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THE IMPORTANCE OF FARMER PARTICIPATION IN REHABILITATING DEGRADED ULUGURU MOUNTAIN SLOPES: THE EXPERIENCES FROM MAGADU AND TOWERO VILLAGES IN MOROGORO REGION. TANZANIA

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ABSTRACT The land on the Uluguru mountain slopes located above the Sokoine University of Agriculture (SUA) main campus is characterized by degraded poor soils with deep gullies endangering the University infrastructures and the lives of the local people. To curb further damage to the environment, SUA initiated the Uluguru Mountain Integrated Soil Conservation Project (UMISCP). Farmers from two villages were involved from the beginning in carrying out rehabilitation and land management activities. Through participation, farmers identified themselves with the project and were able to determine and implement the strategies deemed relevant for rehabilitating the degraded areas. The strategies which were used to involve farmers and the achievements attained due to farmer participation in the project are described in this article. Authors are of the opinion that some of the experiences encountered could provide lessons to similar development oriented projects.

Key Words: Farmer Participation; Uluguru mountain slopes; Environmental degradation; Land management; Tanzania; Intermultidisciplinary approach.

INTRODUCTION

Farmer participation is one of the crucial elements in executing a project for rehabilitating a degraded environment. Farmers are the ones whose welfare is affected and they ultimately decide to adopt or reject any innovation or external intervention. For example, past experience has shown that many development programmes and strategies failed due to insufficient preliminary planning, poor definition of objectives and inadequate participation on the part of the rural people who are the beneficiaries (Gombe, 1985; Young & Fosbrooke, 1960). It is at this point that Van de Ban and Hawkins (1988: 172) asserted that "when conventional methods of development fail to yield significant results, there is need for some re-thinking about socio-economic institutions that link resources, people and government."

The achievements of the Uluguru Mountain Integrated Soil Conservation Project (UMISCP) based at the Sokoine University of Agriculture (SUA) were mainly due to the farmers' active participation in the project. The assumption behind the project's philosophy was that the farmer working in association with the scientist or development agent can usually find a better solution than an agent working alone. Thus, the reasons for encouraging farmer participation in such kind of activities were to (i) rectify the mistakes which were previously made by not consulting the beneficiaries

at the grassroots, (ii) make sure farmers have access to information that is important in planning and implementing the agreed upon activities, (iii) involve all those affected in decision making about what should be done, (iv) integrate the farmers' indigenous knowledge, technology, and values with the scientists' knowledge and methodologies, and (v) encourage farmers to be responsible for their own destiny by initiating income-generating programmes.

The Uluguru Mountain Soil Conservation Project was initiated by SUA in 1991 after the University researchers realized the environmental degradation and the net result on the University infrastructure. The major goal of its project was to carry out soil conservation measures and overall environmental rehabilitation on the rapidly degrading Uluguru slopes above the main campus (SUA) and the western face of the Ulugurus. The immediate objectives were to (i) determine the cause, extent, and severity of environmental degradation on the Uluguru slopes above the main campus and the western face of the Uluguru mountain in general, (ii) identify appropriate measures and interventions for arresting the degradation process, (iii) reduce the workload of women by introducing multipurpose tree species, and (iv) develop sustainable agricultural systems in the area.

In order to achieve the project objectives, the following three strategies were employed: (i) Sensitization and creation of awareness among farmers residing in the target area through village-based meetings, seminars (where relevant video shows were presented), and study tours to areas of similar agro-ecological zones. (ii) Training a group of contact farmers on the use of line-level and A-frame for surveying contour lines before construction of contour bunds took place. (iii) Training a group of farmers on the management of home/village-based tree nurseries. This article first provides the background information about the Uluguru Mountain and the project sites. The details of the importance of farmer participation are presented thereafter.

