Research article

Small Scale Farmers' Perception of Soil and Water Conservation Practices -The Case of Budalangi Area, Kenya

BENARD ONYANGO ODHIAMBO
Graduate School of Agriculture, Tokyo University of Agriculture, Tokyo, Japan
Email: benaxodhis@yahoo.com

MACHITO MIHARA*
Faculty of Regional Environment Science, Tokyo University of Agriculture, Tokyo, Japan
E-mail:m-mihara@nodai.ac.jp

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Abstract Soil and water conservation; a process of minimizing the effects of land degradation, is necessary for sustainability of food production aimed at feeding the rapidly increasing global population. Soil erosion and subsequent transfer of the eroded particles have been seen as a major cause of land degradation. Budalangi area in Kenya is mainly flat with poor drainage and alluvial or black cotton soil with minimal tree cover. Flooding in the study area is believed to be as a result of sediments accumulating in the bed of River Nzoia over the years, making the river course channel to be above the general level of flood plain, resulting to overbank flow across the dykes. The study is to discuss the understanding of small scale farmers and their motivation on soil and water conservation practices. Qualitative and quantitative methods were used. Data collection was mainly through questionnaire survey, both formal and informal interviews together with field visits. The sample was selected by simple random sampling technique from the entire study area. From the general outcome, majority of farmers could attribute the condition of their farm fertility to deposition of top soil from upstream. Respondents also related low productivity to floods and unreliable rainfall pattern in the area. The results showed that about 74.3% of the farmers in the study area are familiar with soil and water conservation with 42.6% of them putting to practice at least one measure to conserve soil and water. About 68.5% of the farmers are not practicing any soil and water conservation measures. Hence, there is need to strengthen small scale farmers` knowledge and adoption of soil and water conservation such as rainwater harvesting to augment overreliance on direct rain for production and sustainable agriculture.

Keywords soil erosion, deposition, soil fertility, farmer perception, and soil and water conservation

INTRODUCTION

In many developing countries, programs to mitigate land degradation have been initiated but with minimal success due to poor user adoption and lack of adequate technology transfer, (Aklilu and Jan, 2007). According to McDonald and Brown, (2000), technical interventions brought to farmers by external agencies are always not sustainable unless attention is paid to both socio-economic and cultural aspects of the community in question. Therefore, in order to enhance sustainability of projects meant to intervene in a particular problem in a community, full community participation is necessary. This way, technology transfer will be meaningful and sustainable.

Decision by farmers to practice or adopt soil and water conservation (SWC) strategies is heavily influenced by personal, socio-economics and technological factors among others. Personal factors of age and level of education determines a farmer`s ability to relate problems associated with erosion to their consequences on productivity, (Woldeamlak, 2007). Inherent land properties such as slope and soil type determine vulnerability of soil to agents of erosion. Land tenure system, family size as well as level of income can be categorized as socioeconomic factors influencing adoption and practice of SWC measures.

Kessler, (2006) reported that in order to understand what motivates human beings to behave in a given way in relation to adoption process, there is need to put into consideration the logics behind the motivating factor which can either be self-driven through personal interests or externally driven by an expected reward or outcome. For SWC activities, self-motivation is important due to their long term nature of payback.

OBJECTIVE

The objective of this study is to discuss the understanding of small scale farmers and their motivation on soil and water conservation practices in Budalangi area, Busia County, Kenya.

METHODOLOGY

Study Area

The study area lies between longitudes N 0° 7′ 0″ to N 0° 9′ 0″ and latitudes E 34° 1′ 30″ to E 34° 3′ 30″. The research was conducted within Budalangi area, Busia County, which forms part of the lower catchment of river Nzoia watershed. Budalangi area is mainly flat with poor drainage, alluvial or black cotton soils with minimal tree cover and thus vulnerable to floods, (Alfred, 2013). The area receives mean annual rainfall amount of about 600 mm. Despite this manageable rainfall amount, the area is prone to floods during rainy seasons and suffers severe water scarcity during other seasons. To address these extreme challenges of excess water and water scarcity, there was need to study the understanding of small scale farmers and their motivation on soil and water conservation practices.

