

UMADEP
AGRICULTURAL REPORT

2001

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1. BACKGROUND

1.1 History

The Uluguru Mountain Agricultural Project (UMADEP) was established in 1993. The Project is based at the Sokoine University of Agriculture (SUA) and is operated by the Department of Agricultural Education and Extension of the SUA. Establishment of this Project is part of SUA's mission to answer the need and resolve the problems of agriculture and well being in rural communities.

UMADEP was established to succeed the Upper Mgeta Horticultural Development Project (UMHODEP). UMHODEP dealt only with horticultural development in the *Western parts of the Mountains* in Mgeta Division. UMADEP aim at promoting all aspects of agricultural development for the communities of the entire Uluguru Mountains. In order to meet that target UMADEP has been expanding gradually in scope and extent.

After establishment UMADEP diversified UMHODEP operations from horticultural development only to other farm production systems in the area, livestock production, income generation activities, micro financing and supporting local initiatives. In 1994 the project expanded its operations from Mgeta Division to the eastern parts of the Mountains in Mkuyuni Division. Currently the Project plans to extend operations to south eastern parts of the mountains in Matombo Division.

The Project has a vision to work with all the people in Uluguru Mountains in establishing sustainable development of the local people. According to UMADEP sustainable development in the Uluguru Mountains means empowerment of the local communities to develop themselves using available resources (land, labor and water) within non restricted areas without necessarily seeking extra resources from restricted areas.

The vast mission of the SUA is to meet all the rural communities. Driving towards that mission in 1996 UMADEP expanded area of the operation to Mvomero Division, which is not part of the Uluguru Mountains.

1.2 Justification

Uluguru Mountains are important not only to the people in the Mountains but also to other people outside. The Mountains are the main water catchments for the people in Morogoro and Dar es Salaam. The nature of the soils, the underlying bed rocks, and the covers on the mountains are important features for the efficiency

of this important catchment. The cover on the mountains has higher biodiversity value as well.

At the same time Uluguru Mountains are commercially and nutritionally important for urban and rural communities in Morogoro, Dodoma and Dar es Salaam regions. The Mountains supply substantial quantities of vegetables, fruits, banana and spices to those areas. It is estimated that Mgeta produces about 5000 tons of vegetables per annum. In Mkuyuni about 7000Tons of banana and spices are transported from Mkuyuni division per annum. The importance of the Uluguru Mountains thus depend on two aspects:

- i. Productivity of the available non restricted natural resources, and
- ii. The ecological balance of the Mountains in the restricted areas.

The increasing population pressure in the mountains threatens these two aspects. Production practices, such as fallow lands, traditionally used to regenerate the quality of the natural resources in the non-restricted areas are no longer effective and non-applicable.

The land in Uluguru Mountains has become less productive. Fields used to produce batches of banana weighing 25kg on average under traditional practices in Mkuyuni division are now producing batches of banana weighing hardly 5kgs. It indicates that traditional production practices no longer guarantee development opportunities to the increased population in the mountains using the available non restricted natural resources.

There have been substantial efforts to promote resource conservation techniques in Uluguru Mountains long time ago before independence. Such efforts included Soil Water Conservation (SWC) techniques, forest reserves and tree planting. Despite those efforts the status of the natural resources and life of the people in the Uluguru Mountains have been progressively deteriorating. Due to deterioration of natural resources in the non-restricted areas in the Uluguru Mountains the people in the area have been struggling to maintain or improve their productivity in expense of the restricted resources. Therefore UMADEP have taken initiatives to participate in intervening to that situation by incorporating innovations that aim at improving the life standard of the people in the Uluguru Mountains. Innovations that enable utilization of the available natural resources, within non restricted areas, efficiently and in a suitable way for development activities.

Factors influencing community development are dynamic in nature. They change with time and space. Experts need to be constantly linked with communities to be able to provide alternative solutions promptly, as the solutions become necessary.

SUA produces more than 50% of graduate experts in agriculture and community development disciplines. The linkage between experts from SUA and the communities in the Uluguru Mountains has not been strong enough. Therefore UMADEP integrates in its operations the activities that aim at strengthening the linkage between experts from SUA and communities in the Uluguru Mountains.

1.3 Goal and Objectives

Broadly, UMADEP is aimed at consolidating the rural society in its complexity to constantly play an active role for betterment in the changing overall socio-economic environment. This broad objective is pursued through three main goals:

- i. To improve the productivity of land and labor of the small-scale farmers in the Uluguru mountains in a sustainable way.
- ii. To develop a long-term communication process to associate experts from SUA and the communities in order to promote the emergence of small-scale farmers' movement.
- iii. To train change agents being farmers, students and professionals to develop a methodology that constantly links actions and reflections.

1.4 Project description

UMADEP is a non-academic development activity undertaken by SUA. In order to avoid duplicating initiatives of the ministry of Agriculture, to be credible to farmers and to be recognized in the University community with an activity, which is not seen as academic, SUA, has been collaborating with other actors in operating UMADEP activities. The Department of Agriculture Extension and Education (DAEE) of the SUA is the main actor in UMADEP. Other actors are the Agriculture and Cooperatives departments of the Morogoro Rural District council, and Farmers' local networks.

UMADEP has two functional organs, the Technical (Steering) committee and the Project team. Activities implemented by UMADEP require substantial financing and are multidisciplinary in nature. Thus UMADEP solicited sponsorship for the activities from some donors and worked with various partners. The following subsections describe the functional organs, and the partners who have worked with UMADEP.

1.4.1 The Steering committee

The supreme functional organ of UMADEP is the Steering Committee. The committee has 12 members. These include the Head of the DAEE, the Project

coordinator, Assistant Project Coordinator, four members one from each of departments of Animal Science, Soil science, food science and technology, and Agribusiness and economy of the Faculty of Agriculture of SUA. Other members of the steering committee are the District Agriculture and livestock officer (DALDO), the district Cooperatives officer (DCO) and two farmers who are representatives of the local farmers' networks in Mgeta and Mkuyuni. Names and positions of the current bearers of the steering committee are shown in Appendix 1.

The role of the steering committee is to review all Project activities that have been implemented and those, which have to be implemented. The committee advises and reacts on Project activities as reported to by the Project team. The committee also facilitates coordination of multidisciplinary and multi-sectoral programs. The head of DAEE chairs the secretariat of the steering committee. The Head of DAEE is the final responsibility on behalf of the University.

1.4.2 The Project Team

The Project team implements project activities. The team is composed of the following:

- Project coordinator and his assistant,
- One project accountant,
- Project secretary,
- One agricultural field officer,
- Five agricultural field officers in agriculture and livestock production all seconded from DALDO's office,
- One cooperative field officer seconded from district cooperative office,
- One community development field officer seconded from district council,
- One agricultural field assistant in livestock,
- Four field assistants recruited from local farmers, and
- Two project drivers.

Each member of a project team is responsible to a specific activity carried by UMADEP. The team meet once every month to review and plan activities. The monthly meeting for the Project team provide opportunity for each member of the team to report on the activities already done and those which will be done. The team discusses, gives recommendations and advises on the presented activities.

This provides opportunities for close monitoring of implementation of the activities, determine attainment of objectives, exchange experiences among staffs and monitor performance of all staffs. Current names of the Project team, their position, responsibilities and qualifications are shown in Appendix 2.

1.4.3 Donor partners

Activities undertaken by UMADEP required substantial financial input. UMADEP have solicited financial support from various donors to meet those requirements. A total of TShs. 374,894,995.17/= have been granted to UMADEP by donors as indicated in Table 1 to enable execution of project activities.

Table 1: Grants for UMADEP activities

DONOR AGENCY	SPONSORED ACTIVITIES	Period	AMOUNT GRANTED (Tshs.)
CIMADE (EU & French government)	<ul style="list-style-type: none"> • Technical assistance (Horticultural) • Running costs • Equipment 	1993	
Swiss Tanzania Trust Fund	<ul style="list-style-type: none"> • Farmers group activities • Local staff salaries • Micro financing • Animal production • Food processing • Input supply • Tree nurseries • Animal traction 	1995-1999	55,896,000.00
ICCO	<ul style="list-style-type: none"> • Farmers training • Staff training • Center for farmers and agriculture 	1996-2000	40,686,500.00
Intermón	<ul style="list-style-type: none"> • Dairy goat Mkuyuni • Draft animal power Mvomero 	1997-2000	37,354,729.00
Christian Aid	<ul style="list-style-type: none"> • Extension and research activities • Fruit tree nurseries • Mountain agriculture • Dairy Goat activities • PRA and farmers' groups support • Bridge construction • Micro financing 	1995-2000	71,400,015.82
Japanese Food Aid	<ul style="list-style-type: none"> • Mgeta road 	1998-1999	109,000,000.00

Counterpart Fund	rehabilitation phase I and Phase II		
French Food Aid Counterpart Fund	<ul style="list-style-type: none"> • Construction of Mgeta Center for farmers and Agriculture 	1993-1997	26,470,000.00
RSPB	<ul style="list-style-type: none"> • Tree nursery and tree planting 		3,462,000.00
DOF	<ul style="list-style-type: none"> • Environmental conservation • Sustainable agriculture • Income generation activities 	1998-2000	30,625,749.25
FPH	<ul style="list-style-type: none"> • Workshops and networks support. 	1990-1994	

Most of sponsorship contracts have achieved more than 90% of implementation. UMADEP has managed to accomplish a wide range of development activities as will be explained later. Some donors such as Christian Aid, Intermón, Tan-Swiss and ICCO have renewed sponsorship contract to UMADEP.

Some donor policies may have limitations for projects dedicated to holistic community development activities like UMADEP. Such policies, which are enforced by some donors, include activity specification or location specification or non-provision of operation expenses. Working with multiple donors has enabled UMADEP to turn these donor policies into opportunities rather than threats.

Also working with multiple donors has entailed intensive reporting to diverse reporting formats and diverse financial management systems. This has been a vital opportunity for UMADEP to strengthen capacity for financial handling information. Working with multiple partners has reduced dominance of individual donors on UMADEP activities.

1.4.4 Collaborating partners

Partners who collaborated with UMADEP are shown in Table 2 Activities for which they collaborated and the periods of cooperation are also shown.

Table 2: Partners worked with UMADEP

PARTNER	ACTIVITIES COLLABORATED	Period
District Agricultural and Livestock development office (DALDO's office)	<ul style="list-style-type: none"> • Provided Agricultural extension staff working in the Project area 	1994-2000
INADES Formation	<ul style="list-style-type: none"> • Farmers and staff training • Publication and promotion 	Occasional. No formal contract
AMKA	<ul style="list-style-type: none"> • Promotion of solar drying technology 	1998-2000

Village GOVT	<ul style="list-style-type: none"> • Organizing village meetings • Facilitating publicity and campaigns 	Through out
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These partners have been important to UMADEP in execution of the Project activities. Their strengths and weaknesses are discussed.

i. DALDO's office

DALDO's office released some of her staff in the Project area on secondment to UMADEP as can be seen in a list of UMADEP staff in Appendix 2. UMADEP adapted participatory approaches in the extension system laid down by the government extension systems. The aim for this adaptation was aimed to enable staffs to work much more closely with farmers than they used to work under DALDO's authority. Also UMADEP provided working facilities to her staff. Eight motorcycles were allocated to field staff. Salaries to seconded staff were complemented by 80% of salaries paid by the Government. These facilities aimed at enhancing staff working morale and improve extension efficiency.

ii. INADES Formation

This is a multi national NGO having substantial experience in development activities. INADES have collaborated with UMADEP in publication of training materials such as booklets and posters.

iii. AMKA

AMKA is an organization that is specialized in Small and Medium Enterprises (SME) development. AMKA is Swahili word that means awareness. It provides opportunities for primary producer groups in the sector of food processing, handicrafts and light engineering. The strategic goal of AMKA is poverty alleviation through fair trade. UMADEP has collaborated with this partner in promotion of solar dried fruits technology. AMKA facilitated access to experts in solar drying technology and in promotion of solar dried fruits produced by farmers working with UMADEP in Mkuyuni.

iv. Village Governments

Participation of village governments in executing UMADEP activities has been to facilitate and organize village meetings for public seminars and campaigns. They guarantee residence of UMADEP staff and allowed establishment of local offices and demonstration plots. However, UMADEP have been careful in handling the weaknesses of the village governments.

The local communities consider most of village governments weak. The communities allege that village leaders are irresponsible to development. Cases of imbursement

allegations to village leaders are common. This has been a big challenge to UMADEP. UMADEP have faced this challenge by making a way through without much reliance on village leaders as explained by UMADEP staffs in Box 1.

In some villages this situation has made village leaders to be non-active in development activities supported by UMADEP. They only observe what UMADEP does in their villages but they do not bother to know about the activities as quoted from the village chairman for Mfumbwe in Box 2. Some times they confuse objectives or approaches of different projects working in their villages. For example the Kibwaya chairman could not distinguish between research approaches and development approaches of projects working in the village (Box 2). Faculty of veterinary is doing research on indigenous chicken in Kibwaya village.

1.5 Documentation process

The documentation process involved search of background information about the project from literature and reports about the project area. Information on the approaches and the activities conducted was obtained from project reports and from individual informants. A fieldwork was conducted to observe activity achievements and impacts on ground. Several informants were contacted as shown in Table.... In general sources information were in three categories that included:

- i. Reports, publications and thesis about the project written by students, researchers and project staff. Bibliography of the documents is included at the end of this report.
- ii. Semi structured interviews with farmers who adopted project innovations, non adopter farmers and government leaders in the project area. Table 3 present number and category of informants.
- iii. Structured and semi structured interview with project staffs.

Table 3: Number and category of informants

Division	Active in UMADEP activities		Non Active in UMADEP activities		Government Leaders	Network leaders		Group leaders	
	M	F	M	F		M	F	M	F
Mkuyuni	34	28	12	4	5	1	0	9	7
Mgeta	39	32	7	3	3	2	1	7	5
Mvomero	25	13	3	0	1	0	1	5	2
Total	98	73	22	7	9	3	2	21	14

2. PROJECT CONTEXT

2.1 Introduction

The Project operates in three divisions of Morogoro rural district. These are Mgeta Division, Mkuyuni Division and Mvomero Division. The divisions have distinct contrast in terms of location, physical features, climate and production systems. Some similarities exist between Mkuyuni and Mgeta divisions in terms of topography, land resource and social welfare, and culture. There is a distinct contrast in religious belief between Mkuyuni and Mgeta divisions. Both Mkuyuni and Mgeta Division are within the Uluguru Mountains. Mvomero Division is unique among the three divisions, as this division is not in the Mountains and lies in the lower plains of the Wami river basin. Figure 1 is the map of Morogoro rural district, which shows relative locations of the divisions. The following sections provide contextual description of the divisions.

LOCATION MAP HERE

2.2 Location, physical features and climate

2.2.1 Mkuyuni Division

Mkuyuni Division is located on the eastern side of the Uluguru Mountains in Morogoro rural District. The two wards Mkuyuni and Kinole in which UMADEP works are about 30 km away from Morogoro town. The division makes the North Eastern border with North Uluguru Mountain Forest reserve. Topography of this area is hilly with few patches of flats along valley bottoms. The altitude ranges from 300m a.s.l to over 1800m a.s.l.

The climate in Mkuyuni division is generally tropical humid at lower altitudes and subtropical at higher altitudes. Total annual rainfall amount ranges from 1300mm to 2900mm. The area experiences very short dry seasons (less than 2 months in a year). This makes the place to be almost evergreen throughout a year. Main tributaries of the Ruvu River originate from the Uluguru forests and pass through the division.

2.2.2 Mgeta Division

Mgeta division is located on the Western side of the Uluguru Mountains. It is about 40km from Morogoro town. It is adjacent to the both Uluguru north and south forest reserves on the West. The topography is hilly with literally no flat areas. Altitude ranges from 300m a.s.l at the foot of the mountains near Morogoro

Town, to over 2000m a.s.l near the forest reserves. The furthest ward in which UMADEP works is Kikeo.

The climate is subtropical with low temperatures, which may go down to 10°C. The area experience long dry periods of about 5 months in a year. However, the place is generally rich in stream water originating from the forest reserves. The Mgeta river originate from the North western side of the forest reserve and collect the majority of water from streams draining through Mgeta Division. The river joins the Ruvu river East of the Uluguru Mountains.

2.2.3 Mvomero Division

Mvomero Division is within flood plains of the Wami river borders with the South Eastern feet of the Nguru Mountains. It is located about 70km north West of Morogoro town along the Morogoro Dodoma highway. The land is generally flat at about 400m a.s.l.

The climate in Mvomero ranges from tropical savanna to semi-arid. It experiences a bi-modal rainfall pattern with short rainy season in November to January and long rainy season from February to June. The short rainy season is becoming unreliable for crop production. The area is generally dry with limited water sources.

Natural land cover still exists in un cropped lands. Grasses and acacia trees dominate the land cover. There are no planted trees except around residential areas. Homesteads are clustered in villages.

2.3 Demography

Population density in the Uluguru Mountains is over 150 persons per square kilometer in both Mgeta and Mkuyuni divisions. The density is much lower than that figure in Mvomero division. Population increase is about 6.5% per annum. The active labor age group is about 37% to 45%. School age children and below are about 41% to 51%. According to 1988 census, projected populations in Mkuyuni, Mgeta and Mvomero by the year 1998 were expected to be 58,140, 50,411 and 64,319 respectively.

2.4 Culture and social values

The majority of the people in the Uluguru Mountains are the Waluguru. There exist some differences between the Eastern and the Western communities. The main similarities are the language, traditional ceremonies to mark maturity of youth

especially girls, matrilineal practices especially in passing over land ownership and recognition of the traditional chiefs.

Ceremonies for the youth (girls) have been adapted into the modern religions, Christians and Moslems. The ceremonies are so important that they make part of important expenditures in households. Traditional chiefs are still powerful in the East Waluguru. The Kingalu chief is highly respected in Kinole, Kiloka and Bigwa wards. In those wards he can influence community decisions. He has some influence in Mkuyuni and Matombo ward but to a lesser extent than the former three wards. The chief conducts traditional rituals and is capable of influencing decisions in the communities. They are believed to be rainmakers. In Mvomero division, traditions and culture are not strong perhaps due the influence of immigrants.

Majority of the people in the Eastern Uluguru is Moslems and those in the Western are Christians by majority. In Mvomero the population is more or less distributed equally between the two religions. However, the pastoral communities are mainly non-believers of the modern religions.

The community in the Uluguru Mountains exercise matrilineal practices in passing of land ownership to children. More than 40% of the land in the Uluguru Mountain is controlled clans. No individual in a clan who has absolute right to the land owned by the clan. This practice influence land use practices. For example a person can not make long term investments on a clan owned land such as planting coconut or perennial crops. However, the land under clan ownership is decreasing. Clans sell off their lands as a convenient way of distributing the land among clan members in case of disputes over the lands.

2.5 Social services

2.5.1.1 Education

Primary school education is the most widely provided social service in the project area. At least every school age child has an opportunity to attend to school within few kilometers. However, the quality of this service is very poor. The ratio of teachers to pupils is very low. Majority of school poor unsafe buildings with too few or no desks.

2.5.1.2 Health services

Health service is not adequate in the project area. Most of the people have to travel or carry their patients over long distances over 10kms for basic medical attention. The few available dispensaries or clinics are usually short of essential

drugs and medical personnel. Traditional midwifery and healers are considered helpful. The forests are considered to be rich in medicinal plants and herbs.

2.5.1.3 Water supply

The project area has plenty of water sources. However, majority of households is not accessible to clean and safe water. Provision of tap water is limited to few villages in Mgeta and Mkuyuni. The nature of the topography makes many households to travel up hills with buckets of water especially in Mgeta division where majority of homesteads is located at hilltops and mid slopes.

2.5.1.4 Wood products supply

Wood and timber products are very important in the livelihood of the people in the Uluguru Mountain. The entire population in Mgeta and Mkuyuni divisions depend on fuel wood by 100% for cooking and other heating activities such smoking banana, bricks burning and brewing. Kerosene is mainly used for lighting. Timber products are used in building constructions for reinforcing mud walls and roofing.

Wood products have become scarce commodities in Mgeta and Mkuyuni divisions. Women and children have to walk long distances over 5kms in search of fuel wood. In Mkuyuni some households fell down old fruit trees especially mangoes trees for fuel wood. Unrestricted land available for wood and timber supply in the two divisions has literally been depleted. Encroachment to reserved forests in search of fuel wood and timber is very common. Some waterfalls exist in the area, which may be potential for alternative energy supply in the area.

Some villages in Mvomero division are connected to the national grid of electric supply. However, due to high tariffs this source of energy is mainly used for lighting and the majority of the community members cannot access it. Fuel wood in Mvomero is not scarce. Charcoal from wood is also available in the area at reasonable costs.

2.5.1.5 Communication and transport

Road access is a problem in many villages in the area. Majority of the villages cannot be reached during wet seasons. The available roads are poorly constructed with limited provision of drainage and with notorious slippery portions. Other villages are not accessible at all. In Mkuyuni Division especially in Kinole ward harvesting season for pineapple mango and oranges coincide with rainy seasons. The situation has serious impact on marketing of those perishable products. During rainy seasons farmers are forced to sell their products at lower prices. For example a pineapple

worthy 500/= in Morogoro town can be bought at 50/= on field during rainy season. The same situation exists in Mgeta Division for fruits and vegetables.

2.6 Farming systems and land use

2.6.1 Mkuyuni Division

Semi perennial and perennial crops produced mainly for cash dominate the farming systems in Mkuyuni. Some cereals are grown for food and horticultural crops mainly grown for cash. Crops grown in the area, in order of livelihood importance, are banana, pineapple, coconuts, fruit trees (oranges, mangoes and jack fruits), yams, Maize, upland rice, spices, vegetables, and coffee. It appears that coffee was an important cash crop in the area in the past 20 years. Production of coffee has been neglected due to marketing problems inherent to malfunctioning of the cooperative societies.

Many households still maintain shifting agriculture. Generally, the pattern of land use in the area is shown in Figure 2.

LONGITUDINAL SECTION OF LAND USE PATTERN HERE

Descriptions of land use pattern are as follows:

- Residential areas are in a form of clusters. The clusters of homesteads are scattered from lower to mid slopes of the mountains. Clustering of homesteads was influenced by villageazation operation in mid 1970s.
- Perennial crops such as coconuts, fruit trees, some bananas and yams are grown around homesteads. Some households have fields grown with perennials.
- Pure stand pineapple fields, maize and upland rice is located between mid-slopes to upper slopes.
- Banana fields are located in the lower slopes along the valleys. However, banana fields tend to extend from the valleys to the upper slopes the more the valleys are closer to the forests.
- Two varieties of yams are grown in the area. One variety is grown in the upper slopes and the other is a wetland variety grown in valley bottoms.
- Poorly managed coffee plants are scattered everywhere from around homestead to fallow lands.
- Patches of treeless lands extend from boundaries of residential areas to hilltops. These patches are larger the further from the forests. The patches used to be banana fields. They were left to fallow after the yields from banana

deteriorated. Some of these patches are used for production of maize and upland rice. Other patches are actually abandoned pineapple fields.

- There are patches of flat lands along valley bottoms. These patches are used for production of dry season maize, vegetables and rice. The patches are commonly flooded in rainy seasons.
- Forest trees, indigenous or exotic are not common in residential areas or in farmer's fields. Portions of woodlots may be seen in some of fallow lands.

