

The Pattern of Expansion of Urban Residential in Eldoret Municipality, Kenya

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Abstract: Population in Eldoret Municipality has grown rapidly resulting in pressure on infrastructural facilities. The aim of this research was to identify the factors that have contributed to urban residential expansion in Eldoret town. The research was carried out in Kapsoya, Pioneer and Kipkaren estates. The pattern of residential expansion was identified and mapped using remotely sensed data. The analysis involved spatial changes where Geographical information system (GIS) and Remote Sensing were used to interpret the changes besides SPSS statistical software. Areas under residential land for the years 1979 to 1989 and 1989 to 2006 and percentage increased were computed. Between 1979-1989 findings shows increases of 121.2% in Kapsoya and 149.8% in Pioneer. This study concludes that Population growth is the leading contributor towards residential development. There is need for affordable housing programmes by the government.

Keywords: GIS, land use, land cover, urban residential, Kenya.

1. Introduction

Eldoret Municipality is one of the fastest growing Municipalities in Kenya. The Municipality has expanded geographically from 12 km² to 147.9 km² between 1912 and 1999. Human population has grown from 19,605 in 1962 (Central Bureau of Statistics, 1999) to approximately 500,000 people at the moment (Central Bureau of Statistics, 2008). The expansion of the Municipality has resulted to land cover depletion and land use changes. The most significant land use change is conversion of agricultural land, mostly owned by East Africa Tanning and Extract Company (EATEC) to residential development.

The 21st century has recorded a high population growth as compared to other previous centuries (Okpala, 2004). The growing population has led to the need to allocate more land towards residential expansion. However residential development has taken an undefined pattern, leading to public outcry on the quality, quantity and even safety of residential houses (Wanyonyi, 1996). Therefore residential development remains a challenge not only to Eldoret Municipality (Okpala, 2004) to meet the demands of the growing human population but also to other urban centers in Kenya. To address some of the challenges facing the Municipality, Ministry of Local Government and Government institutions have initiated programs to obtain timely and valid land-use change information to assist in planning and managing the Municipality (Musyoka, 2004).

Residential expansion is a strong and potentially positive force in the development today. However the rapid expansion of residential areas within the Eldoret Municipality has often overtaken the capacity of the council in dealing with urban development requirements including community facilities and environmental

conservation and protection. Therefore by applying the knowledge of residential expansion, the Municipality will be better placed to develop its human capital which will be able to deal with challenges that arise out of residential development.

The overall objective of the study was to use GIS and Remote Sensing to predict patterns of residential expansion in Eldoret Municipality. The specific objective of the study was to identify factors that contribute to urban residential expansion in Kapsoya, Pioneer and Kipkaren estates in Eldoret Municipality, Kenya.

2. Location of Study

Eldoret is a town in the western part of Kenya and headquarters of Uasin Gishu District in the Rift valley province, a rich agricultural zone. It is traversed by latitude 0°31' North and longitude 35°16' East (Figure 1). The town is approximately 312 km from the capital Nairobi.

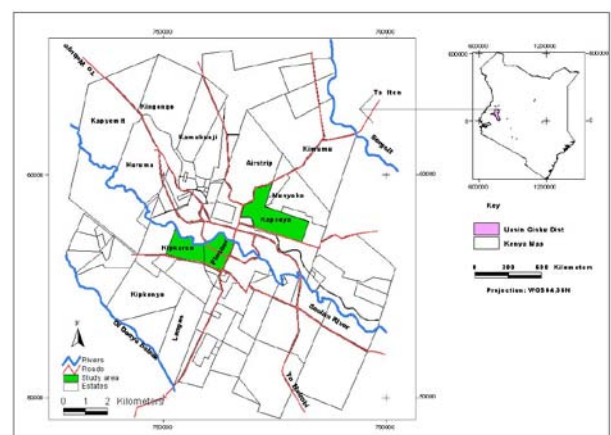


Figure 1: Study area, Source: Municipal Council of Eldoret

3. Methodology

The source of data used included satellite imagery and aerial photographs from which various land cover types were extracted.

3.1 Land use/Land cover classes for 1979

Topographical sheets of 1979 were scanned and georeferenced in ArcGIS using the ground control points that had been collected from the field using the GPS. Six Land use classes were digitized in ArcGIS and the shape files for each land use class stored. The classification of houses was done in IDRISI. The total area under residential houses was calculated and recorded and the map under residential houses extracted.