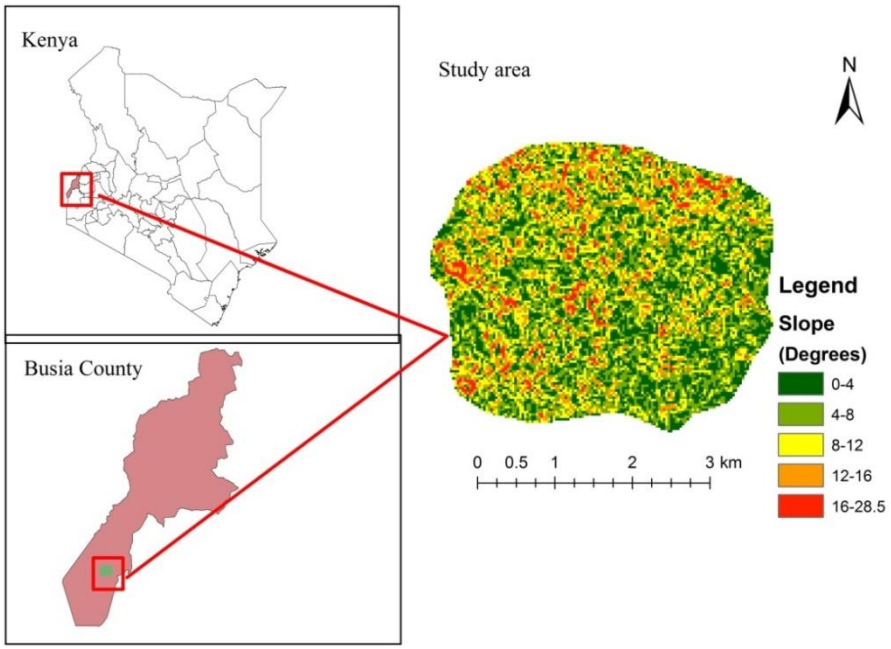

Fig. 1 Map showing location and slope of study area

Methods Applied

A total of 35 household representative farmers were randomly selected as the key informants for interviewing with the assistance of area extension officer. Randomization was to get a good representation of socio-economic characteristics of the target group. The data was collected in August 2016, which corresponded to land preparation period in the study area. Data collection was mainly through questionnaire survey, both formal and informal interviews together with field visits. The

questionnaire was designed consisting of both closed and open ended questions in order not to limit or restrict the response in a given way; this was meant to allow full expression among the respondents and the researchers to understand the respondents` perceptions relating to the mentioned issues.

Land tenure systems, past and present practices on the farms, yield per season, their understanding of soil fertility, erosion and conservation strategies were some of the issues included in the questionnaire. Questions relating to soil fertility changes, soil erosion perception and soil and water conservation strategies were open ended in structure to enable respondents to identify various visual indicators and give possible reasons for their observations.

Descriptive statistics especially tabulation and simple graphics were used to summarize the data. To determine the factors that influenced decline in agricultural production and influencing SWC practices, average ranking for each of the ranked causes was used to determine the most influential factors using the formula;

$$\text{Average rank } P_a = \frac{X_1P_1+X_2P_2+X_3P_3+\cdots+X_nP_n}{Total\ response\ count} \quad (1)$$

Where Xi is the response count for each choice and Pi is the ranked position.

Table 1 Contents of the questionnaire sheet

Category	Related question	Details
Basic information of respondent	General information	Name, age, gender, level of education, occupation
Topography	Farm position in relation to hillside	Location, slope
Security of tenure	Land tenure system	Type of land ownership, previous land use
Cultivated crops and production levels	Type of crop , yield	Maize, beans, potatoes, groundnuts, cassava and millet
Land degradation	Soil erosion severity, soil and water conservation measure	Level of damage and perceived causes, knowledge of SWC measures, adoption level of SWC measures.

RESULTS AND DISCUSSION

Land Tenure System and Preparation

Security of tenure is an important factor in determining whether a farmer is willing to practice soil and water conservation measures on their farmland, (Asrat et al., 2004). If the land belongs to the farmer and he/she is sure of using it for a long period of time, say, lifetime, the farmer has expectations of deriving benefits from the farm for a longer time and hence, he/she is most likely to invest in soil and water conservation measures on the farmland.

