APPENDIX-7

DEVELOPMENT FOR 1ST GENERATION VERIFICATION PROJECTS

CHAPTER 1. THE FIRST GENERATION VERIFICATION PROJECT SITES

This chapter summarizes the activities and experiences of the two-year implementation of the verification project at 23 sites, which are defined as the first generation. The stories of these first generation sites are the basis of evaluation of the verification project, i.e. the origin of the lessons learned and discussion towards further development of smallholder irrigation initially came from the experiences of these 23 sites.

The verification project started with 23 sites in four clusters, each in Lilongwe East, Dedza Hills, Dowa, and Ntchisi RDPs in 2003. Some of those were started by the Study Team's initiative together with the relevant government officers, some by the officers' initiative with only minor technical assistances from the Study Team, and some by the farmers' own initiatives. The government officers involved in the field are the above RDP assistant irrigation officers and AEDCs & AEDOs in five EPAs, namely Mpenu, Kanyama, Bembeke, Mvera and Karila.

Table 1.1 Summary of the Sites with whose Initiative

	Club Name (membership, l.owner)	Stream	Initiative (more farmer⇒)			
			ST & Officers	Officers & ST	Officers & Farmers	Farmers & Officers
LL East RDP, Mpenu EPA						
1-1	Mutwanjovu(25,25)	Mutwanjovu			○	
1-2	Duwu(26,4)	Duwu	○			
1-3	Ngoni(15,4) Miteme(13,5)	Nanjiri	○			
1-4	Chimphonongo(18,18)	Machite		○		
1-5	Zakumva(9,1)	Talira (u/s)				○
1-6	Talira (w/ fish pond)	Talira	○			
1-7	*Mgunda(11,2)*	Mgunda				○
1-8	*Mankhamba(9,0) Tigwirizane(6,0)*	Balangombe			○	
Dedza Hills RDP, Kanyama EP						
2-1	Chikhasu(22,6)	Chikhasu	○			
2-2	Mchiku(16,1)	Mchiku	○			
2-3	Livizi	Livizi		○		
Dedza Hills RDP, Bembeke EP						
2-4	Mtsetse(13,2)	Mtsetse		○		
2-5	Kadiwa(15,2)	Kadiwa		○		
2-6	Mtanda(31,6)	Mtanda				○
2-7	Namanolo(23,8)	Namanolo			○	
Dowa RDP, Mvera EPA						
3-1	Tikolore(70,11)	Fumbwe	○			
3-2	Tilime(30,5)	Chatikowo				○
3-3	Loyi(65,16)	Loyi	○			
3-4	Kambware(40,15)	Kambware				○
Ntchisi RDP, Kalira EPA						
4-1	Msambaimfa(62,53)	Chikandila			○	
4-2	Gontha(49,5)	Gontha	○			
4-3	Katema(30,0)	Katema				○
4-4	Kasangadzi(43,13)	Kasangadzi		○		
Total			8	5	4	6

Table 1.1 shows the summary of the sites with whose initiative in commencing the irrigation development. The more right column we see, the more farmers' initiative gets strong. Though the boundary is not often identical, it can be said that there are already several sites that have been initiated by the officers rather than the Study Team and also commenced by the farmers' own initiative by seeing nearby verification sites: those are Zakumva, Mtanda, Tilime, Kambware, and Katema sites (Mgunda and Mankhamba

were existing sites and played a role to welcome visitors for the demonstration of gravity irrigation).

As of November 2004, first-generation smallholder irrigation development sites have almost come to the end of the second dry season crop. What was achieved in 2003 dry season have encouraged the farmers of the sites and pro-active behaviors of them have been observed, as in many more sites farmers have constructed weir without attendance of AEDO in 2004. There are few sites whose irrigation activities were hindered by poor rainfall during last rainy season especially in Lilongwe East region. Despite such circumstance, farmers in those sites say that they will not surrender but still continue irrigation next year.

Total membership for all the 23sites has come up with around 600 (446 males and 154 females). The number of membership is slightly less than last year, that was 647. The decrease is due to the sites of scale-down and non-development. Also there are sites in Dedza Hills, where landowners are refusing to rent out the lands to keep their benefits. That has also caused the decrease of membership. On the other hand, there are some sites in which the membership considerably increased like Livizi and Tilime.

CHAPTER 2. CLUSTER 1(Lilongwe East RDP)

2.1 Mtuwanjovu

Village:	Mwase
Number of Household:	65
Population:	235 (3.6 per family)
Average Farm Size:	0.5 ha/HH
Dominant Crop:	maize, ground nut, tobacco, cabbage, tomato
No. of Members:	2003: 30 (26 males, 4 females) / 2004: 15 (15 males)
No. of Land Owners:	2003: 26 (26 males) / 2004: 15 (15 males)
Discharge:	-
Irrigation Service Area:	2003: 2.4 ha / 2004: 1.2 ha
Type of Weir:	10 sand bags (length: 1.5 m, height: 0.6 m, water depth: 0.55m)
Specific Structure:	Road crossing (4 m)
Canal Length:	2003: 670 m / 2004: 525 m

2.1.1 Background

Mtuwanjovu site was identified as one of the verification project sites during the phase 1 study. The village concerned on the site is called Mwase, which is located in the southwest of Mpenu EPA office fairly close to M1 national road, as some villagers commute to Lilongwe everyday. The village is relatively rich with tobacco crop. Tobacco is the major cash crop in this area, but the villagers are trying to grow other vegetables like tomato. The villagers have the experience of growing paprika under contract with a private company. Unfortunately, they have already given up producing it because the market price had declined due to oversupply.

A problem analysis was conducted during the phase 1 study, and the villagers voted to “sickness of villagers” as the number one cause of hunger, followed by “Villagers do not have seeds when necessary”, “Theft”, and “Low fertility of land”. The villagers of Mwase village

seem to have substantial income from tobacco crop and that is probably why the priority of fertilizer was relatively low as compared with other villages (refer to Figure 2.1).

2.1.2 Status of Irrigation and Agriculture

During the phase 1 study, the Study Team conducted a provisional canal alignment in the area and the farmers who were observing the operation pegged the line and started the canal excavation by their own. In the middle of May 2003 when the Study Team returned to the field, they had already excavated the canal. In 2003, the canal length reached to 670 m and they also crossed the road by constructing a road crossing to convey water into the neighbor village Katukumara. The road-crossing was made by PVC pipe, which was provided by RDP. The water source is a dambo area and water is easily diverted by the weir made of 10 sand bags.

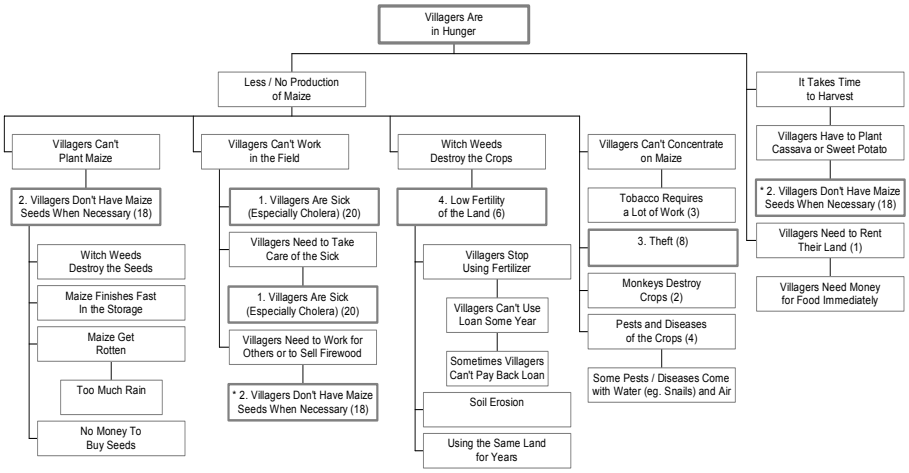
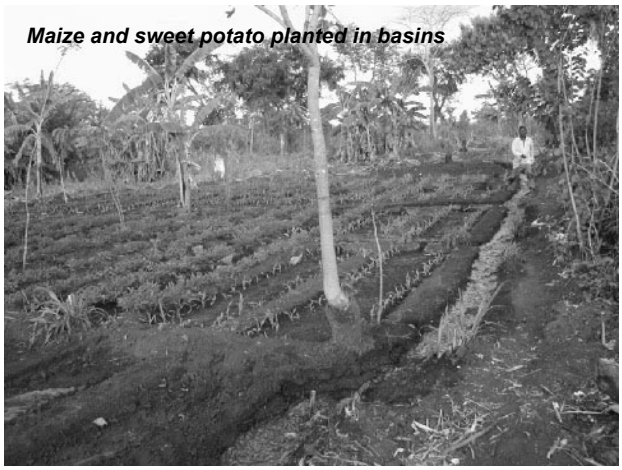


Figure 2.1 Problem Analysis (Mtuwanjovu)
As of Feb. 2003

Crops grown in 2003 were hybrid maize (MH31), recycled local hybrid maize, beans, sweet potato etc. Farmers were trained; making basin, rotational irrigation, vegetable cropping, and also Bacashi compost making. AEDO in charge carried out a field day in the mid of July 2003 and the villagers in this site went to the Chimphonongo site on foot. They learnt compost manure making from there.

The major problems faced in producing crops include pests such as maize stalk borer, maize streak virus and cutworms. Cutworms also attack the beans. A botanical pestciside was demonstrated, which was to use the leaves of Jerejere tree (*Sesbania Sesban*), and it saved some maize from the stalk borer.



Maize and sweet potato planted in basins

In 2004, farmers only in Mwase village developed irrigation due to water shortage as mentioned below. The club members could not make any profit in dry season 2003 mainly because of stalk borer, but had a good harvest in dry season 2004. They used hybrid (SC403) instead of recycle seeds in 2004. Some of the club memebrs say that their maize was not attacked by insects very much like last year, because

they believe that hybrid is more resistant to insects than recycle seeds.

They also say that they did not have to cut trees for firewood sales since they can get food and income from their irrigation farm. Mr. Bison Kuma, Secretary of Mtuwanjovu Club, sold less than a half of the maize in green and got MK2,800, Mr. Fikilaya Joswa, Chairman of Mtuwanjovu Club, also sold only a part of the maize and got MK2,500. Mr. Nkhokomba Mwatibu said he is expecting to get MK13,000 because he has 1,300 cobs and the price in green can be MK10/cob.

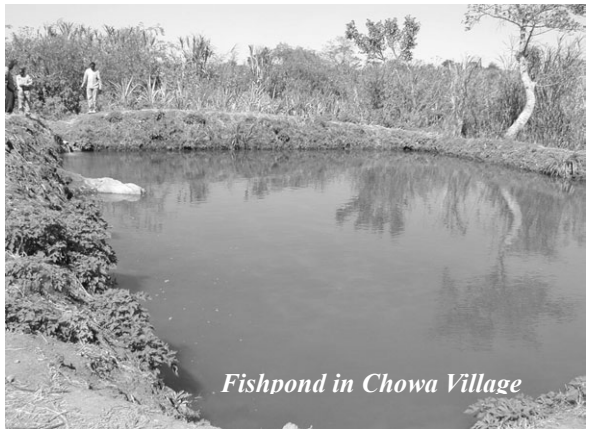
Farmers in the vicinity have visited the site and got motivated to develop irrigation. The club members look confident and they say that they will even try to grow tomato during rainy season after they harvest all the crops in the irrigation farm. During rainy season, tomato price rises high, but due to a lot of insects farmers used to be reluctant to grow tomato during rainy season. The club members are planning to buy pesticeds to tackle the pests. It seems that irrigation gave them confidence and source of fund to buy pesticides.

2.1.3 Water Allocation among Villages

The case of Mtuwanjovu would show how farmers allocate water among villages when volume of water cannot be expected as supposed to be. During the dry season in 2003, Mwase villagers formed the irrigation club and the neighbor villagers of Katukumara asked the club for allowing them to branch the irrigation canal cross the road into their farms. The diversion point was located in Mwase, hence it was a privilege of Mawase villagers to make a priority use of the canal water. Mwase villagers allowed them to branch the canal.

In 2003 farmers agreed with a water distribution rule: three days for the upstream and three days for the tail farm with Sunday being holiday. The upstream area was about as twice as the tail farm. Therefore, three-day allocation for the tail farm seemed quite enough. However, the treadle pump users in the upstream area did not follow the agreed rotation, causing water shortage at the tail farm including the area irrigated through the branch canal. A meeting including village headmen of Mwase and Katukumara was held on October 26, 2003 and upstream farmers agreed to stop using treadle pumps when it is not their turn and also Sunday was allocated to the upstream farmers.

In 2004 dry season due to scarce water, Mwase villagers told Katukumara villagers that it was not possible to divert water into the branch canal and instead, they were going to lend one of their treadle pumps to Katukumara villagers. Authority of using canal water in this case was still given to Mwase villagers, for the diversion point is located within their jurisdiction. Katukumara villagers agreed with it and only Mwase villagers practiced irrigation in 2004.



Fishpond in Chowa Village

Another incident occurred in Mtuwanjovu. Villagers of Chowa, located on the other side of the dambo, have constructed a fishpond with assistance of a MP, using the same water source of Mtuwanjovu. Both villagers agreed with a rotation of day use for irrigation and

night use for the fishpond. Because the fishpond does not require much water, water allocation between the fishpond and irrigation went well.

The secretary of Mtuwanjovu club told that they will not distribute irrigation water to Katukumara village any more from the next year onward, because they consider the conflict between the two villages over irrigation water cannot be avoidable. They suggest that Katukumara village should find another diversion point within their village jurisdiction.

2.2 Duwu

Village:	Mkuntha
Number of Household:	26
Population:	130 (5 per family)
Average Farm Size:	0.3 ha/HH
Dominant Crop:	maize, ground nut, beans, tobacco, sweet potato, Irish potato
No. of Members:	2003: 26 (16 males, 10 females) / 2004: n.a.
No. of Land Owners:	2003: 4 (4 males) / 2004: n.a.
Discharge:	10 l/s (May 28, 2003)
Irrigation Service Area	2003: 2.6 ha / 2004: nil
Type of Weir:	Brush dam (length: 3.7 m, height: 1.1 m, water depth: 0.85m)
Specific Structure:	Road crossing: width: 4.0 m, Canal bridge: 3.0 m
Canal Length:	2003: 450 m / 2004 nil

2.2.1 Background

The Mkuntha village is located in the northeast of Mpenu EPA office, around 20 minutes drive by car from the EPA office. Major income source of the villagers is tobacco production. During a problem analysis session, they identified causes of hunger as "only one season crop (no dry season crop)", "low soil fertility", "lack of farm inputs", "pests and diseases", "inadequate crop diversification" and "food wastage by poor storage". People analyzed themselves that they do not have enough skill or knowledge for better farming as well as lack of inputs and reliable market (Refer to Figure 2.2).

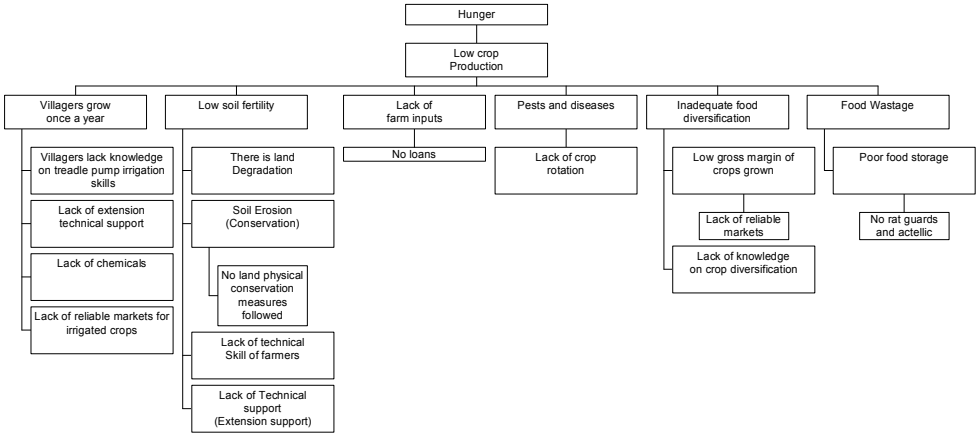


Figure 2.2 Problem Analysis (Duwu)
As of May 2003

2.2.2 Capacity Building of the Group

In this site, a group activity self-assessment was carried out, referring to their past group activities. The villagers were asked about the experiences of successful and unsuccessful group activities in the past and discussed what point made the activities successful or not.

The points they picked up were cooperation, love, constitution of the village, leadership, women's vital role, effectiveness of group work, and participation of the government. Then the villagers rated their current strength on these aspects comparing to the villagers in Masinja, whom they visited for a study tour. The results of the self-rating is shown in Figure 2.3 by dotted line.

In November 2003, the first self-evaluation of the group activity was carried out. During the workshop, each participant was asked to raise their hand to indicate if they thought that the points in their club activity were improved or worsened through the irrigation development activity. The aggregate result of the participants' ratings is shown by the solid line on Figure 2.3.

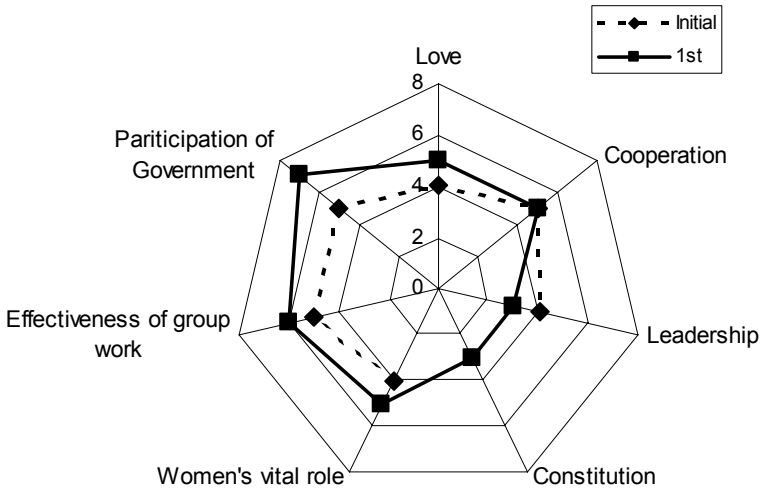


Figure 2.3 Group Activity Assessment of Duwu

As shown in the figure, it was rated that participation of the government was much better, love, effectiveness of group work, and obedience to constitution (this point was not rated last time but the participants rated later) were better. As for the points of leadership and women's vital role, the ratings of the participants were split to worse and better. On average of rating, leadership was rated to be worse and women's vital role to be better. Clarification of the reasons for worsening leadership was not deeply pursued since the leaders were present.

2.2.3 Status of Irrigation and Agriculture

Duwu is the first site the Study Team intervened for the irrigation development in the cluster 1. They have learned the way of constructing brush dam and allocating land from Mgunda site, where they visited for a study tour. In 2003, the plot layout and basin / ridge making were done and 2.6 ha was planted by early July. The crops planted were hybrid maize by three farmers, OPV maize by six farmers, local maize, beans, tomato, mustard etc. Farmers who planted hybrid maize purchased the seeds by their own, while those who planted OPV got the seeds from HIPC fund (winter TIP). They had problems with maize streak virus and grubs, which cut the maize. They used bulldog, a trade name for a pesticide against the grubs and it

Duwu brush dam (standard one)

worked.

In Mgunda site, the landowner of the irrigation service area was renting out pieces of his land to the other villagers free of charge only during the dry season. This idea was imported to Duwu after the Duwu club members visited Mgunda. Instead of free charge, the landowners of Duwu set a condition of not to destroy the ridges on the farm upon using the land. Because of the condition, the width of the basin was made as 90cm, narrower than standard size of 120 cm.

As close to November in 2003, the stream water became very little. Also there were some treadle pump users in the upstream reaches of the diversion point, aggravating the water shortage to the Duwu irrigation system. Farmers therefore suffered from water shortage, and the Study Team provided two treadle pumps to save the would-be-abandoned area. Despite the efforts, about 30 % of the service area located at the tail portion was finally abondoned. Members who benefited said that they were willing to sell their product with very cheap price to the irrigators who lost their harvest.

In 2004, the site suffered from severe water shortage from the beginning of the dry season, so that they decided not to divert the stream water at all. There were three farmers who built small weirs to use treadle pumps in the upstream reaches of the previous diversion point. Though the volume of water in the stream was somehow affected by these farmers abstructing water by treadle pumps, that effect was mere and the primary cause of the water shortage was the little rainfall of the last rainy season. Most of the club members had to earn a living by going to Lilongwe to sell firewood during the dry season 2004. Neverthless the club members interviewed are not reluctant with irrigation but saying that they will practice irrigation next year if water in the river is enough.

2.3 Ngoni（＋Miteme）

Village:	Kafakwanthu, Mbalawe, Chikuse, Maletsa, Chitapo
Number of Household:	28, 11, 15, 11, 11 respectively and total 76
Population:	456 in total (6 per family)
Average Farm Size:	0.4 ha/HH
Dominant Crop:	maize, leafy vegetables
No. of Members:	2003: 35 males / 2004: 21 (20 males, 1 female)
No. of Land Owners:	2003: 10 males / 2004: 11 (10 males, 1 female)
Discharge:	over 500 l/s (June 2003)
Irrigation Service Area:	2003: 5.8 ha / 2004: 3.7 ha
Type of Weir:	Trigonal prop (length: 20.0 m, height: 0.75 m, water depth: 0.55m)
Specific Structure:	-
Canal Length:	2003: 1,200 m / 2004: 1,200 m

2.3.1 Background

Location of Ngoni, just east side of Lilongwe, is the closest to the town among the verification project sites, just 20 miniutes travel to the town by car. Probably for this reason, there are people who come from Lilongwe and buy the lands from the villagers. The chief used to distribute the land free of charge, when there were still some fallow lands, but most of the lands have been already allocated. Therefore, even borrowing land may need some

money in this area.

The villages concerned with this site consists of four villages: Kafakwanthu, Mbalame, Chikuse, Maletsa, and Chitapo. The last four were separated from the Kafakwanthu, so that the VH of Kafakwanthu is called big chief. Unusualy, the chief of Chitapo is female. In spite of the vicinity of the town, a villager told that over five people had died of hunger or hunger related diseases in 2002.

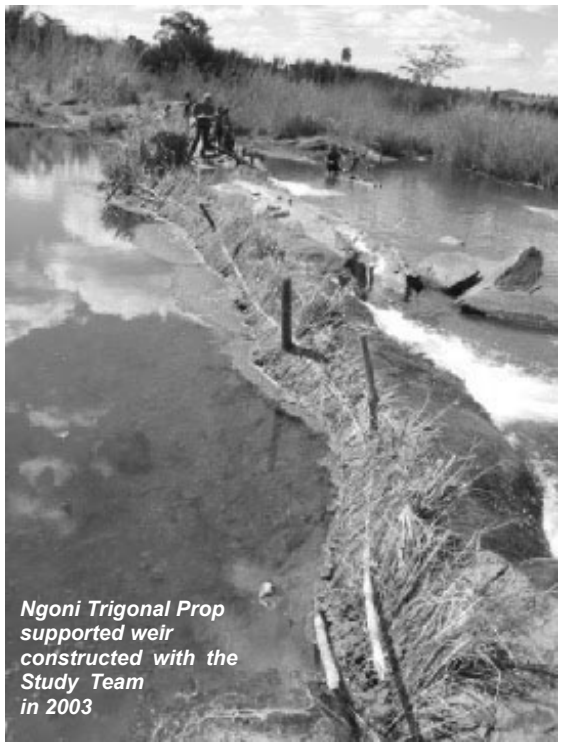
The site has a big river called Nanjiri. There is a person who excavated canal to divert the river water into his farm. Eufullenced by the person, intially 20 villagers got together and formed a club called Ngoni in this year. The person became the chairman. To raise the river water level at the diversion point, an RDP officer provided 22 sand bags, but they were not enough to raise the water level, therefore a villager brought 14 sand bags of his own.

Aside from the Ngoni club, there is Miteme club which was established in 2001. This club is located in the right bank side, and has been engaged in gardening by watering can. In fact, the membership is now composed of the two clubs (no unbrella club has been established). There may be about 50 potential membership incuding the treadle pump users.

2.3.2 Status of Irrigation and Agriculture

Ngoni site is the biggest potential area among the verification project sites with the discharge of more than 500 l/s. In 2003 the villagers made a weir with 36 sand bags, 22 of which were provided by the Lilongwe East RDP. However, some of the sand bags were stolen (especially if they are provided by the government, sense of guilt will be hindered from people's mind). The Study Team introduced the villagers a type of brush dam using wooden trigonal stand structure, which is a Japanese traditional one. Half of the weir was constructed under the supervision of the Team, and the villagers themselves completed the remaining half.

Canal excavation reached up to 1.3 km. Due to refusal of a landowner passing the canal through his land, the canal had to be diverted to pass the land with higher altitude. For this reason, the depth of the canal became as deep as 1.1 m. The villagers are also thinking to irrigate the farm upper side of the canal by treadle pump, so that they were convinced of shifting the canal to the higher land despite the tiresome deep excavation.



Ngoni Trigonal Prop supported weir constructed with the Study Team in 2003

Because of the closeness to Lilongwe city, the area is much oriented toward market economy. For this circumstance, the one who wants to rent land needs to pay MK 1,000 per acre. Marketing opportunity is also high and the farmers here were intending to practice organic farming to sell their produce at the big super

markets in Lilongwe. Due to time constraints, the farmers unfortunately could not proceed to the organic vegetable production in year 2003. Their maize had a stalk borer problem but they used chemical pesticides and controlled it.

In mid June 2004, they constructed a trigonal weir, which they had acknowledged the skill to make, at a bit upper side of the previous point. What needs to be mentioned specially in this site is that many members including V.H. Kufakwanthu only have upland for dry season (11 members out of 17 members interviewed). They are not directly benefited from smallholder gravity irrigation, yet they joined the club and are working together for construction of the weir and canal, and also for preparation of members' farmland.

By the end of November 2004, most of the farmers harvested their crop. Farmers who used hybrid seeds (SC403) complained that the harvest was not good at all. They considered the seed quality as one reason and then the Study Team coordinated to call for personnel from the seed company to assess the crop in the site. The personnel picked up two issues: timing of top-dressing and moisture retention during pollinating period.

Trigonal weir constructed by farmers in 2004

From the evidence of withered maize leaves, it was indicated that top-dressing was carried out later than appropriate time, which is just the beginning of germination. The personnel explained that if the timing of top-dressing were late, the effect would not contribute to growing fruits. Farmers told that they could not prepare fertilizers on time. As for moisture, it was suggested that because the air is dry in winter unlike rainy season, irrigation water should be supplied as double as usual during pollinating time to keep moisture on the top of maize stalk so that pollination would be well done. Farmers in Ngoni learned the difference of how to grow maize in dry season from rainy season.

Mr. Yamikani of Ngoni Club said "We bought new seeds (SC403), doubled the fertilizer and everyone participated better than dry season 2003, yet, the harvest is about a half in dry season 2004." Mr. Shema Masika, Chairman of Ngoni Club, said "The reasons for a poor harvest might be 1) we planted SC403 too close, 2) we applied fertilizer on one side, not both sides, 3) soil is not good, and/or 4) the quality of seeds is not good. Mr. Yobu Chinthuza said "I could make only a half profit of last season. I think it is because of SC403 and we will use Mashika again in dry season 2005."

2.4 Chimphonongo

Village:	Chimphonongo, Madula, Chilima, Kumikundi
Number of Household:	23, 11, 48, 16 respectively and total 98
Population:	186, 46, 288, 80 respectively and total 600 (6.1 per family)
Average Farm Size:	0.9 ha/HH, 0.9ha/HH, 0.4 ha/HH, 0.4 ha/HH respectively
Dominant Crop:	maize, ground nut, tobacco, leafy vegetables, Irish potato, tomato

No. of Members: 2003: 18 (16 males, 2 females) / 2004: n.a.
No. of Land Owners: 2003: 18 (16 males, 2 females) / 2004: n.a.
Discharge: 9 l/s (June 19, 2003)
Irrigation Service Area: 2003: 4.8 ha / 2004: nil
Type of Weir: Embankment (length: 0.7 m, height: 0.4 m, water depth)
Specific Structure: -
Canal Length: 2003: 240 m / 2004: nil

2.4.1 Background

The villages concerned on the site consist of above four villages, located southeast of Mpenu EPA office, fairly close to M1 national road. Chimphonongo, Madula and Chilima have same roots as they have split from other village or one another, but the origin of Kumikundi village is independent from other three villages. The villagers told that 24 people died of hunger in 2001/02.

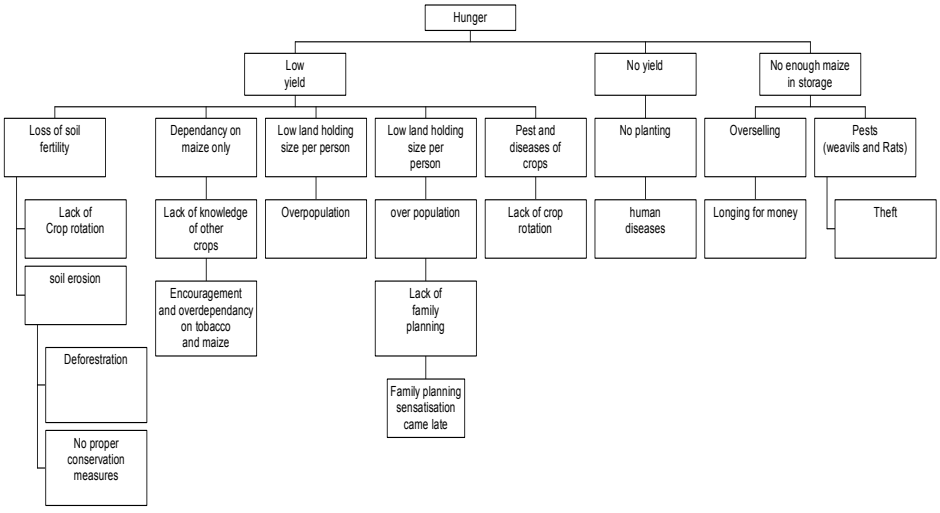


Figure 2.4 Problem Analysis (Chimphonongo)
As of July 2003

According to the problem analysis conducted in the site, the villagers identified the cause of hunger as "low yield", "no yield" and "no enough maize in storage" (Refer to Figure 2.4). The villagers assessed that the causes of low yield were loss of soil fertility, dependency on maize, small land holding due to overpopulation, and pests and diseases. "No yield" was caused by human sickness leading to no planting of crops. Weevils and rats for loss in storage were discussed as commonly seen in the region.

2.4.2 Capacity Building of the Group

A group activity self-assessment was also carried out in this site, referring to their past group activities. They assessed that their constitution and cooperation were well contributing to their successful group activities. On the other hand, they see they have no financial capacity, for the past failure of activities, which were shallow well construction and bridge construction, were due to the lack of finance. The dotted line in Figure 2.5 below shows the result of the self-rating at initial period of the irrigation development.

The result of the first self-evaluation of the group activity, which was carried out in the same manner of Duwu in the end of the first dry season 2003, is shown as solid line in Figure 2.5. It was observed that the self-rating of Chimphonongo club members were more strict than other clubs, though their attitude to each other during the workshop looked very friendly. They rated that their cooperation got much worse and love got worse, as well.

They said that reason for worsening cooperation was low turn-up of the members whenever the chairman called a meeting. As for love, some rated worse and others rated better. Those who rated better told the reason that whenever visitors came to them, they contributed some to welcome the visitors. On the other hand, those who rated worse said that love was shown only when visitors came.

They rated obedience to constitution better and finance also better, as some had already sold their produce from the irrigated farm. Government supervision was rated much better here, as well. Although the members somehow complimented the government staff at his presence, it could be evident that the irrigation development activity actually made AEDO visit the site more frequently and consequently the communication between AEDO and the members increased.