THE ULUGURU MOUNTAINS

The Uluguru mountains were historically covered by thick forests and woodland before the intensification of human activities such as deforestation, setting of fires and poor agricultural practices (e.g. farming along very steep slopes). The present Lugurus migrated from the Ubena plains in Iringa region and settled on these slopes during the 18th and 19th centuries. Initially they were cattle pastoralists (Bagshawe, 1930; Saville, 1947; Young and Fosbrooke, 1960). Their cattle were, however, subsequently decimated by the East Coast Fever and could not flourish with insufficient pastures found in the mountains. After cattle failure, the Luguru adopted agriculture as their main activity and practiced shifting cultivation. The area was mainly planted with annual crops such as maize and pigeon peas. Unfortunately, this initial phase of exploitation of the virgin environment was not accompanied by any soil conservation measure. Hence, land was cleared and cultivated until it became impoverished and later abandoned in search of a new and better place (Temple, 1971).

Efforts to conserve the Uluguru mountains dates back to 1909 (Temple and Rapp, 1972). At this time, an area of 277 km² was declared forest reserve and its bound-

aries were demarcated by the German colonial administration (Cory, undated). According to Temple and Rapp (1972), this forest reserve was established in order to bring shifting cultivation to an end. Pratt (1945) pointed out that where cultivated or cleared land was included within the reserve boundary, occupants were expelled and compensated. The direct consequence of this approach was that people shifted the intensification of their activities to non-reserved areas, subsequently leading to land degradation.

After the First World War, limited soil conservation measures were put into practice. These included tree planting and the introduction of the laying down of grass and weeds in ridges along the contours to control sheet erosion. Other efforts included education, demonstration of storm-draining, terracing and tie-ridging. In 1945 a new approach to the problems of the mountain catchment degradation was initiated with the introduction of the Uluguru Land Usage Scheme (ULUS). This initiative emphasized terracing, re-enforcement of regulations against burning of grass and bush in the hilly areas, and stressed the planting of trees outside the forest limits for the provision of fuelwood and poles for construction purposes. It also emphasized the adoption of contour tie-ridging on a large scale in order to control soil erosion. Despite all these efforts, Duff (1961) reported that the objectives of the scheme were never realized and the scheme was abandoned in 1955. Literature also reveals that at that time, similar conservation efforts which were launched elsewhere (for example, Dodoma region) were unsuccessful due to bad approach (Mbegu and Mlenge, 1983).

It can be concluded that nationwide conservation efforts and policies were a complete failure. Young and Fosbrooke (1960) reviewed specific conservation policies for the Uluguru mountains and concluded that these policies did not have clear objectives, lacked experimental work and demonstration plots, and did not provide adequate extension services. Cliffe (1970) and Temple (1971) contended that, for the conservation policies to be effective in these areas, they should bring the demonstrative advantage to the individual farmers in the short run and long term advantages to the community. Rutatora (1993) asserted that for 50 years, attempts to control land degradation have been directed mainly at preventing or reducing soil loss by employing physical measures without taking into consideration the social, cultural, economical and political milieu of the local people. That is, most of these problems were perceived from the perspective of engineering and rarely was there any direct contact between the farmer and the planner. Those efforts hardly took into consideration the immediate needs of the farmers or their indigenous knowledge and technology and/or the effects they would have on future production. As a matter of fact, they essentially focused on keeping the soil in place. Nair (1993: 325) asserted that, "Originally soil conservation was synonymous with soil erosion control and control efforts were handled in isolation from other aspects of land management". Nair (1993: 326) argued further that "The traditional 'barrier approach' to soil conservation (mechanically constructing physical barriers and structures such as bunds and terraces to control runoff) involved excessive economic and labor costs (for both construction and maintenance) on the one hand, and caused irreparable loss of or damage to valuable topsoil on the other. Extension efforts concentrating on such an approach failed."

Historical perspectives concerning the people of Tanzania show that they have been victims of circumstances since colonial times to the present. These people have been subjected to coercive measures and top-down manipulative approaches which required them to adopt a given conservation measure. The local people were threatened with jail or fines if they refused to adopt any introduced conservation measure. Over time, people have accumulated poor learning experiences and resentments towards the government in general, and the extension workers, in particular.

