
**THE EFFECT OF SOIL EROSION ON AGRICULTURAL PRODUCTION, A CASE STUDY OF RICE
GROWING IN BWAISE, WAKISO DISTRICT**

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Abstract.

Soil erosion has resulted to high pressure on agricultural production in Bwaise in Wakiso district in many areas. This study therefore addressed the following objectives: to describe the socio-demographic characteristics of the respondent's, to examine the effects of soil erosion on the agricultural productivity of rice growing in Kadato sub county, in addition, to examine the causes of soil erosion in the study area (Kadato sub county) and the to identify the intervening measures that can help to reduce or minimize the impacts of soil erosion in the study area of Kadato sub county. The study hypothesized that there is a significant relationship between soil erosion and agricultural production, Wakiso District. Statistical data analysis was performed with the aid of SPSS. Frequencies and Percentages were generated at univariate level, correlations were done at bivariate level and regression performed at Multivariate level. Key findings indicated that the following factors led to soil erosion in Bwaise over grazing (13.5%), heavy rain falls (27%), Deforestation (46%) and lastly poor farming methods (13.5%). However, these are intervened by the following measures re afforestation (99.9%), conservation tillage (67.5%), sustainable farming practice (90.5%) and lastly wind breakers (87.7%). This implied that there was a strong negative correlation ($r = -.512$) between soil erosion and agricultural production. The researcher therefore recommends that there should be a massive sensitization of the general population on the dangers of soil erosion in that the population should be aware of it so that they can adjust and minimize the human causes and modern and sustainable farming methods which are less harmful to the environment should be adopted and be implemented in order to avoid the risks of erosion and its effects.

Key words: Soil erosion, agricultural production and Rice growing.

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Background of the study.

Soil erosion has resulted in high pressure on agricultural production in Bwaise, Wakiso District in many areas; there is increasing local pressure to expand agricultural activities on the open land of Bwaise in Wakiso District (Musa et al., 2023). About 38 percent of the total area of Wakiso is covered by forests, which provide wildlife habitats, unique natural ecosystems and biodiversity, and watersheds (Joanita et al., n.d.). However, the existence of these natural resources favors human activity in agriculture (Emmanuel et al., 2023). However, estimates of forest loss in Africa and Uganda, particularly in Wakiso (Aisha et al., 2023), have been observed to be higher in the last two decades. For example, between 1990 and 2000, the continent lost about 52 million hectares of ecological cover, accounting for about 56 percent of the global reduction in forest cover (Kazaara, 2023). This promotes soil erosion and its negative effects on human activities, especially on agriculture (Kazaara et al., 2023).

Statement of the problem

Depletion of soil nutrients has become a major agricultural problem in Bwaise Wakiso District. Due to improper land management practices (Ariyo et al., 2023). It is clear that it is impossible to achieve food security in the region without overcoming the problem of nutrient depletion (Grace et al., 2023; Reagan & Ezra, 2023) In the study area of Bwaise, Wakiso District, local communities cultivate the top and bottom parts of the slopes, which exacerbates the problems soil erosion and soil fertility losses, which are the main challenges of the watershed (Musa et al., 2023). In some parts of the basin, all topsoil was lost, exposing bedrock and tree roots (Allan et al., 2023). In response to the decline in agricultural productivity, farmers open up new agricultural land, which increases deforestation and its effects (Emmanuel et al., 2023; Jimmy et al., 2023). The amount and quality of soil lost through water erosion and other types of erosion and sediment sources have not been determined (Collins et al., 2023). Determining the concentration of the main lost nutrients is very useful for estimating lost productivity and corresponding economic costs. As the economic impacts of sediment loss on the livelihoods of local people have not been estimated, this study attempted to generate such essential evidence that can be used to inform the local community and policy makers to take appropriate action on the ground. to limit or control erosion in Wakiso District.

Specific objectives:

1. To examine the effects/ impact of soil erosion on agricultural production in Bwaise, Wakiso district.
2. To examine the causes of soil erosion on agricultural production in Bwaise, Wakiso district.
3. To evaluate the intervention measures used to control the effects of soil erosion on agricultural production in Bwaise, Wakiso district.

Methodology

The study employed both qualitative and quantitative approaches in collecting data from the area of study. The qualitative aspect was also manifested in the analysis of data. However, the quality of education is quantitative. In this case the quantitative paradigm also shall come in as well.

The study was conducted in Bwaise, Wakiso District. The study employed 87 respondents and of these 65 shall be

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rice farmers in Kadato Sub County, 5 local residents, 5 local authorities, 7 ministry officials and politicians and 5 students from the sub county and the district. The researcher selected only 74 respondents from the total population and this based on the recommendations of Amin (2005) who said that the fewer respondent in the qualitative research produces credible and reliable data than many respondents. The study used simple systematic random sampling (SRS) in administering a person-to-person interview of the 65 farmers of different households. In this study, data collection methods which were used for data collection were reconnaissance survey, documentary reviews, questionnaires and observation. The researcher sought advice from fellow students and the university supervisor so as to ensure validity of the data collection tool and reliability was ensured by deploying multiple sources of data including questionnaires, interview, observation and secondary data. Statistical data analysis was performed with the aid of SPSS (Nelson et al., 2022). Frequencies and Percentages were generated at univariate level, correlations were done at bivariate level and regression performed at Multivariate level.

