International Journal of Academic Multidisciplinary Research (IJAMR)
ISSN: 2643-9670
Vol. 6 Issue 5, May - 2022, Pages: 15-22

Construction of Trenches and Checkdams and Their Role in Soil-Water Conservation in Rubaya Sub County in Kabale District, South Western Uganda.

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Abstract: The study was about the construction of trenches and check dams and their role in soil and water conservation and was guided by the following objectives**;** To examine the number of trenches and checkdams that were dug and to determine the farmers adoption rate of Natural Resource Management Practices. The study employed a cross sectional descriptive design that employed both qualitative and quantitative approaches. The quantitative approach was used to quantify incidences in order to describe current conditions while qualitative approach was used to explain the events and describe findings using interviews and documentary review and used a target population of 100 respondents from the two selected villages comprising of household heads and project representatives and used a sample of 80 respondents out of the study population. The interview guides and questionnaires were also used. Data analysis involved editing, coding, classifying and tabulating the collected data. The researcher employed both qualitative and quantitative data analysis techniques. Qualitative data, particularly responses from interviews was analyzed following the content analysis. The analysis of the quantitative data was done using descriptive statistics that is frequencies and percentages. Descriptive statistics such as frequencies and percentages were used to show the weight of the responses. Data was recorded manually, editing, coding and tabulation was done, tables were drawn using Microsoft excel program of a computer. Findings indicated that in the month of February 2021, I7 trenches and 19 check dams were dug and previously 360 trenches had been dug and check dams were 282.Kagasha and Kashenyi villages were leading with more trenches and check dams followed by Karengyere, Nduhura and Musamba was the least. Kashenyi and Kagasha were leading because they first had the training and they had the early adoption rates. In addition, the women and youth were actively involved in natural resource management activities. These trenches that had been dug were seen to conserve the fertility of the soils as well as maintaining water in the soils. The farmers were digging trenches and check dams through their farmer groups. 91 males,62females,12 youth and 0Batwa participated in natural resource management activities. In Karengyere village,14 males,9 females,4 youth and 00 Batwa participated. Musamba had 16 males,10 females,2 Youth and 00 Batwa, Ndarura had 18 males,16 females,1 youth, in Kashenyi village 30 males participated followed by 16 females and 2 youth and in Kagasha,13 males participated ,11 females and 3 youth. Generally, the males participated more in the digging of trenches and check dams than their female counterparts due to their gender roles. Women do more of agriculture, looking at children than their male counterparts. There was no Batwa that participated in the activities due to being the minority indigenous group and still the few Batwa that lived in the area were just temporally. A total of 140 males, 85 females, 32 youth, 03 PWDS and 00 Batwa have adopted NRM activities in Kabale district. There is still low adoption rate among the youth and the people with disabilities and yet the country lies in the hands of the youth. The low adoption rate is due to lack of ownership rights for example to land. Farmers have been adopting the practices through their farmer field schools with demonstration sites. Still Kashenyi and Kagasha villages indicate a higher adoption rate among the men and this relates to the total trenches and check dams dug due to this adoption. The study concluded that in areas where more men participated in the digging of trenches and check dams, there were more that had been dug. Also, the men were more actively involved than their female counterparts. Rights of ownership of land determined a lot in the participation as men had more powers to make decisions. More trenches were dug than the check dams because of the fatigue associated with digging the dams in stony areas. The Youth had a low adoption rate yet the future of this country lies in their hands. The women and Youth should be actively engaged in the activities of natural resource management since they are closer to the environment. More public sensitization should be done to make the dwellers much more informed of how they will benefit from the practices. Agriculture extension services should be extended to the farmers and through this they will learn how to conserve their soils and water. Government support inform of finance for the village saving and loans associations and tools to dig trenches and check dams is required.

