IMPACT OF HUMAN POPULATION ON LAND DEGRADATION. A CRITICAL LITERATURE REVIEW

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ABSTRACT

Purpose: The better management of land resources is essential for sustainability and for improving the quality of life of people living in the city and the peri urban areas who are mostly farmers With major changes being agricultural land use giving way to residential land use in the peri urban area, access to agricultural land is drastically reduced causing food insecurity problems in the region. The general objective of the study was to establish the access the impact of human population on land degradation.

Methodology: The paper used a desk study review methodology where relevant empirical literature was reviewed to identify main themes and to extract knowledge gaps.

Findings: The study found out that increase in human population has resulted to more land-use and land cover changes are likely to take place as more land is converted over time, forest to agricultural land, and agricultural land to built-up land, which threatens the existence of agricultural land and water sources in the future.

Recommendations: The study recommends that there is the need for stakeholder participation and institutionalize stakeholders' participations in land use planning process and urban planning. It is only when the public and land owners are well informed about land management issues that a positive change of attitude, adherence to laws on land use among others can be achieved. The county government and the national governments should come up with policies to outlaw arbitrary sale of land especially in areas where the main form of land use is agriculture to enhance the effectiveness of zoning regulations. It is important that the management of land be made the first priority in the study area and the nation as a whole. The various land sector agencies and institutions responsible for land management should enforce the existing laws on land management.

Keywords: *impact human population, land degradation*

INTRODUCTION

Background of the Study

Muchena et al (2005) have defined "land degradation as the loss in productivity of the land and its ability to provide quantitative or qualitative goods or services as a result of natural and human-induced changes in physical, chemical and biological processes". Land degradation is a permanent decline in the rate at which land yields products useful to local livelihoods within a reasonable

timeframe. Land degradation has also been defined as the reduction of the current or future capacity of land to produce (Oluwole and Sikhalazo, 2008). Other scholars have postulated that land degradation, especially due to declining soil fertility is the fundamental biophysical cause of declining per capita food production in Sub-Saharan Africa for the last two decades. The economic fortune of most developing countries, including Kenya revolves largely around the exploitation of and use of land resources especially in the primary industry such as agriculture. Consequently, land and land use policy are important in economic and social development. The analysis of the future trend for food and agricultural raw materials as well as trends in their supplies have shown clearly that greater rapid increases in food production are needed over and above past trends if the goals of improved nutrition and economic development and poverty reduction are to be achieved (Titilola and Jeje, 2008).

Urbanization leads to the outward expansion of cities and results in changes in land use and the dramatic effects are very clear in the cities and peri-urban areas. As the cities expand, the main zone of direct impact is the peri-urban area (NsiahGyabaah, 2000), which are characterized by diverse uses of land, that often vary in relation to their functional linkages to urban and to rural sectors. Aguilar and Ward (2003), notes that peri-urban areas are transitional in nature and they become progressively more agriculture in orientation as one recedes from the urban centre to the rural areas due to diverse land uses.

The population here comprises heterogeneous groups including original residents, farmers, migrant residents, recreational land users, industrial users, natural resource users, investors, and speculators, developers, and builders (Thuo, 2010). Fringe zones associated with urban centres have become more numerous, larger and complex with rapid urbanization and the associated transition of large populations from rural to urban lifestyles. These complex fringe zones have strong interactions with the urban center and characterized by similar physical, demographic, and occupational characteristics.

 A major difference is that in many cases, the fringe zone residents have varying access to urban services and facilities and more importantly, have only a limited voice in urban planning and development. According to Olima (2003), rapid urban population growth goes with a lack of equivalent growth in urban land supply i.e. land is fixed in supply and does not increase with the increasing population. The pressure exerted by this increasing population tends to deprive other sectors of the needed land. Agricultural lands are the most affected by this rapid urbanization, as other land uses such as residential and commercial tend to dominate agricultural lands in competition for more space. As noted by Owusu and Agyei (2007), a key challenge of the urbanization process is the rapid conversion of large amount of prime agriculturalland to urban land use (mainly residential, industrial, and infrastructural construction) in the urban periphery.

