
AN ASSESSMENT OF FACTORS THAT FACILITATE LAND USE AND LAND COVER CHANGES IN ELDORET MUNICIPALITY, UASIN GISHU COUNTY, KENYA

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ABSTRACT: *Each land use and land cover type is found on a portion of the earth due to several influential factors. And it stands in a spatial relationship to the other land use and land cover types. The change to which these land use and land cover types is subjected is a function of a number of influential factors, namely, population increase, human behaviour and ideologies, infrastructural developments, planning modes and development values and patterns which ignore any of these factors encourage environmental degradation. Human beings have spread themselves in nearly every part of this planet and their activities are causing more than the extinction of just a few species (Seymour, 1966). The human role in changing the face of the earth is as old as history and yet it has persistently grown. This study is an analytical examination of factors that have facilitated land use and land cover changes using a Remote Sensing (RS) and Geographic Information Systems (GIS) Applications. The results are achieved through observation and analysis based on some industries formed within the period that the author deemed relevant. The study concludes that some of the influential factors include Boundary Extension, Inception of the Government's Growth Centre Policy and Development Plans. The paper finally recommends that in order to enhance land use development, there is a need to improve on both the land information system and Geographic information systems, so that investors can have ready information on land availability and suitability.*

KEYWORDS: Remote Sensing (RS), Geographic Information Systems' (GSI), Factors, Facilitate, Land Use, Land Cover Changes

INTRODUCTION

Land and Humanity

Human beings have spread themselves in nearly every part of this planet and their activities are causing more than the extinction of just a few species (Seymour, 1966). FAO (1989) reckons that it is due to the increase in population and aspirations, that land is increasingly becoming a scarce resource, (due to which the land use has to change to meet the new demands). Kates (1990) remarks that during the last 300 years, the scales, rates and kinds of environmental change have been fundamentally altered as humanity has passed through an era of rapid population growth and the development of a fossil fuel-based industrial society. Bernstein (1994) agrees that with increase in population in a place, industrial developments come up which in turn exert pressure on the surrounding ecosystem.

From the foregoing, it is quite clear that man cannot be separated from land. His relations with land have emerged from the everyday reality of having to make a living from it (Marther, 1986). It is therefore essential to ensure that all these activities and conducts by man do not damage the natural environment.

Land Ownership

According to Ratcliffe (1976), land ownership refers to legal, contractual or customary arrangements through which individuals or organisations gain access to social or economic opportunities through land. Land ownership is an important issue in terms of urban development. Cox (1984) noted that land owners exert considerable influence over urban planning especially if they act in concert. Kivell (1993) concur with this as he suggests that land ownership is an integral part of both national and local economics which can be seen as part of the relationship between production sector and the consumption sector.

High house prices in urban areas have been blamed on monopoly ownership of land. Kivell (1993) asserts that landowners may use monopoly of land ownership to withhold land from sale, hence driving up land prices and generally controlling the market. However, Massey and Catalano (1978) disagree with this as they conclude that there is no single group, based on land ownership by capital, which can be said to be a distinct and coherent fraction. The main groups differ in their relationship to land and in terms of ideological and political bases.

Private property and the workings of a free enterprise society are thought by some authors to be threatened by public land ownership. Roberts (1977) added that where government or local authorities own the land required for development they can at least in theory promote efficient and desirable land use patterns and channel growth in a rational and co-ordinated manner.

Kehoe et al. (1976) suggest that public ownership will eliminate delays in the land use regulatory system, while Shoup (1983) pointed to the way in which advance public purchase of land for development can ensure the preservation of the best sites for public facilities as well as a favourable purchase price. However, public ownership is not free from criticism. Clawson (1971) feels that a public monopoly will be under a strong temptation to fall into unprogressive, insensitive, and inefficient ways. A related claim against public ownership is that it is largely unresponsive to the knowledge and discipline of market supply and demand. Hamilton and Baxter (1977) argue that there is no evidence that public authorities can provide land better or cheaper than the private sector. In the process of urban development, particularly in a developing country like Kenya, a partnership between public and private sector has to be encouraged, especially for the purpose of overcoming land planning issues. Kivell (1993) concludes that partnerships have attracted large sums of private sector investment and activity into areas where, in many cases, land had lain idle and neglected for many years.

