A Framework for Understanding Soil Degradation and Socio-Economic Considerations in the Adoption of Soil Conservation Measures in Kenya

By Gilbert Mbaka Nduru and William Kiplagat. School of Arts and Social Sciences, Moi University. P.O. Box 3900, 30100 Eldoret, Kenya.

Abstract

Agriculture is the mainstay of rural development in Kenya and other developing countries, although agricultural landscapes have been experiencing severe soil erosion and declining soil fertility. Soil degradation emerged as one of the major constraints to rural development despite concerted involvement by government and other development partners in promoting soil conservation and land husbandry for sustained agricultural development. A variety of technically proven soil conservation measures have been promoted but rarely implemented successfully as a function of area specific socio-economic constraints. This paper provides a valuable framework that presents a clear understanding of the socio-economic causes of environmental degradation and factors that influence land user decision-making on soil conservation. It is grounded in structuration theory.

This framework links four major components of the adoption decision making process; perception of the erosion problem, knowledge of relevant soil conservation measures, ability and incentive to adopt soil conservation measures. This framework is illustrated with reference to Baringo lowlands where for some time; considerable degree of concern about land and soil degradation has been expressed. Social research methods were used to collect data from a random sample of 156 heads of households. Observation, photography as well as archival sources were also instrumental in providing relevant data. The results show that the ranking of soil erosion problem in production, ability and incentive levels are the most significant influencers of decision making concerning the adoption of Soil conservation Measures.

Introduction

In rural Kenya, agriculture contributes the largest share of resources and activities towards social and economic development. But its sustainability has been largely jeopardised by soil degradation caused by soil erosion and other processes, such as leaching and salinity. Soil degradation has become a major obstacle to rural development by destabilising environment and agriculture vitality; reducing yields and constraining further expansion and intensification of agriculture. As a result it has drawn a lot of attention from the government and other locally and internationally based development partners.

Despite much efforts engaged by government agencies and other development partners to promote Soil Conservation Measures (SCM) among farming communities in Kenya, attaining effective and sustainable soil conservation has remained an elusive goal. In much of soil conservation literature, its practice is depicted as a necessary input in farming. But as yet most farmers in rural Kenya have not embraced its practice as an integral part of their farming activities. This has often raised a baffling question among government as well as other development agents involved in the promotion of soil conservation in Kenya. Why would a farmer make a choice to either or not engage in soil conservation as an integral component of farming? In search for answers to this question, much research has been conducted (Cramb and Nelson, 1998; Enters, 1998; Kenya, 1997; Mbaga-Smgalal and Folmer, 2000; Nduru, 2005 and Napier and Sommers, 1993). But as yet the answer has remained elusive.

In this paper, we discuss some conceptual and practical issues involved in studying farm or household level constrains to adoption of recommended soil conservation measures in Kenya. I approach this problem in three stages. First, I provide the socio-economic background within which soil conservation measures have been introduced in rural Kenya; second, consider conceptual issues that guide research on adoption of soil conservation and third, examine a framework for understanding adoption processes based on four major household components, which constitute a household decision process.

Soil Conservation in Kenya

The seriousness of soil degradation problem in Kenya has been recognized since the colonial era. The then government sought to arrest its impact on soil productivity by introducing soil conservation programmes in most parts of Kenya (Nduru, 2005). From 1946 to 1962, a lot of work was done including: construction of terraces, drainage structures, earth dams, and enforcement of controlled grazing systems among African farmers.

However, over time, soil conservation activities became a major issue in the struggle for independence. This was because conservation work before independence was characterized by: Coercion and use of force to get the farmers implement government orders; forced de-stocking, seizure and confiscation of livestock to control over-grazing; emphasis on tedious physical excavation of terraces with little alternative; and forcing petty offenders to undertake conservation work using conservation work as a means of punishment for offences not related to agriculture and land use. This created a negative attitude among the African farmers, which persisted for a decade after independence. This scenario obtained despite a clear expression by the government through Sessional Paper No. 10 of 1965 concerning the need to undertake soil conservation programmes (Kenya, 1965).

It was not until 1974 that Kenya sought support from the Swedish Government towards soil conservation programme, following concerns expressed at the 1972 Stockholm Conference on Human Environment (Kenya, 1997, Nduru, 2005). In 1980s there was a move away from using mechanical structures as the only methods of soil conservation under programmes paid for by government (Kenya, 1997). This move was made after a realisation that terracing alone could not effectively reduce soil erosion. Hence, a variety of new soil conservation strategies and techniques were introduced to farmers.