RESULTS

Impact of soil erosion and agricultural production

The first objective of the study sought to examine the impact of soil erosion on agricultural production in Kadato District. This was investigated using correlation analysis

Table 1: Impacts of soil erosion on agricultural production

		Soil erosion	Agricultural production
Soil erosion	Pearson Correlation	1	-.512**
	Sig. (2-tailed)		.000
	N	73	73
Agricultural production	Pearson Correlation	-.512**	1
	Sig. (2-tailed)	.000	
	N	73	73
**. Correlation is significant at the 0.01 level (2-tailed).			

Findings from the correlation matrix indicated that there is a strong negative correlation ($r = -0.512$) between soil erosion and agricultural production. The correlation is statistically significant since the associated P – Value (0.00) is less than 0.01 at 99% level of significance. This implies that as soil erosion increases, the agricultural production decreases.

Furthermore, the impact was translated into the model using regression analysis and the findings are presented in the table below.

Table 2: Shows the regression model for soil erosion and agricultural production.

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Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	-.232 ^a	.440	.438	.1324

a. Predictors: (Constant), Soil erosion.

Findings from the table 2 indicated that as the rate of soil erosion increases by one-unit, agricultural production reduces by 0.232 units. The R squared value of ($R^2 = 0.440$) indicated that 44% of the variations in the agricultural production is explained by the rate of soil erosion and the remaining 56% of the variations is explained by other factors that are not specified in the model (Nelson et al., 2023).

The causes of soil erosion

Table 3: The causes of soil erosion

Cause	Number of respondents	Percentage
Over grazing	10	13.5
Heavy rain falls	20	27
Deforestation	34	46
Poor farming methods	10	13.5
Total	74	100

Source: field research 2022

Basing on the findings in table 3 above from the respondents, it is seen that deforestation (46%) is the major cause of soil erosion in Bwaise. This has been as a result of need for land for agricultural activities (Rice growing). According to the findings, deforestation is ranked second in causing soil erosion (27%) followed by over grazing and poor farming methods at 13.5% respectively.

Intervening measures to control the impact of soil erosion on the production agricultural productivity

The third objective of this study sought to identify the intervening measures that can help to control the impact of soil erosion on agricultural productivity in Bwaise. The findings are tabulated in the table below.

Table 4: Shows the measures taken to control the impact of soil erosion.

Intervening Measure	SA	A	NS
Re afforestation	50 (67.5%)	24 (32.4%)	0

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Conservation Tillage	30 (40.5%)	20 (27.0%)	24 (32.4%)
Sustainable Farming Practices	40 (54.0%)	30 (40.5%)	4 (5%)
Planting Windbreaks	35 (47.2%)	30 (40.5%)	8 (10.8%)

Findings indicated that 50(67.5%) of the respondents strongly urged and agreed that the best way of conserving and controlling soil erosion is through re afforestation practice. This is a practice of planting trees where they have ever existed but were cut down for some reasons. 24(32.4%) of the respondents agreed and 0% were not sure, 30(40.5%) of the respondents here under strongly agreed, while as 20(27.0%) agreed and 24(32.4%) were not sure whether conservation tillage was the best way of controlling soil erosion in Kadato sub county in Wakiso District. 40 (54.0%) of the respondents agreed that farming practices which are sustainable can help to reduce on the rate of soil erosion and it impacts on agricultural production in Kadato sub county, in the same way, 30 (40.5%) agreed and 4 (5%) were not sure of this concept whether it can control soil erosion and 35 (47.2%) strongly agreed on this while as 30 (40.5%) agreed and 8 (10.8%) were not sure of this method/technique of controlling soil erosion.

Summary

The study investigated the impact of soil erosion on agricultural production in Kadato District, utilizing correlation and regression analyses. The results revealed a significant negative correlation ($r = -0.512$) between soil erosion and agricultural production, indicating that as soil erosion increased, agricultural production decreased. Regression analysis further supported this, indicating that for each one-unit increase in soil erosion, agricultural production decreased by 0.232 units. The study also identified the causes of soil erosion in Bwaise, with deforestation being the major contributor (46%), driven by the need for land for rice cultivation. Additionally, the research explored intervening measures to control soil erosion's impact on agricultural productivity. Reafforestation emerged as a widely supported strategy, with 67.5% of respondents strongly advocating for it, followed by conservation tillage and sustainable farming practices. These findings provided insights into the dynamics of soil erosion, its causes, and potential mitigation strategies in the context of agricultural production in the study area.

Conclusion

Soil erosion is a natural process, it involves detachment of material by two processes, raindrop impact and flow traction; and transportation either by saltation through the air or by overland water flow. The theme of this study was "The impact of soil erosion on agricultural production in Wakiso District, it is seen that there is a strong negative relationship between soil erosion and agricultural productivity. it became evident that farmers in Uganda like most of the farmers in other countries are faced with major challenges in controlling soil erosion. Finally, it is evidenced that

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the following factors lead to soil erosion over grazing (13.5%), heavy rain falls (27%), Deforestation (46%) and lastly poor farming methods (13.5%). However, these are intervened by the following measures re afforestation (99.9%), conservation tillage (67.5%), sustainable farming practice (90.5%) and lastly wind breakers (87.7%). These are based on the findings from the questionnaires for those who strongly agree and agree.

Recommendations

There should be a massive sensitization of the general population on the dangers of soil erosion in that the population should be aware of it so that they can adjust and minimize the human causes.

Modern and sustainable farming methods which are less harmful to the environment should be adopted and be implemented in order to avoid the risks of erosion and its effects.

Strict laws should be put to those who clear away the forests which are helpful in controlling soil erosion in their way of acting as wind breakers.

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