Unlike, when the farmer is not certain about the security of tenure, i.e. when the farm is leased or hired for a short period of time, the farmer may not be willing to invest in soil and water conservation measures.

Table 2 Farmers' responses on land ownership

Land tenure system	Number of respondents in percentage (%)
Individually owned (inherited/given/bought)	80.0
Communally owned	11.4
Others (leased or hired)	8.6

From the results on Table 2, majority of respondents either owned their farms through buying or inherited from the family lineage. Minority leased or hired their farms for a short period of time. This could mean there is relatively a higher security in terms of land ownership among the farmers in the study area and hence, a positive willingness to adopt and practice soil and water conservation strategies. This finding is also in agreement with Desalew and Aklilu, 2017, who observed that among other factors, plot ownership type had a significant influence on farmer's perception on soil and water conservation.

Farm Fertility Status

Proper soil and water conservation measures are important in maintaining and improving soil fertility. Deposition especially during heavy rains and flash floods from upstream was identified by the respondents as a possible cause of soil fertility in the area. Most farmers do not use either organic or inorganic fertilizer on their farms; probably due to deposition of top soil and other organic materials on some farms and high cost of farm inputs making it impossible for most small scale farmers to afford. As shown in Fig. 2, 40% of the farmers perceived deposition from upstream as a cause of their farm fertility status.

Farmers' Perception of Soil Erosion and its Severity

The concept of soil erosion is not a new term among the farmers in the study area. Majority of the respondents were able to identify the effects of soil erosion with its magnitude.

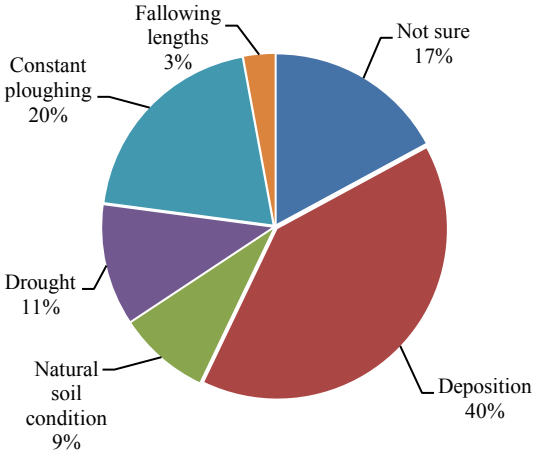

Fig. 2 Perceived cause of soil fertility status magnitude

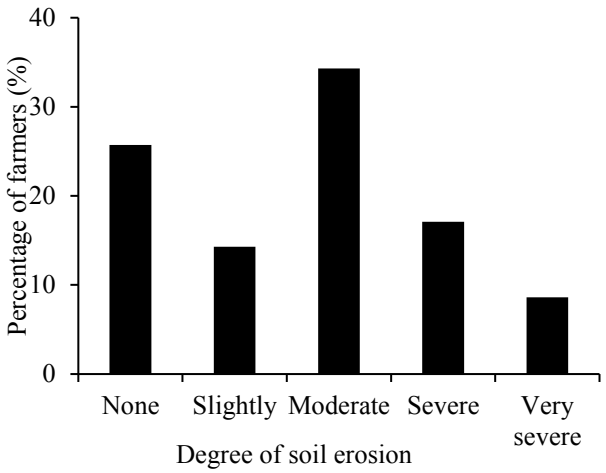

Fig. 3 Perceived soil erosion

Results on Fig. 3 shows 34.3% of the respondents considered soil erosion magnitude as being moderate with 17.1% and 8.6% mentioning severe and very severe respectively.

On the effect of erosion on soil fertility status, 48.6% confirmed it affected it negatively with 28.6% observing no relationship between erosion and soil fertility. This perception is in agreement with finding by Lal, 2003 that erosion has negative impacts on the environment as it reduces soil fertility of arable lands. The 22.8% observed positive effects of erosion; probably as a result of deposition from upstream.

Farmers Understanding of Causes of Decline in Production

From the results, all respondents were able to identify a decline in level of production and recognized possible causes in order of rank from 1 to 6. Where; 1 represented the most likely cause of decline and 6 the least likely contributor to the decline.