Conceptual Considerations in Soil Conservation Studies

Although soil erosion has a long history, it has intensified in the recent past due to the impact of increasing human populations, and the pressure posed by human activities on landscapes (Pimentel, 2000, Nduru, 2005). Prior (1992) and Hudson (1995) argue that rapid population increase often exerts pressure over land resulting in serious degradation of soils. However, this view has been challenged by studies, which show land use intensification and enhanced efforts at soil conservation as positive responses to population growth (Tiffen, et al. 1994).

A lot of research in the past has been directed at the exploration of the social causes of soil degradation and some are particularly aimed at unravelling the reasons why people do not invest in maintaining the productivity of soil in the lands they use (Napier and Sommers, 1993; Cramb and Nelson, 1998; Enters, 1998). But as Mbaga-SmgalaI and Folmer (2000) points out, there is still a lot that is not known about the adoption behaviour of land users and the reason why they behave the way they do.

As pointed out by Napier and Sommers, (1993), soil conservation programmes must therefore address a multiple of interacting factors and sort out any conflicts among them, if

conservation programmes are to be successful. Enters (1998) emphasises the understanding of linkages between biophysical factors and socio-economic processes, which influence both macro and micro level decision making mechanisms concerning resource use. In this way, land users become very important target groups in identifying the need and implementing appropriate SCM. Their perception of soil erosion problems, knowledge of recommended SCM and ability to adopt them are generally area and/or time specific. Therefore, the acceptance of recommended measures depend a lot on individual or group decisions, which are rationalised on the basis of their experiences with both national as well as localised issues.

In most of the adoption literature (Napier and Sommers, 1993; Cramb and Nelson, 1998; Enters, 1998), it is generally agreed that soil erosion is closely related to the socio-economic viability of national economy at the local levels. Therefore, macro-level development efforts and any arising resource use conflicts strongly influence the adoption of SCM at the micro (household/farm) level. They also suggest that attempts to resolve environmental issues at the micro level will be futile if structural barriers to the adoption of SCM are not adequately addressed.

In this respect structuration theory can be applied to help overcome problems encountered in explaining complex issues on soil degradation and conservation studies. It however requires operationalisation in order to address soil erosion and conservation issues in development research through the actor-oriented approach (Long, 1992; Lucila, et al. 1999). This involves taking the level of analysis as the situational context and everyday lives of actors as the interplay, which is determined by internal as well as external factors (Long, 1992). The actor-oriented approach enables the explanation of differential responses to similar structural circumstances experienced in resource use conflicts.

Both social and economic models of adoption have been used in examining the adoption of SCM. Sociological theories of adoption of innovations are based on the assumption that an individual goes through four adoption stages namely awareness, evaluation, trial and adoption (Long, 1992; Lucila, et al. 1999). As such, access to on-farm and off-farm information is an important determinant of technological adoption in this model. Educational programmes, extension services, social interactions with neighbours and friends have been identified as the key sources of information. Individual characteristics such as age, sex and level of education also influence the time it takes an individual to complete the entire adoption process.

As can be noted, innovation adoption-diffusion models used in sociological studies downplay economic variables (Evers, 1994; Rogers, 1983). However they are able to capture the role of community interactions and actions in technology adoption processes. In so doing it alludes to group dynamics theory, which emphasises on interactions between individuals and others in society. It is such interactions that translate into joint or individual decisions in technology adoption.

On the other hand economic theories used for explaining adoption of production technologies are rooted in utility or profit maximization theory (Griliches, 1957). Utility is explained in terms of returns or profits accruing from farm production. In line with this theory, a household is assumed to obtain different levels of profit from different technologies. Thus a household's choice of technology is influenced by profit prospects. Attitudes towards risk and uncertainty are the most important personal characteristics that shape a household's rational actions related to technological choice and resource allocation. With much adherence to utility tenets, economic models also do not encompass sociological variables in their analysis.

The general lack of synthesis between the social and economic theories demands integration in order to enhance research and comprehension of adoption behaviour. Households interact with other households or individuals, groups, institutions and development agents in resource use and management. Such interactions are characterised by different interests,

goals, values, expectations, and/or ideologies, which form the basis for competitive considerations in resource use (Nduru, 2005).

The Framework

The specific framework developed here is utilized in conjunction with the concept of limiting factors used by ecologists, because, in the effort to derive a theory of environmental degradation and conservation with at least minimal predictive capabilities, the construction of a similar theory of limiting factors within political ecology may allow us to explain how factors become causes (Thrupp, 1993). It is modelled purposely to incorporate structural, economic and sociological issues surrounding resource use and management, and which also interactively influence farmers' decision-making and behaviour concerning soil conservation among other issues. It is adapted to the particular circumstances of Baringo Lowlands although it can also be applied to other similar areas of the world. It is figuratively presented in Figure 1.1. This model provides a clear understanding on the forces that form the environment of farmers within Baringo Lowlands. The household decision-making in this case is considered as a process, which involves four major household states in view of soil erosion and conservation including:

- Perception of the erosion problem.
- Knowledge of appropriate remedial measures towards erosion.
- Inceptive to undertake remedial action.
- Ability to adopt and remain devoted to soil conservation.