3.2 Land use/land cover classes for 1989

The aerial photographs of 1989 were scanned and georeferenced. The georeferenced photographs were mosaicked and the six land use classes existing in the mosaic were digitized. The classification of houses was done in IDRISI with the presence of housing unit being represented by 1 (one) while absence was being represented by zero (0). The total area under residential houses was calculated. Change in built up area was calculated.

3.3 Land use /Land cover classes 2006

The Quickbird image was georeferenced. Six land use classes were digitized and exported to IDRISI. The classification for the houses was carried out in IDRISI. The total area under residential houses was calculated and recorded.

To arrive at a comparison, the total area occupied by residential houses for 1979, 1989 and 2006 was calculated and percentage increases determined for the periods 1979 to 1989 and 1989 to 2006. Using SPSS, the percentage of population increase was calculated and compared with the percentage of residential expansion and the results displayed in graphical form.

3.4 Status of residential Expansion

To arrive at the status and extent of residential expansion, maps showing the expansion of residential houses for 1979, 1989 and 2006 were extracted from land cover classes. Maps showing the extent of residential expansion for each year were displayed.

3.5 Extent of residential expansion

Maps were produced chronologically from 1979, 1989 and 2006. For purposes of this article, residential expansion of 1979 and 2006 are displayed in Figure 2 and 3

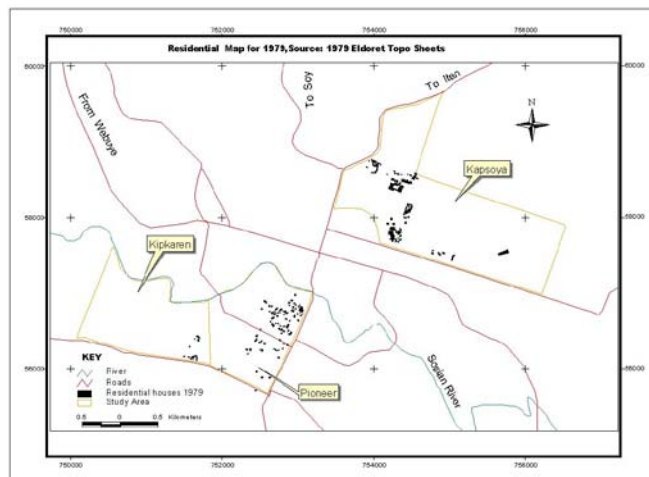


Figure 2: Residential status 1979

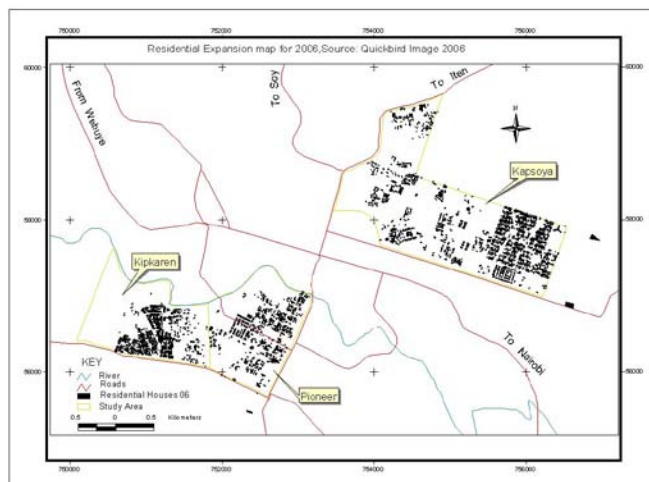


Figure 3: Residential expansion 2006

3.6 Land use / land cover classes

Table 1 summarizes land use / land cover classes while Table 2 shows area under residential land.

Table 1: Land use / land cover classes

Estate	Landuse	1979	1989	2006
		Area In M2	Area In M2	Area In M2
Kapsoya	Unutilized Space	3135400	2954600	2705100
	Schools	13300	13300	13400
	Roads	43200	177900	217000
	Residential	38100	84400	289100
	Playground	23700	23700	23700
	Industry			5600
Pioneer	Unutilized Space	1422800	1332300	1259400
	Church	100	900	2000
	Roads	20300	63300	85000
	Residential	20500	51200	101300
	Hospital		3700	3700
	Commercial		12300	12300
Kipkaren	Unutilized Space	1475800	1379000	1177200
	Roads	12100	50900	89300
	Drainage	11500	11200	11200
	Residential	3500	50900	121100
	Schools		3300	3300