Apart from engaging in farm production other farmers are engaged in petty trading. The most important activity is smoking bananas and transporting to Dares salaam for selling. Shop keeping and restaurant businesses are important. Some few households keep indigenous goats breeds for meat and for selling. The goats are tied and sleep outside the residential houses. Droppings from goat are swept and thrown away.

2.6.2 Mgeta Division

The most important farming system in Mgeta division is production of vegetables especially cabbages. Other common vegetables include carrots, cauliflower and Beatrice, beans and green peas. Temperate fruits such as peaches, plums, pears, and apples are also grown in the area. Production of Irish potatoes and tomatoes has gained importance in the last three years. Maize production for food is also an important system in the area. Some wheat is also produced. Banana, yams and some cassava are grown around homesteads and along valley bottoms. About 30% of the cultivated land is under this production system. In fact the other lands, which is not under the system, is mainly grown with maize and rain fed vegetables. Fruit trees are grown on boundaries of crop fields and around homesteads. Fig.3 show land use pattern in Mgeta division.

Longitudinal section for land use in Mgeta HERE

Dry season production of vegetables using traditional irrigation systems is very important. It is perceived that a household engaged in dry season production has better prospects. Actually irrigated products especially cabbages have literally no season.

Arable land is intensively used in Mgeta Division. There is literally no land for expansion in Langali and Tchenzema wards. Very little opportunity exists for land expansion in other wards. Exotic trees planted within residential areas and in some developed woodlots dominate the little land cover in the area.

2.6.3 Mvomero Division

Maize and rice production is dominant in Mvomero division. Some pastorals have migrated into the area to take advantage of the vast pastureland available. Dry season vegetable and tomato production is exercised in flood valley bottoms. It appears that cotton used to be an important cash crop grown in the area in the past 20 years. Rice is grown in flood plains while maize is grown in well-drained areas. The longitudinal section of area showing land use pattern is shown in Fig.3. Table 4 show cropping calendar of Mvomero Division.

Large herds of cattle are kept in the area. There is no distinction of pastureland and croplands. Livestock graze on crop residuals after harvesting. During rainy seasons the herds are shifted to non-cropped fields. That is the period when non-cropped fields are rich in green pastures.

This practice causes a lot of disputes between livestock keepers and farmers. Livestock keepers prefer to graze their animals on residual crops because they usually realize good milk production and that is the period when natural pasture is scarce due to drought. However, farmers perceive this practice differently. Some farmers consider grazing large heads of animals in crop fields cause soil erosion and compaction of land. However, the land tenure system in the area, which is semi communal, denies these farmers from protecting their fields from being grazed. Other farmer's benefit from livestock grazing in their fields through exchange with FYM from livestock keepers. Others do not realize any problem as long as the animals do not graze on un-harvested crops.

3. PROJECT APPROACHES

This chapter describes the approaches applied by UMADEP. The discussion on the performance of the approaches to the activities for which they were applied is also provided. The main approaches, which UMADEP applied in implementing activities, are:

- i. Participatory rural appraisal
- ii. Participatory trials and demonstrations
- iii. Seminars and training
- iv. Campaigns
- v. Farmers groups and networks
- vi. Farmers exchanges and visits
- vii. Video shows
- viii. Posters and booklets
- ix. Follow up

3.1 Participatory rural appraisal

The objectives of the PRAs were to build partnership between the farmers and the project, involving farmers in assessing existing problems and opportunities in the target communities, and to establish joint development action plans between UMADEP and the communities. PRA aim at empowering the communities with the ability to identify and prioritize problems, and to identify and mobilize opportunities for solving the problems. The project goal for carrying out PRAs is to create sustainable environment for the innovation promoted by the project in the area.

3.1.1 PRA Process

PRA process include building rapport in the project area, and organization and execution

i. Building rapport

Before and during PRA process, UMADEP familiarize with the Uluguru communities in a manner that the ill perception on previous approaches such as that used for promoting terraces in Mkuyuni and Matombo during the colonial period do not become barriers. UMADEP interventions are related to land use and resource management. For example in an attempt to suppress that perception and build acceptance to the communities in Kinole ward Mkuyuni division, UMADEP supported traditional rituals performed by the 'Kingalu', a recognized traditional chief of the

eastern Waluguru. UMADEP also supported youth recreation activities especially football clubs.

ii. Organization and execution

Village general assemblies (meetings) are used as entry points. Project staff had opportunities to address the communities on the scope and objectives of the project. It is in the village meetings where communities develop focus groups to collaborate with project staff in PRA activities. Each village from one focus group. The groups are composed of one farmer from each hamlet and a multi-disciplinary team from project staff. Farmers are key informants and project staff facilitate PRA exercises. PRA tools used included transect walking, social and resource mapping, seasonal calendars, link diagrams, timelines and semi-structured interviews.

For example UMADEP conducted PRA in Tandai village in 1994. The first step was to influence the communities especially the Chief Kingalu on UMADEP goals and PRA objectives. On 19/1/1994 UMADEP attended a village general meeting and got an opportunity to introduce PRA program to the villagers. About 150 villagers attended the meeting including the Chief Kingalu. The meeting appointed 7 villagers (farmers) one farmer from each hamlet making up Tandai village to join in a PRA team. Appointed farmers were three ladies and men. The team composed of 7 farmers and 4 multidisciplinary UMADEP staffs.

On 25/1/1994 the PRA team drew a village map. Farmer members of the team were resource people in that exercise and UMADEP staffs were moderators. The map indicated village boundaries, rivers, vegetation, residential areas, roads and main footpaths. The map was drawn on the ground and features were marked by objects such as tree leaves stones charcoal powder, wood ashes to mention a few. The map was transferred on manila sheets for record and reference. The team identified from the map five routes for transect walks to enable the PRA team to reach all features, which were considered important in the village.

From February to May 1994 the team conducted transect walks. Farmers guided the routes and provided information about the area at each location. Other farmers met on the way during walks also provided useful information. The team recorded the history, farming systems, natural resources, weather, traditions and customs, opportunities and problems existing in the area as they went along the route. The team presented gathered information during the walks on flip sheets diagrammatically using symbols and cartoons.

On 9 September 1994 the PRA team presented results in a village meeting. The Chief Kingalu was present in the meeting. The team performed a role-play to demonstrate important historical events in the area. The play was organized and performed by farmer team members. Other results presented were village resource maps, land use and diagrammatic representation of opportunities and problems in the area. Appendix presents a summary of opportunities and problems found in Tandai during PRA. Similar PRAs were carried by UMADEP in the villages indicated in Table 4.

Table 4: Villages and dates in which PRA were conducted

Division	Ward	Village
Mkuyuni	Kinole	Tandai
		Kalundwa
	Mkuyuni	Kibwaya
		Mfumbwe
Mgeta		Maguruwe
		Bunduki
		Bumu
		Kibigiri
		Kododo
Mvomero	Mvomero	Matale
		Msufini

3.2 Farmers' Participation trials and demonstrations

UMADEP involve farmers in development, testing and demonstrating performance of some innovations through demonstration plots established in the project area. The main objective of this approach is to provide farmers with opportunities to themselves identify innovations suitable for their farming systems and enhance their confidence in innovating and testing new technologies. Demonstrations and trials also provide practical training opportunity for farmers and change agents get opportunity learns useful experiences from farmers. This approach enable the project to merge farmers indigenous knowledge with new knowledge taking into account the current challenges presented by socio-economic and ecological changes in the area. Trials target innovative and progressive farmers who are willing to participate in testing new innovations.

UMADEP have established two plots for demonstrations and trials one in Nyandira village in Mgeta Division and another at Tandai in Mkuyuni division. Trials and demonstration are also conducted in fields of participating farmers.

Farmers are involved in all stages of demonstrations of innovation or trials as co-researchers to project staffs. All farmers are allowed to visit the plots at any time. Farmers' field days on the plots are organized to give farmers opportunities to make evaluation on the results from trials or demonstrations.

For example farmers participated in potato production trials on demonstration plot and others in their own fields in Mgeta Division in 1995 to 1997 seasons. Farmers who participated on demonstration plot were 25 and those who participated in their own fields 34. The purpose of the trials was to identify suitable ridge sizes, suitable type and rate of fertilizers and manure, and suitable variety. Farmers' traditional practices were compared to new practices during the trials. Farmers participated in all stages from land preparation, sowing, weeding, fertilizer and manure application, pesticide application and harvesting. Those who did in their fields replicated all practices applied on the demonstration plot. Farmers and UMADEP staff visited all trial plots regularly to record and make interpretation to any observations in the plots.

3.3 Campaigns

Campaigns aim to sensitize and create awareness of farmers who are not well informed or have no idea about some practices which are identified by other farmers (during PRA, network meetings, seminars and exchange visits) to be useful in production activities in the area. Campaigns also target those farmers who unknowingly adapt incomplete innovations after seeing from neighbors or demonstration plots. Strategies applied in campaigns are public meetings and posters. However, campaigns have been widely applied in promotion of dairy goats. In Mkuyuni 669 farmers were reached during were reached in promotion of dairy goats in Bunduki ward Mgeta division in the same period of 1998 - 2000.

3.3.1 Village meetings

Campaigns in village meetings target all categories of farmers. Village meetings are organized by UMADEP staff in collaboration with farmers knowledgeable on the practices to be campaigned. Public notes are released to all

Box 1

"I got motivated to engage in vegetable production after viewing a video in which I saw fellow farmers in Zanzibar producing a lot of vegetables in climate conditions which I guess are similar that in our area. I was impressed to see in the video my neighbours who went to visit Zanzibar farmers. They have been helpful to me when I started vegetable production"

Mr. Rajabu Kondo a farmer at Kibwaya when interviewed during documentation exercise

farmers through community leaders to invite all farmers for a meeting. The notice prescribe the objective of the meeting date and place for the meeting. Effective campaigns are conducted at hamlet levels. Video shows sometimes are played in campaign meetings. Usually the videos show other farmers else where who have adopted practices that are promoted in the campaign. Video plays that show fellow farmers who are known in the village where the campaign is conducted are said to be more stimulating (Box1). UMADEP take videos during some of the farmers' exchange visits which farmers from the project area pay to farmers in other areas. For example video were taken during visits in Lushoto in 1997 and in Zanzibar in 1994. Forty eight farmers had an opportunity to watch one video show in Mkuyuni and 102 farmers watched two video shows in Mgeta division.

3.3.2 Posters

The use of posters aim at sensitizing farmers who are not willing to attend meetings or are not willing to ask others about new ideas. Posters are also used as training materials. Posters are designed to provoke curiosity on the illustrated innovations and disseminate knowledge on new or practiced techniques.

Table 5: List of posters and year of publication

Subject	Year of publication
Safe transportation of pesticides	1993
Handling of agricultural chemicals	1993
Safe use of pesticides	1994
Improved practices in pineapple production	1994

For example some farmers in Kinole ward Mkuyuni division have adapted, on their own initiatives, contour strips pineapple production introduced by UMADEP. Visits into their fields revealed that pineapples were planted on straight rows across the general slope but actually not on contour lines. This could promote serious soil erosion from the fields. The reason for not asking for innovation details given by some of these farmers was that the innovation seemed too simple to amount for involvement in meetings and groups. Others felt ashamed of asking fellow farmers UMADEP realized this situation and designed a poster to demonstrate correct techniques for the practice. Similar posters were designed for various purposes as shown in Table 5.

3.4 Training

Approaches used by UMADEP in training activities include seminars and workshops, short courses, exchange visits and tours, and publications. Farmers themselves

identify training needs. Seminars and workshops originate from farmers themselves. Farmers' needs for training are picked from farmers in various ways including recommendation from PRAs or during visiting demonstration plots or field days, and resolutions from network meetings, previous exchange visits, seminars and workshops.

Some times project staff may organize training for the purpose of rectifying recommendations for an innovation already practiced by farmers. This usually happens if project staff identify some farmers who have picked incomplete recommendations or when new useful results have been observed from demonstration or at farmers fields. Training is conducted to farmers who indicate willingness to adopt an innovation.

3.4.1 Seminars and workshops

Seminar and workshops are approaches, which UMADEP apply in disseminating innovation messages to farmers. Seminars are targeted to all farmers who have some ideas and wish to know much about specific practices on production. It also targets those farmers who adapt incomplete innovations after seeing from neighbors or demonstration plots.

According to UMADEP seminars and workshops are usually conducted together due to participatory nature of UMADEP approaches in training. Usually UMADEP conduct seminars with farmers to inform farmers on specific issues. After presentation of subject matters participants are given opportunities to discuss and provide their experiences on the subjects. Discussions are moderated until common understandings are reached about the presented subjects and the related experiences from participants. For example in 1999 UMADEP conducted a seminar on improved practices on pineapple production in Mkuyuni. Fourteen farmers from six villages attended the seminar cum workshop in Tandai Village. Participants of the workshop were farmers who have attempted improved practices in pineapple production. The purpose were to gather farmers experiences from the new practices and to provide training on aspects which farmers did not follow correctly. Farmers presented successful inter cropping practices in pineapple fields grown under improved practices. Among the aspects found to require training included seed selection and contour lay out. Training was conducted at the project managed demonstration plot at Tandai.

3.4.2 Short courses

UMADEP conduct or sponsors short courses for farmers in order to develop local farmer experts on specific technology. This approach target farmers who have

some knowledge and indicate a certain level of innovation on specific practices in production activities. Selection of farmer trainees base on ability to participate in theoretical and practical training an willingness to undergo training away from the village. Advertisement for training opportunities are made through networks, groups, and public notices.

All farmers willing to attend the training register to UMADEP field staff. UMADEP provides informal interview to the registered through structured questionnaires to screen those who meet required criteria and remain with a number of farmers equal to available opportunities for the course.

For example in 1994 after PRAs UMADEP farmers to attend a three months course on improved fruit trees at SUA horticultural unit. Advertisement for the course was announced in network meetings in Mkuyuni and through public notices placed in all villages in Mkuyuni and Kinole wards. Finally nine farmers were selected to attend the training. In 1994 ten farmers attended a short course in Kenya at the Kenya Institute of Organic farming. Five farmers were from Mgeta division and the other five from Mkuyuni division. One extension staff accompanied the farmers in the course, which took six weeks. During the course farmers learned several aspects on organic farming.

3.4.3 Publications

Details recommendation packages of some practices have been documented in from of booklets. The booklets are training materials targeted to farmers who wish to have reference materials on specific practices. The booklets are sold to interested farmers and some copies are distributed free to farmers participating in seminars and workshops related to subjects in the booklets. In collaboration with INADES Formation (T) UMADEP published six booklets on various practices as shown in Table 7. All booklets are published in Swahili.

Table 6: List of booklets and year of publication

Subject	Year of publication
Mountain agriculture Part One	1993
Mountain agriculture Part Two	1994
Rural Economy	1999
Challenges of liberalized marketing to a farmer	1998
Pineapple production	1999

3.4.4 Farmers' exchange visits and tours

Some farmers are trained best when they visit other farmers who practice the innovation of interest. Visits may be within the village or area to distant places. It is an opportunity for farmers to live together for a couple of days discussing common problems, learning each other and creating personal relationships. UMADEP have organized several farmers' exchange visit and tours in various places within the project area and outside including Dabaga and Njombe in Iringa region, Lushoto in Tanga region, Tarime in Mara region, Kongwa and Mpwapa in Dodoma, Babati in Arusha region, Same and Mwangi in Kilimanjaro region and in Zanzibar. Also farmers working with UMADEP have hosted several farmers visiting from other areas such as Dodoma, Iringa, Singida, Arusha, Kilimanjaro, Tanga and Coast regions. About 70% of exchange visits on Credit and Savings Banks were of farmers from outside the project area visiting farmers working with UMADEP. Visits in other activities were mainly of farmers' from the project area visiting other farmers outside the project area. Many useful information have been exchanged between farmers during the exchanges.

3.5 Farmers groups and networks

3.5.1 Farmers' groups

UMADEP encourage farmers to form action groups with the following objectives:

- To enhance farmers' participation in planning, implementing and monitoring of development activities
- To establish sustainable information exchange organs among farmers and between farmers and experts or change agents.
- To empower farmers to institutionalize development activities

UMADEP is working with 16 groups of farmers in Mkuyuni Division, 18 groups in Mgeta Division and 14 groups in Mvomero Division. Some groups were formed before UMADEP started to work in area. However, in all cases farmers groups originated from progressive founder members after being influenced by extension agents or members of other farmers' groups or after attending seminars or training or farmers exchange visits. List of groups working with UMADEP, number of members, and origin of the groups is shown in Appendix 3.

The most important features in the groups working with UMADEP include having common goals, and exchange information about problems and alternative solutions. However the groups may differ in the way members cooperate in implementing alternative solutions. Essentially groups working with UMADEP can be put in four

categories depending on the way members execute activities in implementing alternative solutions to achieve their goals.

3.5.1.1 First group category

The first category is that in which group members perform all activities collectively. They contribute cash and/or labor capital and share the benefits at predetermined ratios depending on members' contributions to capital. Groups working with UMADEP that are in this category are shown in Table 7. The table shows the groups and the activities they undertake the current number of members. The current status of the groups is also indicated as good, moderate or poor. Good means the group is operating successfully as planned and number of members are increasing. Moderate means either the group is still operating but number of members has decreased or group is not working as planned but members have taken up activities individually. Poor means activities for the group have deteriorated, number of members has decreased and very few or no member has not taken up the activities.

Table 7: Groups of the first category

Division	Group Name	Activity	Number of Members	Current status
Mkuyuni	Zinduka	Micro financing	119	Good
	Mbeteni	Maize production	11	Poor
	Soko group	Establishment of a market place and construction of market structures	40	Good
	AMM Mkuyuni	Micro financing	45	Moderate
	Mgendege	Input supply	16	Poor
Mgeta division	Tchenezema Bank	Micro financing	86	Good
	Langali Bank	Micro financing	74	Good
	Twikinde	Transport, Input supply and food processing	86	Poor
	Twiyave	Veterinary services	11	Poor
	Bunduki bank	Micro financing	45	Moderate
Mvomero division	Ukombozi-Msufini	DAPT and vegetable production	10	good
	Hembeti Bank	Micro financing	60	Moderate

	Mvomero Bank	Micro financing	43	Moderate
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A typical example is Zinduka group in Mkuyuni Division. Their goals are to develop members managed credit and savings facilities. Their objectives are to establish locally managed saving and credit facilities. Members of this group have managed to establish a savings and credit bank at Tandai village. Members have raised the capital from contributions in cash and labor. Cash shares were worth 2000/= each. The group has raised 898,600/= from shares bought by 119 members. Members also contributed labor worth 1.2m/= during construction of the bank building erected at Tandai village. Labor contribution was valued and added on members share values. UMADEP assisted the group with industrial building materials worth 2.3m/= for the bank building. Other groups in this category are shown in Table 9 together with the activities they perform. The good status groups indicate increasing number of members and active in the group activities. Moderate status groups indicate decreasing number of members and/or members have become less active to group activities. Poor status group indicates non-active members or dispersed group.

3.5.1.2 Second group categories

Groups that fall in this category are shown in Table 9. Members of group in this category meet to share experiences and exchange knowledge about common activities but each member performs the activities by his/her own. Members pay regular field visits among each other. They normally invite UMADEP staff to accompany members during such visits. During the visits fellow members visit two or three members every month.

All group members in this category participate together in training or exchange visits. Some times if resources limit participation of all group members for a distant seminars or training or exchange visits members appoint representatives to represent others. When representatives come back they train others on whatever they gained in the seminars or training or exchange visits.

A typical example in this category is Badilika group in Mkuyuni Division. The objectives of the group are to share experiences in improved Mountain agriculture and disseminate beneficial practices to other farmers. Each member practices at least one or more practices in improved Mountain agriculture in his/her own field. They practice contour strip pineapple planting, agroforestry, and organic farming.

During one farmers' visit to a fellow member of Badilika group Mr. Ndatila group members advised him to add one or two row of pineapples for each strip to increase plant populations and reduce soil erosion. They however appreciated his innovation in grafting fruit trees. They saw a flowering mango tree at age of three years. Mr. Ndatila explained to visitors the grafting process. During that visit they realized that they all faced problems of poor soil fertility. The group presented the problems in the following network meeting. A request for making exchange visit to expert farmers and seminars for that purpose was forwarded to UMADEP and was implemented accordingly.

Table 9. Groups of the second category

Division	Group Name	Activity	Number of Members	Current status
Mkuyuni	Badilika	Mountain agriculture	16	Good
	Mloseni	Environment conservation	8	Moderate
	Twikalehamwe	Dairy goat	17	Moderate
	Twiyame	Dairy goat	14	Good
Mgeta division	Juhudi	Flouriculture	8	Good
	Nguvu kazi	Banana production	12	Good
	Mshikamano	Capital rising	10	Good
	Twibone	Vegetable production	15	Moderate
	Twilole	Diary goat	23	Good
	Mavumbuka	Promotion of indigenous knowledge on botanical pesticides	6	Good
Mvomero division	Mbugani	DAPT	9	Good
	Mkombozi Luhindo	DAPT	10	Good
	Muungano	DAPT	11	good
	Lekake	DAPT	8	moderate

3.5.1.3 Third group categories

A third category of groups is that which combines features of the first and second category. The groups in this category are shown in Table 10. In the first stages of production activities group members in this category operate exactly as those in

the first category. In the later stages of production depending on the nature of production each member takes his/her portion of work and completes the remaining production process by him/herself and operates as those in the second category.

One groups which is typical to this category is Mwitseni in Mkuyuni Division. Members of this group raised 1000 forest trees and 500 mango trees seedlings in 1999/2000 season. They raised the nursery jointly. They contributed labor and material. Later when seedlings were due for transplanting they shared the seedlings depending on labor/material contribution. They arranged to visit each other to exchange experiences on tree planting in their field. They also exchange labor in making pits for banana. Group members exercise regular visits in their fields like the second group category groups.

Table 10. Groups of the third category

Division	Group Name	Activity	Number of Members	Current status
Mkuyuni	Mwnamsamvu Kidawa	Fruit and forest tree nursery management	13	Moderate
	Mwitseni	Fruit and forest tree nursery management	13	Good
	Lukemo	Fruit and forest tree nursery management	14	Good
	Twiyavile	Food processing	15	Poor
	Sanguleni	Food processing	12	Poor
Mgeta division	Twawose	Dairy goat and livestock input supply	53	Moderate
	Twiyohu	Poultry keeping	14	Moderate
	Mtu na Mazingira	Forest tree nursery, potato production and Energy saving stoves	14	Good
	Tupendane	Forest tree nursery	11	Good
	Kafakoya	Forest tree nursery	5	Good
	Songambebe	Forest tree nursery	6	Good
Mvomero division	Kumekucha	Vegetable production	15	Good
	Juhudi	DAPT	4	Moderate
	Jikwamue	DAPT	14	Good

iv. Fourth group category

The fourth category of groups is that in which members perform voluntary activity to create opportunities for which all members has interest on. Groups in that category are shown in Table 11. One typical group in this category is Lamkeni in Mkuyuni Division. This group volunteer in road maintenance of a 10km road portion from Tandai to Mkuyuni. All members in the group are goods truck loaders. The motive to engage in this activity is enable goods trucks to get in Kinole ward so that they can get opportunity for truck loading. One student from SUA did her special project in Tandai and estimated that 2 to 3 trucks of 7tons each are loaded with farm products from Tandai every day (Munubi, R. 1994). This gives an estimated total earning of 15,000/= per day for group members. Also each truck is supposed to pay to the group 1000/= and passenger minibuses or business cars are charged 500/= as plying fee each trip.