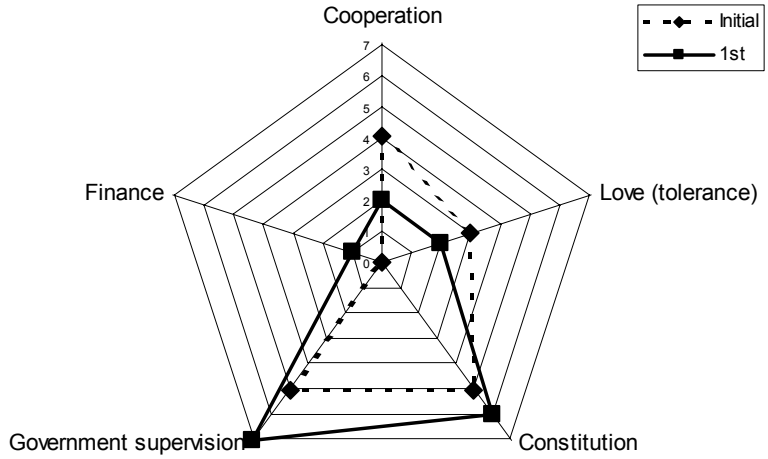
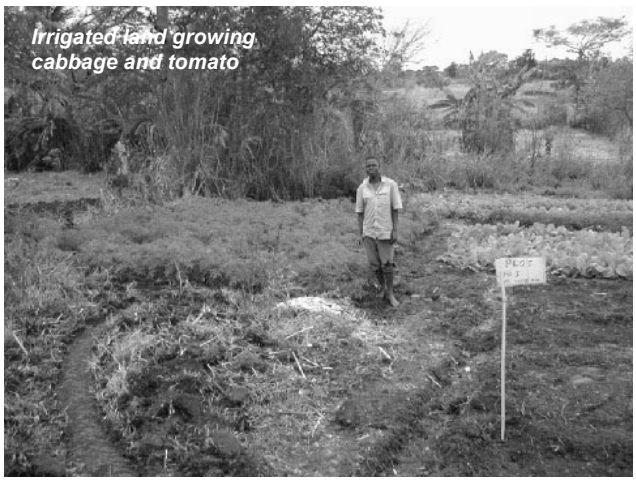


Figure 2.5 Group Activity Assessment of Chimphonongo

2.4.3 Status of Irrigation and Agriculture

The villagers here efficiently utilized the dambo. They just diverted the stream into canal raising the water level a little. They stopped extending canal at the point of 240 m from the intake, though there was still a lot of room for extension. It seems that the limited extension was due to difficulty in organizing the villagers. Since four villages are involved in the site, it might have taken some time to consolidate all the interested villagers. The club therefore was organized mainly by youth.


Irrigated land growing cabbage and tomato

Implementation had been well progressing until they faced critical water shortage in early October 2003. The dambo still had some water but not enough to spill over to the canal. Farmers abandoned the canal in mid October and started irrigating by using watering cans and treadle pumps. Thanks to the smallness of their plot, they narrowly managed irrigation though some potatoes had been immaturely harvested, bearing very small 2-3 cm size of potatoes.

In 2004, Chimphonongo site was also one of the sites severely affected by the little rainfall of

the 2004 rainy season. There is little water in the dambo, as well. Farmers gave up digging canal in this year and some of the farmers cultivated with small plots using watering cane. They dug a shallow hole in the dambo and obtained some water to irrigate their garden by cane. Since the burden of making weir and canal in this site is less, farmers would adopt the size of farm and way of irrigation every year according to the water availability of the dambo.

2.5 Zakumva

Village:	Dambo
Number of Household:	31
Population:	180 (5.8 per family)
Average Farm Size:	0.8 ha
Dominant Crop:	maize, tomato, ground nut, soybean, Chinese cabbage, pumpkin
No. of Members:	2003: 10 (9 males, 1 female) / 2004: 12 (9 males, 3 females)
No. of Land Owners:	2003: 1 male / 2004: 2 males
Discharge:	2 –3 l/s (July 7, 2003)
Irrigation Service Area:	2003: 2 ha / 2004: 2.5 ha
Type of Weir:	Brush dam (length: 4.0 m, height: 1.2 m, water depth: 1.0 m)
Specific Structure:	-
Canal Length:	2003: 370 m / 2004: 402 m

2.5.1 Background

The site is located just next to Duwu site. They started small-scale irrigation development by their own initiative after they saw the Duwu site. There are many wrecks of maize storages in the village. Villagers told that this was due to low production for last two years and theft. To prevent theft, villagers are keeping maize shelled in plastic bags at home. Severe food shortage had attacked to this village as the villagers told that two people died of hunger in 2001/02.

2.5.2 Status of Irrigation and Agriculture

The villagers started irrigation development by their own after they saw the progress of Duwu site. They named the irrigation club Zakumva, or hearsay in English, which means “We saw and heard of Duwu!”. Though they constructed the brush dam by their own, the leakage was so big that they came to ask AEDO and the Team for advice. The Team advised the villagers to deepen the canal to reduce the water storage depth in the dam. Also demonstration of furrow irrigation was conducted in their area. The members of the club were allocated the land free of charge. The crop planted in 2003 was maize only but they did not know the variety, which they received from TIP. The major problem in producing the main crop included pests such as maize stalk borer. They used a chemical pesticide and it worked well.

In 2004 the stream water was less than 2003 at this site, as well. Towards the mid term of the dry season, water in the source was getting scarce, so AEDO advised the farmers not to expand the irrigation areas any more in this season. Farmers also struggled to secure water by laying plastic sheet on the canal. Despite the effort, the stream water dried up in August and all the maize grown were abandoned before the harvest. However, farmers interviewed are not reluctant at all and still aim at dry season crop next year. Even to accommodate more members, they are seeking another diversion point to establish new site.

2.5.3 Improved Stove


Energy saving improved stove which can cook three meals simultaneously.

It was found through discussions with the villagers that there was anxiety for securing firewood, so that the Study Team introduced an improved stove, which can save firewood by at least more than 50% as compared to traditional three-stone stove. One improved stove was made in the village, which can cook three meals simultaneously, and there are already 11 stoves as of mid November 2003. By the end of November 2004, the number of stove did not increase and some of the stoves have been abandoned due to difficulty to maintain, but others are still functioning. Those who still use the improved stove reported that they could reduce two-third of firewood compared to traditional three-stone stove.

2.6 Talira

Village:	Msonthe, Kumala
Number of Household:	30, 25 respectively, total 55
Population:	180, 150 respectively, total 330 (6 per family)
Dominant Crop:	maize, tomato, ground nut, soybean, Chinese cabbage, pumpkin
No. of Members:	-
No. of Land Owners:	-
Discharge:	16 l/s (June 28)
Irrigation Service Area:	Potential 2 ha
Type of Weir:	-
Specific Structure:	Fishpond
Canal Length:	-

In this site, a fishpond has been under construction since April 2003 sponsored by the District Assembly. However, the fishpond construction has been sometimes stopped due to misunderstanding on payment for the construction between the villagers and the sponsor. In 2004, the fishpond is still left out and subsequently the irrigation development in this site has been undermined. Villagers once tried to divert water into incomplete fishpond using sand bags. Some amount of water was stored for a while, but it has been already dried up without utilizing the water during 2004 dry season.

2.7 Mgunda

Village:	Masinja
Number of Household:	24
Population:	120 (5 per family)
Average Farm Size:	0.5 ha/HH
Dominant Crop:	maize, vegetables
No. of Members:	2003: 11 males / 2004: 11 males

No. of Land Owners:	2003: 2 males / 2004: 2 males
Discharge:	-
Irrigation Service Area:	2003: 2.5 ha / 2004: 1.5 ha
Type of Weir:	Brush dam (length: 5.0 m, height: 1.8 m, water depth: 1.5 m)
Specific Structure:	road crossing
Canal Length:	2003: 350 m / 2004: 350 m

2.7.1 Background

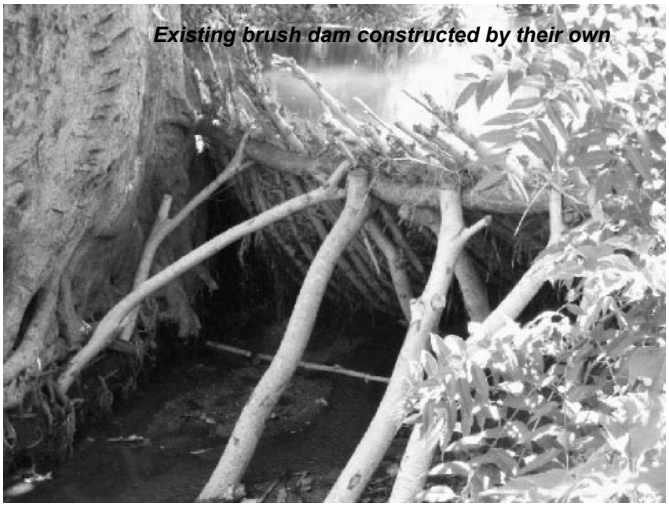
The beneficiaries of Mgunda site come from Masinja village located far northeast side of Lilongwe East RDP. The village is found in Chitekwere EPA under Lilongwe East RDP. Current village headman of the Masinja village is third-generation since the first settlers came from Salima.

According to the village history, the worst year was 2001 when there was the worst harvest due to little rain and it was the time when fertilizer and seed loans started becoming a problem. This meant that the use of fertilizers by the farmers was decreasing or some farmers did not use fertilizers at all. It was reported that the fertilizer and seed loans were easily accessed intensively from 1980's up to early 1990's during Kamuzu's era. There was also a problem of cholera outbreak in the village. Women in the village also face problem of fetching firewood because of deforestation and the other problem raised was the fact that the hospital is very far.

The farmers also remembered some best years in the stay in village like years in 1980's because during this period many villagers had bumper yields. The villagers grow crops like maize, soybeans, groundnuts and Irish potatoes. The farmers also used to grow cash crops like tobacco in the past but stopped due to the default they had with Malawi Rural Finance Company (MRFC).

2.7.2 Status of Irrigation and Agriculture

The villagers grow irrigated crops along Mgunda stream. The villagers by themselves made a brush dam on the abstraction point which helps lead water into the main canal. At present there are 13 members in the site who practice irrigation farming, of which six are men and seven are women. The villagers told that the initiator got the idea of irrigation using the brush dam when his elder brother tried some years back in 1970's. Under the strong leadership of the village headman, the owner of the irrigated land distributed the portions to other villagers only during dry season free of charge.



Existing brush dam constructed by their own

With the brush dam water level was raised by 1.5 m to the downstream reaches and 120 m of a canal was dug. The Study Team took the villagers of Duwu club to show the brush dam prior to starting the irrigation development in their site. For the villagers in Mgunda, the Team organized a study tour to

Mankhamba to show on-farm irrigation practice. RDP irrigation officer assisted them in proper canal alignment according to the topographic condition by using line-level. Though original canal was running at very low elevation, which is quite close to the stream, the canal has been shifted to higher portion of the land, resulting in more irrigable area.

The farmers sourced the maize seeds from a private seed provider. Maize and vegetables such as tomato were grown well in this Mgunda site, although there were pests such as bean stem fly and bean aphid in beans, and red spider mite in tomato. Since year 2003 was the second irrigation season for them, they had harvested by October and started pre-planting for the rainy season maize. There were about three farmers who were to try three-time planting a year. In 2003, they even developed three irrigation sub-sites (three weirs) along the same stream.

In 2004, however, due to water shortage in the stream caused by the poor rainfall of the 2004 rainy season, they only managed to reconstruct the first weir located the most upstream. Though maize was planted in April 2004, the irrigated area was reduced according to water availability. Farmers will continue irrigation and the irrigated area would be controlled according to the water availability in the stream.

2.8 Mankhamba（＋Tigwirizane）

Village:	Kasandulika
Number of Household:	42
Population:	210 (5 per family)
Average Farm Size:	0.4 ha/HH
Dominant Crop:	Maize, vegetables (cabbage, tomato, Irish potato)
No. of Members:	2003: 16 males / 2004: 18 (14 males, 4 females)
No. of Land Owners:	2003: 4 males / 4 males
Discharge:	-
Irrigation Service Area:	2003: 4.5 ha / 6.0 ha
Type of Weir:	Sand bags (length 12m, height 0.5 m, water depth 0.4 m)
Specific Structure:	Road crossing (4m)
Canal Length:	2003: 460 m / 2004: 760 m

2.8.1 Background

The village is located in Chuwanba EPA, Lilongwe East RDP, right south of Salima road. The village has developed the irrigation farm using the Balangombe stream. RDP assistant irrigation officer assisted to develop irrigation and the area has been recognized as advanced area in irrigation. Initially nine members started irrigation and now the membership has increased to more than 15. The landowners of the left bank and right bank are the village headman and farther of a member respectively, and they are renting out the land to the members free of charge.

2.8.2 Status of Irrigation and Agriculture

Irrigation at the site started in April 2003 with assistance of the RDP assistant irrigation officer. Basin irrigation has been applied for all the plots and the crops (maize, cabbage, tomato, and Irish potato) have been growing well. They sourced the seed from a private

seed provider. None of the farmers received free inputs. As an advanced irrigated area in the region, the site was identified as the study tour site and the villagers here are kindly welcoming the visitors. In 2003, villagers from Mgunda, Tikorole, Chimphonongo, Mtanda, and Kadiwa visited the site.

In return, the Team facilitated a study tour for the villagers here to visit an innovative farmer who is practicing organic farming in the suburb of Lilongwe. Motivated by the tour, some of the farmers have started making compost manure as well as applying for grass mulching, and making a square bed, though they used to not practice compost manure making even after AEDO had demonstrated it.

In 2004, they diverted the stream water in early March, which is the earliest amongst first-generation sites. They were using a canal running at about one third inside from the peripheral of the service area in 2003. This means they were irrigating the one-third area located upper side of the canal by watering can since the elevation of the area was higher than the canal. This year, however, they moved up the diversion point to about 50 m upstream from the original point, thereby letting the water run along the peripheral of the service area. All the original service area is now getting irrigation water by gravity. The service area was extended to upstream accordingly, and also extended to downstream as well.

New canal shifted to upper side of the farm

Mankhamba club has got a new male member this year, who has been very much motivated by the peer farmers' irrigation development. There is another club situated on the other side of Mankhamba club, called Tigwirizane site. Three members out of total eight members have left this club this year. They used to be land lessees but upon experiencing of last year's irrigation, they now started their own irrigation on their lands. These lands are located just beside the stream and downstream of the Tigwirizane site. The remaining members thus have larger plots as compared to last year. By the end of October, the river water level went down and the canal dried up but they had already harvested most of the crops, so that there was no actual damage on their crops.

CHAPTER 3. CLUSTER 2 (Dedza Hills RDP)

3.1 Chikhasu

Village:	Kasumbu, kanjondo, Lumwira2, Kumaadzi, Mphale
Number of Household:	147, 97, 60, 68 respectively, total 372
Population:	Total 1,860 (5 per family)
Average Farm Size:	1.2 ha/HH
Dominant Crop:	maize, beans, Irish potato
No. of Members:	2003: 16 (10 males, 6 females) / 2004: 12 (4 males, 8 females)
No. of Land Owners:	2003: 6 (1 male, 5 females) / 2 (1 male, 1 female)

Discharge:	8-9 l/s (June 27, 2003)
Irrigation Service Area:	2003: 1.0 ha / 2004: 0.8 ha
Type of Weir:	Stone layer (length: 7.0 m, height: 0.35 m, water depth: 0.25 m)
Specific Structure:	-
Canal Length:	2003: 165 m / 386 m

3.1.1 Background

The site is located at the center of Kasumbu TA, around seven km away or 20 minutes travel by car from Dedza town. The area is covered by Kanyama EPA, Dedza Hills RDP. Above five villages under the Group Village Kasumbu have land along Chikhasu stream. Those villages are packed together just as one big village with one primary school and the Roman Catholic Church.

The first settlers came to the foot of the rocky mountain, original Chidedza, in around 1940. Group village headman Kasumbu is the third group village headman and at the same time the sixth village headman of Kasumbu. Former headman, who was the second group village headman as well as the fifth village headman, was replaced by the Traditional Authority due to disobedience.

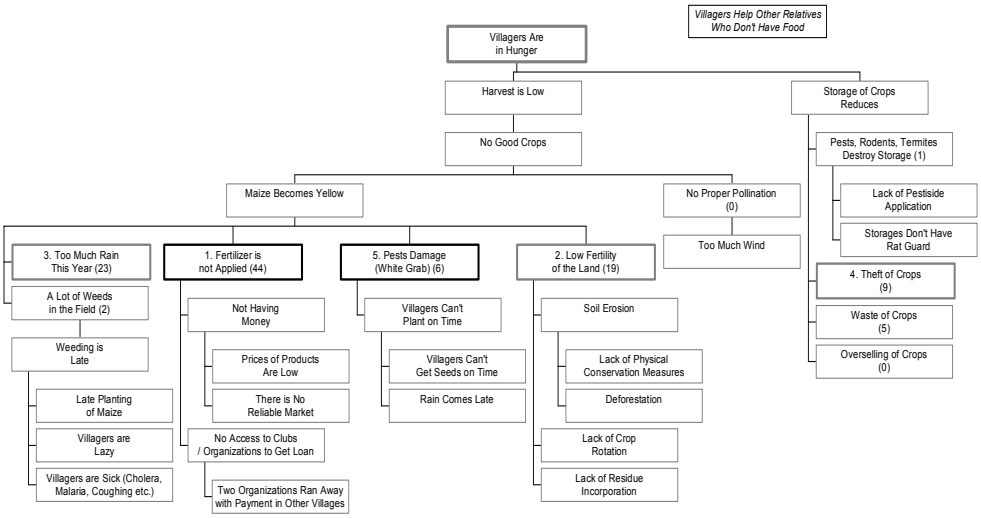


Figure 3.1 Problem Analysis (Chikhasu) As of Feb. 2003

A problem analysis with those five villages was carried out during phase 1 study and the number one cause for hunger was "Fertilizer is not applied", followed by "Low fertility of land" and "Too much rain in 2002/03" (Refer to Figure 3.1). This was the only village where "too much rain this year" was highlighted this much. Particularly, excessive rainfall in year 2002/03 rainy season caused serious damage to the maize crop by water logging and leaching away the soil nutrient that was supplied by fertilization.

Kasumubu village is located at an altitude of over 1,600 m above sea level. Average annual temperature at Dedza metrological station is 18.2 degree centigrade, and average lowest temperature in June is less than 10 degree centigrade. Cool climate is not essentially suitable for maize production and instead of maize, the villagers have grown Irish potato, which prefers cool climate. Although the market is not so close, there are middlemen coming to buy their produce.

3.1.2 Status of Irrigation and Agriculture

Though the site was one of the first targets, the commencement was delayed till June 27 2003,

due to the clearance of Environmental Assessment imposed by the government regulation. Despite the situation, the villagers had been already motivated by seeing the neighboring site like Mchiku. Therefore, when AEDO held the kick-off workshop, they were easily organized and proceeded to the succeeding stage. The weir was constructed on July 11, and thereafter canal excavation started. The canal reached to 165 m.

Since the foundation of the diversion point was rocky, the weir was assembled simply with stones and clay soil. The beginning point of the canal was also rocky so that they smashed the rock with hammer, letting water flow into the direction, which they wanted. While digging the canal, the villagers reinforced the weir with three sand bags and a horizontal log supported by three logs on their own.

The service area is so steep that the furrow irrigation method was employed in this site. The main crop was Masika variety maize. The only other crops grown are mixed breeds of beans and potato and all were grown in pure stand. The farmers sourced seeds and fertilizers on their own. The major problems faced in producing the main crop include pests such as maize stalk borer, aphids (*Aphis craccivora*) on beans and cutworms on both beans and maize. The farmers used botanical pesticides to control pests.

There were 10 male and six female members in 2003 and in 2004 four males and eight females joined that club. Members who left the club quoted no free input as the reason. Having some new female members anyway, they constructed the diversion weir on May 10 2004, about one month earlier than the first year. They also extended the canal up to additional about 220m reach in 2004.

The extension of canal was meant not only to expand irrigation plots but also to find alternative plots, since one of the landowners who rent out his plot to the club members in 2003 has refused to use his plot for this dry season crop. According to a neighbor of the landowner, he refused to lend the land because his plot is very steep and irrigation water caused soil erosion along feeder channels. The club members grew beans and Irish potatoes as previous year and harvested most of them by the end of November w2004.

3.2 Mchiku

Village:	Mphale, Lumwira2
Number of Household:	68, 60 respectively, total 128
Population:	248, 250 respectively, total 498
Average Farm Size:	0.8 ha/HH
Dominant Crop:	maize, sweet potato, Irish potato, beans, ground nut, vegetables
No. of Members:	2003: 16 (7males, 9 females) / 2004: 25 (8 males, 17 females)

No. of Land Owners:	2003: 1 female / 2004: 1 female
Discharge:	6 l/s in 2003
Irrigation Service Area:	2003: 0.7 ha / 2004: 1.0 ha
Type of Weir:	Brush dam (length: 2.0 m, height: 1.3 m, water depth: 1.1 m)
Canal Length:	2003: 215 m / 2004: 151 m

3.2.1 Background


Diversion weir (standard brush dam)

The beneficiaries of the site are from Mphale and Lumiwira2, two of the villages of Chikhasu. Mphale village was established in 1992 split from Lumwira2 village due to increase of population. The first Village Headman, Mphale is a nephew of the Village Headman, Lumieira2. Otherwise the profile of the villages has been described above. A remark is that the villages of Mchiku and Chikhasu are located near Kasumbu TA and therefore, the effects of local politics are heard.

3.2.2 Status of Irrigation and Agriculture

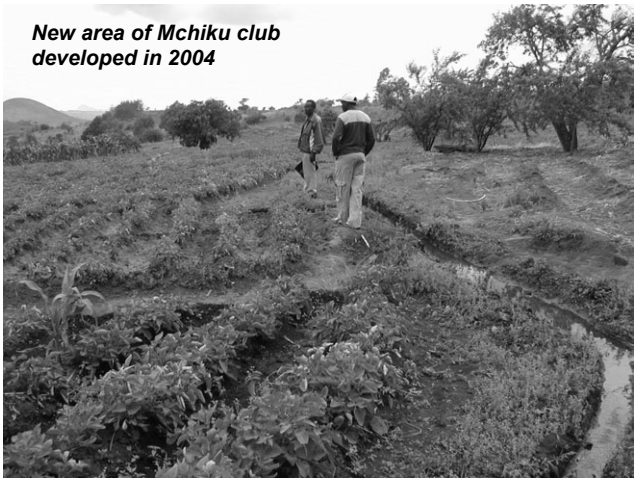
The site was the first to commence in the cluster 2. The irrigation service area was allocated to 16 farmers free of charge under the condition that they have to reproduce the ridges that have been left on the farm. The owner of the service area is only one, a female, but she herself did not join the irrigation club.

The leakage of the weir had increased so often while the discharge of the stream was decreasing. The first diversion point became unable to divert water in September 2003 due to the scarcity of water, so that the farmers shifted the diversion point about 20 m upstream. Though the farmer had tried every effort to tap water, even the upstream diversion point ceased conveying water in late October 2003. Thus, whole area was abandoned very unfortunately.

Having the experience of year 2003 in mind, the farmers started irrigation development at further downstream in 2004. The new site is located about 200m downstream from the previous year's diversion point. Membership was eight males and 17 females; one male and eight females more than last year thanks to the campaign meeting organized by the AEDO in charge. Also a villager who lives more than five km away from Mchiku joined the club. Since he is from different village, he paid rent to the landowner and grew Irish potato in the area of 0.3 ha.

Out of total 25 members, 18 members participated in the construction of the diversion weir on June 7, 2004. The diversion weir was, however, breached due to loose soil of the foundation in early July 2004. They shifted the diversion point again a little upstream and finally managed to divert water. Canal was constructed about 150 m and watered around one ha of service area. The service area is owned by a woman and to be divided amongst the members as done last year except for the one who came from different village and paid the rent.

Most of the members grew Irish potato, but those who could not buy potato seeds grew beans. A woman member told that she grew beans and would keep them as seeds for the following crop season. Farmers interviewed told that they did not think of quitting irrigation in spite of the total failure of 2003 as they saw other irrigation site enjoying the dry season crop. They told that they would definitely continue the irrigation next year onward.


New area of Mchiku club developed in 2004

Ms. Jene said "I planted Irish potato in dry season 2003, but I lost everything. Since I didn't have any seed potatoes, I planted beans in dry season 2004." "I was disappointed, but it is just like a thief and it could happen anytime. So we do not quit just by one failure," she added. Mr. Pesani Kapusa said, "Good thing about the project is we have more contacts with AEDO. Now more people want to join the club."

3.3 Livizi

Village:	Nduwa, Kawaliza, Chalinda, Chiphe, Kachitsa, Naoza, Daniel
Number of Household:	126, 42, 214, 148, 40, 50, 64 respectively, total 620
Population:	756, 294, 1,070, 888, 200, 350, 384 respectively, total 3,942 (6.4 per family)
Average Farm Size:	0.8 ha, 0.8ha, 0.7ha, 0.8ha, 0.6ha, 0.8ha, 0.8ha
Dominant Crop:	maize, sweet potato, Irish potato, beans, soybeans, ground nut, leafy vegetables, tomato, field peas
No. of Members:	2003: 17 (10 males, 7 females) / 2004: 54 (43 males, 11 females)
No. of Land Owners:	2003: 11 (4 males, 7 females) / 2004: 11 (4 males, 7 females)
Discharge:	130 l/s (July 8, 2003)
Irrigation Service Area:	2003: 1.4 ha / 2004: 2.8 ha
Type of Weir:	Double-line brush dam (length 4.2m, height 1.5m, water depth 1.2m)
Specific Structure:	-
Canal Length:	2003: 365 m / 2004: 740 m

3.3.1 Background

The site is located as far as about 25 km from Dedza town, but rather close to Kanyama EPA, as AEDO can commute to the site by bicycle in 20 minutes. Seven villages are involved in this site, hence organizing respective villagers would be an important issue to consider. At the kick-off workshop on July 8, 2003, 110 villagers participated, but for the following planning workshop, nobody turned up. This was due to the function of food for work for road construction on the same day.

3.3.2 Status of Irrigation and Agriculture

Livizi is one of the sites that were identified late. The discharge of the stream was recorded

the second biggest volume of next to Ngoni. On the day of the kick-off workshop, seven representatives from each village were taken to see the on-going sites, Mchiku, Mtanda and Mtsetse and they were so motivated to develop irrigation system.

Despite the successful kick-off workshop, nobody turned up on the following planning session, partly because there was a food for work for road construction as mentioned above in the area and most of the villagers went for it. AEDO did not give up and talked to the villagers and the planning workshop was held again on July 24, 2003 with around 30 attendances. One of the reasons why the attendants decreased to only 30 was that they became aware of the implementation principle that is no free seed and fertilizer.


Farmers practicing furrow irrigation

The weir was constructed on August 4 and 5 2003 with a double-line brush dam. Canal excavation reached to 365 m in late September. Due to local functions and food for work, the progress was not so good and planting was at last done in mid October 2003. The main crop was Masika variety of maize, which was sourced by themselves (the Team provided transportation for purchasing seeds). Major problems in producing the maize crop included pests such as maize stalk borer and cutworms. The farmers controlled the maize stalk borer by using leaves of local trees (botanical drug).

In 2004 the farmers constructed the weir in early June, about two months earlier than previous year. By early July 2004 additional 200 m canal was excavated from the tail of the existing canal. As extending the canal, membership has also been enlarged. The membership reached more than 40 members as compared to the last year's 17. Irrigation farming in this site is rather supplement of dambo agriculture, so some of the farmers grew none though they extended the canal. Anyway since the canal was developed and water in this site is ample, they could continue irrigation according to their needs.

3.4 Mtsetse

Village:	Phulsa, Phulsa1, Kawiya
Number of Household:	168, 130 respectively, total 298
Population:	Total 1,490 (5 per family)
Average Farm Size:	0.7 ha/HH
Dominant Crop:	maize, beans, sweet potato, Irish potato, cassava
No. of Members:	2003: 15 (10 males, 5 females) / 25 (17 males, 8 females)
No. of Land Owners:	2003: 2 males / 2004: 3 (1 male, 2 females)
Discharge:	8-10 l/s (June 3, 2003)
Irrigation Service Area:	2003: 1.2 ha / 2004: 0.4 ha
Type of Weir:	Brush dam (length: 3.0 m, height: 1.2 m, water depth: 0.9 m)
Specific Structure:	Canal bridge (12 m) as stream diversion applied in 2003

Canal Length: 2003: 190 m (Upper canal: 90m, Lower canal: 100 m) / 2004: 90 m

3.4.1 Background

The site is located along the main road running to the center of Kasumbu TA, around 15 minutes drive by car from Dedza town. The first settlers of Phalusa village came from the nearby mountain area called Dzewo. It was reported that Phalusa and Phalusa One villages were one village until 1992 when the village broke up into two since Phalusa One chief wanted to rule his own village and not to be ruled by Phalusa himself. Relationship between the two village headmen as well as the villagers are, therefore, not very much good. However since the villages were originally one and the villagers were all relatives, most of the activities have done together.

For the problem analysis carried out here, the villagers picked up common causes of hunger throughout the region, namely, "pests and diseases", "no or less planting due to human diseases and lack of farm inputs", "lack of modern farming methods" and "one growing season per year" (Figure 3.2). Aside from low yield, there are no cattle in the village because of theft. All the cattle in the village were reported to have been stolen and no one is intending to raise cattle in the village. This issue is also common elsewhere in the region.

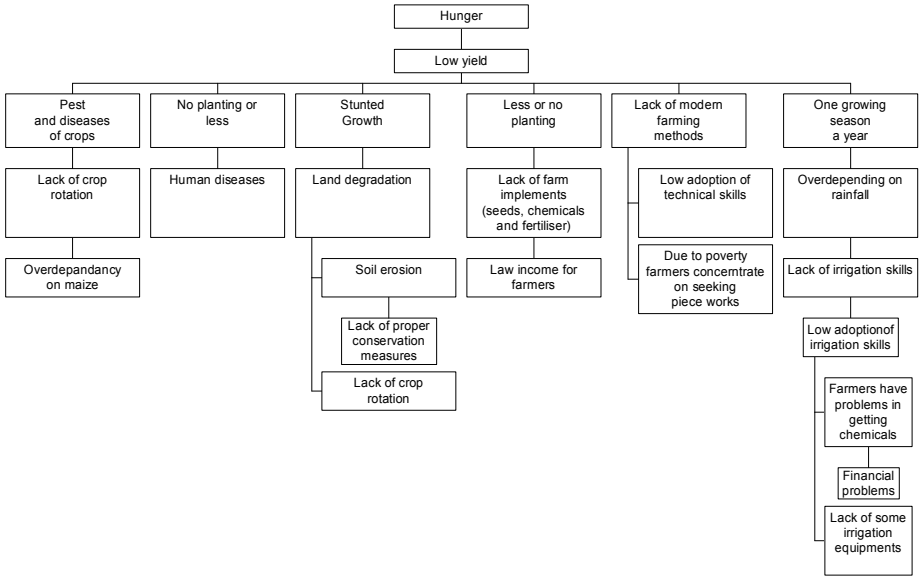


Figure 3.2 Problem Analysis (Mtsetse)
As of June 2003

3.4.2 Capacity Building of the Group

Group activity self-assessment was conducted and the villagers discussed the points to make activity successful. They mainly discussed the past group activities, which were failed, like tree nursery, and small-scale irrigation. Amazingly frankly, the participants were criticizing their village headmen for

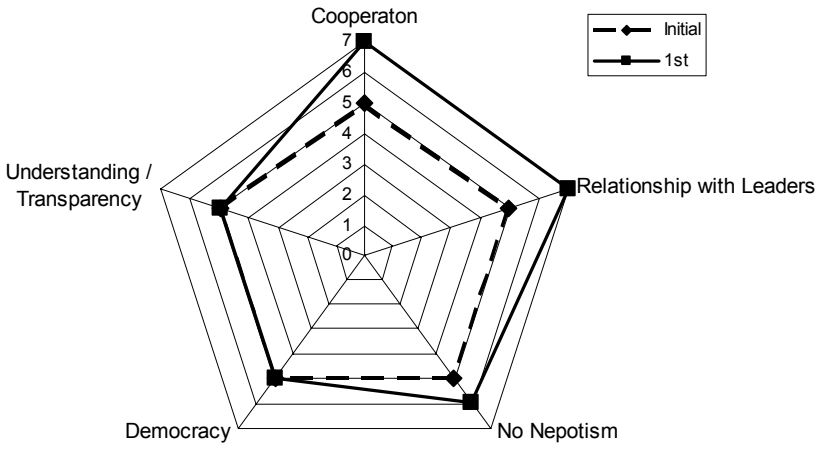


Figure 3.3 Group Activity Assessment of Mtsetse

nepotism and unfair allocation of resources just in front of them. As for small-scale irrigation, it failed because of misinformation on payment for construction work. Though the rating was not done, the villagers identified the important points for the group activity as cooperation, relationship with leaders, abandonment of nepotism, democracy and transparency (Refer to Figure 3.3).