While the causes of socio-economic inequality in the area tend to be structural and historical in context, analysis at that level alone does not reveal the behavioural processes that influence the direction of choice and action. Therefore it is important to analyse the extent to which socio-economic inequality jointly with structural circumstances affect household decisions about production and land use management. This model traces the cycle of land use and socio-economic issues within and among households that result in land and soil conservation choices. I therefore assume that a household's decision to adopt and practice soil conservation is co-determined by structural and socio-economic variables, which influence the decision-making environment of a farmer.

Therefore, for a household to adopt or not adopt, maintain or improve on soil conservation practices:

a) Its members should have a given perception of soil erosion as a problem. In order for a household to choose to protect soil from erosion, members should consider their land to be under threat. Given the nature and extent of erosion they should hopeful that their land may be improved using a particular soil conservation practice. Interpre tations of factors that direct environmental change in an area are mostly cultural constructs, made in line with one's level of education. Therefore, they should be clearly appreciated in order to gain insight on how they influence a households' perception of soil erosion as a problem.

b) Its members should have a functional knowledge or understanding of appropriate soil conservation techniques to remedy the problem. Most often however, soil conservation is a major principle underlying indigenous farming methods (Pawluk, et al. 1992) but non-indigenous observers, especially planners and development agents do not recognise indigenous techniques. Soil conservation knowledge is likely to be partial, fragmented and socially differentiated (Scoones & Thompson, 1994) and include reworked introduced techniques. In terms of introduced technologies, if they have been poorly explained, a lack of appropriate knowledge can impede adoption.

c) Its members should be willing or motivated to remedy the problem or adopt the promoted measures. Monetary incentives, which sometimes accompany soil conservation projects in form of food-for-work in Baringo Lowlands and other regions, have rarely yielded the desired effect, particularly in terms of long-term maintenance of structures and thus, it is clear that incentives should be seen in a wider, culturally specific context. There is usually sufficient incentive to invest in the land, for example, where land users have control over their own resources and lives. Most notable factors affecting incentive might be the security of tenure. This may take the form of land titles and privatisation but it has also been shown that cultural institutions usually serve the same purpose. Disruption of traditional security over land may thus be a major disincentive.

   The incentive to invest in soil conservation is influenced in part, by the structure of multiple objectives of the involved communities as they pursue their livelihood strategies. A multiplicity of conflicts that author confusion and lack of vision often emerge. Disincentives may include feelings of exploitation, such as through extraction of surplus, fluctuating market prices, and powerlessness/helplessness. Land/soil quality may also be an important factor in influencing a people's incentive to improve soil. As Mazzucato and Nie-meijer (2000) pointed out, soil conservation technologies are attractive if they maintain social networks. In this light, cultural factors strongly mediate people's incentives to adopt and maintain introduced soil conservation measures.

d) It should have the capability/ability to remedy the problem of soil degradation. Capability can be seen as a function of available resources since soil conservation requires some additional land, labour or capital. Social relationships and institutions that determine access and control of land are thus crucial as they enhance adoption of soil conservation measures. For example, the capability to manage common property resources without degradation implies an effective system of social organisation where mutually agreed upon rules or policies are developed and adhered to.

At an individual or household level, capability implies the power to make decisions and effect action. The land user's level of access to land resources and the demands posed by conservation technologies play a critical role in determining the acceptability of soil conservation technologies. If land is a limiting factor to production, then practices that reduce the land area are not likely to be embraced; if labour is limited then the gender division of labour and the timing of the various activities become critical to the adoption of technologies. And if capital is limiting then any conservation measure requiring specialised equipment or high capital investments is unlikely to be acceptable.

Modelling of the household adoption decision processes in respect of the four respective components outlined above allows separate analyses of possible decisions. This ensures a clear understanding of the nature of farmers' socio-economic set up in relation to soil conservation behaviour. The sequential process with four components is based on the assumption that for a household to adopt and practice soil conservation, it has to go through a decision making process and overcome all conflicting aspects of choice. The causal factors in adoption process can be represented conceptually as shown in figure 1. below.