Table 11. Groups of the fourth category

Division	Group Name	Activity	Number of Members	Current status
Mkuyuni	Lamkeni	Road maintenance Tandai to Mkuyuni	30	Good
Mgeta division	Fuku	Maintenance of irrigation water structures	16	Good
	Chimbuchimbu	Road maintenance Nyandira to Langali	30	Good
	Waleke	Mifereji	9	Good
	Tuitze	Road maintenance Nyandira to Tchenzema	46	Moderate

The group has allocated Saturdays of each week for road maintenance. In case of emergency they organize themselves and can work any day to rescue the situation. Penalties are imposed to members not attending for work without justification. Each member contributes 25% of his/her earnings from truck loading to the group. The money is saved in a group account in a local credit and savings bank. The saved money is used to help members in case of emergencies (Sickness or attending funerals of relatives). Some of the money is used in paying for road maintenance activities which need cash such as fueling trucks borrowed from district council to spread gravel on the road. UMADEP work with this group in strengthening institutional capacity, and assist in cost intensive road maintenance. Other groups in this category are shown in Table 11.

3.5.1.4 Comparison of group performance between categories

Analysis of performance of farmers' groups between categories specified above show a significant difference. Performance of groups between categories can be compared from Figure 4. Only 40% of groups in category one are doing well while in other categories majority (over 65%) of groups are doing well.

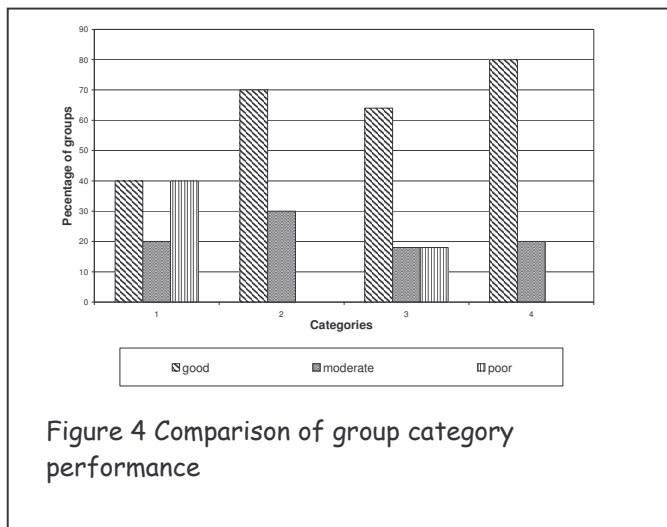


Figure 4 Comparison of group category performance

Also percentage of groups with poor performance in category one is higher (40%) than in other categories (less than 16%). Three most important reasons for relatively poor performance of groups in category one are identified to be:

- Weak management of resources especially finance
- Donor dependence that lead to lack of sense of ownership of group properties
- Lack of members' awareness of their power to control group management.

For example majority of former members of Twikinde group claim to have been disappointed by poor financial management of the leaders. Twikinde used to operate an input shop worthy...../= in 1996 but now the shop is almost out of stock and there is no savings for the groups. Members of the group have literally not realized any returns from group activities although they appreciate that they benefited from availability of inputs on credit and at lower prices compared to other sources. The group is also almost losing their lorry, which is now grounded. It is reported that group leaders mishandled the returns from the lorry to the extent that the group could no longer meet the running costs of the lorry. Most of the groups in this category have been supported substantially by external agents. For example Twikinde was supported...../= for the building and/= for the lorry by UMHODEP. This might have diluted members' sense of ownership of group properties.

The nature of cooperation for groups in category one entails establishment of applicable regulations that can be understood and enforcement by all members every time it becomes necessary. Although almost all groups in category one have established regulations to govern their activities there is evidence that the

regulations stipulated in their constitutions are at best known by leaders only. For example more than 60% of members in bank groups who responded during documentation exercise do not understand their constitutions. During general meetings members are only insisted to know what they are required to for the group like share contributions and participation for group activities. Very little or no efforts are made to make members' aware of their powers to take action against mismanagement. Most the group members perceive that constitutions are made to control members. That is why they do not to have own copies of their constitution. Almost all groups have one copy of constitution, which is at the group office. This situation has promoted poor performance of groups in this category. Members of Twikinde or Mgendege could not take action against mismanagement mainly because they did not know how to go about it constitutionally.

Lack of knowledge on group constitution pose a serious threat on groups that are still performing well (bank groups by majority) in category one. More than 80 % of ordinary members (those who are not leaders) of bank groups indicated ignorance on their constitutions. Lack of knowledge on constitutional have lead to some leaders of groups in category one to monopolize group activities to the extent that other members are considered as being customers. Statements such as our members had so and so problems and not we had so and so problems are common to many group leaders.

It is encouraging that performance of groups in other three categories in the project area is relatively good. However, there is a tendency for many groups especially in category three and four to change their cooperation towards that of category one. For example Mgendege group was a formally a group in category two. They used to meet to share experiences in vegetable production in Mkuyuni division. Later they decided to establish an shop to supply vegetable production inputs. The group changed to category three.

3.5.2 Farmers' groups networks

Farmers' groups working with UMADEP have formed information networks. The networks provide avenues for information and experience exchange among farmers and between farmers and change agents. The networks provide opportunities to UMADEP to get feedback from farmers and make evaluation on the activities carried by the project in the area. Some project activities such as seminars, exchange visits and new innovations are initiated from farmers' networks. Existing networks in the project area are either activity oriented or arial. Farmers' networks in the project area are shown in Table 13:

UMADEP also work closely with the National network of farmers groups MVIWATA. The network coordinates farmers' movements and has members in 16 regions of the Mainland with UMADEP.

Table 12: Farmers' networks in the project area.

NETWORK	ORIENTATION	NUMBER OF ACTIVE GROUPS
Mkuyuni Network	Division	12
Mgeta network	Division	14
Mvibewa	Rural bank groups in Morogoro rural district	7
Mvomero network	Division	10

3.6 Performance of approaches in promotion of activities

i. Mkuyuni division

Records from UMADEP staffs who coordinate project activities show that the frequency farmers' contact was 2979 in Mkuyuni Division as shown in Table 13. However, the number of individual farmers reached by the project may be less because majority of farmers was reached more than once. The number of farmers who are members of farmers' groups in Mkuyuni division is 353. However it was found during documentation exercise that about 30% of farmers' group members are also members of two groups on average. This indicates that there are about 270 farmers who are members of farmers' groups in Mkuyuni Division. Table 14 show that the frequency of farmers' contacts through farmers' groups is 506. Basing on that information it is estimated that the project have reached with about 1600 farmers in Mkuyuni division for the period of eight years. The estimated number of farmers reached by the project is about 10% of the estimated working force (17,000) in the two wards.

Table 13. Frequency of farmers contacts with UMADEP for each approach and the activities for which the approaches were applied in Mkuyuni division.

	Demonstration plots	Booklets and posters	Seminars	Campaigns	groups	Video	Exchange	S/courses	Adopters	Frequency of farmers Contacts
Pineapple production	48	20	120	0	34	0	13	0	68	235

Banana production	59	56	88	0	8	0	22	0	40	233
Fruits and vegetable processing	0	0	74		39	0	22	0	23	135
Introduction of dairy Goats	0	0	111	669	62	0	10	0	37	852
Organic Farming	102	0	103		16	48	12	6	70	287
Tree nurseries and planting	0	0	69		43	0	37	9	289	158
Rural micro financing	0	0	171		164	0	76	0	593	411
Fish farming	0	60	170		60	0	14	0	45	304
Institutional capacity building	0	0	193		80	0	91	0	381	364
Total	209	136	1099	669	506	48	297	15	1546	2979

Farmers who have adopted innovations promoted by the project in Mkuyuni division are estimated to be 1546 (Table 13). This is also about 10% of the working force in the two wards. It must be noted however that not all farmers who adopted the innovations were contacted by the project. Table 14 show the distribution of farmers who adopted through direct project influence and those who have adopted after seeing from fellow farmers.

Table 14: Number of farmers by source of information for each innovation

	Adopters after direct contact with the project	Adopted after seeing from other farmers.
Pineapple production	48	20
Banana production	25	15
Fruits and vegetable processing	23	0
Introduction of dairy Goats	37	0
Organic Farming	52	18
Tree nurseries and planting	154	135
Rural micro financing	275	318
Fish farming	45	0
Total	659	506

The number of farmers adopted through direct contact with the project is less than the estimated number of farmers reached by the project. This is explained by the fact that 669 farmers attended campaign meetings for promotion of dairy goats only 37 farmers adopted dairy goat keeping.

Figure 5 show that UMADEP made contacted farmers most frequently through seminars (1099) followed by campaign meetings (669) and farmers' groups (506). However, the most successful activity in terms of adoption was micro financing activity. About 593 farmers have been engaged in rural micro financing either through membership in bank two bank groups (Zinduka and AMM) or being customers of the banks.

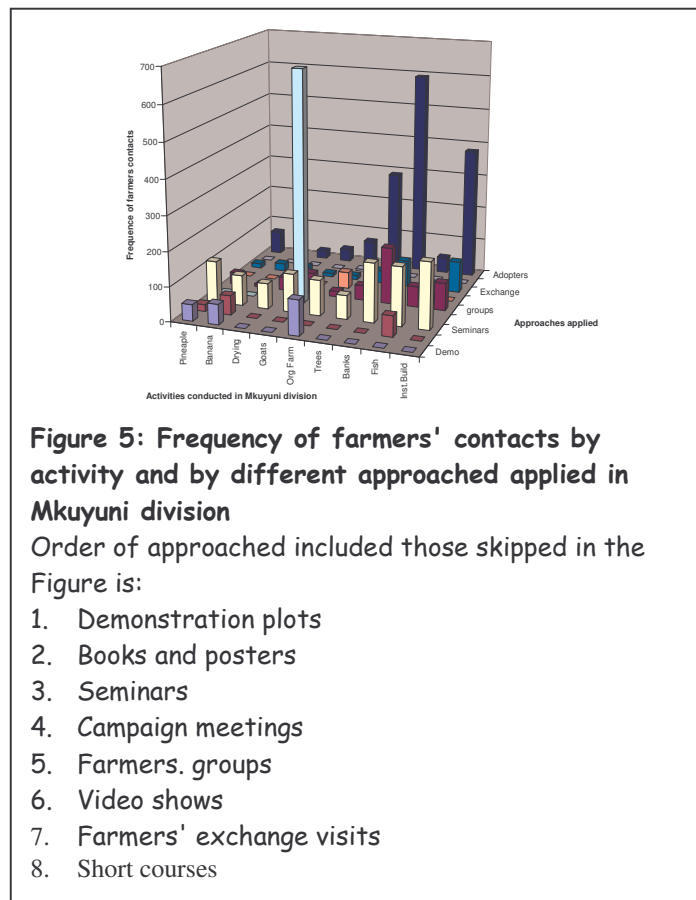
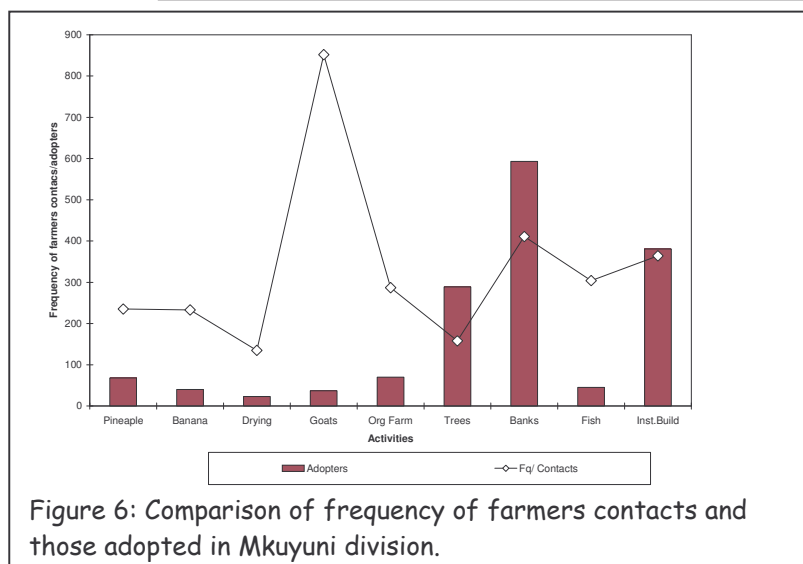


Figure 6 shows comparison of farmers' contacts frequency with number of farmers who took up or adopted the innovations promoted in the activities. Generally the ore contacts with farmers the larger the number of farmers adopted the innovations. However, a



significant discrepancy to that general trend is observed in dairy goat activity. This discrepancy may have been influenced by a number of factors including limited

number of dairy goats at the beginning of promotion, majority (over 70%) of farmers contacts were made through campaigns which were necessary for such a new non traditional innovation in the area. Two activities, micro financing and tree planting indicate that number of adopted farmers was larger than the frequency of farmers' contacts. The trend of adoption shown in figure 6 indicate that all activities have been progressively adopted except dairy goat which indicate decline in adoption in 1999 and improved slightly in 2000.

i. Mgeta division

The frequency of farmers' contacts with UMADEP in Mgeta is about 5098 (Table 15). Farmers who have adopted innovations promoted by the project are 6775. UMADEP is working in all four wards in Mgeta division. The working force population in Mgeta division is estimated to be 22,600. Therefore UMADEP have contacted about 23% of the total working force population in Mgeta division and about 30% of the working population have adopted various innovations promoted by UMADEP in the division

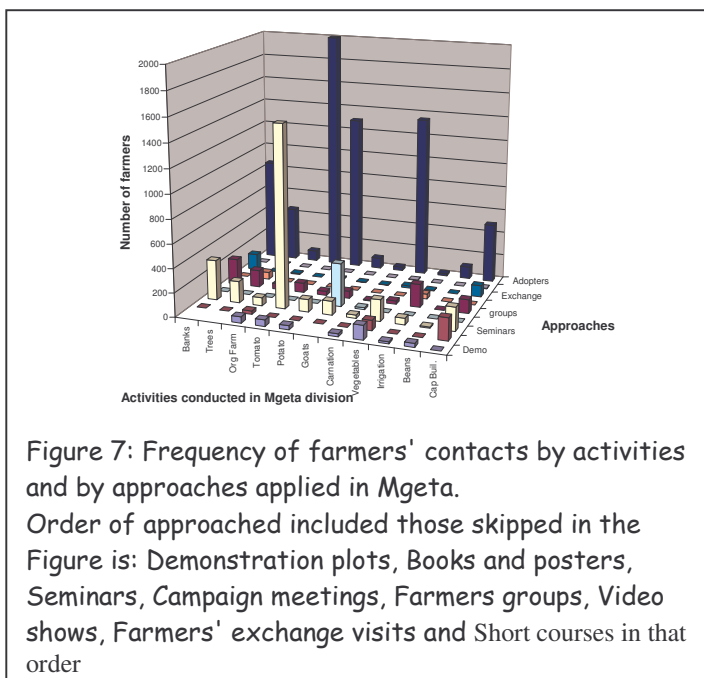


Figure 7: Frequency of farmers' contacts by activities and by approaches applied in Mgeta. Order of approached included those skipped in the Figure is: Demonstration plots, Books and posters, Seminars, Campaign meetings, Farmers groups, Video shows, Farmers' exchange visits and Short courses in that order

Table 15: Frequency of farmers contacts with Mgeta division.

	Demo	Books	Seminars	Campaign	Farmers groups	Video	Exchange	S/courses	Adopters	Frequenc y of farmers'
Rural micro financing		0	334	0	215	0	134	0	855	683
Trees nurseries and planting		0	180	0	142	60	0	0	450	382
Organic Farming	53	28	68	0	47	0	8	0	87	204
Tomato production	54	0	1512	0	80	0	0	0	200	1646
Potato production	35	0	104	0	34	0	7	0	1300	180
Dairy Goat keeping		0	116	360	61	0	2	0	88	539
Carnation production	24	0	27	16	6	0	3	0	31	76
Vegetables production	120	85	180	0	28	0	18	5	1350	436
Improving Irrigation efficiency	16	0	55	0	193	42	5	0	18	311

Green Beans production	32	0	10	0	0	0	0	0	102	42
Capacity Building.	0	186	198	0	115	0	95	5	494	599
Total	334	299	278	376	921	102	272	10	677	5098

Figure 7 shows that tomato production was highly adopted in Mgeta division followed by vegetables, potatoes, micro financing, farmers group activities and tree planting in that order. The most applied approach is seminar training followed by farmers groups.

The trend of relationship between frequency of farmers' contacts with adoption in Mgeta Division is almost the same to that of Mkuyuni Division (Figure 8). The more contacts were made with farmers the more farmers adopted except for potato production.

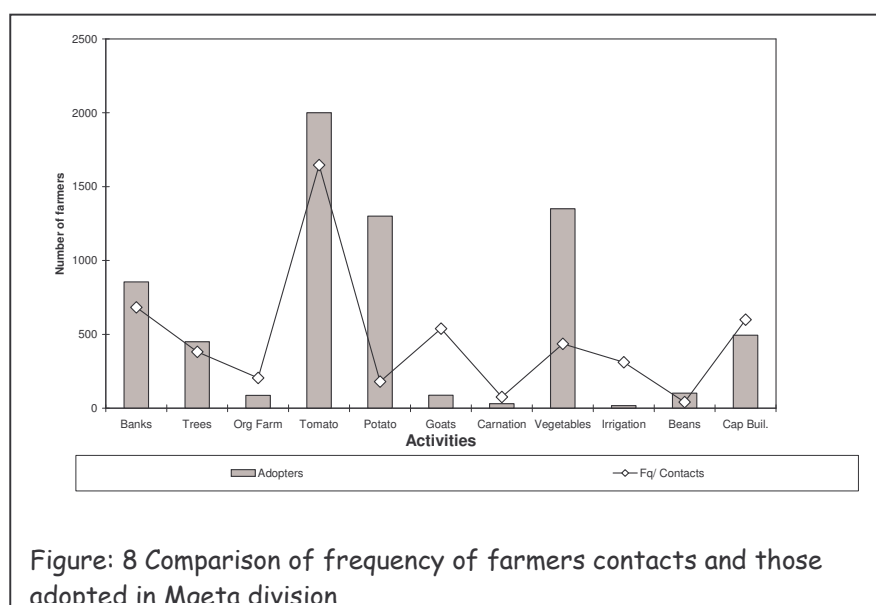


Figure: 8 Comparison of frequency of farmers contacts and those adopted in Maeta division

There was very high adoption of potato production while the frequency of farmers' contacts was low. This deviation may have been caused by factors specific to potato production as discussed in chapter four.

The trend of adoption in relation to adoption suggests that the adoption of irrigation practices, carnation production and organic have been slow perhaps because the project did not make much contacts with farmers.

ii. Mvomero division

The frequency of farmers' contacts with the UMADEP was 988 in five years of work in Mvomero division. Only three approaches were applied in promoting three activities as shown in Figure 9. Farmers were

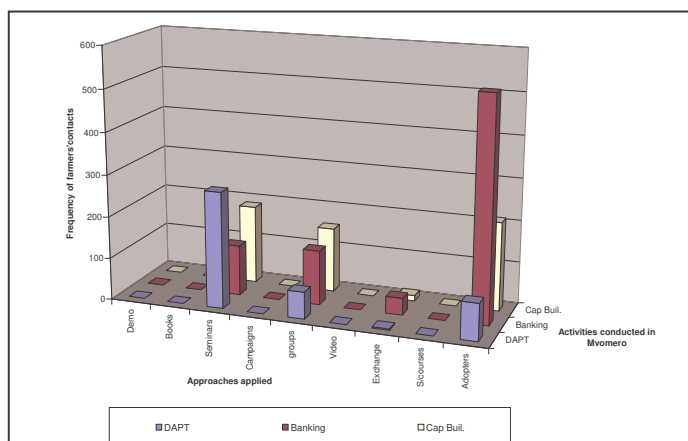
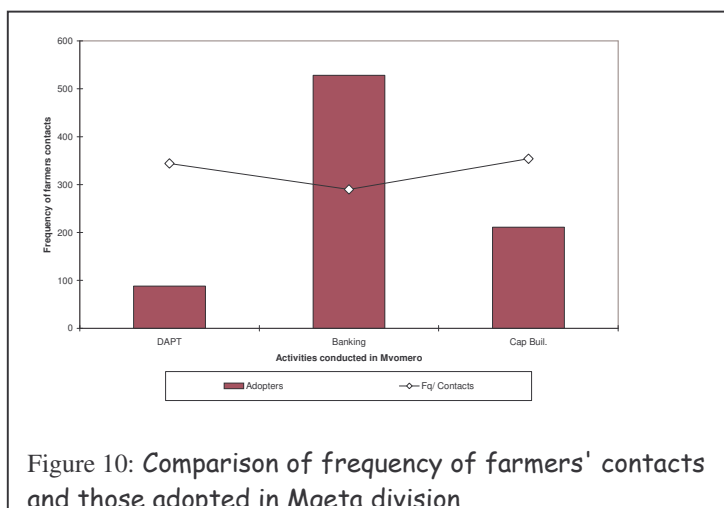


Figure 9: Frequency of farmers' contacts by activities and by approaches applied in Mvomero

almost equally reached for DAPT and capacity building activities. Frequency of farmers contacts in micro financing activity than in the other two activities. However the number of farmers adopted micro financing is larger than that of other activities.



4. PROJECT ACTIVITIES

This chapter provides information on activities conducted by UMADEP in the project area for the period of eight years (1993 to 2000). Justification for carrying out the activities is explained for each activity. The situation before project interventions is described and project activities and achievement are discussed. Finally the impacts and future prospects for each innovation are discussed.

UMADEP have implemented several activities to achieve project objectives. Project objective number one has been pursued through:

- i. Promoting sustainable Mountain agriculture
- ii. Improving livestock production
- iii. Improving low land agriculture
- iv. Supporting community managed micro financing institutions
- v. Supporting farmers' initiatives in rehabilitation and construction of infrastructure, marketing and input supply.

Project objectives number two and three are pursued through:

- i. Direct support to farmers' networks.

- ii. Encouraging and supporting farmers to form development groups as one of the approaches that UMADEP apply to extend innovations to farmers.
- iii. Facilitating farmers exchanges within and outside the Project area. This is done in the process of extending UMADEP innovations.
- iv. Facilitating attachment of University students to Farmers, researchers and other experts from SUA and other institutions within and outside the country.

4.1 Promoting sustainable mountain agriculture

The Mountains influence farm production systems in the Ulugurus. All crop fields are on sloping lands except some few (less than 1%) are on patches of relatively flat lands along river valleys and on hilltops. This is why UMADEP refer farm production systems in the Ulugurus to Mountain agriculture. PRAs revealed several problems related to Mountain agriculture in the Ulugurus. The problems mainly related to soil loss and fertility decline. Two cases are considered to describe the situation. The first case in Mkuyuni Division and the second case in Mgeta division.

i. Mkuyuni division

In Mkuyuni Division some of the important problems identified during PRAs were related to forest (distant) fields. The problems included vermin and theft, poor transport for crops especially banana and pineapple from fields to market or homesteads. All these problems make farmers to realize low return to investment (labor and money) and pose threat to households income and food security.

When the farmers were asked why do they have to have distant fields in the forests close to destructive animals, prone to theft and poorly accessible they said fields closer to homesteads

are no longer productive Box 2. Forest fields produce five time higher yields than fields close to homesteads. For example average weight of banana batches produced in forest fields is 25kg while that in fields close to homesteads is only about 5kgs.

