PERSPECTIVES AND APPROACHES FOR SUSTAINABLE RURAL DEVELOPMENT IN AFRICA

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The SUA Method: The Case Study from Mbinga

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1 Introduction

SCSRD has been involved in developing the "SUA Method" by putting participation at centre and emphasizes on fieldwork to understand multiple realities of each location, while aiming at leading to sustainable rural development. Mbinga District is one of the project activity sites, and located in the Ruvuma region of southern Tanzania. While understanding the realities of the area, SCSRD together with the local government and NGOs, shared ideas and implemented the activities in the framework of the *Ntambo* perspective, as the focal feature which characterizes Mbinga. In this paper, after the brief introduction of Mbinga and SCSRD's approach, two case studies from Kindimba and Kitanda villages are introduced so as to explain how characteristics of SUA method are put in practice in real situation.

2 Brief introduction of Mbinga District

2.1. Ngolo farming, coffee production, and ntambo

In Mbinga, from 1994 to 1997, the research project called "Miombo Woodlands Agro-Ecological Research Project (MWARP)" was conducted, and the researchers conducted the field research covering aspects related to society, economy, culture, natural environment, and livelihoods. They focused on the indigenous farming system called *ngolo* unique to the

Matengo, which was developed along the steep slopes of Matengo Highlands and natural environment of cool climate and reliable rainfall. *Ngolo* farming was developed when the Matengo escaped to the mountainous area after they had lost the war against the Ngoni in the midst of nineteen century. It has the characteristics of sustaining the soil fertility through the grassland fallow system, and of preventing soil erosion through many pits in the farms along the slope. The Matengo continuously produce maize and beans as staple food crops from these fields because of the high productivity of the *ngolo* farming system (Itani 1998, JICA, 1998).

On the other hand, coffee production before market liberalization, was very popular in Mbinga District as a cash crop and supported their livelihood. Coffee was introduced from Kilimanjaro in the 1930's and was favoured by the natural environment of Mbinga. People cultivated coffee fields around their homesteads and raised the productivity by the intensive management. Mbinga farmers enjoyed the benefits from coffee economy, and they almost fully depended on coffee production.

The livelihood of the Matengo is characterized as the combination of *ngolo* farming for food production and coffee production for cash. Both *ngolo* farming and coffee production are carried out by the small-scale farmers, and both fields are situated in the geographic framework of *ntambo*. *Ntambo* is the concept unique to the Matengo society. It refers to a unit on the mountain side which is circumscribed within the river tributaries. The owner of *ntambo* allocates part of his *ntambo* to the descendant who, settled down in that *ntambo* and cultivate *ngolo* farms and coffee fields. With inheritance from one generation to another, *ntambo* is divided into small peaces of land. In addition, one *ntambo* contains a set of forest for firewood and building materials, fields for food production, coffee farms, and gardens, and thus *ntambo* provides nearly everything, which is necessary for everyday life. In other words, *ntambo* is the unit both for land ownership by clan and for production for everyday life.

2.2 The current situation of Mbinga District

Mbinga District used to be one of the major coffee-growing Districts in the country. It produced about 20 percent of the national coffee production. However, in 1994, the liberalization of the coffee market took place, and in 1995, Mbinga Cooperative Union (MBICU) collapsed with lots of debts because it could not stand under the competition due to liberalization. The Cooperative Union used to undertake all the activities related to coffee marketing and sales such as coffee price stabilization, financing, buying coffee beans, and distributing inputs. Since the Cooperative collapsed, the farmers have to deal with all these activities which the Cooperative used to do on behalf of the farmers. In addition, there were no alternative cash crops to coffee which had been promoted in Mbinga District. Since Mbinga District is situated in a rather remote area of Tanzania, it has been difficult to switch from coffee to other cash crops, and the farmers have not found any other way to salvage their economy.

Deterioration of the economy due to the decline of coffee, has greatly affected food productivity. The farmers of Mbinga who had enjoyed the benefits from coffee economy, used to obtain high yields through the use of industrial inputs such as fertilizers, and thus compensate for shortage of farming land. However, they are no longer able to buy inputs, and are forced to continue with the indigenous farming system. In terms of the environmental problems, expansion of the farming land due to the increase of population and sales of firewood caused by the economic difficulty have had a negative impact on the environment, and have increased deforestation of the already scarce forests. This has led to soil degradation and erosion, and has resulted in frequent floods around the low land areas.

2.3 *Ntambo* perspective and potential of indigenousness

The fundamental factor which caused the above mentioned problems is over-reliance on coffee production. In other words, lack of diversification of economic activities has caused the fragility of the environment and livelihoods in the area. SCSRD

considered the recent destitution of rural economy and environmental degradation as two major problems, and decided to carry out the activities to solve them. One of the reasons for a great damage of the coffee economy was lack of diversification of economic activities. Therefore, SCSRD aimed at diversification of economic activities by revitalizing the indigenous livelihood, and made the people aware of the importance of the environmental conservation through direct engagement in the activities related to the environmental conservation.

When SCSRD plans trials, it takes into consideration of the application for the wider area. The original form of *ntambo* consists of forest (*kitengo*) for providing firewood, grassland (*kinzege*) which is seldom used due to shallow soil and scarce grass, fallow land (*kigona* and *lipusa*) for tethering livestock, farm for food (*ngolo*), coffee field, valley bottom (*kijungu*) cultivated during the dry season and provide grazing land, houses, barns, and garden (*nndwi*). Efficiently utilizing the elements of both vegetation and farm adds economic value, and activates the productivity of *ntambo*. The plan of activities is made and implemented by considering the relations among the elements. This enables to apply for all kinds of *ntambo*. If Villages of Matengo society are considered collectively under *ntambo*, the problems which the smallest unit faces should be parallel to the ones which the whole society faces. Understanding the livelihood, social system, economics, ecological system and their mutual relationship in a *ntambo* can be the key to figure out the whole society.