THE UMISCP SITE: MAGADU AND TOWERO VILLAGES

Magadu and Towero villages are essentially mountainous, consisting of ridges and slopes (ranging from 20° to over 60°) on the western face of the Uluguru mountain range above and facing the campus located in Morogoro region, about 200 km west of Dar es Salaam city (Fig. 1). The bimodal rainfall, which falls during October to December and from March to June, ranges from 890 mm (near Morogoro Municipality) to over 2392 mm at Morningside meteorological station (Temple and Rapp, 1972). Both villages are mainly occupied by the Luguru people with a total population of slightly over 4000 people.

People in these villages own small parcels of land scattered over several places. On average, when these are combined, an individual owns one or two acres. The area surrounding the homestead is essentially planted with some bananas, cassava, maize, pigeon peas, beans, pineapples, mangoes, sugarcane and some trees. In order to meet domestic food needs most farmers from these villages own farms far away from their homes (about 10 km or more). Farmers in these areas, like other farmers in Tanzania, utilize a mixed inter-cropping system, in which two or more crops are grown simultaneously with no distinct row arrangement. Nearly all residents in the Uluguru mountains rely primarily on agriculture and especially food crop production. It is important to note that despite the fact that some villagers keep some domesticated animals, such as goats and poultry, the production of field crops, notably cereals and vegetables in some areas, is the most dependable occupation and source of income to the households. However, yields of these crops have over the years been declining due to decreases in agricultural land, poor agricultural practices, declining in soil fertility and inconsistent rainfall. One of the explanation for the unreliable nature of rainfall is that the mountain catchments have been victims of gross mismanagement for the last two or more decades (Kilasara and Rutatora, 1993).

The project area is part of public land. Because of the lack of proper control and management, it is open to intensive exploitation of its vegetation for fuelwood and building poles, and repeatedly burnt each year by the people living on the slopes and in the valleys farther up. Thus, both the woody and grass vegetation in the area deteriorated rapidly over the years. Consequently, this resulted into the fast-moving surface run-off rainwater gushing down the slopes causing severe sheet and gully erosion on the lower parts of the slopes, on the land around and within the main campus. On the basis of these concerns, in 1991 the University initiated a five year project (UMISCP) with the assistance of the Norwegian Agency for International