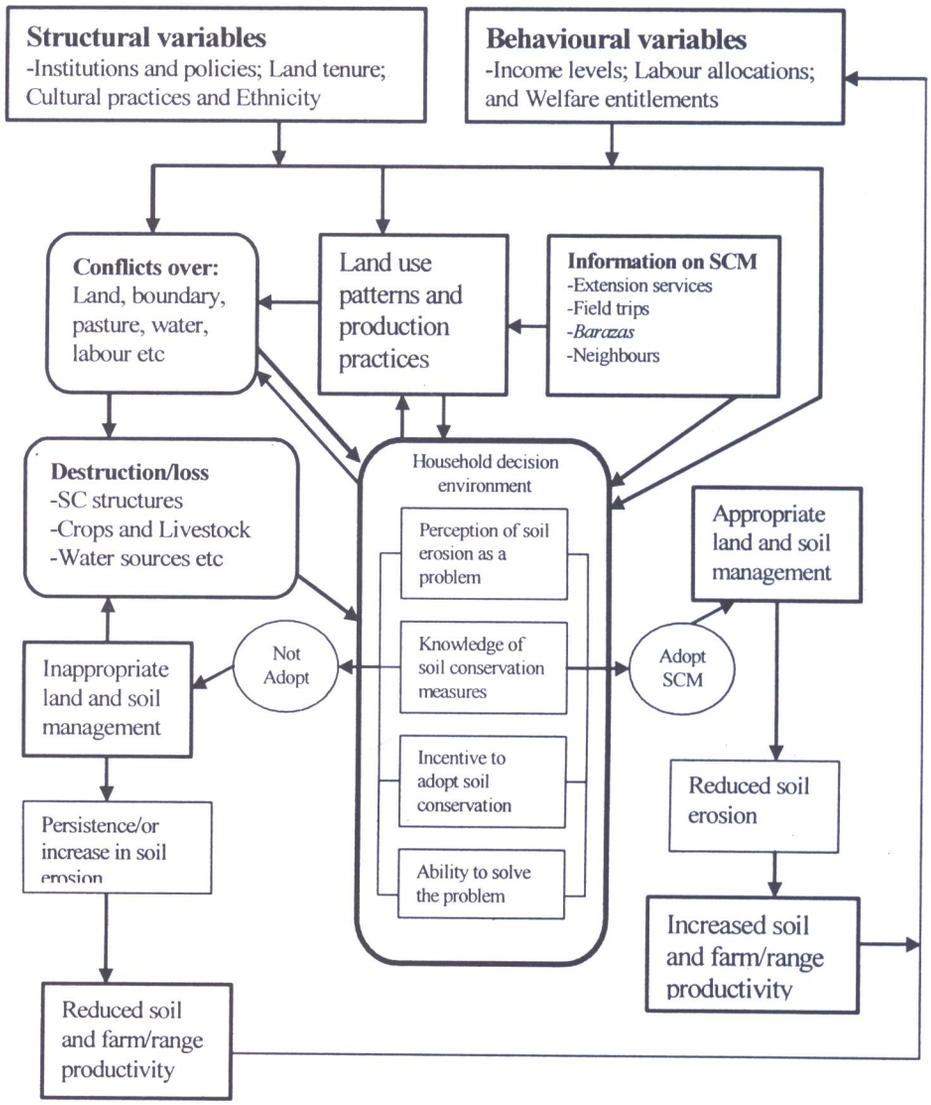


Figure 1 Land and soil management and socio-economic decision-making model for the adoption of soil conservation in Baringo Lowlands
NB: In this figure an arrow ⟶ means: influences or results in.
Source: Nduru (2005)

Methodology

Semi-structured interviews were conducted with 156 farmers in Baringo lowlands. In addition, a range of participatory rural appraisal (PRA) techniques were employed including transects walks, wealth ranking and focused group interviews. Photography, secondary data, as well as interviews with Key informants stimulated data collection in the area. Data were collected over a period of six months in 2000 and three months in 2001.

Soil Degradation and Conservation Efforts in Baringo Lowlands

Perceptions of soil erosion as a problem and willingness to adopt SCM

Results of the study show that the main concerns of the population of Baringo lowlands are food security and water. That means farmers must visualise soil erosion as a major threat to their food and water provisioning if they are to seek ways of addressing it. That is why water-harvesting techniques were more appealing to local communities than other SCM. For example, during a group discussion at Partaro a farmer remarked;

> *"I have always been told that soil conservation will increase our food production, but we are still dying of hunger. What is the use of spending time on soil conservation, when I have no water and our crops never grow to maturity?"*

This shows that understanding a local peoples' perception of a problem is very important. The study revealed that SCM were undertaken only to the extent that erosion was considered a problem to water sources. The rationale behind undertaking the recommended measures was in such cases geared at averting envisaged threat. In this light, it is important to identify whether farmers recognise soil erosion as a threat to their livelihood and how their perception influence their willingness to adopt SCM as an entry point to introducing SCM.

