. According to these households, their pipes do not flow frequently; sometimes they get water thrice in a week and therefore have to

Table 4. Accommodation type and facilities available (%).

Building type	Electricity	Water	Bathroom	Toilet	Kitchen
Apartments	94	82	100	96	78
L-shaped houses	86	64	88	48	38
Compound houses	68	26	100	36	22

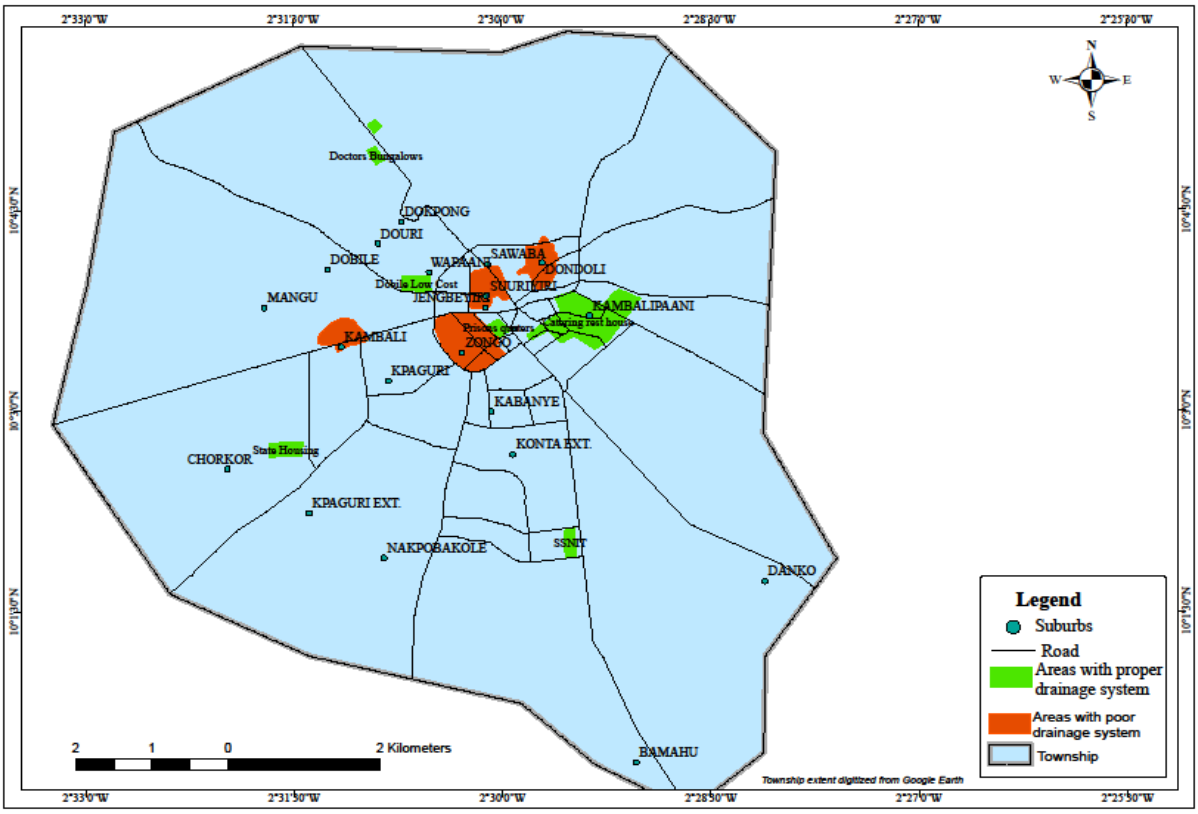


Figure 4. Nature of drainage systems in different areas.

store water in barrels and gallons anytime their taps flow. Also, 34% of the respondents have access to hand dug wells and they have to fetch water in the early hours of the day or in the evenings in order to get clean water for their domestic use since it gets muddy when there is pressure on them in the afternoon. They also buy water from vendors and store them in drums during dry seasons when their wells dry up. However, 24% of the respondents access water from community boreholes provided by the District Assembly and some NGOs and store them in their gallons and barrels for use. The remaining 30% buy water from private water vendors (private boreholes) or obtain such from neighbours who have hand dug wells since the purchasing of water from vendors is expensive.

The study reveals that 96% of households had access to a bathroom in their houses. Many of the bathhouses in compound and L-shape houses had gravels and stones as their floors, and rusted roofing sheets and woods were used to fence them. They had no doors and their drainage systems were very poor serving as breeding places for mosquitoes. The poor drainage system in particular is as a result of lack of privately constructed septic tanks and inadequate drainage systems in the whole municipality (Figure 4).