The background of the concept of the "focal feature" is based on the lessons from the previous collaborative research project where researchers from various disciplines tended to do their own research without any focus or coordination as a group. Setting up the focal feature at the earlier stage aims at showing the researchers the direction of the research and avoiding the dispersion of the focus. "*Ntambo* perspective" was, therefore, set up in order to analyze *ntambo* from multidimensional aspects. As a vital point to coordinate multidimensional and academic research, "*Ntambo*" is a "focal feature" of the Matengo

Highlands. It has played a core role, and is useful for the practical activities and for the extension to wider areas.

"*Ntambo* perspective" provides the framework to show the characteristics of each element and their relationships. Revitalizing "the potential of indigenousness" related to each element is the basis of the activities. "The potential of indigenousness" are such potentials of indigenous resources, technology, knowledge, wisdom, and other systems which the community has nurtured and developed. All the activities were planned in such a way as to recognize the potential of indigenousness from human and environmental aspects. For example, the technique and knowledge concerning the water conservation developed along the slope farming lands with high rainfall intensity, and the technique of seedling and planting obtained through previous experience of growing coffee, are supposed to be recognized and encouraged. For example, the Matengo, who live on the slope mountainous area with heavy rainfall, are concerned with soil conservation, and have developed the indigenous flood control system. The system itself is the potential of indigenousness. Furthermore, their capability of understanding the SCSRD purpose of revitalizing the potential of indigenousness can also be considered as the potential of indigenousness. The potential of indigenousness may become obvious through basic study or be revealed through practical activities.

2.4 Activities being implemented

There are mainly for four types of activities, and all the activities are closely linked to each other (Figure 1).