As shown in table 1 the majority (84.6%) of the population perceive soil degradation as an environmental problem. Blocking and diversion of water for irrigation was also pointed out by 10.3% of the respondents as a major environmental problem. Deforestation and overgrazing scored least. Despite the apparent reality of overgrazing on the ground, local people do not readily accept responsibility for it. They hence do not support any suggestion to reduce their livestock numbers as a range rehabilitation measure. Historical records as well as contemporary data show that any effort geared to reducing livestock numbers in the area has always been met with hostility and considered a threat to their livelihood.

Table 1. Main environmental problems threatening Lake Baringo and its catchment's productivity

Environment problems	Frequency	Percentage
Soil erosion and sedimentation	132	84.6
Overgrazing	2	1.3
Deforestation	6	3.8
Blocking of rivers	16	10.3
Total	156	100.0

Source: Nduru (2005)

Table 2. Main causes of food shortage in Baringo lowlands

Reasons given for food shortages	Frequency	Percentage
Destruction of crops by livestock	36	28.1
Insecurity	18	14.1
Droughts	42	32.8
Soil erosion	8	6.3
Lack of water	24	18.7
Total	128	100.0

Source: Nduru (2005)

Surprisingly, as shown in table 2, only a minority (6.3%) of the respondents considered soil erosion as a major cause of food shortage in the area. The population considers it as a major environmental problem, but not a threat to their food production. Instead, a majority (51.5%) of them blame biophysical factors such as droughts (32.8%) and water shortages (18.7%). Lack of rainfall results in crop failure and pasture shortages as well as drying up of rivers. Lack of pasture and drying up of streams is held responsible for livestock deaths, so it is their problem number one. A relatively high proportion of respondents totalling 42.2% (28.1% and 14.1%) also blamed food shortages on resource use conflicts.

According to information obtained from interviews, local communities appreciated that there was a general environmental downward spiral. The older people talked nostalgically about the good old days when water and pasture were plenty. They compared droughts and famines experienced in their past with contemporary ones saying and said the situation had worsened with time. There was a general consensus that vegetation cover had reduced drastically through time and soil erosion had worsened. These claims were also confirmed from aerial photographs and satellite images on the area coupled as well as personal observation.

However, there was a wide variation in the definition of soil erosion and land degradation. Most (67%) of people interviewed, considered them as one and the same thing, while only 30% of them knew at least two basic causes of soil erosion. Over 75% of the population equate soil erosion with the dissection of land by gullies. As such, if an area had no visible rills or gullies, it was considered free from erosion threat. Unfortunately, this is the view held generally in the area. Therefore efforts geared at mustering local support for soil conservation in parts without gullies is considered a waste of resources. As a result, in many cases, except where financial gains are expected, participation in soil conservation efforts in the area has usually been low.

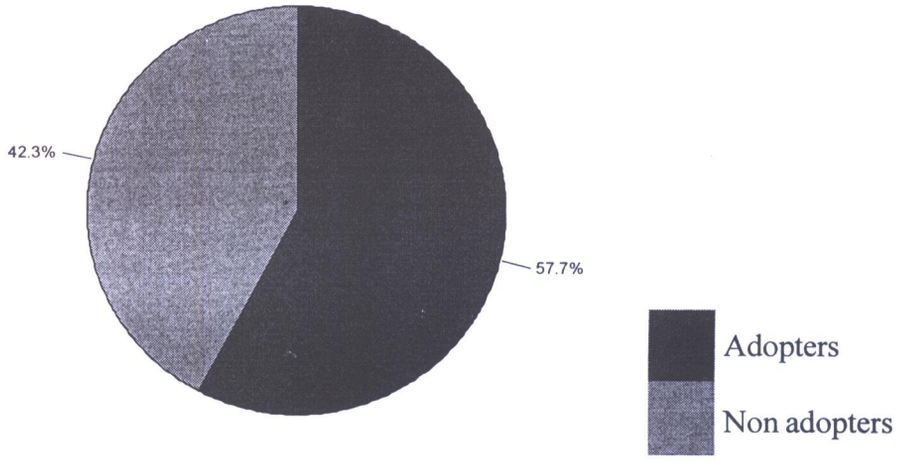
Generally, the population of the area recognise soil erosion and sedimentation as major environmental problems. They talk of muddy waters of Lake Baringo, gravelly soils, and bad lands/bare landscapes. But these perceptions are generally on a micro than macro-scale. If they were to adopt some SCM, they would do so around their homesteads. But that is not the case either. Since in their view, erosion is not a major threat to food security and water, they consider soil conservation work as a government affair. This stance has been strengthened by the heavy presence of government-initiated projects such as gabion building, terracing and reafforestation, which have spent millions of shillings. In most of these, government agents are involved and participants are motivated through food-for-wok programmes or are paid cash for work done. This has created a generally donor dependent society, which poses an insurmountable task of creating a macro-perception where people feel responsible for their soil.