The few bathhouses built with cement blocks were very short and exposes the upper body of the users since these bathrooms are usually out-doors. Some 38% of the households attested that rubber containers were placed at the back of the bathhouse to collect the water and is poured in the open after bathing as a result of the poor drainage systems. Also, 28% revealed that they use their cloths to cover the entrance of the bathhouse because theirs has no doors. A further 14% indicated that they

Table 5. Toilet facilities in use (%).

Building type	Flush toilets	Type of toilet facilities		Public toilets
		KVIP	Pit Latrines	
Apartments	52	30	12	6
L-shape houses	12	42	28	18
Compound houses	6	42	24	28

place stones and gravels on the floor of the bathhouse to prevent their feet from getting dirty because the floors are not cemented or tiled. The conditions of bath houses, apart from enabling mosquito breeding, make the surroundings look unpleasant, with several degrees of odour. These practices also constitute affronts on the bye-laws of the Wa Municipal Assembly, specifically the Wa Municipal Assembly Bye-law (2006), which stipulates that:

"A person commits an offense when he/she fails to provide a standard container for liquid waste as prescribed by the Assembly. Where a person commits any of the offence, the person shall be liable on summarily conviction to a fine not exceeding GHS 50.00 and, in default of payment, serve a term of imprisonment not exceeding six months or both".

Of the households who had access to bathrooms, only 16% had their bathrooms being standard (had doors, cemented floors, properly roofed and a good drainage system). The remaining had their bathrooms in poor or sub-standard conditions and posing several health risks. Households with no access to bathrooms in their houses adapt a number of measures to meet their bathing needs, including using neighbours' bathrooms or bathing in the open at dawn and in the night. Surprisingly, in areas with well-planned drainage systems, many houses are not connected to them, a situation which also affronts the Municipal Assembly Bye-law (2006) that:

"All premises shall be connected by the owner or occupier to the nearest available public drain in a manner to be specified by the Assembly and the only discharges permissible into the public drain shall be sullage (waste water from bathrooms, washing of clothes, kitchen utensil/s and rainwater within the premises) and storm water. A person commits an offense when he/she connects drains in his premises to a public drain without prior authorization by the Assembly. Where a person commits any of the offence, the person shall be liable on summarily conviction to a fine not exceeding GHS 50.00 and, in default of payment, to a term of imprisonment not exceeding six months or both".

Hygienic management of excreta is a fundamental part of sanitation and a basic necessity in disease prevention (MLGRD and LGS, 2010) and, therefore, an important indicator of adequate housing. Toilet facilities identified in the houses were flush toilets, KVIPs and pit latrines (Table 5). Majority (44%) of households, however, used KVIPs. This finding quite contradicts that of the Fifth Round of the Ghana Living Standard Survey (GLSS), which indicates that one in every 10 households in Ghana use flush toilets and another 12% use KVIP, but pit latrine is the most common form of toilet, used by 32% of households (Ghana Statistical Service, 2008). This is because pit latrines are used mostly in rural areas, which is also the case in the Wa Municipality as this study found pit latrines to be dominant along the fringes of the municipality.

An issue that limits the use of flush toilets in the municipality is the lack of piped water connections to homes. Some 36% of households using flush toilets indicated that they have to fetch water from wells or boreholes to flush their toilets after use. In addition, households using flush toilets have to pay huge sums of money to vacuum truck operators to empty their septic tanks when they are full, thus making flush toilets unaffordable for many households. As a result, households prefer constructing KVIPs which are usually detached from the main building (Figure 5). Though there are several inconveniences with the use of such facilities including difficulty in accessing them in the night and whenever it rains, households indicated that they prefer them to pit latrines and public toilets.

Arguably, according to Wa Municipal Bye-law (2006), a person commits an offense when he/she fails to provide an approved toilet or sanitation facility on the premise which they occupy, and indiscriminately urinates or defecates in any unauthorized place. However, mindful of the fact that not all households can have their own toilet facilities, public toilets are usually provided at convenient places to serve the general public and those that do not have domestic toilet facilities (MLGRD and LGS, 2010). Yet, it is frequently observed that those who did not have any form of toilet facilities in their homes and claimed to be using public toilets go to available bushes, uncompleted buildings and open spaces within their vicinities to attend to nature's call (open defecation) as a result of the charges they have to pay at the public toilets coupled with the poor condition of such facilities.