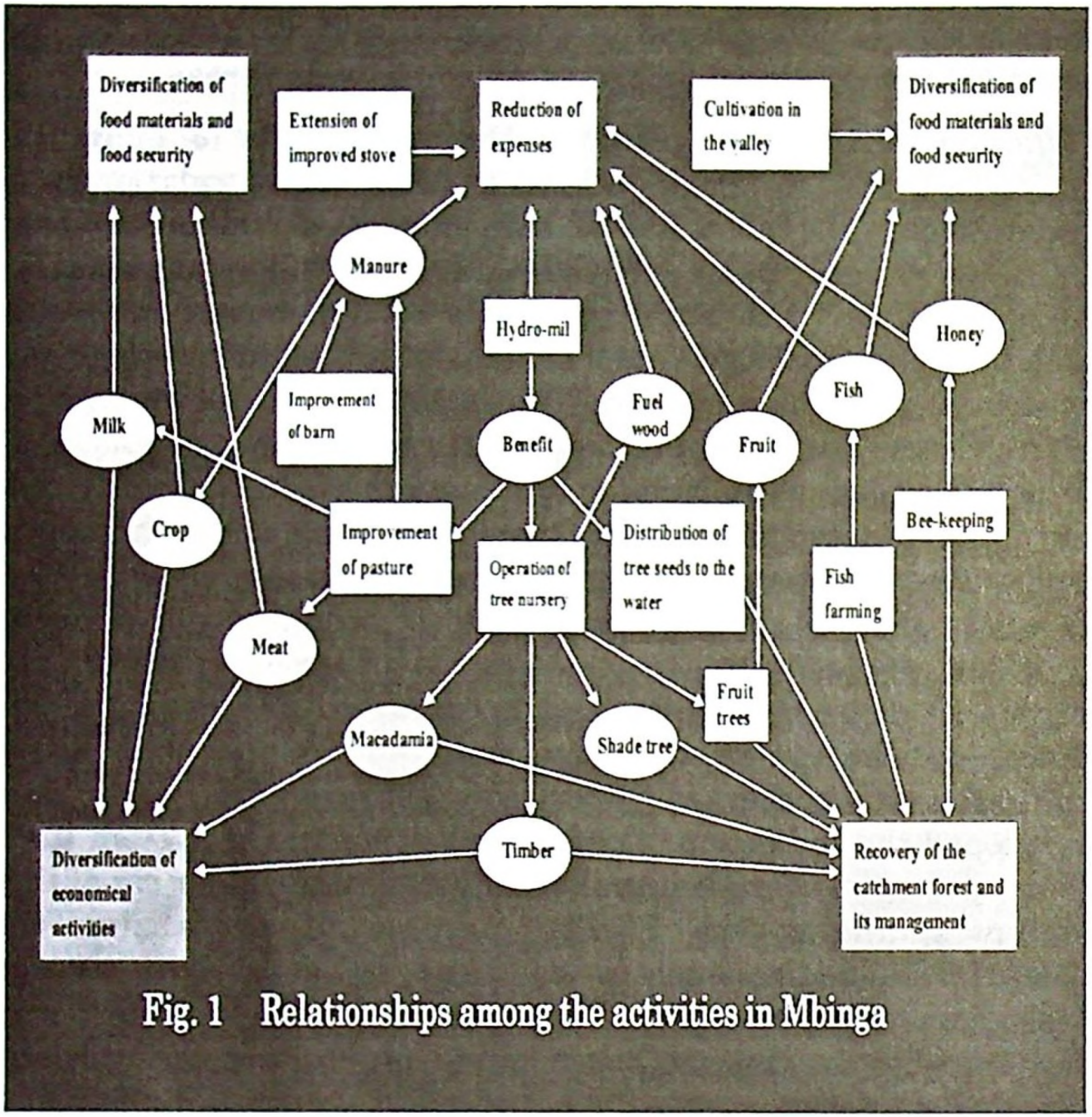

Fig. 1 Relationships among the activities in Mbinga

2.4.1 Diversification of economic activities

The use of pesticides and application of fertilizers are indispensable to coffee production. The farmers in Mbinga used to benefit from sales of coffee. However, the recent sharp decline in coffee prices has made it difficult for farmers to have regular application of agricultural inputs. Coffee productivity has dramatically dropped due to spread of diseases, increase of insect infestation and aging of coffee trees. This situation has formed a vicious spiral and resulted in reduction of income from coffee. In order to break this vicious circle so as to obtain constant cash income, diversification of the economic activities is recommended. The economic activities such as production of

macadamia and livestock improvement through the improvement of grasslands and pasture were, therefore, initiated.

2.4.2 Diversification of food items and improving food security

This was aimed at obtaining better and adequate nutrition and providing more varieties of dishes and a richer diet. Therefore, the products from the trials were basically consumed at home. In addition, the areas of multi-purpose forests are intended to be enlarged through such activities as valley bottom cultivation called *kijungu* during the dry season, fish-farming, fruit trees, and bee-keeping.

2.4.3 Reduction of expenses

The activities under this category are aimed at reducing daily expenses and pressure on the environment by, for example, reduction of milling costs due to the introduction of the hydro-mill, improvement of livestock barns to increase manure quantity and quality, obtaining firewood, and improved fire-wood stoves.

2.4.4 Environmental regeneration and management

Catchment's forests serve in reducing the fluctuation in water levels. It also enables the hydro-mill to run for the whole year, and offers some other merits such as preventing soil erosion, and providing daily livelihood materials like timber and medicine, and food materials like fruits, honey, and mushroom. In addition, planting useful tree species and promoting bee-keeping are intended to serve as utilization and management of these catchment's forests.

2.5 SCSRD approach to the project sites in Mbinga

In order to put the concept of SUA method into practice, almost all the activities in Mbinga are implemented through the NOW model described in the SUA method concept paper, which is adaptable to various types of the activities, locality, and time constraint. SCSRD selected one village called Kindimba Village

from the western side of the mountainous area and the other called Kitanda Village from the eastern side, considering their difference in natural environment and settlement pattern (Figure 2).

