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# ASSESSMENT OF THE IMPACT OF INCENTIVES ON ADOPTION OF SUSTAINABLE LAND MANAGEMENT: A CASE STUDY OF CHESOWER SUB-COUNTY, BUKWO DISTRICT, UGANDA

**Olive Chemutai**
Bukwo District Local Government,
P.O. Box 2, Bukwo, Uganda
*ochemutai@yahoo.com*

**Supervisor**
Sjöfn Vilhelmsdottir
University of Iceland
*sjofn@hi.is*

## ABSTRACT

The overall aim of this study was to assess the impact of incentives on sustainable land management (SLM) adoption. The study focused on Chesower Sub-county in Bukwo District in Eastern Uganda, and its objectives were to: (1) assess the extent of adoption of SLM technologies with the use of incentives, (2) identify the challenges faced by farmers in using SLM technologies, and (3) identify strategies for addressing the challenges faced by farmers in adoption of SLM technologies. The study was based on survey questionnaire data as well as a literature review and secondary data on SLM and the study area. The survey questionnaire was administered to 40 farmers in Chesower Sub-county, using a systematic sampling method where a household list was used as a unit for selecting survey participants. Most of the respondents said that they had received inputs and services and that they were using SLM technologies. They also said that they were required to practice SLM by the organisations giving the support. This implies that the provision of incentives may influence farmers' decisions to undertake SLM practices. The main challenges in using SLM technologies included limited finances for purchasing inputs and hiring labour, as well as soil erosion because control measures are not practiced by all farmers at the landscape level, making it uneconomical for an individual farmer to invest where erosion control structures are required. The respondents suggested strategies to address challenges to adoption, such as provision of financial support, soft loans for purchase of inputs and farm equipment, increased awareness about good farming practices, and collective action to increase co-operation amongst farmers. The study's findings suggest that a combination of short term and long term incentives would be an effective approach to enhance and maintain SLM adoption in rural communities of Uganda.

**Key words:** SLM, adoption, incentives, challenges, strategies, Uganda.

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## 1. INTRODUCTION

Sustainable land management (SLM) involves land use systems and practices that enable land users to maximize the economic and social benefits of the land, while also maintaining or enhancing the ecological functions of land resources. According to FAO (2013), SLM is based on four principles: 1) land user driven and participatory approaches; 2) integrated use of natural resources at ecosystem and farming system levels; 3) multilevel and multi-stakeholder involvement; and 4) targeted policy and institutional support, including development of incentive mechanisms for SLM adoption and income generation at the local level. SLM is believed to provide a means to prevent environmental threats, especially land degradation and desertification, global climate change, loss of biodiversity, and food insecurity (Schwilch et al. 2012).

Agriculture remains the backbone of Uganda's economy. Some 85% of the population is engaged in agricultural production, which contributes to 42% of the National Gross Domestic Product (GDP). Some 80% of the export earnings come from agricultural production and the agricultural sector employs 90% of the country's labour force (NEMA 2010). Population growth is considered to be one of the key drivers to environmental change in Uganda, driven by a very high fertility rate of 6.7 children per woman. Uganda's population has more than tripled in the past 40 years, from 9.5 million in 1969 to 32.9 million in 2010. As population grows, resource use increases in line with changes in people's aspirations, values and socioeconomic status (NEMA 2010).

According to the World Bank (2006), more people are employed in the agricultural sector and uses more land and water than in any other human activity. It has therefore the potential to degrade or enhance land resources depending on decisions made by land users whose livelihoods depend on land directly. In an effort to strengthen sustainable land use and management, the Ugandan government has developed sector-wide guiding frameworks, namely, the Land Sector Strategic Plan (LSSP) and the Strategic Investment Programme (SIP). The frameworks' aim is poverty reduction through attaining sustainable management of land, on which the poor directly depend for their livelihood, while ensuring sustainable growth, productivity and economic development in the natural resources sectors (Nkonya et al. 2008).

Furthermore, Uganda's National Environment Action Plan (NEAP) provides a framework for addressing environment and natural resource management concerns. The Ugandan National Environment Management Authority (NEMA) was established by the National Environment Act of 1998, and it is the leading organ of the NEAP (NEMA 2011). NEMA is in charge of natural resources management programmes, and its implementation process over a few years has been capacity building of stakeholders for environmental management at the district and lower levels through integrating environment and natural resource management issues into their planning processes (Banadda 2010). Under the SIP SLM, a strategic investment framework has already leveraged investments in Uganda with financial support from international development co-operation partners. Some of the projects being implemented in this context include:

- The Agricultural Technologies and Advisory Services (ATAS) project;
- Sustainable Land Management in the "cattle corridor" of the country;
- COMESA funded National Climate Resilient Conservation Agriculture Programme;
- Stimulating Community Initiatives in SLM;

- National Livestock Productivity Improvement Project; and
- The Farm Income Enhancement and Forest Conservation Project (Ellis & Bahiigwa 2003)

In addition, the Government of Uganda set up the Plan for Modernisation of Agriculture (PMA) framework in 2000 with the aim of poverty reduction. The main objective of PMA is to increase productivity and income in agriculture. To achieve this objective the National Agricultural Advisory Services (NAADS) was created in 2001. The NAADS programme promotes the development of farmer organisations through an innovative and extensive service delivery approach, to co-ordinate service provision to subsistence farmers beyond the traditional advice on productivity (Nahdy 2004). The NAADS is argued to be one of the key government programmes for implementing the Prosperity for all Programme. The programme is intended to ensure that farmers increase their farm productivity and profitability in order to earn better incomes (Kiyaga-Nsubuga 2009).

Sanders and Cahill (1999) acknowledge that use of appropriate incentives may be necessary for conservation adoption by farmers. The incentives can be direct or indirect. Direct incentives may be in the form of payments, supply of agricultural inputs, tools and tree seedlings which support the process of achieving progress, while indirect incentives are developments in place that create a conducive environment for the land user to adopt conservation practices to achieve SLM (Kamar et al. 1999). Indirect incentives may include extension services, technical guidance and support, training and capacity building programmes (Kamar et al. 1999). Incentives have been used in Uganda with a major focus on the enhancement of agricultural productivity through farmer institutional development under the NAADS programme (Benin et al. 2011).

Additionally, guidelines for mainstreaming environment issues and concerns have been integrated in other sectors' plans and programmes, performance monitoring schemes and planning cycles of district local governments (MWLE [Ministry of Water Lands and Environment] 2003). A decentralization policy was developed in 1993 by the Ugandan government. The purpose was to have decision-making on development issues at sub-national levels with the aim of bringing services closer to the people. This system strengthens local governance structures by devolving service delivery, promoting participation and empowering local people. District and sub-county development plans are the basic instruments to guide budget allocation. The Ministry of Local Government builds the capacity of local governments to effectively deliver services, including management of natural resources. It is further claimed that user based natural resource management is the most efficient, cost-effective, and sustainable way to make the population adequately aware of the importance of natural resources in their environments (Oosterveer & Van Vliet 2010).

