Enhancing Stakeholders’ Capacity to Manage Soil Resources Using Participatory Approaches in Uganda

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Abstract

Declining soil productivity is a concern in Uganda. One of the major causes is nutrient depletion. Studies of root causes implicate lack of adequate capacities among stakeholders (farmers, extension staff and local leaders) to face the challenge. To this end, this study was conducted in Kachonga sub-county, Tororo District, Eastern Uganda with the objectives of showing how (i) Policy capacity to support and implement programs for improved soil management can be enhanced (ii). Farmers can be provided with an opportunity to manage their soil problems through use of available local knowledge on soil management, and sensitization on available scientific technologies, and (iii) Extension staff can be equipped with skills in use of soil management decision-aid guidelines. The approach was participatory, making use of such techniques as focus group discussions, mapping, timelines, and transect walks. Activities conducted included workshops for local leaders and farmers, training sessions for extension staff, and participatory meetings with farmers in the fields, at village levels. Findings indicate that local policy makers are committed to playing their roles in contributing to the solution of this problem but are constrained by lack of information for decision making, among other things; farmers are aware of the problem but only need empowerment to solve it and that there are gaps in the skills of staff, which need adequate filling. It is thus recommended that policy makers be routinely advised of their roles, that skills of staff are adequately updated, and that farmers are appropriately involved in programs that benefit them.
Introduction

Degradation of the natural resource base is a major threat in many developing countries (Bumb and Banaante, 1996) and has had a high international profile for more than 30 years. Central to natural resource degradation is degradation of soils. Uganda is no exception to this phenomenon as manifested by the declining farm-level crop yields, which are below 30% of the potential for most staples (FAO, 1999). The severity of soil degradation in Uganda is more pronounced in the eastern axis of the country where the natural resource base is poor; soils predominantly sandy, acidic, and inherently low in fertility (World Bank, 1993). This threatens the food security of that vast region and in turn impinges on the food supply equation of the nation.

Several studies (Bekunda, 1999; FAO, 1999; Nkonya et al 2002; Tenywa et al 1999; UNECA, 2001; and Walaga et al 2000) have investigated or implicitly alluded to the role effective soil management could play in improving productivity, increasing food sufficiency both in quality and quantity and reducing poverty levels. Surprisingly very few studies have explicitly investigated the role involvement of farmers; extension workers and local leaders can play in soil management programs either singly or as a group. In contrast, all the case studies undertaken so far offer insights into general soil degradation scenarios, farmers’ perceptions of the problem and are thus subjective interpretations and assumptions rather than attempts to mitigate the problem. Thus the literature is rich in insights and "stories", but weak in detailed assessments that illuminate the role that farmers could play along the path to soil productivity improvement.

However, a synthesis of the perceptions of the soil degradation problem by stakeholders in the region all point in one direction to a general lack of adequate knowledge, appropriate skills and manpower to face the challenges in soil management (Semana, 1994; Nkonya et al, 2002). This study was commissioned to enable working with farmers, local policy makers, extension agents and other stakeholders to integrate in a participatory fashion indigenous and scientific knowledge to develop “situation relevant” soil management decision aid guidelines for better soil resource management.

Purposes and Objectives

The major purposes of the paper were to show how:

- Policy capacity to support and implement programs for improved soil management through involvement of community leaders in the problem analysis, identification of solutions and provision of concrete data sets can be enhanced;
- Farmers can be provided with an opportunity to manage their soil problems through use of available local knowledge on soil management, and sensitization on available scientific technologies;
- Extension staff can be equipped with skills in use of soil management decision aid guidelines.
Agricultural extension and many other government services in Uganda are undergoing a key transformation towards decentralization (MAAIF, 2000). This strategy is based upon the realization that centralized government operations in social service areas such as agricultural development, natural resource management, education, feeder roads management and public health have difficulties in identifying client needs and initiating collective actions designed to improve citizens’ welfare. A process is underway that is increasingly devolving responsibilities to local officials and citizens groups. One example of decentralized control of natural resources is the promotion of the Sub-County (a sub-division of the County that is composed of various Parishes) as the administrative unit with primary responsibility for soil resource management. This is done by way of committing funds to the sub-county level leaders and staff, who then assess clients’ needs from village levels and prioritize them. Each sub-county in Uganda produces a three-year development plan to be funded using the local government funds released for decentralized governance activities. Funds are then committed to the top most priority ones in the social based services. These usually include at least one from each of public health, education, feeder roads agriculture and local administration. Experience with the way activities for funding under this decentralized system are selected has indicated overtime that those that are agricultural in nature are largely left out. This therefore formed the basis on which this study was approached.