Box 2

"What else can we do! We have to find better fields in the forest valleys because these other fields near homesteads are useless. It is better to share with animals and thieves and get big batches of banana than harvesting too small batches in old fields" Mama Shabani a divorced lady in Tandai. Stays with her three children and her mother. She grows banana in the forest and claim to be bothered by animal destruction and theft. She is not aware of UMADEP neither the activity promoted by UMADEP. She is only aware that there are some dairy goats she saw at one neighbor house and new methods for pineapple production.

PRAs also revealed that traditional practices for crop production applied in Mkuyuni Division do not take into account prevention of losses of soil and soil fertility. Measures for replenishment of soil fertility are also not adequately taken. It was realized that there are opportunities to increase productivity of traditional crops in fields close to homesteads if adequate measures to control soil losses and replenish soil fertility are included in the farming practices.

ii. Mgeta Division

In Mgeta division farming systems are predominantly intensive due to land scarcity. Intensive use of farm inputs such as inorganic fertilizers, industrial chemicals and irrigation are common practices. During PRAs farmers indicated to be concerned with high costs of inputs, soil erosion due to irrigation and rain water and soil fertility decline.

PRAs also revealed that traditional agricultural practices do not take much account on measures for preventing soil erosion. Some farmers were found to use terraces mostly to fields, which are irrigated. At any rate it was realized that replenishment of soil fertility is necessary due to nutrient leaching and high nutrient demand of crops grown. However, farmers seemed not putting much considerations on other nutrient sources that are alternative to industrial fertilizers.

The information from PRAs in the two divisions Mkuyuni and Mgeta prompted UMADEP to intervene to the situations through improving crop production. Promoted innovations are those which improve the means for sustainable on farm management of nutrient, soil, water, germplasm conservation and proper spacing.

4.1.1 Improving agricultural practices for traditional crops in Mkuyuni Division

UMADEP have dealt with improving production of two crops in Mkuyuni Division. These are banana and pineapple. Banana is the main cash crop in the area and pineapple is potentially a second important cash crop. Many fields close to homesteads used to be banana or pineapple fields have been abandoned. The idea to improve production of these crops were to encourage farmers to revive production of the abandoned fields so as to avoid problems of encroachment into the forest reserves in search of fertile .

4.1.1.1 Pineapple production

i. Situation before intervention

Pineapple plants in a traditional field are scattered at a spacing of about 1m between plants (Photo 1). The reason behind that practice given by farmers was to give enough space for plants to ratoons for many seasons (at least five) before the field becomes non-productive. They believed that closer spacing for pineapple could not give good yields. Experience from that practice show that after three or four season pineapple yields drop tremendously from about 3kg per fruit to about 0.5kg. Plant leaves in the field overlap to the extent it becomes too difficult for field upkeep. Pruning is traditionally not practiced. Traditional managed pineapple fields look like fallow fields like the one captured in plate 1. Assessment of that practice indicated that the yield drop is due to declined soil fertility, poor field management as no weeding and desuckering is done, and non-use of fertilizer or manure.

ii. Project interventions and achievements

UMADEP introduced contour strip planting pineapple production. This practice intervene the situation by:

- It allows progressive terraces which control soil and fertility loss from fields
- Maximizing field spaces utility through increased plant population and inter cropping.
- Improving working condition in the fields by providing a wider between-row spaces to allow convenient field attendance
- It allows application of organic manure such as mulching, composting, inter-cropping with legume plants and application of FYM.

In 1994 UMADEP established trials at demo plots to develop new practices for pineapple production in Mkuyuni. UMADEP also organized one farmers' exchange visit to Mgeta Division in which 22 farmers participated. The exchange aimed at exposing Mkuyuni farmers on techniques for soil erosion control and intensification of production.

During the second season of trials in 1995 UMADEP started to demonstrate the innovation to farmers. Farmers were involved at each stage of the trials through practical training. Other farmers replicated the trials in their own fields. During the period of six years (1995 to 2000) UMADEP trained about 308 farmers on improved pineapple production as shown in Table 17. Training approaches applied include practical sessions on project demonstration plots and on farmers' fields, exchange visits and farmer to farmer sharing of experience through farmers' groups. Three farmers group with 34 members have been engaged in pineapple

production. These are Badilika with 16 members, Mwitseni with 13 members and Lukemo with 14 members. Group members cooperate in training activities, pay regular visit to each other's field and share experiences.

Table 17: Number of farmers trained and adopted pineapple production

Year	Farmers attended seminar on plot each year	Farmers doing in their fields each year	Farmers visited	Farmers participated in exchange visits each year	Cumulative number of farmers adopted after training	Cumulative number of farmers adopted after seeing from other farmers
1995	44	3	94	22	3	0
1996	22	5	105		8	0
1997	20	4	164		15	0
1998	25	8	192		23	0
1999	20	6	230		35	6
2000	69	8	120	10	48	20
Total	200	34	905	32	48	20

After four seasons of trials in 1998 UMADEP established a recommendations package on improved pineapple production. In 1999 UMADEP in supported by UMBCP published a booklet and prepared a poster sheet as training materials for improved pineapple production practices. Twenty copies of the booklet were distributed to farmers and 15 copies of posters were displayed at various places in Mkuyuni division. Techniques that were introduced to farmers during training and in the booklets and posters included:

- Techniques for contour layout
- Selection and preparation of planting materials
- Planting and plant spacing
- Nutrient management: Mulching, application of liquid manure, preparations and application of compost manure and application of FYM
- Seed type and preparation
- Pruning and desuckering
- Intercropping in center lines

Assessment made by field staffs indicated that 68 farmers have adopted improved pineapple production as shown in Table 18. Forty-eight farmers adopted after they attended training offered by the project. Twenty farmers have adopted after seeing or advised by other farmers. However, very few adopters practice nutrient replenishment techniques as shown in Table 18.

Table 18: Distribution of adopters by recommended practices

Practice	Number of adopters	% of total adopters
Contour strip planting	32	47
Spacing	68	100
Pruning and desuckering	48	70
Intercropping	10	15
Mulching	45	66
Liquid manure	3	4
Composting	5	7
FYM	2	3

According to records from the demonstration plot and that from the adopting farmers have shown that production of pineapple per unit area have improved. One farmers Mr. Ndatila who adopted in 1998 the new practice by improving his pineapple field some 1.5km from his homestead, have reported that he has increased the number plants to 3500 in his plot used to have 500 plants only.

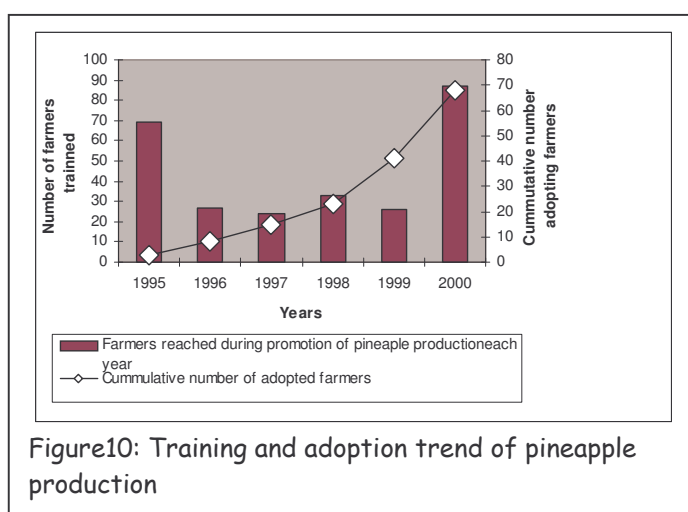


Figure10: Training and adoption trend of pineapple production

He estimated that the he is now harvesting of pineapple three times the size of pineapples he used to harvest before adopting new practices. His observation agreed to that obtained from the demonstration plot where the average size of pineapples is 3kgs while the average size in similar fields of farmers in traditional practice is 1.5kg.

Another demonstrated success in new practice is progressive leveling (bench terracing) of the space between strips as can be seen in plate 2. This indicates that the soil, which is eroded from the lower side of upper contour strips, is held at the upper side of the lower contour strips.

The trend of training and adoption of pineapple production indicate successful progress (Figure10). Dissemination of information

Box 3

"At the first time when I saw pineapple trial in the demonstration field I thought those intellectuals were crazy with doing useless practices. I said to my self let's wait and see. When saw the first yields I could not believe my eyes. It was wonderful. Such a poor (infertile) field with such too close spacing yielded that much! I said perhaps it was only that seasons. I decided to follow up what they do. I found no strange things done. Just simple practices which I can do. And yields have continued like that until now."
Mzee Ayubu A farmer at Tandai.

through demonstrations has proved to be efficient. Almost all farmers trained were involved in demonstration and trials, and all have adopted. Respondent farmers during documentation exercise, who are aware of improved pineapple production, showed appreciation on the performance of pineapples in project demonstration plots (Box 3). The demonstration plot also provided opportunity to farmers to observe new production practices. Between 1995 and 2000 about 905 farmers visited the demonstration plot.

iii. Intervention impacts

All farmers responded during documentation exercise indicated to have at least some information on new practices or to have seen some fellow farmers planting pineapple in a different way to that they are used to. Almost all respondents during documentation exercise who are aware of improved pineapple production agreed that before intervention farmers in Mkuyuni perceived that pineapple should be spaced wide enough to have better yields and to have longer yielding life. They appreciated that they did not believe that production of pineapple in such close spacing and poor soil fields would have good yields (Box 3).

The situation after intervention have indicated that a majority of farmers who are informed on the new practice have changed their mind from the traditional practices towards the new practices for pineapple production. About 50% of the respondents who have information on the new practice have repeated to be looking for capital to enable them to adopt. Land preparation, laying out of contours, seeds and planting considered to be labor and capital intensive activities. About 30% of the respondents who have some information on the new practices still need to know more about the practices before they can make decision to adopt the new practice. Other farmers are still reluctant due marketing problem.

All adopting farmers have reported more income from sales of pineapple than what they used to earn before. For example Mr. Ndatila realized 280,000/= in his first harvesting season (1999) from his improved field. He used to earn hardly 60,000/= only from that field under traditional practice. Patches of newly cleared and planted with pineapple in fields (Plate 2) which were formerly abandoned fields are observed in Tandai, Kalundwa, Kibwaya, Mfumbwe and Mifuru villages.

Farmers who are informed about the new practice hope for higher income generated from pineapple production. However, in one of the network meeting members were concerned on marketing of the expected high production in the next few seasons to come. They are worried on the road condition during pineapple

harvesting season (December to April) which is normally rainy and roads are in poor conditions.

UMADEP have realized financial benefits from pineapple production in the demonstration plot. The project earned a total sum of TShs. 540,000/= in four season harvest as shown in Table 22. Production in 1999/2000 season dropped tremendously due to poor management for the plot. Responsible field staffs were away for training overseas. Manure was not applied and more than 70% of pineapple produce spoilt in the field. However, this experience has been useful to farmers who visited the plot in 1999/2000 because they were made aware of the effect of non-application of manure to pineapple.

Table 22: Production and revenue from pineapple production in Tandai demonstration plot

Season	Pineapple harvest (Kg)	Average kg per fruit	Sales (Tshs)
1996/97	11,400	3	154,000
1997/98	12,200	3.2	162,000
1998/99	11,920	3.1	155,000
1999/2000	2,550	1.8	69,000
Total	38,070	2.7	540,000

iv. Factors influencing adoption of pineapple

The most important factor for successful adoption of improved pineapple production practice is the convenience for weeding in fields. All farmers interviewed during documentation exercise said that pineapple fields are abandoned mainly due to difficulty in maintenance especially weeding. Demonstration of increased production in the new practice is also an important factor that influenced adoption of improved practice of pineapple production.

Potential challenges ahead for sustainable adoption of this new practice are on marketing and somehow on the capital needed for establishing a pineapple field under new practice. Some opportunities give hope for solutions on these challenges.

One opportunity is the establishment of local Savings and Credit banks. Second opportunity is the farmer initiatives in road repairs. The third opportunity if farmers involvement in fruit processing especially solar drying. The conditions required for effectiveness of these opportunities will be discussed in the respective activities since they are among UMADEP activities in the area.

Effectiveness of booklets and posters has not been determined due to lack of adequate information. Also accessibility to project demonstration plots of farmers who are not involved in project activities has not been assessed due to lack of

records on visitors in the demonstration plot. Therefore the following data must be kept in order for the project to be able to have adequate evidence on:

- Record of farmers visiting demonstration plots
- Record of farmers accessed posters and booklets
- Statistically adequate random sample of adopter farmers should be facilitated to keep record of farmers adopting after their advises

4.1.1.2 Banana production

i. Situation before intervention

Banana production under traditional practice involves clearing of land digging random pits at a spacing of about 5m. After crop establishment no activity is done other than weeding and harvesting. Under that practice a relatively virgin land produces batches of banana of up to 35kg each. After about four years batches produced may be less than 10kg each. Banana will have developed large colonies of up to 20 plants per stool. That is the time when fields can no longer be managed easily and production becomes less compared to the labor and times investments. Next alternative for farmers under that situation is to look for another virgin land and open up a new field and abandon the old field. Plate 4 shows an abandoned old banana field and plate 5 show a relatively new banana field.

Yield decline under traditional practices are due to deterioration of soil fertility which is caused by stools of banana growing on same places and left to develop large colonies of plant without nutrient supplement.

ii. Project intervention and achievement

New practices promoted by UMADEP to intervene problems relate to traditional banana production include:

- Selection of planting materials
- Nutrient management: Incorporation of compost and/or FYM during planting, and top-dressing every season.
- Desuckering to allow not more than three plants per stool
- Pest management
- Shifting stool positions when yields show significant decline
- Intercropping between plants along contour with close spaced useful vegetation such as cecropia and lemon grasses.
- Intercropping with cover crops

In 1994 UMADEP established trials to demonstrate the innovation at the demonstration plot at Tandai. The plot is a typical field to those fields which farmers considered useless for production of banana. Farmers refer such fields as 'male' fields. Different types of banana grown in the area were planted in the trials plot. All new practices were applied. Twenty-two farmers participated establishment and management of the trials. They also went to Mgeta in 1994 to exchange experience with Mgeta farmers on soil erosion control and fertility management.

Table 19: Number of farmers trained and adopted banana production

Year	Farmers attended seminar on plot each year	Participated for trials in demonstration plot	Farmers visited	Farmers participated in exchange visits each year	Cumulative number of farmers adopted after training	Cumulative number of farmers adopted after seeing from other farmers
1995	22	28	94	22	6	0
1996		35	105		6	0
1997		50	164		6	0
1998		12	192		6	0
1999		7	230		10	0
2000	66	41	120		25	15
Total	88	173	905	22	25	15

Field activity promotion to banana was not conducted between 1996 and 1999 because a responsible field staff fell sick and the project could not make replacement until 2000. However, farmers continued to participate in trials on the demonstration plot. During the period of five years (1995 to 2000) about 173 farmers visited trials on the demonstration plot (Table 19).

Field promotion activities for banana production resumed in 2000. Farmers participated in seminar training were 88. Those who participated in exchange visit were 22. Farmers who have adopted new practices in banana

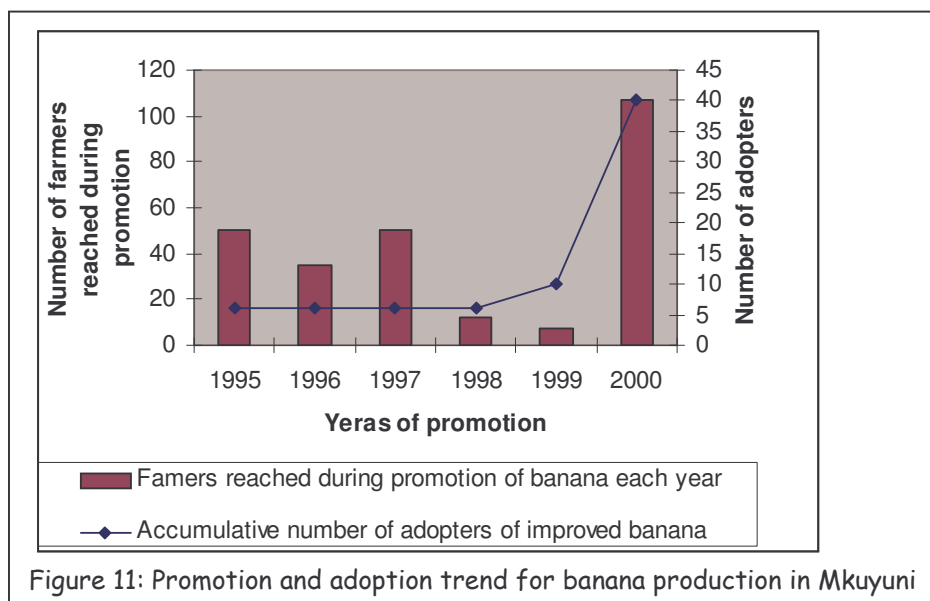


Figure 11: Promotion and adoption trend for banana production in Mkuyuni

production are 40. Twenty-five farmers have adopted after attending training or participated in the trials. Fifteen farmers adopted after learning from other farmers or at demonstration plot. The trend of adoption and that of promotion is shown in Figure 11 Results for banana germplasm collection at Tandai demonstration plot is shown in Table20. Teachers from 10 primary schools five from Kinole ward and five from Mkuyuni ward also participated in a three days residential seminar at Tandai Kinole.

Table20 Average weight of banana batches produced at Tandai demonstration plot for each Banana germplasm collected in the plot

Year	Banan germplasm in local names						
	Mtwike	Kisukari	Bahama	Kigoma and Bukoba	Mzuzu and bokoboko	Malindi	Mshale
1994							
1995	22	5	18	12	7	12	4
1996	15	7	20	13	9	9	5
1997	16	6	22	13	11	12	5
1998	12	4	17	9	7	8	4
1999	13	4	14	7	4	6	4
2000	11	5	10	6	4	7	4

Yield assessments of three banana cultivars, which are mostly preferred in Mkuyuni (Mtwike, Kisukari, and bahama), indicate similar trend (Fig12). Production was generally declining gradually. This was expected. That is why the project implemented shifting of banana stools in 2000 season to improve production. Despite the decline in yield all bananas cultivars collected in the plot performed well compared to the performance of fields in similar soil conditions.

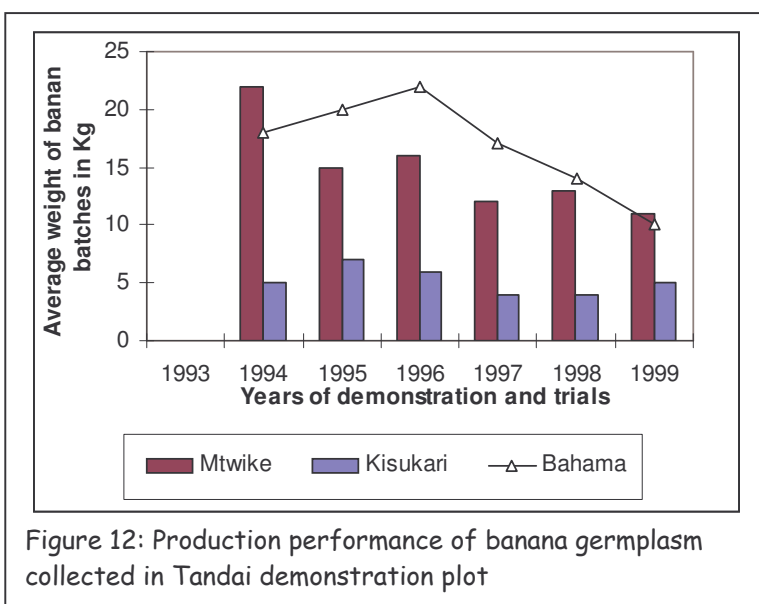


Figure 12: Production performance of banana germplasm collected in Tandai demonstration plot

iii. Intervention impacts

The most important impact resulted from promotion of

Box4:

"It is just as miracles that such a 'male' land (meaning non erable) could give produce such good produce of banan and pinneaples which I saw in the demonstration plot. But I think the capital and labour needed for the management and inputs my limit many of us to adopt the innovation' Mr Shaibu Mgowela. A farmer who is also a watch and radio repairer at Tandai Village.

improved banana production is the awareness that poor soils can be made to produce better yields. According to respondents during the documentation exercise all farmers who are active in project activities and about 30% of farmers who are non-active to UMADEP activities in Tandai are aware of improved banana production. Almost all farmers who are aware indicated appreciation on the innovation (Box. 4).

Local banks at Tandai have allocated funds for Agriculture loans. Fifteen banana growers have applied. They are planning to apply improved practices in the fields, which were abandoned. A field staff responsible for banana production has visited the fields to assess the situation. The loan process for the applications was in progress during documentation exercise.

iv. Factors influencing adoption

Factors that have influence on adoption of improved practices on banana production include:

- The innovation address real problems that banana growers perceive to be important. Interviewed farmers indicated that they would like to have banana field near their homes and the innovation is perceived to be a viable solution
- Results from the demonstration plot. Majority of farmers interviewed at Tandai appreciated the results from the demonstration plots and they would like to copy the innovation in their fields.
- However, farmers are still reluctant to adopt because they consider additional investment to be too high.

Address existing problem to an important cash crop in the area

Results seen in the demo plot

Against:

Additional investments needed

Lack of capital

Benefits to additional costs not worked out and farmers well aware of that.

Adoption trend for improved banana production (Fig. 11) indicates future prospects for the increased adoption of the innovation. However, a sustainable credit system must be established. The capital in the local banks is not developed enough to guarantee support on loans required for adoption of new innovations.

The loan systems in the banks are also not strong enough to ensure economic feasibility of the loans taken for agricultural business. For example it was not readily established whether the farmers who applied for loan were motivated by

the expected returns to the investment or they just needed to have some money for other expenditures. No cost benefit analysis was made to any loan application although the loans were almost approved.

4.1.2 Improving agricultural practices of traditional crops in Mgeta Division

4.1.2.1 Potato production

i. Situation before intervention

Before UMADEP interventions potato production in Mgeta was not important. Potatoes were grown scattered in fields of other crops such as maize cabbages and other vegetables. A traditional variety grown in Mgeta was known as Kongwa. This is a creeping variety and produces about 10bags of potatoes per one bag of potato seeds. Farmers perceived that potatoes can only be grown during rainy seasons and that it can not be produced on large quantities. Literally no significant production of Irish potato was recorded from Mgeta Division before UMADEP intervention.

Among the problems identified by farmers in Mgeta Division was inadequate food supply especially cereal products. UMADEP intervened to that problem by improving production of potato as a food crop alternative to cereal products. Problems related to Mountain agriculture such as soil erosion and fertility decline were taken into account along side promotion of potato.

The package for promoting production of Irish potato include:

- Selection of appropriate seed varieties and seed quality
- Proper land preparation using large contour ridges and proper terraces
- Irrigation practice
- Use of organic manure
- Production of seed quality potatoes
- Seed storage techniques

ii. Intervention activities and achievements

In 1993 UMADEP developed trials in the demonstration plot at Nyandira to test the recommendations. Four new varieties from southern highlands were tested. The varieties were super Tona, Bulongwa, Kikondo and Sasamoa. Organic manure tested were liquid manure, and FYM from pigs and goats. The trials continued for two season in the demonstration plot and in fields of farmers who participating in trials. Trials were conducted for three seasons from 1993 to 1995. Later the demonstration plot continued to grow potatoes on the plot for demonstration,

training and production. Trial results showed that new varieties under new practices yielded three times higher than traditional practices. New varieties yielded up to 15 bags of potato for each bag of potato seeds planted. However, control plots for industrial fertilizers produced 25% higher yields than those with organic manure.