There are several causes of land degradation in Uganda. Rapid population growth and the slow transformation of a largely agrarian into an industrial economy are said to be some of the reasons. The growing rural population has few alternatives for a livelihood and depends on crop cultivation and livestock rearing. Farm intensification has resulted into massive and unregulated conversion of forest lands to agriculture. This, combined with the harvesting of wood to meet energy needs, has caused large-scale deforestation, bush burning, overgrazing and high levels of poverty. It is important to note that land degradation is a major development issue, especially because of the constraints it places on socioeconomic and environmental sustainability (Banadda 2010).

Most of Uganda's current policies, development strategic frameworks and investment plans systematically integrate SLM into their objectives and central pillars. The government is committed to addressing land degradation and desertification concerns. In 1999, Uganda's government formulated the National Action Programme (NAP) through the Ministry of Agriculture, Animal Industry and Fisheries as the UNCCD Focal Point institution to combat desertification. The Global Mechanism supported the NAP mainstreaming into the Poverty Eradication Action Plan (PEAP), while UNDP supported its mainstreaming at the local government level (Banadda 2010).

Nonetheless, public expenditure for SLM and other corrective measures for land degradation is still very low in Uganda and international development partners provide most of the funds for SLM programmes (McDonagh & Lu 2007). Yet, SLM is already being integrated into policies and frameworks of government programmes like the Plan for Modernisation of Agriculture (PMA) and the National Environment Action Plan (NEAP). SLM adoption requires governments to be committed, especially in poor communities, by using measures which will attract farmers to use conservation practices on their land. Uganda is favoured by good climate and soils, which give her the ability to produce and feed her people if more sustainable systems of production are implemented (Olson & Berry 2003). SLM policies should therefore focus on increased agricultural productivity, food security and income rather than only focussing on controlling land degradation (World Bank 2006).

Finally, there is a need for a holistic approach that puts into consideration all categories in terms of age, sex and social recognition to promote sustainable land use for improvement in rural livelihoods. The approach should acknowledge that women and men's options and strategies often differ and may require different types of support (GOU [Government of Uganda] 2003). In the rural farming communities of Uganda, gender roles are clearly laid out, and most of agriculture related roles are undertaken by women, so it is important that men and women are equally involved in all decision-making and programme planning regarding SLM (Mukadasi & Nabalegwa 2007).

## 1.1 Statement of the research problem

Despite environmental policies and frameworks, land degradation, declining agricultural productivity and poverty are severe and interrelated problems in Uganda. Declining soil fertility, which limits crop yields, is a particularly serious and widespread problem (Pender et al. 2004). It has also been argued that poverty incidences in Uganda are closely linked to land degradation and has become a main obstacle in addressing land degradation problems (Nkonya 2004). Whereas investing in good land management practices requires resources, it has been suggested that incentive strategies and policies to facilitate the adoption of conservation practices should be provided as necessary catalysts for farmers who normally are resource-poor and may not afford the costs associated with the adoption of conservation farming (Bahiigwa et al. 2005).

In Uganda there are still high levels of land degradation and poverty despite incentives being in place to improve agricultural productivity as strategies to eradicate poverty. It is important to understand how incentives affect adoption of SLM and how the design of policy instruments can induce farming households to adopt sustainable farming practices (Berger et al. 2006). This study sought to examine the impact of agricultural incentives on adoption of SLM in Chesower Subcounty of Bukwo District in Eastern Uganda.

### 1.2 Goal of the study

The overall aim of the study was to assess the impact of agricultural incentives on adoption of sustainable land management (SLM) in rural communities of Uganda.

### 1.3 Objectives of the study

The study focused on the impact of agricultural incentives and SLM adoption in Chesower Sub-county in Bukwo District in eastern Uganda, and its specific objectives were:

1. To assess the extent of adoption of SLM technologies with the use of incentives in Chesower Sub-county.

2. To identify the challenges faced by farmers in using SLM technologies in Chesower Sub-county.

3. To identify strategies for addressing the challenges faced by farmers in Chesower Sub-county in adoption of SLM technologies.

### 1.4 Importance of the study

Addressing the challenges of land degradation requires strategies that link sustainable agricultural production and poverty alleviation. The study's findings can provide further understanding of how incentive mechanisms for agriculture can be used to influence farmer behaviour towards adoption of SLM. The study may be used to help policy makers to come up with a more integrated approach in implementing SLM policy. An integrated approach is needed because the agricultural sector provides incentives for increasing agricultural productivity while the natural resources sector deals with sustainable land use, to ensure improved agricultural productivity while maintaining environmental sustainability.

## 2. LITERATURE REVIEW

This section provides a wider understanding of SLM adoption: its importance, challenges and relevance to achieving sustainable development in agriculture based countries. Published studies and research findings on the impact of incentives to adoption of SLM are reviewed, with particular emphasis on agricultural programmes that offer extension services to farmers.

### 2.1 Sustainable land management

The majority of the population in developing countries are direct land users who are interested in using the production potential of the land, but they will also play a key role in maintaining land potential as the basis for their livelihood and survival. SLM is therefore a delicate balance of production and protection, and the overall goal of sustainable development cannot be reached without giving due consideration to SLM. Sustainable development planning and programming require the consideration of specific environmental, sociocultural and economic conditions of a location. This is because poorer communities are trapped by socioeconomic poverty as well as environmental degradation. As Hurni (1997) points out, more emphasis should be put on SLM programming with the aim of enhancing their capacities to meet their livelihood needs.

## 2.2 Principles of sustainable land management

Sustainable land management (SLM) is based on four common principles, which are:

(1) Land user driven and participatory approaches. Participation has been emphasised as a new approach where land users are involved in the entire planning process to enhance ownership and sustainability. The farmers are to decide what enterprises they want, and therefore it is the facilitator's role to guide the process where the land users identify the problems and solutions to solve land problems (Hagmann et al. 1999).

(2) Integrated use of natural resources at ecosystem and farming system levels; there is urgent need for agricultural productivity to integrate natural resource management in all agricultural productivity plans. This will ensure sustainability and long term gains, both economically and socially as well as ecologically. Natural resource management should not be treated as a stand-alone because it is the base of all farming systems (Douglas 1997).

(3) Multilevel and multi-stakeholder involvement. Land degradation affects different stakeholders from household, farm, community or watershed levels to national and international levels. It is important that all stakeholders are involved in their different capacities. SLM categorises stakeholders as farmers, local leaders, politicians, researchers and extension agents (Prior 1997).

(4) Targeted policy and institutional support, including development of incentive mechanisms for SLM adoption and income generation at the local level. Achieving SLM is complex and requires proper planning and designing support which enables land users to be appreciated and to undertake SLM willingly. They should actually be facilitated to identify underlying problems and solutions. Enabling policies in place will be incentive for adoption and maintenance of SLM practices (Sanders & Cahill 1999).