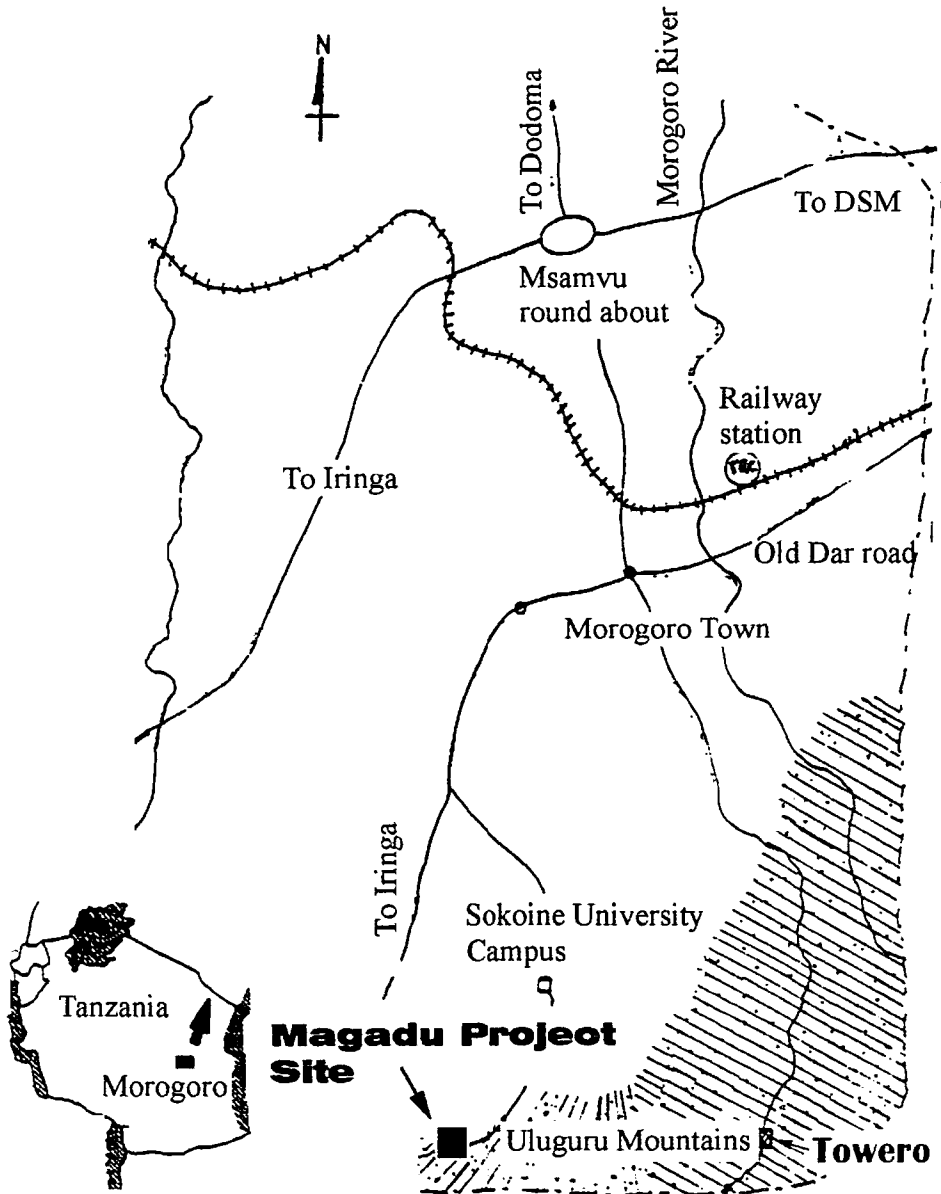


Fig. 1. Location of project area

Development (NORAD). The project came to an end in December, 1995. The following section describes the importance of farmer participation in the project.

THE IMPORTANCE OF FARMER PARTICIPATION IN REHABILITATING DEGRADED ULUGURU MOUNTAIN SLOPES

Immediately after the project concept was made clear to farmers, they were involved in conducting situational and technical surveys of the project sites. Because of their involvement in this particular activity, farmers noted the extent of severity of the environmental degradation and were able to discuss the possible causes. For example, farmers observed that there were increasing incidences of encroachment both for agricultural and residential purposes, increased rates of deforestation, continued traditional farming practices, cultivation of marginal areas (such as valley bottoms, river banks and very steep slopes) and wild bush fires.

Discussion amongst farmers and between farmers and scientists gave participating farmers an impetus to weigh appropriate remedial measures. During such discussions, it was possible to bring to light the reasons that led to previous unsuccessful attempts at soil conservation. Because of the farmers' active participation, farmers as well as scientists were able to come up with a priority list of activities or interventions to be undertaken in order to alleviate the problem of environmental degradation. That is, farmers themselves decided the order to undertake the activities. Because farmers identified themselves with the project and felt that their contributions were recognized and valued, they produced a programme of action which they adhered to during the execution of the activities. The following part of this section elaborates the participation of farmers in various activities and the achievements attained.