Knowledge of relevant soil conservation techniques

Although, the economic viability of a technique is necessary for adoption, it is not a sufficient reason to ensure that soil conservation techniques are incorporated into existing farming systems. This is because a variety of technical and socio-economic factors may constrain farmers from adopting recommended techniques, which may otherwise appear profitable. The essence of technology adopting is that it involves progressive acquisition of information (learning) about it and then a sequence of risky decisions. Therefore, the decision to adopt SCM also depends on the state of knowledge that people have about available options of solving a perceived problem.

Farmers in the area knew on average four methods, which could be used to improve soil fertility and at least two methods of reducing soil erosion. These included a wide range of techniques for improving the soil and the land in general, including techniques such as: burning, shifting cultivation, intercropping, fallowing and agroforestry. It shows clearly that people have a functional knowledge of a wide range of techniques, which they could practice in rehabilitating eroded soils. Out of the sample population, a majority (57.7%) of them had adopted at least one SCM as shown by chart 1. However, many respondents considered practices like livestock mobility in the range as a viable SCM. Fallow periods have also become shorter with time to an extent that soil under cultivated lands as well as surface cover in grazing lands are not able to regenerate before they are put into use again.

Chart 1. Practice of soil conservation



It is worth noting that a significant 42.3% of the population practice no form of SCM. Out of these, 18.2% pointed out that they saw no need for soil conservation because soils are already destroyed beyond repair Most (50.0%) of them based their behaviour on past experiences. They cited tenure insecurity, livestock incursions in croplands and raids by neighbours as reason for not adopting SCM. However, 24.2% of them viewed soil conservation works as a government responsibility, meaning they waited for government intervention than act on their lands. Although poverty and labour problems are major hindrances to sustainable development, only 7.6% among them failed to invest in SCM due to lack of funds and labour as shown in table 3.

Table 3. Reasons why people do not practice soil conservation in Baringo lowlands

Reason for not adopting SCM	Frequency	Percentage
See no need for it	12	18.2
Lack of funds	3	4.6
Lack of labour	2	3.0
Land is communally owned	33	50.0
It is government responsibility	16	24.2
Total	66	100.0

Source: Nduru (2005)

Table 4. Visitation by soil conservation extension officers

Visited and advised	Frequency	Percentage
Yes	73	47.7
No	80	52.3
Total	153	100.0

Source: Nduru (2005)

According to table 4, majority (52.3%) of the population had never been visited by SCEO in their farms, although as shown in table 3, that did not mean they lacked SCM's knowledge since it was not given as a cause of not adopting SCM. Although, only 47.7% of the respondents were visited and held discussions with SCEO, the population is relatively informed about the various SCM through attending *Baraza* meetings, reading pamphlets, visit to other areas and seeing what neighbours are doing. Lack of information or relevant knowledge about relevant techniques was therefore not a significant limiting factor against the adoption of effective SCM in the area.

Incentive to adopt and practise soil conservation

Findings from group discussions revealed that people are generally afraid of incurring loses. They cited destruction of crops by livestock, draughts, flush floods, land disputes and violent conflicts as their main problems. For instance, in Salabani, villagers refused to construct terraces and semi-circular bunds in their gardens and grazing areas because they did not want to get involved in what they called "wasteful" activities. One elder posed;

"These features are easily destroyed by livestock and flush floods from upstream areas, which I cannot control. Why should I fight a loosing battle?"

Other groups also expressed this resigned stance during focussed discussions, which represents a general hopelessness and lack of motivation among resident communities concerning soil conservation. As table 3 shows, majority (50.0%) of those who had never adopted any SCM blamed tenure insecurity for their failure. This has been due to the breakdown of traditional land tenure relationships and emergence of different production systems within neighbourhoods. As a result, new and often conflicting relationships between land users and land have emerged. Given the breakdown of traditional regulatory institutions, a state of open tenure system has evolved in the area. This situation has discouraged individual investments in soil conservation efforts, to the extent that people expect the government than themselves to continue leading the fight.