## 2.3 Constraints to adoption of SLM

Fulfilling the principles of SLM may not guarantee a successful adoption of SLM as there can be constraints in place. Enters (1997) has identified a variety constraints to the adoption of SLM, including technical, economic and sociocultural dimensions as elaborated below.

New technologies to support SLM may be promoted, yet their appropriateness and usefulness will determine whether the farmer takes them up or not. For instance, where land is already scarce farmers are not likely to accept a technology which takes a lot of farm land like digging trenches and terrace bunds (Enters 1997).

Franzel (1999) maintains that some farmers perceive conservation practices as very expensive and may in some cases not even know the benefits of conservation. This is consistent with Dixon and Pagiola (2001), who pointed out that an up-front financing cost can be high, while on-farm benefits may not be realized until medium to long-term. Thus, land use choices are made depending on objectives and constraints faced by the farmer. It is therefore important to understand the reason why farmers make certain land use choices in order to select appropriate SLM policy interventions (Pagiola 1999).

Factors such as land size, gender roles and norms, age and labour availability will influence adoption levels of a given conservation measures (Franzel 2001). Enters (1997) emphasizes

that conservation practices should be simple and compatible with existing local farming practices and new technologies should build on existing indigenous knowledge. Cribb (2010) points out the critical role of the land tenure system in the adoption of SLM. It is well known that farmers do not have the morale to invest in conservation measures where there is tenure insecurity.

Furthermore, there can be barriers to conservation practices that have to do with infrastructure, access and participation in decision making, as well as biophysical barriers beyond the capacity of the farmer. These constraints include high transaction costs, like imperfect and missing input and output markets, as well as poor infrastructure and public services, insufficient capital and land scarcity. The biophysical constraints may include uncertain rainfall, poor soil fertility, steep slopes, lack of irrigation, and soil susceptibility to erosion (Berger et al. 2006).

Due to management constraints and a limited capacity to mobilise resources, adoption by small holder land users will be gradual; poor farmers find agroforestry beneficial but they are constrained by limited land, labour, capital resources and the need to ensure food security. Adoption between small and large farm holders will differ due to their different capabilities. (Current et al. 1995). Finally, it has been stated that farmers have often been addressed as targets rather than collaborators and the final decision makers. Chambers (1994) argues that unless farmers are enabled to express their priorities through participation, the technologies provided to them are liable to be inappropriate. Addressing the constraints to adoption of SLM helps to create an enabling environment for increased agricultural productivity, poverty alleviation and improved land health.

Farmers in low income countries often face unfavourable policy environments and weak incentives to invest in agriculture, and they are highly vulnerable to shocks with little capacity to cope with risks. Moreover, small holder farmers are very often faced with extreme poverty, weak property rights, and poor access to markets and financial services (FAO 2012). According to Enters (1999), economic incentives can change the outcome of a decision an individual makes by changing the constraints faced by land users. Incentives can be described as mechanisms for changing action, and they may be direct or indirect. Enters (1999) further argues that incentives should be used as a catalyst to bring about attitude change of individual farmers. Yet, the farmers' behaviour is dictated by their environments which range across biophysical, sociocultural, political and economic aspects (Sanders & Cahill 1999). Governments can therefore use particular policy instruments to alter decisions made by land users (Enters 1999).

Programmes and organizations that focus on agricultural or environmental related topics such as tree planting or the distribution of agricultural inputs are likely to have a direct effect on the adoption of land management technologies. Some programmes may also focus on issues such as population pressure, poverty eradication, infrastructure, access to credit, and the provision of social services. Although the goal of these types of programmes and organizations is not to address the issue of land degradation, they may have an indirect impact on the adoption of land management technologies (Jagger & Pender 2006). However it is important for governments to broaden their scope by building the necessary economic structure which can make it profitable for farmers to adopt and maintain conservation even after government programmes have come to an end.

# 3. METHODOLOGY

## 3.1 Sources of data

The methods of the study were threefold: literature review, survey questionnaire and secondary data. The study included a review of the main literature on SLM issues in agriculture, with the focus on mixed farming systems of crops and domestic animals. The secondary data for the study included documents and reports on SLM, incentives in agriculture and natural resources management. The primary data of the study were collected by interviewing farmers in Bukwo District, using a survey questionnaire method. Key informant interviews with government officials and programme staff in Bukwo District were included in the first stage of the study. However, the key informant interviews were not successful due to a low response rate, and therefore they were eventually dropped from the study.

## 3.2 Survey questionnaire

A simple systematic sampling was used to select respondents for the survey questionnaire. In Chesower Sub-county there are five parishes, and from each of the five parishes eight respondents were selected using a systematic sampling procedure. From a list of households in each parish, every $10^{th}$ household was selected until eight respondents were obtained for each parish, giving a total of 40 respondents for the study. A household list was used as the unit for selecting survey participants given that a list with individual household members was not available. This arrangement meant that whoever was found to be present in the household at the time when the survey was conducted, the husband or the wife, was interviewed. Consequently the survey sample has an unequal number of males and females, or 13 women and 26 men. The survey questionnaire was administered to each respondent by Elijah Masika, an agricultural extension worker in Bukwo District, and Silus Kwemboi, a volunteer with a local community-based organisation (CBO). The study was conducted from the $24^{th}$ to the $28^{th}$ of June, 2013. A copy of the survey questionnaire can be found in Appendix 1.

## 3.3 Study area

The study was conducted in Bukwo District, which was carved out of Kapchorwa District in 2005 with the main purpose of extending service delivery by bringing services nearer the people. The district has one county, Kongasis, with eleven sub-counties, one Town Council (Bukwo) and one Town Board (Suam). The district can be accessed by one seasonal murram road from Kapchorwa. It is also accessed through a security road (Sironko-Muyembe-Chepsukunya-Grik River to Bukwo or through Lwakaka or Malaba border via Kitale in Kenya (Bukwo District profile 2008).

Bukwo District is located on the slopes of Mt Elgon in Eastern Uganda. It is bordered by Kween District to the west and Amudat District to the north, and to the east and south lies the Republic of Kenya. It has a total area of about 598 km sq. Part of the land is included in Mt Elgon National Park and agricultural land, while the other part has been left vacant due to the effect of constant cattle rustling by the Pokot of Kenya. The district lies between latitudes 1.18°N, and longitude 34.44ºE. The altitude ranges from 1500 to 3000 meters above sea level (Bukwo District profile 2008).

Most of the land in Bukwo District is located on the slopes of Mt Elgon. The land on the lower side of the district is fairly flat in the north-eastern part and rugged all the way to the mountain. The soils are rich and fertile, are derived from volcanic ash and agglomerate from Mt Elgon. Average rainfall per annum lies between 920-1,650mm. Most rain is received during the months of May-August. There is one long rainy season commencing from March/April and ending in October/November. The temperatures are generally low, between 15- 25 ºC, the result of the high altitude of the area. There is mixed mountainous forest found at altitudes below 2500m, bamboo and low canopy mountainous forest found between 2400m to 3500m, and moorland found above 3500m. Open savannah covers the northern part of the district (Bukwo District Profile 2008).