During the wrap up meeting in November 2003, the club members evaluated that their cooperation and relationship with leaders had improved, but there was still question on way of decision-making. The participants talked about the study tour as its evidence. They said that the schedule of the study tour was not informed to all the members and the selection of the participants to go to the tour was not fair. Way of sharing opportunity would be the challenge for the club to increase their strength.

3.4.3 Status of Irrigation and Agriculture

The site was developed with two diversion points. At the upper diversion point, a canal bridge with 12 m length was constructed and a brush dam with water depth of 0.9 m was built at the lower diversion point. The clay soil found around the site is so excellent that the weir smeared with clay soil stopped water very well. For the canal bridge, plastic bags as well as clay soil are well functioning to prevent leakage. The plastic bags were brought by the farmers and it can be considered that plastic is already locally available material.


Canal bridge (12 m length)

The canal bridge had well functioned until the upper stream dried up in mid October 2003. The farmers abandoned the canal bridge and constructed a new brush dam, same type of the lower dam, at about 50m upstream of the lower brush dam.

The members of the club visited Duwu and Ngoni sites as a study tour and learnt about on-farm irrigation. On the recommendation from AEDO and the Team, they chose to apply furrow irrigation instead of basin irrigation considering the steepness of the farmland, and it was functioning well. However, due to water shortage, about 20% of the planted area had been affected in October 2003. To cope with the water shortage, the Team had provided two treadle pumps. The club members narrowly managed water with the newly constructed upper brush dam and also


Lower Brush Dam (vertical type)

the treadle pump and got harvest somehow.

In 2004 farmers themselves constructed the midstream weir in late June. But because the members did not well clear the land after the dry season crop, the landowner refused to rent out the land to the members in 2004. Members from Phulusa One village had been wishing to connect the canal to their farms located beyond the road since 2003, so that they do not have to rent the land. Road authority concerned gave permission to the plan of crossing the road, and the Study Team provided a 6m long PVC pipe for road crossing. Since this road is a district road, a crossing made of locally available material was not be applied.

Mr. Sikweye Peter of Mtsetse Club and Phulusa One said, "We did not get any profit last year. We have just lost. The relation between Phulusa and Phulusa one is a big problem. Villagers of Phulusa think there is only one Phulusa and do not recognize Phulusa One." Having such issues unresolved, club members anyhow started the dry season crop this year with a little external assistance to make the canal cross the road.

The landowner of the original Mtsetse site, Ms. Monica Samuel and her husband Mr. Samuel Benson did not allow any member to cultivate their land in dry season 2004. It is rather a village headmanship problem than land issue. There are two village headmen Phulusa One and Phulusa in a village, and they do not talk each other. Mr. Samuel Benson, however, said "The relation between two chiefs is the only problem and we can work together in dry season 2005, if each and every member cultivates his/her own land." Since the members from Phulusa One Village constructed a water pipe under the road on 26 October 2004, they expect to cultivate their own lands down the road in dry season 2005.

Mtsetse site has contributed to demonstrating the effects of the irrigation and other farmers started cultivating farm at upstream reaches of the Mtsetse site in 2004. Because of abstraction of water upstream, the water for Mtsetse site was much reduced and there was no water flowing the canal by October 2004. Water allocation among Mtsetse club members and upstream farmers will be another issue to solve in this site toward the future.

3.5 Kadiwa

Village:	Mangwenu
Number of Household:	125
Population:	625 (5 per family)
Average Farm Size:	0.4 ha/HH
Dominant Crop:	maize, cabbage, tomato, Irish potato, onion, vegetables
No. of Member:	2003: 7 (3 males, 4 females) / 2004: 14 (6 males, 8 females)
No. of Land Owner:	2003: 1 male / 2004: 2 (1male, 1 female)
Discharge:	2.8 l/s (June 24, 2003)
Irrigation Service Area:	2003: 0.8 ha / 2004: 0.4 ha
Type of Weir:	Brush dam (length: 2.0 m, height: 1.0 m, water depth: 0.8 m)
Specific Structure:	-
Canal Length:	2003: 190 m / 2004: 90 m

3.5.1 Background

The village is located along the M1 national road after five minutes drive by car from Dedza

town. It was observed during the workshop that the villagers apparently look relatively wealthy as compared to other villagers in the verification project sites (probably the most wealthy site). They even offered lunch, Nshima and vegetable to the Team and this practice has been done whenever the government officers visit the village for special function. This wealthiness may be because of their vicinity to the M1 national road.

The village used to be a sub-village up until 2001, and then became a village in 2002. Now this has become a village but actually all of the villagers are relatives, brothers and sisters, having cohesiveness among the villagers to certain extent. The village headman is already old and working as a watchman, so that he delegated his authority to a villager who is now the acting village headman. There is a secretary to the acting village headman who was writing down what was happening during the workshop.

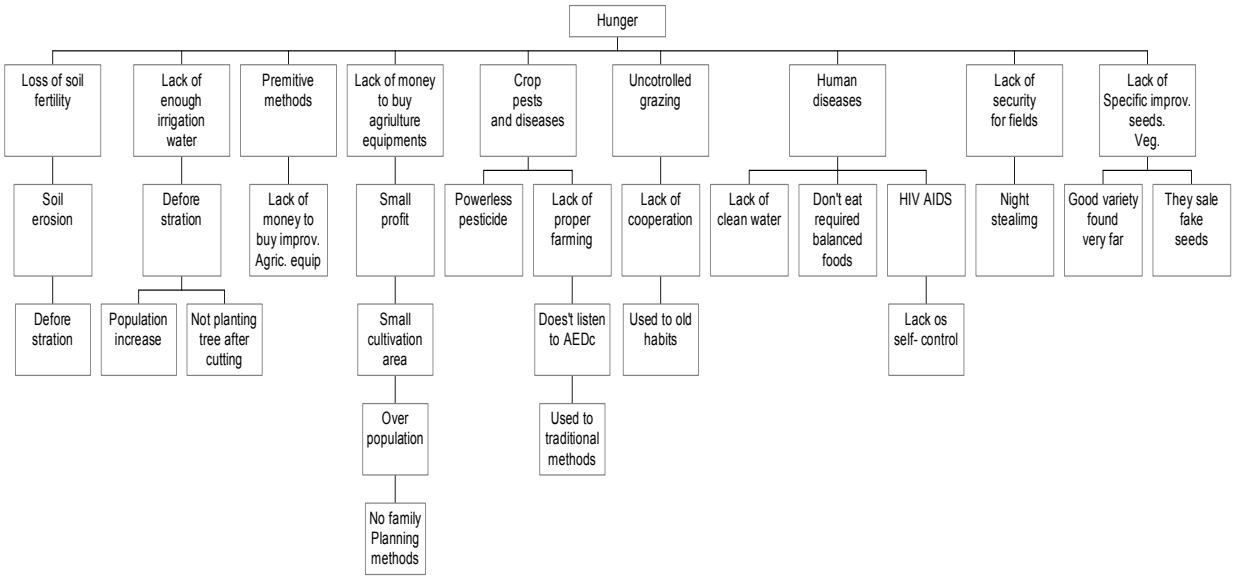


Figure 3.4 Problem Analysis (Kadiwa)
As of July 2003

Their response during problem analysis was very smart (probably smartest among the verification sites). They raised HIV as one of the causes of human diseases again leading to the core problem of Hunger (Figure 3.4). The reason why there is HIV was difficult to do self-control. Another problem in this village was theft, and since they are mostly relatives each other the theft does not steel in his village but do the steeling in other village and instead the theft invites another theft in the other village to his village.

3.5.2 Status of Irrigation and Agriculture

There was already an irrigation system, which had been practiced for about five years by a farmer. But due to gully erosion, the system could no longer be operational in 2003. This is the reason why the villagers asked their AEDO to call the Study Team. The potential farm is now owned by only one farmer, but he said he can distribute the land to his four relatives, thereby there would be five cultivators upon succeeding the irrigation construction.

One problem is that there are farmers (probably two) already tapping the water for irrigation at about 200m downstream from the first potential diversion point (already doing irrigation). One of the farmers was also participating in the kick-off workshop and attended the site

together, and he mentioned there would be no problem concerning water allocation between upstream and his downstream since they are relatives each other so that they can solve problems on discussion.

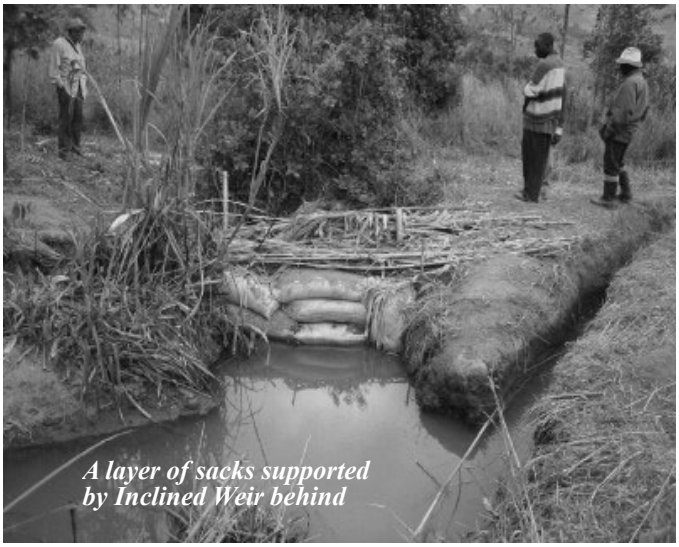
The brush dam of the site was constructed using sand bags and plastic sheets as well as logs and soils. Because clay soil was not available in the surroundings and a neighbor who got clay in his land refused to give it, they had to seek the alternatives. There is still potential to extend the canal, but they stopped extending it just in front of a land of a farmer who lives in other village, because he did not turn up for the construction work. They used to rent lands near dambo for dry season crop, and therefore, they do not want to increase the membership as well to be free from renting land during dry season.

A study tour with the villagers from Mtanda was carried out to learn the leadership of the group village headman at Tikolore and on-farm irrigation in Mankhamba in 2003. Though their sites were suitable for furrow irrigation, they were impressed by the well maintained basin in Mankhamba. Having informed to the villagers that the Team would only prepare a minibus and drinking water, the participants from Kadiwa brought food for lunch. The villagers from Kadiwa were kindly sharing the food with all the participants.

Since this site is located along M1 highway and near Dedza town, the members have planted many vegetables such as mustard, sweet potato, cabbage, onion, etc. (no maize is planted in this site). This site has a lot of diamondback moths (DBM), which damage most of the brassica (cabbage) family. Control of the pest needs an integrated pest management approach because most pesticides have failed and most beneficial insects have been killed by the indiscriminate use of pesticides.


Various Kind of Vegetables

In 2004 they constructed the diversion weir on June 17, which is about one month earlier than previous year. The original members are seven and two females newly joined. There are other villagers who want to join the irrigation club as motivated by seeing the production of vegetables with irrigation in 2003. Aside from the original weir, they constructed a new weir about 200m downstream. They dug about 80 m length of canal.


A layer of sacks supported by Inclined Weir behind

The weir constructed is a combined type

of standard inclined with sand bags. On top of the grasses placed on the inclined members of trees and bamboos, they have put sand bags in order to minimize the leakage. They bought 21 sand bags by selling vegetables. The crops they planted in 2004 were more or less same as the previous year. By mid October 2004, they also faced water shortage and they intensively used treadle pumps to irrigate their crops by the time of harvest.

3.6 Mtanda

Village:	Bizaliyele, Mmuwla, Kawiya
Number of Household:	51, -, 60
Population:	265, -, 300 (5.1 per family)
Dominant Crop:	maize, beans, sweet potato, millet, soybean, ground nut, Irish potato, tomato
No. of Members:	2003: 38 (7 males, 31 females) / 2004: 19 (9 males, 10 females)
No. of Land Owners:	2003: 6 females / 2004: 6 females
Discharge:	-
Irrigation Service Area:	2003: 1.5 ha / 2004: 1.5 ha
Type of Weir:	Brush dam (length: 8.5 m, height: 1.55 m, water depth: 1.45 m)
Specific Structure:	-
Canal Length:	2003: 320 m / 2004: 320 m

3.6.1 Background

The site is located between Mtsetse and Chikhasu. They started the irrigation development by seeing Mtsetse. Some villagers of Kawiya village are also involved in Mtsetse site as well as Mtanda. Bizaliyele and Mmuwala used to belong to Kawiya, but due to population increase, Bizaliyele and Mmuwala were separated in 1998 and 2002 respectively.

3.6.2 Status of Irrigation and Agriculture

The site was initiated by the villagers who saw Mtsetse. They themselves contacted AEDO for the technical assistance. The site was set to be ambitious as to raise the water level as high as 1.5 m. They once managed to stop the stream water by brush dam and raised water onto canal, but a lot of leakage repeatedly lowered the water level. The villagers with assistances by AEDO struggled to repair the dam and finally stopped the leakage by doubling the weir line and putting soil in between the two weirs.


Mtanda brush weir in 2003

The villagers were extending the canal, but a landowner refused to dig the canal in his land, stagnating the excavation work. AEDO had worked on this issue to clarify the reason of his refusal and found that he was afraid of land confiscation by the government. The owner was finally convinced, so that the canal is expected to extend next year through his land. Some farmers dropped out because they were expecting free seeds and fertilizers upon the

construction of the irrigation system, and found that there was no such arrangement. Final membership was 38, and sourced seeds on their own. As most farmers could not buy maize seed, they planted beans and few planted potato.

In 2004 Mutanda club members got together again and constructed the diversion weir on June 25. Construction took a whole day, started at around 9:00 and finished evening because not all the required materials had been collected in advance. After the first construction work, they reinforced the weir to stop the leakage and raise the water level higher and the weir was successfully made. The weir in 2004 was not double lined as 2003, but it was elegantly made and well keeping water level.

There were 38 members in 2003, and 19 members joined again by early July 2004. There are some old members who still want to join the club, however, the landowners refused more members to join in order to keep bigger irrigation area per member. They also had a complaint about the members who did not clear the land after the harvest of dry season crop. They grew beans and Irish potato as 2003.

Three landladies, Ms. Gelenita Samuel, Ms. Kalangi Samuel and Ms. Jojina Sikenala of Mtanda Club felt unhappy and complained because most of the renters did not clear their plots after they harvested. They said they were late for rainy season planting and then harvesting because of that. Ms. Jojina Sikenala said "When I told other farmers about the problem, they said white men did not tell them to clear the land after harvest."


Mtanda Weir in 2004

Before harvesting in dry season 2004, Ms. Jojina Sikenala said "There was some discussion on the issue at the meeting with the V.H. Bizaliyere and Chairman of Mtanda Club, and an agreement was made. The members now have to prepare the land after harvesting. I am not sure if they will actually do that or not though."


Irrigated Area of Mtanda 2004

Mr. Huswell F. Kadembo, a patrolman of Forestry Department and whose wife is a member of Mtanda Club, said "I do not recommend starter packs because they might contain expired seeds or local seeds." He also said "Dry season harvest was good. The only problem is that the plot is too small."

3.7 Namanolo

Village:	Salapa, Kankhudza
Number of Household:	78, 207 respectively, total 285
Population:	390, 1,035 respectively, total 1,425
Average Farm Size:	0.7 ha/HH
Dominant Crop:	maize, beans, soybean, ground nut, potato, tomato, cabbage
No. of Members:	2003: 23 (16 males, 7 females) / 2004: 10
No. of Land Owners:	2003: 8 (2 males, 6 females) / 2004: 10
Discharge:	-
Irrigation Service Area:	2003: 1.2 ha / 1.8 ha
Type of Weir:	Brush dam (length: 4.7m, height: 1.3m, water depth: 1.2m)
Specific Structure:	-
Canal Length:	2003: 401 m / 2004: 550 m

3.7.1 Background

The site is located fairly close to Dedza town, around five minutes drive by car. The first settler came from Mabwani and started the chieftainship in 1910. Current leader of Kankhudza village is the fifth generation. The village headman of Salapa is the first generation. They separated in 1999 from Kankhudza due to population increase.

3.7.2 Status of Irrigation and Agriculture

The site is one of being started late. After the kick-off workshop, some of the villagers were taken to see Mtsetse and Mtanda and they were well motivated to dig canals. The villagers learned how to use the line-level for confirming the gradient of canal. The weir was successfully constructed on July 23, 2003. The main crops in the site were beans and Irish potato. Farmers sourced their own seed. Though planting was done in mid August 2003, they harvested the crops before rainy season started since these crops need only about three months to mature. This site is expected to display effectiveness of the brush dam as well as benefit of irrigation, as it is located just beside the trunk road from Dedza town.

Construction of Namanolo weir

In 2004 five landowners constructed the weir together with the AEDO on June 10, more than one month earlier than previous year. The structure is exactly the same as the previous weir, which is a double line weir. They utilized the wooden logs, which had been used last year. Upon completing the previous year's irrigation, they dismantled the weir and set aside the major material: the wooden logs. Although the weir had diverted the water to both sides of the stream last year, only left side was irrigated due to time constraint. However, the completion of weir construction more than one month earlier than previous year enabled both sides of irrigation this year.

In 2004, landowners did not rent out their land to the members of the previous year. So far the members of the new club are 10, and are all landowners out of 23 last year. This is due to the same reason as Mtanda site. Some of the landowners refused to provide their lands to the peer farmers, as they want to have larger service area. Five landowners on the left bank and fiver landowners on the right bank organized a new club and cultivated using the same weir in dry season 2004.

Mr. Eric Samalani, the landowner of the left bank in dry season 2003, is the only member of the first club remained. He told the V.H. Kamkhudza that the members did not change basins to furrows after harvest as instructed. The V.H. said there is no option if the situation is like that, and a new club was formed. Mr. John Kenith, a landowner of the right bank and a new member said, "I did not join in dry season 2003 because I was not sure if water really comes to the field."

The landowners grew mainly Irish potato and Mr. Eric Salamani earned around MK10,000 from his Iirsh potato. He told that he would start earlier next year so that he can harvest and sell Irish potato by September when the market price of Irish potato is still high. He is so motivated to continue irrigation, but he would not rent out the land to others.

CHAPTER 4. CLUSTER 3 (Dowa RDP)

4.1 Tikolore

Village:	Fandani
Number of Household:	350
Population:	-
Average Farm Size:	1.0 ha/HH
Dominant Crop:	maize, tomato, cabbage, Irish potato
No. of Member:	2003: 81 (69 males, 12 females) / 2004: 81 (69 males, 12 females)
No. of Land Owner:	2003: 10 males / 2004: 10 males
Discharge:	30 l/s (upstream), 40 l/s (downstream) (June 5, 2003)
Irrigation Service Area:	2003: 5.8 ha / 2004: 5.8 ha
Type of Weir:	Brush dam (length: 6.0 m, height: 0.7 m, water depth: 0.45 m)
Specific Structure:	Canal bridge
Canal Length:	2003: 2,154 m / 2004: 2,254 m

4.1.1 Background

Fandani village is located along the road to the Dowa town near the junction with Salima road. Because of this advantageous road condition, there are many farmers who are growing cash crops like cabbage, tomato etc. The village is big with 350 households and there are five hamlets in the village, namely Fandani, Kandani, Mdzinga, Chilowe and Vungula. The village headman and the village elders from each hamlet decide internal issues such as land allocation. The village headman, Fandani was also the group village headman and he is highly respected by the villagers, but the new village headman was assigned in March 2004.

The number one cause for hunger of the problem analysis carried out during the phase 1 study was "Fertility of land is decreasing", followed by "Villagers are sick (cholera, malaria, coughing)", "Rodents / pests destroy crops", "Villagers cannot plant or plant late", and "Seeds

are washed away" (Figure 4.1). Since Fandani village is located on a slope, soil fertility, soil erosion, and seeds washed away were recognized as major problems.

The villagers can access to a weekly market that is held every Thursday along the trunk road on foot or by bicycle. Cabbage and tomato are major income sources of the villagers. Other cultivated crops are groundnut, beans, Irish potato, pumpkin, mustard leaf, Chinese cabbage, soybean, banana, mango and guava.

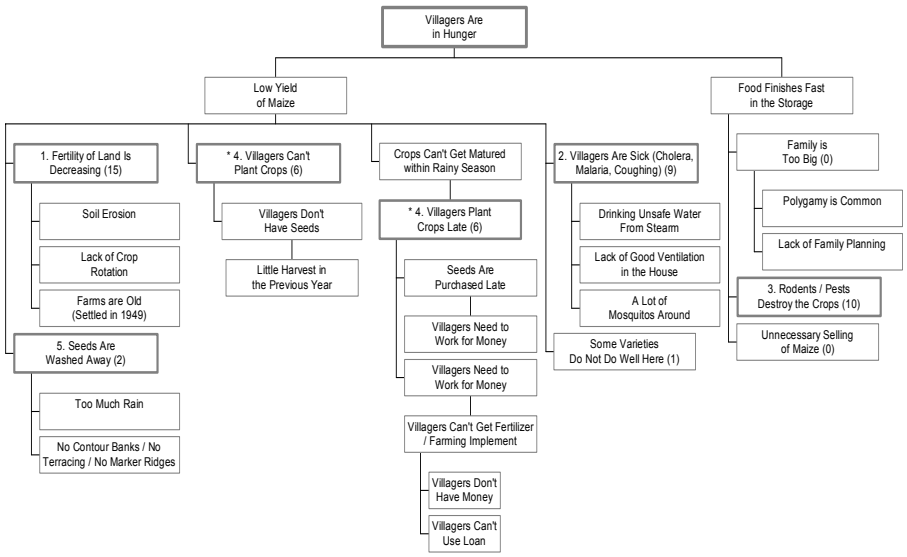


Figure 4.1 Problem Analysis (Tikolore)
As of Feb. 2003

Land degradation due to steep slope and poor land husbandry becomes obvious in the village. Soil conservation activities such as promotion of agro-forestry, contour ridging and vetiver grass planting have been practiced under PROSCAP. But the villagers were saying that the soil conservation activities are not active after the NGO withdrew from the site.

4.1.2 Capacity Building of the Group

Group activity self-assessment was carried out in this site, referring to their past experiences. They cited public improvement such as road construction as successful activity and group marketing as unsuccessful activity. The important points for the group activity were identified as leadership, organization, very few drunk (hard working), encouragement from the Government, and Jealousy mitigation. They rated the leadership as the most contributing factor to the past success (Refer to Figure 4.2).

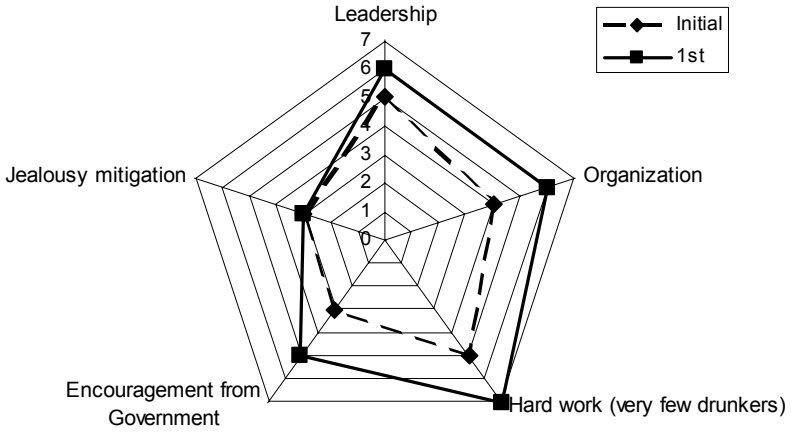


Figure 4.2 Group Activity Assessment of Tikolore

At the first self-evaluation of the group activity through irrigation development, they rated the points mostly better or much better, except for jealousy mitigation. Although it seemed that the participants, especially women, were

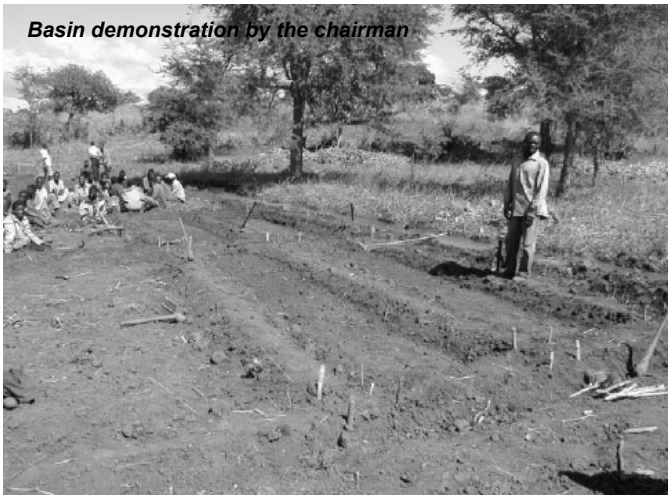
reluctant to clearly express their minds on the meeting, some participants explained the existence of jealousy within the group. They said, there appeared a jealousy on plot allocation, as some received fertile plots and others did not.

4.1.3 Status of Irrigation and Agriculture

The site is the first runner among the sites in the cluster 3. Leadership of the group village headman and the committee were significant in this site. Canal excavation required in some part two meters depth, but the villagers finished the target length in two weeks time. They have extended the canal and it reached as far as around 2 km, which was the longest among the verification sites. The irrigation service area of 5.8 ha developed in Tikolore was also the largest amongst the verification project sites.

Committee members, the group village headman and two ladies were taken for a study tour to Mankhamba and they learned basin irrigation. The committee members demonstrated what they learnt to the other members of the club soon after they came back from the study tour. They had started land preparation at the end of June, and some of them also started planting simultaneously with feeder canal excavation.

The main crop in 2003 was Masika variety of maize, which was provided by winter TIP. The other crops grown include mixed varieties of beans and all were grown in pure stand, potato (*Solanum tuberosum*), tomato (*Lycospersicon esculentum*). The major problems faced in producing maize include pests such as maize stalk borer and cutworms. The farmers tried their best in controlling the maize stalk borer by using leaves from local herbs called *katupe* and *dema*, and these worked well.


Basin demonstration by the chairman

In 2004 Tikolore club members tried construction of the diversion weir at about 50 m upstream from the previous year's diversion point as early as April 14. This location was the originally intended place even last year. In 2003, however, the landowner who has a land where the intended canal starts refused to let the canal pass by. Therefore, they had constructed the diversion weir at another point, last year. Upon the agreement with the landowner, they started constructing the diversion weir, type of which was same as the previous year's: a standard vertical type. As the water level rose up, they faced piping and boiling problem of the foundation. Since the foundation is composed of very loose sand, they failed to overcome the problem even with 24 sand bags being put in the foundation. All the sand bags had gone down in the foundation.

Instead, they sifted the diversion point further upstream into the dambo area. New diversion point is located about 90m upstream from the previous year's diversion point where no hard effort was required to raise the water level thanks to the little elevation difference between the

stream bed and the land nearby. New diversion is now made of small earthen band, just withdrawing the stream water by gravity into the canal. Club members who participated in the construction were about 20, and according to the new arraignment of the diversion point, those members had excavated new canal of about 200m, which joins the old canal. This new 200m canal includes about 1.7m deep excavation for a reach of about 70m.

Farmers cleaned the canal and prepared their land time by time. Since these works this year were not as tough as last year, they did not work so collectively, rather more or less individual basis. Upon finishing land preparation, three farmers started planting as of early June. This planting was about one month earlier than last year (last year's planting had started on August 7).

Tikolore site also met the land issues, as some of the landowners were reluctant to rent the land from the viewpoint of physical condition such as soil erosion occurred in 2003 dry season. Also new village headman was assigned against the opinion of the esteemed group village headman in March 2004 and that caused the decline of cohesiveness of the village. Anyway Tikolore club is still vital continuing the irrigation work.

Mr. Max Zawa said, "The only problem was that the landowner of my plot refused me to use there last season. Therefore, I got a new plot this season. Each two members will buy one bag of fertilizer together." Mr. & Ms. Nikison also said "We prepared the garden, but the landowner refused us to use the plot because it was too late."

G.V.H. Fandani said "There is no unity in Tikolore Club as before." The Committee Members of Tikolore Club decided to relocate poor performers to the tail of the canal by assessment of the performance of last dry season. That discouraged some people to join again this season.

Mr. Richard Chiyazu, Chairman of Tikilore Club, said there was less cooperation in Tikolore Club in dry season 2004. He also said, "No good cooperation between landowners and the V.H. Fandani. For example, the canal caused soil erosion in rainy season 2003-2004. Though we closed the canal, the water came through dambo and caused soil erosion in the area near the weir. V.H. did not go and talk with the landowner and the landowner refused the club to use his land. We had to change the location of the weir because of that." Other problems were shortage of water and damage by the cattle from the neighboring village.

4.2 Tilime

Village:	Magolowondo
Number of Household:	81
Population:	-
Average Farm Size:	1.5 ha/HH
Dominant Crop:	maize, cabbage
No. of Members:	2003: 50 (40 males, 10 females) / 2004: 61 (50 males, 11 females)
No. of Land Owners:	2003: 5 males / 2004: 5 males
Discharge:	-
Irrigation Service Area:	2003: 2.1 ha / 2004: 3.5 ha
Type of Weir:	Embankment (length: 39.0 m, height: 0.8 m, water depth: 0.7 m)

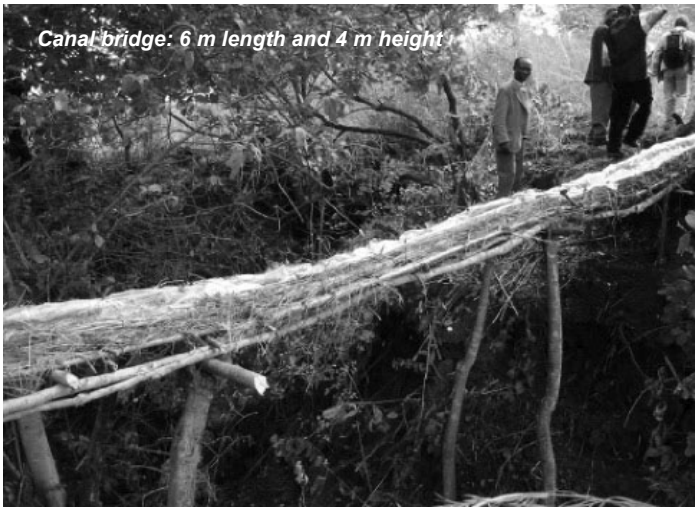
Specific Structure: Canal bridge (length: 6 m, height: 4 m)
Canal Length: 2003: 1,852 m / 2004: 1,980 m

4.2.1 Background

The site is located just beside Tikolore, hence sharing the same advantage in marketing with Tikolore. According to the AEDO in this site, the village has never had good yield due to lack of fertilizers and they used to be reluctant to attend the demonstration in making compost manure by the AEDO. Despite the low yield of maize, they sometimes have to sell the produce even if the price is low to get cash for any purposes.

4.2.2 Status of Irrigation and Agriculture

The site was initiated by two farmers who saw Tikolore. The weir was constructed by the farmers themselves. They diverted the river flow by soil embankment. The Study Team and AEDO assisted for the canal alignment. To extend the canal over a stream, a farmer constructed a canal bridge with 6m in length and 4m in height, which is made of logs, grass and plastic sheets. The farmers further extended the canal reached to about 2 km.