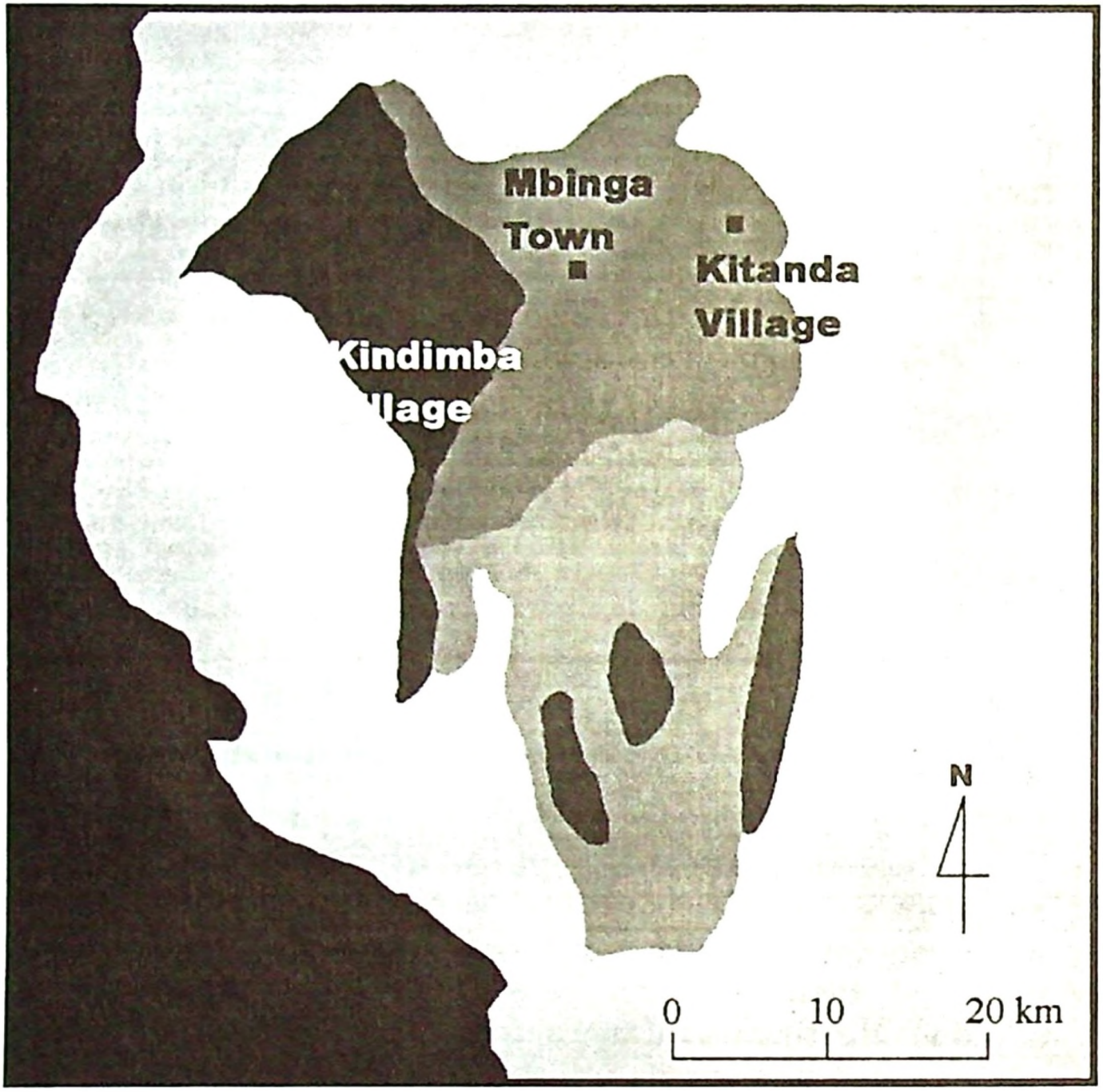

Fig.2. Map of the project sites

SCSRD consulted the staff of the Ministries of Agriculture and Food Security, and Natural Resources and Tourism, and conducted seminars with them so as to explain the aims of the project and collected opinions towards the project from the villagers. During the planning, SCSRD paid great attention to the people's opinion, while taking consideration into the natural

environment and economic situation of each locality. The two selected villages, Kindimba and Kitanda, as the project sites where the basic research had been conducted for years. The SCSRD members understood the realities of both villages and had already created a good relationship of mutual trust with villagers. The small trials have also been conducted in these areas.

All the activities are documented for monitoring and evaluation as explained in the SUA method concept paper. Through process documentation of the entire process, variable dimensions of the changes become clear with turning points. Based on these materials, all the actors evaluate the plan, and if there is a problem, we sit together, think of the causes and look at different interpretations and ideas among actors. Thereafter, we feedback whatever we learnt from the process and modify the plan. In this way, through monitoring of the process, lessons learnt could be feedback to the on-going activities and SUA method. In addition, we may see the endogenous way of development by looking at their own way of innovating and modifying the activities (see the conference paper titled "Introduction of the SUA Method Concept and Approach to Sustainable Rural Development" for the examples of process monitoring and evaluation in Mbinga).

3 The case study of Kindimba Village

3.1 Introduction

Kindimba village is 18 km away from Mbinga town, and situated between longitudes 34°24'E and 35°28'E and latitudes 10°15'S and 11°34'S. The mountainous landscape in Kindimba is highly dissected with very steep gradient, generally exceeding 45%. The valley bottoms are longitudinally steep and have a U-shaped cross section with perennial streams (Magogo *et al,* 1996 and Kimaro *et al,* 1996). The estimated annual rainfall is about 1300 mm. The average annual temperature is about 13°C. The population is 2,288 people according to 2002 population census. The village is densely populated, so the new generations have to move out to other areas like Kitanda village to establish their

new settlements and open farms because no more land remains unoccupied in Kindimba.

3.2 Environmental conservation

3.2.1 The rationale of environmental conservation

According to the Miombo Woodland Report (1997) the expansion of the population as well as the decline in soil fertility due to prolonged farming on the same land unit have made people to encroach the remaining forest areas as well as water catchments for both farming and settlement establishment. The vegetation of both the mountains and water catchment areas has been cleared off leading to severe erosion in those areas. Other aftermaths include siltation of Mungaka River, widening of the river bed, changing of the river course as well as contamination of the water. All these environmental problems were identified when the basic study was conducted and hence the need for environmental conservation.

Environmental conservation activities have been implemented under the framework of *Ntambo* perspective. This activity is only one among many activities implemented collaboratively by the villagers and other actors. Other activities include improvement of pasture, valley bottom cultivation, fish farming and cultivation of fruit trees. All these activities are interlinked under the main objectives of *Ntambo* improvement and building people's capacity to manage the available resources in a sustainable way. This section, however, is confined to environmental conservation where by the main focus is on the hydro-mill project, tree planting, fish farming and beekeeping.

3.2.2 Participation and partnership

The initial approach used in Kindimba village was the participation of the whole village community. On the process of discussion among different actors, the people's committee called *Sengu* was appointed based on the agreement of all actors to link the village community with other stakeholders namely SCSRD, CARITAS and the District Council. The name *sengu* reflects the traditional context whereby *Sengu* meant people of the same

ancestor coming and eating together under the leadership of the head of that clan, normally an elderly person, while discussing some important matters. So it is a reflection of potential of indigenousness in the Matengo community. *Sengu* committee did a lot of work in mobilizing the villagers about the environmental conservation.

Actors involved in environmental conservation in Kindimba are the village community, Mbinga District Council through its environmental committee, SCSRD, and CARITAS. The District role was to advice and mobilize Kindimba villagers and the surrounding villages about environmental and water sources conservation. The village role was to implement the planned activities under the supervision of *Sengu* Committee that supervises the activities on the behalf of the village. The SCSRD role is to conduct the research on how well should the communities be involved to ensure sustainable conservation of the environment. The role of the Roman Catholic Church through CARITAS was to assist in providing education and mobilization of the villagers pertaining environmental issues.

