BUSITEMA UNIVERSITY
Pursuing Excellence

CLIMATE CHANGE AND SUGARCANE PRODUCTIVITY IN UGANDA

Implications on livelihood sustainability in Busedde sub county, Jinja district

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DECLARATION

I, Namazzi Betty hereby certify that this dissertation is a result of my original research work and I present it without any reservations.

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APPROVAL

The research work culminating in to this thesis or dissertation was conducted under my guidance and supervision.

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DEDICATION

I dedicate this dissertation to my family and friends. You have supported me throughout the process.

I will always appreciate you all, especially Mr. Nsubuga Benard and Ms. Khanzira Prossy for helping me develop my technology skills.

I dedicate this work and give special thanks to my wonderful husband Mr. Semakula Emmanuel for being there for me throughout the entire Masters program and the many hours of proofreading my work. You have been my best cheerleader.

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ACRONYMS AND ABBREVIATION

AHP	Analytic Hierarchy Process
DEM	Digital Elevation Model
EM	Electro Magnetic
FAO	Food and Agriculture Organization
GIS	Geographical Information System
HA	Hectares
IPCC	Intergovernmental Panel on Climate Change
ISA	International Standard Atmosphere
KG	Kilograms
LP	Linear Programming
MCDM	Multi Criteria Decision Making
MW	Mega Watts
UNFCCC	United Nations Framework Conventions on Climate Change

ABSTRACT

There is an increasing demand for sugar both on the national and international market which implies expansion of more land for sugar cane production to meet this increasing demand. The allocation of more land to sugar cane growing upshots into a reduction of land allocated for food crops like banana and this results in food insecurity as farmers are confronted with the problem of optimal allocation of farm resources. Considering the effects that may arise from climate change on sugarcane production, the study aimed at promoting sugar cane growing promote sugar cane production, food security and household income with the changing climate. In order to be able to achieve this goal, the study employed both the bio physical evaluation methods to identify areas that can support sugarcane growing with changing climate and economic valuation so as to identify the optimal allocation of resources that ensure sugar cane farmers are food security and maximize the net returns to increase their household incomes. From the study results show that there are more areas that suitable for sugarcane growing with minimum conflict to land use due to low population densities. Additional it was also revealed that in order to solve the problem of food insecurity and ensure steady household incomes, a farmer should produce 1 unit of sugarcane and 1 unit of bananas using 1 hectare for sugarcane and 2 hectare for banana growing while fully utilizing the available resources. From observation made in the study it is recommended that new areas identified as suitable for sugarcane production require addition of application of fertilizers and irrigation in order to get high yields which will increase household income and for any farmer to decide to undertake sugar cane farming he should have a minimum of 3 hectares.

Keywords: Suitability, Optimal Crop Combination, Food

CHAPTER ONE

INTRODUCTION

1.1 Background

Sugar cane is a global important crop that provides nearly 80% of the sugar consumed worldwide (Murphy, 2017). It is one of the world's major C4 crops grown mainly in the tropic and sub tropics regions and they provide nearly 75 % of sugar produced for human consumption in the world (Souza *et al.*, 2008). The crop is grown in more than 120 countries and Brazil is the leading producer of sugarcane with 33% of global sugar production followed by India at (23%), China and Pakistan stand at (7%) and (4%) respectively (FNP, 2009). Worldwide sugar cane occupies an area of 20.42 million ha with a total production of 1328 million metric tonnes (FAOSTAT, 2005) and the trend for sugar production has increased as observed in 2014 (World Data Atlas,2014) where the world's total sugar cane was estimated at 27.1 million ha.

Sugar cane production is not only used for sugar consumption but it also curbs greenhouse gas emissions through production of various forms of energy, including ethanol, bioelectricity and bio hydrocarbons. It's already happening today in the different parts of the world for example in Brazil where sugar cane is now the number one source of renewable energy and represents 17 percent of the country's total energy supply, in Nigeria production of bio ethanol amounts to 11500MW from sugar cane (Heinimo, 2009). In Uganda the power station at Kakira is capable of producing 52 megawatts. Furthermore, sugar cane production has contributed to economic growth and development of the different countries through contributing to their Gross Domestic Product. Sugar cane accounts for 8.5% of total foreign earnings and generates direct and indirect employment for approximately 51,000 people (Government Fiji 2002). In Uganda Sugar cane production contributes 16.8% to Gross Domestic Product (UBOS, 2014) and also provides direct employment to 20,000 and 50,000 direct and indirect employments respectively. A study undertaken in South Africa revealed that sugarcane is a key resource to livelihood of small scale farmer's involved (Cockburn *et al.*, 2014). In Zimbabwe sugar industry is contributing 1.4% of Gross Domestic Product (Annual Action Programme, 2009) alongside employing 25,000 people directly and 125,000 people indirectly.

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