Osumanu and Kosoe (2013) observed that given several socio-cultural conditions, the current system of

Figure 5. Detached KVIP toilet facilities; Household toilet facility detached from a compound house and L-shape building. All zinc built toilet facility is behind the L-shape house while the cement block and zinc roof toilet facility is found outside a compound house.

public toilet operating in Wa cannot be resource intensive to meet households' aspirations because they do not respond to local sanitation needs. On the contrary, it tends to create even more problems, thereby encouraging open defecation. In spite of this, some households were of the view that public toilets were the best option available even though the amount charged were not economical but their safety is assured aside the health implications of using such a facility. The use of public toilets is an unavoidable option for sanitation in many low-income towns and cities of developing countries. In most parts of Ghana, it is common practice for people to answer the call of nature in the open field as a result of the lack of household and public toilet facilities, which results in a poor sanitary, health and environmental situation (Osumanu and Kosoe 2013). This confirms MLGRD and LGS's (2010) assertion that because few homes have toilet facilities, households will resort to public toilets but given the increasing pressure on these facilities their users would be deprived of the essential services they are intended to provide, forcing them to use other unacceptable options such as free ranging and the use of black polythene bags.

Unavailability or inadequacy of sanitation facilities in homes affects children more than their adult counterparts. According to Osumanu and Kosoe (2013), it is estimated that only 5% of children use household toilets and none use public toilets. Households do not allow children to use public toilets for fear of them falling into the pits. This indicates that open defecation is mostly done by children. Similarly, females are said to be at a higher risk relative to males. Female household members also complained about some health effects from using KVIPs and the pit latrines as a result of the unclean and poor maintenance of the facilities. Some of these health effects were candidiasis and diarrhoeal problems which have devastating impacts on their well-being.

One important facility often ignored in the discussion of housing facilities in developing countries is that of household solid waste management. The overall management of solid waste in the municipality is the responsibility of the Wa Municipal Assembly and its registered agents or contractors. Solid wastes made available by households are to be collected and disposed of at designated sites by the Assembly or its authorized agents and contractors. As a result, the Assembly has designated vantage points within the municipality for households to dispose of their solid waste for collection by the Assembly or its agents and contractors. A total of 20 communal solid waste containers are available in the municipality. The spatial distribution of these containers is presented in Figure 6.

The communal containers are placed at strategic locations in various suburbs to serve the immediate inhabitants within particular vicinities. The distribution shows a concentration of the containers within the central area, mainly Zone One and parts of Zone Two, mainly low income residential areas. In many instances, accessibility to solid waste disposal containers is affected by the poor nature of access roads in the suburbs, bringing to the fore serious considerations that are given to locations where the solid waste collection vehicles can