3.3 Environmental conservation by the village community

Although it was realized during basic study that villagers in Kindimba had some awareness about environment conservation, nothing serious had been done in practical dimensions until the establishment of the hydro-mill project. The project, which emanated from people themselves, has increased people's awareness to conserve the water sources and neighbouring environment. The project managed by the village community under the supervision of *Sengu* Committee, spends some money accrued from it to manage a tree nursery so as to improve the water catchment's areas within and outside the village to ensure a sustainable supply of adequate water and hence sustainable operation of the mill. *Sengu* committee had an idea that if the nursery were closer to the hydro-mill the villagers would be easily educated about the connection of the two activities and thus become easily mobilized to plant trees to protect the degraded water sources and riverbanks. Therefore, the nursery was stationed beside the hydro-mill-house.

Prior to the establishment of the tree nursery, it was realized that the village community was not very much aware of environmental conservation. However, even this little awareness had not been put into a serious practice yet. *Sengu* committee moved from one sub-village to another, and explained the importance of environment and possible negative effects that are caused by environmental degradation as well as the benefits that may be realized if the environment is properly conserved. The management of the nursery was done by the villagers themselves under the supervision of *Sengu* committee, so as to build their capacity on conservation of the environment around them.

Tree planting was scheduled to be implemented in phases. The first phase began with establishment of the tree nursery in Kindimba village in July 2002. The indigenous tree species namely *Albizia schimperiana*, *Khaya anthotheca*, *Syzygium guineense*, *Brachystegia spiciformis*, *Pterocarpus angolensis*, and *Strichnos cocculoides*, as well as an alternative cash crop to coffee, macadamia spp were sown. Peoples' indigenous knowledge on the trees, which used to grow around the catchments areas before degradation, was very useful during the identification of the right tree species for conservation of water sources. On this matter, SCSRD provided technical assistance on environmental conservation issues only.

For this phase, a total of 5000 trees were planted for conservation of water sources and establishing an alternative cash crop to coffee. The Village made a plan of distributing the raised tree seedlings for planting not only within the water sources and open areas within their village but also in the tributaries of the Mungaka River, the sources of waterpower to Kindimba hydro-mill. These sources are located in Kilanga Juu, Mundeki and Mahenge villages which border Kindimba Village.

3.4 Environmental conservation by farmers' froups

3.4.1 Emergence of farmers' groups

Initially the whole village community used to implement various development activities only under the supervision and direction

of *Sengu* committee and the village government. However, in 2003, farmers groups started being formed in Kindimba Village. The origin of group formation in Kindimba village came after one villager's visit to Kitanda Village, where the group activities are very active. He was very much impressed by their activities. Once back to Kindimba, he briefed the group activities in Kitanda to his relatives and neighbours, and organized the group named *Jiokoe*. The aim of forming the groups was to assist one another in different activities like easy accessibility to agricultural education and technical assistance as well as creating new projects to alleviate poverty. Currently there are four farmers' groups namely *Jiokoe* (literary meaning "save yourself"), *Nguvu kazi* ("work hard"), *Ondoa umaskini* ("eradicate poverty") and *Uhusiano mwema* ("good human relationship"). All of the four groups are practising fish farming, and the former two are conducting beekeeping in addition to fish farming. These groups have been receiving advice on how to manage their groups and activities from *Sengu* committee.

3.4.2 Group activities

There are mainly two activities carrying out by the farmers' groups: beekeeping and fish farming. First of all, the aim of beekeeping is to integrate natural forest restoration with some direct nutritional and economic benefits to the farmers. This activity is carried out in the area under the hydro-mill project where farming has been stopped, along the Mungaka river to protect riverbanks against erosion and on mountainous deforested land to encourage natural regeneration.

In the village, beekeeping was initially started in 2002 by Roman Catholic Parish, who made four Tanzania transitional bee-hives (TTH) and installed them for demonstration. The area where the hives were installed is under the hydro-mill project. Formally as well as fodder collection were banned so as to encourage natural forest regeneration. Thus, beekeeping in this area assists the protection of this area. Since the installation of the hives the Parish managed to harvest 16 litres of honey. With the realization of the benefits of beekeeping, two farmers' groups namely *Ondoa Umaskini* and *Nguvukazi*, were formed originally

with the aim of starting beekeeping. The former group has installed 17 traditional beehives and the later has installed 20 traditional hives in their beekeeping sites. In addition, the groups started to plant bee plants in their beekeeping sites for both provisions of adequate nectar as well as shade to their bee swarms.

Secondly, the idea of fish farming came from one Kindimba villager who visited Kitanda village. He observed fish farming there and was impressed by their trial. Presently there are five fishponds in Kindimba and the activity has rapidly spread within the village and to the neighbouring villages namely Mundeki and Kilanga Juu. SCSRD in collaboration with the District Fisheries Officers have been providing information to the fish farmers that they need to conserve water resources by initiating tree planting so as to ensure availability of water in future.

3.5 Problems and some solutions

During the first phase of environmental conservation, the following problems were encountered. First of all, it takes time for some villagers to receive and digest the messages related to environmental conservation. Secondly, some villagers claimed that since hydro-mill project earned enough money to employ someone in nursery management and tree planting, part of benefits should be used for it instead of villagers' volunteering for those activities. Villagers worked out this problem through frequent meetings to elaborate the problems and determine the solution altogether. Thirdly, people encountered the problem of collision in timetables between the farmers' activities and tree planting exercise because all of these activities are to be implemented during the rainy season. *Sengu* committee resolved it by using the primary school pupils to assist in the practice. The fourth problem was erosion along the Mungaka River caused by the cultivation. During the dry season farmers wanted to maximize the utilization of the valley bottoms so as to have the sustained supply of food. It has been difficult to let the farmers abandon at least some few meters from the riverbank. However, the *Sengu* committee has tried hard to provide

environmental education to the owners of these plots along the valley bottom. For the villages outside Kindimba where *Sengu* committee's power cannot extend, the Mbinga District Environmental Committee has supported by providing such an education.