Bukwo District has an estimated population of 81,354 people with a sex ratio of 99 males to 100 females and a population growth rate of 4.0%. This is slightly higher than the national growth rate of 3.4%. The population of the young constitutes more than half of the population (57.8% are below 18 years of age) and only 4% are above 65 years of age. Some 20% of the district population are below five years of age, and 21% are of primary school age (6-12 years). Over 95% of the population live in the rural areas. The population density stands at 111 persons per square kilometre. The main activity of most of the population is mixed crop and livestock farming, while some 7% are employed in other sectors (Bukwo District Profile 2008).

## 4. RESULTS

### 4.1 Socio-demographic characteristics of respondents in Chesower Sub-county

The total number interviewed were 40 but 39 responses were recorded. Majority of the respondents were between ages 21-40 years old, which accounted for 69% of all the responses. Some 25% were 41 years old and above, while about five 5% were between 15-20 years of age. Some 95% of the respondents were married with an average household size of eight occupants. A great majority of the respondents had attained primary and secondary education. The socio-demographic characteristics of the respondents can be seen in table 1.

### 4.2 Extent of adoption of SLM with the use of agricultural incentives

*4.2.1 Land acquisition, inputs and service providers in Chesower Sub-county*

All the respondents had either bought or inherited their farming land, or 56 and 44%, respectively. Some 54% said they had received agricultural inputs while 90% had received agricultural services. The services were offered through training by National Agricultural Advisory Services (NAADS) and KAWACOM, a private organization promoting coffee production in the study area. Some 77% of the respondents said that they were required to practice SLM by organizations giving the support, although it was not a criterion for selecting beneficiaries. Responses to the questions on land acquisition, access and conditions for receiving incentives are shown in table 2.

The inputs provided by organizations in Chesower Sub-county include improved seed, coffee seedlings, inorganic fertilizer, improved heifers, banana suckers, pesticides, and equipment. The majority received inorganic fertilizer (36%) and improved seed (28%). The rest of the

inputs were received by 5 to 10% of the respondents. The different types of inputs received by the respondents are shown in figure 1.

***Table 1.*** *Socio-demographic characteristics of respondents (N = 39) in Chesower Sub-county, Uganda.*

| Variable | Response (%) |
|---|---|
| **Age** | |
| 15-20 | 5 |
| 21-30 | 28 |
| 31-40 | 41 |
| 41-50 | 11 |
| 50> | 15 |
| **Sex** | |
| Female | 33 |
| Male | 67 |
| **Area of residence** | |
| Bisho | 16 |
| Siit | 21 |
| Chesower | 21 |
| Nyalit | 21 |
| Kapteka | 21 |
| **Marital status** | |
| Married | 95 |
| Single | 5 |
| Divorced | 0 |
| Widow | 0 |
| **No of household occupants** | |
| 1-5 | 36 |
| 6-10 | 44 |
| 11-15 | 20 |
| **Level of Education** | |
| No formal education | 5 |
| Primary | 34 |
| Secondary | 46 |
| Tertiary | 10 |
| University | 5 |

The services provided by organizations included training in agronomic practices, coffee management, soil conservation and animal husbandry. Most respondents, between 25 to 35%, received training in agronomic practices, coffee management and soil conservation, while some 15% were trained in animal husbandry. The different types of services received by the respondents can be seen in figure 2.

The SLM technologies that farmers are using include Napier grass bunds, terraces, and trenches, use of organic matter, agroforestry, mulching, soil bunds, crop rotation, fallowing and mono-cropping.

Most respondents (between 16 to 19%) said that they use Napier grass bunds, terraces, trenches and organic matter. Some 6-10% are using agroforestry, mulching and crop rotation, while less than 2% said that they were using fallow and mono-cropping. Figure 3 shows the different SLM technologies used by the respondents.

***Table 2.*** *Land acquisition, access and conditions for receiving incentives, and sources of inputs and services (N=39). In Chesower Sub-county, Uganda.*

| Question/variable | Response (%) |
|---|---|
| Land acquisition | |
| Bought | 56 |
| Inherited | 44 |
| | |
| Do you receive agricultural inputs? | |
| Yes | 54 |
| No | 46 |
| | |
| From whom do you receive these inputs? | |
| NAADS | 46 |
| Agronomic stockist | 8 |
| None | 46 |
| | |
| Do you receive agricultural services? | |
| Yes | 90 |
| No | 10 |
| | |
| From whom do you receive services? | |
| NAADS | 77 |
| KAWACOM | 13 |
| None | 10 |
| | |
| Are you required to use SLM technologies by the organisations giving the support? | |
| Yes | 77 |
| No | 23 |

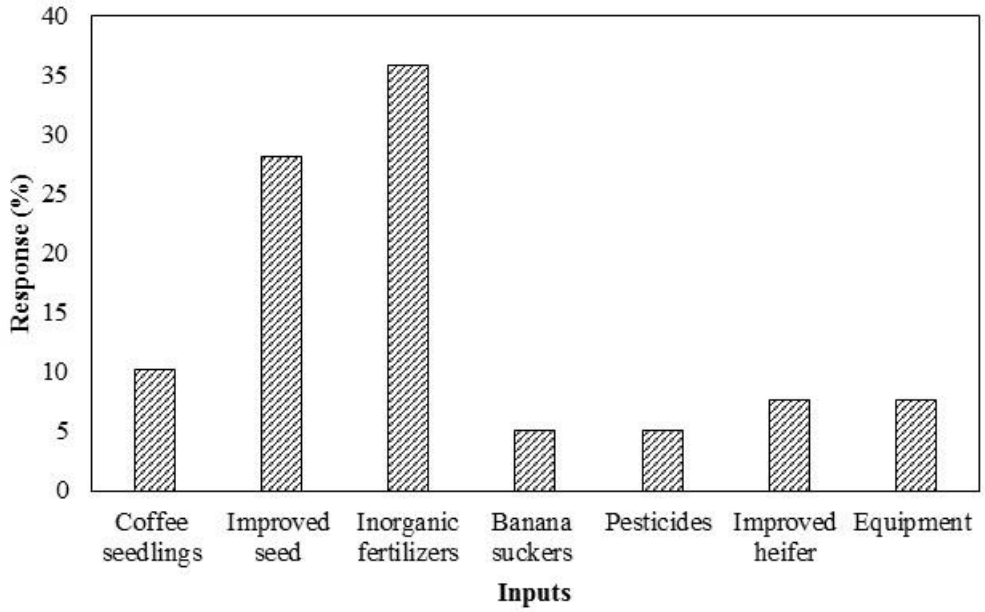


***Fig. 1.*** *Inputs received by respondents to increase agricultural production (N=39).*

*4.2.2 SLM adoption based the respondents' demographic and social backgrounds*

The responses were analysed according to the respondents' demographic and social backgrounds. The analysis revealed that receiving inputs was more common among female farmers than among male farmers, 54% and 46% respectively. When asked about receiving

services almost all the male farmers said they had received services, or 96%, compared to 62%of female farmers. A higher percentage of men than women said that they are required to use SLM technologies when receiving inputs and/or services (see table 3).