Procedures and Data Sources

This study was conducted in Kachonga subcounty, Tororo District, Eastern Uganda during the months of August to December 2002. This is an area dominated by severely degraded soils (NARO, 2001), with about 3,000 predominantly agrarian households. The average population is about ten people per household. The soils are predominantly sandy, and have undergone a very long period of intense weathering rendering them low in bases (Walaga et al 2000). This area was selected for the study, based on preliminary findings of the Network of Ugandan Researchers and Research Users (NURRU)

Three categories of respondents participated in the study, that is, local leaders, farmers and extension staff. Local leaders were involved for purposes of getting their perception of soil management problems and propping up support for the resource in the sub-county. This was especially important, given that decentralized governance is being emphasized in Uganda. All of them, twelve in number were involved. The major technique used was focus group discussions.

For farmers, about ninety were involved. They were selected from all the thirty-seven villages that make up the sub-county, with each village having at least one representative. They were selected in collaboration with extension staff and local leaders. The selection criteria included a farming experience of at least five years in the village; and also ensuring gender and youth representation. They were first involved in a workshop, for elicitation of their perceptions of the soil degradation problem and to obtain indigenous knowledge. Specific techniques used included problem and solution tree analyses, historical profiles, and group discussions. The problem and solution syntheses using problem and
solution trees respectively were conducted to produce a synopsis of problems, current practices, and suggested interventions.

The resulting interventions were participatorily modified by all stakeholders, in light of technological advances to produce a set of guidelines to address the farmers’ soil degradation problems. The guidelines consisted of a description of two main participatory approaches used in addressing soil management problems, namely, nutrient balance which is used when handling the problem at farm level and watershed approaches which make use of resource mapping, transect walks and use of vegetation (indicator plants) to assess soil fertility levels. There was also a section on available fertility management interventions compiled earlier form the national Agricultural Research systems. Three extension staff in the sub-county received training, both in theory and practice, on use of these approaches and sensitization on the available soil management interventions.

To reinforce the capacity of farmers and the skills of staff, village level analyses of the soil problem were conducted in twelve villages out of the thirty-seven. These villages were selected by farmers assisted by extension staff, the criteria being representativeness in terms of soil types, land use and management, and degradation levels. For purposes of effective involvement of every respondent during the focused group discussion, five farmers selected by the village councils represented each village. For each of the villages still, which were handled singly during the data collection, criteria for selection of the farmers included at least five years farming experience in the village and also inclusion of at least one woman and one youth. Techniques used included focus group discussions, resource mapping, time lines, and transect walks.

For the resource mapping activity, a sub-county topomap at a scale of 1:500,000 was used in demarcating the maps of selected villages and enlarging them on transparency paper. Farmers conducted the mapping, facilitated by the extension staff. The researchers played a backstopping role. Maps produced for each village included that of soil types, fertility levels, land-use, degradation features and management. On the soil types map, a transect route could be drawn, making sure that all types are captured and following it during the transect walks. A transect diagram which was deliberated upon and clarified for each village was the product of the walk. Information from the mapping and transect walks was analyzed to come up with solutions for facilitating generation of solutions for the soil problem which was dispatched to the stakeholders.
Results

There was a consensus among all regarding of the decline in soil fertility and agreement that fertility levels were at their lowest in the recent times. But what had council done so far? Admittedly, the LC III council had not been instrumental in guiding agricultural work, including soil fertility management. However, the leaders said that they generally leave the task for agricultural extension workers to choose issues to be addressed in the sub-county three-year development plan. Rarely do they have an input regarding the problem to be addressed. This, they largely attributed to lack of information to guide them in effective decision-making and pledged to meet the role if this, among others, is addressed.

Interaction with farmers indicated that if appropriately involved in development activities in which they are stakeholders, they could significantly contribute to the solutions. Results of focus group discussions and problem tree analyses on their perception of the soil degradation problem are shown in Figure 1.
The main causes of soil fertility degradation included continuous cropping and soil erosion, the root causes being lack of knowledge and skills in soil management and lack of inputs. Poor growth of plants and livestock resulting in low yields were the effects, the consequences being famine, thefts and mired development efforts. For the solutions, many were generated but surprisingly, most farmers were not utilizing most of those they were aware of. Main practices utilized (by 94% of the farmers and constituting indigenous knowledge) included crop rotation (but improper—just a change of crop regimes) and mixed cropping. Fallowing was practiced in the past, but the increasing population pressure does not allow for this anymore. Minimal use of inorganic fertilizers and other chemical inputs was reported for rice (22%) and cotton growers (10%). Lack of access to knowledge and skills was attributed to failure of the extension staff to reach out to farmers. On the contrary, the extension staff said that when they organize sessions, farmers do not turn up. This is food for thought for development work, and participatory approaches have a great potential to address the issue. The farmers’ suggested interventions included facilitation to use practices available to them and from research access to timely extension services.