Canal bridge: 6 m length and 4 m height

Most parts of the irrigation service area was reclaimed from bush, so that the possibility of promoting open pollinated variety of maize was high. Though the Study Team suggested the farmers to promote OPV maize seeds by sourcing on their own, EPA has availed of all the seeds including cabbage, onion, etc., fertilizers and even chemicals from Food Security Component under EU Public Works Program. Farmers in this site also imported how to make basin on the farm from Tikolore, which was originally brought from Mankhamba. The cluster approach to enable farmer-to-farmer extension has well worked in these sites.

Tilime farmers had been learning a lot from Tikolore farmers such as how to make basin, how to irrigate plots, etc. In this sense, Tilime farmers were somewhat like students with Tikolore being the teacher. However, the Tilime farmers have very advanced in the following year 2004; they constructed the weir in late April just later than Tikolore site, and then started overtaking Tikolore in preparing plots and planting. Land preparation was done in May and early June, and most of the plots were planted as of mid July. There are 10 male and one female who were motivated by seeing the last year's harvesting and then joined the club this year. The service area of Tilime site is exclusively used for dry season irrigated agriculture, which made the farmers possible in preparing and planting the lands much earlier than Tikolore.

The Study Team held a workshop with the villagers of Tilime site to discuss how to improve irrigation and agriculture in 2004. 53 villagers, of whom only two were not members,

participated in the workshop and they identified and prioritized issues to improve the above objective as "Making compost manure" as the first priority followed by "crop twice during dry season", "open group bank account to buy inputs" and "dig shallow well". The logic of digging shallow well for improving irrigation and agriculture was explained such way that they can get cleaner water by shallow well and can be healthier to work harder on the field.


First Irrigation in 2004 Started on May 25

The Study Team suggested making compost manure along the canal so that water can be easily obtained for making compost manure. Farmers are used to make compost manure near their house to utilize their garbage. Making compost near house has disadvantages of transport and securing water for it. But if they make compost by the canal, water can be easily obtained and also burden of transport is drastically reduced. By November 2004, farmers in Tilime took action to make compost manure along the irrigation canal and there are around 30 heaps in a row.

Apart from making compost, farmers are also utilizing the irrigation canal water to other use such as tree nursery and fishpond, both of which are made along the canal. Maize in Tilime is growing very well compared to other sites, so the farmers look so happy to work on the field.


Compost manure made along the canal

Most members of Tilime Club are getting better harvest in dry season 2004. Mr. John Chakana, Vice-chairman of Tilime Club, said "One of the reasons why Tilime Club is working good might be sub-club system. We organize sub-club of 10 members as a family, and select vice-chairman. When there is a problem, the members of sub-club discuss the problem first. If they cannot solve the problem, it will be discussed at the committee." Mr. Sixpence Kapondo said, "Foundation of the club is important. We need to have full discussion and to put everything on the table at the beginning." Tilime members must chase goats if they saw them in the garden, and apply fertilizer. If not, they should leave the club.

4.3 Loyi

Village:	Mtalanje
Number of Household:	114
Population:	570 (5 per family)
Average Farm Size:	0.8 ha/HH

Dominant Crop:	maize, cabbage, tomato, vegetables
No. of Members:	2003: 36 (22 males, 14 females) / 2004: 20
No. of Land Owners:	2003: 4 (3 males, 1 female) / 2004: 4 (3 males, 1 female)
Discharge:	8 l/s, 2003
Irrigation Service Area:	2003: 3.6 ha / 2004: 3.6 ha (0.2 ha used for dry season crop)
Type of Weir:	Brush dam (length: 13.5 m, height: 0.95 m, water depth: 0.85 m)
Specific Structure:	-
Canal Length:	2003: 510 m / 2004: 80 m (up to the farm for dry season crop)

4.3.1 Background

The village is located in the south side of Salima road. Current village headman is the fourth. Most of the villagers are relatives but there are 11 immigrants from Lilongwe. During the problem analysis in the village, alcoholism of the men was raised as a serious problem. Other significant cause for hunger was that small size of the land is utilized (Figure 4.3). There is an existing irrigation site in the village, but they said, they only know how to use watering can. Furrow irrigation or basin irrigation had not been introduced in this site.

Figure 4.3 Problem Analysis (Loyi)
As of July 2003

4.3.2 Capacity Building of the Group

Group activity self-assessment was also carried out in the village. Their successful activities were farming and transporting the products as a group, molding of bricks, road construction and dancing for ceremony. Their unsuccessful activity was an agriculture inputs club, which stopped the activity in 1994, because the government credit scheme stopped in the year. They identified the important points for the successful group activity as leadership, love (friendship), unity and financial capacity and they assessed that the leadership was the most contributing factor to the success of the past activities. Referring to the highest rating of the leadership as a criterion, they rated the strength as a group on the other

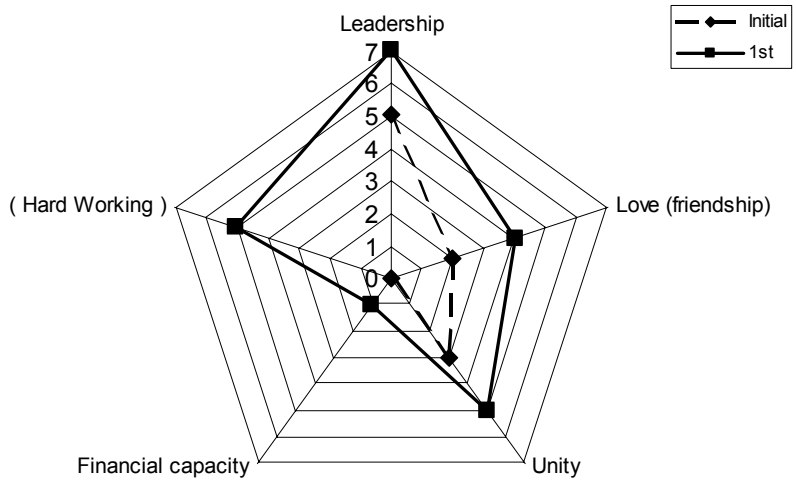


Figure 4.4 Group Activity Assessment of Loyi

aspects. The dotted line in Figure 4.4 shows the result.

For the evaluation of the group activity in November 2003, they rated most of the aspects as much better after the irrigation development activity. They even rated their financial capacity better since they have now expectation to harvest dry season crop within a few months. They also added another important point for the successful group activity as hard working. There was a story introduced during the workshop that one of the landowners, who is a non-member of the club, refused to lend her land of 0.4 ha to four farmers without payment. The club decided that all the members would contribute MK15 to pay for the rent of the land, which was MK500.

4.3.3 Status of Irrigation and Agriculture

In Loyi site, active participation of women has been observed, while alcoholism of men was told as a problem during the problem analysis. The weir was constructed with a bush dam made of logs, grass and soil. To well stop the stream water, the wall of the weir was made double and soil was compacted in between the walls. There was a rock at the beginning point of the canal, so the villagers had to break the rock by a local technique, which is to heat up the rock with fire and do watering to crack the rock. The canal was extended to 510 m surrounding the hill on the left bank of the stream.

Loyi weir made of double brush with compacted soil

Plot layout started in early August 2003, and planting in mid August. RDP availed of free maize seeds with fertilizer for all the members. Since this area is located on a slope, the Team suggested applying furrow irrigation. Maize and Irish potato were grown with furrow irrigation. As to Irish potato, they sourced the seeds on their own, and every women member was given two ridges each.

Maize under furrow irrigation

There is an existing weir at an upstream reach irrigating the right bank of the stream. Extension of the canal from this weir was also incorporated in the irrigation development in this site. Although gravity irrigation was able from the canal on the right bank, farmers were still using watering can to irrigate the crops because they did not know how to irrigate by gravity.

In 2004 the diversion weir was constructed by 15 members as early as May 3, then the

farmers once went back to harvesting of their rainy season maize. The canal was cleared only for the first 80 m out of total 510m as of early July. The landowners asked members to pay MK500 for the rent and then this amount went down to MK100 after negotiation between the landowner and Ms. Adinesi Saize, Chairlady of Loyi Club.

By the time they finally agreed with the rent at MK100, it had become obvious that the volume of water in the stream was less. Though the chairlady collected the rent from members with effort, the members did not crop in this dry season. 14 members who paid rent did not take back the rent because they were wondering if they could rent the land for rainy season crop. In the mid of November, eventually the club members and landowner agreed to use the land for rainy season crop. Mr. Saundani Philipe said "They are going to cultivate the land in rainy season 2004-2005 to keep soil fresh. If nobody uses in rainy season, soil will get hard." 20 members paid MK100 each by December 2004 and they are ready for dry season 2005.

Mr. Damba Madziada (age 24) complained about the rent. "Loyi Club plots are the land where landowners were not using. And it was a lot of work to clear the land. Also we could not get much harvest in dry season 2003. If they charge us, they would better tell us from the beginning." Mr. Wilson Mwale (age 35) said, "People who have authority are not prepared and do not tell villagers what they need to do next. That is why we are a bit late for doing things. Development in other villages is going in time, but not for Loyi Club members."

There were four farmers who got out of the original Loyi club, who stay in a different hamlet from the main village (administratively they are under the same village of Mtalanje). Though drinking is a prevailing problem in this area, the four do not drink and are hard working. On April 21, the four made an earthen band to tap the water further upstream, about 300m upstream from the original Loyi weir. The canal was running on a very steep slope of the stream, especially for the first 200m. The slope was sometimes cut more than three meters vertically at one side of the canal. They worked on the canal excavation until mid May, and they once again went back to their field to harvest the rainy season maize.

According to what they explained, they were to develop their own irrigation scheme even last year. However, by seeing the activity taking place in Loyi, they opted to join the Loyi club rather than proceeding by themselves. They said they could have developed their own scheme even last year by themselves, could have excavated canal, could have tapped the water, etc., but for gravity irrigation on the field, they did not come up with an idea of furrow irrigation or basin irrigation until they had seen how the gravity irrigation in the field was. They said, without last year's experience in Loyi club, watering to the crops would have gone with watering can even if canal were running higher than plot.

They came back for canal excavation in early July and excavated more than 1000m as of mid July. There were two canal bridges along the canal very similar to the one in Tilime site, made of ladder-like base frame having mounded sides of grasses and plastic paper on top. They leaned how to cross the gullies with such canal bridge by seeing the Tilime bridge.

In spite of such progress, a farmer from neighboring village, whose land is located by the

weir site, refused the canal to pass at the periphery of his farm since it would cause fall of his land by soil erosion when water runs through the canal. The weir was, therefore, abandoned and eventually no irrigation took place at the new site. The four members came back to Loyi club and the committee members welcomed them to rejoin, because they were major participants of the club last year and hard workers.

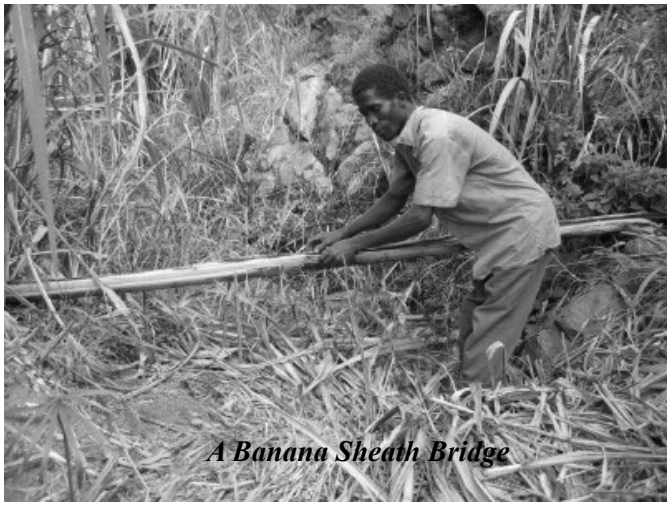
4.4 Kambware

4.4.1 Status of Irrigation and Agriculture

Kambware site was developed by the initiative of the farmers themselves. AEDO assisted to construct the weir and canal alignment according to the technical advice from the Study Team. The first year weir was so huge that farmers were reluctant to dismantle the weir before the rainy season. Farmers grew maize in the irrigated area. Though they encountered stalk borer attack, they managed to rid of the pests using India tree sap.

In 2004 the site was suffering from critical water shortage. The flow in the steam was minimal, less than one litter per second though it is only by observation. The members gave up the reconstruction of the diversion weir this year. Even the sandbags used to construct the weir last year were dug up and stolen by some people, who are said those selling charcoals.

There was a farmer taking water by tapping the water with small earthen band. He constructed about 150m length of canal. Since the flow was minimal, his service area was very small, say about 0.1 ha. Out of the 0.1 ha, about half was located on a slope higher than the canal, so that he used watering can. The remaining area was located at both sides of the stream, which were connected via a water bridge made of banana sheath.



A Banana Sheath Bridge

CHAPTER 5. CLUSTER 4 (Ntchisi RDP)

5.1 Msambaimfa

Village:	Sajeni
Number of Household:	30
Population:	130 (4.3 per family)
Average Farm Size:	1.2 ha/HH
Dominant Crop:	maize, tobacco, onion, cabbage
No. of Members:	2003: 61 (47 males, 14 females) / 2004: 61 (47 males, 14 females)
No. of Land Owners:	2003: 13 (10 males, 3 females) / 2004: 13 (10 males, 3 females)
Discharge:	-
Irrigation Service Area:	2003: 4.5 ha / 2004: 4.5 ha
Type of Weir:	Brush dam (length: 1.0 m, height: 1.0 m, water depth: 0.7 m)

Specific Structure: 3 canal bridges across gullies by PVC pipe
Canal Length: 2003: 1,500 m / 2004: 1,500 m

5.1.1 Background

The site is located at the southern part of Ntchisi district, on the way from Kalira EPA to Mponela town. The distance from the site to Mponela town is around 10 km, but the road is sometimes cut during rainy season. Its geography is hilly, so that the steep slope causes soil erosion. The villagers have recognized that the fertility of the farm is decreasing year by year and they have been practicing contour ridge and vetiver grass planting to reduce the soil erosion.

Sajeni village is a very cohesive community of 30 households with total population of 130. The first settler, the grandparents of the current village headman, came to the area from Dowa in 1914. The current village headman is the fourth headman. His grandfather was the first, then the younger brother of his grandfather was the second, and his father was the third village headman.

A problem analysis with the villagers was carried out during the phase 1 study and "Villagers cannot buy fertilizer" was the number one cause of hunger, followed by "villagers can get little seeds", "Land degradation" and "Family is too big" (Figure 5.1). Because the village is in a remote area, nearby ADMARC office closed in 1996, and Farmer's World loan is not available since 2000, acquisition of farm inputs is the greatest problem.

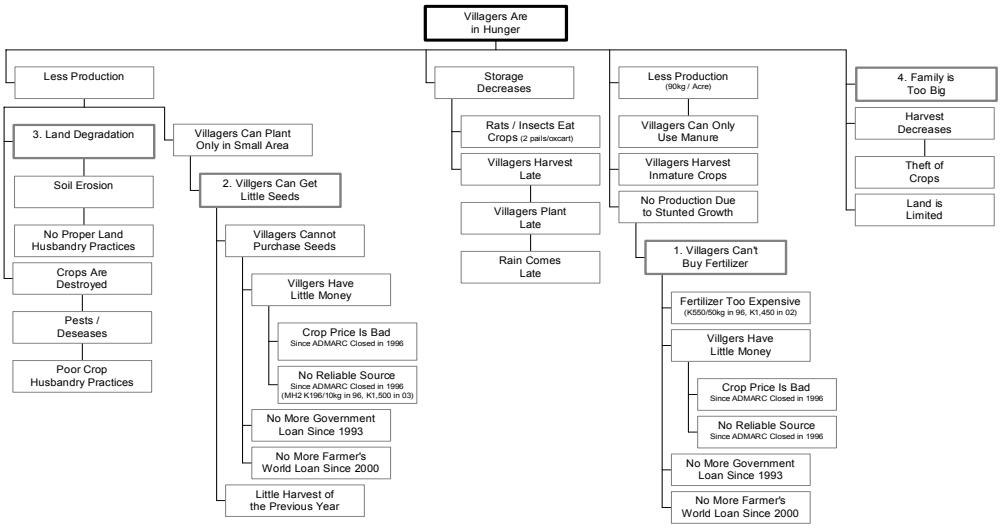


Figure 5.1 Problem Analysis (Msambaimfa)
As of Feb. 2003

Tobacco, vegetables and fruits are major cash crops in the village. One of the major cash crops here is onion. Onion is storable, transportable and it can be cultivated twice a year. The villagers are able to sell onion at good price despite the disadvantageous marketing condition. Peach is also a good income source for the villagers, as it is sold at a range from MK30 to 50 per piece.

5.1.2 Status of Irrigation and Agriculture

Though the site was the first target identified during the phase 1 study, the intervention by the Study Team was suspended due to the clearance of Environmental Assessment same as Chikhasu. Meanwhile, the farmers in the site had already started digging the canal by their

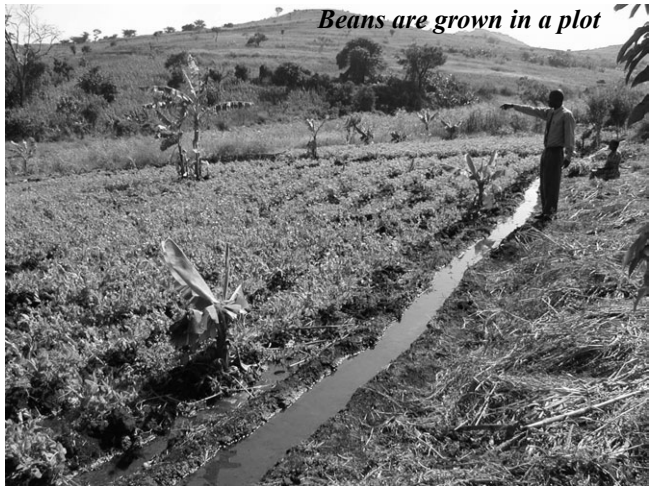
own, according to the alignment made by the Study Team during the phase 1 study.


Maize irrigated in Basins

The stream water is diverted by simple embankment, but further improvement of weir to raise the water level was not carried out in 2003 since there was farmland already opened right upstream reach of the diversion point. Raising water level further would cause inundation in the farmlands, therefore the simple structure to divert, not to raise, water was used for the season of year 2003.

The main crop was Masika variety of maize. The other crops grown were mixed breeds of beans, tomato onion, potato, mpiru, etc. Onion is produced widely in this area dependent on residual moisture. Though the farmers sourced seeds by themselves, they received fertilizers from winter TIP. The major problems faced in the production of maize were pests such as maize stalk borer and maize streak virus and cutworms The farmers controlled the maize stalk borer by using botanical pesticides such as Jerejere (*Sesbania sesban*) and *Katupe.* They also had livestock damage problem and farmers should always be in the gardens protecting their crops.

In 2004 farmers in the site constructed weir and cleaned canal in early May without attendance of AEDO. Prior to construction of the weir, some farmers started planting in mid March using rainfall. Farmers grew maize (Masiaka), beans and onions. This year no one received handout but sourced inputs by themselves. Water in the canal in this site was less than last year, but farmers went for the dry season crop one by one after they were released from harvesting and processing work of the last rainy season crop. There was a farmer who constructed a fishpond receiving water from irrigation canal, but no fish was grown in this year.


Beans are grown in a plot

5.2 Gontha

Village:	Chikwawe
Number of Household:	88
Population:	440 (5 per family)
Average Farm Size:	0.8 ha
Dominant Crop:	Maize, Tobacco, Beans

No. of Members:	2003: 52 (43 males, 9 females) / 2004: 18
No. of Land Owners:	2003: 4 (3 males, 1 female) / 2004: 1 male
Discharge:	30 l/s (May 30, 2003)
Irrigation Service Area:	2003: 4.9 ha / 2004: 2.5 ha
Type of Weir:	Brush dam (length: 1.5 m, height: 1.0 m, water depth: 0.8 m)
Specific Structure:	2 road crossings (4 m each), 1 canal bridge (2.5 m)
Canal Length:	2003: 600m (300 m each on left bank and right bank) / 2004: 300m

5.2.1 Background

Chikwawe village is located at the southern part of Ntchisi district. Although the village is near Kalira EPA, the site is considered the most remote area among the verification project sites. They earn from tobacco production, but it seems the education level is low as it is reported from a villager that the literacy rate of the village is just around 10%. It is also observed that there were dozens of children gathering at the venue of the workshop held in the morning, though they were supposed to be the ages to go to school.

A problem analysis was carried out in June 2003 and the villagers identified the cause for hunger as "little seeds available", "use of unimproved seeds", "Stunted growth", "Land degradation", "Pests (monkeys)", "Crop pests and diseases", "Lack of crop diversification" and only one cropping in a year due to lack of irrigation skill" (Figure 5.2). The significant issues here are the presence of monkey as pest and villagers' awareness on irrigation. It is the first time to hear about monkey in the verification project sites and also the villages, which discussed irrigation issue, were rare among the sites.

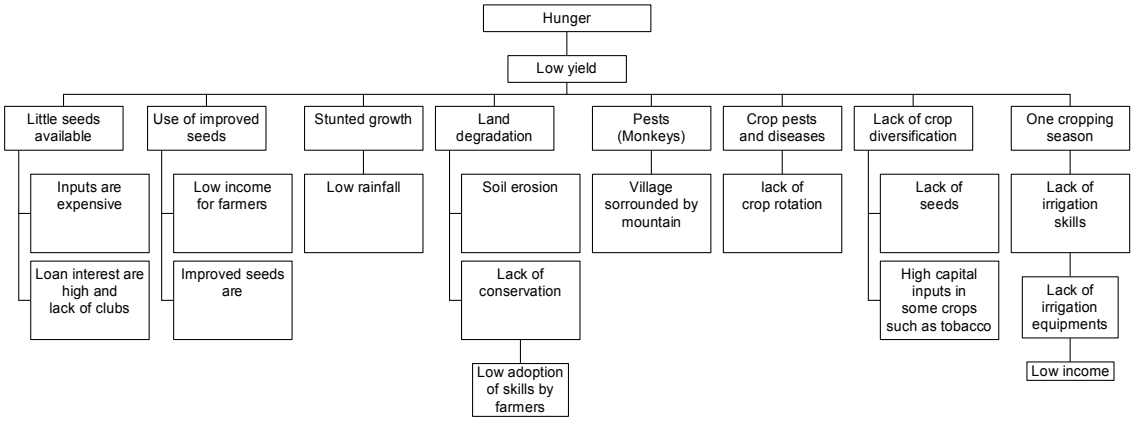


Figure 5.2 Problem Analysis (Gontha)
As of June 2003

5.2.2 Capacity Building of the Group

In this village, the leadership of the village headman was considered strong and so was the cohesiveness of the villagers. That was recognized even when the initial group activity self-assessment was carried out in June 2003. The villagers discussed their strength in carrying out the group activities. They identified the strength as cooperation, hard working, love one another, trust each other, and trust village headman. Rating on each aspect was not conducted.

At the review meeting in November 2003, the members evaluated how these points improved or worsened in their group through the irrigation development activity. All the members assembled at the meeting rated that all the aspects of the group had improved very much through the irrigation development (Figure 5.3). No matter how much biased in rating in front of one another, the group looked trustful each other during the meeting anyway.

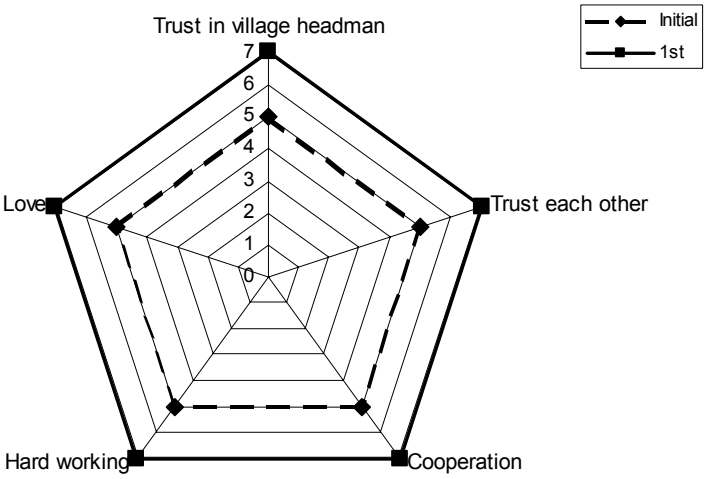


Figure 5.3 Group Activity Assessment of Gontha

5.2.3 Status of Irrigation and Agriculture

The site is the first runner among the sites in the cluster 4. The irrigation service area was distributed to the villagers fairly by the village headman. The weir, which was constructed, was a small-scale brush dam and diverted the stream water to both left and right banks. The length of the canals reached 300 m each.

To complete the canal reach of 300 m, a canal bridge with 2.8 m length using tree bark and two road crossings with a length of 4.5 m each were constructed. The villagers planted maize at early August 2003, sourced by winter TIP. Since most of the lands were located on a gentle slope, they adopted furrow irrigation method. The main crop, maize, had pink coloration in some parts, which is sign of phosphorus deficiency or that the maize was grown during cold season. The major problems faced in producing the main crop in 2003 include pests such as maize stalk borer and maize streak virus and cutworms. The farmers tried their best in controlling the maize stalk borer by using leaves from *Futsa*.


Canal Bridge made of tree bark

V.H. Chikware said, "We now have some concrete evidence so more people want to join the club, though no new members have joined yet. Working in a group is powerful. There was some damage by cows and goats, so we need to have discussion with the owners. The biggest problem was some people cheated at applying fertilizer." Mr. Marisani Aroni who is


Group work for fertilizer application

Chairman of Gontha Club, Ms. Solome Mark and Mr. Gaveni Chindozi also complained about cheating in application of fertilizer. Fertilizer application work was carried out in a group last year, but some people allocated more fertilizers on their plots than others.

There was little participation for Gontha Club in dry season 2004. The landowners did not want the members to cultivate in dry season and the V.H. Chikwawe supported that. A landlady said, "The members left stems in the garden after harvest so that we spent two weeks to prepare the land from December 2003 to January 2004. We planted maize in January, but it did not grow properly. We are facing food shortage now." She also added "Some members opened water for their gardens and went back home to sleep." In addition, according to her brother, members of Gontha club did not pay MK100 or a pail of maize to her after the harvest of dry season crop in 2003, although it was an agreement among the members.

Eventually some members of Gontha found another diversion site at upstream reaches of the Gontha stream and started irrigation for this year 2004. This new site succeeded the name of the club, Gontha and the same chairman and secretary as the original club were chosen. Mr. Marisani Aroni, Chairman of Gontha Club, has a land there and five members are cultivating there as of November 2004. The chairman is expecting 18 members to cultivate in dry season 2005. Another five farmers, who have their lands at downstream reaches of the original site, are practicing dimba cropping in their own lands. Others are just staying idle in this dry season.

5.3 Katema

Village:	Kanyama
Number of Household:	46
Population:	230 (5 per family)
Average Farm Size:	1.5 ha/HH
Dominant Crop:	maize, sweet potato, cassava, Irish potato, ground nut, beans, soybean
No. of Members:	2003: 33 (22 males, 11 females) / 35 (24 males, 11 females)
No. of Land Owners:	2003: 26 (22 males, 4 females) / 26 (22 males, 4 females)
Discharge:	42 l/s (June 20, 2003)
Irrigation Service Area:	2003: 2 ha / 2004: 2.8 ha
Type of Weir:	Brush dam (length: 8.0 m, height: 0.7 m, water depth: 0.6 m)
Specific Structure:	Fishpond
Canal Length:	2003: 554 m / 604 m

5.3.1 Background

The site is located near Gontha and just 10 minutes on foot from Kalira EPA. The villagers were so motivated by seeing the activities of Gontha that they established the irrigation

committee in the 2nd week of June, 2003 and requested AEDO for assistance. There is a man who started fish farming in 1984, and the pond was constructed by his family members only. The canal feeding water to the pond was constructed one year ago (1983). Irrigation development in this site could be combined with fish farming by utilizing the pond of the man and his experiences.

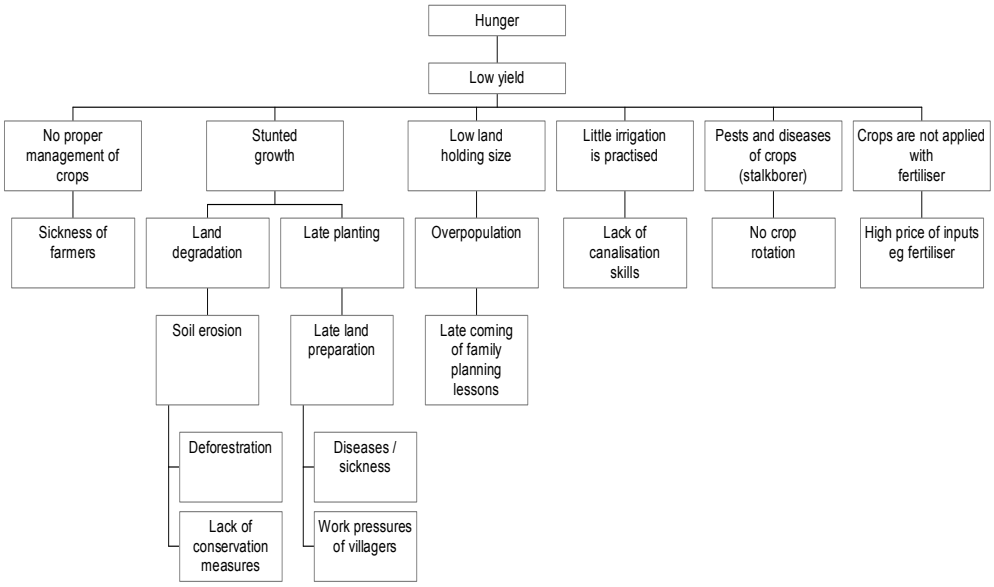


Figure 5.4 Problem Analysis (Katema)
As of June 2003

A problem analysis was carried out in June 2003 and the villagers identified the cause for hunger / low yield as "No proper management of crops", "Stunted Growth", Low land holding size", "Little irrigation is practiced", "Pest and diseases of crops", and "Crops not applied with fertilizers". The villagers here also pointed out the importance of crop rotation for pest control and needs of approaches apart from agriculture such as family planning and soil conservation were implied in the analysis (Figure 5.4)

5.3.2 Capacity Building of the Group

In this site, initial group activity assessment was not conducted during the commencement of the irrigation development. However, at the review meeting, the Study Team facilitated their group activity assessment. The participants were asked to pick up important points to make group activity successful and how such points changed with implementation of the irrigation development as a group.

They picked up important points for the successful group activity as obedience to constitution, leadership, sharing interest, cooperation, respect among each other, and no stranger (there is no stranger in the group such as other villagers). Then they rated that obedience to constitution and leadership had become

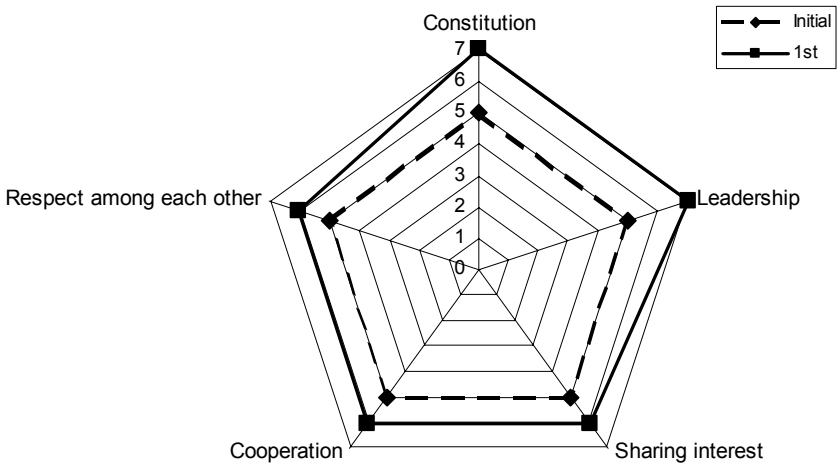


Figure 5.5 Group Activity Assessment of Katema

much better and also rated that respect among each other, sharing interest and cooperation had been better through the implementation of irrigation development. One male participant told that he rated cooperation of the group got better when he saw their fund raising for purchasing farm inputs (Figure 5.5).