Land Policy

Baken (1992) defines land policy as the involvement by the government in the land market. The government is involved through the enforcement of tax, planning regulations and provision of infrastructure and services all in the process of development.

Marther (1986) reckons that land policy adopted in the past has influenced the land use at present. The influence is exerted through the size and shape of the basic units in the structure of the land ownership, and he has given an example of United States of America where the land policy adopted during the nineteenth century determined a farm structure that is found in many parts of the country even at present day.

Land policies affect both the cost of land and the availability of land. However, these policies are lacking in most of the developing countries. Ombura (1997) cites the lack of an effective national urban land policy as the major cause for the persistent urban environmental and planning problems in Kenya. Government intervention is supposed to reduce inefficiency and improve equity. Barret and Healey (1985) suggest that land policy should be seen, not simply as a set of regulations for achieving narrow land planning objectives, but as an integral part of broader economic and social policies.

It is clear from the above that land policy must be clear and have accepted meaning. Kivell (1993) clarified this by making a distinction between aspects of control, and promotion of development as the key issues of land policy. Under the aspects of control, the regulation and limitation of the free market and some powerful agents within it are included, while promotion of development involves the encouragement of desirable forms of development.

The purpose and rationale

The main aim of this study was to examine and document some of the factors that facilitated land use and land cover changes and also examine the environmental impacts caused by these changes in Eldoret Municipality. Understanding these changes can assist in devising sustainable management strategies and therefore reducing environmental problems. Most of the studies reported for example Ombura,(1997) concentrate on industrial development and their pollution problems and yet land use and land use cover change is a common phenomena in most towns of developing countries. This analysis is expected to promote environmental quality of the study area and also guide the land use planners in the study area. The information obtained can also be applied to other urban areas with similar environmental problems.

Eldoret Municipality is an ideal site for this kind of study because of three main reasons. Firstly, it is one of the major urban centres which has so far provided an alternative for the absorption of migrants to Nairobi, Kisumu and Mombasa and thus lessening the pressure arising from excessive concentration in the three main urban areas of the country. This is so because Eldoret is classified as the fast growing urban centre with a growth rate of more than 7.4% per annum (World Bank, 1982). Secondly, Eldoret's location along a major highway with connections to all the major Western towns like Kisumu, Kakamega, Kitale and Lodwar and neighbouring countries like Uganda and Sudan makes it a suitable area for investment and thus urban expansion. Thirdly, Eldoret being a rapidly growing town in an inland region provides a clear picture on how an urban expansion influences land use and land cover patterns of the rural area around it. The growth of a town may result in a number of problems for the rural area around it and the urban environment. These problems need to be analysed so that solutions can be devised for future use. This study will be of use in highlighting some of the environmental impacts of urban expansion and land use and land cover changes.

MATERIALS AND METHODS

Documented Data

Certain data was obtained from various documented literature, which involved reviewing of target documents with the aim of getting relevant and vital information. These include the government reports that relate to urban development, Municipal annual report on the growth Eldoret town, the Kenya government development plans and other reports on urban growth and urban environmental management were also used. Other relevant information was got from books and journals on urban land use changes and environmental management. Statistical abstracts provided the necessary statistics for the study.

This method provided valuable information especially those pertaining to:

- The history of the growth of Eldoret Town
- Industrial developments in Eldoret
- Urban environmental development
- Impacts of land use and land cover changes
- Strategies of minimizing impacts of land use and land cover changes

RESULTS

Possible Factors Responsible for Land Use and Land Cover Changes

Table 1 shows a chronological perspective of milestone events in the study area from 1970 to 1990. It is clear from this table that Eldoret Municipality has undergone three boundary changes since 1970 up to the present (see figure 1). These boundary changes have contributed to some of the land use changes in the study area. Due to the advent of boundary expansion, large areas under agriculture and forest were included in the Municipal boundary. These are privately owned lands some of which have now been sub-divided or turned into squatter housing. In addition to this, there have been a number of development plans prepared between 1970 and 1990. The first one which was the physical development plan (PDP) was prepared in 1970 to lay strategies for development in the study area. This was based on the twenty five square kilometers of the Municipal boundary at that time and thus became inapplicable after the 1974 boundary extension.