**Village level focus group discussions on the soil problem**

Discussions with farmers dwelt on major crops grown, sources of labor (gender disaggregated), trends in land size and population density; and coping mechanisms during adverse weather conditions. Farming is the main economic activity in all the villages. Other activities include trade in household essentials (67%) agricultural commodities (50%), and local village transport using motorbikes locally known as ‘boda-boda’ (33%).

Major crops in the farming system included cassava (100%), maize (100%), sweet potatoes (100%), with banana being the lowest (Table 1). However, the list was not conclusive as only information on major crops was solicited. Farmers reported that emphasis has shifted recently from cereal and grain crops (like millet and sorghum) to root crops due to erratic weather conditions, characterized by low rainfall and severe sunshine, given the rain-fed nature of agriculture in the system and also due to the noxious witch weed, *Striga haermonthica*, which leads to total crop failure in cereals and grain crops.

All households relied solely on family labor for agricultural operations with females providing the largest proportion (83%). Youth participate in agricultural activities in most villages but on a part-time basis as they are also involved in off-farm employment in form of trade in agricultural produce, household essentials and *boda-boda*. The per capita land holding is declining as a result of increasing population density. In times of unfavorable weather conditions, farmers rely on purchase of food from local markets and what they buy is...
usually imported from other parts of the country. In some instances, they work for food within the community, from those who may have stocked enough.

*Table 1. Major crops grown in Kachonga (n= 12 groups)*

<table>
<thead>
<tr>
<th>Crop</th>
<th>% of respondent villages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cassava</td>
<td>100.0</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>100.0</td>
</tr>
<tr>
<td>Maize</td>
<td>100.0</td>
</tr>
<tr>
<td>Millet</td>
<td>100.0</td>
</tr>
<tr>
<td>Beans</td>
<td>92.0</td>
</tr>
<tr>
<td>Cotton</td>
<td>83.3</td>
</tr>
<tr>
<td>Rice</td>
<td>50.0</td>
</tr>
<tr>
<td>Banana</td>
<td>42.0</td>
</tr>
</tbody>
</table>

**Mapping exercises and transect walks**

The mapping exercise and transect walks identified three major land-use types, namely, farming, grazing, and residential. Farming was practiced on six categories of soils. These, expressed in terms of frequency included sandy loam, sandy, sandy clay, clay, and loam. Table 2 shows the results of deliberations on the different aspects of land use and management.
Table 2: Summary of land use and management in Kachonga Sub-county (n= 12 villages)

<table>
<thead>
<tr>
<th>Landscape position</th>
<th>Top/flat</th>
<th>Flat</th>
<th>Flat</th>
<th>Flat</th>
<th>Valley/bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Soil type</strong></td>
<td>Sandy loam</td>
<td>Sandy</td>
<td>Sandy clay</td>
<td>Loam</td>
<td>Clay</td>
</tr>
<tr>
<td>- Soil color</td>
<td>Grey-red</td>
<td>Grey</td>
<td>Grey-black</td>
<td>Red-black</td>
<td>Black</td>
</tr>
<tr>
<td>- Moisture availability</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
<td>Medium-High</td>
<td>High</td>
</tr>
<tr>
<td>- Natural vegetation (especially indicator types)</td>
<td><em>Sporobolus</em> spp, <em>Spear grass</em></td>
<td><em>Leucina indica</em> <em>Spear grass</em></td>
<td><em>Striga</em> spp, <em>Brachiaria</em> spp</td>
<td><em>Sedges</em>, <em>Goat weed</em> <em>Hyperrenia rufa</em> <em>Spear grass</em></td>
<td><em>Lantana camara</em> <em>Spear grass</em>, <em>Striga</em> spp, <em>Panicum maximum</em>, <em>Tridax procumbet</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main activities</th>
<th>Farming, residential</th>
<th>Farming, residential</th>
<th>Farming, residential</th>
<th>Farming, residential</th>
<th>Grazing, farming</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Major crops or livestock</strong></td>
<td>Maize, cassava, sweet potato, sorghum, beans, millet</td>
<td>Cassava, sweet potato, sorghum, beans, cotton</td>
<td>Cassava, sweet potato, sorghum, beans, cotton</td>
<td>Bananas, maize, millet, sorghum, cotton, cassava</td>
<td>Cattle, goats, tomatoes, cabbages, rice</td>
</tr>
<tr>
<td><strong>Management practices, including soil fertility</strong></td>
<td>Intercrop, crop rotation, use of manure</td>
<td>Intercrop, crop rotation</td>
<td>Intercrop, crop rotation, use of manure</td>
<td>Mulching, crop rotation, use of manure</td>
<td></td>
</tr>
<tr>
<td><strong>General fertility status</strong></td>
<td>Moderate-low</td>
<td>Low</td>
<td>Medium-high</td>
<td>Medium-high</td>
<td></td>
</tr>
<tr>
<td><strong>Major constraints</strong></td>
<td>Fertility decline, erosion, crop pests and diseases, weeds</td>
<td>Fertility decline, crop pests and diseases, weeds</td>
<td>Fertility decline, crop pests and diseases, weeds</td>
<td>Pests and diseases Water logging</td>
<td></td>
</tr>
<tr>
<td><strong>Potential improvements</strong></td>
<td>- Access to resources and training</td>
<td>- Access to resources and training</td>
<td>- Access to resources and training</td>
<td>- Access to resources and training</td>
<td></td>
</tr>
</tbody>
</table>