3.6 Way forward

The participatory management approach whereby the local people are involved in decision making is important in ensuring the continuity when the project reverts exclusively to local management. In addition, the consideration for the short-term benefits from the local communities' point of view is critical, especially for the activities like afforestation where the benefits are accrued after a long period of time. Furthermore, for any development process the contradicting opinions among the community itself are very significant when worked out in the positive way.

Lastly but not least in the process of development the key stakeholders opinions and comments should be considered and acted upon regularly. Currently, comments request forms have been distributed to the farmers at household levels with the wide list of tree species and description of their end uses. The forms are intended for the farmers to provide their opinions as to what tree species do they prefer to plant within the *Ntambo* as well as water catchments areas. *Sengu* committee has provided the comments forms to the sub-village chairpersons who ultimately provided them to ten cell leaders to collect such comments from the households under him/her.

4. The case study of Kitanda Village

4.1 Introduction

Kitanda village is located around 22 km away from the Mbinga town, lying in the southern rolling hills with the mean elevation of 1300 m a.s.l. in the eastern side of the mountainside bordering the lower plateau of 900 m a.s.l. in the east. Climatically, the area has a unimodal rainfall pattern, starting in November to May. The village is receiving an annual rainfall of slightly less

than 1000 mm, and with annual mean temperatures ranging between 20°C and 25°C (MWARP, 1995). Kitanda Village was established around 1960 as compared to Kindimba Villgae which was established in 1900. It was formed by the people from Matengo highlands particularly Kindimba seeking for more land. Therefore, the human population is still low compared to the central Matengo highlands. According to 2002 population census. the population in the village is 2345 people. The village consists of four sub-villages namely, Muungano, Lami, Kibulang'oma and Nsenga. It is characterised by natural Miombo (*Brachystegia spp.*) trees with dominant grass species of *Hyparhenea, Imperata cylindrica*, and ferns (MWARP, 1998). Maize and beans are the main staple food crops, and coffee being the main cash crop. The village is dominated by ridge cultivation methods for annual crops like maize and beans along the plateau and *ngolo* pits in steep slopes, while valley bottoms are flat cultivated for dry season crop production. Fragility of the environment and livelihoods in the model site were among the problems noted during the Miombo Woodland and Agro-ecological Research Project (1994-1997) facing the local communities. The growing population in Matengo highlands has led to the migration of people to the lowlands including Kitanda and converting more land into agricultural production through clearing of more forests, which in return has posed a great threat to environmental degradation.

4.2 SCSRD Approach to the Village

The project conducted some focus group discussions and consultative meetings with the villagers to grasp further villagers' settings and resources and to chart out a way forward to sustainable rural development. Muungano sub-village, in particular, was selected as the site for implementing micro-project interventions due to the typology of its *Ntambo* (in Ktanda, *Mtaa* is more popularly used). That is basically consisting of all types of land use patterns of *Ntambo (Mtaa)*, namely "*kigona*" (fallow land with trees and grasses vegetations left for not less than five years), "*kitengo*" (forest reserve), "*lipusa*" (grass fallow of one to two years), "*mashamba*" (upland

cultivated plots of ngolo and ridges) and *"kijungu"* (valley bottom cultivation).

The SCSRD began its activities with farmers in Kitanda Village in 2002 to implement some trials at grassroots level with reference to the SUA Method. Following several meetings with villagers to raise the awareness on the issue of improving the *Ntambo* management, eight farmers deliberately formed a group on 8th April 2002. They named the group *"Ujamaa"*, which has been working in close partnership with SCSRD to revitalize pertinent issues identified in their village. The group grew to 21 members within two months before going down to 18. The decline of the group number was ascribed to difficulties in implementing some activities, out-migration and some despairing due to delayed results from trials. As far as the group profile is concerned, all members have attained a formal education up to standard seven. About 80% of the members are between 20 to 39 years old, with only one person aged 61 years. The members have formulated some rules and regulations governing the group and a working schedule (meeting twice a week) for activities' monitoring. The group mainly aims at alleviating poverty and improve their livelihoods through maximum participation in the trials to build up the capacity in planning and implementing practical solutions to their problems.

4.3 Ujamaa group activities

Information collected regarding to the local resources availability and emphasis placed by local communities on their identified priorities were used to formulate the trials collaboratively with farmers. Integration of the practical trials with the prevailing production systems and environment conservation were also taken into account, and conducted within the *Ntambo* under the pilot scale to promote sustainable natural resources management practices before being scaled up gradually to other areas. These micro-project interventions pertaining to tree nursery establishment, valley bottom cultivation, fresh water fish farming and beekeeping activities. All the activities are related to each other (see Fig.1).