The face of the world is changing more rapidly now than at any time in history. The trend primarily responsible for the transformation is the rapid growth of the world population. People are moving into cities at a rate not seen since the industrial revolution filled the cities of the developed world more than a century ago (UN-HABITAT, 2006). In 2000, world population reached 6.1 billion. Currently about half of the world's population is urbanized, and this is expected to increase to 80-

90 % in forty years' time, growing at an annual rate of 1.2 % and it is projected to reach 8 billion by 2030. Urbanization is expected to continue rising in both the developed and the less developed regions so that, by 2050, urban dwellers will likely account for 86 % of the population in the developed regions and for 66% of that in the less developed regions.

According to the expected result, 64.7% population in Asia and 61.6% population in Africa will have settled in urban regions by 2050. Similarly, 90.1% in North America, 88.8% in Latin America and the Caribbean, 84.3% in Europe and 74.8% 9 population in Oceania is expected to be urban by 2050 (UNDESA, 2010; UN, 2009). Today, the largest and fastest-growing cities are located in developing countries of Africa, Asia, Central and South America. In regard to future trends, it is estimated that 93 % of urban growth would occur in Asia and Africa and to a lesser extent in Latin America and the Caribbean (UN-HABITAT, 2006). Currently, Africa is the least urbanized region and has the highest urban population growth in the world, at an average annual rate of 3.5% for the period 2005-2010 (ESCAP, 2011). Despite decline in population growth rates since the mid-1980s, Africa remains the world's fastest growing region at an estimated rate of 2.4 % per annum. Although future growth rates are expected to be lower, the region will attain an estimated population of 1.4 billion by the year 2030 (UNDP, 2002). It is worth noting that even in Africa, differences exist among the subregions. As presented in Table 2.1, the urban growth rates are high for every region in Africa but much more in East Africa

Statement of the Problem

Improving agricultural productivity is central in achieving the Millennium Development Goals in Sub-Saharan Africa. However, widespread land degradation, exemplified by soil erosion and declining soil fertility, which in turn leads to falling production, remains a big challenge in the region (Kimaru and Jama, 2005). Many small-farm zones have unacceptably high levels of erosion and land degradation (Gachene and Kimaru, 2003) attributed to various factors. These include frequent cultivation for seedbed preparation without incorporating soil conservation measures, cultivation of steep slopes and hillsides, extending cultivation too close to watercourses and encroaching on wetlands, and turning of vital forests into farmlands and settlements. There is tremendous pressure on the natural resources due to increasing human population. To meet the demands of large population means the need for more food production, more requirement of energy, more water requirement, better civic amenities for a reasonable quality of life and infrastructural development to sustain increasing pressure to sustain the quality of life (Chaudhary et al, 2008).

Ramphelle and McDowell (1991) stated that in rural areas the heavy use of traditional fuel notably wood, has far outstripped the capacity for natural regeneration. Rapid deforestation, soil erosion and general soil depletion have been the result. The 5th International Conference on Land Degradation (IUSS, 2008) affirmed that land degradation and desertification continue to threaten the livelihood of millions of people worldwide both in poor and rich countries alike. In view of the increasing effects of resource constraints on the global economy, there is need for more targeted research on ecological-economic interaction and to review the national policies and action plans to give more attention to land use policies and sustainable land management to prevent land

degradation and loss of productive land. The current study will bring into light the impact of human population on land degradation. A critical literature review.