Grazing is usually done in the clay soils but the integrated nature of rainfed farming systems allows for livestock to graze on crop residues after harvest and provide manure in turn. Apart from soil fertility levels, which range from low (in sandy soils, which are also
predominant) through medium to high, problems of pests and diseases for most crops were reported. Farmers could easily identify their soil fertility levels by use of dominant vegetation on a given piece of land. One striking example was their articulation of two types of vegetation—spear grass and Lantana *camara*). They reported that there is community succession by different vegetation as fertility levels change. When soil is left fallow, spear grass may dominate and with time, as the soil regains its fertility levels, *Lantana camara* dominates and the more it dominates the higher the levels of fertility regained.

Main crops grown vary by soil type, but it is noteworthy that less of grain and cereal crops are being grown on soils with low water retention capacity, notably the sandy type. This is largely as a result of the increasing unpredictability of rainfall yet grain and cereal crops require a lot of moisture especially during the early stages of growth. Another problem is related to weeds, especially the noxious *Striga hermonthica*, which leads to total crop failure among cereal and grain crops (millet and sorghum are its major hosts in the farming system) and cannot be effectively overcome using herbicides. Farmers have high hopes of overcoming the soil management problem through access to knowledge and skills, especially in face of the country’s strategic Plan for Modernization of Agriculture (MAAIF, 2000) under which they hope to get access to credit, training on priority agricultural enterprises, market information, and strengthened groups. They also have access to resources, whose virtues in so far as overcoming soil degradation is concerned has not been realized. These include the manures from livestock, use of rice husks (the sub-county is near one of the largest irrigated rice schemes in Uganda, Doho Rice scheme), which are currently not utilized due to lack of knowledge and training on their use. They are mostly burnt to ashes, despite their potential for alleviating the soil status.

**Conclusions and Recommendations**

Soil fertility in Kachonga sub-county is a problem that requires attention if the standards of living of the population are to be improved. Local policy makers are committed to playing their role in contributing to the solution of this problem. Farmers are aware of the problem but only need empowerment to solve it. There are gaps in the skills of staff, which need adequate filling. On the basis of these findings, the following recommendations are suggested:

- With the advent of decentralization in Uganda, local leaders need to be assisted to play their adequate role in modernizing agriculture. This also goes to the extension staff. Their skills need updating since new problems arise in society that require their attention and in case they cannot rise to the occasion, credibility of the extension system is lost. Strengthening links between the stakeholders can also help.

- Farmers, if adequately empowered, can play a very important role contributing to solving their problems. So, rural development workers should think of how best they can involve rural people, and sustain this involvement, because it has so many virtues. Farmers are also highly knowledgeable about what can be done about most of their farming problems. Only a few issues need redirection and development is achieved.
Educational Importance, Implications, and Application

The study exhibits the importance of involving all stakeholders in solving existing community problems. It shows that all stakeholders, if appropriately involved can contribute significantly to solving the problems. This is especially so in the case of Uganda which is undergoing structural adjustments characterized by decentralization of social service delivery and privatization of advisory services whereby local leaders and farmers will play a great role in rational allocation of resources to community development programmes. The study also shows how certain participatory techniques can be applied in practice,

Given that the study was action research-oriented from the set out, findings of this study need to be developed into a booklet aimed at enhancing the management capacity of the soil resource in Kachonga and other areas with similar problems both in Uganda and internationally.

References