5.3.3 Status of Irrigation and Agriculture

The villager of the site established an irrigation committee when they saw Gontha and requested AEDO for technical assistance to develop the irrigation system in late June 2003. There were four sites that were initiated by farmers by seeing the other verification project site as at the mid of July 2003. These sites are Zakumva, Mtanda, Tilime and here Katema.


Canal alignment by line-level

They constructed a weir diverting water in the dambo and started excavating the canal. The Study Team together with AEDO realigned the canal line by using line-level since the canal line, which the farmers had identified, was inadequate. In year 2003, the farmers completed 554m of excavation. A demonstration of furrow irrigation was carried out for them together with the villagers from Gontha.

The irrigation committee checked the participants for the work every time. If a villager wants to join after completion of the irrigation system, he/she should contribute something, probably money. The chairman implied that about MK 200 might be required to get the membership according to his personal opinion. Aside from the money, the committee will check the person who wants to join.

Only maize crop was grown and the farmers sourced seeds by themselves. The farmers were once asked by EPA to wait for winter TIP, free handouts, for sometime. However, the farmers decided not to wait for the seeds since it was getting too late to plant. The farmers contributed money, and the Study Team bought Masika (an OPV variety) at Chitedze Research Station on behalf of them and delivered.


Katema

In 2004 farmers in the site concentrated the developed plots on dry season crop only, so that the rainy season crop would not obstruct the starting period of dry season crop. Hence, they could get started planting maize (mainly recycled Masiaka) in 22nd of March using late rainfall as in Msambaimfa. They constructed weir in early May and started using irrigation water. They harvest the first dry season maize in September 2004

and immediately after the harvest, they planted the second dry season maize on the same farm.

Katema site is the one and only site, in which all the farmer members grow twice per dry season. But farmers complained about the low yield of the first dry season maize, due to, they think, the cold weather in this area. Mr. Titani Windman said "Only very lucky farmers could sell green maize. A middleman from Mponela came once and bought MK570 from me, MK280 from Manuel and MK300 from Biziweki. He told us to come back again, but he never came." They would take this issue for next year onward.

They cleared bush to extend the irrigation area so that each member can have two portions of plot. According to AEDO's estimation, total area and canal length reached 2.8 ha and 604 meters respectively. That is 1.4 times in area and 1.1 times in canal length of previous year. Two new members have joined in the club, one of whom is a landowner and agreed to divide his land into plots to share with other members. The number of the members of Katema Club increased from 33 to 35 in dry season 2004. They extended the canal also and each member has increased his/her plot from 3 x 41 furrows (about 1,250 stems, 10.3m x 34m=0.0350ha) in dry season 2003, to 4 x 41 furrows (about 1,650 stems, 13.7m x 34m = 0.0466ha) in dry season 2004.

The Study Team, AEDO and the farmers held a workshop to discuss how to improve irrigation agriculture in mid July 2004. Farmers identified the priority activities as "Buying fertilizers", "crop diversification", "expanding the service area", "grow crop twice per dry season" and "making compost manure". Among them expansion of the area and crop twice per dry season had already been taken action by the farmers. So they focused at the workshop on making compost manure. They made target of making 105hips of pit compost.

After the Study Team demonstrated how to make bocashi compost and lectured the effects of the compost, farmers shift their target of making pit compost to bocashi. Village headman of the site allowed the club members to take the manure of a cow, which the VH keeps. Enabling the access to cow manure, farmers were able to increase bocashi. By the mid of November, 16 club members made two to three heaps of bocashi totaling around 40 heaps.

5.4 Kasangadzi

Village:	Chalundu
Number of Household:	63
Population:	800 (12.7 per family)
Average Farm Size:	0.45 ha/HH
Dominant Crop:	maize, tobacco, soybean, beans, potato, onion, vegetables
No. of Members:	2003: 36 (27 males, 9 females) / 2004: n.a.
No. of Land Owners:	2003: 5 males / 2004: n.a.
Discharge:	13 l/s (upstream), 23 l/s (downstream) (June 27, 2003)
Irrigation Service Area:	2003: 4.0 ha / 2004: nil
Type of Weir:	Embankment (length: 0.8 m, height: 0.6 m, water depth: 0.45 m)
Specific Structure:	-
Canal Length:	2003: 1,000 m / 2004: nil

5.4.1 Background

The site and village are located north of Kalira EPA, opposite side of Gontha and Katema over the top of a hill. The concerned farmers are very eager to establish an irrigation system. There are farmers who are doing farming by utilizing residual moisture. Asked why they cannot continue farming with the residual moisture, they answered the residual moisture is not enough and the land easily dries up, especially in the higher area.

First settlers came from Kanyenda village about 100 years ago. In 2000, Chalumdu village was split into three villages, namely Chalumdu, Kabundule, and Kapombe. It seems that the literacy rate in the village is relatively high as compared to the area like Gontha, though the sites are not very far each other. It was observed during the workshop that there are some villagers who speak English and two women were taking note.

A problem analysis was carried out in the village in July 2003 and the causes of hunger were identified as stunted growth due to loss of soil fertility, late land preparation, laziness and theft, less or no planting at all due to lack of farm inputs and human disease, not planting in time due to family dispute (alcoholism and poverty), and unnecessary festivals (Figure 5.6). Following Loyi in Dowa, this is the second case that the villagers raised the issue of alcoholism during the problem analysis.

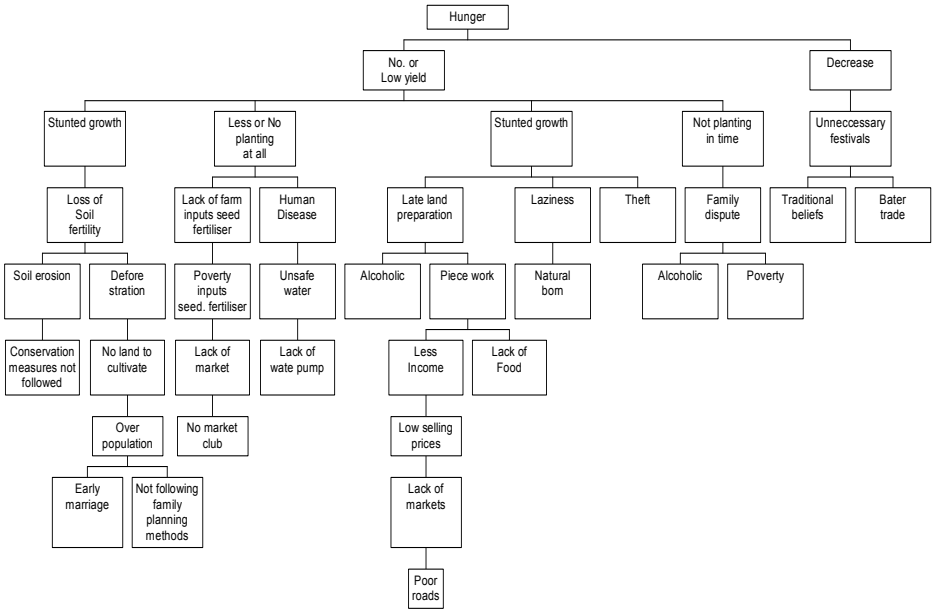


Figure 5.6 Problem Analysis (Kasangadzi)
As of July 2003

5.4.2 Status of Irrigation and Agriculture

This was the last site to have commenced during year 2003 dry season in the cluster 4. The water source is a wide dambo where the diversion points are found several from upper part to lower part. The villagers together with the Study Team identified two diversion points on June 27, 2003 in the upstream and midstream reaches of the dambo. However, the owner of the land, within which the upstream diversion point is located, complained of the weir construction.

The landowner is from a different village. They have, therefore, constructed the weir in the midstream reaches and excavated the canal with the assistance of AEDO.


Furrow Irrigation for Maize

Farmers applied furrow irrigation since the land is located on a slope. Same as other sites in this cluster 4, the length of furrow is all set at three meters, which is sometimes too short especially for the upstream reach of the canal. Since water is enough in the upstream reach of the canal, the length can be extended to five to even 10 m. The main crop was maize. The only other crop grown was mixed varieties of beans and all is grown as an intercrop of maize. The major problems faced in producing the main crop include pests such as maize stalk borer, cutworms and maize streak virus. Cutworms also attack the beans. The farmers controlled the maize stalk borer by using botanical pesticide called *Katupe*.

According to Mr. Dagiu, a member of Kasangdzi club, 11 farmers out of 33 used fertilizers in the irrigation plots of 2003 dry season and the two-third of the farmers who did not use fertilizers could not get good harvests. Nonetheless, the club members were about to start the second year irrigation in 2004. However, the landowner of the farmland, where the diversion point is located, refused again to construct weir at the site. The gravity irrigation in this site eventually did not take place in 2004.

Status Summary of the Verification Projects as at Mid November, 2003 (1/2)

Club Name (membership, l.owner)		Member M, F	L.Owner M, F	Developed Area, ha	Canal Length, m	Stream	Village(s) concerned (nr. of HHs)	Discharge, l/s	Problem Analysis	Kick-off WS	Feasibility WS	Planning WS	Weir Const'n	Plot Layout	Planting	Review WS	Wrap up	Study Tour where to	Remarks
LL East RDP, Mpenu EPA																			
1-1	Mtuwanjovu(30,26)	26,4	26,0	2.4	670	Mutwanjovu	Mwase(65)		done in Ph.1	proceeded w/ AIO			mid June	late May	early June				studied in Phase 1
1-2	Duwu(26,4)	16,10	4,0	2.6	450	Duwu	Mkuntha(26)	10 l/s (May 28)	May 28	May 28	June 6	June 11	June 16	early July	early July	August 11	Nov. 5	May 31 (Mgunda)	
1-3	Ngoni(20,5) Miteme(15,5)	35,0	10,0	5.8	1,200	Nanjiri	Kufarkwanthu(28)/ Mbalame(11)/ Chikuse(15)/ Maletsa(11)/ Chitapo(11)	>500 l/s (June)		June 13/16	June 18	ad hoc basis	June 21/24	end June	July 7 - mid	August 11	Nov. 5	July 10 (Duwu)	large potential
1-4	Chimphonongo(18,18)	16,2	16,2	4.8	240	Machite	Chimphonongo(23)/ Chilima(48)/ Madula(11)/ Kumikundi(16)	9 l/s (June 19)	June 19	June 19	June 19	June 24	June 24	early July	late July		Nov. 5		
1-5	Zakumva(10,1)	9,1	1,0	2.0	370	Talira (u/s)	Dambo(31) separated from Msonthe village	2-3 l/s (July 7)		motivated by Duwu			June 27	mid July	eary Aug.				improved stove promotion
1-6	Talira (w/ fish pond)					Talira	Msonthe(14)/ Kumala(21) VHs are brother each other.	16 l/s (June 28)		June 28									w/ fish pond, MK8,000 paid by the District Assembly
1-7	Mgunda(11,2)	11,0	2,0	2.5	350	Mwanangombe	Msanja(31)		May 29	by their own initiative				late May	late May			June 7 (Balangombe)	
1-8	Mankhamba(10,2) Tigwirizane(6,2)	16,0	4,0	4.5	460	Balangombe	Kasandulika(42)			proceeded w/ AIO				late May	late May			July 6 (Mr. Aybu)	
Dedza Hills RDP, Kanyama EPA																			
2-1	Chikhasu(16,6)	10,6	1,5	1.0	165	Chikhasu	Kasumbu(147)/ Kanjondo(97)/ Lumwira2(60)/ Kumaadzi(77)/ Mphale(68)	8-9 l/s (June 27)	done in Ph.1	June 27	June 27	July 1 by AEDO	July 11	late July	early Aug.	August 25	Nov. 12	August 23	studied in Phase 1
2-2	Mchiku(16,1)	7,9	0,1	0.7	215	Mchiku	Mphale(68)/ Lumwira2(60)	6 l/s (May 29)	refer to Chkhasu	May 29	June 9	June 12	June 24	mid July	end July	August 25	Nov. 12	August 23	
2-3	Livizi(17,11)	10,7	4,7	1.4	365	Livizi	Nduwa(126)/ Chalinda(214)	130 l/s (July 8)	July 8	July 8	July 24	July 24	August 4/5	early Oct.	Oct. 10-17	August 30		September 15	
Dedza Hills RDP, Bembeke EPA																			
2-4	Mtsetse(15,2)	10,5	2,0	1.2	190	Mtsetse	Phulusa(168)/ Phulusa1(130)/ Kawiya(60)	8-10 l/s (June 3)	June 3	June 3	June 10	June 13	June 18/27	mid July	end July	August 21	Nov. 12	July 12 (Duwu/Ngoni)	
2-5	Kadiwa(7,1)	3,4	1,0	0.8	190	Kadiwa	Mangwenu(125)	2.8 l/s (June 24)	June 24	June 24	June 24	ad hoc basis	July 15	end July	early Aug.			July 19	level of family farming
2-6	Mtanda(38,6)	7,31	0,6	1.5	320	Mtanda	Bizaliyele(51)/ Mmuwla/ Kawiya(60)		refer to Mtsetse	June 3	proceeded w/ AEDO		July 9	end July	mid August	August 28		July 19	fairly big discharge
2-7	Namanolo(23,8)	16,7	2,6	1.2	401	Namanolo	Kankhuza(207)/ Salapa(78)		July 14	July 14	July 14	July 17	July 24	end July	mid August			September 15	
Dowa RDP, Mvera EPA																			
3-1	Tikolore(81,10)	69,12	10,0	5.8	2,154	Fumbwe	Fandani(350)	30 l/s (UP, June 5) 40 l/s (DS, June 5)	done in Ph.1	June 2	June 5	June 6	June 17	end June	Aug. 7-15	August 12	Nov. 4	August 15	studied in Phase 1
3-2	Tilime(50,5)	40,10	5,0	4.1	1,852	Chatikowo	Magolondo(80)		refer to Tikolore	motivated by Tikolore			early June	mid July	early Sep.			August 15	
3-3	Loyi(36,4)	22,14	3,1	3.6	510	Loyi	Mtalanje(114)	8 l/s (July 4)	July 4	July 4	July 4	July 8	July 11	early Aug.	mid August	Sep 2	Nov. 4	August 22	
3-4	Kambware(15,3)	15,0	3,0	2.0	1,250	Kambware	Mwansangu(161)			by their own initiative				end May	end June			August 22	
Ntchisi RDP, Kalira EPA																			
4-1	Msambaimfa(61,13)	47,14	10,3	4.5	1,500	Chikandila	Mchela/ Chinguwo/ Sajeni(30)/ Loleni		done in Ph.1	July 11	by their own initiative			mid June	early July			August 10 (3 members)	studied in Phase 1
4-2	Gontha(52,4)	43,9	3,1	4.9	600	Gontha	Chikwawe(88)	30 l/s (May 30)	May 30	May 30	June 4	June 10	June 16	mid July	Aug. 4-7	August 8	Nov. 7	August 14	
4-3	Katema(33,26)	22,11	22,4	2.0	554	Katema	Kanyama(46)	42 l/s (June 20)	June 20	June 20	June 20	ad hoc basis	June 14	end August	mid Sep.	Sep 8	Nov. 7	July 16 / September 12	w/ fish pond, started in '84
4-4	Kasangadzi(36,5)	27,9	5,0	4.0	1,000	Kasangadzi	Chalundu(49)/ Kapombe(15)	13 l/s (US, June 27) 23 l/s (MS, June 27)	June 27	June 27	June 27	July 1	July 14	end August	Sep. 26			September 26	
	Total 23 sites	**477,165**	**134,36**	**63.3**	**15,006**														
	Total Member : 642			**2.75**	**652**	**per site**													
	Total L. Owner: 170			**0.10**	**23**	**per membership**													

Status Summary of the Verification Projects as at Mid November, 2003 (2/2)

Club Name (membership, l.owner)	Stream	Village(s) concerned (nr. of HHs)	Topography	Market Opportunity	OPV Opportunity	Recom'le Agr. Compoment	Major Crop	Other Crops	HIPC Farmers		Bocashi Demonst'n	Imp. Stove Demo., (Nr)	Remarks
LL East RDP, Mpenu EPA									Nr.	50 100			
1-1 Mtuwanjovu(30,26)	Mutwanjovu	Mwase(65)	- -	+	-		Maize	Tomato,S/potato, Beans	2		Aug. 27	(1)	
1-2 Duwu(26,4)	Duwu	Mkuntha(26)	- -	-	-		Maize	Beans, Tomatoes	6		Aug. 18		Maize seeds mostly from last year TIP.
1-3 Ngoni(20,5) Miteme(15,5)	Nanjiri	Kufarkwanthu(28)/ Mbalame(11)/ Chikuse(15)/ Maletsa(11)/ Chitapo(11)	-	++	+	Vegetable, OPV on contract	Maize (Masika, ZM421)	Nil	0		Aug. 16		bought maize seeds from Chitedze.
1-4 Chimphonongo(18,18)	Machite	Chimphonongo(23)/ Chilima(48)/ Madula(11)/ Kumikundi(16)	- -	+	-	Vegetables	Maize (Masika)	Iriah Potatoe, Tomatoes	0				
1-5 Zakumva(10,1)	Talira (u/s)	Dambo(31) separated from Msonthe village	- /	-	-		Maize	Nil	10			July 14 (11)	
1-6 Talira (w/ fish pond)	Talira	Msonthe(14)/ Kumala(21) VHs are brother each other.	- - /	-	-								
1-7 Mgunda(11,2)	Mwanangombe	Msanja(31)	- //	- -	- -		Maize (DK8031, Masika)	Beans, onion, Cabbage, Pumpkin, Leaf Mustard	11				
1-8 Mankhamba(10,2) Tigwirizane(6,2)	Balangombe	Kasandulika(42)	- -	+	-		Maize	Cabbage, Irish Potatoes, Leaf Mustard, etc	0				
Dedza Hills RDP, Kanyama EPA													
2-1 Chikhasu(16,6)	Chikhasu	Kasumbu(147)/ Kanjondo(97)/ Lumwira2(60)/ Kumaadzi(77)/ Mphale(68)	/	+	-		Beans	Tomatoes, Maize	0		Aug. 20		
2-2 Mchiku(16,1)	Mchiku	Mphale(68)/ Lumwira2(60)	/	+	-		Beans	Irish Potatoes, Peas	0		Aug. 12		
2-3 Livizi(17,11)	Livizi	Nduwa(126)/ Chalinda(214)	- -	-	-		Maize (Masika)	Nil	0				
Dedza Hills RDP, Bembeke EPA													
2-4 Mtsetse(15,2)	Mtsetse	Phulusa(168)/ Phulusa1(130)/ Kawiya(60)	- /	+	-		Maize (ZM421)	Tomatoes,Beans S/potatoe, Leafy Vegetables	1				bought maize seeds from Chitedze
2-5 Kadiwa(7,1)	Kadiwa	Mangwenu(125)	/	++	-	Vegetables	Cabbage	Leaf Mustard, S/potatoe, Tomatoes, Peas, Carrot	2		Oct. 25	Nov. 6 (1)	
2-6 Mtanda(38,6)	Mtanda	Bizaliyele(51)/ Mmuwla/ Kawiya(60)	/	+	++	(OPV)	Beans	Potato	0				
2-7 Namanolo(23,8)	Namanolo	Kankhuza(207)/ Salapa(78)	/	++	-		Beans	Nil	0				
Dowa RDP, Mvera EPA													
3-1 Tikolore(81,10)	Fumbwe	Fandani(350)	-	++	+	Vegetable	Maize (Masika)	Tomatoes, Beans,Irish Potatoes	75		Aug. 19		
3-2 Tilime(50,5)	Chatikowo	Magolondo(80)	- /	++	++	Vegetables, OPV	Maize	Cabbage, Tomatoes, Onion, Chinese Cabbage	50				All agr. inputs provided by EU.
3-3 Loyi(36,4)	Loyi	Mtalanje(114)	//	++	-		Maize	Irish Potatoes, Beans, Pumpkins	36		Aug. 26		
3-4 Kambware(15,3)	Kambware	Mwansangu(161)	//	++	-		Maize (Masika)	Beans	10			Sep. 5 (1)	
Ntchisi RDP, Kalira EPA													
4-1 Msambaimfa(61,13)	Chikandila	Mchela/ Chinguwo/ Sajeni(30)/ Loleni	- -	-	-		Maize (Masika)	Onion	0			(1)	Fertilizer came from HIPC.
4-2 Gontha(52,4)	Gontha	Chikwawe(88)	/	- -	-	improved maize storage	Maize	Nil	49		Sep. 3	Sep. 12 (2)	Received from HIPC.
4-3 Katema(33,26)	Katema	Kanyama(46)	- //	- -	++	OPV	Maize (Masika)	Nil	0			Nov. 4 (1)	bought maize seeds from Chitedze.
4-4 Kasangadzi(36,5)	Kasangadzi	Chalundu(49)/ Kapombe(15)	- -	-	-		Maize	Beans	31				

- - - : very gentle
- - : gentle
- / : sloped
- // : very sloped

- - - : very poor
- - : poor
- + : good
- ++: very good

APPENDIX-8

AEDO TRAININGS

CHAPTER 1 INTRODUCTION

During 2004 dry season, systematic dissemination was tried mainly through AEDOs. The dissemination trial started with training to AEDOs in May. AEDOs in all the 26 EPAs under the targeted 4 were called to regional training center where they were administered necessary irrigation technologies and set their target in the dry season. They were once again called to the training center in September to report their achievement against the target, discuss problems they had faced and share. Following describes the two AEDO trainings.

CHAPTER 2 FIRST AEDO TRAINING

2.1 Rationale

The National Irrigation Policy and Development Strategy established in June 2000 centers on poverty alleviation for resource poor smallholder farmers by means of irrigation development. In nowadays context, however, the Government is no longer allowed to stay as the main entity in developing the irrigation but is regarded as a facilitator of the development thereby promoting self-dependency on the farmers. Irrigation development increases the agriculture production and enhances the food security, which will ensure the livelihood of the resource poor smallholder farmers.

Smallholder Irrigation Development involves long process and various activities such as identifying potential site, organizing farmers, constructing irrigation facilities, irrigating farms and harvesting. For the success of the development, there is due need to cultivate a culture of irrigation by using appropriate technology and finally help promote self-dependency. The Department of Irrigation (DOI) together with JICA is now of the opinion that AEDOs, the frontline extension officers, should be equipped with the necessary skills, knowledge, hands on experience and right attitude to pursue the development hence, this TRAINING. was organized and administered.

2.2 Objectives

The training aimed at equipping the participants with skills, knowledge and attitude necessary in discharging their duties and responsibilities of promoting smallholder irrigation development. After the training activities, the participants are expected to be able to:

1) Discuss the DOI's objectives, bases, and program direction,
2) Discuss smallholder irrigation development being promoted in Malawi,
3) Discuss constraints/opportunities to smallholder irrigation development,
4) Enumerate and discuss smallholder irrigation facilities and structures,
5) Organize farmers in developing smallholder irrigation schemes,
6) Facilitate farmers in solving problems to be encountered,
7) Prepare EPA and RDP basis entry program for 2004 dry season, and
8) Discuss way-forward for smallholder irrigation in Malawi.

2.3 Training Mechanics

The training was a net five-day live-in and out activity held at Nathenje RTC for Lilongwe

group and Mponela RTC for Kasungu group (see Attachment-2.1 for detail activity). The date, issues tackled, methodologies employed and the trainers during the course are as follows:

2.3.1 Date

1) For LL E. and Dedza Hills RDPs groups:
   23-29 May (23&29 for traveling) at Nathenje RTC
2) For Dowa and Ntchisi RDPs:
   30 May-5 June (30&5 for traveling) at Mponela RTC

2.3.2 Topics tackled

Following are the modules undertaken during the net 5-day training. The objectives of the modules are given in the Attachment-2.1.

Module 1 Program Orientation
Module 2 Overview of Smallholder Irrigation Development
DOI's Vision, Mission & Objectives
Irrigation Development in Malawi
Introduction to JICA Smallholder Irrigation Dev. Study
Overview of Smallholder Irrigation Facilities and Structures
Module 3 Smallholder Irrigation Facilities and Structures
Identification of Suitable Gravity Diversion Sites
Discharge Measurement
Weir Type and Construction Method
Canal Alignment and Construction
Ancillary Facilities
On-farm Irrigation Method
Module 4 Problems to be encountered and Possible Solutions
Module 5 Entry Planning
Entry Planning Orientation and Presentation
Preparation of Dissemination Material (picture stories)

2.3.3 Methodologies

Methodologies employed are lecture-interactive discussion, brainstorming, field trips and observation, practices on the field such as weir construction and line-leveling, and small group task preparing 2004 dry season entry program. Also, conducted during the course was preparation of picture stories, a dissemination material which can be used during a kick-off meeting of the irrigation development with farmers.

2.3.4 Trainers

12 trainers were appointed from those who have been working with the JICA study team since year 2003. The trainers were given a training course in advance of the plenary AEDO trainings to equip themselves with necessary skills and knowledge as the trainer. The training of the trainers, TOT, was administered from May 10 – 13, 2004 by the JICA study team at Natural Resource College. The trainers' list is given bleow.

Trainers (Resource Person):	
Dedza Hills RDP:	
1. Mr. A.B.B.C. Cheyo	Ass. Irrigation Officer, Dedza RDP
2. Mrs. C.T. Somanje	AEDO, Kanyama EPA
3. Mr. L.R.W. Lingani	AEDO, Bembeke EPA
LL RDP:	
4. Mr. M.N. Kumasala	Ass. Irrigation Officer, Lilongwe RDP
5. Mr. J. M. Malunga	AEDO, Mpenu EPA
6. Mr. E.W.Kilembe	AEDO, Mpenu EPA
Dowa RDP:	
7. Mr. M.S.Z Luhanga	AEDO, Mvera EPA
8. Mr. R.N.A Chingwalu	AEDO, Mvera EPA
Ntchisi RDP:	
9. Mr. F.F. Mzalule	Ass. Irrigation Officer, Ntchisi RDP
10. Mr. F.M. Kumchulesi	AEDO, Kalira EPA
11. Mr. J.M. Chabuka	AEDO, Kalira EPA
DOI HQs	
12. Mr. M.M. Ngwira	Irrigation Officer, DOI
Training Management Group:	
K. Hashiguchi	Team Leader, JICA Study Team
T. Ieizumi	Irrigation, JICA Study Team
A. Hata	Project Monitoring
D. Kaunda	Secretary

2.4 Participants

This training course invited three AEDOs and AEDC each from all the 26 EPAs under the targeted 4 RDPs of Lilongwe East, Dedza Hills, Dowa and Ntchisi. Irrigation officers in those four RDPs were also invited. The numbers of participants were 62 for Lilongwe group and 65 for Kasungu group including the trainers (see detail in Attachment-2.2). The criteria for selecting the AEDOs were as follows:

1) The AEDOs should have potential areas to develop GRAVITY smallholder irrigation schemes in their sections,
2) The AEDOs should have strong will to facilitate the farmers to develop GRAVITY smallholder irrigation schemes, and
3) The AEDOs should have strong will to share the knowledge learnt during the training course with their fellow AEDOs.

2.5 Participants' Expectation

Right after the registration, the participants were asked of what they expect to derive from the training course. The participants expected to learn about those listed in the following tables, amongst which underlined expectations were not programmed in the course and it was explained to the participants during the session of the surfacing of the participants' expectation. Also observed was expectations from the Lilongwe group looked somewhat more farmer oriented while the ones from the Kasungu group more technology oriented.

Table 2.5.1 Expectations from the Lilongwe group

No.	Expectation	Nos
1	To gain canalisation knowledge	16
2	To gain knowledge/skills to form small scale irrigation group	9
3	To share experiences in irrigation	8
4	To gain ability to train farmers with new irrigation technology	5
5	To know new method of irrigation system	5
6	*To improve crop production*	3
7	To receive certificates of attendance	2
8	To extend friendship	2
9	To know weir construction	2
10	To gain bicycles for mobility	2
11	To know the definition of small scale irrigation	1
12	*To gain ability to assemble and maintain motorized pump*	1
13	*To gain ability to design plots for T/pump*	1
14	To handle problems faced in irrigation system	1
15	To be provided with protective wear (gum boot)	1
16	To know support materials for implementation	1
17	*To know water harvesting method*	1
18	To know implementation procedure	1
19	*To have input handout*	1
20	To know site identification	1

Table 2.5.2 Expectations from the Kasungu Group

No.	Expectation	Nos
1	To know more about canalisation	23
2	To learn more on small scale irrigation	11
3	To be equipped with modern irrigation	11
4	To learn more on river diversion	10
5	To know irrigation system	6
6	To be given equipment	5
7	To know more about JICA activities	4
8	To have field visit	3
9	To gain knowledge/skills to form small scale irrigation group	3
10	To learn types of weir and construction	2
11	To know site identification	2
12	To be able to assist farmers accordingly	2
13	To know implementation procedure	2
14	To receive allowance	1
15	*To avail of credit/handout to farmers*	1
16	To know how to measure water discharge	1
17	*To be well equipped on use of treadle pump*	1
18	To have practicals in field	1
19	To get certificates of attendance	1

2.6 Participant Pre-training Inventory Survey

A one-page questionnaire was administered right after the registration, inquiring the years in the government service, their pre-training knowledge and experiences concerning small-scale irrigation, role of developing smallholder irrigation as extension officers, etc. (for the detail results, see Attachment-2.3).

2.6.1 Years in Gvt Service

Figure 2.6.1 shows the distribution of years in government service for the participants. The

mode falls in a range of 11-15 years for Lilongwe group, while it is in a range of 1-5 years for Kasungu group followed by ranges of 11-15 years and 21-25 years. The average years in the government service is 15.8 for the both cases.

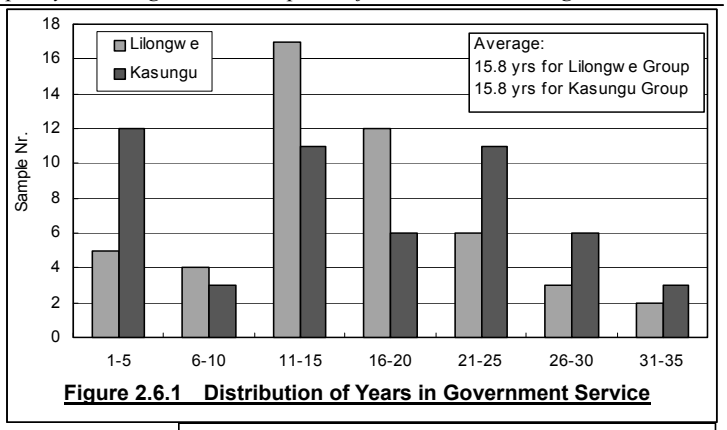


Figure 2.6.1 Distribution of Years in Government Service

2.6.2 Involvement in Irrigation Project

Figure 2.6.2 shows the percentage of the participants who have been ever involved in any smallholder irrigation project. About 60% of the Lilongwe participants responded they have been involved while nearly about 80% of the Kasungu participants responded yes. This reflects more potential of smallholder irrigation development in Dowa and Ntchisi areas than Lilongwe area, hence more projects have been undertaken there.

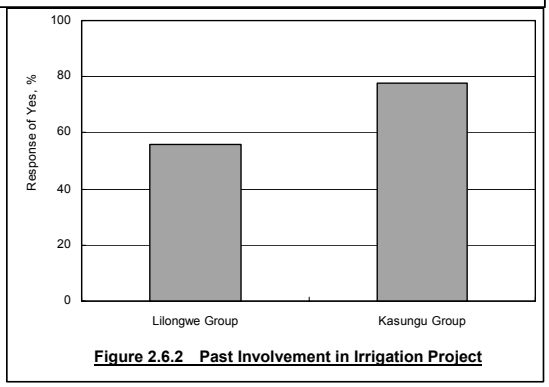


Figure 2.6.2 Past Involvement in Irrigation Project

Figure 2.6.3 shows which smallholder irrigation systems the participants have seen or known. Almost all the participants so far have seen or known some kinds of smallholder irrigation system with treadle pump being the most. Gravity irrigation which is now promoted under this JICA study has not so much been familiar to the participants.