Trials resumed in 1999 to test and demonstrate techniques for seed production selection and storage. Additional recommendations tested to suit seed production were:

- Optimum quantity of fertilizer application
- seed grading
- Timing of stumping leaves
- Construction of appropriate seed storage structures.

The purpose for the trials was to develop techniques that farmers can apply for producing and save their own seeds. Initially (early adopters) used to buy seeds brought from Njombe or Lushoto at 150/= per kg. This practice may cause introduction of diseases from other areas. To control that situation UMADEP started to promote on farm seed production and protection in 1998.

The first and second season trials yielded about 6 bags per bag of seeds. Participating farmers were not very happy with the results because the yields were only about 30% of yields in non-seed fields. That was due to limited application of fertilizer necessary for good seed quality. However, farmers and project staffs continued with the trials on expectation that seed prices, which are about twice as higher than normal potatoes during planting season, may compensate the yield difference. This will also depend on the success on seed storage, which has not yet been determined.

Total farmers participated in trials on the demonstration plot were 25. Those who replicated the trials in their fields were 34 farmers. Total farmers trained on the demonstration plots during that period through practical seminars were 66. Table 21 presents the distribution of farmers benefited from demonstration plots.

UMADEP conducted 13 seminars with farmers on improved potato from 1993 to 2000 in which a Total of 136 farmers were involved (Table 21). Three farmers' groups (Mavumbuka, Nguvukazi, and Twibone) with a total of 34 members were involved in promoting the innovation. UMADEP organized one farmers visit to Njombe Iringa for the purpose of exposing farmers to more experienced farmers in production of potato. Seven farmers participated in the visit. Among interesting

experiences which farmers observed in the Njombe visit was seed storage techniques.

Table 21: Number of farmers trained and adopted potato production

Year	Farmers attended seminar on plot each year	Participated for trials in demonstration plot	Exchange visits	Cumulative number of villages adopted the innovation	Cumulative number of farmers adopted after training
1993	10	17	0	1	4
1994	22	29	7	3	9
1995	22	13	0	5	23
1996	0	0	0	5	38
1997	14	0	0	6	38
1998	0	0	0	6	126
1999	0	0	0	7	480
2000	68	0	0	8	1300
Total	136	59	7	8	1300

iii. Project impacts

Figure13 indicates that farmers in the area have successfully taken up the innovation. Potato is now produced in the area for food and for cash. A study done by Hardman, L. (1999) indicated that about 60% of households in Mgeta grow potatoes of which about 11% grow potato for cash and about 41% grow for food. The rest 48% grow for both cash and food.

Estimates from random counting of cropped fields in

Langali and Nyandira village have indicated that potato occupy about 60% of the

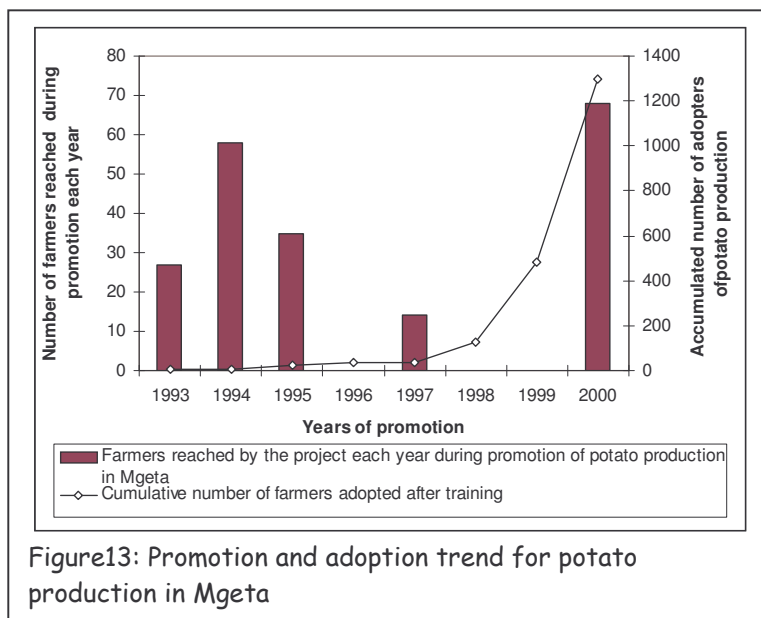


Figure13: Promotion and adoption trend for potato production in Mgeta

area occupied by cabbage. Estimated production of potato basing on the volume of sales in weekly markets at Nyandira and Langali indicate that about 40 bags of potato weighing about 130kg are sold on each market day during the harvesting seasons. The potato from Mgeta is transported to Morogoro and Dar es salaam.

There is evidence that disease outbreak in cabbages which experts declared to have no control triggered adoption of potato. The outbreak became apparent in 1996. The situation worried farmers greatly (Box 6) because cabbage was the main and reliable cash crop in Mgeta Division.

Fig 13 indicate rapid adoption of potatoes from 1997. Farmers adopted potato production mainly as a source of income rather than an alternative food crop.

The shock in farmers generated by outbreak of cabbage disease has been reduced (Box 5). Irish potato is now considered among high valued crops in the area worth grown under irrigation. Farmers are now focusing to establish terraces for production of potato.

Box 5:

"We new that was the end of Mgeta if we could no longer produce cabbages. We had no idea of an alternative crop. Introduction of potato has restored our hope for survival"

Mzee Mkali A farmer at Nyandira

According to businessmen met during one market day in Langali, potato from Mgeta are preferred to those from other areas. They have appealing color and test to customers.

iv. Influencing factors for adoption of potato production in Mgeta

The future of potato production in Mgeta is promising. Production potential and marketing opportunity are high. Potato indicates to have served as an alternative food crop as well as a revenue generator to households. Analysis made by a field staff indicated that ordinary households that required five bags of maize per annum for food can now require only three bags and earn 300,000/= per annum from sales of 10 bags of potato. Majority of ordinary households plant one bag of potato seeds which produces 15 bags sold at 10,000/= each bag on average.

However, seed availability is still a problem, which require a lasting solution. It is encouraging that in 1999 UMADEP invested substantial efforts to address that situation as shown in Fig. However the trials conducted by the project and participant farmers need to be continued basing on production of seed for own farmer's use. Other wise economic viability of the activity must be considered rather than the volume of production in comparison to non-seed potatoes.

For example farmers who participated in seed production trials perceived to be trained for commercial seed production. They were discouraged with 1999 season

results because they realized lower yields from seed fields than from normal fields. Yet they had to sale the potatoes intended for seed before planting season at prices equal to prices of normal potatoes so as to be able to pay back in time the loans they took from the local banks. The bank interests are too high (5% per month) to wait for the planting season four months after harvesting.

Another aspect to be considered is the use of industrial fertilizers. Farmers seem to be tempted to use high dozes of industrial fertilizer to realize higher yields and returns from potatoes. UMADEP must continue to educate farmers on the dangers from that practice and continue to promote the use of organic manure.

4.1.3 Irrigation water management techniques

4.1.3.1 Improving irrigation water management in Mgeta

i. Situation before intervention

Traditional irrigation practices in Mgeta Division apply earth structures through out water conveyance system. Farmers construct terraces to enhance water storage capacity of the cropped fields and for uniform distribution of water on the fields. Field ditches are located along main slope. Water is supplied to cropped fields by blocking field ditches adjacent to the cropped terrace to be supplied with water as shown in Figure 6a. Water is allowed to stand in a ditch at the upper side parallel to the terrace. Water is distributed on the terrace manually using a can of approximately one litter capacity. Crops are those which are considered high valued such as cabbage, potato, onions, and other vegetables. Irrigation schedule is between three to 10 days depending on allocation of water.

Main canals are managed by specific groups of farmers who have formed informal water users' associations. Each main canal has its own intake position. Members for each canal are responsible for construction and maintenance for the canal.

ii. Intervention activities

Situation analysis made by UMADEP through farmers' networks and visits to farmers fields indicated that traditional field water conveyance systems is one of major agents of soil erosion in farmers fields. Other problems identified were too much water losses along main along water conveyance ditches. Water flow measurement made along a 4.5km long canal indicated water loss of about 10l/s between intake and farmers fields. One farmers' group (Fuku) with 15 manages the canal. This situation prompted UMADEP to intervene by promoting the following practices:

- Improved intake conveyance structures
- Methods for monitoring water flows to aid rational water distribution among farmers' fields
- Improved field water distribution techniques
- Capacity building for water users groups.

UMADEP started to work with farmers to improve irrigation practices in 1997 in Mgeta Division. About 30% of cropped fields in Mgeta Division are irrigated. Fifty percent of un-irrigated areas are potential for irrigation. Initially UMADEP organized one farmers' exchange visit in 1997 to Lushoto. Five farmers participated for the visit. During the visit farmers from Mgeta learned from farmers in Lushoto different farmer managed improved irrigation structures, their functions and how they are constructed. They also learned how water users conflicts are settled through associations. A video for the visit was taken and was used for training and campaign.

Between 1997 to 2000 UMADEP conducted five seminars in which a total of 193 farmers participated in four villages (Nyandira, Langali, Tchenzema and Mwalazi). Seminars trained farmers on:

- Types of improved intake and conveyance structures,
- appropriate techniques for construction of irrigation structures
- Methods for farmer managed techniques on monitoring water flows to aid rational water distribution among farmers' fields
- appropriate field water distribution techniques
- formation and management of water users groups.

UMADEP established demonstrations on improved techniques (S-form) for field water distribution in the demonstration plot at Nyandira. About 60% of seminar participants had an opportunity to visit and obtain training on the demonstration.

The video show taken in Lushoto was played once at Nyandira for promotion campaign on improved irrigation water management techniques. Forty two farmers attended the show.

iii. Impacts

Box 6

"I was shocked to realize that we are just getting a drop of water from huge volumes we tap from intakes. Perhaps the conflicts we encounter in using the water are not necessary if at least 50% of that water would reach our fields. I can see have the potential increase circles of production if we can manage to minimize that loss of water"

One member of Fuku group commented in the discussion during documentation exercise

One farmers group with 15 members (Fuku) is operating as a formal water users association. They have developed by laws to govern their group activities and they have improved their intake structure. They have improved water flow efficiency to the extent they now sell water supply service to neighbors for irrigation and domestic use such as house construction activities.

UMADEP have increased awareness among farmers on the extent of water conveyance inefficiency in traditional irrigation systems. According to respondents during documentation exercise about 80% of farmers who participated in seminars are now aware of the huge loss of water occurring in the traditional conveyance systems. The perception of the farmers is that irrigation systems in the area still have a lot of un-utilised potential as one farmer was quoted (Box 6).

iv. Factors influencing adoption of irrigation practices in Mgeta

There has been no evidence as yet of farmers who have attempted S-form water distribution system in their fields. Apparently the problem of soil erosion due to irrigation has not been addressed. According to respondents during documentation exercise (Box 7) there are two reasons which possibly explain this lag:

Box 7:

"I am impressed with the new method but I am worried the little water that reaches my field may not reach even the middle of my field before it is completely sunk in the soil....." Mr....

"How long am I going to wait for the slow flows if I use the new method? I am sure I may always run out of time before I complete my fields. That method may increase water conflicts." Wondered

- Although farmers perceive soil erosion problems caused by irrigation water in their fields they are more concerned with water adequacy than soil loss because water scarcity has instant effects. Significant higher water loss occur in the S-form method than that in the traditional method. This is because the water-soil contact time is longer in S-form than in traditional method due to increased length of ditches and reduced speed of water flow. Farmers are aware that using S-form method will reduce the effective water distributed in the fields from the already little water from supply.
- Farmers perceive that they usually have shorter time available for irrigation. The reduced speed of water in S-form system is perceived to increase that problem.

This evidence suggests that S-form practice as an important solution for soil erosion caused by irrigation water can be taken up if:

- farmers are guaranteed of adequate water flows reaching their fields, and

- alternative field water distribution method that is more convenient and efficient than the traditional method is introduced.

Future focus of UMADEP should therefore be on reducing water loss to increase available water at farmers fields and introducing more labor

efficient water distribution system as one farmer commented during documentation exercise (Box 9) Attempts to adapt S-form conveyance system in the traditional water distribution system should be stepped.

BOX 8

"I was shocked to realize that we are just getting a drop of water from huge volumes we tap from intakes. Perhaps the conflicts we encounter in using the water is unnecessary if at least 50% of that water would reach our fields. I think have the potential increase circles of production if we can manage to minimize that loss of water"

Mzee Mhali

4.1.3.2 Introduction of irrigation system in Mkuyuni Division

i. Situation before intervention

During PRAs in Mkuyuni Division it was realized that farmers perceive that dry season cultivation along riverbanks may rescue food shortage during that season for households that depend mainly on seasonal crops. Households depending on seasonal crops are considered among the poor households. However, dry season cultivation was found to be affected by drought. Normally residue moisture do not last long enough to guarantee maturity of the groups. The riverbanks are generally too deep to tap water easily for irrigation.

ii. project intervention

In 1996 UMADEP attempted to address that problem by establishing demonstration on appropriate irrigation water system. Intake was constructed (Plate 6) and bamboo pipes laid down to convey water about (Plate 7) 2kms from intake to the demonstration plot in Tandai village about 2km away. Twelve farmers participated in all stages of installation of the system (Plate 8). Activities performed were:

- ◆ Selection of intake position
- ◆ Construction of intake using gabions
- ◆ Preparation of bamboo pipes and laying down
- ◆ Water distribution in the field.

iii. Impacts

According to farmers and project staffs involved in installation of the system, the system did not work due to the following reasons:

- The whole system was laid through residential areas where interruptions on water flows by domestic users and children were too frequent for effective water supply to the field.
- Water loss from ruptured bamboo was too high. Bamboo ruptured due to over exposure to sunlight whenever was not in use.

However, farmers participating in the demonstration indicated to have gathered knowledge on techniques establishing water intake and the use of bamboo as water conveyance structures. The use of bamboo pipes to tap clean water (although not necessarily safe) from springs has become a common practice in Tandai village.

iii. Factors influencing adoption of irrigation practice in Mkuyuni

UMADEP have conducted assessment on irrigation potential in Mkuyuni and realized that there are adequate water sources. Area available for dry season cultivation is about 5% of total cultivable land in the area, which can be used to produce maize, rice and vegetables if supplementary water is guaranteed.

However, diversion of water from water sources to the fields is a challenge. Riverbanks are so deep that it requires diversion of water over long distances of not less than a kilometer. The challenge is on laying out of conveyance structures, which will always pass through other farmers fields who may not allow the structures pass through their fields. Therefore future prospects on irrigated dry season cultivation will require introduction of appropriate water lifters to supply water from rivers to adjacent fields.

4.2 Improvement of horticultural crop production system

4.2.1 Tomatoes production in Mgeta Division

i. Situation before intervention

Tomato was not produced in the area before UMADEP intervention. Farmers perceived that tomato could not be produced in climatic conditions such as that in Mgeta Division. The dominant cash crop in Mgeta was cabbage. Fluctuation of prices affected production of cabbages. This is common problem for horticultural crops in Tanzania and Mgeta is not odd out. Farmers identified that problem in PRAs and farmers' group networks. UMADEP intervened the situation by introduction of tomato production as an alternative cash crop in the area.

ii. Project intervention

In 1993 UMADEP established trials on tomato production in the project demonstration plot at Nyandira village and in one farmers field at Tchenzema village. Thirty-six farmers participated in trials on the project demonstration plots and 59 farmers replicated the trials in their fields. Sixty-eight students from SUA were involved in the trials and evaluation of results. From 1994 to 1998 UMADEP continued production of Tomatoes in the project demonstration plot at Nyandira village.

Promotion activities involved training farmers through seminars and working with farmers' groups. From 1994 to 2000 a total of 103 seminars was conducted in which about 1500 farmers participated. Table 22 show the trend of promotion activities and levels of farmers responses.

Table 22: Tomato

Year	demonstration and trials		seminars		No of adopters
	No off years	participating farmers	No of seminars	No of farmers	
1993	1	11	39	274	5
1994	2	19	39	605	13
1995	3	45	10	200	34
1996	4	14	8	280	200
1997	5	9	5	125	620
1998			-	-	900
1999			1	14	750
2000			1	14	1800

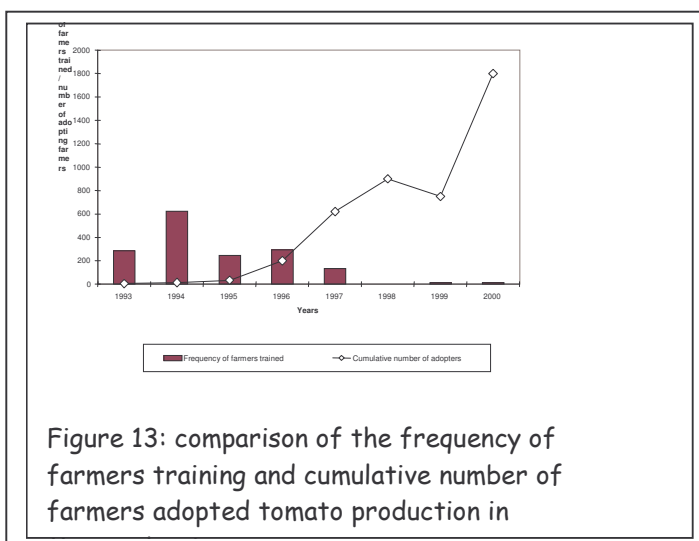
Messages given to farmers during training and the estimated percentages of farmers adopting a particular practice are shown in Table 23.

Table 23: Percentage of farmer adopting particular practicing

Topics trained	% of Farmers practicing properly
Seedbed preparation	100
Seed nursery management	80
Transplanting	100
Fertility and diseases control	80
Stacking, knitting and pruning	50
Harvesting and products handling	10

iii. Impacts

Promotion of production of tomato in Mgeta division show successful adoption (Fig 13). It is estimated that about 250 tons of tomato is produced in Mgeta annually. Tomato is estimated to contribute about 30% of the total income in the area. Tomato has been an important activity in annual production of households. Adoption in tomato production indicated a drop in 1998



(Figure13). This was explained by the effect of el nino rains.

According to respondents during documentation exercise majority of the poor households do not engage in Tomato production. Poor households are those that subsidy income through laboring out and general has poor house than need major repairs every one or two seasons. Also poor households do not have access to irrigation water. Poor households are estimated to be about 25% of all households in Mgeta. Non involvement of poor households in tomato is mainly due to high investment costs. It was estimated that the required investment is about 40% to 80% of expected revenues from tomato.

iv. Factors influencing adoption of tomato production in Mgeta

The future of tomato production is promising. Adoption of the innovation has taken off. This is indicated by the trend in figure 13 that although UMADEP promotion efforts were reduced from 1997 the adoption increased tremendously over year. This success might have been influence by the market opportunity for tomato. Availability of reliable transportation provided by Twikinde cooperative also increased market accessibility.

However, Intensive use of industrial inputs in horticultural crops such as tomatoes has been reported to a problem in Mgeta. This is a potential threat to sustainability of tomato production. Marketing is also reported to be a problem. To guarantee sustainability of that crop UMADEP should therefore strengthen the following:

- Continuous farmers link and collaboration with experts (researchers, students) so as to be able to identify solutions to new problems before they become a threat. Also to establish means of processing the product as an alternative for fresh tomato marketing.
- Use of indigenous knowledge on organic manure and botanical pesticides to substitute industrial fertilizers. Industrial inputs have become more expensive progressively. Previous promotion activities have not shown considerable efforts from UMADEP on this aspect.

4.2.2 Diversification of varieties of vegetables and fruits produced in Mgeta division

UMADEP introduced new vegetables and fruits varieties to increase alternative cash crops in the area and to address the problem of poor households' income identified during PRAs. Another problem, which was to be address, was the problem of crop pests and diseases. This problem is one of the concerns of

farmers in Mgeta. The idea was to provide alternative high valued horticultural crops that have different diseases and pests which farmers can rotate with traditional crops in control of diseases and pests.

i. Situation before intervention

Traditional vegetables grown in Mgeta before UMADEP intervention were cabbages, carrots, Cauliflower, onions, parsley lettuce. Continuous production of those crops promoted diseases and pests, which entailed intensive use of pesticides. Production costs increased and return to investment decreased. Farmers in Mgeta also used produce local fruit varieties of pears, apples, plums and pitches. The fruits were usually not of market value.

ii. Project intervention

In 1993 UMADEP took over demonstration activities established by UMHODEP in 1989 and continued to conduct trials and demonstrate the performance of different varieties of vegetable and fruits. New vegetable varieties introduced by the project in Mgeta include fresh beans, squashes. The project also introduced new varieties of apples, plums, nectaring pitches and grapes. The husbandry of the introduced vegetable and fruits was tested and demonstrated in the project demonstration plot at Nyandira. Seven farmers one from each village in Mgeta Division were involved in establishment and management of fruit nurseries. The farmers learned how to improve local fruit varieties with new varieties by grafting and budding. The farmers replicated the trials in their fields and visited each other in their fields to exchange experience. Table 24 shows the number of farmers involved in promotion activities and the approaches applied. Number of adopting farmers is also indicated.

In a period of 1993 to 2000 about 340 farmers participated in trials or got training in demonstration plot at Nyandira. Sixty four students from SUA participated in trials and research in the demonstration plot. During that period 50 training seminars conducted by UMADEP in which 220 farmers participated in the seminars. Three exchange visits were conducted one in Iringa, another in Mkuyuni and the third in Morogoro. About 30 farmers participated in the exchange visits. Table 24 shows the number of farmers reached during promotion through the approaches that were applied by the project. Cumulative number of adopters of the innovations is shown.

Table 24: Number of farmers reached by the project during promotion of vegetable and fruits.

Year	Farmers participated in trials	Seminar participants	Exchange groups	Villages	Adopters
1993	125	56		3	300
1994	125	78		3	450
1995	25	41		5	600
1996	40	32	12	5	750
1997	5		6	5	840
1998	8			6	900
1999	8			6	1200
2000	8	14	12	6	1250
	344	221	30	39	1250

Over 1200 farmers are estimated to have adopted at least one or more of the new vegetable and fruit varieties by 2000. Estimates on random farmers fields indicate that about 60% adopted farmers grow green beans and about 40% have improved fruit trees with new fruit varieties.

iii. Project impacts

Figure 14 indicate progressing adoption of new varieties of vegetables and fruits although the project reduced promotion efforts from 1997 for about 10% of promotion efforts invested in 1993 and 1994. Green beans are now a common food stuffs in Mgeta.