Objectives of the Study

The general objective of the study was to access the impact of human population on land degradation. A critical literature review

Justification and Significance of the Study

It is estimated that 1 to 2 million Ha of cropland are being taken out of production every year in developing countries to meet the land demand for housing, industry, infrastructure and recreation (UN-Habitat 2010). Understanding the consequences of urban expansion on land-use aimed at developing an approach for assessing land-use changes and their effects on landuse patterns and processes at the urban and peri-urban level is essential in landuse resource planning and management. The results of the study will serve as baseline information on urban expansion in terms of its effects on land use patterns, the drivers/conditions that contribute to the changing land use patterns. The outcome of this research could be beneficial to local, sub-county, County and National Governments, as it will be useful in generating base line data for further studies and intervention, policy formulation, implementation, monitoring and evaluation, especially on issues relating to urban expansion and land use planning and management.

LITERATURE REVIEW

Urbanization and urban sprawl

Urbanisation is a form of metropolitan growth that is a response to often less understood implications of technological, economic, social, and political forces and to the physical geography of an area (Sudhira, 2008). Further, he observed that the significant economic and livelihood opportunities provided in the urban areas, results to an expansion for accommodating the immigrants resulting to greater urbanisation. Urbanisation, in this context then viewed not as a threat to the environment and development but the unplanned urbanisation and dynamic urban growth, or the sprawl that affects the land-use of any region that becomes a matter of concern through its affectation in the loss of prime agricultural lands. It is thus imperative to study and bring out the intricacies and implications associated with the problem of unplanned urban growth ensuing into sprawl. Asamoah, (2010) notes that the unplanned expansion of cities and encroachment by people for various purposes also has contributed to land use changes more so, towards the urban fringes. Towns and cities are expanding in certain pockets with a change in the land-use along the highways and in the immediate vicinity of the cities due to ad hoc approaches in regional planning, governance, and decisionmaking. This dispersed development outside compact urban and rural centres that is along highways and in rural countryside referred to as sprawl. Sprawl generally refers to some type of development with impacts such as losses of agricultural lands, open spaces, and ecologically sensitive habitat s in and around the urban areas (Mishra, et al., 2011). These regions lack basic amenities due to the unplanned growth and lack of prior information and forecasts of such growth during policy, planning, and decision-making. According to UNCED (1992), lack 13 of prior planning, coordinated decision-making, and

visualisation of the outgrowths, the regions remain lacking of basic amenities like water, electricity, sanitation, and result in inefficient and drastic changes in land-use, affecting the ecosystem and thus threatening the sustainable development of the region.

Land use planning response to urbanization

 Asamoah, (2010) notes, urban planning plays an important part in increasing the capacity of cities to cope with population growth. Poor planning leads to inefficiencies and institutional rigidities that hasten diminishing returns and causes inoperative capacities. Good planning however allows a city to take in more than what the average would permit (Mutiara, 2008). In an attempt to ensure better management of urbanisation, governments adopt macro and microeconomic policies that designed to mitigate the magnitude of urbanisation to manageable levels. In Kumasi, for instance, land use planning, managing, and controlling its growth and development has been a daunting task. The mechanism for controlling its development is rather weak, ineffective, inappropriate, and limited in scope; measures to enforce planning legislation are very unpopular and rarely implemented. As Adarkwa and Post, (2001) observed that development control in Ghana tends to be reactive instead of proactive. In addition, there is little coordination between various development stakeholders. Hence, most planning done is on a piecemeal basis and the overall effect is that development appears haphazard, uncoordinated, and uneconomical. Land use planning and management tools have, over the years, played crucial role in avoiding and mitigating the adverse impact of rapid, unplanned urbanisation (Masakazu, 2003) . As a primary tool, physical plans established are 19 to address mid and long-term problems. Physical planning, as a complement to social and economic planning, has an important role to play in helping achieve the aims of social, economic and other forms of planning (Asamoah, 2010). The result manifested is in a meaningful and functional organisation of facilities in space. This includes the proper use of land, development of new land, and provision of water, energy, and infrastructure that favour decentralised economic development. Such planning approach is effective in establishing orderly and consistent use of land. In addition, zoning regulations promote efficiency and allow for easier regulation of urban development. Zoning techniques, applied are to implement master plans and guide urban development to spatially appropriate areas, include designation of sensitive land resources and areas, establishment of buffer zones, management of hazard-prone lands and protection of cultural resources. Others include conservation of open spaces and urban green, management of prime agricultural land and discouraging of excessive urban sprawl.