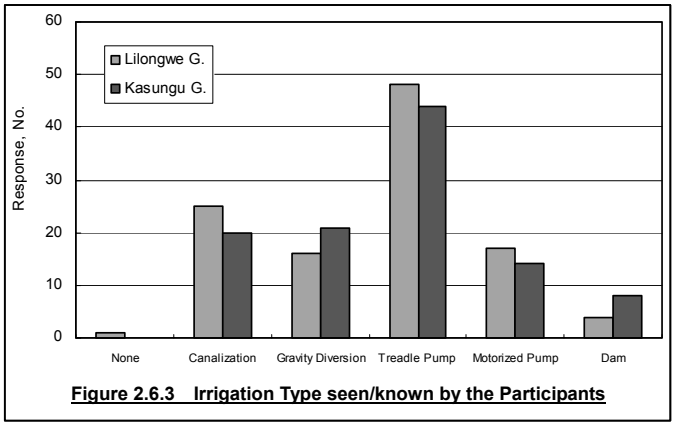


Figure 2.6.3 Irrigation Type seen/known by the Participants

2.6.3 Roles as Extension Officer in Pursuing Smallholder Irrigation Development

A question of "what do you think the role of an AEDO/AEDC is for developing small-scale irrigation" was asked in the pre-training inventory survey. Tables 2.6.1 and 2.6.2 show the answers for Lilongwe and Kasungu groups respectively, and following are the summaries:

1) Though most of the participants understand what to do in pursuing smallholder irrigation development, there are some participants who still seem to work on a top-down approach as shown in such words as "supervise", and
2) "Train farmers" is important but on top of that there should be always "facilitation". "Training" often entails a top-down approach, while the approach this JICA study proposes is that "facilitate the farmers" in implementing the smallholder irrigation development, through which irrigation technologies should be imparted.

Table 2.6.1 Roles in Pursuing Smallholder Irrigation Development for Lilongwe Group

No.	Roles presented	Nos
1	Facilitate the farmers in implementing smallholder irrigation	17
2	Train farmers on crop husbandry techniques	8
3	Train farmers in small scale irrigation development	7
4	Demonstrate on different things (e.g. weir maintenance)	5
5	Encourage group working	5
6	Supervise the farmers' work frequently	4
7	Organize farmers club	4
8	Assist smallholder farmers with new technology	3

Table 2.6.2 Roles in Pursuing Smallholder Irrigation Development for Kasungu Group

No.	Roles presented	Nos
1	Train farmers in irrigation development (including technologies)	19
2	Facilitate the farmers in implementing small scale irrigation	12
3	Facilitate group working	12
4	Supervise the farmers' work closely in the sites	6
5	Demonstrate to the farmers how to do things	6
6	Carry out frequent monitoring	5
7	Assist the farmers in implementing smallholder irrigation development	5
8	Organize farmers' club	3

2.6.4 Smallholder Irrigation's Role

A question of "How do you think small-scale irrigation can improve the life of smallholders?" was asked in the pre-training inventory survey. Tables 2.6.3 and 2.6.4 show the responses for Lilongwe and Kasungu groups respectively, and most of the participants think smallholder irrigation best contributes to increasing food security and income:

Table 2.6.3 Smallholder Irrigation's Role answered by Lilongwe Group

No.	Roles presented	Nos
1	Food security	36
2	Improve the income	30
3	Enable dry season cultivation	9
4	Grow crops twice a year or three times a year	6
5	Improve nutrition	5

Table 2.6.4 Smallholder Irrigation's Role answered by Kasungu Group

No.	Roles presented	Nos
1	Food security	28
2	Improve the income	23
3	Improve the life of smallholder farmers	11
4	Enable dry season cultivation	5
5	Grow crops twice a year or three time a year	4
6	Improve nutrition	3

2.7 Achievement of the Objectives

At the end of the training course, the participants were asked how much they have achieved the objectives of the training in a level of 1 to 5; level-1 is least-achieved while level-5 is most-achieved. None of the participants answered level-1 or level-2 achievement. As shown in figures 2.7.1 and 2.7.2 for Lilongwe group and Kasungu group respectively, more than 90% of the participants answered they have attained level-4 or more, and more than 60% of the participants answered they have reached level-5 achievement for all the objectives.

The objective No.5, which is "able to organize farmers in developing smallholder irrigation schemes," may have been somewhat difficult although about 65% of the participants replied they have reached level-5 achievement. This may be due to what they are anxious until they face the real problem on the ground. On the other hand, objective No.7, "prepare EPA and RDP basis entry program for 2004 dry season", was achieved to the highest level: more than 80% of the participants reached level-5 achievement since this was a group activity carried out during the training.

Objectives are at the end of the training the participants are able to:

1. Discuss the DOI's objectives, bases, and program direction,
2. Discuss smallholder irrigation dvlpmnt being promoted in Malawi,
3. Discuss constraints/opportunities to smallholder irrigation dvlpmnt,
4. Enumerate and discuss smallholder irrigation facilities and structures,
5. Organize farmers in developing smallholder irrigation schemes,
6. Facilitate farmers in solving problems to be encountered,
7. Prepare EPA and RDP basis entry program for 2004 dry season, and
8. Discuss way-forward for smallholder irrigation in Malawi.

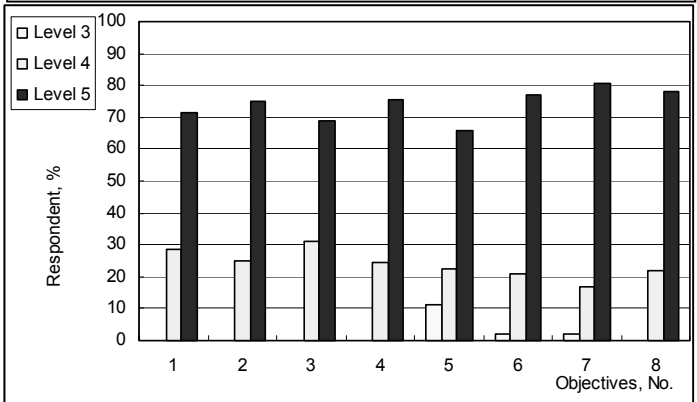


Figure 2.7.1 Achievement in a Level of 1-5 by Objectives: Lilongwe G.

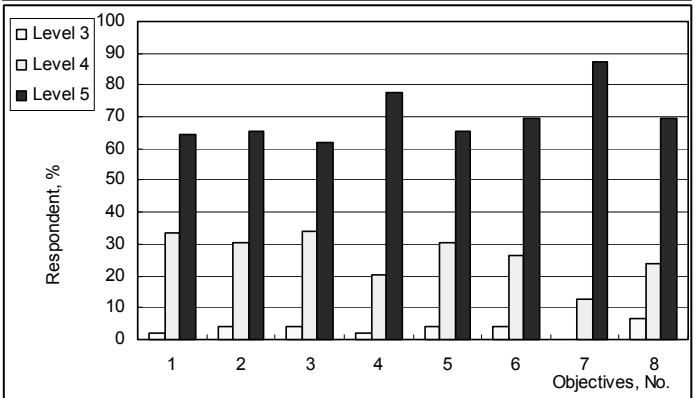


Figure 2.7.2 Achievement in a Level of 1-5 by Objectives: Kasungu G.

2.8 Target set for the Year 2004 Dry Season

Given all the necessary trainings and also a list of tools to be provided to each EPA, the participants prepared an entry program for the year 2004 dry season. The entry program consists of: 1) identification of potential sites, 2) pre-selection of to-be-developed sites, 2) number of sites to be developed, 4) number of farmers to be organized, 5) area to be developed, and 6) canal length to be constructed. AEDO participants together with their AEDCs were asked to set his/her own target according to the potential of their sections. The table below summarizes the milestone targets to be achieved by the mid of September 2004 (for more detail, see Attachment-2.4 and the list of the tools is on Attachment-2.5).

Table 2.8.1 Summary of Milestone Target by the mid of September 2004

Particular	Lilongwe E.	Dedza Hills	Dowa	Ntchisi	Total	per site
No. of EPAs	7	6	9	4	26	
Identification of potential sites	129	112	169	73	483	
Pre-selection of to-be-developed sites	106	76	121	47	350	
No. of sites to be developed	85	59	99	42	285	
No. of farmers to be organized	2,030	1,133	1,899	1,011	6,073	21
Area to be developed, ha	66.0	44.3	130.7	93.3	334	1.2
Canal length to be constructed, m	73,210	39,960	67,270	42,453	222,893	782
Site per EPA	12	10	11	11	11	
Farmers per EPA	290	189	211	253	234	
Area per EPA, ha	9	7	15	23	13	
Canal length per EPA, ha	10,459	6,660	7,474	10,613	8,573	
Area per site, ha	0.8	0.8	1.3	2.2	1.2	
Canal length per site, m	861	677	679	1,011	782	

285 sites in total were targeted to be developed with targeted 6,073 farmers, a total service area of 334 ha and a total length of 223 km canal. As an average, one site expects 21 members, 1.2 ha service area and 782 m length canal. The average service area per site, 1.2 ha only, looks very small. This may be because trainers/JICA advised the participants not to be ambitious in the first year. Given to the participants were last year's examples that some sites were abandoned due to critical water shortage. Even though stream flow looks enough at the beginning of the season, the flow may dry up in September and October. These made the participants somewhat conservative thereby they limited the service area.

By RDP, it can be said that Kasungu area, especially Ntchisi RDP area, has more potential than Lilongwe area as shown in the area to be developed per site. Ntchisi RDP targeted an average of 2.2 ha per site and Dowa RDP targeted 1.3 ha per site, while both of Lilongwe East and Dedza Hills RDPs targeted only 0.8 ha per site. In fact, Lilongwe area is less blessed with natural streams than Kasungu area hence this target.

2.9 Participants' Satisfaction

2.9.1 Satisfaction by Activity

At the end of each day's activities, the participants were asked of what extend he/she was satisfied by each activity: level 1 is the least satisfied while level 5 is the most satisfied. Figure 2.9.1 summarizes the level of satisfaction of Lilongwe group: relatively low satisfaction was observed in such sessions of "1.4 Implementation Procedure" and "3.2 Discharge Measurement", while very high satisfaction observed in sessions of "4.1 Practice on Weir Construction and 4.2 Canal Alignment". In general, the participants tend to give higher satisfaction to practices while less satisfaction to classroom type lectures.

Activities	
1.1	Program orientation
1.2	DOI's vision, mission and irrigation dev. In Malawi
1.3	JICA presentation (introduction & Overview)
1.4	Implementation mechanism
2.1	Field trip in the morning
2.2	Field trip in the afternoon
3.1	Identification of potential gravity diversion
3.2	Discharge measurement
3.3(A)	Weir type & construction (type A)
3.3(B)	Weir type & construction (type B)
3.3(C)	Weir type & construction (type C)
3.3(D)	Weir type & construction (type D)
3.3(E)	Weir type & construction (type E)
3.4	Canal alignment and construction
3.5	Ancillary facilities
3.6	On-farm irrigation
4.1	Practice of construction of weirs
4.2	Practice of canal alignment
5.1	Problems and possible solutions
5.2	Entry planning and output presentation
5.3	Preparation of dissemination material

The trainers once sat down after the training for the Lilongwe group had finished and looked through the satisfaction rate together with comments given by the participants. The comments were: more interactive than one-way lecture, more practice, more participation by the participants, etc, which have been incorporated in the Kasungu group training session. Therefore, the training mechanics in Kasungu group must have been improved, which in fact gave the higher satisfaction rate than the Lilongwe group as shown in Figure 2.9.2.

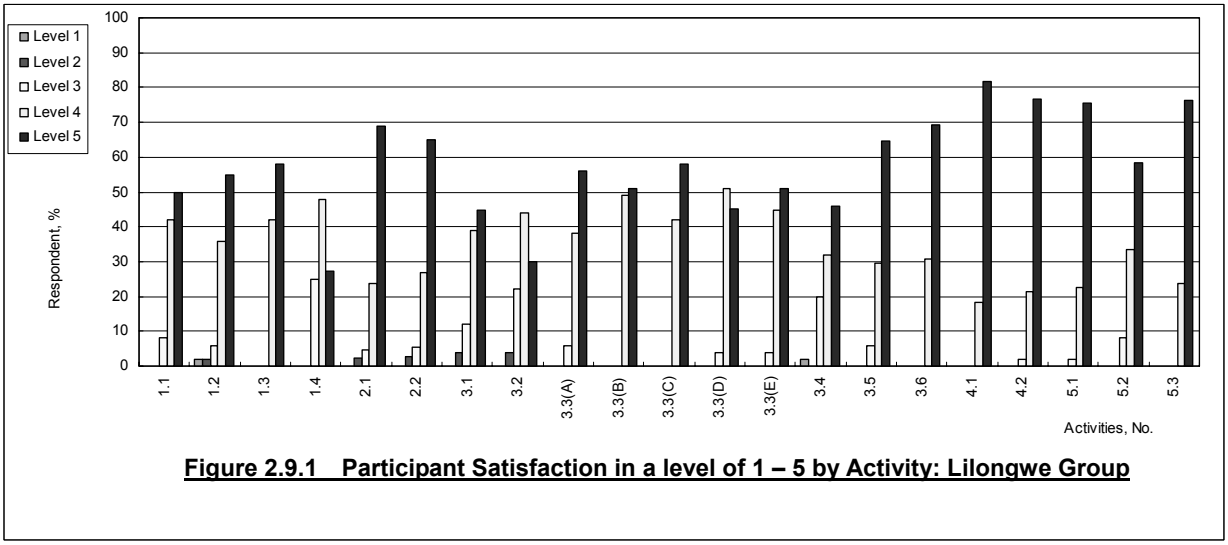


Figure 2.9.1 Participant Satisfaction in a level of 1 – 5 by Activity: Lilongwe Group

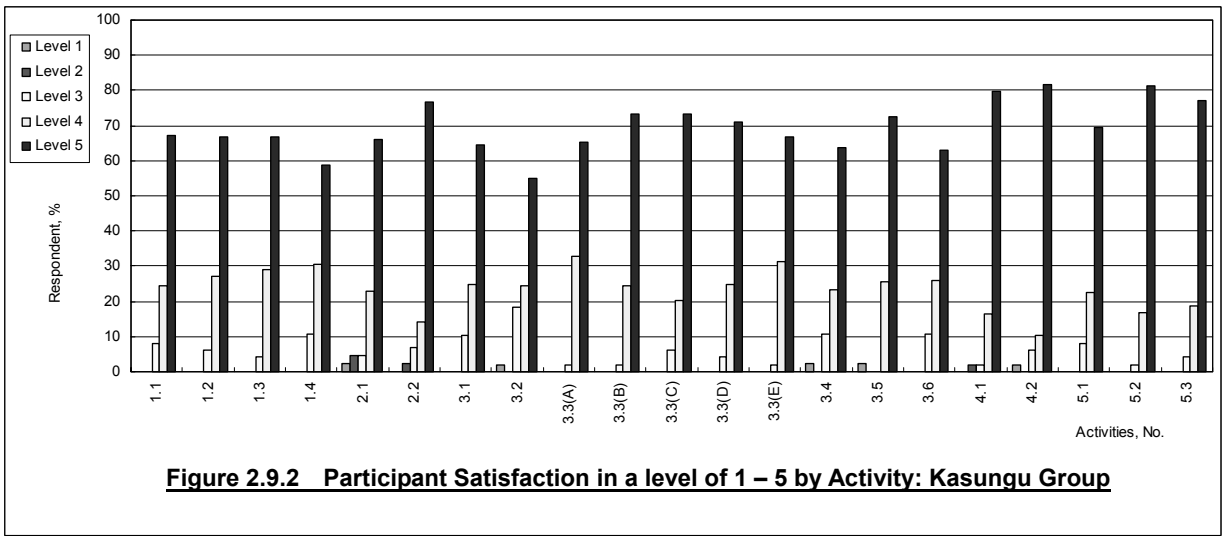


Figure 2.9.2 Participant Satisfaction in a level of 1 – 5 by Activity: Kasungu Group

2.9.2 Satisfaction by as a whole, logistics, theory, practice, and own participation

Aside from asking the participants their satisfaction by activity, satisfaction by as a whole, logistics, theory, practice and own participation in a level of 1-5 were also asked. Figure 2.9.3 shows the satisfactions for Lilongwe group and Figure 2.9.4 for Kasungu group.

Most of the participants gave very high level of satisfaction to those issues; namely, more than 50% of the participants gave the highest level of satisfaction to all the issues and participants who gave level 4 or more reached about 90%. Though satisfaction as a whole for Lilongwe group looks a little low, the rate improved very much for Kasungu group probably due to

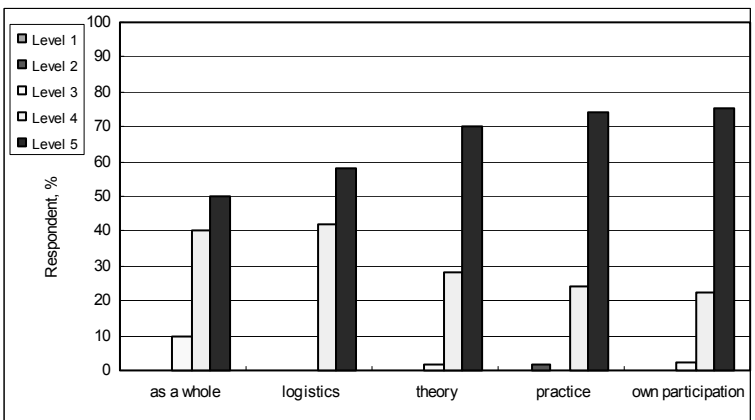


Figure 2.9.3 Participants' Satisfaction for Lilongwe G.

feedback of the comments from the Lilongwe group to the Kasungu group. Logistics was a concern for some of the participants especially in terms of lodging in Kasungu group. Since there are many better lodging places in Mponela than the RTC, the participants expected to stay in those hotels. Also sanitation in Nathenje RTC was a problem. These concerns rated the satisfaction of Logistics a little low as compared to others.

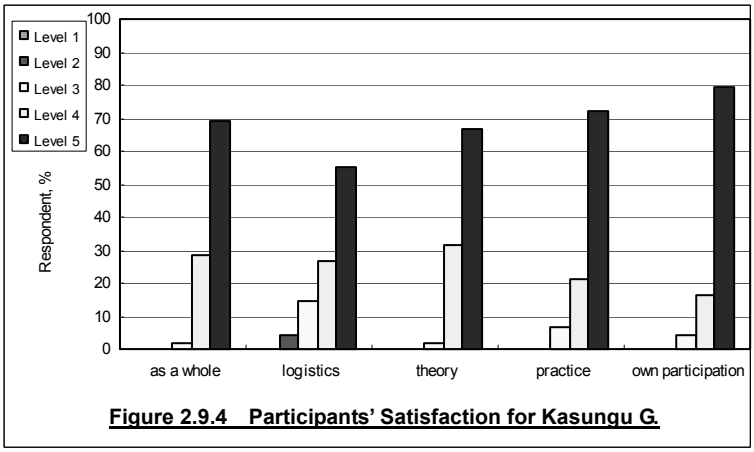


Figure 2.9.4 Participants' Satisfaction for Kasungu G.

2.10 Participants' Comments to Improve

In addition to rating the satisfactions above, the participants were asked to make comments to improve if any with respect to: 1) as a whole, 2) logistics, 3) theory, 4) practice, 5) own participation, and 6) how to best improve the training course in future. Tables 2.10.1 to 2.10.12 summarize the comments respectively, key points of which are as follows:

1) Training has satisfied most of the participants in terms of all the aspects as shown in the tables that comment to come first is "well organized, well presented, fully governed, well achieved, so on so forth" in most cases.
2) Some participants pointed more practicals than theory since they are the frontline officers who work on the ground. Though this is very important point, the training course had to deal with both theory and practices within a limited duration of net 5 days. An improvement can be done by incorporating model-construction in the classroom during those sessions.
3) Some participants emphasized more participatory way of facilitating the sessions. Since all the facilitators were recruited from AEDOs and irrigation officers in RDPs, some of them may have not been used to leading the sessions at the beginning. However, as they have been experienced they have become more confident as shown by less such comments from Kasungu group. Also, pointed out is that recruiting facilitators from government officers is much more sustainable in running such training course than dependent on outside facilitators.
4) Some participants asked to provide all the handouts to each and every participant since some of the materials such as comprehensive guidelines and PowerPoint handouts had been provided to EPAs only due to limited budget for copying. The management team suggested to share those limited materials at their EPA.
5) Participants, especially Kasungu group, raised lodging issue to be settled by themselves upon given a lump sum amount. However, a JICA regulation specifies that lodging allowance should be settled upon the production of valid receipt, hence no such arrangement could be done.
6) Some participants pointed that the training centers are not comfortable in lodging due to

dilapidated facilities, especially toilet facility in Nathenje RTC. Faced with limited recurrent budget, these RTCs have a difficulty to improve the facilities. This was a background that we have asked the participants to stay in the RTCs so that the RTCs may replenish the recurrent budget out of the lodging fee.

Table 2.10.1 Comments on as a whole for Lilongwe Group

No.	Comments	Nos
1	The training was well organized and well presented.	16
2	Arrange more group work and practicals than lecturing in class.	6
3	Reduce the number of the facilitators.	2
4	Face the audience while facilitators are handling the sessions, and be confident.	2
5	Cover the notes, when presenting on the flip chart, to avoid pre-emptying.	1
6	Start from the known things to unknown during lecturing.	1
7	Use two ways of communication.	1
8	Produce more handouts not for EPAs only.	1
9	Involve other related topics on social to complete the package.	1
10	Others (not specifically relevant)	3

Table 2.10.2 Comments on as a whole for Kasungu Group

No.	Comments	Nos
1	Produce more handouts for each participant and not for EPAs only.	22
2	The training was well organized and well presented.	21
3	Increase time as many operations are done in a rush.	5
4	Choose nearby sites for the field trip.	1
5	Arrange the practicals on a place where it is not developed.	1
6	Arrange more practicals.	1
7	Involve smaller group activity in practicals.	1
8	Involve frontline staff as training team.	1
9	Others (not specifically relevant)	2

Table 2.10.3 Comments on Logistics for Lilongwe Group

No.	Comments	Nos
1	Well-organized.	23
2	Improve lodging place (specifically sanitation).	11
3	Improve the diet at the field (prepared Mvera EPA).	2
4	Pay lodging allowance in advance.	1
5	Give the balance for accommodation to the participant.	1
6	Others (not specifically relevant)	3

Table 2.10.4 Comments on Logistics for Kasungu Group

No.	Comments	Nos
1	Well-organized.	17
2	Arrange lodging allowance to be settled by the participants themselves.	6
3	Give a choice to participants where to sleep.	6
4	Arrange practical site nearby.	1
5	Arrange minibus in time.	1
6	Others (not specifically relevant)	1

Table 2.10.5 Comments on Theory Lilongwe Group

No.	Comments	Nos
1	The crucial areas in irrigation have been fully governed.	26
2	Employ two ways of communication, participatory way, and group discussion.	5
3	Be slow but sure on theory part .	1
4	Arrange as far as possible practicals after theory for the subject is taught.	1
5	Include organization aspects for sustainability for the sites.	1
6	Include crop management part.	1

Table 2.10.6 Comments on Theory for Kasungu Group

No.	Comments	Nos
1	The crucial areas in irrigation have been fully governed.	22
2	Improve on handout in terms of copies.	3
3	Include canal digging after the theory.	1
4	Reduce the materials because there were a lot to use.	1
5	Prepare resource persons to be steady and confidence in teaching.	1
6	Others (not specifically relevant)	1

Table 2.10.7 Comments on Practice for Lilongwe Group

No.	Comments	Nos
1	Very good, the practical has reflected the exact job on the ground.	21
2	Prepare enough materials for the practice.	2
3	Arrange more days for example two weeks in total.	2
4	Arrange canal-digging practicals.	2
5	Arrange canal alignment at a river, not at implicated river.	1
6	Prepare very ideal place for practice.	1
7	Provide protective wear before going to the field.	1
8	Prepare lunch in advance to meet up with time.	1
9	Others	1

Table 2.10.8 Comments on Practice for Kasungu Group

No.	Comments	Nos
1	Very good, the practical has reflected the exact job on the ground.	21
2	More practicals needed, for example two weeks.	4
3	Arrange small groups on practicals for more participation.	1
4	Improve the session of discharge measurement.	1
5	Arrange canal-digging practicals.	1
6	Others	1

Table 2.10.9 Comments on Own Participation for Lilongwe Group

No.	Comments	Nos
1	Well achieved.	11
2	Good though practicals were not fully completed.	6
3	Arrange group discussions to avoid sleeping, to allow full participation.	3
4	Engage participants fully on participatory basis than reading the flip chart.	1
5	Make easily understand the math for gradient, water velocity and depth.	1

Table 2.10.10 Comments on Own Participation for Kasungu Group

No.	Comments	Nos
1	Well achieved.	20
2	Helpful of the knowledge and skills to assist the farmers.	2
3	Not all participants were participated on practicals, more participation required.	2
4	Participated more time on practice and more participation.	1

Table 2.10.11 Comments on how to best improve the training course in future for Lilongwe Group

No.	Comments	Nos
1	Allocate more time to practicals than theory.	8
2	Arrange practicals near the training center.	7
3	Arrange entertainment after supper.	4
4	Arrange more small groups exercise and group discussion.	4
5	Use participatory approach/facilitation.	4
6	Arrange better venue for training.	3
7	Prepare enough handouts to every participant not for the EPA only.	2
8	Avoid late lunch.	2
9	Limit the number of participators to well handle.	1
10	Encourage the participants to more participate.	1
11	Improve allowance to MK1500/day.	1
12	Include agro-forestry activities in the program.	1
13	Add more days, and also think of adult learning.	1
14	Allocate more time on identification of suitable gravity dimension site.	1
15	Allocate more time on discharge measurement.	1
16	Arrange training course for the remaining AEDOs.	1
17	Arrange more training to top up the knowledge and practicals.	1
18	Do climate setting to keep the audience live.	1
19	Explain but not read the materials.	1
20	Improve food during field trips.	1
21	Arrange enough biscuits for teas.	1

Table 2.10.12 Comments on how to best improve the training course in future for Kasungu Group

No.	Comments	Nos
1	Arrange lodging allowance to be settled by the participants themselves.	7
2	Prepare enough handouts to every participant not for the EPA only.	6
3	Arrange more practice by each and every participant.	6
4	Arrange more days for example two weeks in total.	4
5	Arrange places of practices near the training center.	4
6	Change the venue of the training.	2
7	Arrange enough biscuits for teas.	2
8	Improve number of participants.	1
9	Elaborate the new conception of canalisation.	1
10	Provide flat file to participants to keep their handout.	1
11	Do co-facilitation by facilitators on the presentations.	1
12	Encourage AEDOs in the Training of Trainee.	1
13	Have reliable transport to reduce break down.	1
14	Improve food during field trips.	1
15	Organize small groups on practicals.	1

Attachment-2.1 Schedule of Activities

SCHEDULE OF ACTIVITIES

DATE / TIME	***ACTIVITIES***	***RESPONSIBLE***
Day 1 (sun): Gathering to the training center		
Day 2 (Mon): Officer of the Day; Mr. Cheyo / Mr. Muzalule		
Module 1 - Program Orientation		
8:00-8:30	*Registration and Pre-Training Knowledge Inventory*	*Mr. Kilembe*
8:30-9:30	*Opening Program*	*Mr. Cheyo/Mzalule*
9:30-10:00	*Overview of the Training Program*	*Mr. Cheyo/Mzalule*
10:00-10:15	*Tea Break*	*Ms. Diana*
10:15-11:00	*Surfacing of Participants' Expectation*	*Mr. Kilembe*
Module 2 - Overview of Smallholder Irrigation Development		
11:00-11:30	*DOI's Vision, Mission & Objectives*	*Mr. Ngwira*
11:30-12:00	*Irrigation Development in Malawi*	*Mr. Ngwira*
12:00-13:00	*Lunch Break*	
13:00-14:00	*Introduction to JICA Smallholder Irrigation Dev. Study*	*Mr. Hashiguchi*
14:00-15:00	*Overview of Smallholder Irrigation Facilities and Structures*	*Mr. Hashiguchi*
15:00-15:15	*Tea Break*	*Ms. Diana*
15:15-16:30	*Implementation Mechanism of Smallholder Irrigat'n Dev.*	*Mr. Lingani/Luhanga*
16:30-17:00	*Participants Action Reflection*	
DAY 3(Tue): Officer of the Day; Mr. Chabuka / Mrs. Somanje		
Module 3 - Smallholder Irrigation Facilities and Structures (Observation in Field)		
7:30-8:00	*Recapitulation*	
8:00-12:00	*Field Trip to Smallholder Irrigation Schemes*	
12:00-13:00	*Lunch Break*	*Ms. Diana*
13:00-17:00	*Field Trip to Smallholder Irrigation Schemes*	
17:00-17:30	*Participants Action Reflection*	
DAY 4(Wed): Officer of the Day; Mr. Kumasala / Mr. Kunchulesi		
Module 3 - Smallholder Irrigation Facilities and Structures (in Lecture)		
8:00-9:00	*Recapitulation*	
9:00-9:30	*Identification of Suitable Gravity Diversion Sites*	*Mr. Mzalule*
9:30-10:00	*Discharge Measurement*	*Mr. Malunga/Mzalule*
10:00-10:15	*Tea Break*	*Ms Diana*
10:15-12:00	*Weir Type and Construction Method*	*Mr. Malunga/Somanje*
12:00-13:00	*Lunch Break*	
13:00-14:00	*Weir Type and Construction Method*	*Mr. Kilembe/Chingwalu Mr. Chabuka*
14:00-15:00	*Canal Alignment and Construction*	*Mr.Lingani/Kunchulesi*
15:00-15:15	*Tea Break*	*Ms. Diana*
15:15-15:45	*Ancillary Facilities*	*Mr. Luhanga*
15:45-16:30	*On-farm Irrigation Method*	*Mr. Cheyo*
16:30-17:00	*Participants Action Reflection*	
DAY 5(Thu): Officer of the Day; Mr. Kilembe / Mr. Chingwalu		
Module 3 - Smallholder Irrigation Facilities and Structures (Practice in Field)		

7:30-8:00	*Recapitulation*	
8:00-12:00	*Practice of Construction of Weirs in the Field*	
12:00-13:00	*Lunch Break*	*Ms. Diana*
13:00-17:00	*Practice of Canal Alignment*	
17:00-17:30	*Participants Action Reflection*	

DAY 6 (Fri): Officer of the Day; Mr. Luhanga / Mr. Lingani
Module 4 – Problems to be encountered and Possible Solutions

8:00-9:00	*Recapitulation*	
9:00-10:00	*Problems and Possible Solutions*	*Mrs. Somanje*
10:00-10:15	*Tea Break*	*Ms. Diana*
10:15-11:00	*Problems and Possible Solutions*	*Mr. Chabuka*

Module 5 – Entry Planning and Program Evaluation

11:00-12:00	*Entry Planning Orientation*	*Mr. Lingani*
12:00-13:00	*Lunch Break*	
13:00-15:00	*Entry Planning and Output Presentation by EPA/RDP*	*Mr. Lingani*
15:00-15:15	*Tea Break*	*Ms. Diana*
15:15-16:30	*Preparation of Dissemination Material (picture stories)*	*Mr. Malunga*
16:30-17:00	*Training Program Evaluation*	*Mr. Kilembe*
17:00-17:30	*Closing Program*	*Mr. Luhanga/Lingani*
18:00-	*Participants – JICA Study Team Interaction*	*Ms. Diana*

Day 7 (Sat): Home Sweet Home (transportation arranged by JICA)

MODULE OBJECTIVES

MODULE 2
SUBJECT: IMPLEMENTATION MECHANISM OF SMALLHOLDER IRRIGATION DEVELOPMENT
TOPIC: ORGANISING FARMERS INTO FARMER IRRIGATION

OBJECTIVES:
1. By the end of this topic participants will be able to:
2. Understand the process followed in organising farmers into irrigation clubs,
3. Understand and know the recommended process of organising farmers into irrigation clubs,
4. Understand the internal organisation set up of the committees and how they operate,
5. Implementation on the ground, and
6. Know implementation in technical and administrative lines.