TREE PLANTING AND ESTABLISHMENT OF HOME-BASED NURSERIES:

A total of 800,000 seedlings of different tree species such as *Grevillea robusta*, *Cassia siamea*, *Cassia grandis*, *Casuarina equisetifolia*, *Leucaena leucocephala*, *Albizia lebbek*, *Azadirachta indica*, *Bauhinia variegata*, *Eucalyptus*, *Khaya nyasika*, *Delonix elata*, *Markhamia*, *Petrophorum pterocarpus*, *Xeroderis*, and *Efzelia quinsensis*, were raised. Of these, over 130,000 seedlings (mostly *Grevillea robusta*) were planted by the farmers in the project areas. The rest of the seedlings were taken for planting on the Uluguru mountain slopes by the people outside the current project activity areas. In any case, fewer tree seedlings (except *Grevillea* spp.) were collected by the intended group. This was due to the fact that most farmers preferred *Grevillea* species over other species, which was discovered after the evaluation study was conducted. The farmers planted the seedlings in such areas as farm boundaries, within farms (especially *Grevillea*), marginal areas (e.g., along river banks and around water sources) and individual woodlots. Other tree seedlings were planted as hedgerows (e.g., *Leucaena*) and for reclaiming degraded lands and windbreaks (e.g., *Cassia* spp. and neem, i.e. *Azadirachta indica*). *Eucalyptus* spp. were less preferred by the farmers because they negatively affect water availability and crop productivity in the vicinity.

Information obtained from an evaluation conducted in 1993 (Lulandala et al., 1993) revealed that the survival rate of trees planted in the target areas was over 75

percent. According to farmers, drought and termites caused the death of some tree seedlings. In order to support afforestation activities, some farmers established individual and community-based tree nurseries. Such farmers may increase as more sensitization visits, village-based meetings and farmer-to-farmer feedback continue to be conducted. For the year 1994/95, individual farmers raised an average of 200 *Grevillea* and about 200 fruit tree seedlings (e.g., citrus and mango). Establishment of home and community based nurseries have in a way facilitated the transfer of technical skills from the scientists or technicians to the people and this may act as a powerful tool for sustaining the programme amongst the villagers.

TRAINING AND CONSTRUCTION OF CONTOUR-BUNDS

A total of 18 contact farmers were identified and trained in the use of line-level and A-frame for surveying contour lines. This was done in three groups in 1993 and 1994. An initial training was conducted outside the premises of the Department of Agricultural Engineering and Land-Use Planning, where most of the facilities were located. Later on, farmers were taken to one of the project areas to carry out some exercises. Farmers had to learn by doing. In addition, 4 line levels and 10 A-frames were supplied to farmers. Trained contact farmers trained 32 other farmers and continue to train their fellow villagers interested in this activity, in a significant multiplication effect as indicated in the farmers' reports.

In addition, the same 18 contact farmers received training on how to construct interceptor drains and ultimately the contour bunds. The training was carried out in the field, on one of the farmer's plot. The "fanya chini" (a process by which the soil from the interceptor drain is put on the lower side of the contour bunds) technique was adopted as a starting point as it was relatively easier compared to "fanya juu" (a process whereby the soil from the interceptor drain is put on the upper side of the contour-bund), the current and future drive in contour bund construction. "Fanya juu" is believed to be more effective in controlling soil erosion, and allows natural development of terraces and more infiltration of water to be eventually become available to crops. Farmers were initially exposed to both techniques but chose to undertake "fanya chini" in order to gain experience. Some farmers have already started practicing it. A total of 32 farmers from the project areas have each constructed an average of 7 contour bunds of average length of 32 m, average depth, 45 cm, average width, 45 cm at an interval of 9 m. In order to stabilize the bunds, pasture grass had to be planted. Although other choice than pasture grass were available, (e.g., pineapples) farmers were interested in raising dairy goats. Until the farmers complete further training on dairy goat keeping, pasture grass is being sold as mulch to other farmers. The contact farmers have also managed to train 64 farmers on how best to construct contour bunds.

