

BUSITEMA UNIVERSITY

IMPACTS OF CHARCOAL PRODUCTION ON THE ENVIRONMENT:

A CASE STUDY OF NAMASAGALI SUB COUNTY, KAMULI DISTRICT

BY

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**A RESEARCH REPORT SUBMITTED TO THE FACULTY OF NATURAL
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DECLARATION

I NAZZIWA JOAN declare that the work presented in this research report is original and has not been submitted to any university for any academic award.

Signed.......... Date.....27/6/2017.....

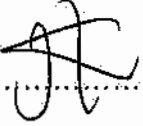
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APPROVAL

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Date..... 27/6/2017

DEDICATION

I dedicate this report to my mum and dad who gave me the support required to accomplish this research. I also dedicate this report to my brother and sisters to inspire them study.

Lastly I dedicate this report to environmentalists to 'keep up their fight for a good environment'.

ACKNOWLEDGEMENTS

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LIST OF ABBREVIATIONS

CBOs	COMMUNITY BASED ORGANIZATIONS
CFR	CENTRAL FOREST RESERVE
FAO	FOOD AND AGRICULTURE ORGANIZATION
LFR	LOCAL FOREST RESERVE
MEMD	MINISTRY OF ENERGY AND MINERAL DEVELOPMENT
MWLE	MINISTRY OF WATER, LANDS AND ENVIRONMENT
NEMA	NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY
NFA	NATIONAL FOREST AUTHORITY
NGOS	NON-GOVERNMENTAL ORGANIZATIONS
NFTPA	NATIONAL FORESTRY AND TREE PLANTING ACT
NHPC	NATIONAL HOUSING AND POPULATION CENSUS
UBOS	UGANDA BUREAU OF STATISTICS
UNEP	UGANDA NATIONAL ENVIRONMENTAL PROGRAME
%	PERCENTAGE

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ABSTRACT

This research project was conducted on the local communities in villages of Bususwa, Bugulu, Bulumira in Bwiiza parish and Kabaganda, Kabanyoro and Mutukula in Namasagali parish of Namasagali Sub County in Kamuli district. The research was carried out in the month of April 2017. The main objective of the study was to assess the impacts of charcoal production on the environment: A case study of Namasagali Sub-county, Kamuli District.

The research project employed descriptive and explanatory research designs that were used to collect data on the quantity of charcoal produced, tree species used and their impacts on the environment. The data was collected using questionnaires, observation, and review of existing literature for Kamuli District such as Kamuli District Environment Action Plan (2010/2015), Kamuli District Statistical Abstract, Land conflict mapping tool, journals, and websites. The collected data was edited, coded and entered into Microsoft Excel and analyzed using SPSS (Statistical Package for Social Scientists) version 16 to give descriptive and inferential statistics.

Findings showed that the area faced impacts such as little rainfall, too much sun shine, poor food yields, loss of tree cover on a wide area and poor tree regeneration. The tree species most used for charcoal production were indigenous including Muyembe (*Mangifera indica*), Muvule (*Milicia excelsa*), Gasiya (*Cassia spectabilis*), Musita (*Albizia coriaria*), Fene (*Artocarpus heterophylla*), Mugayile (*Ficus Natalensis*). The average number of charcoal bags produced monthly by each producer was 32. The charcoal producers who carried more production were

youth aged 21-40 years to earn income. However, the traditional kiln used in charcoal production was wasteful. Also, the tools used were rudimentary and techniques used in felling trees for charcoal production were characterized by many accidents.

It is recommended that the local people in the area be sensitized on the importance of sustainable charcoal production, importance of tree planting, need to observe laws and regulations concerning tree usage, and provided with other alternative sources of livelihood.

CHAPTER ONE: INTRODUCTION

1.1 Introduction

This chapter includes background of the study, research problem, the research objectives, research questions, conceptual framework, justification and significance of the study.

1.2 Background of the study

Charcoal production has become one of the major economic activities done in rural areas of Uganda. The rural communities carry out charcoal production to supply urban areas that highly consume the charcoal. According to Nationally Appropriate Mitigation Action Study on Sustainable Charcoal in Uganda (2013) , Kamuli district ranked fifth in supply of charcoal to urban areas like Kampala with over 178,165,336 tons per year. The consumption of charcoal nationally increased from 15.4 percent in 2002 to 22.9 percent in 2014 (UBOS, 2016). This increase means that charcoal is viewed by households as a reliable, convenient and accessible cooking fuel with a stable price. The price of a 70kg bag of charcoal; ranged from 30,000 Shs in rural areas to 70,000 Shs in urban areas. Prices were in agreement with those cited in Nationally Appropriate Mitigation Study on Sustainable Charcoal (2013) in Uganda and are still the same in 2017.