Empirical Review

Maurice, (2012) conducted a study to examines the complex nexus between agricultural land use intensity and the socio-economic milieu in which the farming households operate. Socio-economic factors investigated include demographic characteristics, education, income differentials, farm inputs, and distance and land tenure. It is hypothesized that socio-economic characteristics of the farmers do no significantly influence variations in land use intensity. The study was based largely on field interviews conducted on 257 homesteads chosen randomly using multistage sampling. Data was analysed using both simple mathematical calculations and computerized multivariate techniques including stepwise Regression and Factor Analysis. The study revealed that socio-

economic factors studied accounted for about 92 per cent of the spatial variations in land use intensity between the farmsteads. The regression of the 17-predictor variables on land use intensity using the stepwise method reveals that dependency ratio, sex ratio. Family size, farm size, crop index, distance to the furthest plot, farmers' income and the number of visits by extension agents accounted for about 91 per cent of the total variations in the dependent variable. These are the most significant factors influencing variations in land use intensity levels between the farmsteads. The remaining nine variables are not significant. Agricultural land use intensification in Siaya District hinges upon increased extension services and loan availability. Raising farmers' income is a necessary precursor to high capital investment in agriculture. This can be achieved through reducing the sizes of families and hence dependency ratio. Increased involvement of women in decision-making framework will stimulate their participation in farming activities. Land consolidation and the even distribution of market centers should also encourage land use intensification in the district. Farmers should be encouraged to commercialize their farms by cultivating high value crops such as coffee. There is also need for scholars to determine the "Optimum Farm Size" necessary for intensive land use. Farmers with surplus land can be induced to lease out for intensive agricultural production.

Onyango, (2012) conducted a study to investigate the possible causes and magnitude of soil erosion along the River Nyando basin at Kobong'o area. It also examines the local community perception of the identified land use changes and degradation problems in the area. Land degradation in the watershed is of concern in terms of the ecological stability and socio-economic wellbeing. Soil erosion is evident in most parts of Nyando District and has recently been rated by farmers as the most urgent problem. The specific objectives are: to determine historical land use changes and river dynamics in the study area; to compare runoff, sediment and nutrient (N & P) loss from different land use types; and to assess the local community perception on riverine ecosystem management. Buffer strips and conservation crops can empirically provide for net costs to farmers as well as protect the fragile riverine areas from degradation. They control soil erosion, nutrient and water loss and provide additional services and products to the community. Most conservation technologies are underutilized due to a variety of reasons such as lack of demonstrable profitability at the farm level. It therefore requires a combination of both biophysical and socio-economic considerations to design any management strategy for riverine areas. The perception of the local community is paramount as is their involvement in the design process from the initial stages. The "Retirement Theory" developed in New Zealand promoted exclusion of any exploitation activity along the waterways, which are then planted with natural vegetations due to their protective potentials. The theory did not attract the farmers' socio-economic priorities. Historical land use patterns are examined by use of selected digitized aerial photographs from 1948. Soil, nutrient and water loss is captured in terms of different land use types using 100m2 plots through pipe samplers and laboratory analysis. A participatory Rural Appraisal is conducted to collate the views, needs and understanding of the community as concerns riparian resources. The results indicate over cultivation particularly on fragile lands, high soil and water losses from cattle tracks, and lack of awareness on the importance of long-term management strategies. It can be argued that increased soil conservation and fertility management and improvement activities

are required in this area. There is also need to restrict cattle movement on fragile landscapes. Participatory awareness creation on the value of sustainable management strategies for the riparian zones and need for communal protection of shared resources are the other intervention points that needs to be looked into. Further research should be conducted and indigenous and exotic tree and shrub species that provide both resource protection and socio-economic return to farmers be developed. Acceptable means of confining cattle such as Zero grazing could be looked into.