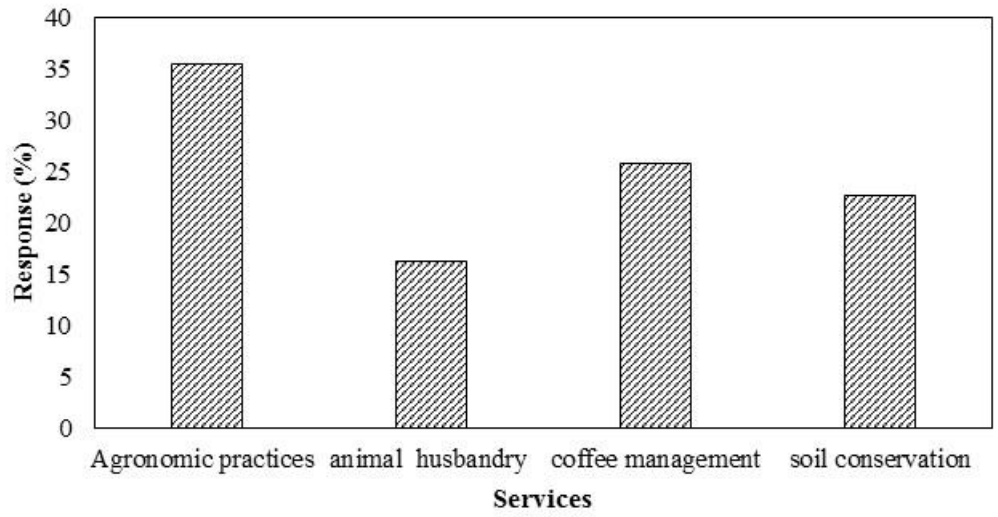


***Fig. 2.*** *Agricultural services received by farmers to enhance agricultural production (N=39).*

Analysis of adoption of SLM based on education level, age group, and number of occupants in a household and home parish of respondents did not reveal large differences in responses (see tables in Appendix 2).

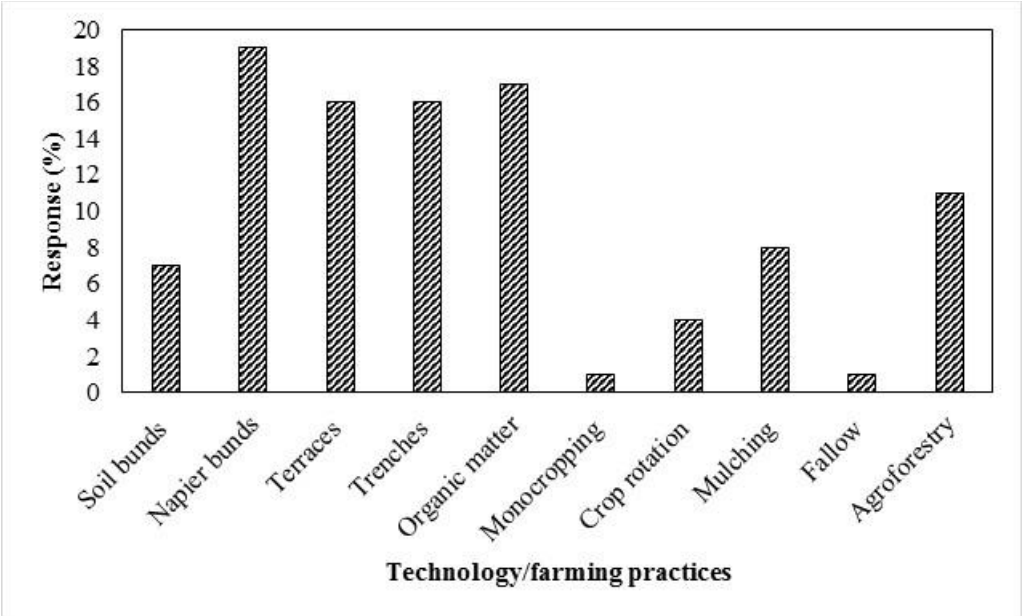


***Fig. 3.*** *Sustainable land management technologies used by farmers in Chesower Sub-county (N=39)*

***Table 3.*** *Responses based on the sex of the respondent in Chesower Sub-county (N=39) in Uganda.*

| | **Percentage response by sex of respondents** | | | |
|---|---|---|---|---|
| | **Female** | | **Male** | |
| **Question/Variables** | **Yes** | **No** | **Yes** | **No** |
| Do you receive inputs? | 54 | 46 | 46 | 54 |
| Do you receive services? | 62 | 38 | 96 | 4 |
| SLM as a requirement for inputs and services | 69 | 31 | 89 | 11 |

*4.2.3 Challenges to the adoption of SLM in Chesower Sub-county*

The respondents were asked if they face challenges in undertaking SLM. The most cited challenges reported included inadequate funds, soil erosion and silting of trenches. Roaming animals were said to destroy crops, whereas some mentioned inadequate knowledge of SLM practices. Table 4 shows the challenges faced by farmers in Chesower Sub-county.

***Table 4.*** *Challenges to practicing sustainable land management in Chesower Sub-county (N=39).*

| **Challenge to practising SLM** | **Response (%)** |
|---|---|
| Inadequate funds to buy inputs | 18 |
| Soil erosion | 14 |
| Silting of trenches | 8 |
| Limited labour | 7 |
| Floods | 7 |
| Roaming animals destroy crops | 7 |
| Pests and diseases lower productivity of crops | 7 |
| Inadequate knowledge of SLM practices | 7 |
| Inadequate organic manure | 5 |
| Trees compete with crops | 4 |
| Terrace slides | 4 |
| Limited land increases cost of production | 3 |
| Trenches limit unit area for cropping | 3 |
| Poor transport facilities | 2 |
| High cost of improved crop varieties | 1 |
| Neighbours not practicing soil erosion control measures | 1 |
| Notorious weeds | 1 |
| Lack of farm equipment | 1 |
| **Total** | **100** |

A clear gender difference emerged in the respondents' answers regarding challenges to adopting SLM practices. While 92% of the male respondents identified lack of finances as a challenge only some 20% of the women cited that as a challenge. On the other hand women said SLM was too labour demanding and some 80% of the women identified that as the greatest challenge to adoption of SLM, while only 20% of men cited that as a challenge. Table 5 shows the challenges faced by farmers in Chesower Sub-county, broken down according to respondents' sex.