In Baringo Lowlands, biophysical factors and resource endowments differ within short distances. For instance, the Njemps Flats are endowed with water and fertile soils suitable for irrigation as opposed to the outlying areas. Concurrently, they generate greater returns

from labour and capital, than other areas, thus offering stronger incentive for farmers to invest in SCM within their plots. On the contrary, the fringing hill slopes within Kimalel, Mukutani and Arabal locations have generally thin and poor soils, which attract low interest in cultivation and higher concentration on pastoralism.

Since local communities and unfortunately most development agents view soil conservation as being crop compatible than otherwise, little efforts in promoting SCM have been directed to these areas. For instance, the government has given more development attention to the lower irrigable flats than to the outlying steep landscapes in the past. As a result, there has been less incentive even by local communities to adopt new SCM in the hillside plots. Moreover, hillside inhabitants purchase food cheaply from the market than by cultivation. This coupled with frequent loses or low returns reaped from cultivation, discourage adequate investments in hillside plots. Also, hillside-farming suffers frequent crop failures due to lack of rains and low soil fertility. These experiences have not motivated investment in soil conservation efforts. Instead, any generated incomes are invested elsewhere in business or increasing livestock numbers.

Besides, competition for labour exerts significant influence on soil conservation efforts too. And since, most people in the area are first pastoralists and then farmers or something else, they direct more labour to pastoral activities. However, off-farm employment patterned with seasonal and semi-permanent out-migration has become an important form of livelihood. It mainly absolves able-bodied people and most of those with more than high school education from the local production systems. Once, the remaining able-bodied labour is directed to livestock keeping, cropland management is generally neglected except in cases with irrigated agriculture. Since soil conservation efforts in the area have always been considered as being integral with cultivation, it has always suffered labour shortage after being overlooked in favour of other activities.

Generally, the adoption of SCM is bedevilled by commonplace apathy towards soil conservation work. While some people see no need for it, some others who think it is necessary, consider its implementation as government responsibility. Further, the traditional preference of pastoralism to crop cultivation in the area has played a significant role in diminishing incentives among the local communities to invest their resources in countering soil erosion problem.

Ability to adopt soil conservation measures

The ability of farmers to invest in soil conservation in the area was evaluated in terms of land ownership, financial capital and labour supply. Ownership of land was important as a basis for determining an individual's authority to making investment decisions. Land ownership and/or access in the area have been based on traditional rights vested on male household heads belonging to a particular clan or neighbourhood. Women access land through their husbands or male relatives, while outsiders have to get permission through local elders before using land in a certain neighbourhood.

This arrangement gives male household heads almost absolute authority over household land use affairs and all associated decisions. Therefore, soil conservation efforts require their blessing to be implemented in lands to which they are custodians. Although men may be expected to adopt or allow SCM in their plots, their emphasis has been more on livestock than cultivation, which leaves most of the farm management processes to women. Unfortunately, women do not have authority to implement major land use decisions on their own. This poses a major structural obstacle to the adoption of SCM in the area.

Many people from the area are turning to urban and irrigated occupations as well as non-farm employment. As a result, there is a general lack of labour for soil conservation. For

example, 35% of the respondents said they were not able to attend to soil conservation issues because they were busy with something else. This stimulated disability in terms of labour shortages leading to dismal performance in efforts at soil conservation. However, as Napier and Sommers (1993) observed, once land users are convinced to adopt SCM, their financial ability to adopt relevant techniques is very crucial. Rogers (1983) points out that, land users will adopt innovations that are demonstrated to be in their best economic interest. This assertion would be correct if there were no financial barriers to the adoption. But, poverty in the area has continued to rise while prices on agricultural inputs skyrocket. Available funds are used to provide consumables like food leaving no funds for investment in soil conservation. Financial shortages have therefore become a major obstruction to the adoption of SCM.

Conclusion

Generally, farmers in the area act rationally in deciding whether or not to invest in SCM. They practice some form of SCM whenever it is in their interest if their circumstances are enabling. Whenever, they perceive soil erosion as a threat to their livelihood, have appropriate knowledge of measures that can be used in their environment to mitigate soil erosion, are motivated and enabled to act positively against soil erosion, there is adoption of SCM. This would translate to improved soil quality and increased food production, which would not only eradicate food insecurity but also reduce poverty levels. Otherwise, soil erosion will continue unhindered and food security will remain an elusive. Figure 2 summarises this scenario in view of the farmer experiences in Baringo lowlands.