Keywords: Trenches, Checkdams, Natural Resource Management

SECTION ONE: INTRODUCTION

Background to the study

Land management has been used narrowly to mean "soil management". However, it has also referred more broadly to the management of ecosystem features, including soils, rocks and other solid geological features, rivers, vegetation, fauna and human infrastructure (FAO, 2007)Soil degradation, water availability and loss of biodiversity (Hurni, 1997) are key issues threatening the global life support system. In principle, Sustainable Land Management is relevant worldwide and it has been developed as a concept in Australia (Bateson, 2000), Canada (Carter, 2002).It is estimated that 4%-12% of GNP is lost due to environmental degradation of which 85% is accountable to soil erosion, change in the range of cultivated crops, and soil nutrient loss (Olsen & May, 2003).Unsustainable Land management practices are considered the main drivers of land degradation, in particular desertification and deforestation, causing reduced agricultural productivity. The impacts of these practices include loss of soil, changes in natural habitats and ecosystems, reduced ecosystem services (loss of water infiltration, loss of agro-biodiversity, loss of wild biodiversity), as well as decreases in land productivity leading to poor harvests and food shortages. Climate change is now exacerbating these problems. Rubaya Subcounty is one of the hilly areas in Kigezi region in South western Uganda with loose soils that are vulnerable to landslides and inorder for the farmers to conserve their soils,they have engaged in the digging of trenches,bench terraces and checkdams to check on the run offs.In trying to conserve the soil and water in Rubaya subcounty,the non governmental organisations such as African International christian Ministry(AICM)in paternship with Self Help Africa with support from European Union have supporting the community members in the selected villages in the same subcounty with tools such as hoes,forked hoes and spades to enable them dig trenches and checkdams to conserve water and soils.Most of the villages in Rubaya Subcounty touch on the shores of Lake Bunyonyi,the second deepest lake in Uganda and due to unsustainable land management practices the effects have been affecting this beautiful natural resource.

Problem Statement:

Although there have been sustainable land management practices in Rubaya Subcounty in Kabale district, land degradation continues to be a bigger threat to soil and water conservation in the same area. Rubaya Subcounty is one of the most vulnerable areas in south western Uganda due to being hilly and over populated with people who depend on the land for their livelihood (Bagyenda 2003). Unsustainable Land management practices are considered the main drivers of this land degradation. In particular, desertification and deforestation cause reduced agricultural productivity.The impacts of these practices include loss of soil, changes in natural habitats and ecosystems, reduced ecosystem services (loss of water infiltration, loss of agro-biodiversity, loss of wild biodiversity), as well as decreases in land productivity leading to poor harvests and food shortages.The degradation of land resources exacerbated by human activities such as deforestation, unsustainable use of agro inputs, over cultivation and bush burning has been a prime development challenge in the past 20th century hence calling for this study.

Objectives of the study:

The study was guided by the following objectives:
1.To examine the number of trenches and checkdams that were dug
2.To determine the farmers adoption rate of Natural Resource Management Practices

Functional Land Approach and the Natural Resource Management around Lake Bunyonyi in Rubaya Subcounty.

a. Community participatory approach: Due to land fragmentation where there are few farmers with consolidated land and thus the whole community has to be mobilized.
b. Group participatory/Farmer Field School approach: FFS approach that aims at promoting soil and water conservation in the area was used which entitles NRM and FLA.

Participants in NRM Activities (construction of trenches)

The following stakeholders were actively participating in the digging of trenches and check dams to conserve the soil and water:

a. District Environment Officers.
b. Sub county level agricultural extension workers.
c. Local council one chairpersons.
d. Parish chiefs.
e. Project officers

Activity details

1. The project officers mobilized communities to dig trenches from top to bottom, this is because run offs start from hill top to down the hill, and check dams were dug where there is a lot of run offs to avoid creation of gullies and rill erosion.

2. The constructed trenches have been planted with Napier and staria grass and Calliandra trees for stabilization. These grasses also provide fodder for animals.

SECTION TWO: METHODOLOGY

The trenches and check dams have been dug following the measurements below:

A. Digging trenches: Digging of trenches was guided by the measurements below:
   a. Length= 10M
   b. Width= 2.5ft
   c. Depth= 2-3ft depending on gradient &volume of water
   d. Tie band= 1-1.5ft

B. Check dams are guided by measurements: dug 6m in depth and 3 m in length to tap excess water that could erode soil with its fertility to low land areas.
C. Grass strips to retain water in the soil and its fertility.

Research Design

The study employed a cross sectional descriptive design that employed both qualitative and quantitative approaches. The quantitative approach was used to quantify incidences in order to describe current conditions while qualitative approach was used to explain the events and describe findings using interviews and documentary review.