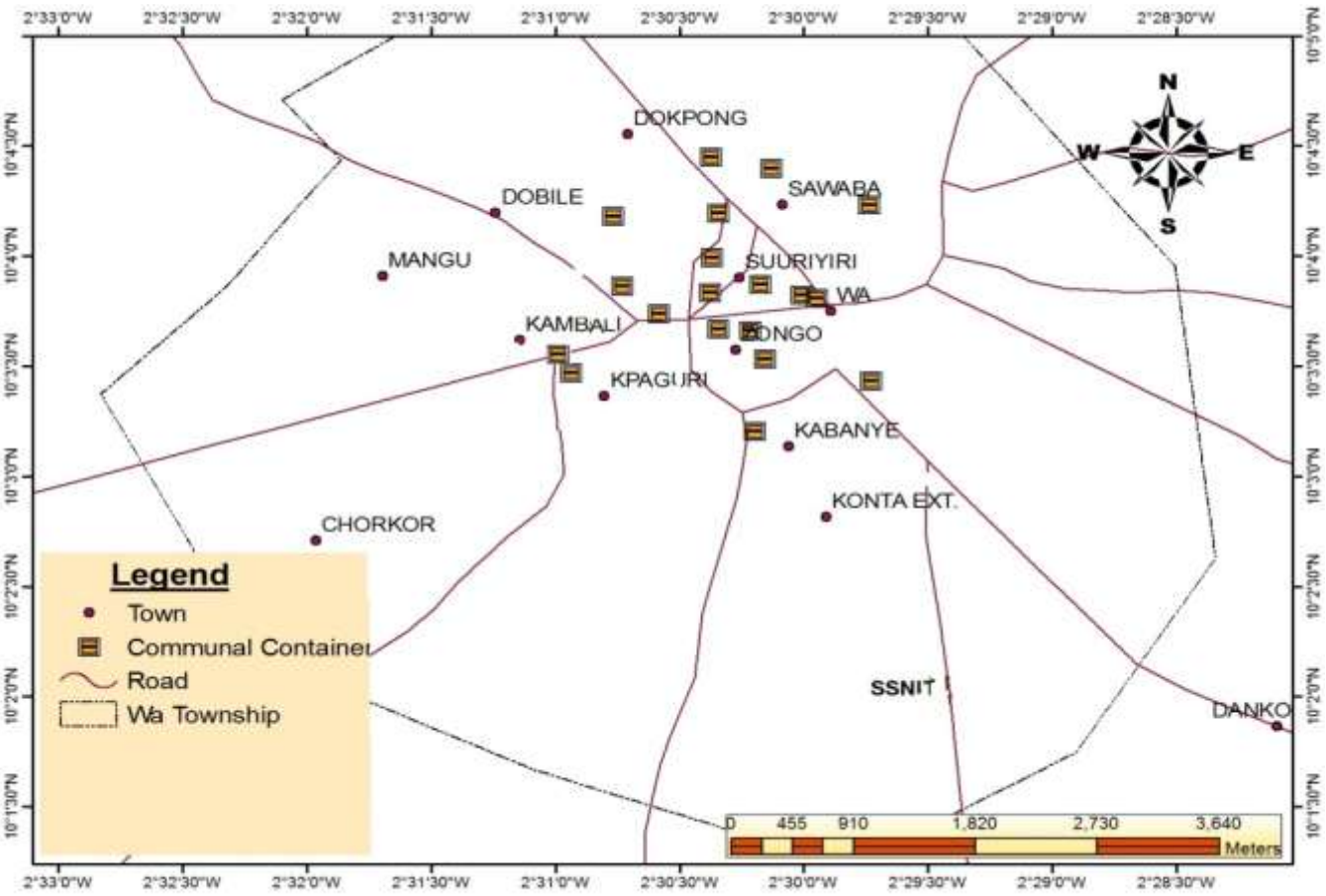


Figure 6. Spatial distributions of communal solid waste containers

have access to these containers when they are due for collection.

Also, as observed by Amoah and Kosoe (2014), considering the persistent increase in waste generation, the available communal solid waste containers are woefully inadequate since they cannot contain the total daily solid waste generated. The resultant effect has been the littering and dumping of solid waste at available open spaces or places, such as along roads, uncompleted structures and in open drains within the municipality. However, the Wa Municipal Bye-law (2006) says that:

"No house owner/occupier shall create a refuse dump in or outside his/her premises. Also any person who throws litter, refuse or other matter which may cause nuisance or lock the water passage provided by a gutter or drain shall be guilty of an offence. Furthermore, no person shall place or deposit or dispose on any land, or cause or knowingly allow waste to be placed on any land, or use any vehicle, plant or equipment for the purpose of disposing of waste unless the land on which the waste is placed is so designated by the Assembly for the purpose of waste disposal and the person is licensed by the Assembly to place the waste at such designated disposal site".

Majority of the households in Zones Two and Three subscribe to the door-to-door solid waste collection services of Zoomlion Ghana Limited, a private waste management company. This can be seen in Figure 7. These middle and high income areas enjoy the door to door services due to the good road network that link houses. Refuse containers are given to households, for a fee, for domestic solid waste disposal for regular collection by the company. It was observed from the study that households in parts of Zone Three, constituting the newly developing areas, rely on open dumping or burning for their solid waste disposal needs. According to these households, this situation has arisen since there are no communal containers and they cannot also afford the services of Zoomlion Ghana Limited.

An important component of household solid waste management is how the waste is treated before disposal into a container or onto a dumpsite. The study reveals that, unlike other housing facilities such as water, electricity, toilet and bathrooms, households do not