***Table 5.*** *The major challenges to adoption of SLM in Chesower Sub-county with views of different sexes of respondents (N=39). The percentage responses of male and female equal to 100%.*

| **Challenges** | Female | Male |
|---|---|---|
| Soil erosion | 10 | 90 |
| Inadequate funds | 8 | 92 |
| Silting of trenches | 33 | 67 |
| Limited labour | 80 | 20 |
| Floods | 20 | 80 |
| Roaming animals | 20 | 80 |
| Pests and diseases | 0 | 100 |
| Inadequate knowledge | 20 | 80 |

*4.2.4 Strategies for addressing the challenges to SLM in Chesower Sub-county*

When asked how they thought the challenges to SLM practices should be addressed, some 20% of the respondents suggested increasing financial support, while 16% said creating more awareness would make SLM realized. About 16% mentioned soft loans from micro-finance institutions to support them to meet the costs of adopting the SLM technologies. Others also mentioned collective action where farmers co-operate to undertake SLM as the best option for attaining benefits from SLM. Table 6 shows the strategies suggested by the respondents.

***Table 6.*** *Strategies to address challenges to the adoption of sustainable land management as suggested by respondent (N=39).*

| **Strategies to address the challenges to SLM** | **Responses (%)** |
|---|---|
| Increasing financial support from government | 20 |
| More sensitization to create awareness | 16 |
| Soft loans from micro finance institutions | 11 |
| Training from extension | 8 |
| Planting agro forestry trees and shrubs | 8 |
| Digging trenches for soil and water conservation | 8 |
| Collective action to control erosion | 8 |
| Planting Napier grass | 5 |
| Diversifying crops grown | 4 |
| Fencing to prevent crop damage by animals | 3 |
| Providing equipment to farmers | 2 |
| Increase access to seedlings of agroforestry trees and shrubs | 2 |
| Avoiding over grazing of fallow lands | 2 |
| Appropriate spacing of crops and trees | 2 |
| Providing good roads | 2 |
| **Total** | **100** |

## 5. DISCUSSION

The results of the study are discussed based on the extent of adoption of SLM by farmers who received inputs and services, the challenges faced in adopting SLM and possible strategies to address the challenges that were identified.

The results in general did not reveal much difference in responses based on the differences in age, number of occupants in a household, education level or the home parish of respondents. However, the analysis indicated some aspects of gender dimensions in SLM adoption. It should be noted that the sample size was small with an unequal number of men and women respondents, and therefore the findings on gender differences should be regarded with caution.

### 5.1 Extent of SLM adoption based on land acquisition, inputs and service providers in Chesower Sub-county

All the respondents reported that they either bought or inherited their farming land. This reveals that there is some degree of land ownership and tenure security in place in Chesower Sub-county. It has been suggested that ownership of land encourages investment in land and probably increases the rate of SLM adoption, as pointed out by Deininger (2003). This interpretation is further supported by Ai-Ping & Yonqin (1999) who argued that ensuring land tenure security is an incentive for SLM adoption. The general land ownership is probably one of the reasons why SLM has been adopted in Chesower Sub-county.

The majority of the respondents who received inputs and services said that they were required to practice SLM. This implies that the organisations providing inputs and services in Chesower Sub-county are creating awareness which increases the rate of adoption through provision of inputs and services. This interpretation is further supported by Jagger & Pender (2006) who noted that the presence of agricultural and environmental organisations in an area can influence adoption of SLM.

The results show that majority of the respondents had received improved seed and inorganic fertilizer as inputs. This may be preferred by the farmers because improved seed and inorganic fertilizer give quick returns. The economic benefits of inputs may explain the farmer's choice of a given technology, a result that is supported by Howeler (2000), who says that the choice of farmers to adopt a technology is influenced by the cost effectiveness of the technology.

The farmers had also been offered training in agronomic practices, coffee management and soil conservation. These training sessions enhance farmers' knowledge of land management and may enable them to decide on adopting a SLM technology, especially if proven to be effective. Hurni (1997) argues that farmers are normally more experienced in crop production than in soil conservation. Attaining success will require integrating soil conservation into profitable agricultural enterprises which are more preferred by farmers. This will make conservation attractive to the farmers and thus lead to adoption of SLM.

The SLM technologies mostly used by the farmers in Chesower Sub-county are Napier grass bunds, organic matter, trenches, terraces and agroforestry. This implies that farmers are willing to take up new practices that promote SLM. The presence of incentives in the form of inputs and agricultural services may have contributed to the adoption of these technologies.

The choice of technologies may depend on the farmer's social, institutional and policy environments. Hagmann et al. (1999) maintained that farmers' involvement in the decision making on types of technologies to be promoted is important and may enhance SLM adoption. In Bukwo District the inputs and services supplied by the NAADS programme are chosen by the farmers themselves based on their needs which are identified during enterprise selection and training. The survey results indicate the farmers' ownership of the planning and decision making regarding the type of technologies provided by the NAADS programme.

A clear gender dimension emerged in the responses on inputs and services. More women than men received inputs by a slight difference of 4 percentage points. In contrast more men than women had received services by 34 percentage points. These results indicate that men have received more benefits than women in agricultural programmes in Chesower Sub-county, and that services such as training in enhancing the adoption of SLM do not effectively reach women. When asked whether they were required to use SLM technologies, more men than women said they were required to do so. This result has a direct linkage to men having more access to other services like training and information as compared to the women.

The low percentage of women who received services may also be attributed to the difficulties faced by women in abandoning their domestic duties to move to training centres for meetings and training sessions. According to a study by Kamar (1998), women are capable of undertaking conservation measures on their land if offered training. However, Benin et al. (2011) found in their studies that the majority of the extension providers in Uganda are men and that gender similarities between receiver and extension play an important role in adoption. This has been attributed to the low rates of women receiving extension services.

### 5.2 Challenges to the adoption of SLM in Chesower Sub-county

The results showed that the main challenges to adoption of SLM were inadequate funds and soil erosion, among others. Inadequate funds limit the ability of farmers to sustain the SLM technologies, for example maintaining trenches, procurement of seeds and seedlings, access to extension services, purchase of pesticides and hiring labour. These results are in accordance with other studies, such as Dixon & Pagiola's (2001) study that noted that upfront financial costs can be high and therefore may limit investment in the land. Provision of financial support may therefore facilitate adoption of SLM among farmers in Chesower Sub-county.

Soil erosion negatively impacts on the adoption of SLM because its effects do not have boundaries. Downstream farmers are discouraged from adopting SLM if their upstream counterparts are not practicing SLM, especially soil erosion control measures. This is because control of soil erosion in hilly landscapes requires participation by both upstream and downstream farmers. Tanui et al. (2006) notes that natural resources management will require a wide approach through collective action rather than individual based action to attain SLM. Soil erosion control measures in hilly landscapes, like parts of Chesower Sub-county, require collective rather than individual action to succeed. Furthermore, the study's results showing soil erosion as a key challenge to adoption of SLM highlights the importance of establishing and maintaining co-operation between farmers in all SLM efforts.