Edgar,(2016) conducted a study whose objectives were; (i) To determine the physical sub-catchment characteristics. (ii)To assess the spatial and temporal land cover change (1995-2010). (iii) To assess the effects of land use land cover changes on the stream flow in Nyangores sub-catchment. The morphometric characteristics were assessed from a Digital Elevation Model (DEM) based on standard and automated procedures available within ArcGIS to determine physically based catchment characteristics. The land cover changes were obtained through classification of Landsat images for 1995 (Landsat TM) and 2010 (Landsat ETM+) based on a supervised classification methodology employing the Maximum Likelihood Function. The images were classified into four major classes namely, farmlands, tree plantation, natural forest and Shrub lands. The WEAP model was calibrated and validated using observed monthly streamflow data and later used to simulate the land cover change effects on stream flow between 1995 and 2010. From the morphometric analysis, the sub-catchment covers an area of about 933km2. Nyangores River was found to be a 4th order stream with a mean bifurcation ratio of 1.4. Land cover classification reveals that tree plantation declined by about 9.4%, farmland expanded by about 8.7%, Shrub lands increased by about 1.9% while forest declined by 1.2%. After calibration and validation, the simulation results indicated that stream flow increased by 3% in the whole sub catchment. The statistical analysis showed that the increase of streamflow and farmland expansion demonstrates a very strong and positive relationship. Land use change in the study area have contributed to environmental degradation, erosion and deforestation. The analysis of stream flow indicates predominantly low dry season flows and peak wet season flows between the 1995 and 2010. These changes could be attributed to spatial decrease in natural forest and tree plantation land areas that occupied upper sub-catchment over the study period. This situation has strong implications to water resources management in Nyangores sub-catchment where conflicts related to periodic water scarcity are increasing. The results will go a long way providing a useful information to support land-use planning and management. The study therefore calls for a multidisciplinary approach with a comprehensive view towards land use that maintains ecological health and human requirements. This study provides valuable information for sub-catchment management in the efforts to mitigate streamflow impact caused by LULC change in this critical watershed.

Renny,(2013) conducted a study on effects of land use and land cover changes on the hydrology of Weruweru-kiladeda sub-catchment in Pangani river basin, Tanzania.The objective of the study was to achieve four specific objectives, namely i) to determine the land-use/cover changes in Weruweru-Kiladeda Sub-catchment between 1990 and 2009; ii) to identify factors contributing to land-use changes in Weruweru-Kiladeda Sub-catchment; iii) to identify the hydrological response

of the sub-catchment to land-use/cover change; and iv) to investigate the measures taken to mitigate the negative effects of land-use/cover change in the sub-catchment. Satellite data was integrated in GIS to examine the extent of land-use and cover change in the sub-catchment. Through a GIS overlay of land-use type, a topographic index distribution of each land-use type was created. Both quantitative and qualitative data were used for this study. Various data types such as socio-economic data, land-use data, rainfall data and river flow data were collected in order to supplement information from landsat images. Analysis was done using classified landsat images of 1990, 2000 and 2009. SPSS and Ms Excel were used to analyse descriptive data. The study revealed a significant change of land-use/cover between 1990 and 2009 with a sub-catchment-wide increase in urbanization (15%), shrub (1.9%) and bare land (3%), and a decrease in forested land (11.9%) and agricultural area (7.8%). Environmental degradation, resource use conflicts, erosion, deforestation and decreasing river discharges were some of the key outcomes of land-use change. These are coupled with demographic changes, institutional factors, socio-economic transition, traditional and climate variation. Trends in river flow indicated predominantly low dry season flows and peak wet season flows between the 1990s and 2009. These changes could be attributed to spatial decrease in forest and shrub land areas that occupied upper sub-catchment over the study period. This situation has strong implications to water resources management in Pangani Basin where conflicts related to periodic water scarcity are increasing. The findings provide a useful support for land-use planning and management. Also, the results provide necessary inputs to decision makers that must balance trade-offs between the positive benefits of land-use change and potentially negative unintended consequences. The study calls for a multidisciplinary approach with a comprehensive view towards the hydrologic processes that maintain ecological health and human requirements for food, water and shelter.