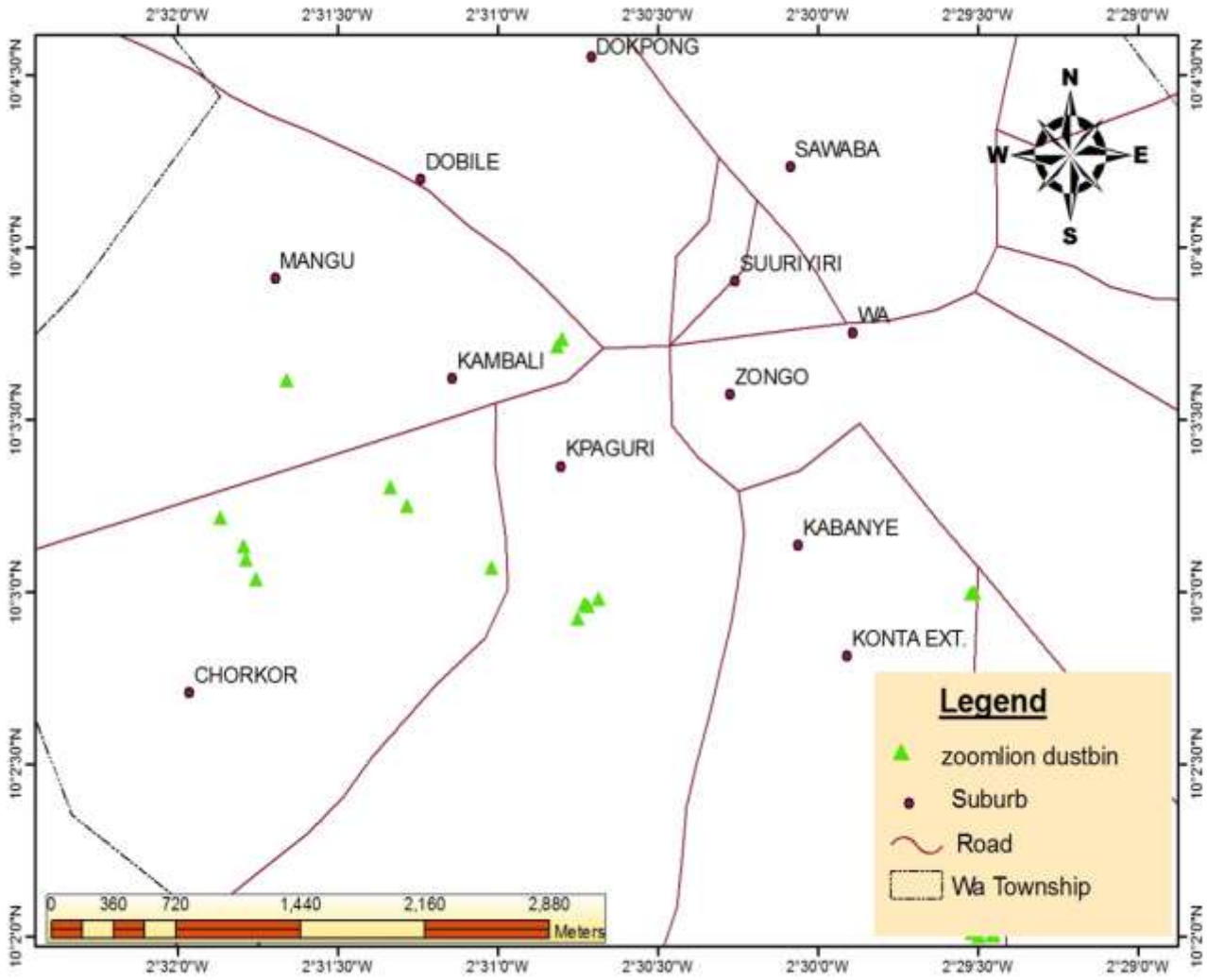


Figure 7. Spatial distributions of door-to-door collection solid waste containers

bother about solid waste issues when considering a living space. Similarly, landlords do not consider solid waste management as part of their responsibilities in the provision of housing. However, the Wa Municipal By-law (2006) indicates that:

"Any owner/occupier of any premises shall use a sanitation facility approved for the purpose by the Assembly and a person commits an offense when he/she fails to provide a standard container for solid waste as prescribed by the Assembly or burns solid waste in one's compound. Where a person commits any of the offence, the person shall be liable on summarily conviction to a fine not exceeding GHS 50.00 and, in default of payment, to a term of imprisonment not exceeding six months or both".

As a result of the unavailability solid waste management facilities within residential premises, households use various custom containers such as plastic, metal, basket and carton containers to store waste temporarily, before disposing them onto the various dumpsites and communal containers. According to respondents, carrying waste daily to the various disposing sites and containers for disposal was time consuming and, therefore, preferred storing them and disposing them in a three-day or a week interval.

The households who use communal containers indicated that they are sometimes prevented from dropping wastes there because the containers are usually full and sometimes overflow unto the ground, compelling them to leave the waste in their homes until the waste container is emptied. This inconvenience, according to them, can lead to a possible outbreak of diseases like cholera and malaria because the waste in the houses will breed mosquitoes and flies. With regards to the households relying on the services of Zoomlion Ghana Limited, the waste is not frequently collected and

as scheduled, and it stays in their homes for an average of five days creating a stench in their homes. A consequence of this is the creation of breeding places for mosquitoes which lead to malaria incidence. It was also revealed that the gathering and burning of waste by households causes respiratory and airborne diseases.

For 60% of the households covered in the study, their hopes of getting descent housing with adequate facilities lies in the Wa Municipal Assembly. According to these households, the Assembly should be in charge of the provision of water and toilet facilities in their homes. However, information available at Wa Municipal Assembly indicate that under the UNDP/World Bank funded urban sanitation programme – Urban IV – implemented between 1985 and 1995 households were given support to construct their own toilet (KVIP) facilities. The provision of the facility was, however, demand driven where interested households paid 50% of the total cost of construction, which was provided as credit to be paid over a period of two years at an interest rate of 10%, whilst the assembly absorbed the remaining 50%. At the end of the project period, only 53 household toilet facilities had been constructed in the municipality, indicating a very low patronage of the facility.