Table 1: A Chronology of Events in the Study Area from 1970 to 1990

YEAR	KM ²	EVENTS	EFFECTS
1970	25	First Physical Development Plan (PDP)	-Laid Strategies for Development
1974	59	Boundary Extension Growth Centre Policy Inception	Privately owned land included in Municipal boundary.
1975	59	Long-term Structural Plan - Eldoret Structural Plan (ESP)	- Laid Broad Development Strategy. -Limited by Physical Constraints
1980	59	Short-term Development Plan - Eldoret Physical Development Plan (EPDP)	- To implement ESP - Land Zoning Technique introduced - Overtaken by events
1988	149	Boundary Extension	- Vast areas of Forest and Agricultural Land included in the Municipality.
1990	149	Layout Plan for Up-Grading Scheme	- Implementation of EDP - Limited by Inadequate Finance

Source: Field Survey

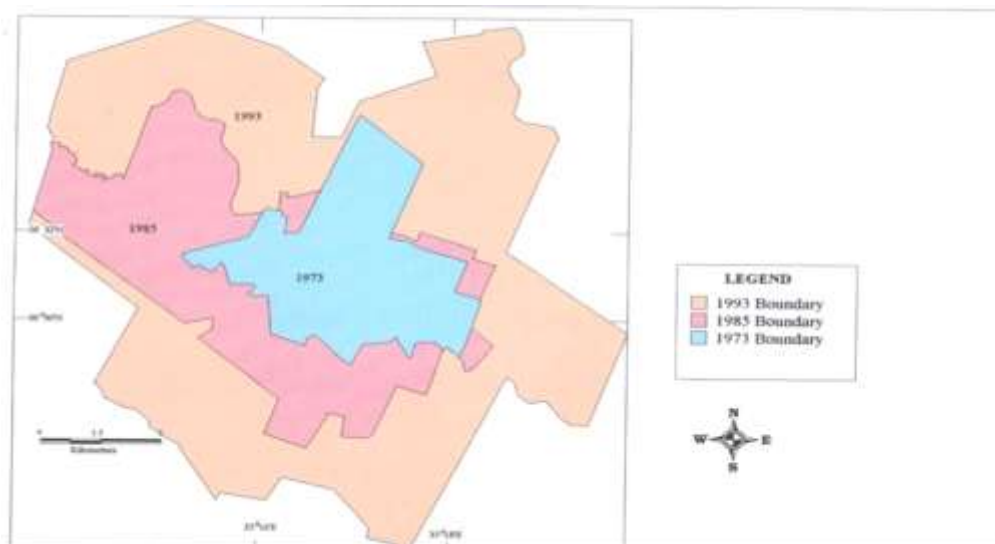


Figure 1: Boundary Change map derived from the Physical Planning Unit, Eldoret

The long-term plan called the Eldoret structure plan (ESP) prepared in 1975 was to run upto 1990, but was limited by the existing physical development constraints and thus led to concentration of development around the existing built-up areas. The short term plan, the Eldoret Physical Development Plan (EPDP) was prepared in 1980 and was to serve as an implementation schedule

for the long-term plan. It was a planning strategy based on land zoning regulation especially for land use delimitation. The zoning concept has also been side lined by the expansion of the Municipal boundary to 147 square kilometers in 1988 which made it quite expensive for the Municipality to develop the entire area.

All these planning modes have facilitated land use changes as well as urban sprawl and hence created conditions for environmental problems to arise in the study area.

Table 2: The Main Industries Established in the Study Area between 1930 and 1993.

INDUSTRY	YEAR OF ESTABLISHMENT
East African Tanning and Extract Company (EATEC)	1932
Kenya Co-operative Creameries (KCC)	1932
Unga Limited	1934
Ken-Knit	1966
Raymond's Textiles	1970
Rai-Plywood	1973
Mugoya Quarry	1973
Kenya Industrial Estates (KIE)	1975
Rivatex Textiles	1975
Corn Products Company(CPC)	1976
Highland Paper Mills	1977
Rift Valley Bottlers	1977
Technical Seals Limited	1978
Multi Craft Limited	1980
Arkay Oil Processing	1980
Cadburry Schweppes	1983
Kenya Furfural Company	1983
Rubber Components	1990
Kenya Ports Authority and Inland Containers	1993
Kenya Oil Pipeline Depots	1993

Source: Field survey.