Labour constraint was the only challenge where female responses had a higher percentage that for males. It is probably because it is the women who carry out most of the farm activities, especially in production, which is very labour intensive. This result is supported by Sanders & Cahill (1999) who pointed out that labour intensive technologies may not be undertaken by

women because they have to attend to other domestic activities. Providing technologies with different labour requirements for farmers to choose from would enable women to adopt SLM technologies where labour demands are minimal.

### 5.3 Strategies for addressing the challenges to SLM in Chesower Sub-county

The study's respondents identified the following strategies to address the challenges to the adoption of SLM: increasing financial support, creating awareness, provision of loans and ensuring co-operation among farmers.

It is well established that provision of financial support may increase adoption of SLM by increasing farmers' access to inputs and services. According to FAO (2001), provision of financial support in the form of guaranteed output prices, input subsidies, deficiency payments, or disaster relief encourages and facilitates massive adoption of sustainable agriculture by farmers.

However, it is probably not sustainable to provide financial support as a direct incentive without strengthening the capacities of farmers to effectively demand advisory services like training in SLM. Kamar et al. (1999) note that indirect incentives may be in the form of extension services, technical guidance and support, training, and capacity building. It is probably better to provide farmers with both direct incentives as catalysts to enhance adoption rates and indirect incentives to strengthen their capacity to adopt and maintain SLM technologies.

Increasing access to soft loans can help to increase adoption of SLM. The loans may be used to purchase inputs, agro processing, cost sharing programs where adoption is unprofitable from the individual farm perspective, and sustaining the technologies. Wandel and Smithers (2000) point out that large investment costs, for example equipment and machinery, may discourage adoption of sustainable farming practices. Provision of loans is therefore important to meet those costs which would make a farmer not to adopt SLM.

Creating awareness about the benefits of SLM may increase adoption rates. Awareness may be created through interpersonal communication where farmers already practising SLM are encouraged to share their knowledge on the practices, as well as through mass media and training. Awareness may also be created about the missed benefits of not practising SLM, such as reduced land productivity. D'Souza et al. (1993) found that creating awareness about sustainable agriculture increased SLM adoption. Awareness can be made more achievable by involving communities in planning for meeting venues and periods which farmers find more conducive for them. This should be done with gender and age considerations to effectively include women and the elderly.

Collective action will be necessary for hilly landscapes where erosion effects are high. This may enhance the willingness of a farmer to participate since his or her neighbours are also involved. Successful SLM requires that all land users at a landscape level be involved for collective benefits to be achieved. According to FAO (2001), adoption rates decrease where it is unprofitable for individual farmers to practice SLM. In such cases farmers can be facilitated to solve problems through a joint effort for the benefit of all.

## 6. CONCLUSIONS AND RECOMMENDATIONS

It is clear that land resources are very important in meeting the food and income needs of rural farmers in Uganda. Yet land resources in Bukwo District, as in most parts of Uganda, are constrained due to pressure caused by the growing population and poor farming practices. The Ugandan government has adopted various environmental policies and frameworks to address the problems of land degradation and declining agricultural productivity. It has also been argued that poverty incidences in Uganda are closely linked to land degradation and poverty has been identified as one of the main obstacles in addressing land degradation problems. Since investing in good land management practices requires resources, it has been suggested that incentive strategies and policies should be provided as necessary catalysts for farmers to adopt SLM technologies and practices.

The overall aim of this study was to assess the impact of agricultural incentives on adoption of SLM in rural communities of Uganda. The study focused on the impact of agricultural incentives and SLM adoption in Chesower Sub-county in Bukwo District, eastern Uganda.

Agricultural programmes operating in Bukwo District support farmers with inputs and other services which can be used as an entry point to promote SLM adoption. The findings revealed that most farmers who had received inputs and training to improve agricultural productivity were using some SLM technologies, probably as a result of the training they had received. It can be concluded that incentives play a role in enhancing SLM adoption. Furthermore, all the farmers participating in the study said they owned their farmland; they had either bought or inherited their land. Secure land tenure is found to increase SLM adoption rates and the stable land tenure in place in Bukwo District can be capitalised on to increase adoption levels of SLM among the farmers.

The study sought to understand the challenges faced by the farmers in using SLM technologies. The findings revealed a number of challenges faced by the farmers but the most cited challenges were limited finances and soil erosion. SLM can be costly, especially technologies which do not have quick economic benefits. Farmers are much more likely to adopt technologies that yield short term economic gains and enhance their incomes. It is therefore important for programmes promoting SLM to consider viable technologies that can attract the farmer to adopt SLM.

Soil erosion as one of the main challenges to SLM adoption was a very important finding and reveals the difficulties that farmers are faced with in undertaking SLM. This is because the effects of soil erosion are widespread and they have no boundaries. Soil erosion, especially in hilly landscapes, is a problem that individual farmers can't tackle alone; it requires the collective action of all farmers at the landscape level. It's therefore important that agricultural programmes like NAADS promote collective action and encourage farmers to work together for a common goal.

The study also sought to identify possible strategies to address barriers in adopting SLM technologies and practices. The strategies identified by the survey respondents included provision of financial support by the government, provision of soft loans and increased awareness of SLM. Provision of financial support to farmers can be in the form of input subsidies, guaranteed output prizes and provision of soft loans to purchase needed inputs and farm equipment. Improvement of social infrastructure by government like roads will also attract markets in the area and this will have a positive effect on farmers' incomes.

The study's respondents noted that creating awareness was important, especially for rural communities in Uganda where service delivery is still very low due to inadequate extension staff in the agricultural and natural resource sectors. This can be solved by increasing manpower in the agricultural and natural resources sectors at the local government level, and by supporting farmer-to-farmer learning through success stories from champion farmers who often influence other members of the community. It is important that programmes capitalise on success stories and use them as learning sites for other community members to enhance rates of SLM adoption.

The study's results indicate that a combination of short term and long term incentives may be an effective strategy to enhance and maintain SLM adoption in rural communities in Uganda. Strategies to enhance SLM adoption should address the primary needs of farmers which are normally short term economic gains. This can be done by provision of low cost but profitable SLM technologies that attract the farmers to adopt SLM. The long term strategies to enhance adoption of SLM are to strengthen the farmers' willingness to co-operate and to build their capacity to take part in decision making, and in planning to ensure that their needs are put into consideration by government programmes.

The results revealed some gender dimensions in SLM adoption in Chesower Sub-county. The findings indicate that women do not benefit from incentives that enhance SLM adoption to the same extent as men. This difference seems to be due to constraining factors of high labour demands of some of the SLM technologies and to limited access to training offered by extension staff. These findings support calls for making SLM planning and programming gender responsive.