Esther,(2016) conducted a study on evaluation of urban expansion and its implications on land use in Kiambu County, Kenya.The specific objectives of the research were to, 1) investigate the dynamics of rural land lost to urban land uses in Kiambu County from 1986 to 2014. 2) Assess the effects of urban land use changes on agricultural land use in Kiambu County and lastly, 3) to investigate the urban planning and management response to land use changes in northern area of Nairobi. Remote sensed data on land use/land cover change for the period of 1986-2014 together with any historical information and archived reference data used to compute spatial/temporal changes in the expansion of urban settlement and extent of land use/land cover changes. Change detection analysis was performed through GIS overlay operations. The study revealed a significant change of land-use/cover between 1986 and 2014 with the area experiencing rapid increase in urbanization (41.6%), Forest decreased by (10.3%), and a decrease in bare land (1.8%), water (0.22%) and agricultural area (29.3%). Agricultural land in a period of 28 years is losing rapidly to urbanization with the results indicating that 61.5 % of agricultural land converted to built-up land. Declining agricultural land, loss and creation of employment, changing social interaction and lifestyles, increasing land values and housing costs were some of the effects of rural land transformation. The measures put forward to control the rapid land use conversions included zoning for the various land uses. Findings provide a useful support for land-use planning and management. In addition, the results provide necessary inputs to decision makers that should

balance trade-offs between the positive benefits of land-use change and potentially negative unintended consequences. The study calls for a combined approach, which involves participation of all the stakeholders in management and planning of land as a vital resource. This approach will protect the endangered land use, agricultural land, as well as controlling urban developments. Based on these results and some observations made in the study area, the study therefore recommends that, stakeholder participation should be given first priority in land use planning and management process, and a cost benefit analysis of land use conversions

Research gaps

Geographical gap is a knowledge gap that considers, the untapped potential or missing/limited research literature, in the geographical area that has not yet been explored or is under-explored. For instance Onyango, (2012) conducted a study to investigate the possible causes and magnitude of soil erosion along the River Nyando basin at Kobong'o area. It also examines the local community perception of the identified land use changes and degradation problems in the area. The results indicate over cultivation particularly on fragile lands, high soil and water losses from cattle tracks, and lack of awareness on the importance of long-term management strategies. It can be argued that increased soil conservation and fertility management and improvement activities are required in this area. The studies presented a geographical gap as they were conducted in Kenya while our current study focused on the impact of human population on land degradation. A critical literature review

Methodological gap is the gap that is presented as a result in limitations in the methods and techniques used in the research (explains the situation as it is, avoids bias, positivism, etc.). Maurice, (2012) conducted a study to examines the complex nexus between agricultural land use intensity and the socio-economic milieu in which the farming households operate.The study is based largely on field interviews conducted on 257 homesteads chosen randomly using multistage sampling. Data are analysed using both simple mathematical calculations and computerized multivariate techniques including stepwise Regression and Factor Analysis. The study reveals that socio-economic factors studied accounted for about 92 per cent of the spatial variations in land use intensity between the farmsteads. The regression of the 17-predictor variables on land use intensity using the stepwise method reveals that dependency ratio, sex ratio. Family size, farm size, crop index, distance to the furthest plot, farmers' income and the number of visits by extension agents accounted for about 91 per cent of the total variations in the dependent variable. The studies presented a methodological gap as it used regression and factor Analysis while our current study adopted a desktop literature review method

Conceptual gap arises because of some difference between the user's mental model of the application and how the application actually works. Esther,(2016) conducted a study on evaluation of urban expansion and its implications on land use in Kiambu County. Remote sensed data on land use/land cover change for the period of 1986-2014 together with any historical information and archived reference data used to compute spatial/temporal changes in the expansion of urban settlement and extent of land use/land cover changes. Change detection analysis was performed through GIS overlay operations. The study revealed a significant change of land-use/cover