MODULE 3
SUBJECT: SMALLHOLDER IRRIGATION FACILITIES AND STRUCTURES
TOPIC: DISCHARGE MEASUREMENT

OBJECTIVES:
By the end of this topic participants will be able:
1. Define discharge measurement, and

2. Learn methods of discharge measurement.

TOPIC: TYPE AND CONSTRUCTION

OBJECTIVES:
By the end of this topic participants will be able to know:
1. Material needed to construct a weir,
2. Know various type of brush dams, and
3. Know how to construct each type of weir.

TOPIC: ON-FARM IRRIGATION

OBJECTIVES:
By the end of this topic participants will be able to know:
1. What is basin Irrigation,
2. What is furrow Irrigation, and
3. How to cope with salinity problems.

TOPIC: ANCILLARY FACILITIES

OBJECTIVES:
By the end of this topic participants will be able to know:
1. Definition of ancillary facility,
2. Material used in making ancillary,
3. How to construct different types, and
4. How ancillary facility used in irrigation site.

MODULE 4
SUBJECT: PROBLEMS TO BE ENCOUNTERED AND POSSIBLE SOLUTIONS

METHODOLOGY:
The participants were divided into two groups: G1 to discuss technical problems and solutions, and G2 to discuss social problems and solutions. Both groups should come up with the possible solutions and present their solution and problem in the class.

OBJECTIVES:
By the end of this topic participants should come up with expected problems and solutions in their groups.

MODULE 5
SUBJECT: ENTRY PLANNING AND PROGRAMME EVALUATION

METHODOLOGY
Lecture, and small group task per EPA for entry planning
OBJECTIVES:
By the end of this topic participants should come up with:
1. Knowing the tools to be provided,
2. Being told when the follow – up AEDO training will be,
3. Receiving and knowing how to fill in Proforma and Site Profile Forms, and
4. Actually filling up the proforma which is the action plan for year 2004 dry season.

Attachment-2.2 Participants to the First AEDO Training

LILONGWE ADD: Participant to the Training Course for Smallholder Irrigation Development (JICA)

ADD	RDP	EPA	Irrigation Officer	AEDOs	AEDC or Ass. AEDC	Remarks
Lilongwe	Lilongwe East		1			
		Chitekwere		3	1	
		Nyanja		3	1	
		Mkwinda		3	1	
		Chiwamba		3	1	
		Chitsime		3	1	
		Chigonthi		3	1	
		Mpenu		4	1	
	Above Total		1	22	7	
	RDP Total			30		
	Dedza Hills		1			
		Kanyama		3	1	
		Mayani		3	1	
		Mtakataka		3	1	
		Kaphuka		3	1	
		Golomoti		3	1	
		Bembeke		4	1	
	Above Total		1	19	6	
	RDP Total			26		
Above Total			2	41	13	
ADD Total				**56**		
Resource Person from Above RDPs				6		included in 56 above
Resource Person from Dowa/Ntchisi RDPs				5		
Resource Person from DOI				1		
Total Participants				**62**		
JICA Study Team				4		
JICA Counterpart from DOI HQs				1		same as the RP from DOI

KASUNGU ADD: Participant to the Training Course for Smallholder Irrigation Development (JICA)

ADD	RDP	EPA	Irrigation Officer	AEDOs	AEDC or Ass. AEDC	Remarks
Kasungu	Dowa		2			
		Mvera		3	1	
		Nachisaka		3	1	
		Chivala		4	1	
		Chisepo		3	1	
		Madisi		3	1	
		Mponela		3	1	
		Mndolera		3	1	
		Bowe		3	1	
		Nalunga		3	1	
	Above Total		2	28	9	
	RDP Total			39		
	Ntchisi		2			
		Chipuka		3	1	
		Kalira		3	1	
		Chikwatula		3	1	
		Malomo		3	1	
	Above Total		2	12	4	
	RDP Total			18		
Above Total			4	40	13	
ADD			1			
ADD Total				**58**		
Resource Person from Above RDPs				5		included in 56 above
Resource Person from LL E/Dedza Hills RDPs				6		
Resource Person from DOI				1		
Total Participants				**65**		
JICA Study Team				4		
JICA Counterpart from DOI HQs				1		same as the RP from DOI

Attachment-2.3 Participant Pre-training Inventory Survey Result

Please describe the best experience you have had as an AEDO/AEDC?

LILONGWE EAST RDP

1.	Treadle pump irrigation	4
2.	Plot lay out and control water reservoirs	3
3.	Experience a lot especially on canalisation	2
4.	Maintenance of treadle pump	2
5.	Hard working farmers	2
6.	River diversion	1
7.	Handling staff members	1
8.	Training for one year upgrading on irrigation in Egypt	1
9.	Any project if owned by the farmers without free issues	1
10.	Farmers growing crops twice a year and get more food, income and relish	1
11.	Passing agro-forest technologies to farmers	1
12.	I have know something on irrigation	1
13.	Advise farmer to control irrigation using buckets &treadle pump	1
14.	Harvesting three time a year	1
15.	Formation of manure (compost)	1
16.	Club formation	1
17.	Farmer are resourceful and ready to take any knowledge	1
18.	Very successful in the ARCOD project	1
19.	Propagation and horticulture	1
20.	Bed making	1

DEDZA RDP

1.	Using treadle pump	8
2.	Plot layout	5
3.	Maintenance of treadle pump	2
4.	Assisting the farmers in local weir construction	2
5.	Sustainability	2
6.	Small scale irrigation	2
7.	Canalisation	1
8.	How to solve some problems	1
9.	How to line with people	1
10.	A lot of activities done by AEDO	1
11.	Planting spacing for irrigation	1
12.	Water management using treadle pump	1
13.	Assisting AEDO and farmers in the area	1
14.	Mobility of farmers	1
15.	Group organisation	1
16.	Farmers contributions	1
17.	Farmers willing to implement	1

DOWA RDP

1.	Small scale farmers grouping themselves for small scale irrigation	4
2.	Treadle pump use – plot layout	4
3.	To sustain food production	3
4.	Working with a farmer	3

5. Diverting river course to a land which were dry 1
6. The farmer had food throughout the year 1
7. Co-ordination with other partners (NGO) 1
8. Farmers discuss and have a solution 1
9. Construction of weirs and a canals 1
10. Using treadle pump in irrigation 1
11. Planning and implementing programs 1
12. Group organisation 1
13. Irrigation activities are throughout and crop produced 1
14. Where farmers are interested the training becomes easy 1
15. Irrigation – credit estimation – extension and general estimation 1
16. The price of treadle pumps are higher hence un affordable by a farmer 1
17. Canalisation at small scale 1
18. Known how different people behave and how best to tackle 1
19. Treadle pump irrigation is good but it needs more labour 1
20. Double cropping by small scale farmers 1
21. Fulfill the goal 1
22. Training of planting assorted crops, intensify watering 1
23. It is important not to depend on your source not other 1

NTCHISI RDP

1. Grouping farmers working together as one family 4
2. The use of treadle pump 2
3. Working with JICA team and developed 4 irrigation sites 1
4. Achieve facilitate the development of some 21 site 1
5. On river diversion and 18 clubs were formed and diverted a river 1
6. To be close with farmers who have just started irrigation system 1
7. Farmers were able to contribute the funds and got good yields of maize 1
8. Compost manure making 1
9. Plot lay out and basin making 1
10. Responsive of farmers 1
11. Learning some skills 1
12. To achieve my targets with farmers 1

How do you think small-scale irrigation can improve the life of smallholders?

LILONGWE EAST

1. Food security 18
2. Income 17
3. Enables dry season cultivation 9
4. Nutrition 2
5. Improved agriculture production 1
6. Make use of wasted water 1

DEDZA RDP

1. Food security 18
2. Income at household 13
3. Growing twice a year or three time a year 6
4. Improve nutrition 3
5. Grouping the farmers 2
6. Reduces poverty 1

DOWA RDP

1.	Food security	24
2.	Household income can be increased	17
3.	Maximum production by double cropping a year	5
4.	Balanced diet	3
5.	Material required are locally available no money spent	2
6.	Intensive training both to AEDO and farmers	1
7.	Number of farmers will be increased	1
8.	Continuously agriculture activities	1
9.	Encourage group working	1
10.	Boast agriculture production	1
11.	To learn more way and techniques of impounding water	1

NTCHISI RDP

1.	Improve the life of smallholder farmers	11
2.	Income	6
3.	Improve harvesting (2 – 3) time a year	4
4.	Strengthen of group	1
5.	Multiple cropping	1

What do you think the role of an AEDO/AEDC is for developing small-scale irrigation?

LILONGWE EAST

1.	To facilitate the technical aspects of the job	11
2.	Encourage group working	5
3.	Assist smallholder farmers with new technology	3
4.	Training on new methods on small scale irrigation	3
5.	Improve status on food and income	2
6.	Assist the farmers to utilise the water to develop self food sufficiency	2
7.	Assisting the farmers on solving up their problems	2
8.	It is to facilitate training farmers	1
9.	Follow up	1
10.	Ensure smooth implementation with summer crops	1
11.	Mobilise farmers develop small scale	1
12.	Develop system in the area that can be easily adopted by the farmers	1

DEDZA RDP

1.	Training farmers on crop husbandly techniques	8
2.	Facilitating of all farmers while the farmers are implementing activities	6
3.	Demonstration on different things (weir maintenance)	5
4.	Training farmers in small scale development irrigation	4
5.	Frequently supervision	4
6.	Farmers organisation	4
7.	Group assistance	2
8.	Support them in their problems	2
9.	Teach farmers the good way of farming	1
10.	Train them how to use irrigation equipments	1
11.	Assisting the farmer how they can buy their inputs	1

DOWA RDP

1.	Training farmers in irrigation technologies	13

2. Facilitating group work 12
3. Close supervision in the sites 6
4. Demonstrate to the farmers how to do things 6
5. Assisting the farmers 5
6. Assist the farmer how to use canals for better production 3
7. Encourage farmers 2
8. Self dependence on the smallholder community 1
9. Support where possible in the site in managing irrigation 1
10. Prepare programmes for the irrigation 1
11. Tell the farmer the importance of small scale irrigation for food security 1
12. Explain to the farmers development related to agricultural production 1
13. Advising the farmers on what they can do to improve crop production 1
14. Field day tour 1
15. Farmer to farmer tour 1

NTCHISI RDP

1. Facilitate the farmers on small scale irrigation 7
2. Train farmers on small scale irrigation technologies 6
3. Monitoring 5
4. Group formation of the farmers 3
5. Make sure that the farmers have better yield 1
6. Planning the action 1
7. Assist the farmer in action planning 1
8. Evaluation 1

Please describe the problem(s) you have faced or are facing as an AEDO/AEDC and those solutions you have done.

LILONGWE EAST RDP

NO	PROBLEMS FACED OR FACING	EFFORTS YOU HAVE DONE
1	Drying up small rivers in potential areas (11)	Water impounding in some sites
2	Transportation (9)	Own transport(4), Repairing of old bike and hire
3	Lack of knowledge on canalisation (6)	Search for a technologies on my own Consult other AEDO & AEDC Farmers should use treadle pump on irrigation
4	Lack of knowledge and skills to staff (5)	Reading of books Impart knowledge and skill which I know partially
5	Lack of training for irrigation for farmers (4)	Government will consider Farmer to farmer visitation Invite the AEDC if any training was needed
6	Lack of resources (3)	Using local material Personal effort
7	Mobility T & T are not paid timely (3)	Discussed with the DADO to pay promptly in order to improve mobility
8	Lack of farm inputs (2)	To encourage farmers to find their own means of getting finance (2)
9	Lack of Equipment (2)	
10	Inadequate administrative support (2)	Encouraging farmers to use local resources
11	Lack of or very low Allowance (2)	
12	Lack of push bike (2)	
13	Unfulfilled promise (2)	Farmers are encouraged to use available materials
14	Training of farmers leadership	Locally we arrange some training on a group

15	Group organisation	Conduct group dynamics training
16	Conflicts among the farmers themselves	Use local leaders to address conflicts.
17	Lack of stationeries	Buying
18	Lack of knowledge on the use of treadle pump	AIO has promised to help
19	Lack of support when implementation	Involved local leaders in the implementation
20	Maintenance of treadle pump	AEDO assistance
21	Involvement of activities not being done by us	
22	Lack of protective wear	
23	Poor salaries	
24	Poor accommodation	

DEDZA HILLS RDP

NO	PROBLEMS FACED OR FACING	EFFORTS YOU HAVE DONE
1	Low understanding capacity by farmers on irrigation technology (10)	Training required from RDP (2) Training the farmers and follow up Frequently visitation to the farmers and meetings
2	Lack of transport (9) Lack of fuel	Use my own bite (3) Buy fuel using our money Borrowing the push bike Walking
3	Knowledge on new technology (7)	Training for the AEDO (3) Reading books (2)
4	Protective wear e.g. working materials (5)	Asking assistance from the boss Use local materials
5	Sourcing of spare parts for treadle pump (2)	Farmers to contribute money for the maintenance
6	Allowance is not given on time (2)	Consult the bosses
7	Lack of support in material and resources (1)	Training staff by interactive demonstrative
8	Incompetence by field staff	Training of farmers interactively
9	Some rivers are very deep	Built weir to trap and train farmers to have patience long result
10	Very few farmers involved in treadle pump irrigation	Meetings on the importance of treadle pump irrigation
11	Inputs	Sensitising farmers on organisation which provide inputs loans
12	No payment of T & T	
13	Poor salaries	
14	Tours to be conducted	
15	Individual working instead of group working	
16	How to calculate gloss margin	

DOWA RDP

NO	PROBLEMS FACED OR FACING	EFFORTS YOU HAVE DONE
1	Transport shortage (6)	Walking (5) Borrow from our friends Using our resources for transport
2	Expensiveness of the equipment (6) e.g. treadle pump, mobility (3)	Use our resources to purchase bike spares (2) Use old bike Contribution to buy the equipment Some NGOs provide the treadle pump Use watering cane
3	Insufficient water in other site (5)	Advising the farmer to dig deep wells (3) Impounding
4	Limited knowledge for canalisation (3)	Encourage farmer in irrigation Grouping farmers to form a group
5	Lack of capacity building (2)	Training (2)
6	Construction of a canal (2)	Farmers should work as a team Ask assistance form AEDC and ADD specialist
7	Insufficient material (2)	Use local source
8	Lack of watering implements i.e. treadle pump, motorised pump, water resource (2)	Encourage farmers to dig wells for water accumulation, and to find source from GVH / NGO By providing farmers with treadle pumps on credit
9	Low adoption by farmers (2)	Conduct field days for training (2)
10	Support from management not reliable (2)	More training on irrigation Conducting field day
11	Lack of skills and technologies used in irrigation (2)	Training (2)
12	Farmer mobilization, planning (village action plan)	Farmer to farmer visit, and farmer training farm group
13	Input distribution	Ask farmers to contribute money
14	Shortage of pipes for crossing gullies	Using local material in crossing the gully
15	No allowance	
16	Short training	Using local leaders (committee)
17	No supervision	Frequent follow up
18	No protective wear	
19	Cooperation among the farmer	Training farmers on group dynamic
20	No training for AEDO/AEDC	Theoretical reading
21	Little support from Government and NGO	Use our common source where applies
22	Natural facilities are not fully utilised e.g. spring, stream, rivers	Organise farmer for furrow irrigation (present donor Action AID)
23	Failure of funding	Farmers are asked to fund on their own
24	When farmers as beneficiaries failing to be honoured as promised by the donor, hence project failing to achieve its Intended goals	Discussing with farmers to find an alternative for the project to achieve
25	Communications e.g. telephone or transport	Go to the place a day before

NTCHISI RDP

NO	PROBLEMS FACED OR FACING	EFFORTS YOU HAVE DONE
1	Lack of knowledge on irrigation technology (8)	Reading some handout and books on different type of irrigation (3) Campaigning for more farmers to go for small scale irrigation Encouraging farmers to buy treadle pump
2	Transportation (8) Fuel (2)	Using local resource (salary) 4 Maintaining the old motor cycle to work A new bike is required Walking for along distance
3	Motorcycle maintenance	From our salary
4	Intensive training for application in the field	Extensive reading
5	Some farmers expect to have everything from the AEDO so if any break of visiting the site means failure to the group	Farmers were trained to do things on their own even the AEDO is not there (community empowering)
6	Covering big area with very big number of farm families	Working in group where everyone takes part in participation
7	Break down of motorised pump	Encourage farmers to contribute the funds for maintenance of the pump
8	Equipment scarce	Improvised equipment is used
9	Canal construction	Learning from our friend on how to construct a canal
10	Bed construction	Learning from friends
11	In draining up the river few sacks	Ask the farmer to fetch for some more
12	Meal allowance	
13	Financial constraints	
14	Inadequate water towards the end of dry season	
15	Lock of protective wear	
16	Uniform	

Attachment-2.4 Target set for Dry Season 2004

Target of Lilongwe East RDP

Activity	Chigonthi				Chisisima				Chitekwere				Chiwamba				Mkwinda				Mwenu				Nyanja				RDP
	A1	A2	A3	FA	ST	A1	A2	A3	FA	ST	A1	A2	A3	FA	ST	A1	A2	A3	FA	ST	A1	A2	A3	A4	FA	ST	A1	A2	A3	FA	ST	
Identification of potential sites	3	4	5	18	30	4	4	5	3	16	4	4	4	11	23	7	5	8	8	24	2	2	2	3	3	9	2	3	2	2	13	4	5	2	3	14	126
Pre-selection of to-be-developed sites	3	4	5	18	30	4	4	5	3	16	2	2	2	5	11	5	3	5	6	19	2	2	2	3	3	9	2	2	2	4	2	12	2	2	3	9	105
No. of sites to be developed	2	3	3	9	17	3	3	3	3	12	2	2	2	6	11	4	3	4	6	17	2	2	2	3	3	9	2	2	2	2	2	10	2	2	3	9	66
No. of farmers to be organized	50	75	75	225	425	49	60	75	90	213	60	75	45	165	345	65	60	80	180	405	34	35	37	60	166	26	20	20	25	30	121	90	85	60	120	355	2,039
Area to be developed, ha	2.0	3.0	3.0	9.0	17.0	1.0	1.2	1.5	0.6	4.3	2.0	2.0	4.0	2.0	8.0	3.0	1.7	2.5	3.0	13.2	1.7	1.8	1.9	3.0	8.3	1.7	1.5	1.0	1.5	1.5	6.7	0.9	0.9	0.6	1.2	3.6	66.0
Canal length to be constructed, m	3,000	4,500	4,500	13,500	25,500	3,850	3,850	4,200	3,000	14,700	1,100	1,100	800	2,800	5,900	4,000	2,500	3,600	4,200	14,500	800	800	1,000	1,500	4,100	560	500	600	400	700	2,760	1,700	1,300	850	1,900	5,750	73,210

Target of Dedza Hills RDP

Activity	Mtakataka					Bembeke					Golomoti					Kanyama					Mayani					Kaphuka					RDP	LL ADD
	A1	A2	A3	FA	ST	A1	A2	A3	A4	FA	ST	A1	A2	A3	FA	ST	A1	A2	A3	FA	ST	A1	A2	A3	FA	ST	A1	A2	A3	A4	FA	ST		
Identification of potential sites	3	3	2	5	13	2	4	3	2	5	16	3	3	4	14	24	3	5	4	7	19	4	3	5	7	17	5	4	4	14	27	116	245
Pre-selection of to-be-developed sites	2	2	2	8	2	2	4	3	2	5	16	2	2	2	6	11	3	4	3	5	15	3	2	2	6	12	3	3	3	6	14	76	182
No. of sites to be developed	2	2	2	8	2	2	3	2	2	5	14	2	2	2	5	11	2	3	3	2	10	2	2	2	2	5	11	2	2	2	3	9	83	140
No. of farmers to be organized	30	20	20	30	100	40	49	60	74	105	328	20	20	20	20	60	110	50	80	45	70	225	56	35	32	105	220	80	80	60	90	270	1,282	3,262
Area to be developed, ha	1.2	0.8	0.8	1.2	4.0	3.1	5.0	4.3	2.1	1.8	16.1	0.8	0.8	0.8	0.8	2.0	4.4	1.5	1.8	1.4	2.1	6.8	3.8	2.7	2.5	2.0	10.5	1.5	1.5	1.5	4.5	9.0	50.8	117
Canal length to be constructed, m	600	450	450	600	3,000	1,400	2,000	1,800	1,800	3,000	9,200	1,000	1,000	1,000	1,000	3,000	6,000	1,255	1,910	1,495	1,800	6,460	1,720	1,410	1,560	750	5,440	1,500	1,500	1,500	4,500	9,000	40,750	119,966

Target of Dowa RDP

Activity	Bowe					Chisepo					Chinkata					Madisi					Mndolera					Mwansambo					Mvera					Nachisaka					Nalunga					RDP
	A1	A2	A3	FA	ST	A1	A2	A3	FA	ST	A1	A2	A3	A4	FA	ST	A1	A2	A3	FA	ST	A1	A2	A3	FA	ST	A1	A2	A3	A4	FA	ST	A1	A2	A3	FA	ST	A1	A2	A3	FA	ST	A1	A2	A3	FA	ST	
Identification of potential sites	2	2	2	1	7	3	3	2	5	13	3	3	2	3	2	13	2	3	3	2	10	3	4	3	8	18	3	2	3	8	16	10	7	5	21	43	9	8	10	33	4	3	4	5	16	188
Pre-selection of to-be-developed sites	2	2	2	1	7	3	3	2	5	13	3	3	2	3	2	13	2	3	3	2	10	2	3	2	3	10	2	2	2	5	11	7	4	2	7	20	4	5	6	10	25	3	2	3	4	12	121
No. of sites to be developed	2	2	2	1	7	2	2	2	5	11	2	2	2	2	2	10	1	2	2	2	8	2	3	2	3	10	2	1	2	3	8	7	4	2	7	20	3	3	4	8	18	2	2	2	3	8	89
No. of farmers to be organized	40	54	50	30	174	60	45	42	75	222	50	24	27	40	27	168	20	16	14	35	42	15	16	14	18	30	78	55	72	31	125	283	140	40	140	400	63	39	75	80	257	80	35	50	60	205	1,899
Area to be developed, ha	4.0	5.4	5.0	3.0	17.4	3.0	2.0	1.5	3.5	10.0	4.5	1.0	1.7	3.0	1.7	11.9	2.0	1.5	1.4	3.5	11.2	1.6	1.4	1.8	3.0	7.8	1.5	2.0	0.6	2.5	6.6	14.0	8.0	4.0	14.0	40.0	2.2	1.2	3.7	8.4	16.5	3.0	1.8	2.5	3.0	10.3	130.7
Canal length to be constructed, m	1,900	1,800	1,500	1,000	6,200	1,500	1,000	800	3,000	6,400	2,500	1,000	1,000	1,000	1,300	1,900	6,700	1,300	1,300	1,300	10,700	640	560	720	1,300	3,220	900	800	500	1,600	3,700	5,000	3,000	2,000	15,000	1,850	2,430	7,800	2,800	14,880	3,000	1,800	3,000	2,100	9,700	87,270

Target of Ntcheu RDP

Activity	Chikwakwa					Chipuka					Kaliro					Malomo					RDP
	A1	A2	A3	FA	ST	A1	A2	A3	FA	ST	A1	A2	A3	FA	ST	A1	A2	A3	FA	ST	
Identification of potential sites	4	4	6	4	18	4	4	3	10	27	3	3	3	5	14	3	2	4	5	14	73
Pre-selection of to-be-developed sites	3	3	3	3	12	2	2	2	7	13	3	3	3	5	14	2	2	2	2	8	47
No. of sites to be developed	2	2	2	3	10	2	2	2	7	13	2	2	2	5	11	2	2	2	2	8	42
No. of farmers to be organized	60	40	40	45	185	40	60	56	235	391	55	81	51	75	262	38	55	35	45	173	1,011
Area to be developed, ha	8.0	4.0	4.0	4.5	18.5	4.0	6.0	5.6	23.5	39.1	5.5	8.1	5.1	7.5	26.2	1.5	4.0	2.0	2.0	9.5	93.3
Canal length to be constructed, m	3,500	2,400	2,000	3,900	11,800	2,000	2,103	1,900	7,000	13,003	2,400	2,400	2,400	4,000	11,200	1,000	3,000	1,500	950	6,450	42,453

IGU ADD
242
168
141
2,910
224
186,720

LL+IGU ADD	Iber site
487	
350	
289	
6,202	21.5
341	1.2
223,683	774.0

Attachment-2.5 Tools Provided to EPAs

Tools provided to each EPA (not applied to the five EPAs undertaken in 2003)

Specifications	Quantity	Remarks
Tools		
Panga	10	
Hoe	10	
Pick	5	
File	5	
Wheel barrow	8	
Hammer (4 lbs)	3	
Hammer (14 lbs)	5	
String	10	
Saw (22 ")	3	
Saw (26")	5	
Gun boot	25	
Measuring tape (50m)	5	
Bucket (typeA)	3	
Bucket (typeB)	3	
Line level	5	distributed during AEDO training
Push bike (w/o gear)	4	
Pump for push bike	1	
Stationeries		distributed during AEDO training
Paper A-4 (1 rim)	2	ditto
Hard-cover notebook	10	ditto
Lever arch file	3	ditto
Calculator	1	ditto
Plastic bag	10	ditto
Pen (ball point)	10	ditto
Pencil	10	ditto
Sharpener for pencil	5	ditto
Punch	1	ditto
Ruler	5	ditto
Paper Glue	2	ditto
Color Pencil	1	ditto
Paper cutter	1	ditto
Thick A-0 paper (20xA-3)	4 (20 sheets in A-3 paper)	ditto

CHAPTER 3 FOLLOW UP AEDO TRAINING

3.1 Rationale

The AEDOs have been developing smallholder irrigation schemes in their jurisdiction upon completion of the first AEDO Training Program in May and June 2004. In order to present the output/outcome so far achieved, share feedback on their experiences among themselves and together learn a collective feed-forward work orientation, the need to sit down together has become apparent.

In addition to the above-mentioned need, irrigation development should always incorporate local resources based agriculture development such as application of compost manure, botanical pesticide and promotion of improved storage, as well as gender issues, or no fruit from the irrigation can be realized. Also, a mean to conserve catchment area, the place where irrigation water is generated, should be promoted in order for the smallholder farmers to live with irrigation systems over generations.

The Department of Irrigation (DOI) together with JICA is now of the opinion that the AEDOs who had participated in the first AEDO training should gather once again and sit down together in order to move ahead upon equipping with shared knowledge and new ideas, hence THIS FOLLOW UP TRAINING. was organized and administered.

3.2 Objectives

The training aimed at having the participants to acquire the collective knowledge and experiences based upon what they have been doing so far, and knowledge, skills, and attitude necessary in promoting local resources based agriculture development as well as catchment area conservation. Specifically, the participants were expected to be able to:

1) Sum up experiences of the AEDOs & AEDCs on the smallholder irrigation development,
2) Share the skills and attitude to solve the problems encountered during the implementation,
3) Gain collective insights on what needs to be improved further relative to implementing smallholder irrigation development,
4) Enumerate and discuss local resources based agriculture development in conjunction with irrigation,
5) Acquire knowledge and skill to construct an energy efficient cooking stove, which contributes to conserving catchment area,
6) Prepare EPA and RDP basis entry program for year 2004/05, and
7) Discuss way-forward for smallholder irrigated agriculture development in Malawi.

3.3 Training Mechanics

The training was a net five-day activity held at Nathenje RTC for Lilongwe group and Mponela RTC for Kasungu group (see attachment–3.1 for detail activity schedule). The date, issues tackled, methodologies employed and the trainers during the course are as follows:

3.3.1 Date and Venues

1) LL E. and Dedza Hills RDPs: 19-25 Sep. (19&25 for traveling) at Nathenje RTC

2) Dowa and Ntchisi RDPs: 26 Sep.-2 Oct. (26&2 for traveling) at Mponela RTC TC

3.3.2 Topics tackled

The topics tackled during the training are as follows. As shown below, major topic is the report on what they have achieved since the 1st training together with the problems they have faced on the ground as well as the solutions/ actions taken. In addition, agriculture components such as compost making, botanical pesticide, etc. were also the main topics in the training. Though these agriculture topics may have to be undertaken together with irrigation component, the time for the 1st training allocated did not allow hence this follow up training undertakes those component. Also, pointed out is the incorporation of gender as well as HIV/ AIDS issues to sensitize the participants as well as awareness raising.

Module 1 Program Orientation
Module 2 Presentation of Smallholder Irrigation Development
Achievement against the targets set during 1st AEDO training
Problems and actions taken (group discussion)
Tools required for implementing smallholder irrigation schemes
Module 3 Local Resources Based Agriculture Development
A quick maturing compost (Bocashi), including practice
Liquid fertilizer
Botanical pesticide
Bamboo liquid
Improved grain storage
Module 4 A Mean of Conserving Catchment Area
Energy efficient cooking stove (conserving fuel wood), including practice
Module 5 Gender, and HIV/ AIDS
Module 6 Entry Planning and Output Presentation
Entry planning orientation
Entry plan presentation
Dissemination material (posters and leaflets)
Module 7 Training Evaluation

3.3.3 Methodologies

Methodologies employed are lecture-interactive discussion, brainstorming, field trips and observation, hand on practices on the field such as compost making and improved cooking stove, and small group task preparing 2004/5 entry program. During the sessions, all the trainers have tried to well interact with the participants in order to avoid participants from being left behind and to well let them understand.

3.3.4 Trainers and Management Team

12 trainers who facilitated the 1st AEDO training were once again appointed to lead this follow up training. The trainers were given a refresher training course in advance of the plenary follow up AEDO trainings to enrich themselves with necessary skills and knowledge as the trainer. The training of the trainers, TOT, was administered from September 12 to 16, 2004 by the JICA study team at Lilongwe Staff Training Center.

3.4 Participants

The participants are basically same as those who participated in the 1st AEDO training course; namely, invited are three AEDOs and AEDC each from all the 26 EPAs under the targeted 4 RDPs of Lilongwe East, Dedza Hills, Dowa and Ntchisi. Irrigation officers in those four RDPs were also the participants, and this time even 3 participants from Karonga joined. The numbers of participants were 65 for Lilongwe group including the tree from Karonga and 65 for Kasungu group including the trainers (see detail in Attachment-3.2).

3.5 Participants' Expectation from the Training Course

Right after the registration, the participants were asked of what they expected from the training course. The participants expected to learn about those listed in the following tables, amongst which "to share experiences" came first for the Lilongwe group and "to review the previous target" came for the Kasungu group. Since the participants were all aware this training course is the follow up to the 1st training, they came up those expectations first. Second expectation was to learn new technologies and skills for the both groups, and it was explained that the participants would gain those mainly relating to agriculture development. Underlined expectations were not programmed in the course and it was explained to the participants during the surfacing of the participants' expectation.

Table 3.5.1 Expectations from the Lilongwe group

No.	Expectation	Nos
1	To share experiences, problems faced and solutions taken	29
2	To learn new technologies and skills	26
3	To review the targets and come up with achievements	14
4	To have field trips to successful sites	6
5	To plan the 2004/05 season	5
6	To have refresher training course	3
6	To get another certificate	3
8	*To allocate more resources to the sites and AEDOs*	2
9	To have enough hand outs than before (the 1st AEDO training)	1
9	To have more practicals	1
9	*To have gross margin analysis*	1
9	To be trained on general field management	1
9	*To learn more about canalization*	1

Table 3. 5.2 Expectations from the Kasungu Group

No.	Expectation	Nos
1	To review the previous target the participants made in June 2004	30
2	To learn new technologies and skills	26
3	To share problems and solutions taken during the implementations	19
4	To plan for the 2004/2005 season	9
5	To have a visit to successful sites	3
6	To visit new sites managed by the trainers	2
6	*JICA to continue training us*	2
8	To be with the same trainers (same trainer team)	1
8	To meet with old friends	1
8	To get allowance	1
8	*To review the water depth calculations*	1
8	*To learn the other irrigation systems (e.g. sprinkler)*	1
8	*JICA to adopt the project (refereeing to project implementation)*	1

3.6 Participant Pre-Training Inventory

A one-page questionnaire was administered right after the registration, inquiring their property, government assistances needed in the course of implementation smallholder irrigation, their pre-training knowledge and experiences concerning local resource based agriculture, role of improving local people's life as extension officers, etc.