Fruits are common market items in Mgeta markets. Some fruits especially pitches are sold in Morogoro and Dar es salaam

markets. In 1996 most fruits produced spoilt in fields due lack of market. That was

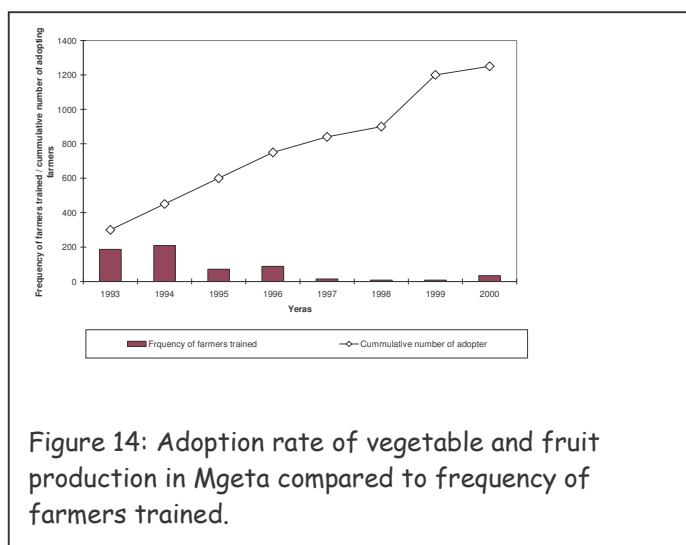


Figure 14: Adoption rate of vegetable and fruit production in Mgeta compared to frequency of farmers trained.

the period when roads were in poor condition. That situation led to introduction of wine processing in Nyandira and Tchenzema villages. Raw materials for wine processing were the mainly pitches. However wine processing have not done well. Poor performance of the group (Twikinde) that was engaged in wine processing is explained to be a major reason wine processing decline. The group failed to secure market in time for the produced wine. Expire time was too short (hardly two weeks) due poor bottling techniques.

iv. Factors influencing adoption of vegetables in Mgeta

Introduction of new varieties of the crops that were traditionally grown in the area might have made farmers to take up the innovations fast. Farmers in Mgeta are accustomed to produce for the market. The new varieties required no significant change in traditional production systems.

However, availability of convenient transport, provided by Twikinde cooperative, might have influenced the rate of adoption of improved practices of vegetable and fruit production. Availability of input supplied by Twikinde was another factor influenced the high rate of adoption. Liberalization of input supply, transport service and rehabilitation of the roads to Mgeta in 1998 maintained the increasing rate of adoption despite decline of Twikinde services in 1998. Therefore availability of inputs and access to market are necessary factors for sustainable production of vegetables and fruits.

4.2.3 Vegetable and fruit processing in Mkuyuni Division

i. Situation before intervention

Important cash crops in Mkuyuni Division are perishables. They have to be sold immediately or a short time, say two days, after harvesting. Losses of crop produces such was indicated by farmers during PRAs as a constraint to improved households' income and food security. Losses of fruits are estimated to be about between 30% to 60% for pineapples and jack fruits. Prices of fruits during harvest are almost 4 times less than the actual values of the products. Fruits processing are not a traditional practice in the area. UMADEP introduced innovations in fruit processing for the purpose of increasing households' income and creating local markets for fruits and vegetables.

ii. Project intervention

In 1995 UMADEP initiated promotion activities on fruit processing in Mkuyuni Division. A total of five seminars was conducted in a period of 5 years from 1995 to 1999. Seventy-four farmers participated in the seminars. Participants for the seminars were trained on:

- Sugar processing (grain sugar and crude sugar)
- Mango pickle production
- Solar drying Technology.

One exchange visit to Iringa was organized in 1995. During the visit, farmers observed how tomato is processed and preserved at Dabaga factories.

One farmers group Twiyavile with 14 members in Tandai engaged in sugar processing and mango pickle production. UMADEP provided one cane crusher worthy shs. 120,000/= to the group in 1996. However, they could not manage to process grain sugar instead they produced crude sugar. Grain sugar production required additive raw material that was to be purchased was not available in the village and the member could not manage to purchase it.

UMADEP hired one expert in 1997 to train Twiyavile members to produce mango pickle. They produced the first batch under supervision of the expert. They produced about 60 bottles of 0.25 liter capacity. The product was sold in Morogoro town and fetched about Shs. 30,000/= The investment cost from group members was about Shs. 5,000 for purchasing of raw materials, and about 35 man days provided by member themselves. UMADEP complemented the cost for bottling materials worthy 6,000/= The group tried to produce a second batch without supervision. The product was not of good quality and it was a total loss. The group and the project got scared of the activity and it was stopped.

Other farmers engaged in production of solar dried products. Twenty-six farmers participated in seminars. In 1999 three farmers represented others to a trade fair organised by AMKA. In 2000 seven farmers participated in Sabasaba trade fair in Dar es Salaam and 3 farmers participated in Nanenane agricultural show in Morogoro. Participation in the fairs gave opportunities to farmers dealing with solar dried fruits to promote their products.

Table 25: Number of farmers involved in promotion of fruit and vegetable processing.

Year	Seminars		Exchange visits/fairs		Groups/adopters	
	No.	Farmers	No	Farmers	No	members
1995	1	20	1	9	2	20
1996	2	23	-	-	-	23
1997	1	6	-	-	-	6
1998	-	-	-	-	1	6

1999	1	25	1	3	3	23
2000	-	-	2	10	3	23

iii. Impacts

An adoption level of fruit and processing techniques is shown in Table 34. The most successfully adopted technology is solar drying. In 1998 four solar dryers were installed in three villages two dryers in Mfumbwe, and one in Mkuyuni and another in Nchanga. One of the dryers installed at Mfumbwe village was for training. The throughput capacity of dryers was about 5kg of fresh fruits. In 1999 six solar dryers with throughput capacity of 20kg were installed in Tandai, Mfumbwe, and Nchanga villages.

Farmers engaged in solar drying have formed an association known as KUMTAM. The association is Member ship of that association is not registered but it is recognize as a farmers group and is active in framers groups networks. All farmers owning solar dryers are members of the association. The association has three member groups (each group own one drier) and three individual members each owning one drier. The association has a total of 23 individual members.

The dryers have been used to dry banana, jack fruits, pineapples, papaw and mangoes. Dried fruits are preserved in packets of about 50g each. Dryers can produce 10 packets of dried fruits per tray in 6 days. Small dryers have 4 trays and big dryers have 12 trays. One packet of dried fruits is sold at 200/=. Raw fruits worthy 5,000/= can produce dried products worth 12,000/=. Polythene packets is another materials required is for packaging. The cost of the packets is estimated to be almost 5% of raw fruit costs. The labor required is provided by the farmers themselves which is estimated to be 5 man days per one batch. That means a households owning one big solar drier can earn a profit of up to 6,500/= per week if the drier is utilized at full capacity.

A period conducive for solar dying in Mkuyuni is between September and February. March to July is unsuitable due rainfall and high humidity. One big drier is expected to process up to 1000 pineapples in that period. Farmers growing pineapples reported to loose about 400 pineapples per season from one acre. One big drier can therefore save pineapple losses from 2.5 acres per season.

There are no proper records on the number of packets produced by the dryers in Mkuyuni Division. However, solar drier owners have reported to utilize the dryers at hardly 20% of the full capacity. The also reported to have market problems. Experience of one solar drier owner Mama Gonza is that only 40% of dried products is sold and 60% expires before it is sold. However, she is reporting to

realize a net profit of about 2,000/= per batch despite the losses. She estimates to have earned about 40,000/= from her drier in two seasons.

iv. Factors influencing adoption of solar drying

Solar dryers are expected to be useful in saving losses of fresh fruits and raise households' income. However, market promotion of the products is still a problem. Three big solar dryers are literally not utilized due to marketing problem. The association has established marketing center at Mkuyuni village for market promotion purpose. Participation of KUMTAM members in trade fairs raised awareness of people on solar dried fruits from Mkuyuni. However, the producers have to establish means to reach potential customers in the towns especially schools. Children liked dried fruits when they tested the products during the trade fairs.

4.3 Environmental conservation

During PRAs and from farmers' information networks such (farmers' groups network meetings) in Mkuyuni and Mgeta Divisions farmers indicated to be much concerned with environmental degradation in the area. Farmers are aware of the limited resources especially land and forest products. They are also aware of consequences from the use of industrial chemicals to their environment. In general farmers indicated the need for more efficient and sustainable use and conservation of their environment.

Most of UMADEP activities aim at efficient and sustainable use of resources available to the communities in the Uluguru Mountains. The project also promotes activities, which directly influence conservation of the environment. Innovations, which UMADEP promotes for that purpose, include organic farming, Agroforestry and safe use of agricultural industrial chemicals.

According to UMADEP agroforestry is the incorporation of production of forest and tree products in the farming systems. Organic farming is the use of non-industrial chemicals in agricultural production. This is achieved by use of cultural practices, application of botanical pesticides and use of organic manure instead of industrial inputs.

4.3.1 Agroforestry in Mgeta Division

i. Situation before intervention

The environmental situation in Mgeta Division was alarming. The area is literally bare with some planted foreign trees making patches of wood lots. These patches cover hardly 10% of the land in Mgeta. Individuals or institutions such as religious

institutions and schools own wood lots. The wood lots serves about 30% of wood and timber requirement in the the area. Majority (about 60%) of households buy fire wood from woodlot owners or walk over 5kms to the forests or lowlands in search of firewood or timber. Time spend for that activity is estimated to be 25% of the available working time of household members.

The government through Natural Resources Department and village government conducted tree-planting campaigns between 1987 to 1993 through MWAPU programs. About 30,000 trees were planted per annum. Tree species planted were eucalyptus, glivealia, and accaia. However only about 10% of the trees planted have survived. Farmers do not like eucalyptus trees. They perceive that eucalyptus trees have excessive drainage effects in fields. The estimated tree planting potential in Mgeta is 200 trees per households. Therefore about million trees may be planted in Mgeta.

ii. Project intervention

In 1999 UMADEP started to promote tree planting in Mgeta. A field assistant who is a native in the area and used to work with Natural Resources department for tree planting was recruited. Promotion activities are conducted through seminars, exchange visits, and farmers' groups. Institutions are also mobilized to participate in tree planting.

Thirteen seminars have been conducted with farmers and institutions for the period of 1999 to 2000. About 180 farmers and 10 institutions participated in the seminars (Table 26). One farmers exchange visit was organized in 1999 when 10 farmers visited SECAP project in Lushoto. Seven farmers groups with 46 members are engaged in tree nurseries and tree planting activities promoted by UMADEP. Six schools and five religious institutions are also engaged in the activities. Tree species promoted by UMADEP are Cyprus, glevelia and accasia (**please not spelling of spicies**) trees. Farmers have been trained on:

- Importance and advantages of tree planting
- Uses of different tree species
- Advantages and disadvantages of indigenous and exotic trees
- Nursery management
- Planting methods
- Trees as means of preventing soil erosion
- Management of trees in the field

Table 26: Number of farmers and institutions participated in tree planting program in Mgeta division.

Year	Seminars		Exchange visits		Groups		Villages	Institutions
1999	10	110	1	10	4	50	5	-
2000	3	70	-	-	7	92	10	10

Tree planting requires capital and the benefits from trees are realized after several years. UMADEP have facilitated availability of a credit facility to farmers engaged in tree planting. A revolving fund worth 1,000,000/= was deposited to the local banks. The performance of the fund is shown in Table 27. The project provided 30% of the revolving as subsidy to beneficiaries.

UMADEP also operates a program to promote use energy efficient stoves parallel to promotion of tree planting. Three types of stoves are promoted. Two are wood stoves one is a charcoal stove. The stoves use only 30% of wood charcoal compared to traditional stoves. In general the information disseminated to farmers during promotion tree planting and energy efficient stoves include:

- Importance energy saving in cooking
- Types of energy saving stoves
- Construction of energy saving stoves

Table 27: Performance of a revolving fund for tree planting in Mgeta.

	Year	Credited	Paid back	Beneficiaries		Tree planted	
				Ind.	Groups	Nurs	Field
Langali	1998	343350		48	2	20000	8000
500,000/= Deposited	1999						
	2000		215700				
Tchenzema 500,000/= deposited	1998	500000		22		31500	3000
	1999		350110				
	2000						

iii. Impacts

In a period of two years of promotion of tree planting in Mgeta 30 nurseries have been raised. A total of 117000 trees seedling were raised in the nurseries. Distribution of nursery tree managers is shown in Table28

Table28 Number farmers and institution raising tree nurseries and percentage of trees raised by each category

Category	Number	Percentage of trees raised in the nurseries
Religious institutions	4	9%
Farmers groups	10	60%
Individual farmers	10	10%
Secondary school	1	6%

Trees planted in the field for the period of two (1999-2000) years was 67,000. The remaining trees are still in nurseries expected for planting in 2001. Distribution of tree planting is shown in Table30. Percentage distribution of trees by category community members planted in fields in Mgeta.

Farmers in Mgeta are now aware of tree planting. The performance of the revolving funds operated by the local banks indicate increased farmers' awareness on the importance of tree planting in their fields.

Cyprus trees planted in 1999 are now about two meters high. Farmers sold some of the trees as Christmas trees to people in Morogoro and Dar es Salaam.. About 5000 Cyprus trees are estimated to have been sold during Christmas in 2000. The trees were sold at between 500/= to 1000/=. Although this situation increase households income in poses a threat for the development Cyprus trees.

Table 30: Percentage distribution of planted tree by category of community members in Mgeta

Category	Percentage of tree planted
Primary schools	17%
Religious institutions	13%
Secondary school	10%
Individuals	60%

iv. Influencing factors on adoption of tree planting

Availability of revolving fund in local banks for tree planting might have influenced the adoption of tree planting in Mgeta. The bussiness made by farmers who planted tree in past years have motivated other farmers to engage in tree planting. One

farmer reported to have earned more than 50,000/= from his woodlot after selling some of his eucalyptus trees to other farmers for firewood. Tree species that are provided by the project are considered appropriate.

4.3.2 Agroforestry in Mkuyuni Division

i. Situation before intervention

Before UMADEP intervention in Mkuyuni Division farmers used only to plant fruit trees as components in their farming systems. Forest tree planting in Mkuyuni was not common. The weather and the cropping system in Mkuyuni make the environment in Mkuyuni to be evergreen. This behavior led to scarcity of wood and forest tree products in the area. Community members used to get firewood, building poles and other tree products from the forest adjacent to the villages. Tree in forest in the non-restricted areas was almost finished. Encroachment into the reserved forests became a common practice.

ii. Project intervention

In 1995 UMADEP began to promote forest tree planting alongside fruit tree planting to enable community members produce wood and tree products in their fields. Table 31 shows a total of 59 farmers participated in seminar training organized by the project by 2000. In the same period 37 farmers participated in farmers' exchange visits in Mgeta, Lushoto and at SUA. Four farmers' groups with 54 members were involved in promotion nursery raising and tree planting.

Table 31 Number of farmers and groups involved in promotion of tree planting in Mkuyuni through different approaches.

Year	Seminars	exchange visits	Group members	Villages
1995	10	9	10	6
1996				6
1997	9	23	9	6
1998	9			6
1999	5	5	9	6
2000	26		26	7

All seven villages in Kinole and Mkuyuni wards in Mkuyuni Division were involved in tree planting program. A total of 37 nurseries were raised in Mkuyuni Division.

Indigenous and exotic forest tree species were raised. Mkangazi is dominant indigenous specie raised in the nurseries. Exotic forest trees included Sedelea, glevelia, and ticks. Wood trees species promoted were sessibania and lucina. The spicies recommended for planting in farmers' fields. There was no data available to estimate the potential of tree planting in Mkuyuni Division. Number of trees raised in nurseries and planted in the fields is indicated in Table 32

Table32: Number of trees raised in nurseries and planted in fields

Years	Number of nurseries	Trees in nurseries	% of nursery trees planted
1995	4	1800	100%
1996		2000	100%
1997	9	10500	95%
1998	9	13732	95%
1999	7	14267	80%
2000	8	35628	30%

Most of trees rain in the nurseries in 2000 were still in the nurseries during documentation exercise.

UMADEP introduced a revolving fund in the local banks to facilitate tree-planting program. The revolving fund targeted farmers who raise tree nurseries. One farmer group in Kinole ward (Mgendege) was contacted to supply equipment and other inputs required for nursery raising. The group borrowed money from the revolving fund at 10% interest. Farmers purchased the equipment and inputs from the group on credit. The banks paid the group on behalf of the farmers and the bank debited the farmers as loans. Performance of the revolving fund is shown in Table33 In 2000 WCST took over activities of forest tree promotion. UMADEP continued with promotion of fruit trees in collaboration with WCST.

Table33 Performance of the revolving funds for environmental conservation in Mkuyuni Division.

Shs.1,000,000/= deposited in the bank		Loaned	Paid back	Beneficirers		Tree planted	
Year	Individuals			institutions	Nursery	Planted	
Kinole Bank	1998	640000		6	1	14100	

	1999	10000	650000	67	1		12109
	2000		604860				

Revolving fund available in the bank at the end of 2000 was Tshs 604,860/= in cash and equipment for nursery raising worth Tshs. 45, 140.

iii. Impacts

The trend of promotion efforts indicated by frequency of farmers trained shown in Figure 15 indicate that the number of trees in nurseries were proportional the efforts invested during promotion in the last three years. The first three years rate tree planting was low as expected because forest tree planting was new in Mkuyuni.

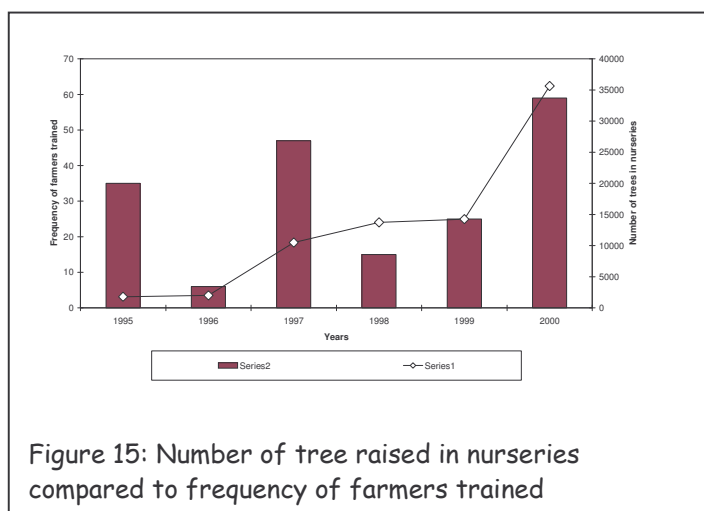


Figure 15: Number of tree raised in nurseries compared to frequency of farmers trained

4.3.3 Organic farming in Mkuyuni Division

i. Situation before intervention

Farmers in Mkuyuni Division practiced shifting cultivation as cultural mean for nutrient regeneration for crop fields. When soil fertility declined the field were left to fallow for the time long enough to accumulate fertility from plant residues. During that time new land or regenerated fields would be used for crop production. This practice used to be effective in the past when land was not limited. Due increased population pressure the available land became inadequate for the cultural practice to be efficient. However, farmers still maintained the practice in expense to forests reserved for wood and timber products. Farmers in Mkuyuni were not used to on-farm fertility management such as manure or fertilizer application.

ii. Project Intervention

UMADEP introduced application of organic manure in Mkuyuni Division to enable farmers replenish soil nutrients in their fields and use the limited land available sustainably. UMADEP also promoted indogenous knowledge on the use botanical

pesticide to enable farmers fight crop diseases and pests locally available inputs which are cost effective. The use of botanical pesticides are considered environmentally friendly because they are easily decomposed. Also technical packages for botanical pesticides consider application of other cultural practices such as crop rotation, and genetic management and conservation.

Promotion activities for organic farming started in 1996. During that period UMADEP conducted 90 seminars in which 105 farmers participated. The seminars were conducted in farmers fields. The same farmers also participated in trial in demonstration plots. UMADEP organised two exchange visits and one short course training to 12 farmers between 1996 and 1999. The first visit was made to Zanzibar in 1996. Five farmers participated. The second visit was made to Lushoto in 1999. Two farmers participated. In both visits farmers learned from host farmers various organic farming techniques. In 1997 UMADEP sponsored five farmers and one staff to attend a five weeks training in Kenya at the Kenya Institute of Organic Farming (KIOF). Table 34 shows promotion progress of organic farming.

In 1998 UMADEP established trials and demonstrated some techniques on organic farming. Table 35 show the techniques covered during promotion activities and the crops for which they may be applied. During the period of three years 1998 to 2000 about 110 farmers participated in demonstrations and trials in the project project demonstration plots at Tandai.

Table 34: Number of farmers trained and those adopted organic farming in Mkuyuni

Year	Demo. participant	Plot	Seminars	Exch. visits and short courses	Farmers in groups	Villages	Adopters
1996				5		3	
1997	5		5	5		3	
1998	20		20			4	15
1999	32		32	2	16	5	25
2000	48		48		16	6	30

Table 35: Organic-farming techniques promoted in Mkuyuni

TECHNIQUE	CROPS TO WHICH CAN BE APPLIED
Compost manure	Horticultural crops, Banana, pineapples

FYM	Horticultural crops, Banana, pineapples
Liquid manure	Horticultural crops, pineapple
Botanical storage pesticides	Maize and beans
Botanical plant pesticides	Horticultural crops and banana

Table36: Adoption rate of organic farming techniques promoted in Mkuyuni division

Technique	Adopters
FYM	34
Liquid manure	0
Composting	23
Botanical pesticide	15
Storage pesticide (botanical)	20

iii. Impacts

Some farmers who keep goats have realized the importance of FYM. They have started to keep FYM for use in their fields. FYM used to be obtained at free. FYM is no longer a free commodity in Mkuyuni. One tin (about 10kg of dry FYM is sold at 500/= to 1000/= . Mzee Ayubu dairy goat keeper at Tandai reported to have realize 15,000/= form sales of FYM. However he has stopped selling because he wants to accumulate sufficient FYM for his pineapple and spices field near his home.

iv. Influencing factors in adoption of organic farming techniques

There is indication that adoption of organic farming has not gone beyond those reached by the project as shown in Figure 16 and from the information obtained during documentation exercise. Farmers indicated that they are most likely to adopt FYM and composting than other techniques as shown in Table 36 because they have the effects from the manure. However, FYM is not sufficiently available.

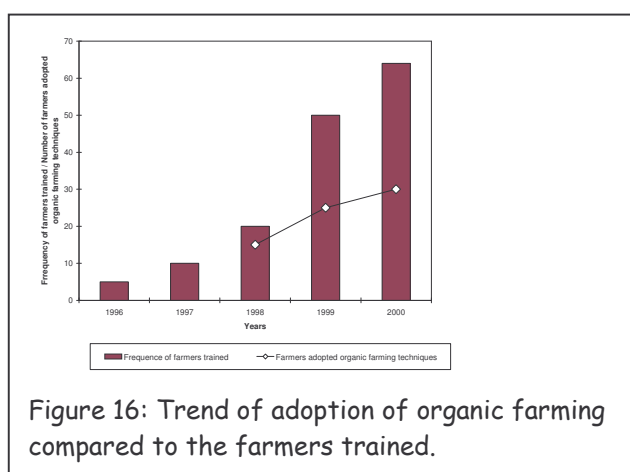


Figure 16: Trend of adoption of organic farming compared to the farmers trained.

Most farmers (over 70%) interviewed during documentation exercise indicated that they would adopt use of botanical pesticide if the knowledge is made available. But they indicated that the knowledge is still not known by the and they would like see the effectiveness of the pesticides.

4.4 Livestock production

4.4.1 Introduction of dairy goat production in Mkuyuni

i. Situation before project intervention

Inadequate supply of animal protein was identified to be one of the problems in Mkuyuni Division during PRAs. People in Uluguru Mountains are traditionally non-livestock keepers very likely so due to physiography of the area. Few households (less than 1% of total households in the area) keep traditional goat breeds for meat. They do not maintain goat shelters and they graze the goats in fields tied with ropes. Dry milk (powder) is supplied from local shops but are too expensive for the majority of households to afford. Quantity of milk powder equivalent to a litter of fresh milk is sold at 1200/=.

ii. Project intervention

UMADEP intervened to the situation by introducing dairy goat production. Between 1997 and 2000 UMADEP have conducted 12 campaign meetings in Tandai, Amini, Mfumbwe, Kibwaya, Mkuyuni and Changa villages. Participants who attended campaign meetings were 569. Objectives of the meetings were to create community awareness on the importance of milk production at household level, viability of dairy goat keeping in Mkuyuni Division and basic livestock husbandry. UMADEP encouraged women spouses to take up dairy goat keeping for their families and offered to provide dairy goat breeds on installment purchase scheme at only 50% of the value of the goats.

