BUSITEMA UNIVERSITY
Pursuing Excellence

P.O. Box 236, Tororo, Uganda
Gen: +256 - 45 444 8838
Fax: +256 - 45 4436517
Email: info@adm.busitema.ac.ug

www.busitema.ac.ug

COMPARISON OF TREE SPECIES DIVERSITY IN HIGHLY DEGRADED AND MODERATELY EXPLOITED PARTS OF WEST BUGWE CENTRAL FOREST RESERVE UGANDA

BY

WABUGWA JAMES

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DECLARATION

I WABUGWA JAMES solemnly declare that this is my original work and has never been submitted by any other student for degree or any other award in any University or other institution of higher learning. The information derived from the literature has been duly acknowledged in the text and a list of references provided.

Signature…….... Date…….

APPROVAL

This report has been submitted for examination to the Faculty of Science and Education, Busitema University with the approval of my supervisor;

DR. ANDAMA EDWARD.

Sign..... Date.....

MRS KAWUMA CAROL

Sign..... Date.....

DEDICATION

I dedicate this report to my friends, Mukisa Henry, Maniriho Armstrong, Chelimo jabeth, Buyi Milon and beloved Biology lecturers for the support they have rendered to me throughout the course.

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ACRONYMS AND ABBREVIATIONS:

1 WBCFR: West Bugwe central forest reserve.

2 ha: hectare.

3 UWA: Uganda Wildlife Authority.

4 NFA: National Forest Authority.

5 PFE: Permanent Forest Estate.

6 CFRs: Central Forest Reserves.

7 Spp: Species.
FR: Forest Reserve
CFR: Central Forest Reserve

8 NEMA National Environmental Management Authority

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ABSTRACT

West Bugwe CFR was heavily degraded through uncontrolled harvesting of timber, firewood, poles, charcoal burning, grazing and agricultural encroachment. There is natural regeneration in the CFR under NFA. However, the CFR continue to provide the function of protection of watersheds, biodiversity and soils and the local communities continue to harvest firewood and poles for domestic use.

The aim of this research is to assess the impact of deforestation on diversity and distribution of tree species in West Bugwe central Forest reserve, identify the dominant tree species in West Bugwe central Forest Reserve, determine tree species evenness in WBCFR, using Diversity index, Shannon Weiner diversity index, field measurements to determine Woody species composition in the forest reserve and Shannon equitability for evenness distribution of tree species. Trees species diversity, richness, and evenness were studied in fourteen plots of West Bugwe CFR, based on trees inventories conducted on fourteen plots of 0.09 ha installed in two zones of the forest that were highly degraded zone and the moderately degraded forest zone. In all of the plots installed, all trees with diameter at breast height, DBH ≥ 5 cm (Ifo et al., 2016) were measured. The Shannon diversity index, Simpson diversity index and equitability index were computed to see the variation in tree species among plots but also between the highly degraded forest area and the moderately exploited forest area. A total of 847 trees and 711 saplings representing 32 tree species were identified from the total area of 1.26 ha. A total of 576 trees were identified from moderately exploited area while 271 trees were recorded from the 7 plots of highly degraded area of West Bugwe CFR. In terms of the number of trees, *Broussonetia papyrifera* was the most abundant with 294 trees encountered followed by *Trema orientalis* with 179 individuals each. The least abundant species were *Ficus sycomorus* (11). A low Shannon diversity index value was obtained in plot 1 while the highest value was obtained from sample plot 6. The evenness index values varied between 0.728(sample 1) and 0.943 (sample 6). The value of equitability varied from 0 to 1. It's equal to 1 when all the species have the same abundance and tend towards 0 when the near total of flora is concentrated on only one species. The value in sample plot 1 and 2 confirms a well conducted survey in the plot as they are dominated by two species of *Trema orientalis* and *Broussonentia papyrifera* (Boniface & Yamungu, 2020). Species diversity was higher in the moderately exploited forest area and least in the heavily degraded forest area.

Knowledge of how deforestation influences tree species composition and diversity and the impact of deforestation on the environment is very important for designing the appropriate restoration and other management strategies of WBCFR by the policy makers and locals in conservation of tree species biodiversity of the forest reserve.

CHAPTER 1: INTRODUCTION

8.1 Background

Sustainably managed forests have multiple environmental and socio-economic functions which are important at the global, national and local scales, and they play a vital part in sustainable development. Reliable and up-to-date information on the state of forest resources - not only on area and area change, but also on such variables as growing stock, wood and non-wood products, carbon, protected areas, use of forests for recreation and other services, biological diversity and forests contribution to national economies - is crucial to support decision-making for policies and programmes in forestry and sustainable development at all levels (Ifo et al., 2016).

During pre-colonial management of forests in Uganda was communal and forests were used as open access resources. To sustainably manage the forests, informal policy existed amongst the kingdoms where chiefs were given authority over conservation of the forests. (Otieno., *et al.* 2012).

In Uganda, the first forest reserve was gazetted in 1932 by policies and law makers of the colonial government and forest boundaries were put on the reserves in 1940s (Hamilton, 1984). Kantwi (2001) reported that the forest reserves were viewed by the colonial government as established projects where the traditional system of resource conservation was banned and given power to civilized and scientific management by the colonial staff (Otieno.*et* al., 2012)

National Environmental Management Authority, NEMA by around 1890, forests and wood lands covered over 10,800,000ha (45%) of Uganda's total land area but currently it's 4,900,000(20%) of the country's land area. This rapid decline in the forests land cover may be attributed to a number of factors such as politics of the country, population pressure, poverty and break down in law (Otieno, *et al* 2012). Deforestation is an act of cutting down of trees without replacement for human uses. Uganda being a developing country relies more on wood for fuel wood as a major source of energy for cooking and other domestic and industrial uses. Samba, (2005) said Nigeria is using 80 million cubic meters of fuel wood per annum for cooking and other domestics uses. Presently, Ugandan households use fuel wood as their major sources of fuel. This issue has tremendous consequences on the environment due to the fact that, illegal cutting down of tress in the forest without replacement is what is meant by forest exploitation(Wada & Bilyaminu, 2019). Although, the history of man right from the Neolithic era used branches, leaves, stems, bark to ignite fire, fry his food and for warmth. This passed through centuries up to date, as the wood from forest are cut to meet man's various energy requirement example cooking, heating, lightening, other purposes such as construction of roads, houses and Agricultural practices (Korea, 2016). It has been acknowledged that over one third of the world's population depend on

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