In most districts of Uganda, charcoal production is considered as one of the quick paying livelihood activity. This coupled with the increased demand, has resulted in massive tree cutting and its associated environmental impacts. These impacts include extensive loss of tree cover, increased runoff in low land and hilly areas, loss of soil fertility, increased temperatures, low rainfall, poor crop yields, loss of medicinal and sacred trees, high wastage

REFERENCES

- Adam, J.C. (2009). Improved and more environmentally friendly charcoal production system using a low-cost retort-kiln (Eco-charcoal), *Renewable Energy*, Vol. 34, pp. 1923–1925.
- Brieland J (2015) Social and environmental impacts of charcoal production in Liberia. Unpublished Msc dissertation. University of Michigan, USA.
- Bailis, R., Majid, E., Kammen, D. M. (2005). Mortality and greenhouse gas impacts of biomass and petroleum energy futures in Africa, *Science*, Vol. 308, 1 April, pp. 98–103.
- Biomass, N., & Demand, E. (2010). The Government of the Republic of Uganda National Biomass Energy Demand Strategy, (June 2001).
- Byabashaija, M. D., Esegu, J. F. O., Kidiya, J. M., Basoga, M., & Ondia, R. K. (2004). Traditional uses of indigenous tree species, 367–371.
- Biomass Energy Strategy (2014). United Nations Development Programme (UNDP).
- Cuñá Suárez, A., Tancredi, N., Pinheiro, P., Irene Yoshida, M. (2010). Thermal analysis of the combustion of charcoals from *Eucalyptus dunnii* obtained at different pyrolysis temperatures, in *Journal of Thermal Analysis and Calorimetry*. Vol. 100:3, pp. 1051–105.
- Engineering, F. (2008). “Charcoal production and use in Mozambique, Malawi, Tanzania, and Zambia : historical overview , present situation and outlook ”, 1–19.
- Egeru, A., Okia, C., & Leeuw, J. De. (December, 2014). Trees and Livelihoods in Karamoja, Uganda. World Agroforestry Centre for Evidence on Demand.
- Energypedia (2012). Charcoal production. Available at: https://energypedia.info/index.php/Charcoal_Production. [Accessed: 21 JUNE 2017]
- Eco-guardian (2015). Police Activities Destroying Forests. A Water and Environment Media Network Publication.p.10-15.
- Food and Agriculture Organisation (2015). Forest product statistics: Global Forest Products Facts and Figures.
- World Bank (2010). Enabling reforms: A Stakeholder-Based Analysis of the Political Economy of Tanzania’s Charcoal Sector and the Poverty and Social Impacts of Proposed Reforms, Washington, D.C., USA

Greenpower. (2012a). Statistics of Charcoal Production. Available at: www.pirroliz.org/index.php/component/content/article/6-2009-03-11-16-26-28/96-statistics-of-charcoal-production.html.

Hofstad, O. (2000). Production and spatial price differences for charcoal in Uganda, (August). <https://doi.org/10.1007/BF02762389>

Ainembabazi, J.H., Shively, G, and Angelsen, A (2013). Charcoal production and household welfare in Uganda: a quantile regression approach. *Environment and Development Economics*, 18, pp 537-558 doi:10.1017/S1355770X1300017X

Kamuli District Environment Action Plan (2010/2015). Kamuli District Local Government.

Kureeba, D. NAPE (2013,). Firewood collection in the Bukaleba forest reserve.

Malimbwi R.E. and Zahabu E.(2008) The analysis of sustainable charcoal production systems in Tanzania.

Migiro, K. (2012). Encourage commercial logging to grow Kenya's forest cover – report, Alertnet. Available at: www.trust.org/alertnet/news/encourage-commercial-logging-to-grow-kenyas-forest-cover-report (Accessed 21 June 2017)

Uganda. Ministry of Energy and Mineral Development (2007).

Msuya, N., Masanja, E., & Temu, A. K. (2011). Environmental Burden of Charcoal Production and Use in Dar es Salaam , Tanzania, 2011(December), 1364–1369. <https://doi.org/10.4236/jep.2011.210158>.

Nationally Appropriate Mitigation Action Study on Sustainable Charcoal in Uganda. (2013). United Nations Development Programme (UNDP).

Ndonga, W. (2012). Kenya Seeks to legalise Charcoal Trade, Available at: <http://allafrica.com/stories/201211051760.html?viewall=1> (Accessed 21 June 2017).

Renewable and Sustainable Energy Reviews. 2013.

Steenblik, R. (2006). Liberalisation of Trade in Renewable Energy Products and Associated Goods Environmental and Energy Products: The Benefits of Liberalising Trade. OECD, Paris, France.

Uganda. State of Environment Report 2015.

Species, A. (2012). Sustainable Tree Management for Charcoal Production, (June).

Technology, F., Management, W., Science, B., & Management, W. (2015). Charcoal Production and Producers' Tree Species Preference in Borgu Local Government Area of Niger State , Nigeria, 5(11), 1–8.

The land conflict mapping tool, Uganda.

Uganda National Forest Authority Report (2015).

Uganda Vision 2040. National Development Plan.

Uganda Bureau of Statistics (2016). National Population and Housing Census, 2014- Main report. Kampala, Uganda.

United Nations Environment Programs (UNEP) (2012): Green Economy Briefing Paper, Metrics & Indicators.