Study population

The study used a target population of 100 respondents from the two selected villages comprising of household heads and project representatives.

Sampling Size

The researcher used a sample of 80 respondents out of the study population. The distribution of the sample was shown in the table below;

Sample size S = $\frac{N}{1+N(e)^2}$

Where;
N = target population
e = margin of error = 0.05
1 is a constant
Therefore,

S = $\frac{100}{1+100(0.05)^2}$

S = $\frac{100}{1+100(0.0025)}$

S = $\frac{100}{1+0.25}$

S = **80**

Table.1: Distribution of Sample Size

Categories	Study population	Sample size	Sampling strategies
Household heads	80	70	Random sampling
NGO representatives	02	02	Purposive sampling
Other farmers including the youth	18	8	Purposive sampling
Total	**100**	**80**	

Data Collection Instruments

A number of instruments were used during collection of data. Both primary and secondary data was collected.

Questionnaire

Questionnaires was used to collect primary data as questions will be designed to collect data from the study respondents. This helped to gather quantitative and qualitative information regarding the variables understudy. Questionnaires were also preferred because they were convenient as respondents filled them during their free time and had a chance to consult for views and information about the research problem.

Interview Guide

The interview guide is a research instrument that contains a list of questions you ask your participants during the interview in order to obtain firsthand information about a phenomenon. The interview guide was used to collect data during interviews. The reason for using this guide was to collect firsthand information that will not directly be got using a questionnaire.

Data Analysis

Data analysis involved editing, coding, classifying and tabulating the collected data. The researcher employed both qualitative and quantitative data analysis techniques. Qualitative data, particularly responses from interviews was analyzed following the content analysis. The analysis of the quantitative data was done using descriptive statistics that is frequencies and percentages. Descriptive statistics such as frequencies and percentages were used to show the weight of the responses. Data was recorded manually, editing, coding and tabulation was done, tables were drawn using Microsoft excel program of a computer

SECTION THREE: FINDINGS

PROGRESS IN THE CONSTRUCTION OF TRENCHES AND CHECK DAMS

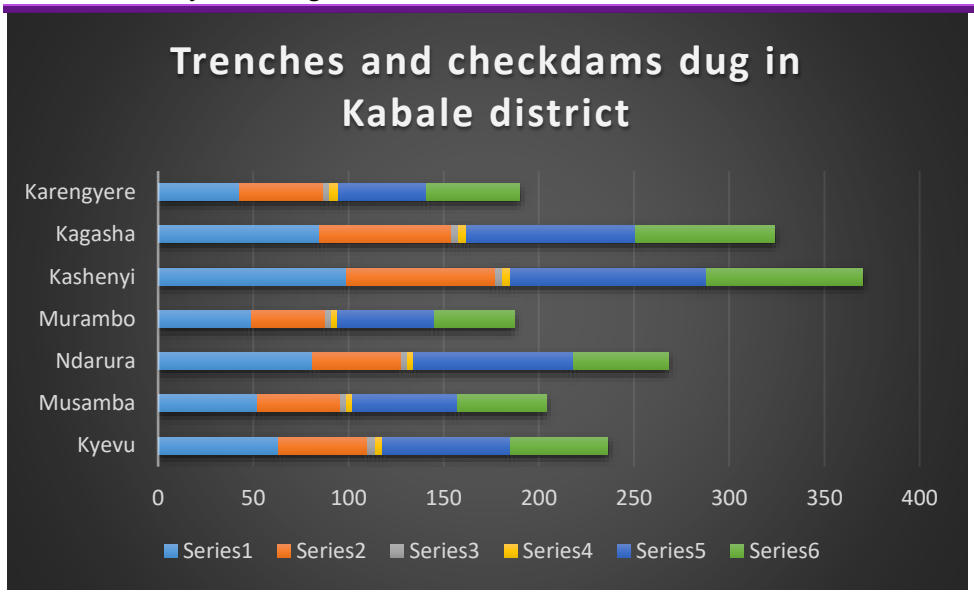
	Trenches Previously dug		**February**		**Total**	
Village	Trenches	Check dams	Trenches	Check dams	Trenches	Check dams
Musamba	52	44	03	3	55	47
Ndarura	81	47	3	3	84	50
Kashenyi	99	78	4	4	103	82
Kagasha	85	69	04	04	89	73
Karengyere	43	44	3	5	46	49
Total	**360**	**282**	**17**	**19**	**377**	**301**

Source: Primary data 2021

Findings indicated that in the month of February 2021, I7 trenches and 19 check dams were dug and previously 360 trenches had been dug and check dams were 282.