SEMINARS

In order to create further awareness, to enlighten farmers on previous activities,

identify mitigating factors or concerns, plan future activities and propose strategies for achieving them, it was deemed essential to conduct a series of seminars at least after each major activity. It was mainly through such seminars that farmers discussed the hazards of wild or uncontrolled bush fires and agreed on measures to be taken up by the respective village committees. In addition, farmers were also educated on the importance of not burning trash or crop residues after harvest, proper crop rotation, proper use of inorganic fertilizers and the use of organic matter and compost manure. During the five years, a total of 8 seminars for village and local leaders and the general community were conducted, comprising of 3 seminars for each village and 2 joint seminars for both villages. The last two seminars dwelt on reviewing the performance of the project and setting up future strategies, through lectures, group discussions, and video presentations on soil conservation and/or land management efforts in other parts of the country of similar agro-ecological conditions. On the average, 190 farmers (60 males and 130 females) and 20 wards and village leaders (18 males and 2 females) participated. The statistics of the villages show that only a small proportion of villagers attended. The participants claimed that poor attendance might have been due to the venue being too far for some to attend. For convenience, they wanted future seminars to be conducted within the villages. Although the researchers and some farmer participants anticipated this, in order to conduct video presentation, it was necessary to utilize the University premises which have electricity. The dates and time for the seminars had been suggested by the village representatives after consultations with their fellow villagers.

STUDY TOURS AND FARMER-TO-FARMER VISITS

A total of 35 farmers participated in a total of 4 study tours and visited such places as Lushoto (Soil Erosion Control project, SECAP), Arusha (Soil Conservation and Agroforestry Project, SCAPA), Babati (Land Management Programme, LAMP), Kondoa (*Hifadhi Ardhi Dodoma*, HADO) and Mgeta (Dairy Goat Project under the management of Sokoine University of Agriculture). During the visits farmers were exposed to such activities as afforestation, soil and water conservation structures, agroforestry practices by local people, and improved crop and livestock practices. Most of the sites resembled the villages found in the Uluguru mountains. Farmers had a chance to exchange ideas and opinions pertaining to their lives and occupations with their fellow farmers. Upon return, farmers had to report back to fellow villagers the kind of knowledge they had gained at village meetings organized by the village leadership. It was at such meetings that further appropriate action was charted out and a programme of action developed. From the reports which were written by the farmers, it is clear that farmers learned a lot from the trips. Of course, one could comfortably say that the momentum for attempting the construction of contour bunds was gained from this first trip. These study visits were the main springboards for bringing about change in attitude of most farmers in the project areas.

DEMONSTRATION PLOTS

In order to show farmers how to carry out improved farming practices on their respective fields, and especially where contour bunds had been and continue to be constructed, two demonstration plots were established at Nyandira (Towero) and Kilumba (Magadu) areas. Farmers contributed land for demonstration purposes free of charge and they were the ones who decided on the location of such plots. On these plots, researchers demonstrated how to plant in rows (across the slope), proper spacing, fertilizer measurement and application (especially pertaining to their major food crop, maize). Farmers in collaboration with the researchers took necessary measurements and made several observations pertaining to the growth of maize in those plots. More demonstration plots are expected to be established in other areas which are easily accessible (for both farmers and researchers) and easy to follow up and monitor. These demonstration plots may act as a means of transferring technical knowledge and skills from scientists to farmers. Also, it is here that farmers learn by doing while scientists teach by showing.

ESTABLISHMENT OF BY-LAWS

By-laws were established by the farmers themselves during their regular village meetings and requested higher authorities for support. These proved effective in controlling of wild bush fires.

In summary, through continued dialogue and regular interaction with the scientific community, farmers were able to get rid of the fears and other stereotypes about the academicians. Both groups reached a stage of regarding each other as partners and recognized one's contributions. Because of such interaction and dialogue, farmers could realize the weaknesses of their indigenous knowledge and technology (e.g., farming along steep slopes) as well as the strengths of the conventional scientific knowledge. The study visits and farmer-to-farmer exchange programmes made farmers change their negative attitude toward soil conservation and land management at large. They realized that their counterparts in other areas had gone a step further and had reached a stage of realizing the benefits from soil conservation efforts.

In addition, farmer participation in training and seminars helped them acquire additional knowledge and skills in training their fellow farmers individually or through work groups. This particular aspect is expected to continue even when the project ends and help sustain to continuation of activities. Most of the activities envisaged were those which utilize locally available resources. As farmers' interest grew, they managed to persuade the primary school teachers to allow their children to practice similar activities on school farms. Such experience may help instill positive attitudes and interest in soil conservation activities in children. Last but not least, farmers now know where to look for information related to environmental rehabilitation.