4.3.1 Valley bottom cultivation

The Matengo people like many other farmers in the south western part of the country tends to utilize the residual moisture in valley bottoms ("*kijungu*" in Matengo language) for growing food crops like maize, beans and taro in the dry season for food security and supplementing cash income to their households. However, from the exploratory surveys done with farmers to identify constraints facing the valley bottom agriculture during the year of 2002, water logging especially during the rainy seasons and pests including rodents, cutworms (*Agrostis spp.* or "*kiringa*" in Matengo's vernacular language), stalk borers ("*menge*") and birds were noted as key issues hampering valley bottom production. In line to this, Ujamaa group decided to start this trial activity by growing crops like taro and others as a strategy for mobilizing their fellows to join the collaborative partnership to forge a way forward towards improved cultivation and management practices.

In order to improve the ability of the sound use of valley bottoms, an exchange visit was organised in July 2002 to Kifanya Village in Njombe District, Iringa Region, where the valley bottom cultivation is considered as one of the oldest indigenous land use practices, and over 90% of households rely on it for dry season crop production (Lema, 1996). The farmers from Mbinga exchanged their experiences with the Bena people. They learnt the Bena's method of cultivating valley bottoms by forming raised beds in contrast to their flat cultivation technique which has been vulnerable to water logging. On the return, the group set a trial to assess the performance of both methods using maize (Staha variety) as a test crop plant. Slashed and dried grasses were spread over cultivated plots for burning to kill some soil born pests and improving soil fertility altogether. Plots were then ploughed and harrowed using hand hoes to the fine tilth before planting maize seeds in August 2003. Nevertheless, there were still cutworm problems during the germination stage, which led farmers into the application of ashes at the base of plants and taking advantage of sowing more seeds per hill. Similarly, stalk borers were also noted at the knee height stage

though the incidence was not so serious.

Crop harvesting was done in March 2003, and the yield records from two cultivation methods differed slightly (equivalent to 2260 and 2331 kg per ha from flat and raised ridges, respectively). However, the yields are higher than those obtained from other bottomlands in the village which ranges from 300 to 1375 kg per ha. Farmers' observations noted that maize planted on raised beds grew faster than those in flat cultivated plot, which could probably be ascribed to the fact that roots did not suffer from raised water table during rainy season. They also deduced further that the efficiency of raised ridges could probably be impaired if long dry spells are experienced resulting into moisture stress/deficits occurrence at crop rooting zone.

4.3.2 Fish farming

The idea of fish farming cropped up from one of the farmers when opening ditches at the valley bottom trial site, which forced him to recall back to his former fishpond that was abandoned due to fish predators' incidences. This served as a turning point, the members tuned their minds to fish farming and their immediate demand focused on acquiring the knowledge on implementing and managing the particular trial. A pond of 144 square metres as mother pond was dug by farmers at the site formerly owned by one of the group members to provide hatcheries and training purposes. The main beneficiaries selected the site on the basis of accessibility to adequate water supply taped from a natural spring and capacity of the soil to hold water as was formerly used by the owner for conventional fish farming. With regards to the site topography being close to a sloping land, a cut off drain was opened on the upland to control the surface run off from breaking pond dikes.

Tilapia fingerlings were supplied in the late of November 2002 by the SCSRD from the National Aquaculture Development Centre, Morogoro, after plankton had already fully developed through application of manures in weekly basis. Stocking rate employed at planting was two fingerlings per square metre. Apart from feeding on developed phytoplankton as the primary

feed, fingerlings were also supplemented with maize bran, chopped taro leaves and weed plants (like "*Kijanamsi*" in Matengo language) for fish fattening. The group also had to establish a vegetable garden close to the fishpond for growing Chinese cabbages to feed fish and selling surpluses. SCSRD and the Fisheries Section from the Mbinga District Natural Resource Department have played the facilitation role to ensure that farmers are accessible to the required expertise on fish farming through locally organised seminars.

Fish thinning was done in April 2003 before final harvesting in June 2003 using a seine net, whereby table size fish with an average weight of 90·100g were obtained for selling and distribution to the members for home consumption. The second harvest was done in November 2003, when the weight of fish relatively improved to 130g probably due to some experience acquired by the farmers on fishpond management. To date, about half of the Ujamaa group members have started individual fishponds at their respective homesteads. Fish weights from these individually managed ponds have surprisingly increased, ranging from 250–300g as compared to that managed by the group. It might have been associated with close management and more ample time allowed for fish to grow (kept beyond six months) before harvesting.

Despite all successes, there have been some difficulties in capturing fingerlings from the mother pond that could meet the demand of members and other interested farmers in the village. Indigenous knowledge and modern technologies were surfaced for collaborative discussion to come up with efficient harvesting alternatives. Different proposals were developed to use locally available techniques and materials such as using a plunge basket containing food remnants ("*ugali*" for baiting) submerged in the pond water for hours to catch fish. Through several attempts done at Ujamaa's fishpond, tantalizing results were found; just frogs trapped in the basket. In the last resort a seine net was opted for use to meet the increased demand for fingerlings from farmers. SCSRD offered the net under loan conditions, and the District Fisheries Officer had to demonstrate

to the group and other farmers on how it is organised before harvesting and the way harvesting is done.