Table 2 also illustrates that the period between 1970 and 1990 was an industrial era for the study area. Most of the major industries were established after 1970 and these attracted high population and hence rapid changes in land use types in the study area. According to the economic survey report of 1989, the population of Eldoret in 1979 was 50,503, which increased upto 111,882 in 1989, and was projected to be 146,790 in 1996.

DISCUSSION

Factors that have Caused Land Use and Land Cover Changes and the Associated Environmental Problems

The results indicate that there have been three major events in the study area that could have perpetuated land use and land cover changes and hence caused environmental problems. These include the boundary extension, inception of the growth centre, policy preparation and implementation of development plans.

Boundary Extension

The two major boundary extensions done after 1970 have contributed to the rapid expansion of built environment in the study area. First this has happened because the extension has brought in large privately owned lands which have been sub-divided into numerous individual plots or turned into squatter housing, such as Langas, Kapkoros, Sugunanga and Kipkeiyo farms. The sub-divisions are done illegally without provision of essential social facilities and no reserves for roads. Secondly, the latest boundary expansion (147 km²), appears to be beyond the existing requirements for urban land, more so when Eldoret Municipality has to inherit large areas of agricultural land which generate very little revenue. The Council is therefore faced with the problem of supplying infrastructure for an area far beyond its present financial capacity. The boundary extension in the study area has thus led to a number of environmental problems which include emergence of spontaneous settlements, inadequate water supply, poor sanitation and inadequate infrastructural facilities.

Inception of the Government's Growth Centre Policy

The growth centre policy which aimed at promoting economic, social and community sectors in small urban centres has contributed to rapid land use changes in the study area. Through provision of industries, housing and infrastructural facilities, the general built environment has expanded to an extent that deforestation has resulted.

The growth centre policy has also failed to provide adequate government housing due to limited finance. The housing supply is therefore less than the demand, hence many residents in the study area live in poor housing environment.

In addition, the provision for water supply from Kapsoya and Sosiani treatment plants is inadequately distributed throughout the Municipality. The areas which are not provided with piped water depend on wells which are not protected from contamination through seepage from pit latrines. The growth centre policy has therefore encouraged general land use changes without providing for a quality environment.

Development Plans

There are three development plans enacted in the study area between 1970 and 1990. These plans were mainly concerned with laying strategies for land use development with little concern of the environment. Their implementation has therefore facilitated land use and land cover changes as well as environmental problems. This has happened because the plans have promoted provision

and zoning of housing and infrastructural developments leading to demand for more space which has been obtained from the former agricultural, forests and wetland land cover types. The implementation of these development plans is also done without basing them on the results of the Environmental Impacts Assessment which is not done.

It is also noted in this study that in all cases, the development plans designated for the study area have been overtaken by events. For instance, the 1975 ESP and 1980 EPDP which were based on the 1974 municipal boundaries became less applicable after the 1988 boundary extension. This in turn led to prevalence of unplanned activities and thus environmental problems.

It is therefore essential to call for improvement in land use planning and policy frameworks, especially on how planning practices should respond to changing circumstances in urban development.

CONCLUSION

The objective of this study was to examine the major factors that have caused land use and land cover changes in the study area. This was basically achieved through the personal observation and literature research and it covered factors such as boundary expansion, development plans and the growth centre policy.

The results show that there are mainly three events which have taken place in the study area between 1970 and 1990 and have contributed to land use expansion at the expense of environmental quality. The events are: boundary expansion, implementation of development plans and inception of the growth centre policy. The lack of environmental concern in these factors has facilitated land use problems in the study area.

RECOMMENDATION

In order to enhance land use development, there is a need to improve on both the land information system and Geographic information systems, so that investors can have ready information on land availability and suitability. At the same time infrastructural services will be easily extended to areas identified and planned for land use developments.

There is need to educate landowners within the extended Municipal boundaries of the benefits of developing their land in accordance with the physical plans. This can be done through local radio programmes, adverts at public offices and public meetings.

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