Kagasha and Kashenyi villages were leading with more trenches and check dams followed by Karengyere, Nduhura and Musamba was the least. Kashenyi and Kagasha were leading because they first had the training and they had the early adoption rates. In addition, the women and youth were actively involved in natural resource management activities.

These trenches that had been dug were seen to conserve the fertility of the soils as well as maintaining water in the soils. The farmers were digging trenches and check dams through their farmer groups. In places where there already dug trenches, crops in those fields were looking healthy and the soils were dark than where there were no interventions by the farmers.



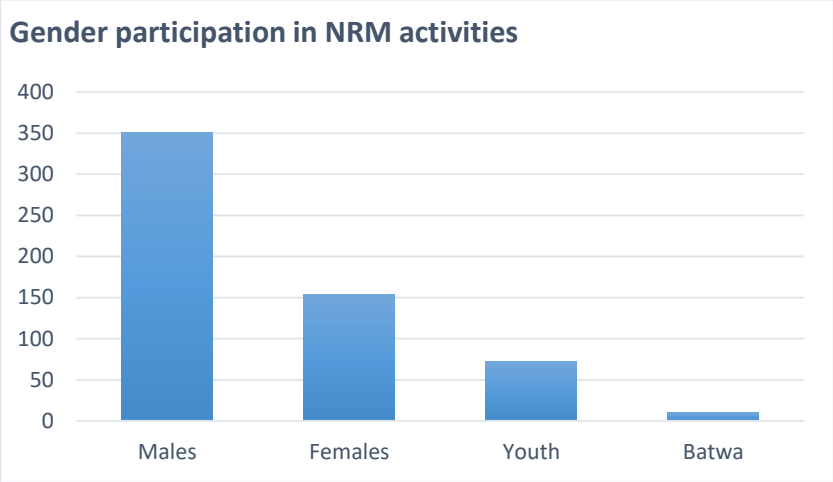
Below is the composition of people that participated in NRM in Kabale districts.

No	Village	Males	Females	Youth	Batwa
1	Karengyere	14	9	4	00
2	Musamba	16	10	2	0
3	Ndarura	18	16	1	0
4	Kashenyi	30	16	2	0
5	Kagasha	13	11	3	0
	Total	**91**	**62**	**12**	**0**

Source: Primary data 2021

Findings indicate that in February 2021,91 males,62females,12 youth and 0 Batwa participated in natural resource management activities. In Karengyere village,14 males,9 females,4 youth and 00 Batwa participated. Musamba had 16 males,10 females,2 Youth and 00 Batwa, Ndarura had 18 males,16 females,1 youth, in Kashenyi village 30 males participated followed by 16 females and 2 youth and in Kagasha,13 males participated ,11 females and 3 youth. Generally, the males participated more in the digging of trenches and check dams than their female counterparts due to their gender roles. Women do more of agriculture, looking at children than their male counterparts. There was no Batwa that participated in the activities due to being the minority indigenous group and still the few Batwa that lived in the area were just temporally.

In January 2021, community participation in NRM activities were composed of both males, females, youth and Batwa as usual.



Males participated in natural resource management than females because of the differences in gender roles in the society. Women most of the times remain at home doing in door activities and doing most of agriculture. It was observed that the number of Youth that participated in NRM activities increased than before and the number of Batwa also still remain low because they spend most of their time in bars drinking alcohol.

Challenges	Proposed Solutions
Weather change was a great problem in the month of Feb, 2020.	To continue with digging of trenches and check dams after the rains.
Land fragmentation has affected us in terms of linear planting and spacing as recommended	The project officer and VNRMCS have always tried to have trees planted as recommended.
In some villages, cows silt the dug check dams while drinking water tapped by the check dams.	Community to keep watching and penalize those whose animals silt check dams as well as de-silting check dams and trenches.