Table 2: Area under residential land for the years 1979 to 1989 and 1989 to 2006

<i>Estate</i>	<i>Area-1979 (m²)</i>	<i>Area-1989 (m²)</i>	<i>Area_2006 (m²)</i>	<i>% Increase 1979-1989</i>	<i>% Increase 1989-2006</i>
<i>Kapsoya</i>	38100	84400	289100	121.2	242.5
<i>Pioneer</i>	20500	51200	101300	149.8	97.9
<i>Kipkaren</i>	3500	50900	121100	1354.3	137.9

The major observation was the drastic residential expansion from 1979 to 2006. The results also show that the percentage of population increase was more than that of residential development. The increase in the built up area resulted into a decline in the natural environment. The major implication of residential development has been loss of biodiversity associated with open space and modification of surface hydrology within the study area. From the casual interview conducted on original inhabitants of the study area regarding the effects of human settlement, they reported loss of biodiversity evidenced by lack of natural mushrooms and disappearance of termites that were common in seventies and eighties.

Low residential development is attributed to lack of infrastructural facilities and poor social amenities. The major facilities that were lacking were, road network and power supply. In fact by 1989 no power had been supplied to this estate. But with provision of facilities like schools and hospital in the nearby estate, it attracted the residential development at an alarming rate. Also its inclusion into the municipal council led to transformation of a rural based population into urban prompting the council to provide facilities like piped water, drainage system and waste collection centre.

Pioneer estate had witnessed residential development as a result of inherent colonial influence. It was one of the estates that housed Asians that were constructing the Kenya Uganda Railway. Its accessibility to service facilities, e.g. power supply and good road network, and its closeness to the CBD, contributed to its early growth. Residential expansion in the estate has remained steady since 1979. This is due to provision and maintenance of infrastructural facilities that go in hand with human population growth.

Residential development in Kapsoya estate started at a low pace (Wanyonyi, 1996) despite the establishment of a learning institution like Moi Girls high school and Eldoret prisons. As much as it had power supply by 1979, its low growth by 1979 is attributed to poor road network that was not developed by then. However its tremendous growth in the 1990s was provoked by good road provision, courtesy of a Site and Service scheme. Kapsoya estate realized an expansion of 121.2% between 1979 and 1989 and 242.7% between 1989 and 2006. The sharp residential expansion

is due to Site and Service scheme that led to massive housing production from 1989 (Central Bureau of Statistics, 2000). The scheme was facilitated by the World Bank and Kapsoya estate was one of the beneficiaries within Eldoret Municipality. The scheme provided infrastructural facilities that attracted both private and public investors in the housing sector. Between 1979 and 1989 is the phase that has been described as the industrialization age in Eldoret Municipality (Ombura, 1997).

4. Conclusion

The residential expansion over a period of 25 years was quantified in terms of change of built up area. By 2006, the percentage of population increase has surpassed the percentage of residential development as opposed to the period 1979 to 1989 when residential development increment was much higher than population increase. Due to rapid population increase within the Municipality, as a result of rural urban migration and high reproductive rates, floor space per person is on the decline across the three estates studied. The development of residential houses and infrastructure facilities in the three estates will continue. Therefore there is need to balance population growth and residential expansion to match market demands. Population growth is the leading contributor towards residential development. In order to reduce overcrowding, the Eldoret Municipal Council and the Central government need to roll out residential expansion programs that will increase affordable housing production so that they reduce congestion in the estate like Kipkaren.

References

- [1] Central Bureau of Statistics, (1999), Population Census Reports, Nairobi: Government printer.
- [2] Central Bureau of Statistics, (2000), Economic Survey, Government printer, Nairobi.
- [3] Central Bureau of Statistics, (2008), Economic Survey, Government printer, Nairobi.
- [4] Musyoka, R., (2004), Informal Land Delivery Process and Access to Land In Eldoret Kenya, Working paper No.4 . International Development Department School of Public Policy University of Birmingham, England.
- [5] Okpala, D.C.I., (2004), Financing Housing in Developing Countries. A Review of The Pitfalls and Potentials in The Development of The Formal

Housing Finance systems, Urban Studies Vol. 31, No.9.

- [6] Ombura, C.O., (1997), Towards Environmental Planning Approach in Urban Industrial Citing and Operations in Kenya: The Case of Eldoret Town, D.Phil Thesis University of Amsterdam.
- [7] Wanyonyi, R.N., (1996), the Urban Poor and the Environment: A Case Study of Eldoret Slums, Kenya. M.Phil Thesis Unpublished, Moi University.

Author Profile



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