Finally it is important to stress that the study had some limitations and its findings should be regarded accordingly. Firstly there were more men than women in the study's survey sample. It means that the results may not be fully representative of the population and findings regarding gender difference should be regarded with caution. Secondly, the study's findings are based on the survey participants' individual experiences, views and perceptions on issues regarding SLM adoption. It would have been beneficial for the study to include more structural perspectives on SLM adoption through interviews with government officials and agricultural programme staff in Bukwo District, yet key informant's interviews were not successful due to a low response rate. Because of these limitations the study's findings should be regarded more as insights into and indications of SLM adoption in rural communities of Uganda rather than well-established research findings.

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# APPENDICES

**Appendix 1**. A copy of the survey questionnaire

**Assessment of the Impact of Incentives in Adoption of Sustainable Land Management in Chesower Sub-county, Bukwo District**

Dear Respondent, I am Olive Chemutai, a fellow at the United Nations University Land Restoration programme. I am carrying out a study entitled "The impact of incentives on adoption of sustainable land management" in Chesower Sub-county. I humbly request you to co-operate with me by providing the information required. Your contribution is very important and the information you will provide is purely for study purposes. It is part of capacity training in land restoration. Your co-operation is highly appreciated.

**Section A: Social demographic characteristics**

I) Name of respondent .....Village..... Parish.....
ii) Age:
a) 15-20 ☐ b) 21-30 ☐ c) 31-40 ☐ d) 41-50 ☐ e) 50 and above ☐
iii) Sex: a) Male ☐ b) Female ☐
iv) Marital status:
a) Married ☐ b) Single ☐ c) Separated ☐ d) Widowed ☐
v) Household size/ No of occupants

vi) Level of Education:
a) No formal education ☐ b) Primary ☐ c) Secondary ☐
d) Tertiary ☐ e) University ☐

**Section B: Extent of Adoption of SLM technologies**
i) What is your land holding a) Inherited ☐ b) Bought ☐ c) Rented ☐
ii) Do you receive any agricultural inputs? Yes ☐ or No ☐
iii) If yes, which ones?
iii) Do you receive any agricultural services? Yes ☐ or No ☐
iv) If yes, which ones?
v) From whom do you receive the inputs or services?
a) Inputs
b) Services
vi) What are the criteria of selection for receiving these inputs/services?
vii) Are you required to practice sustainable land management by the organisations giving the inputs and services? Yes ☐ or No ☐
Viii) If yes, which sustainable land management technologies are you using
ix) What challenges do you face in practicing sustainable land management?
x) How do you think the challenges can be addressed?
xi) If answer is No in (vii) above, do you practice sustainable land management ☐ Yes ☐ or No?
xii) If yes which technologies are you using?
xiii) What challenges do you face in practicing sustainable land management?
xiv) How do you think the challenges can be addressed?
xv) If you are not practicing sustainable land management why?

**Appendix 2.** Extent of adoption of SLM based on sex, age, level of education, home parish, marital status of respondents and challenges faced in adoption of SLM.

***Table I.*** *Extent of adoption based on sex, and different age groups in Chesower Sub-county. Responses for Yes and No equal to 100%*

| | **Percentage response per sex and Age of respondents** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Female** | | **Male** | | **15-20 (years)** | | **21-30 (years)** | | **31-40 (years)** | | **41-50 (years)** | | **50> (years)** | |
| **Question/Variables** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** |
| Do you receive inputs? | 54 | 46 | 46 | 54 | 50 | 50 | 64 | 36 | 44 | 56 | 67 | 33 | 50 | 50 |
| Do you receive services? | 62 | 38 | 96 | 4 | 100 | 0 | 73 | 27 | 100 | 0 | 100 | 0 | 100 | 0 |
| SLM as a requirement for inputs and services | 89 | 11 | 69 | 31 | 100 | 0 | 82 | 18 | 85 | 15 | 75 | 25 | 100 | 0 |

***Table II.*** *Extent of adoption based on education level, and home parish of respondent in Chesower Sub-county. Responses for Yes and No equal to 100%*

| | **Education** | | | | | | | | | | **Location** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Non formal** | | **Primary** | | **Secondary** | | **Tertiary** | | **University** | | **Kapteka** | | **Nyalit** | | **Bisho** | | **Chesower** | | **Siit** | |
| **Question/Variable** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** |
| Do you receive inputs | 0 | 100 | 54 | 46 | 50 | 50 | 50 | 50 | 100 | 0 | 75 | 25 | 0 | 100 | 50 | 50 | 63 | 37 | 57 | 43 |
| Do you receive services | 50 | 50 | 92 | 8 | 83 | 17 | 75 | 25 | 100 | 0 | 75 | 25 | 75 | 25 | 100 | 0 | 87 | 13 | 86 | 14 |
| SLM as a requirement for inputs and services | 0 | 100 | 92 | 8 | 83 | 17 | 75 | 25 | 100 | 0 | 87 | 13 | 63 | 37 | 100 | 0 | 63 | 37 | 100 | 0 |

***Table III.*** *Extent of adoption of SLM based on marital status and number of occupants in a farm household. (%)*

| | **No. occupants** | | | | | | **Marital status** | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1-5** | | **6-10** | | **11-15** | | **Married** | | **Unmarried** | |
| | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** |
| Do you receive inputs | 22 | 78 | 64 | 36 | 50 | 50 | 48 | 52 | 50 | 50 |
| Do you receive services | 100 | 0 | 100 | 0 | 80 | 20 | 84 | 16 | 100 | 0 |
| SLM as a requirement for inputs and services | 89 | 11 | 91 | 9 | 80 | 20 | 81 | 19 | 100 | 0 |

**Table IV.** *The major challenges to adoption of SLM in Chesower Sub County with views of different sex, age and number of occupants in a household. Responses for Yes and No equal to 100%.*

| | **Sex** | | **Age** | | | | | **Occupants** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Challenges** | **Female** | **Male** | **15-20** | **21-30** | **31-40** | **41-50** | **50>** | **1-5** | **6-10** | **11-15** |
| Soil erosion | 10 | 90 | 0 | 40 | 50 | 0 | 10 | 40 | 40 | 20 |
| Inadequate funds | 8 | 92 | 8 | 8 | 54 | 8 | 23 | 23 | 46 | 31 |
| Silting of trenches | 33 | 67 | 0 | 50 | 0 | 33 | 17 | 33 | 33 | 34 |
| Limited labour | 80 | 20 | 0 | 20 | 20 | 40 | 20 | 40 | 20 | 40 |
| Floods | 20 | 80 | 0 | 40 | 20 | 0 | 40 | 40 | 40 | 20 |
| Roaming animals | 20 | 80 | 20 | 20 | 20 | 0 | 40 | 0 | 80 | 20 |
| Pests and diseases | 0 | 100 | 0 | 0 | 40 | 20 | 40 | 0 | 100 | 0 |