As in Table 3; flooding, income levels and water scarcity were identified as the major causes of decline in agricultural production in the area as most of the respondents were ranking them from first to second as shown in their average rank. Thus, the perception of causes leading to decline in production is important in determining the possible levels of adoption of any conservation strategy to be recommended in addressing challenges facing crop production and sustainable agriculture wholesomely. According to Enyew et al., 2013, soil and water conservation leads to improved crop productivity. Their study focused mainly on terraced fields for teff, barley and maize production. Each field showed a significant increase in yield per hectare.

Table 3 Crop production decline and prioritized causes

Cause	Rank by respondent (%)						Average rank
	1st	*2nd*	*3rd*	*4th*	*5th*	*6th*	
Soil erosion	31.4	28.6	-	5.7	34.2	-	**2.8**
Water scarcity	54.2	25.7	8.6	5.7	5.7	-	**1.8**
Flooding	68.6	25.7	5.7	-	-	-	**1.4**
Size of farmland	25.7	2.9	5.7	22.9	34.2	8.6	**3.6**
Income levels	60.0	22.9	17.1	-	-	-	**1.6**
Wild animals	28.6	17.1	5.7	20.1	17.1	11.4	**3.1**

Soil and Water Conservation Strategies

SWC measures are normally put in place to control surface runoff and harvest rainwater. From the survey, it showed that about 74.3% of the respondents were familiar with SWC measures with about 42.6% doing something towards SWC in their farms. As in Fig. 4, out of 42.6% respondents who were able to identify some problems of surface runoff and water ponding, 51.4% and 31.4% used trenches and waterways as conservation measures, respectively in an attempt to control water movement within their farms. Figure 5 shows some of the soil and water conservation practices within the study area.

Some farmers were unable to respond to whether they practice SWC measures on their farms or not. According to Kessler, (2006), farmers may decide not to adopt any SWC measure even after perceiving a given problem and have an idea on how to solve it. This is due to various constraints to adoption, ranging from personal factors to technological aspects. From the survey, flooding especially during heavy downpour and water scarcity during dry seasons was identified as top constraints to production.

Therefore, there is need to bridge these extremes through rainwater harvesting and storage during heavy rains for use in dry seasons. To attain this, a deeper understanding of factors influencing farmers' perception and willingness to adopt any sustainable SWC measures is important (Derajew et al., 2013).

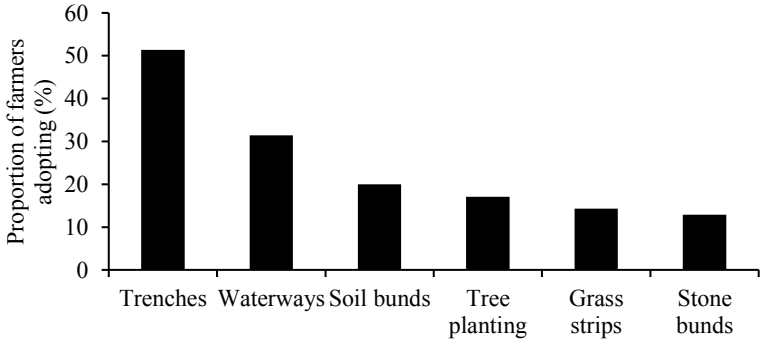

Fig. 4 Adoption levels of each SWC measure

Fig. 5 Soil and water conservation practices in the study area

CONCLUSION

This study aimed at discussing the understanding of small scale farmers on soil and water conservation practices in Budalangi area of Busia County, Kenya. From the results of the survey, it is demonstrated that majority of small scale farmers in the study area are aware of soil and water conservation measures and practices. About 74.3% are familiar with soil and water conservation with 42.6% of them putting to practice at least one measure to conserve soil and water. It is clear therefore that 68.5% of farmers, despite having the information, they are not putting to practice any soil and water conservation measure in their farmlands. Hence, there is need to strengthen small scale farmers` knowledge and adoption of soil and water conservation through training and extension services in order to realize a more sustainable land and water management practices and subsequently, sustainable agriculture.

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