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METHODOLOGY

The study adopted a desktop literature review method (desk study). This involved an in-depth review of studies related to the role of voter education on governance efficacy. Three sorting stages were implemented on the subject under study in order to determine the viability of the subject for research. This is the first stage that comprised the initial identification of all articles that were based on impact of human population on land degradation from various data bases. The search was done generally by searching the articles in the article title, abstract, keywords. A second search involved fully available publications on the subject on impact of human population on land degradation. The third step involved the selection of fully accessible publications. Reduction of the literature to only fully accessible publications yielded specificity and allowed the researcher to focus on the articles that related to impact of human population on land degradation which was split into top key words. After an in-depth search into the top key words (impact, human, population, land degradation), the researcher arrived at 5 articles that were suitable for analysis. The 5 articles were findings from Maurice, (2012) who conducted a study to examine the complex nexus between agricultural land use intensity and the socio-economic milieu in which the farming household's operate.The study is based largely on field interviews conducted on 257 homesteads chosen randomly using multistage sampling. Data are analysed using both simple mathematical calculations and computerized multivariate techniques including stepwise Regression and Factor Analysis. The study reveals that socio-economic factors studied accounted for about 92 per cent of the spatial variations in land use intensity between the farmsteads. The regression of the 17-predictor variables on land use intensity using the stepwise method reveals that dependency ratio, sex ratio. Family size, farm size, crop index, distance to the furthest plot, farmers' income and the number of visits by extension agents accounted for about 91 per cent of the total variations in the dependent variable.

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SUMMARY, CONCLUSION AND POLICY IMPLICATION FOR FURTHER STUDY

Summary

Peri-urban agriculture has a significant role in food and nutrition security in most low-income nations (. Rapid urbanization threatens agriculture, which is the main source of livelihood of peri-urban dwellers, resulting to problems of land scarcity for agricultural purposes. Thus, the allocation of agricultural land for residential development has resulted in a reduction in the quantity (size) and quality of land. Farmers are therefore, often left with little or no land to cultivate and this renders them vulnerable. The peri-urban interface of most urban areas, which show

characteristics of both rural and a few urban life is, in most cases the agricultural hub of the urbanites and supply's most of their food requirements.

Conclusion

The study concludes that conversion of land to feed and shelter the growing human enterprise has been one of the primary modes for human modification of the environment (Chiwa, 2012). It was evident that there has been a significant land-use and land cover change in the area where the agricultural land covered 65% in 1986, decreased to 64% in 2002, and further decreased to 13.1% in 2014. However, the area occupied by built up land increased from 1.4% in 1986 and 15.5% in 2002 to 43.1% in 2014. There was also a decrease in Forest from 23% in 1986 to 6.1% in 2010 later increased to 13.1% in 2014. The area occupied by water bodies was 0.7% in 1986, 0.7% in 2002 and showed a slight decrease to 0.4% in 2014. The changes are attributed to the growth of urban areas, increase in population through natural, and immigration, reduced income from agricultural in the area to satisfy the demands of increasing population. For the period covered by the study the thematic maps produced from the Landsat images across the area revealed that 61.5% of agricultural land was converted to built-up, while forest 26.0% has been converted to built-up. During this period, the 12% of bare land was converted to built-up land while 0.5% of water body also converted to built-up land.

Recommendations

The study recommends that there is the need for stakeholder participation and institutionalize stakeholders' participations in land use planning process and urban planning. It is only when the public and land owners are well informed about land management issues that a positive change of attitude, adherence to laws on land use among others can be achieved. The county government and the national governments should come up with policies to outlaw arbitrary sale of land especially in areas where the main form of land use is agriculture to enhance the effectiveness of zoning regulations. It is important that the management of land be made the first priority in the study area and the nation as a whole. The various land sector agencies and institutions responsible for land management should enforce the existing laws on land management.

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