4.3.3 Establishment of tree nursery

In June 2002, the tree nursery was established. It aimed of improving environments including restoring back river line and mountain forests, conserving water sources, providing other forest products like construction poles, fruits, fuel woods, and the like for household consumption and sales. The tree nursery comprised mostly of indigenous trees species like *Khaya anthotheca, Albizia schimperiana, Syzigium guineense, Brachystegia spiciformis, Rauvolfia caffra, Brideria spp. and Pterocarpus angolensis* and exotic like *Pinus patula* for timber and Macadamia nuts as alternatives for cash crops. Both two cash crops command good prices at the local and outside market. There has been also some fruit tree seedlings like avocado and citrus species established as mother trees (root stock) for further improvement through budding and grafting. About 3500 indigenous trees and 300 Macadamia nut trees were grown at the nursery during the initial year of 2002. Whereby, 11% of indigenous trees mainly *Syzigium spp.* were planted to eight water sources identified by the farmers themselves in the village, and 26% were sold to farmers and local institutions such as the Tanzania Coffee Research Institute. Some were planted to the group's apiary site (22%) and other distributed to group members including other interested villagers to plant in their respective localities for environmental conservations. In the second phase of the year 2003, nursery activities were expanded not only the indigenous trees but also 3,000 coffee seedlings as the farmers' deliberation to improve the quality and quantity of their cash crop. During this period, seedlings were as follows with their respective total numbers in brackets: Coffee (3,000); Indigenous trees (1,300 including *Rauvolfia* and *Bridelia spp.*); Rough lemons (300) as rootstalks for grafting purposes. Some of these particularly indigenous trees have already been transplanted to different areas including water sources, group's apiary site and their respective homesteads.

4.3.4 Bee-keeping trial

Honey production unlike other farming activities, it does not compete for resources with other agricultural activities, requires little investment and land used can be the poorest but still can provide employment, food and cash (Mutungi *et al.*, 1996). Beekeeping has been noted to have a tremendous potential for raising the household income, food diversity and conserving the nature in some areas in the District as regards to various vegetation types found in those areas. The beekeeping trial was given a priority for implementation as it could also promote environmental conservations through forest restorations and protection. In November 2002, Ujamaa group installed twenty log hives at the fallow land ("*kigona*") offered by the group member close to the water stream. However, before implementations of the trial, farmers were offered an open seminar involving other farmers/villagers from different sub villages build their confidence on handling the trial. The exchange visits to indigenous beekeepers and progressive groups inside and outside the village were also organised for improving their level of understanding in apiary management. Both men and women participated in hive making and installation activities, whereas the colony management is mostly left to the former sex group.

As far as harvesting trials are concerned, it was also considered as important to restore back the people's confidence over modern technologies and globalisation influence by advocating use of simple locally available materials for harvesting. For protective clothing, second hand jackets, mosquito net and winnowing basket for a veil, dried banana leaves and kerosene lamps being as smokers and for lighting, respectively were used during honey harvesting. Lessons learnt were that most of beehives were absconded as due to annoyance caused by smoking kerosene traditional lamps. However, still no significant returns have been recognised by the group rather only propolis and dry honeycombs. The reasons pointed by the members are the depletion of bee forage tree plants like Miombo which have been cleared off for charcoal making, the opening of more farms, and

bush fire setting for farming and hunting. In addition, the farmers fail to establish proper harvesting time. It has necessitated conducting a flowering calendar analysis with farmers to identify the flowering period of different plant resources available in their respective localities. Due to the current degradation of natural resources, beekeepers have started preparing for a flowering calendar and planting flowering trees in their apiaries for shading, and bee forages supplementation as copying strategies.

4.4 Community based impact

4.4.1 Newly born groups in Kitanda Village

Through gained experiences by Ujamaa group, the endogenous expansion of implemented activities to other villagers has been taking place. One year after the formation of Ujamaa group and implementation of trials took place, other farmers have started to adopt the similar activities through different groups. Currently there are five self-initiated farmers' groups, namely: Umoja Endelevu (literary meaning "sustainable unity"), Familia ("family"), Mwamko ("awareness"), Vumilia ("tolerance", "endure, bear") and Tazama from Nsenga, Machimbo, Lami–A and Muungano sub-villages involved in more or less the same activities implemented by their fellows of Ujamaa group. Those groups also use the indigenous labour exchange system (barter) called *chama* to assist each other during social events or high labour requirements such as digging individual fishponds.

4.4.2 Farmer to farmer extension within and outside Kitanda Village

The experience and knowledge gained from their Ujamaa group counterparts, who currently spear head the facilitation of farmer-to-farmer extension have been driving forces towards adoption of their activities. As pioneers, Ujamaa group farmers have assisted other groups in making log hives, digging fishponds, distributing fingerlings from their mother pond, which are, in return, supposed to be distributed to other groups freely. Networking among groups is also observed. They set up a system of offering fingerlings to the newly born groups and

sharing a fish net among the groups. Being as the matter of concern, Ujamaa group members have now understood the rationale of the *Ntambo* perspective advocated by SCSRD. Its impact has now extended to not only other villagers in Kitanda but also those outside the village.

5 Conclusion and recommendation

Through the learning experiences from Kindimba and Kitanda, the following issues may be pointed out for considerations to apply SUA Method to other areas:

- Various actors' participation from the very initial stage and partnership should be crucial for sustainable management of the project
- To think the meaning of indigenousness in the context of each locality shall be of importance
- Restoring of the confidence and revaluation of the potential of indigenousness may be achieved through the entire process of activities
- By looking at people's own way of innovating, modifying and creating the activities may be the key to search for endogenous way of development.

In order to improve the activities and brush-up the method, the process of on-going trials is recommended to be monitored and evaluated with critical feedback to the activities and the SUA Method. All the trials as a set together with the forthcoming *SUA Method Concept and Case Studies* shall be introduced to the local government. The system for implementation, which has been established in the area, will be incorporated into the district planning agenda, and then shall be expanded to the whole district. Through the various experiences in different areas, we hope that policy implementation will reflect people's voices.

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