Not surprisingly, 26% of the respondents suggested that the Assembly should enforce bye-laws to punish landlords who fail to provide the basic housing facilities in their houses. Also, the various units concerned with housing issues must take immediate actions when reports of poor housing conditions get to them. A few landlords, however, felt that they should be educated on the effects of living in poor housing and the need to provide households with the basic housing facilities. Other suggestions for improvement were the provision of refuse bins to each household to keep homes and the municipality clean, and compelling landlords to provide the necessary basic facilities.

Conclusion

This study has analysed the conditions under which households in the Wa Municipality live. The study focused on one of the common challenges of urban development – residential housing. It has identified and discussed the various components of housing including water supply, sanitation and solid waste management.

Generally, the production, maintenance and management of housing have been, and continue to be, market-based activities, with private individuals leading the process. At the same time, households seeking living spaces are subjected to exploitative activities of individual landlords, who have no regards for municipal housing policies and regulations. In lieu of this, housing facilities in the municipality differ in terms of access to water, toilet, drainage and drainage systems, and the amount households pay as rent differ from one area to another contingent on the structured or unstructured nature of the residential area and facilities available. But it is also true that rent determination is a prerogative of landlords due to ineffective implementation of rent controls by municipal authorities.

Considering the nature of the housing problem facing the municipality, traditional methods of meeting the shelter demands of households will not be sufficient. In addition to enforcing bye-laws and building regulations on the provision of housing facilities by the Wa Municipal Assembly, new and innovative means of regulating the housing sector must be considered. To assist and enhance this, it is conceptually helpful to disentangle the production of dwelling units from the contribution of good, safe and secure housing and domestic infrastructure to the wider social processes of equitable urban development, notably the provision of adequate portable water supply, sanitation and waste management services through the collaborative efforts of government agencies and departments at the municipal and regional level.

Thus, the principle of subsidiarity and the devolution of authority in the housing sector is an essential starting point. Again, to be effective and to encourage landlords to provide basic housing facilities, municipal authorities must consider developing public infrastructure, such as access roads and water and drainage systems within the municipality.

Conflict of Interests

The authors have not declared any conflict of interests.

REFERENCES

Addo AI (2013). Assessing residential satisfaction among low income households in multi-habited dwellings in selected low income communities in Accra: policy review. Urb. Std. J. 5(4):1-20.

Addo AI (2015). Perceptions and acceptability of multi-habitation as an urban low income housing strategy in the Greater Accra Metropolitan Area, Ghana. Urb. For. 24:543-571.

Adjei KO, Fobiri G, Owiredu GK (2015). Policies and barriers in the provision of affordable housing in Ghana. Afr. J. Appl. Res. 1(1):159-169.

Afrane KS, Owusu-Mensah D, Donkor-Hyiaman AK, Bondinuba KF (2014). Toward innovative housing financing in Ghana: an evidence-based from South Africa's pension housing financing system. Pub. Pol. Adm. Res. 4(4):20-38.

Amoah TS, Kosoe AE (2014). Solid waste management in urban areas of Ghana: issues and experiences from Wa. J. Environ. Pollut. Hum. Health 2(5):110-117.

Archer WR, Gatzlaff DH, Ling DC (1996). Measuring the importance of location in house price appreciation. J. Urb. Econ. 10(3):334-353.