Despite the above achievements attained in a relatively short period, these were problems and constraints encountered as well as the tasks ahead. These two aspects are described in the following sections.

PROBLEMS AND CONSTRAINTS

During the life of the project, the following problems and constraints (which might serve as lessons to other similar projects) were encountered.

- (1) Although we realize the importance of farmer involvement, the number of farmers who took part were small partly due to their initial negative perception of the project, partly due to the conflicts which surfaced between the government and the villagers during the implementation of the Uluguru Land Usage Scheme. As pointed out above, to this day some farmers still associate terracing, a major activity in ULUS, with previous memories of severe punishments. Negative perceptions of the project activities may have also been due to the lack of thorough and in-depth socioeconomic studies of the project areas essential for identifying the real issues pertaining to people's lives, needs, aspirations, environment and political structures. Had if such studies been conducted vague before project implementation and results discussed with the farmers, scientists may have come to grasp why there was a lack of interest in soil conservation. An earlier study which was by Lulandala et al. (1993) was undertaken after the project started and focused on general socio-economic issues and agroforestry practices. However, as the current project got under way, more farmers have gained interest and approached the contact farmers for advice and training.
- (2) Minimum involvement of extension officers from key ministries such as Agriculture, Natural Resources and Community Development. Although efforts were made to involve more extension personnel, it seemed that extension officers were not interested in the entire business. One of the extension officers who once accompanied the project team in situational surveys never participated in subsequent activities. The reason pointed out by the officer was that she had been assigned other duties. The exact reasons need to be determined for such disinclination to participate in this project so that future activities are not jeopardized. Involvement of village-based extension officers is essential as they work very closely with the villagers compared to researchers, and provide support after the project ends. Seepersad (1993) underscored the importance of having full cooperation of extension staff in such kind of programmes, after being confronted with a similar problem.

WHAT REMAINS TO BE DONE

The project has not yet determined the amount of increased food production to the farmers. However, according to the mini-evaluation report (Mafu, 1995) it was found that farmers who adopted contour-bund structures have realized increased yield of maize. For example, one farmer reported that the yield increased from usual 20-40 kgs from his 1/4 acre farm, to 200 kgs of maize from the same plot. This was possible because of two major reasons (i) the run-off water was controlled and (ii) the farmer used farmyard manure to improve the fertility of the soil.

The amount of increased wood supply can not be determined because trees take a long time to mature. However, as the survival rate of trees was over 75%, it is hoped that in time the mountain side will gradually become a good source of wood supply

as well as serve other purposes.

CONCLUSION

The paper has pointed out the importance of farmer participation in rehabilitating degraded Uluguru mountain slopes under the UMISC project, some weaknesses pertaining to the execution of the project activities. Although some observable achievements have been attained, land management programmes are never easy nor achieved in a short time, especially when changing and modifying attitudes of farmers are a requisite. That is, such programmes require patience, hard work and continued support by the donor for at least 10 to 15 years in order to realize benefits. The project is expected to be sustainable as the farmers have already organized themselves into work groups under their respective village leadership. Also, establishment of home-based tree nurseries by a good number of farmers in the project areas will assist in providing farmers outside the project with readily available tree seedlings for planting in different areas of interest to them.

From the achievements and constraints described above, it is recommended that

- (a) More sensitization activities (for example, home visits, study tours, seminars and village-based meetings) should be carried out to encourage participation of a good number of people and to raise awareness about community environment and farmer well being.
- (b) Afforestation activities should be continued. This can be facilitated by establishing more home- and community-based trees and fruit tree nurseries in which multipurpose trees could also be raised.
- (c) The number of demonstration farms should be increased and located in areas easily accessible (for both farmers and researchers) for easy follow-up and monitoring, possibly to a level that each location should have its own demonstration farm.

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