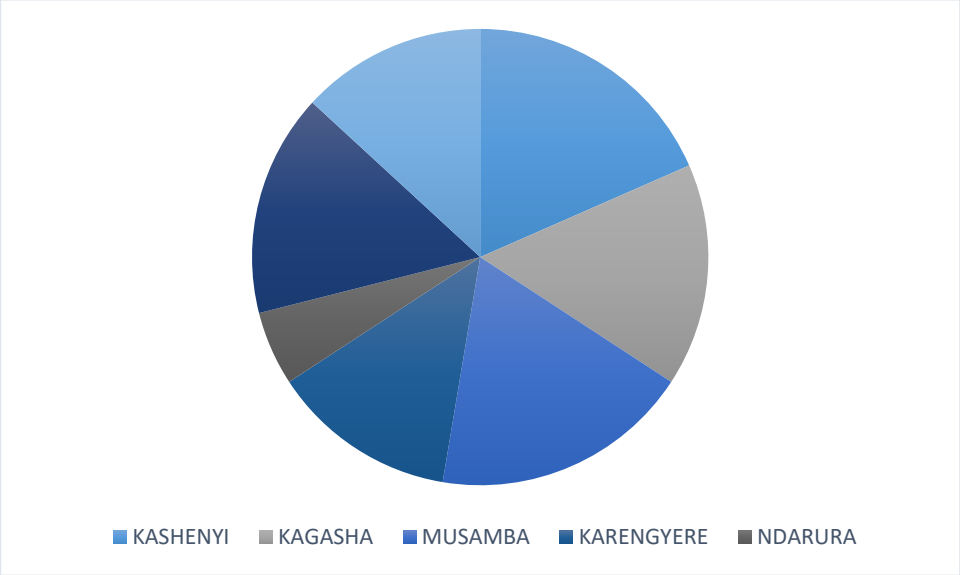
ADOPTION RATE OF FARMERS IN NATURAL RESOURCE MANAGEMENT

S/N	VILLAGE	MALES	FEMALES	YOUTH	PWDS	BATWA
1	Kashenyi	45	28	8	1	0
2	Kagasha	25	13	6	2	0
3	Musamba	27	17	7	0	0
4	Karengyere	20	9	5	0	0
5	Ndarura	23	18	6	0	0
	Total	**140**	**85**	**32**	**3**	**0**

Source: Primary data 2021

A total of 140 males, 85 females, 32 youth, 03 PWDS and 00 Batwa have adopted NRM activities in Kabale district. There is still low adoption rate among the youth and the people with disabilities and yet the country lies in the hands of the youth. The low adoption rate is due to lack of ownership rights for example to land. Farmers have been adopting the practices through their farmer field schools with demonstration sites. Still Kashenyi and Kagasha villages indicate a higher adoption rate among the men and this relates to the total trenches and check dams dug due to this adoption.

This is illustrated by the use of the pie-chart below.



SUSTAINABILITY

- Community members were organized into farming groups and village savings and loans associations (VSLAS) from which they would meet and contribute and borrow money and thus VSLA acting as a uniting factor.
- The members were working with the local government officials and this would sustain the good results of the interventions after the project.

SECTION FOUR: CONCLUSION AND RECOMMENDATIONS

Conclusions:

The study concluded that in areas where more men participated in the digging of trenches and check dams, there were more that had been dug. Also, the men were more actively involved than their female counterparts. Rights of ownership of land determined a lot in the participation as men had more powers to make decisions. More trenches were dug than the check dams because of the fatigue associated with digging the dams in stony areas. The Youth had a low adoption rate yet the future of this country lies in their hands.

RECOMMENDATIONS

The women and Youth should be actively engaged in the activities of natural resource management since they are closer to the environment.

More public sensitization should be done to make the dwellers much more informed of how they will benefit from the practices.

Agriculture extension services should be extended to the farmers and through this they will learn how to conserve their soils and water.

Government support inform of finance for the village saving and loans associations and tools to dig trenches and check dams is required.

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Pictorials showing the Progress of NRM Activities.

Below: Trenches dug in Kashenyi village in Rubaya Sub County.