UMADEP have conducted seven seminars to forty households that accepted the offer. More than 60% of seminar participants were women. Plate 9 shows one of seminar sessions conducted in Kinole ward. Three exchange visits have been organized by UMADEP. The first exchange visit involved 40 farmers all (women). They visited Magadu dairy farm at SUA and dairy farmers in Mgeta Division. It was a three days visit in which farmers got opportunities to gather theoretical and practical experience from livestock experts in SUA and dairy goat farmers in Mgeta.

The second visit was made in 2000 to Mpwapwa. Five farmers (all women) participated. They learned about pasture and goat feed management from dairy

goat farmers in Mpwapwa. They were also informed on experiences on the use of goat milk. Mpwapwa farmers keep dairy goats of the same breeds as those introduced in Mkuyuni Division.

The third visit was made in 2000 to Babati. Five farmers (all women) participated in the visit. Farmers learned how to construct appropriate goat shelters from farmers in Babati. Generally topics covered during training seminars and exchange visits included:

- ◆ Importance and construction of appropriate goat shelters
- ◆ Pasture and feeding management
- ◆ Breeding and genetic conservation
- ◆ Health care for animals, diagnosis of diseases and treatment
- ◆ Milking
- ◆ Record keeping
- ◆ Institutional capacity building for goat dairy keepers.

Table 37 presents number of farmers participated in promotion activities and trend of dairy goat development in Mkuyuni.

In collaboration with Heifer Breeding project Tanzania (HPI) 40 male goats and 5 bucks were bought from Ireland in 1997. Goat breeds bought were Anglo-nubians, Saanea and Toggenburg. UMADEP paid half of the air freight from Ireland to Tanzania. Four female goats died on transit. Goats were delivered to farmers after the goats stayed for two weeks under supervision at the Department of Animal Science at SUA for sanitary checking and vaccination.

Table 37: Farmers reached during dairy goat promotion activities in Mkuyuni

Promotion Activity	Category of participants	1997	1998	1999	2000	Total
Campaigns	Women	206	-	22	186	414
	Men	87	-	12	56	155
Seminars	Women	32	25	7	21	85
	Men	16	8	2	8	34
Exchange visits	women	40	-	-	10	50
	men	-	-	-	-	-

Farmer constructed required goat shelters and each paid 15,000/= for one goat as down payment to the project. The payment was made through a local bank before the farmers received the goats. Farmers were to pay a total of 30,000/= in ten months after receiving the goats. The money would be collected and managed by

the local banks as revolving fund for promoting dairy goat keeping. Table 25 shows dairy goat development in Mkuyuni Division after four years of operation.

Table 38: Number of households Adopted and dairy goats development

	Category of participants	1997	1998	1999	2000	Total
Adopted households (Cummulative)	Mkuyuni ward	21	19	20	14	14
	Kinole ward	16	14	15	16	16
Villages (cumulative)		7	7	8	8	
New goats	Male	7				7
	female	37	-	-	2	39
Births	Male	-	9	15	24	48
	female	-	19	14	29	62
Existing pure breeds (cumulative)	male	5	13	18	30	30
	female	32	40	39	41	41
Existing cross breeds (cumulative)	Male	-	-	3	4	4
Existing cross breeds (cumulative)	female	-	-	5	13	13

iii. Impacts

Introduction of dairy goat in Mkuyuni has made significant impacts on social and economic affairs in the communities in Mkuyuni Division. They include change of attitude towards diverse utility of goat products, change in attitude on entrepreneurship and gender sensitivity.

1. Use of goat milk

Goat milk was not known in Mkuyuni before the project. According to respondents during documentation exercise more than 50% of community members in Mkuyuni Division are informed of dairy goats and availability of goat milk. At least 10% of the community members have tested goat milk and the majority of those tested liked goat milk. However, the majority of those who have not tested goat milk and know about goat milk perceive that goat milk may not be good due to intensive care medical given to dairy goats. They consider dairy goats to be too artificial to be edible.

In Kinole ward there is indication that that perception also influenced those who had started to take goat milk as Mama Ayubu explained during documentation exercise. Assessment made by a staff responsible for dairy goat production in Mkuyuni has shown that milk use at household level is increasing (Table 39).

Table 39: Percentage of milk use and adequacy for dairy goat keepers in Mkuyuni

Year	% Milk use in households	% Milk sold from households	% milk adequacy in households
1998	50	50	50
1999	85	15	80
2000	95	5	70

Data from that assessment indicate that milk use and adequacy in dairy keeping households has increased while milk sold decreased. Table 39 shows that dairy goat keepers do not sell surplus (excess to what they need for households consumption) milk rather they sell milk on expense to milk adequacy in their households. According to observations made during documentation exercise the drop in market milk have prompted dairy goat keepers to use the milk themselves.

2. Use FYM from goat

The use of FYM was not a common practice in Mkuyuni Division before the project. Farmers who kept some goats did not have a habit for accumulating FYM from their goats. Introduction of dairy goat in Mkuyuni Division has increased awareness on the importance of FYM. There is evidence that goat keepers are now using FYM in their fields and some farmers buy FYM from goat keepers. There is evidence that some dairy goat keepers are planning to improve their fields using FYM from their goats (Box10).

However, awareness among farmers on the use of FYM is still very low. While the assessment made by the field staff indicates that FYM is potentially highly needed in Mkuyuni area more than 50% of FYM produced in the area in disposed off as waste.

Box 9

"We have eight dairy goats now. Milk market has dropped tremendously but I have discovered that FYM from goat is equally important. We collect about two tins of FYM from our goats every week. Some people from environmental project and some neighbor used to buy FYM from us. We have earned 5,000/= (they don't keep record properly) from sales of FYM. Now we have stopped selling our manure. I have dug a pit to decompose the manure. We are planning to improve our pineapple and spices fields. Also our children are much more healthier now because they during a lot of milk" Mzee Ayubu at Tandai village responding

3. Women welfare

There is indication that dairy goat project have influenced women welfare in Mkuyuni Division. Cooperation between spouses in dairy goat keeping households has improved, especially in Kinole ward. Four out of six dairy goat keeping households met during documentation reported enhanced cooperation between spouses

Box 10

"It was difficult for my husband to sit together with me to plan our activities and make decisions. Now the situation has changed significantly from the time we engaged in dairy goat keeping. We made the decision on the activity together. He allows me to attend meetings and make visits with fellow farmers. He listens to my advises and we plan together who does what. This has extended to other households' activities as well. I used not to know what my husband earns from the business he manages himself. But now I know most of our households income and influence decision on expenditure." Saada Ubaya a beneficiarer of dairy goat program in Amini village responding during documentation exercise.

due to dairy goat keeping. Women spouses appreciate that now they are feeling to have more equal right in households planning and decision making than before (Box 11). In Mkuyuni ward the issue was a bit different. There is an indication that some husbands do not involve their wives in making decision especially on spending earnings from goat products. They now feel that keeping diary goat is just adding labor burden to the benefit of husbands (Box 12). Because women do much work in care of the animals.

Box 11

"We have sold three cross breed goats. I do not know how much they earned. My husband sold them" A woman at Mfumbwe village Mkuyuni wards responded and her fellow continued " You know that happened for me as well. Our husbands benefit more than us who do much work in care of the goats. My husband sold a pure male goat and one crossbreed. He did not say how much he sold the goats and where the money went. These goats are just additional labor on us (women). Fellow women in the village are laughing on us for being too busy caring for goats and we have nothing as yet to show them as benefits from this activity" Names withheld

Another aspect in which women welfare has been significantly influenced by the dairy goat project is the awareness and confidence in the use of credit facilities. Women and their spouses are now conversant in the use of credit facilities (Box 13). Reports from the use of dairy goat revolving funds show

Box 12

" Although I haven't realized remarkable earnings from my dairy goat one thing which this program has benefited me accessing me to credit facilities in our bank. I had no idea of joining the bank previously. I thought banking is just saving. Now I know is more than that, it can facilitate working capital for my shamba work. We are now known in the bank as members as customers. We (and her husband) have planned to apply for credit to rehabilitate our banana and pineapple fields." Fatuma Zahoro a Goat diary keeper in Tandai village responding during documentation exercise.

successful repayment from beneficiaries. Only one farmer in Mkuyuni and one farmer in Kinole failed to pay back the loan because their goats died before a few days after delivery. The revolving fund available in Mkuyuni bank after payments from farmers is 540,000/=. Revolving fund in Kinole bank was recovered and three new farmers borrowed to purchase dairy goats from fellow farmers.

Earnings from dairy goat products have increased income to households keeping dairy goats. The income is from sales of milk and FYM as explained earlier and sales from goats. Eight goats have been sold by six farmers at average price of 40,000/= per head. Dairy goat farmers have reported to have bought clothes and paid school fees for their children.

4. Institutional capacity

Dairy goat keepers in Mkuyuni have established two groups Twiyame in Kinole ward having 16 members and Twikalehamwe in Mkuyuni ward having 17 members. Group members cooperate in training and visit each other to share experiences, identify common problems and seek for problem solutions. They participate in farmers' group networks.

The groups have established a joint veterinary fund. They contributed 1,000/= each the money was used to stock medicines for common goat diseases such as anti worms, some antibiotics, and dip chemicals. Dairy goat keepers are generally happy with the cooperation, they perceive that without which expenses for dairy farming would be too high. Cooperation has also enabled the farmers to access training easily from experts and by each other. They have quickly become conversant in diagnosing and treating common diseases of their animals (Plate 10).

iii. Factors influencing adoption

The activity indicates to be potentially important for integration in the farming systems in Mkuyuni Division. Most dairy goat keepers in Mkuyuni put income generation from sales of goat products at forefront. However, some of them have

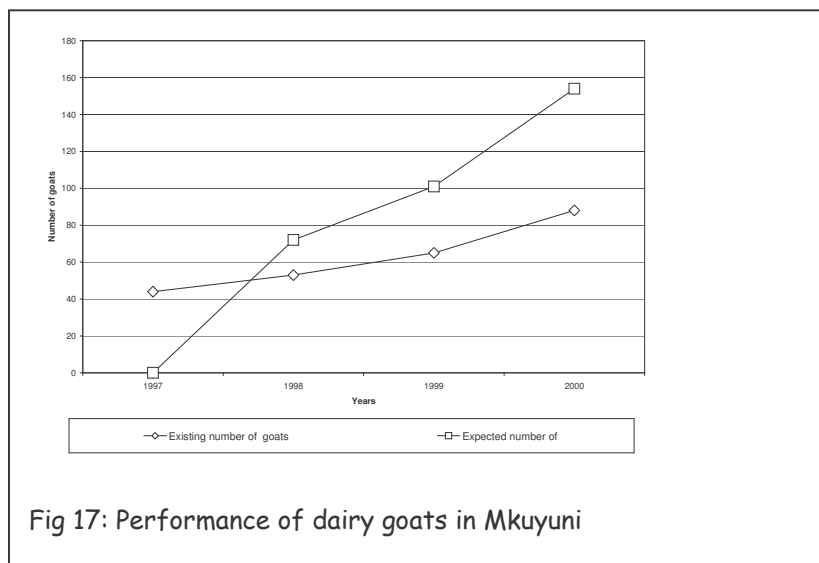


Fig 17: Performance of dairy goats in Mkuyuni

realized that use of milk and FYM at households is equally or more important.

Putting income generation at a forefront in dairy goat keeping might have affected progress of dairy goat program in Mkuyuni. Decline in goat market milk in Kinole has made dairy goat keepers to loose hope on commercial benefits from the goats. Farmers have become reluctant to invest more for the goats like buying medicines. This has lead to high death rates due to lack of adequate care as shown in Figure 17. The number of goats increased by only 50% of the number of introduced goats in four years. No sales of dairy goats outside Mkuyuni division are reported. Records show that only one goat was slaughtered in Kibwaya village for meat. Poor cooperation in decision making between spouses was indicated in some households in Mkuyuni ward. That might have contributed to women demoralization to dairy goat care.

This information suggests that the future of the dairy goat program in Mkuyuni Division should focus on utility benefits from goat products (Manure, milk, and meat) in households and reducing emphasis on commercial benefits. But then initial costs for acquiring a dairy goat must be worked out. If possible to make it be equal to costs of indigenous breeds. The high costs (40,000/= per goat) prompt a beneficiener to look for quick returns from the goats hence selling of milk or goats or manure become priorities.

Also extension massages in promoting dairy goats should indicate clearly the integral link of dairy goats and the farming systems. Emphasis should also be on health than treatment to reduce maintenance costs of goats and restore positive attitude on dairy goats.

4.4.2 Promotion of dairy goat production in Mgeta division

i. Situation before project intervention

Livestock keeping in Mgeta Division was not a traditional practice in the past. During colonial period and with the influence of missionaries, pigs were introduced in the Division. The weather condition in Mgeta favored pig keeping and peoples liked pig meat. Majority (more than 60% of households in Mgeta Division keep pig mainly as a source of income. Pigs are a big source of animal protein in the area. Although animal protein in Mgeta was not problem milk was still a problem. Animal protein from pig is readily available for older people but for children especially infants protein from pig may not be available.

During the last decade of 1980s the department of animal science of SUA conducted research on viability of dairy goat keeping in Mgeta in Langali, Nyandira, and Tchenzema villages. Ten dairy goats were given goats to ten pilot households in 1988 on trial. The goats performed well and farmers appreciated the results. Farmers considered dairy goats as alternative source of income through sales of milk and goats. Also as sources of FYM for their crops. In 1992 the department of animal science completed their research and the trials phased out.

UMADEP took over promotion activities of dairy goat in Mgeta in 1993. The purpose of promoting dairy goats in the area was to address the problems of low households' income, availability of milk to children and sick persons and increasing supply of FYM to crops.

ii. Promotion activities

UMADEP promoted dairy goat keeping in Mgeta Division through seminars and farmers' group. In 1998 UMADEP conducted campaigns to accelerate uptake of dairy goats in Bunduki ward where it was still very low.

During promotion activities six seminars were conducted and attended by 116 participants from 10 villages. Seven campaign meetings were conducted in 5 villages. Participants attended campaign meeting were 364. UMADEP organized farmers to form groups of dairy goat keepers. Two farmers' groups, Twawose in Tchenzema ward with 52 members established in 1993 and ... in Bunduki ward with 9 members established in 1999 in Bunduki ward. One exchange visit was organised in 2000. Two farmers from Bunduki ward participated in the exchange. UMADEP provided a revolving fund of 2,000,000/= to accelerate adoption in Bunduki ward. Table 40 shows progress of promotion activities.

Table 40: Farmers reached during promotion of dairy goats in Mgeta

Promotion Activity	1993	1994	1995	1996	1997	1998	1999	2000	Total
Campaigns	-	-	-	-	-	43	-	321	364
Seminars		10	-	42	-	9	40	15	116
Exchange visits	-	-	-	-	-	-	-	2	2
Adopted households (Cumulative)	10	30	50	74	105	144	152	175	175

During UMADEP sensitized farmers on the importance of dairy goat keeping in households welfare. Seminars and exchange visits provided farmers with

theoretical and practical training in dairy goat keeping. Generally farmers were trained about:

- Construction of appropriate goat sheds
- Pasture and feed management
- Diagnosis and treatment of common goat diseases
- Milking and milk handling
- Reproduction and breeding (genetic conservation)
- General animal care
- Record keeping

By 2000 there was 191 dairy goat in Mgeta Division from 30 new goats brought in the Division by the department of Animal Science between 1988 and 1992. An average of 50 goats is sold outside Mgeta Division or is slaughtered for meat every year. That accounts for the difference between

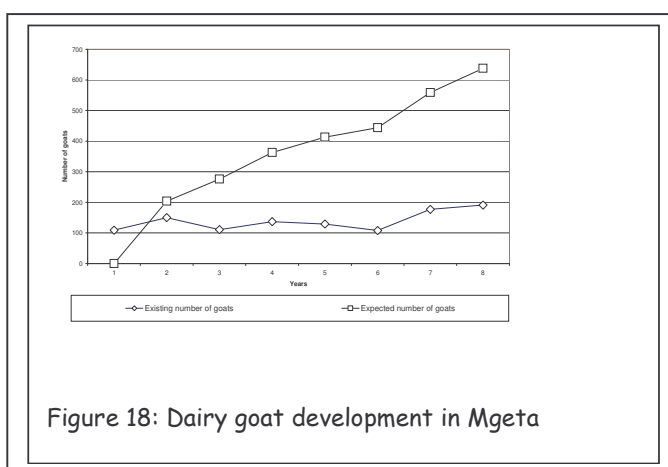


Figure 18: Dairy goat development in Mgeta

expected number of goats and existing number of goats. The trend of dairy goat production in Mgeta is shown in Figure 18.

Diary goat farmers have formed a cooperative group known as Twawose. The group was established in 1994 at Tchenzema ward. The group has 52 members and operates input store, which supplies livestock inputs and veterinary services. The group has also constructed a building for vet clinic and slaughterhouse worth about Tshs 2.5million.

Table 41: Adopting households and dairy goat development

Achivements	93	94	95	96	1997	1998	1999	2000	Total
Adopted households (Cummulative)	10	30	50	74	105	144	152	175	175
Villages (cummulative)	3	3	5	5	5	7	7	10	10
New goats	3	4	-	-	-	-	-	-	4
	7	20	-	-	-	-	-	-	37

Births		48	29	44	17	12	57	32	239
		47	43	43	33	19	58	47	290
Existing pure breeds (cummulative)	3	2	2	2	2	1	1	4	4
	7	9	9	9	9	9	7	3	3
Existing cross breeds (cummulative)	17	29	18	22	18	10	46	44	44
Existing cross breeds (cummulative)	72	86	82	104	100	88	123	140	140

iii. Project impacts

Mgeta Division is now famous in production of cross breed dairy goats. Mgeta dairy goats are known in Iringa. About 40 dairy goats are sold each year from Mgeta to Iringa and other areas.

Interviewed farmers have reported to improve their houses from dairy goats. About 80% of dairy keepers in Mgeta pay school fees for their children from dairy goat earnings. One farmer, the chairman for Twawose managed to pay secondary school fees for his two children.

4.4.3 Comparative factors influencing adoption of dairy goats in Mgeta and Mkuyuni division.

Farmers in Mgeta are Christians by majority. They are used to keep pigs, which are exotic and are small animals just like dairy goats are. This is not the case for Mkuyuni division where the majority of community members are Moslems. Keeping of exotic small animals is a new activity altogether in Mkuyuni division.

However, there are more critical issues, which have to be looked into in order to have a clear direction on how to go about improving the success of this activity in Mkuyuni division. These issues include relevance of the intervention in the livelihood strategies of the communities, susceptibility of the animals in the environment and economic feasibility.

4.4.3.1 Relevance to livelihood strategies

Many rural households run subsistence life. To these households a constant petty cash earning is very important. The traditional farming products in Mgeta are seasonal and sold in batches. Sale of milk or livestock provides to a household a daily or instant earning. This type of a production system is important in places like Mgeta. The majority of households in Mkuyuni have opportunities for daily cash earning throughout a year from sales of banana, coconut and yams. To introduce an intervention on the basis of petty cash income might not be very important to this kind of the community.

Therefore, other areas for which dairy goat keeping has importance to livelihood and production strategies in Mkuyuni division have to be looked at. Perhaps more emphasis should be directed to household nutritional value, availability of animal protein in the area, and FYM production. But then the returns to the initial investment in terms of benefits must be made apparent and should be realistic.

4.4.3.2 Environmental susceptibility

The breeds, which are introduced in Mgeta, have proved to have high ability to adapt the weather in the area. Very likely so because these breeds are bred in temperate climates which are similar to that in Mgeta. The majority of the animals in Mgeta is doing very well and has a presentable look for a new observer.

The breeds, which are introduced in Mkuyuni, are from Ireland. These animals might have been artificially made capable of surviving in humid tropical climates. Therefore adaptation of these animals in the area like Mkuyuni may need some special management practices.

The majority of the animals in Mkuyuni are not as presentable as those in Mgeta. This indicates that something is seriously wrong in the management of the goats. Too much emphasis on medical treatment especially at the beginning might have developed negative perceptions in the communities. Proper handling of the animals and pasture management might bring a turn about point for this issue.

4.4.3.3 Commercial feasibility

Availability of dairy goat market in places outside Mgeta has an important opportunity for development of this activity in the area. The first dairy goat keepers in Mgeta realized earning from sales of goats to Iringa and Njombe. This has made the place to become famous in production of dairy goats. The department of Animal Science is constantly buying goats from Mgeta for research purposes. This opportunity is not available in Mkuyuni.

4.5 Fish farming in Mkuyuni Division

i. Situation before intervention

Scarcity of animal protein was one of the problem identified in PRAs which contribute to poor health in the area. The sources of animal protein in the area were dried 'dagaa' and fish sold in shops at an average of 700/= per kilo. At least not less than 50% of households in Mkuyuni Division keep chicken. But the chicken is not available sources of meat for households. They are used for special occasions e.g festivals and entertaining guests.

Table 43: Promotion of fish farming

ii. Project intervention

UMADEP intervened the situation by introducing fish farming in the area. Fish farming was not known in the area before UMADEP intervention. From 1995 to 2000 UMADEP conducted six-seminar training to 170 farmers (Table 43). During seminars farmers learned the following practices:

Year	Seminars	Exchange visits	Villages	Ponds
1995	10		4	5
1996	40		4	7
1997	45		5	12
1998	40		5	25
1999	-	14	6	41
2000	35		6	30

- Site selection for pond construction
- Techniques for pond construction
- Introducing fingerlings in the pond
- Feeding and fertility management of the pond
- Harvesting techniques
- Protection from vermin's

One exchange visit was organized in 1999 when 14 farmers visited other farmers in Mgeta Division. During the visit farmers observed and learned from host farmers on their experience in fishpond management and benefits from fish farming.

iii. Impacts

Thirty ponds out of 41 ponds produce fish at least once in year. Average production per pond is 150 kg of fish per harvest. Fishes produced are of 0.25kg on average. Each fish is sold at 300/= equivalent to about 1200/= per kg.

Fresh fish farming is now commonly supplied in Mkuyuni Division especially at Kibwaya village. Households owning fishponds report that fish has made up of about 20% of protein source in their families. Thirty ponds out of 41 ponds produce fish at least once in year. Average production per pond is 150 kg of fish per harvest. Fishes produced are of 0.25kg on average. Each fish is sold at 300/= equivalent to about 1200/= per kg.

Mr. Hija Mhondogwa fish pond keeper in Kalundwa report to earn about 70,000 per annum each year from his pond. He has integrated vegetable production near his fishpond. He earns about 40,000/= per annum from vegetables. He managed to buy 35 corrugated Iron sheets and 5000 burnt bricks for his house.

iv. Factors influencing adoption of fish farming.

Collaboration with FAO fish program enhanced adoption of fish farming in Mkuyuni. Most households in Mkuyuni prefer fresh fish. There are no traditional taboos that limit eating fish in the area. Supply of fish in the area is still inadequate compared to demand. Households that are considered poor in the area they still do not afford fish prices.

Factors that limit adoption of fish farming in Mkuyuni include availability of water and soil stability. Farmers whose fields distant from water streams are less likely to adopt. Channeling water through fields is perceived to promote soil erosion and gully formation. Farmers with distant fields from water streams may not be allowed to channel water through other farmers' fields. Five ponds were abandoned after construction because they could not hold water long enough for fish grow. Farmers with fields in such soils are less likely to adopt fish farming. There was no data available to quantify the relative size of fields with unsuitable soils.