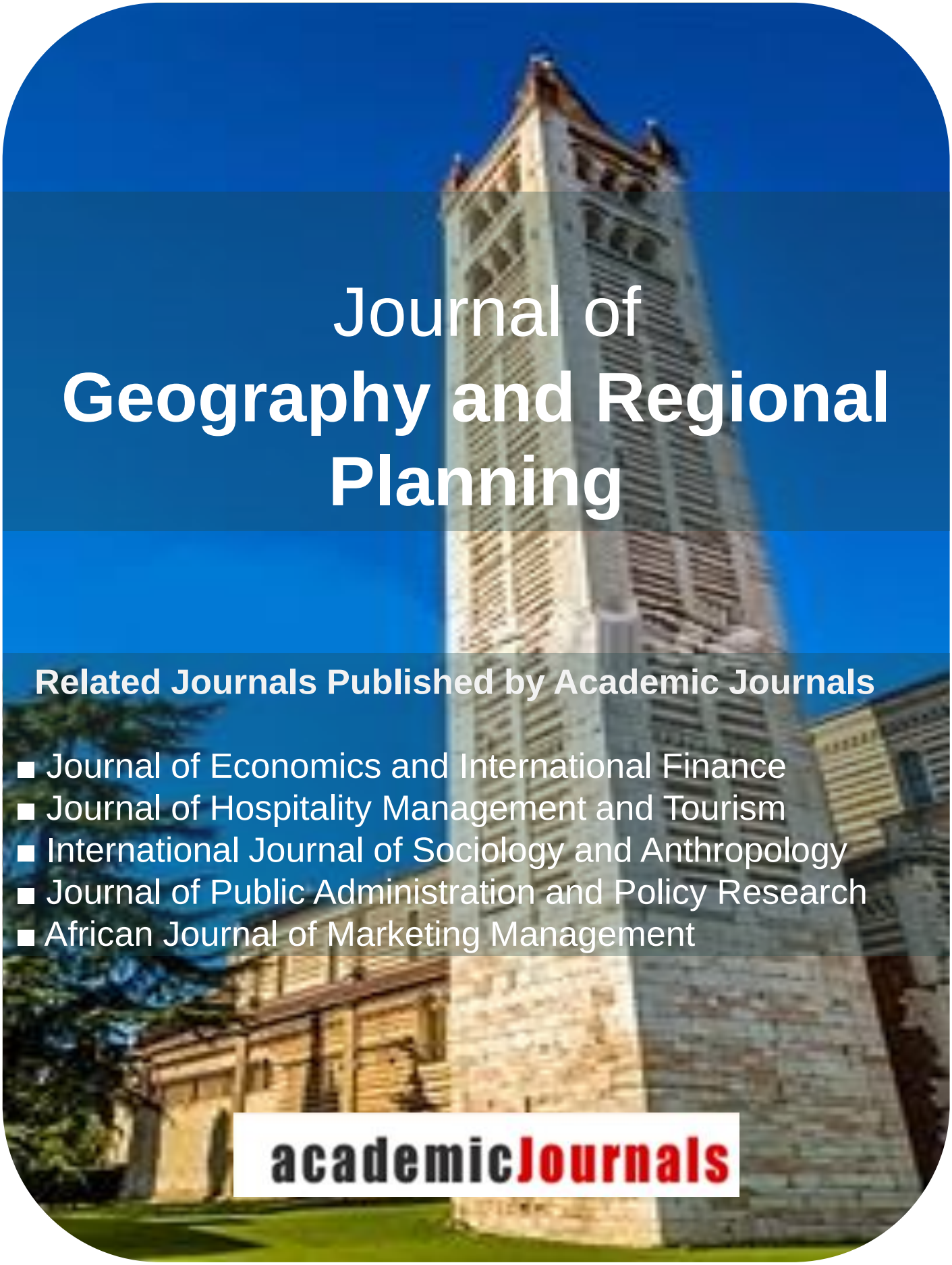
Aribigbola A (2011). Housing affordability as a factor in the creation of sustainable environment in the developing world: the example of Akure, Nigeria. J. Hum. Econ. 35(2):121-131.

Arku G (2009). Housing Policy Changes in Ghana in the 1990s. Housing Stud. 24(2):261-272.

Asomani-Boateng R (2007). Closing the loop community-based organic solid waste recycling, urban gardening, and land use planning in Ghana, West Africa. J. Plan. Educ. Res. 27:132-145.

Bank of Ghana (2007). The Housing Market in Ghana. Accra, Ghana:

Bank of Ghana.
Belsky ES, Drew RB, McCue D (2007). Projecting the Underlying Demand for New Housing Units: Inferences from the Past, Assumptions about the Future. Cambridge: Joint Center for Housing Studies Harvard University.
Boamah NA (2010a). Housing affordability in Ghana: a focus on Kumasi and Tamale. Ethiopia J. Environ. Stud. Manage. 3(3):1-11.
Boamah NA (2010b). Housing finance in Ghana: can community mortgage cooperatives provide a panacea? Ghana. J. Dev. Stud. 7(1):21-37.
Boamah NA (2013). Land use planning and housing situation in the Wa and Offinso South Municipalities, Ghana. Ethiopia J. Environ. Stud. Manag. 6(4):13-27.
Bonnefoy X (2007). Inadequate housing and health: an overview. Int. J. Environ. Pollut. 30(3/4):17-32.
Bonnefoy X, Braubach M, Krapavickaite D, Ormandy D, Zurlyte I (2003). Housing conditions and self-reported health status: a study in Panel Block Buildings in three cities of Eastern Europe. J. Hous. Built Environ. 18(4):329-352.
Bramley G, Pawson H, White M, Watkins D, Pleace N (2010). Estimating Housing Need. London: DCLG.
Desai RM (2010). The Political Economy of Urban Poverty in Developing Countries: Theories, Issues, and an Agenda for Research. Wolfensohn Center of Development Working Paper 20. Brookings: Global Economy and Development.
Di ZX (2001). The Role of Housing as a Component of Household Wealth. Joint Centre for Housing Studies, Working Paper WO1-6. Harvard: Harvard University.
Di ZX, Yang Y, Liu X (2003). The Importance of Housing to the Accumulation of Household Net Wealth. Joint Centre for Housing Studies, Working Paper WO3-5. Harvard: Harvard University.
Firdaus G, Ahmad A (2013). Relationship between housing health: a cross-sectional study of an urban centre of India. Indoor Built Environ. 22(3):498-507.
Ghana Statistical Service (2008). Ghana Living Standard Survey: Report the Fifth (5th) Round (GLSS 5). Accra, Ghana: Ghana Statistical Service.
Ghana Statistical Service (2012). 2010 Population and Housing Census: Summary Report of Final Result. Accra, Ghana: Ghana Statistical Service.
Ghana Statistical Service (2014). Ghana Living Standard Survey: Report the Sixth (6th) Round (GLSS 6). Accra, Ghana: Ghana Statistical Service.
Government of Ghana (1990). National Building Regulations, 1990, L.I. 1630. Accra, Ghana: Ghana Publishing Corporation.
Heath S (2014). Housing Demand and Need (England). England: House of Commons Library.
Jackson RJ (2003). The impact of the built environment on health: an emerging field. Am. J. Pub. Health 93(9):1382-1384.
Karley NK (2008). Residential property affordability analysis in Ghana. Hab. Int. 25:191-208.
Ministry of Local Government and Rural Development (MLGRD) and Local Government Service (LGS) (2010). Guidelines for the Provision, Operation and Maintenance of Public Toilets in Ghana. Accra, Ghana: MLGRD.
Ministry of Works and Housing (2005). Housing in Ghana and Investment Opportunities. Accra, Ghana: Ministry of Works and Housing.
Monson M (2009). Valuation using hedonic pricing models. Cornell Real Estate Rev. 7:62-73.
Njiru MM, Moronge M (2013). Factors affecting growth of mortgage industries in Kenya: a case study of National Housing Corporation. Int. J. Soc. Sci. Entrepr. 1(7):26-35.
Obeng-Odoom F (2009). The future of our cities. Cities 26(1):49-53.
Obeng-Odoom F (2010). Urban real estate in Ghana: a study of housing-related remittances from Australia. Hous. Stud. 25(3):357-373.
Osumanu KI (2010). Financing housing improvement in urban Ghana: experiences from the rental sector in Accra and Trakoradi. Ghana J. Geogr. 2:1-24.
Osumanu KI, Kosoe EA (2013). Where do I answer nature's call? an assessment of accessibility and utilisation of toilet facilities in Wa, Ghana. Ghana J. Geogr. 5:17-31.
Pugh C (2001). The theory and practice of housing sector development for developing countries, 195099. Hous. Stud. 16(14):399-423.
Rondinelli AD (1990). Housing the urban poor in developing countries: the magnitude of housing deficiencies and failure of conventional strategies are world-wide problems. Am. J. Econ. Soc. 49(2):153-166.
Scammell TE, Willie JT, Guilleminault C, Siegel JM (2009). A consensus definition of cataplexy in mouse models of narcolepsy. Sleep 32:111-116.
Schmuecker K (2011). The Good, the Bad and the Ugly: Housing Demand 2025. London: Institute for Public Policy Research.
Songsore J (2003). Towards a better Understanding of Urban Change: Urbanization, National Development and Inequality in Ghana. Accra, Ghana: Ghana Universities Press.
United Nations Human Settlements Programme (UN-HABITAT) (2010). The State of African Cities: Governance, Inequality and Urban Land Markets. Nairobi, Kenya: UNHABITAT.
United Nations Human Settlements Programme (UN-HABITAT) (2003). Rental Housing: An Essential Option for the Urban Poor in Developing Countries. Nairobi, Kenya: UN-HABITAT.
United Nations Human Settlements Programme (UN-HABITAT) (2012). Sustainable Housing for Sustainable Cities: A Policy Framework for Developing Countries. Nairobi, Kenya: UN-HABITAT.
Wa Municipal Assembly (WMA) (2006). Wa Municipal Assembly Bye-Laws. Wa, Ghana: WMA.
Whitehead C, Sagor E (2015). Understanding the Local Impact of New Residential Development: a Pilot Study. London: LSE.
Yeboah IEA (2005). Housing the urban poor in the twenty-first century sub-Saharan Africa: policy mismatch and a way forward for Ghana." Geo J. 62(1–2):147-161.
Yormesor GK (2007). Affordable housing for Ghana's urban poor. J. Sci. Tech. 18(2):16-31.



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