BUSITEMA UNIVERSITY

Faculty of Natural Resources and Environmental Sciences

# ASSESSMENT OF THE ABOVEGROUND CARBON STOCK POTENTIAL IN KAWERI CENTRAL FOREST RESERVE

BY

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## DECLARATION

I **SundayChristopher** do declare in the name of the almighty God that this research work is mine and has never been formally submitted by anyperson. And where other peoples' reports were used, the authors were dully acknowledged

**Signature**.....

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**Date**02../..07.../.2018..

## APPROVAL

This is to confirm that this research report is original and has only been through the efforts of **SundayChristopher** after pursuing a three year Bachelor of Science in Natural Resource Economics of Busitema University. He has therefore fulfilled part of his requirements for the Award of the Degree in Natural Resource Economics of Busitema University.

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## DEDICATION

I **SundayChristopher**, dedicate this research report to my parents Nansaale Hariet and Birungi Joseph. My brothers, John Sekajugo, Fred Mugabi, Joseph, Deo, Kizito, Petter and Mathias.My sisters, Rose, Juliet, and my friends Paul, Dorah, Happy, Jaya, Ronald, Elizabeth, etc, and my in-law Ms. Areto Dorcus. My supervisor professor Moses Isabirye, Mr. Ssuuna James and whoever put in a hand towards accomplishment of this report. May the good Lord reward you abundantly?

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## LIST OF ACRONYMS

| | |
|---|---|
| AGC | Aboveground Carbon |
| AGB | Aboveground Biomass |
| $CO_2$ | Carbon dioxide |
| $^0C$ | Degrees centigrade |
| C | Carbon |
| CFR | Central Forest Reserve |
| DBH | Diameter at Breast Height (1.3M) |
| Exp | Exponential |
| EPA | Environmental Protection Agency |
| FACE | Forests Absorbing Carbon Emissions |
| FAO | Food and Agricultural Organization |
| g | gram |
| GHG's | Green House Gases |
| GIS | Geographical Information System |
| GPS | Global Positioning System |
| GtC | Gigatons of carbon |
| H | Height |
| Ha | Hectare ($10000m^2$) |
| IFAD | International Fund for Agricultural Development |
| IPCC | Panel for Climate Change International |
| Km | Kilometer |
| MAAIF | Ministry of Agriculture, Animal Industry, and Fisheries |
| M | Meter |
| Mg | Mega grams |
| MW | Mega Watts |
| NFA | National Forestry Authority |
| NGO | Non-Governmental Organization |
| NTFP | Non Timber Forest Products |
| PEMA | Participatory Environmental Management Programme |

| | |
|---|---|
| PHRD | Policy and Human Resources Development Fund |
| KPO | Palm Kernel Oil |
| RED | Renewable Energy Directive |
| SOC | Soil Organic carbon |
| t/Ha | tons per Hectare |
| TEV | Total Economic Value |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment Programme |
| UNFCCC | United Framework Convention on Climate Change |
| USA | United States of America |
| WMO | World Meteorological Organization |

## ABSTRACT

In order to understand the aboveground carbon stock potential of eucalyptus and indigenous tree species, this study on assessment of the aboveground carbon stock potential in eucalyptus and selected indigenous species was carried out in Kaweri central forest reserve which had two divided parts; one being natural with various indigenous species while another part being restored with five years eucalyptus plantation. The main objective was this study was to assess the aboveground carbon stock potential of eucalyptus and the selected indigenous tree species. The specific objectives included; assessing the AGB of both eucalyptus and the selected indigenous tree species in Kaweri CFR, assessing the AGC of both eucalyptus and the selected indigenous tree species in Kaweri CFR, and assessing the potential economic value of AGC sequestration in Kaweri CFR. Data was collected within ten established plots of 10 by 10 meters where five samples were taken per plot in the restored part of the reserve (with eucalyptus) irrespective of the size totaling to 25 samples. Also the same procedure was used in the natural part of the reserve with respect to the selected five indigenous species (Ficus natalesis, Albizzia zygia, Misopsis eminii, Markamia lutea, and Melicia exelsa),this is because these species dominate the natural part of reserve. The data was summarized into tables and analyzed using excel and STATA. The results were illustrated using graphs and pie charts for easy interpretation and discussion to draw conclusions. The results indicated that there is a significant difference in carbon stock potential between eucalyptus and the selected indigenous species. The results showed that on average, the five years eucalyptus had 25.1tons/Ha while as the indigenous species had 35.5tons/Ha. Indicating that, there was much aboveground carbon in the selected indigenous tree species than in eucalyptus plantation. However, the difference in the age of the two difference parts of the reserve was ignored. In addition, the economic value of carbon sequestered from the natural forest was higher than that from the eucalyptus thus recommended that tropical forests should not be substituted for eucalyptus as a form of improving the aboveground carbon stocks according to the results.


**Keywords:** *above ground carbon stocks, forest, and biomas*

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# CHARPTER ONE: Introduction:

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Forests form a major component of the C reserves in the world's ecosystems (Houghton 2007) and greatly influence both the lives of other organisms and human societies. Trees also plays a key role in global C cycle. Managing forests through forestry, agroforestry and plantation systems is seen as an important opportunity for climate change mitigation and adaptation (IPCC 200, Canandell and Raupach)

Biomass and carbon for tropical forests are globally undergoing greatest change. However, reliable estimates for them are few. Biomass and carbon influence the global cycle. Tropical forests produce sources and sinks require reliable estimates of biomass density of forests and change over time. About 50% of forest biomass is C and this amount is the potential percentage of biomass carbon that can be added to the atmosphere as $CO_2$ when forests are cleared to other land uses.

In recent centuries, the concentration of atmospheric $CO_2$ has increased to 380 ppm, mainly due to human activities. As a means of carbon sequestration, afforestation plays a vital role in alleviating the $CO_2$ emission. The carbon storage capacity of forest ecosystems has been the focus of significant research. In the last two decades, the carbon sequestration function of forest systems has been significantly increased worldwide more especially in countries like China where the plantation forests are contributing about 80% of the total forest carbon sink increment. Carbon sequestration could be affected by plantation types and stand ages. It is of importance to

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