4.6 Improving lowland agriculture

Mvomero Division is in the low land contrary to Ulugurus, which are in the Mountains. UMADEP refer to agricultural activities in Mvomero as Lowland Agriculture. UMADEP identified constraints facing farmers in lowland agriculture during PRAs conducted in 1996 and through farmers groups networks. The constraints included:

- High costs of tractor hire which lead to poor land preparation and delayed operations using hand hoes
- Lack of capital to meet required costs for optimum farm operations
- Lack of transport facilities for farm produces from fields to homesteads
- High costs of inputs especially fertilizer and pesticides

UMADEP interpretation on those constraints was that farmers in Mvomero Division would improve productivity if:

- appropriate low cost technologies for farm operations, and
- appropriate locally managed credit and saving systems are introduced.

In 1997 UMADEP intervened the situation by promoting Draft Animal Power Technology (DAPT) and rural farmers' credit and savings banks in Mvomero and Hembeti wards. This section discusses on DAPT promotion. Discussion on credit and savings bank is discussed in section

i. Situation before intervention

Important farming systems in Mvomero Division are maize and paddy rice. Production of these crops requires extensive land use which entails intensive labor and/or implement use. Traditionally farmers in Mvomero Division used do land preparations and maintenance (weeding) using hand hoes. This practice limited to available household labor. The majority of households in Mvomero can hardly manage about one hacter under the traditional practice.

Use of tractors in Mvomero Division was introduced in late 1970s and early 1980s by the village cooperatives. Cooperative tractors used to hired to farmers at subsidized rates. The system did not work efficiently. Tractors were not adequate to meet farmers' requirement and most of them were grounded due to poor handling. In the mid 1980s businessmen started to invest in agriculture. They brought in tractors, which also used to provide services to other farmers. However the charges became progressively too high for the majority of farmers.

Between 1993 and 1996 the ministry of agriculture under FAO program, and the SUA-TU linkage project of SUA promoted DAPT in Mvomero Division. Apparently the two projects had phased out by 1997. When UMADEP took over promotion activities of DAPT in 1997 there were 10 pairs of oxen, five working plough, two working cultivators, three carts in four villages. Ninety-eight farmers had been trained on DAPT. About 150 acres per season estimated to be ploughed by ox-ploughs by the time when UMADEP intervened.

ii. Promotion activities by UMADEP

In 1997 UMADEP started promoting DAPT in Mvomero through seminars, exchange visits, through farmers, group networks and field follow up project staff. Eleven seminars have been conducted in which 278 farmers participated. One exchange visit was organised in 2000 where three farmers visited farmers in Babati. UMADEP have worked with eight farmers groups with a total of 68 members. The progress of DAPT promotion is shown in Table 44.

Table 44: Number of farmers trained during DAPT promotion and adoption of DAPT

Year	Seminar participants	Exchange	groups	Buffaloes	Oxen	Donkeys	Ploughs	Cultivators	Carts	Villages
1997	103		96		38	6	6	2	2	4
1998	73		68	2	47	18	13	-	2	5
1999	25		24	2	48	24	24	-	1	6
2000	76	3	64	2	84	42	34	-	4	7

Farmers who participated in seminars learned about the following:

- Training new draft animals
- Animal health and care
- The use of collar harness instead of brastband harness
- Record keeping

Table 45: performance of the revolving fund fro DAPT

Managing Bank	Year	Fund allocated	Fund recovered	Benefited farmers	Water buffalo	oxen	carts	plough
Hembeti	1998	450,000		3	3			
	1999			2		4	2	
	2000		350,000					
Mvomero	1998	250,000		3			3	
	1999			2			2	
	2000			1				1

Farmers who paid a visit in Babati learned about Ox-weeding and ridging. Farmers' groups participated in information exchange during network meeting and local farmers' exchange visits. The groups also helped to identify problems, recommend solutions, assess and monitor project implementation.

UMADEP facilitated provision of a revolving fund to help farmers' meet initial costs for acquiring new DAP implements. The local banks managed the revolving fund. The performance of the revolving fund is shown in Table 45.

iii. Impacts

All farmers interviewed during documentation exercise were convinced that DAPT was an appropriate mean for ploughing and transportation. Farmers who own DAPT have repeated increasing demand for their equipment. One farmer owning a pair of oxen and a plough reported to have ploughed have increased his field area from 3 acres in 1996 to 15 acres in 1999. His former three-acre field was not sufficient to guarantee food security in high household. DAP has enabled him to produce enough food for his family and he is planing to build a corrugated iron sheet with burnt brick house.

iv. Factors influencing adoption

The trend of adoption shown in Table 44 indicates progressive adoption for oxen, donkeys and plough. However, cultivators have not been unpopular. Factors, which might have influenced that trend, include increased high costs for tractor hire and inviolability of tractors.

Farmers have realized that ox plough are more reliable than tractors. Ox plough access of fields that may not be accessed by tractors. Ox plough can work in wetter fields than those tractors can afford. Therefore during rainy seasons ox ploughs may only plough many fields in Mvemero.

However, adoption of DAPT is threatened by lack training facilities. Majority of training provides to farmers do not provide adequate practical training. Lack of spares and inviolability of DAPT equipment is another limitation to sustainable adoption of DAPT.

4.7 Support farmers initiatives

During PRA and in farmers' network meeting availability of capital was mentioned to a limiting factors to development activities in the project area. The situation threatened adoption of some project innovations as well. UMADEP facilitated availability of capital to some community and farmers' activities that seemed capital too capital intensive to farmers. They included marketing and input supply,

roads rehabilitation and bridge construction, and provision of construction materials to commercial buildings.

4.7.1 Marketing and input supply in Mgeta

i. Situation before project intervention

Farmer in Mgeta mainly produces for the market. Land scarcity entailed intensification of production. UMADEP interventions aimed at improved production. Improved production of vegetables promoted UMHODEP faced Market and input supply constraints. Additional efforts to promote production farm products were expected to increase problems marketing and in put availability.

Efforts to enable farmers establish sustainable marketing and input supply systems had started during UMHODEP. A farmers' cooperative (TWIKINDE) was established in Tchenzema ward. The cooperative built a warehouse with assistance in construction industrial materials from UMHODEP.

ii. Project intervention and impacts

UMADEP took over UMHODEP activities and facilitated the cooperative to acquire seven-ton truck worth... on loan from the project in 1996. The cooperative used the lorry to transport farmers' products to Morogoro and Dar es Salaam markets. The rates for transport charged by the cooperative were almost half of that charged by private transporters. Reliability of transport also increased. Farmers were able to transport their products as they wished.

Transport reliability made by the cooperative lorry is reported to have influenced promotion of production of vegetables and tomato. Market dealers in Morogoro and town referred tomatoes in Mgeta as twikinde tomato because Twikinde lorry used to supply tomato from Mgeta to the markets.

Availability of transport improved input supply. The cooperative utilized return trips of the lorry to carry farm inputs such as fertilizers and agri-chemicals and seeds. All farmers interview during documentation exercise appreciated that availability of the cooperative lorry motivated farmers to produce more. Before the lorry was available more than 50% of farm products spoilt in fields on during transportation. In 1996 another farmers cooperative group Twawose established supply of livestock in put.

Input supply started by the cooperative stimulated private business men to engage in input supply business in Mgeta at competitive prices. In 1998 when Twikinde cooperative activities declined the business men had almost taken up the business. New farmers groups formed with expectations to attain achievements made by

Twikinde. Private transport business by also picked up especially after roads were rehabilitated. This impact cushioned decline of Twikinde activities.

ii. Factors influenced success and failure

Success in promoting marketing and input supply was mainly influenced by projects. The pressure from farm losses and expectations of project grants made farmers took up the activities. However, failure for Twikinde as a farmers' movement for local markets development has to be taken as an important experience from heavy project investments to community development.

Another factor that influenced failure of Twikinde is related to institutional strength. Institutional capacity building aimed at establishment of skilled leaders.

Majority of farmers interviewed during documentation exercise indicated that ordinary cooperative members were less knowledgeable to their own constitution. This situation led to the formation of leaders class who were accessible to cooperative resource. Ordinary members

were perceived as customers (Box 14). This showed that the cooperative leaders reached the extent of perceiving they not part of cooperative members. Ignorance of majority of cooperative members on their constitutional rights enabled mismanagement of the cooperative to go on unchecked.

Box 13

"We decided to engage in supply of potato seeds to help our members to get potato seeds at cheaper prices." One former leader of Twikinde responding during documentation exercise

4.7.2 Road rehabilitation

Road condition Nyandira - Langali - Mlali section became pathetic in 1997 due to poor maintenance. Trucks used to take more than three ours to get to Mlali from Langali. No truck was able to get to Nyandira. Promoted production of vegetables and tomato was threatened. In 1998 UMADEP took up initiative to rehabilitate the road sections Nayndira - langali (6 kms) and Langali - Mlali (15km).one contactor was hired to rehabilitate the Langali - Mlali road section and another contactor was hired to construct the Langali - Nyandira road section. Volunteer farmers who used to repair the road section between langali and Nyandira (Chimbuchimbu group) were sub-contracted to carry out repair activities that required labour. Costs for rehabilitation of the Langali Mlali road section was about 90m/= . Costs for the Langali Nyandira road were about (**Mgumia please find**).

Rehabilitation of the roads improved the condition of the roads. Trucks managed to get to Nyandira and the Nyandira market was revived. Transportation costs went down to less than 20% of that used to be before rehabilitation. Markets in

Nyandira and Langali became more reliable. Goods trucks reaching Nyandira and Langali increased from 2 to over seven at each market day. A group of farmers (Chimbuchimbu) engaged in regular road maintenance between Langali and Nyandira. The group is composed of 14 members who are to maintain engage in truck loading during market days. The motive for this group is to encourage trucks to reach Nyandira market so as to maintain income from truck loading.

4.7.3 Bridge construction at Mbezi river Mkuyuni division

During PRA in Kinole village farmers raised their concern on communication problem between Tandai village and Mifuru village. During rainy periods farmers in Mifuru were usually un able to cross the river to Tandai where there is a market and is a shopping center. About 30% of residents at Tandai and Kalundwa villages have field plots in Mfuru village. Production in the Mfulu village was considered affected by poor accessibility. This situation threatened adoption of UMADEP intervention in Mfuru village.

UMADEP took up the initiative to facilitate construction of the bridge between at Mbezi River about 3km down stream from Tandai. UMADEP mobilized farmers through their government to participate in bridge construction. About 300 farmers from three villages Tandai, Mifuru and Kalundwa participated in collecting local building materials and labor. Construction started in 1998 and was completed in 2000. The project paid for the contractor and industrial building materials. Total cost of construction of the bridge is estimated to be Out of which% is community contribution (**Data was not found**).

The impact of the bridge is not yet determined. Community members are expected to construct access road from the bridge towards Mifuru village.

4.7.4 Capital support

Farmers initiatives to establish commercial activities were threatened by lack of capital for buildings construction. UMADEP facilitated availability of grants to four bank groups (Zinduka AMM, Langali and Bunduki) for construction of bank buildings. UMADEP also facilitated grants to Twawose group to enable the group to construct a building for animal clinic and butchery. Table 47 present the grants given for each group.

All bank building are in use although some of them are not complete as shown in Table 47 Twawose group have also stated to use part of the building as for group office purposes. Members' contribution to building construction activities is estimated to be between 25% to 35% depending on level of completion of

construction. Members' contribution to construction activated was valued and added on members' shares.

Table 47: Amount of money spent as grants from the project for buildings of farmers' groups.

GROUP	AMOUNT GRANTED (Tshs)	Date of commencement	Percentage completion
Twawose	1,669,250	1995	60
Bunduki bank group	1,575,965	1996	70
Zinduka (Kinole bank group)	2,102,890	1995	100
Langali bank group	1,933,165	1995	100
Mkuyuni bank group	1,125,300	1995	60
Total	8,406,570		

iii. Impact

Bank building in Kinole and Langali has raised the status of rural micro financing. Completion of banks buildings in Kinole and Langali have enhanced trust of the communities to the bank (Box 15). Construction of the group building demonstrated the ability of community members to participate in development activities by investing their time and labor.

Box 14

"I got convinced to open an account in the bank after they managed to complete a bank building. I am sure now they are committed enough for the business. Security for our money is somehow guaranteed." A customer of Zinduka bank group responding during documentation exercise

iv. Influencing factors for success

External project influence is the most important factor on the success of construction of the building. It is evident that this experience developed dependence syndrome to the communities. For example all bank groups that were not granted for construction of bank buildings have not managed to build even a moderate structure for their banks. The Tchenzema bank in Mgeta and the Hembeti and Mvomero banks in Mvomero are operating banking activities in rented buildings. Majority of farmers group members interviewed during documentation exercise indicated expectations for grants from external donors to support capital investments for their activities.

4.8 Supporting micro-financing institution

Rural communities are not accessible to conventional savings and credit facilities. Farmers in the project area are aware of that problem and showed much concern about it during PRAs and farmers group networking meetings. Analysis on that situation indicated that unless farmers are accessed to credit facilities they would not easily adopt improved practices. Most of improved practices would require credit facilities at certain stages of adoption. Therefore it was important to create conditions for successful uptake of new innovations by empowering the communities to develop their own credit system from their own savings. UMADEP have been supporting establishment of rural micro-financing institutions in the project area parallel to promotion of improved innovations in the area.

i. Situation before intervention

The cooperative unions once introduced rural savings and credit facilities (SACCOS) in the project area (Mkuyuni, Mgeta and Mvomero divisions) in 1970s to 19980s. The rural and credit banks were operated through the primary cooperative societies. Experiences from the credit and savings banks operated by the cooperatives were not successful. All the SACCOS in the project area collapsed. The reason for failure of the SACCOS as given by farmers was poor governance of the SACCOS. The SACCOS were introduced in a top down approach. The SACCOS did not perform well. Some people interviewed during documentation exercise claimed to have lost their money they saved in the SACCOS. The failure of the SACCOS was described as being the consequence of the top down approach applied in establishing the SACCOS.

Poor performance of the SACCOS led to the formation of farmers' groups engaged in credit and savings groups before UMADEP started. These included the Tchenzema savings and credit group and Langali savings and credit group in Mgeta and the Savings and credit group in Mkuyuni.

The groups were formed mainly for the purpose of raising capital and operate local CS bank in their areas. Farmers motive to engage in the credit and savings activities were:

- Availability of a local saving facility for safety of households cash
- Availability of credit. Easy to ensure trustworthiness among people who know each other. This guarantee promptness of credit delivery for emergencies.
- Create environment for external sponsors.
- Income generation through profit shares from interests.

ii. *Project intervention*

After PRA in Mkuyuni and Mgeta farmers realized the need to have farmer managed savings and credit banks. In 1994 UMADEP mobilized existed savings and credit groups to institutionalize their groups and establish. Some new savings and credit groups were formed in Kinole (Zinduka) and another group was formed in Bunduki ward (Bunduki savings and credit group) after PRAs. Table... shows credit and savings groups existing in Mgeta and Mkuyuni divisions. The idea behind institutionalizing was to build the capacity of the farmers groups to operate as rural micro financing institutions.

Table 48: Community managed Banks promoted by UMADEP

Division	Ward-Village	Bank group
Mkuyuni	Kinole- Tandai	Zinduka
	Mkuyuni-Mkuyuni	Akiba na Mikopo Mkuyuni (AMM)
Mgeta	Langali-Langali	Akiba na Mikopo Langali (AML)
	Bunduki-Bunduki	Akiba na Mikopo Bunduki (AMB)
	Tchenzema-Nyandira	Akiba na Mikopo Tchenzema
Mvomero	Mvomero - Mvomero	Akiba na Mikopo Mvomero (AMM)
	Hembeti-Hembeti	Akiba na Mikopo Hembeti (AMH)

UMADEP facilitated capacity building of the credit and savings groups by sponsoring training for bank clerks. Five clerks were sponsored for training in the Moshi cooperative collage between 1996 and 1997 Seminars were conducted to leaders and members on banking techniques and management. UMADEP also facilitated establishment of constitutions for each bank group. By 1998 all bank groups had established group constitutions except the Bunduki bank group which was sent to reviewers during documentation exercise. The project also facilitated construction of bank buildings for Zinduka, Mkuyuni, Langali and Bunduki Banks. UMADEP provided industrial construction materials and members provided local building materials and labor. Table 40 shows summary of UMADEP promotion intervention in micro-financing activity. The groups have close relations with each other and other farmers groups through the local networks, the banks network MUVIBEWA and through exchange visits.

Table 49: Number of farmers involved in training activities through different approaches in promoting micro financing institutions.

Year	seminars					Exchange Visits					Trained personnel				
	Z	M	T	L	B	Z	M	T	L	B	Z	M	T	L	B
1994	0	0	0	0	0	12	8	12	12	4	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	4	0	0	0	0	0	0	0	0	0	2	0	0	0	0
1997	11	0	11	11	0	10	10	10	10	10	0	2	1	1	2
1998	32	11	32	32	0	10	0	10	10	0	0	0	1	1	0
1999	54	0	0	0	11	0	0	0	0	0	0	0	0	0	0
2000	48	11	0	0	0	30	10	23	33	0	0	0	0	0	0

Table50: Number of farmers involved in training activities through different approaches in promoting micro financing institutions in Mvomero division.

Year	seminars		Exchange Visits		Trained personnel	
	H	Mv	H	Mv	H	Mv
1994						0
1995						0
1996						0
1997				10		0
1998	14	48	10	0	2	2
1999	30	18		0		0
2000	14	9		20		0

Description of codes in Table...

- Z = Zinduka Bank group Kinole
- M = Mkuyuni Bank group
- T = Tchenzema Bank group
- B = Bunduki bank group
- L = Langali bank group
- Mv = Mvomero bank group
- H = Hembeti

Micro financing activities started in most banks started in 1997 except the Tchenzema bank, which started to operate in 1995. The period between establishment of groups and starting of micro financing activities was spent to build up capital for the activity and construction of bank buildings.

During seminars and exchange visits farmers learned about:

- Responsibilities and duties of the credit and savings banks
- Regulations of leasing program for revolving funds
- The opportunity of savings and credit banks with regard to legal proceedings
- Ways of strengthening internal control for the provision and reimbursement of credit
- Importance of shares for constituting the owned capital of the savings and credit business.
- The necessity of the members to read and understand their by laws and bank policy

iii. Impacts

Table 51: Performance of Zinduka bank group (Kinole)

Year	Members	Customers	Capital assets	Cash shares	Revolving funds	CUSTOMERS						
						Savings	No. of Normal credits		No. of Agric. credits		No of Enviro. credits	
			Tshs '000	Tshs '000	Tshs '000	Tshs '000	D	R	D	R	D	R
1994	34	0	0	325	0	0	0	0	0	0	0	0
1995	34	0	0	325	0	0	0	0	0	0	0	0
1996	34	0	0	380	420	0	0	0	0	0	0	0
1997	71	74	3320	410	320	164	0	0	15	15	0	0
1998	75	182	3360	587	1320	4565	92	2	3	2	5	5
1999	85	320	3556	607	1320	8124	154	12	1	1	1	1

2000	119	430	3556	898	1320	9827	232	112	0	0	0	0
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Note: D denotes loan delivered and R loan recovered.

Zinduka bank indicates good progress in micro financing activity table 51 shows that number member, share capital and savings are increasing with time. The bank have managed to offer a total of 478 normal loans, six loans for environmental activities and 19 loans for agriculture (dairy goat loans) for the period of 4 years from 1997 to 2000. Normal loans are for small business is short-term loans of one to three months. However, the recovered loan only 26% of the normal loans. Loans for environment were from the revolving fund for environment activities deposited in the bank by the project. All loans for environment activity were recovered. Loan for dairy goat were also from the revolving fund for the

Table 52 show credit and savings activities of the Langali bank group. The group also indicates success. Number of members, customers , cash shares and savings increased with time as shown Table.

Table 53: Performance of Langali bank group

Year	Members	Customers	Capital assets	Cash shares	Revolving funds	CUSTOMERS							
						Savings		No. of Normal credits		No. of Agric. credits		No of Enviro. credits	
			Tshs '000	Tshs '000	Tshs '000	Tshs '000	D	R	D	R	D	R	
1994	28		0	86									
1995	38		0	121									
1996	45		0	220									
1997	50	4	3110	290	80								
1998	56	86	3110	784	2433	500	82	63	31	27			
1999	61	194	3200	1224	2815		124	99	46	18	53	0	
2000	74	301	3200	3274	5409		154	119	63	29	0	51	

Table 54: Performance of Tchenzema bank group

Year	Members	Customers	Capital assets	Cash shares	Revolving funds	CUSTOMERS						
						Savings	No. of Normal credits		No. of Agric. credits		No of Enviro. credits	
			Tshs '000	Tshs '000	Tshs '000	Tshs '000	D	R	D	R	D	R
1994	0	0	0	0	0	36						
1995	9	9	10	63	0	121						
1996	13	9	10	126	0	190						
1997	15	162	50	137	0	3567						
1998	23	162	150	202	500	5107						
1999	75	163	150	1144	0	6824					22	
2000	96	315	150	1926	0	7439						21

Table 56: Performance of Mkuyuni bank group

Year	Members	Customers	Capital assets	Cash shares	Revolving funds	CUSTOMERS						
						Savings	No. of Normal credits		No. of Agric. credits		No of Enviro. credits	
			Tshs '000	Tshs '000	Tshs '000	Tshs '000	D	R	D	R	D	R
1994	17	0	0	0	0	0						
1995	17	0	0	0	0	0						
1996	17	0	0	0	0	0						
1997	27	0	0	26	630	0			15			
1998	47	0	2100	42	495	0				6		
1999	48	12	2120	61	495	270				4		
2000	48	14	2120	61	495	370				4		

Table58: Performance of Bunduki bank group

Year	Members	Customers	Capital assets	Cash shares	Revolving funds	CUSTOMERS						
						Savings	No. of Normal credits		No. of Agric. credits		No of Enviro. credits	
			Tshs '000	Tshs '000	Tshs '000	Tshs '000	D	R	D	R	D	R
1994	13	0	0	0	0	0						
1995	13	0	0	0	0	0						
1996	13	0	0	0	0	0						
1997	18	0	1200	36	0	0						
1998	24	0	1700	44	0	0						
1999	29	16	2200	50	230	187						
2000	29	40	2200	180	230	284						

Table59: Performance of Mvomero bank group

Year	Members	Customers	Capital assets	Cash shares	Revolving funds	CUSTOMERS						
						Savings	No. of Normal credits		No. of Agric. credits		No of Enviro. credits	
			Tshs '000	Tshs '000	Tshs '000	Tshs '000	D	R	D	R	D	R
1994												
1995												
1996												
1997	42		0	201	0							
1998	61	79	80	303	250	1961						
1999	63	228	80	589		3120						
2000	75	309	180	898		6234						

Table60: Performance of Hembeti bank group.

Year	Members	Customers	Capital assets	Cash shares	Revolving funds	CUSTOMERS						
						Savings	No. of Normal credits		No. of Agric. credits		No of Enviro. credits	
			Tshs '000	Tshs '000	Tshs '000	Tshs '000	D	R	D	R	D	R
1994												
1995												
1996												
1997												
1998	48	99	80	314	450	1158			3			
1999	54	209	80	430		1848			2	3		
2000	64	282	80	489		1920			1	2		