The foregoing discussion strongly suggests that accelerated soil erosion is closely linked with the structural and socio-economic environment within which a farmer operates. This must be addressed in any attempt aimed at resolving soil erosion problem and promote soil conservation. Stakeholders in an area must collectively decide if soil conservation is important as economic growth and other developments. They must also determine whether sustaining farming productivity in the long run is important than in the short run. Only if these issues are positively considered and acted upon would soil conservation programmes be effectively implemented.

The framework outlined in Figure 2 focuses on the decision-making context of the farmer as a medium for explaining how socio-economic factors become causes of soil degradation. It explains temporal and spatial variability of issues that affect farm level decisions as well as in generating context-specific studies. This deepens understanding of linkages influencing soil degradation and enhances formulation of appropriate soil conservation policy. When applied to adoption soil conservation measures, it enhances examination of a wide range of social and cultural factors that may explain farmer behaviour. By this it shifts away from over reliance on economic determinants of degradation and can be applied in predicting success or failure than other adoption models.

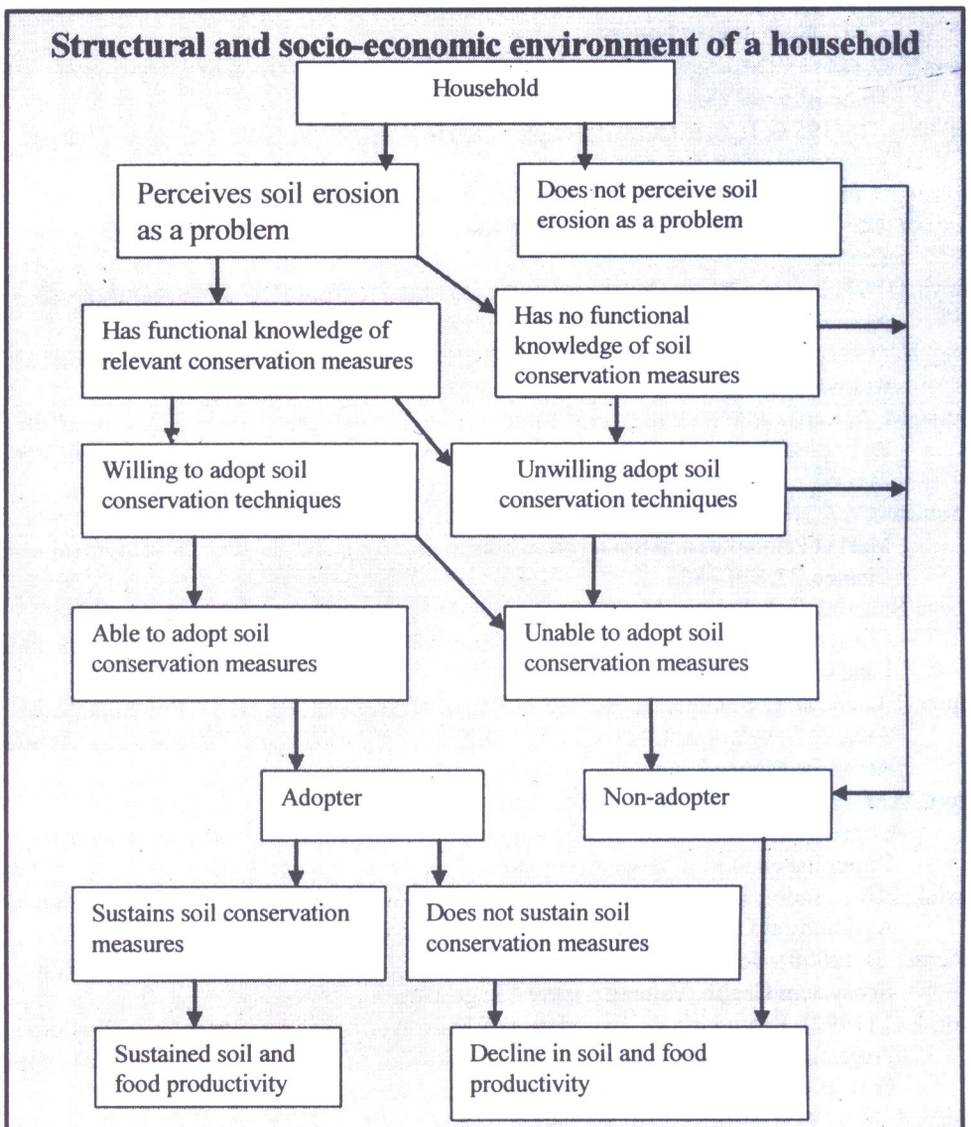


Figure 2. A summary of possible decisions that a household can make in response to structural, socio-economic environment, which conditions resource accessibility and use. → Arrows represent the type of decision made and its impact.
Source: Nduru (2005)

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