

**LAND USE CHANGE AND ITS
IMPLICATIONS ON TEMPERATURE AND
RAINFALL IN THE CENTRAL CATTLE
CORRIDOR DISTRICTS OF UGANDA**

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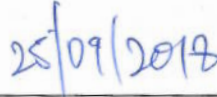
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Declaration

I, Lotet Ronald, declare that this dissertation is my original work and has not been submitted to any other institution for any award.



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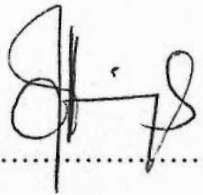


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Approval

This is to confirm that this dissertation has been submitted with our approval as university supervisors.

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Date..... 25/09/2018

Dedication

This dissertation is dedicated to the Almighty God who made everything possible in his time and gave me the grace to carry on. I also dedicate it to my family Grace, Mark, Mathias who always gave me the motivation to go on. I also dedicate it to my Mum, friends and relatives.

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Acronyms

LULCC	Land Use and Land Cover Change
LULC	Land Use and Land Cover
CSIRO	Commonwealth Scientific and Industrial Research Organization
CCAM	Conformal-Cubic Atmospheric Model
CABLE	CSIRO Atmosphere Biosphere Land Exchange
MODIS	Moderate Resolution Imaging Spectroradiometer
CONICYT	Comisión Nacional de Investigación Científica y Tecnológica (Chile)
BNU	Beijing National University
Ha	Hectares
SPOT	System pour observation de tere
IPCC	Inter-governmental panel on climate change
NFA	National Forestry Authority
UNMA	Uganda Meteorological Authority

Abstract

The study was conducted in six the cattle corridor Districts of Uganda (Sembabule, Mubende, Kiboga, Kyankwanzi, Nakaseke and Nakasongola) in central Uganda, with a major objective of assessing land use change and its implications on temperature and rainfall. Specifically of the study sought to identify and delineate different Land Use Land Cover categories and pattern of land use in the cattle corridor from 1995 to 2015, to assess the change in Land Use Land Cover (LULC) categories through spatial comparison and to evaluate the correlation between Land Use Land Cover Change and rainfall and temperature in the cattle corridor. Data of land use and land cover change was got by remote sensing and analyzed in ArcGIS. Satellite images were acquired which underwent a process of preparation, editing, visualization, segmentation, classification and validation. This process generated the land use and land cover maps together with the statistics. The rainfall data was collected by the use of the Climate Hazard group infrared precipitation Station (CHIRPS) data set while the temperature data was collected through the climate research center (CRU) website. To evaluate the correlation, a regression analysis was done in Microsoft excel. The research found that there were tremendous changes in the land use and land cover classes. Broad leaved plantations increased by 2,514.7 hectares, coniferous forests by 26,530.6 ha, wetlands increased by 22,970.5, Subsistence farmlands also increased by 251,879.7, commercial farmlands increased by 3,930.7 ha, built up areas, open water and impediment also increase while Tropical high Forests well stocked, Tropical high Forests low stocked, Woodlands and Grasslands reduced over the period of assessment that is from 1995 to 2015. The study findings also reveal that stable forests covered 151,911.6ha, forest loss 445, 381.5 ha, forest to wetlands 8087.9 ha, forest gain 78808.4 ha, stable non forest 998772.1ha, none forest to wetland 27030.3 ha, wetlands to forest 1300.3, wetlands to none forest 7795.6 ha and stable wetlands 77296.6 ha. The changes in land use and land cover were regressed with rainfall and temperature. It was found that there was no significant correlation between all the land use and land cover categories with rainfall. Well as changes in land use and land cover classes to include open water and Bush lands did not have a significant correlation with temperature, changes Tropical forests, plantations and wetlands had significant correlation with temperature. The study concluded that changes in land use and land cover impacted on the temperatures over the years. Therefore a significant reduction in forest cover, wetlands, and plantations will increase temperatures of a given area. However, further research should be conducted to investigate the period taken for the changes to significantly impact on rainfall and also correlation and interactions between the two meteorological parameters.

CHAPTER ONE: INTRODUCTION

1.1 Background

Changes in land use can be categorized by the complex interaction of structural and behavioral factors associated with technological capacity, demand, and social relations that affect both environmental capacity and the demand, along with the nature of the environment of interest (Butt, *et al.* 2015). Ecologists pay considerable attention to the land use change impacts predominantly with respect to its effects on biodiversity and aquatic ecosystems (Butt, *et al.* 2015).

According to (Kiggundu, 2018) the impact of land use and land cover change may be felt across a wide spectrum of environmental systems including the atmosphere, hydrology, geomorphology and ecology. Over utilization of land resources have caused numerous forms of degradation such as loss of biodiversity, deforestation, land and water degradation (Kiggundu, *et al.* 2018). It is estimated that, about 83% of the global terrestrial land surface has been affected by the activities of humans and 60% of the ecosystem degraded over the past half century (Lambin & Meyfroidt 2011). The modification of the terrestrial surface of the earth is generally referred as land use and land cover change (Ellis, 2013).

The collective impact of land use and cover changes on the environment is a subject of concern to both developing and developed nations as it affects sustainable development (Kiggundu, *et al.* 2018). Poor use of land especially in developing countries has led to huge proportions of land being degraded, reduction in food production and it is now a threat to livelihood (Kirui & Mirzabaev 2014). Rapid urbanization, predominantly in developing worlds, is one of the critical issues and visible anthropogenic force that has brought so much changes in urban landscape and land cover pattern around the globe (Zhang & Seto 2011).

Land use and land cover changes are found to be the most evident indicator of these human footprints and the greatest driver of biodiversity loss and other land degradation forms (Nkonya, *et al.* 2012). The disturbance of the land through these human activities has wide ranging and long-term consequences that affect important ecosystem processes and services (Wu 2013).

Land resources constitute the most important natural resources in Uganda with its people mostly depending on them for sustainability and survival; therefore, land and its resources make Uganda habitable (Turyamureeba 2017). Uganda has a total surface area of about

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