3.6.1 Age and Years in Gvt Services

Figure 3.6.1 shows the distribution of age and Figure 3.6.2 shows years in the government service for the participants. The mode for the age falls in a range of 36-40 years old and 46-50 years old with 41 years old and 46 years old for the Lilongwe and Kasungu groups respectively. The mode for the service in government is 11-15 years for Lilongwe group while it is in a range of 1-5 years for Kasungu group followed by ranges of 11-15 years and 21-25 years. The average years in the government service is 15.8 for the both groups.

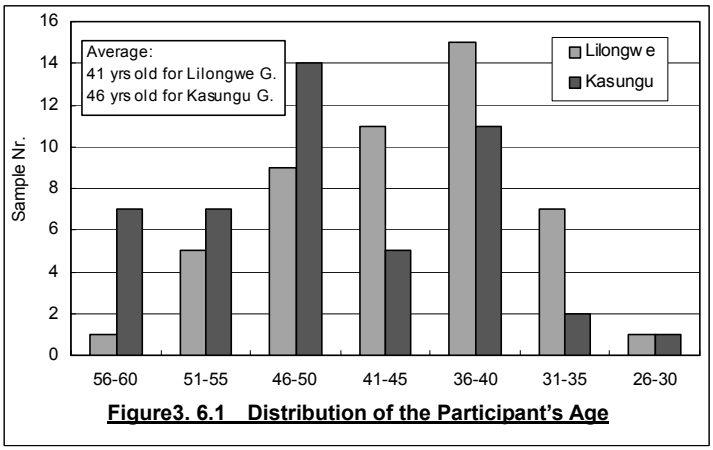


Figure3. 6.1 Distribution of the Participant's Age

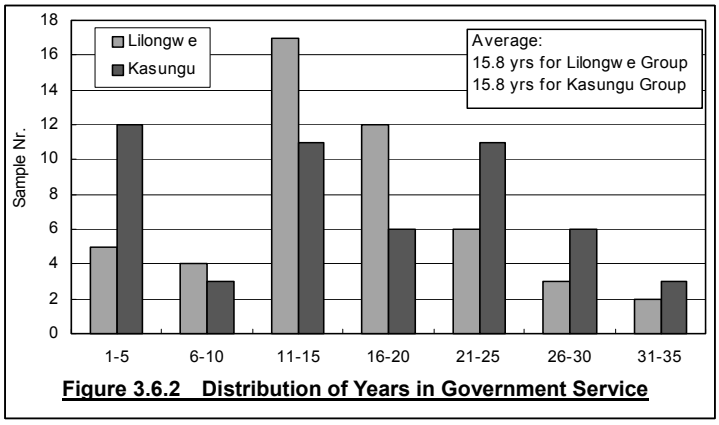


Figure 3.6.2 Distribution of Years in Government Service

3.6.2 Government Supports in Implementing Smallholder Irrigation

A question of "what assistances do you need from the Government in implementing smallholder irrigation?" was asked. Tables 3.6.1 and 3.6.2 show the responses for Lilongwe and Kasungu groups respectively, and following are the summaries:

- Both group listed input as the first requirement of government assistance. Several participants in Lilongwe group voiced that though an officer informed EPAs they would provide free seed and fertilizer out of HIPC with high priority those have not yet been delivered. In fact some AEDOs have already told their farmers the input to come, and this unfulfilling promise made themselves difficult to proceed with the farmers sometime after they commenced.

- For Kasungu area, NGOs and donors' activities are more active than Lilongwe area. When they saw irrigation development taking place on the ground and knew JICA would not provide any free handout, some of those approached AEDOs/AEDC, saying they will provide. According to the Kasungu participants, there are about 30% sites which have been approached by those after they commenced with the farmers. Out of the 30%, about half sites have been provided free handout, thereby those sites became no longer

their site but the NGO's or the donor's site. When neighboring farmers saw the free handout, they started telling the AEDOs to provide the same.

- An encouragement is that they listed loan for input rather than just asking free input. Lilongwe group listed this loan as No.3 requirement from the government, and as No. 7 for the Kasungu group. Though operationalizing such loan may need sophisticated process, the loan arrangement may keep the farmers away from dependency and also could provide them with more equal opportunity than just issuing handout.

- Transport/ fuel is always a problem. This is listed at No.2 requirement for the both group. Most AEDCs have motorbike but the reimbursable distance is only 250 km per month and the reimbursement often delays. Since availing of fuel is difficult under the curtailed ORT, right after the 1st AEDO training, all the participant were provided with bicycle, which have been assisting their mobility.

Table 3.6.1 Government Support required from the Lilongwe Group

No.	Specification	Nos
1	Input (mostly fertilizer & seed, and in some cases tools)	27
2	Transport and/or fuel	14
3	Loans especially for input	11
3	(Advanced/ refresher) Training for the AEDCs/AEDOs	11
5	Incentives and/or (meal) allowance	8
5	Protective wear	8
7	Training for the farmers	4
8	Study tour for the farmers	3
8	Materials e.g. cement to line canal	3
10	Periodical review meeting at RDP level	2
11	Technical Backup	1
11	Follow-up for the sites by senior officers	1
11	Collaboration among relevant offices	1

Table 3.6.2 Government Support required from the Kasungu Group

No.	Specification	Nos
1	Input (mostly fertilizer & seed, and in some cases tools)	23
2	Transport, fuel and/or spare parts for bike/motorcycle	21
3	Technical backup/ support	13
4	Materials (eg. stationary, cement)	9
5	Incentives and/or allowance	8
6	Study tour for the farmers	7
7	Loans especially for input	4
8	(Advanced/ refresher) Training for the AEDCs/AEDOs	3
8	Construction of structure	3
8	Meeting for discussion about problems & solutions	3
11	Good management	2
11	Sensitizations	2
13	Follow-up for the sites by senior officers	1
13	Protective wear	1
13	Collaboration among relevant offices	1
13	Leaflet	1
13	Uniform	1
13	Fruit tree productions	1

3.6.3 Problems and Action Taken during the Implementation of Smallholder Irrigation

In the pre-training questionnaire, participant listed problems they have encountered and actions/ solutions taken during the course of implementing smallholder irrigation. The problems and solutions have also been discussed during a training session (see Attachment-3.3). Tables 3.6.3 and 3.6.4 show the responses for the Lilongwe and Kasungu groups respectively, and following are the summaries:

- Problem No.1 is water shortage, and in some cases the streams got dried up. As coming to end of dry season, stream flow reduces by more than half in most cases. Faced with this problem, AEDOs have advised the farmers to use watering can and treadle pump, to carry out water rationing, to start early next year, etc.

- Lilongwe group listed "Conflict on Land for Canal Passing" as No.2 problem while Kasungu group listed this problem as No.5. Land owners located, especially upstream land owners, where canal passes often cannot access to the water by gravity though the water is running in their fields. Also, some of the landowners fear that the members may occupy the land traversed by the canal forever. These situations made some of the landowners hesitated to cooperate, and the solution taken was to involve local leaders in most of the cases.

- Kasungu group listed "Free Handout Expectation by the Farmers" as No. 2 problem. As aforementioned, there are many NGOs and donors operating in Kasungu area than Lilongwe. Their program usually accompanies free input of seed and fertilizer. Also, it is said that historically Kasungu area has been provided free input than other areas. Given this situation, AEDOs have faced such expectation from the farmers, and tried farmers to contribute on their own and also in some cases introduced such input.

- No.3 problem for Lilongwe group was "lack of input", "lack of interest", and lack of cooperation among the farmers", and for Kasungu group was "poor leadership and weak group organization". AEDOs have made an awareness campaign, encouraged farmers to contribute, made frequent visit, and also arranged opportunities for interaction among the members including the leaders and between sites. Providing such opportunity would work better in a way of letting the farmers learn by themselves.

Table 3.6.3 Problem and Actions taken by Lilongwe Group

No.	Problem	No	Action taken	No
1	Water getting less, and dried up in cases	30	Used water can and treadle pump Advised farmers to start earlier next year Deepened canal Constructed water storage Reduced service area	14 4 3 2 1
2	Conflict on land for canal passing	9	Involved L. leaders to solve Sensitized on the importance	9 1
3	Lack of input (seed and fertilizer)	5	Encouraged to contribute to buy Empowered local leaders to proceed Contacted RDP, and got the input	4 1 1
3	Lack of interest	5	Made awareness campaign Involved local leaders Concentrated on interested ones Carried out demonstration Moved to another site	2 2 1 1 1
3	Lack of cooperation among farmers	5	Made awareness campaign Trained the committee Made frequent visit	2 1 1
6	Conflict on land to be developed	3	Took farmers to successful site	2
6	Boiling/ piping thr/ weir foundation	3	Imported clay soil Used plastic paper	2 1
6	Too deep stream to tap water	3		
9	Fuel not reimbursed timely	2		
9	Inadequate fuel to move	2	Bought on my own	1
9	Pest and animals	2	Made fence	1
9	Free handout expectation by farmers	2	Advised to sustain on their own	2
9	Rocks in canal alignment	2	Crashed by hammer Heated and watering	1 1
12	Lack of incentives for AEDC/AEDO	1	Committed and dedicated to work hard	1
12	Lack of tools	1	Encouraged to use their own	1
12	Loose soil on canal alignment	1	Used plastic paper Imported clay soil	1 1
12	Scarcity of land to be irrigated	1	Involved local leaders	1
12	Late briefing to L. leaders by AEDC	1	Done by AEDO	1
12	Late release of tools by AEDC	1	Advised to use the farmers' own	1
12	Weir damaged by jealously	1	Sensitized on the importance	1
12	Very short time to develop	1		
12	Weak local leadership	1		
12	Free hand out given by an NGO	1		

Table 3.6.4 Problem and Actions taken by Kasungu Group

No.	Problem	No	Action taken	No
1	Water getting less, and dried up in cases	30	Used water can and treadle pump Digging shallow well Group discussion about water rationing Planting early mature variety/ vegetables Advised farmers to start earlier next year Reduced service area Deepened canal Constructed water storage Mulching	4 4 4 2 1 1 1 1 1
2	Free handout expectation by farmers	15	Explaining farmers about JICA's policy Introduce the other donors/ NGOs Convincing farmers that they get harvest	4 2 2
3	Poor leadership/ weak group organization	8	Give opportunities for interaction Training of leadership	3 3
4	Lack of input (seed and fertilizer)	7	Encouraged to contribute to buy Encouraged to use manure	7 4
5	Conflict on land for canal passing	6	Involved local leaders to solve Convincing land owners	4 1
6	Transportation problems	5	Buy fuel Use bicycles Use fuel provided to DADO Borrowing transportation from neighbor Walk	3 1 1 1 1
7	Lack of implement	3	Demonstration Intensive visit	1 1
8	Water pressure damaged weir	2	Ask RDP sandbags Combination of weirs	1 1
8	Rocks in canal alignment	2	Crashed by picks Heated and watering	1 1
8	Big gullies on where canal passes	2	Constructed water bridge	1
8	Lack of tools	2	Contact RDP officer to assistance EPA has a source of materials	1 1
8	Too deep stream to tap water	2	Making dams to rise water level	1
13	Little commitment of staff	1	Proper planning and follow up	1
13	Lack of interest (few participation)	1	Start with a few interested farmers Demonstration/Visit	1 1
13	Animals	1	Made fence Deployed watch man	1 1
13	No super vision	1		
13	The other NGOs free input, etc.	1		
13	Lack of training to AEDOs	1		
13	Farmers are busy on other activities	1		

3.6.4 Best Experience during the Course of Implementation

A question of "what best experience(s) you have had on the course of the implementation was asked in the pre-training inventory survey. Tables 3.6.5 and 3.6.6 show the responses for Lilongwe and Kasungu groups respectively, and many participants listed "Weir well constructed (with local materials)" and "Canal well constructed with line level alignment" as the best experience. Most of the AEDOs together with their farmers admired the irrigation facilities they have constructed with very simple but appropriate technology.

Table 3.6.5 Best Experience on the Course of implementation for Lilongwe Group

No.	Specification	Nos
1	Weir well constructed	17
2	Canal well constructed with line level alignment	12
3	Gravity irrigation done	6
4	Site suitably chosen	4
4	Farmers willingness, actively participated	4
4	Facilitated farmers to construct weir/canal	4
7	Ancillary facilities well constructed	3
8	Weir constructed with locally available materials only	2
8	Farmers very impressed with the technology	2
10	Second crop planted	1
10	Farmers very happy to enjoy irrigation	1
10	Farmers who worked without handout	1
10	Farmers well cooperated	1

Table 3.6.6 Best Experience on the Course of implementation for Kasungu Group

No.	Specification	Nos
1	Canal well constructed with line level alignment	10
2	Weir well constructed	9
3	Farmers have interest in new technologies	6
4	Farmers willingness, actively participated	5
4	Farmers very impressed with the irrigation results	5
4	Successful participatory approach	5
7	Weir constructed with locally available materials only	3
7	Demonstration of small scale irrigation technologies	3
7	High adoption rate of the technologies	3
10	Successfully organized group	2
10	Some farmers developed sites themselves	2
11	New groups were organized by farmers watched developed sites	1
11	Group fund establishment	1
11	Farmers overcame the hard situations and constructed canals	1
11	Bridge construction	1

3.6.5 AEDO/AEDC Roles to Improve the Life of Smallholder Farmers

A question of "what do you think you should do to improve the life of smallholder farmers?" was asked in the pre-training inventory survey. Tables 3.6.7 and 3.6.8 show the responses for Lilongwe and Kasungu groups respectively, and more than half of the participants think that "arrange/ administer training, demonstration, and field trip" should be the priority role to improve the life of the smallholder farmers. One of the very important roles for extension officers should be Change Agent to the farmers. The role they think is due required for the change agent.

Table 3.6.7 AEDC/AEDO's Role to improve Smallholder Farmers Life for Lilongwe Group

No.	Specification	Nos
1	Arrange/ Administer training, demonstration, and field trip	27
2	Promote/ develop smallholder irrigation	9
3	Intensify agriculture production in higher yield	5
4	Arrange a soft loan with which farmers avail of input	3
4	Arrange input (seed and chemical fertilizer)	3
6	Commit and dedicate to his/her own work hard	2
6	Introduce small animal husbandry	2
6	Encourage farmers to intensify compost making	2
6	Encourage farmers to form cooperation/ association	2
10	Encourage farmers on self sustained agriculture system	1
10	Advice farmers to grow different crops	1
10	Train farmers in agri-business	1
10	Assist farmers in early planting	1
10	Find good market for farmers	1
10	Sensitize farmers to save crop sales for the following rainy season	1

Table 3.6.8 AEDC/AEDO's Role to improve Smallholder Farmers Life for Kasungu Group

No.	Specification	Nos
1	Arrange/ Administer training, demonstration, and field trip	23
2	Group organization/Participatory approach	9
3	Arrange input (seed and chemical fertilizer)	8
3	Promote/ develop smallholder irrigation	8
5	Intensify follow up of agricultural technologies	7
6	Enhance farmers motivation to adopt new technologies	6
7	Give business training to increase farm income	5
8	Arrange a soft loan with which farmers avail of input	3
8	Introduce farmers low cost technologies	3
10	Encourage farmers to intensify compost making	2
11	Encourage farmers on sustainable agriculture system	1
11	Sensitize farmers about importance of irrigation	1
11	Access to local leaders if problems about local society happen	1
11	Encourage farmers to diversify crop varieties	1
11	Disseminate materials	1

3.6.6 Compost Manure

Figures 3.6.3 and 3.6.4 show compost manure that the participants know and they have ever demonstrated respectively. As Figure 3.6.3 shows, all the participants for both Lilongwe and Kasungu groups know "Pit Compost" and in fact the Lilongwe group participants have all demonstrated the compost so far. Almost all participants also know "Chinese Compost", and over 80% of the participants have already demonstrated this type as well. "Chimato Compost" is known by about 90% of the Lilongwe participants and by 75% of the Kasungu group Participants.

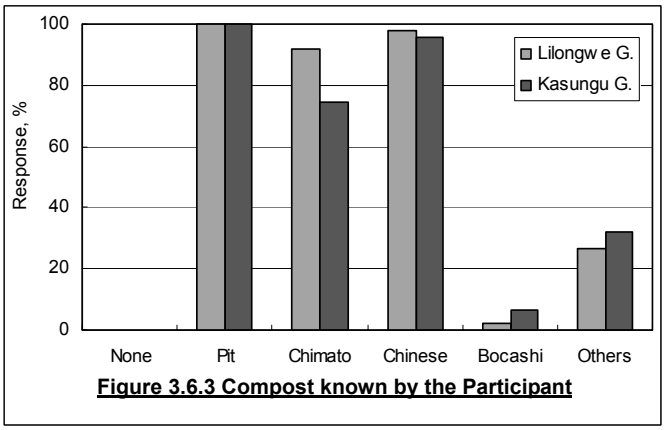


Figure 3.6.3 Compost known by the Participant

Demonstration of the Chimato compost has been done by over 80% of the Lilongwe participants and by about 55% of the Kasungu participants.

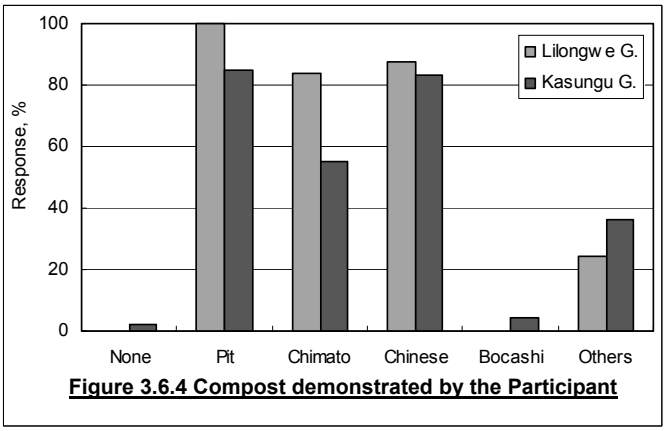


Figure 3.6.4 Compost demonstrated by the Participant

A question of "in what way do you think compost manure works?" was asked in the pre-training inventory survey. Tables 3.6.9 and 3.6.10 show the responses for Lilongwe and Kasungu groups respectively, and all of the participants understand the effects of the compost manure. Since farmers are very keen to apply chemical fertilizer rather than compost manure, it is recommended to point out that compost manure can hold water as mentioned by the participants as well as hold the nutrient of the chemical fertilizer so that the expensive chemical fertilizer is not necessary lost.

Table 3.6.9 Effects of Compost Manure for Lilongwe Group

No.	Effect	Nos
1	To supplement nutrient in terms of:	
	Nutrient	41
	Nitrogen	2
	Phosphate	1
2	To improve soil physical character especially in terms of:	
	Structure	32
	Water holding capacity	24
	Aeration	8
	Erosion control	3
	Acidity	3
	Soil temperature control	1
3	To contribute plant growth	9
4	To be cheap	1

Table 3.6.10 Effects of Compost Manure for Kasungu Group

No.	Effect	Nos
1	To supplement nutrient in terms of:	
	Nutrient	37
	Nitrogen	5
2	To improve soil physical character especially in terms of:	
	Structure	34
	Water holding capacity	24
	Aeration	6
	Soil softer	4
	Soil temperature control	2
	Retain soil nutrients	1
	Keep microorganisms	1
	Erosion control	1
	Acidity	1
3	Longer effect	1
3	To be cheap/locally available	1

In addition to the above question, another question of "what are the difficulties you have faced in disseminating compost manure?" was asked in the pre-training inventory survey.

Tables 3.6.11 and 3.6.12 show the responses for Lilongwe and Kasungu groups respectively, and Lilongwe participants think it is laborious work while Kasungu group thinks lack of transportation of the compost as the top reason. Water shortage is listed as No. 3 reason for Lilongwe group and No.10 for Kasungu group. Irrigation system, of course, entails canal which conveys water to the field. The canal therefore can avail of water for compost making near the field where the compost is applied. Irrigation system thus eases the laborious work and also lack of the transportation.

Table 3.6.11 Difficulties of Disseminating Compost Manure for Lilongwe Group

No.	Difficulties	Nos
1	Laborious work (especially for pit compost)	21
2	Adoption is low (even if they make, they do not apply)	10
3	Water shortage especially when making compost on the field	8
3	Lack of interest (low participation)	8
4	Lack of tools (e.g. wheel barrow to transport compost to the field)	5
4	No problem	5
7	Religious brief of not to use compost	4
8	Scarce animal dung	3
9	Difficult to make compost	2
9	Lack of understanding (think chemical fertilizer much better)	2
11	Slow effect of compost manure	1
11	Handout of chemical fertilizer	1
11	Long time for maturing	1

Table 3.6.12 Difficulties of Disseminating Compost Manure for Kasungu Group

No.	Difficulties	Nos
1	Lack of transportation	10
2	Adoption is low (even if they make, they do not apply)	9
3	Lack of interest (low participation)	8
3	Difficult to make compost (Methods)	8
5	Lack of understanding (think chemical fertilizer much better)	5
5	Laborious work (e.g. turning)	5
7	Long time to prepare	4
7	Slow effect of compost manure	4
9	Lack of animal manure	3
10	Water shortage especially when making compost on the field	2
11	Less fertility	1
11	Lack of tools	1
11	Free handout (chemical fertilizer)	1
11	Lack of plant residues	1

3.6.7 Natural Pesticide

Figure 3.6.5 shows natural pesticide (botanical pesticide) that the participant know and Figure 3.6.6 show the natural pesticide ever they have demonstrated. As Figure 3.6.5 shows, Katupe (*Tephrocia vagilii*) is known by almost 90% participants and also over 70% of the participants have demonstrated this plant as a natural pesticide. As

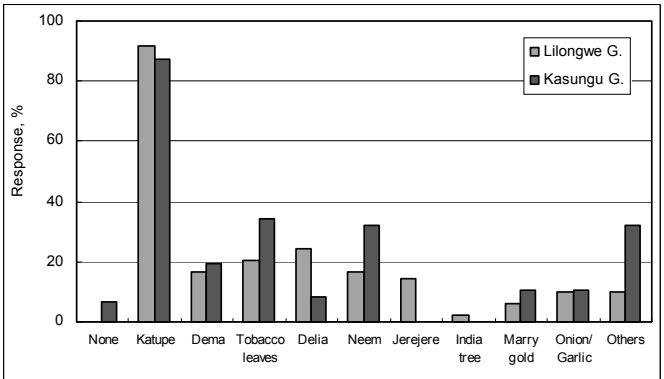


Figure 3.6.5 Natural Pesticide known by the Participant

compared to the Katupe, other natural pesticides are not so much familiar. One example is Jerejere (*Sesbania sesban*). Jerejere has been promoted in Malawi as one of agro-forestry trees. This leguminous tree fertilizes the soil as well as works as natural pesticide. Rotenone, tephrosin, deguelin are the element, which work as pesticide especially on maize stalk borer. These chemical element can be easily decomposed by ultra violet ray[1] so that toxemic effect to human (mammals) is not expected.

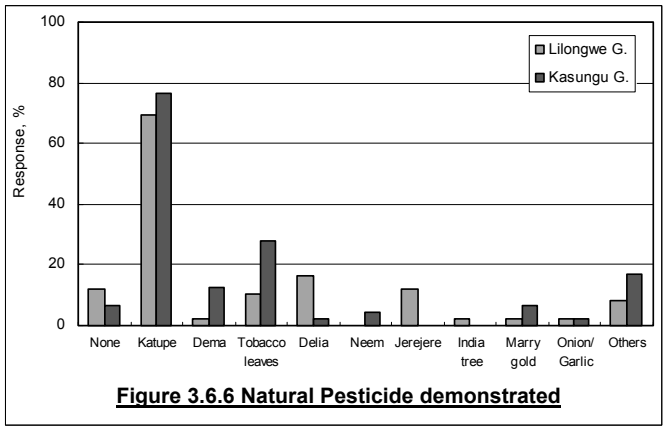


Figure 3.6.6 Natural Pesticide demonstrated

3.6.8 Catchment Area Conservation

Figure 3.6.7 shows catchment area conservation so far the participants demonstrated. Catchment area is the place where water, the source of irrigation, is generated. Irrigation development should always be taken into account catchment area conservation. About 80% of the participants so far demonstrated marker ridge together with in many cases vetiver grass planting. Followed are tree planting by about 30% of the participants, box ridge and check dam by about 20% of the participants.

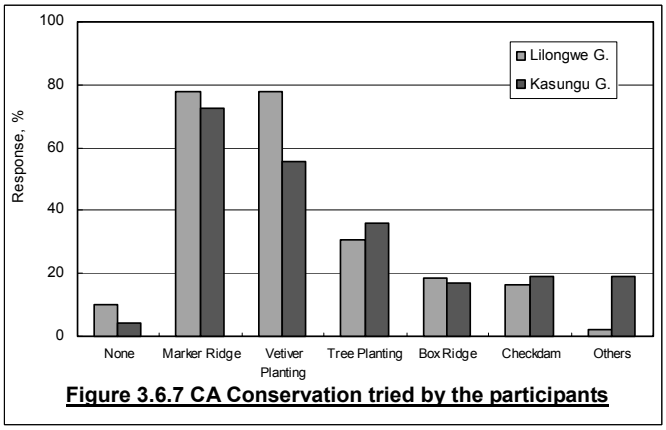


Figure 3.6.7 CA Conservation tried by the participants

3.7 Achievement of the Smallholder Irrigation Development in 2004 Dry Season

Table 3.7.1 shows the achievement of the smallholder irrigation development in this dry season 2004 (for detail, see Attachment-3.4). Total number of sites developed is 264, of which 61 sites (23%) are rehabilitation and 203 sites (77%) are newly developed area. The 264 sites altogether has developed a total area of 321 ha, giving an average of 1.21 ha per site. Farmers organized are 5,376 in total, and the total canal length so far excavated is 142km. These achievements are about 90% of the targets set in last May/June except for canal excavation which is 64% achievement of the target.

As an average, one site accommodates 20 farmer members in the 1.21 ha and has 541m length of canal. Overall average area allocated per farmer arrives at 0.06 ha (12x50m, or 24x25m). The average area per farmer by RDP is 0.029ha, 0.066ha, 0.066ha, and 0.092ha for Lilongwe E., Dedza Hills, Dowa and Ntchisi respectively. Lilongwe E. area has mostly suffered from critical water shortage, resulting in this small area allocation per farmer. Ntchisi area has, on the other hand, not suffered from water shortage blessed with enough rainfall and as a result gives largest area developed per site and per farmer: that are 1.93 ha per site and 0.092 ha per farmer.

[1] Half life is less than 1 day.

Table 3.7.1 Summary of the Smallholder Irrigation Development in 2004 Dry Season

Particular	Lilongwe E.	Dedza Hills	Dowa	Ntchisi	Total	Target set in May
No. of EPA	7	6	9	4	26	
Potential sites identified	78	93	147	58	376	
No. of sites pre-selected	69	59	104	46	278	
Sites developed	69	57	94	44	**264**	**287**
Site rehabilitated	23	8	18	12	**61**	
Site newly developed	46	49	76	32	**203**	
Area developed, ha	45	69	121	85	**321**	**340**
Farmers organized	1,588	1,040	1,826	922	**5,376**	**6,177**
Canal excavated, m	42,015	19,974	52,685	28,095	**142,769**	**223,283**
Site per EPA	10	10	10	11	10	
Farmers per EPA	227	173	203	231	207	
Area per EPA, ha	6	11	13	21	12	
Canal per EPA, m	6,002	3,329	5,854	7,024	5,491	
Farmers per site	23	18	19	21	**20**	
Area per site, ha	0.66	1.21	1.29	1.93	**1.21**	
Canal per site, m	609	350	560	639	**541**	
Area per farmer, ha	0.029	0.066	0.066	0.092	**0.060**	

Given a net 5-day training course and simple tools such as pick, wheel barrow, panga, etc. which total cost per EPA is about MK200,000 (for detail see Attachment-3.6), the trained AEDOs/AEDCs, total 104, together with their fellows who did not attended the course have developed such a great number of 264 sites with a total area of 321ha. The area developed is now about to give benefit to as many as over 5,000 farmer members. This has been achieved in just three and half months.

Though some of the sites, especially in Lilongwe East area, may not be able to harvest this year due to critical water shortage[2], at least the skills of developing smallholder irrigation has been imparted in the relevant extension officers and also farmers. Therefore, whenever they are blessed with rainfall, it is expected that they start smallholder irrigation on their own and can have harvest.

3.8 Target set for the Year 2004/05 Season

Given all the necessary trainings relative to agriculture component as well as improved cooking stove, which contributes to catchment area conservation, and also dissemination materials of poster and leaflet, the participants prepared an entry program for the year 2004/05. The entry program consists of: 1) Bocashi compost, 2) Improved cooking stove, 3) Botanical pesticide, and 4) Improved grain storage. For the Bocashi compost and improved cooking stove, the program further consists of 1) how many demonstration by AEDOs and 2) how many to be made by the farmers. AEDO participants together with their AEDCs were asked to set his/her own target according to the potential of their sections. Tables 3.8.1 and 3.8.2 below summarizes the milestone targets to be achieved by the 1st week December of 2004 and by the end June of 2004 (for more detail, see Attachment-3.5).

The targets by 1st week of December 2004 are: 535 for Bocashi demonstration, 2,851 for Bocashi heap to me made by the farmers, 381 for improved stove demonstration, 1,106 for the stove constructed by farmers, 640 for botanical pesticide demonstration and 215 for improved

[2] The last rainfall (2003/04) in Lilongwe area was about 20% less than average.

storage demonstration. The other targets by the end of June 2005 are: 1,205 for Bocashi demonstration, 11,138 for Bocashi heap to me made by the farmers, 938 for improved stove demonstration, 2,417 for the stove constructed by farmers, 1,727 for botanical pesticide demonstration and 638 for improved storage demonstration.

The achievement against the target of 1st week December 2004 will be collected by JICA study team and incorporated in the final report of the Study. However the achievement against the target at the end of June 2004 will be reported to the respective DADOs by AEDCs (the JICA study is to finish at the end of March 2005).

Table 3.8.1 Summary of Milestone Target by the 1st Week of December 2004

Particular	Lilongwe E.	Dedza Hills	Dowa	Ntchisi	Total	Remarks
No. of EPAs	7	6	9	4	26	
Demonstration of Bocashi	162	116	182	75	535	
No. of Bocashi heaps	1,122	614	782	333	2,851	
Demonstration of improved stove	99	72	157	53	381	
No. of improved stoves	334	165	477	130	1,106	
Demonstration of botanical pesticide	168	71	271	130	640	
Demonstration of improved storage	51	35	98	31	215	
Demonstration of Bocashi per EPA	23	19	20	19	21	
No. of Bocashi heaps per EPA	160	102	87	83	110	
Demonstration of improved stove per EPA	14	12	17	13	15	
No. of improved stove per EPA	48	28	53	33	43	
Demonstration of botanical pesticide per EPA	24	12	30	33	25	
Demonstration of improved storage per EPA	7	6	11	8	8	
No. of Bocashi per demonstration	7	5	4	4	5	
No. of improved stove per demonstration	3	2	3	2	3	

Table 3.8.2 Summary of Milestone Target by the end of June 2005

Particular	Lilongwe E.	Dedza Hills	Dowa	Ntchisi	Total	Remarks
No. of EPAs	7	6	9	4	26	
Demonstration of Bocashi	365	260	398	182	1,205	
No. of Bocashi heaps	2,317	5,018	2,601	1,202	11,138	
Demonstration of improved stove	226	178	414	120	938	
No. of improved stoves	596	343	1,089	389	2,417	
Demonstration of botanical pesticide	370	231	860	266	1,727	
Demonstration of improved storage	131	114	301	137	683	
Demonstration of Bocashi per EPA	52	43	44	46	46	
No. of Bocashi heaps per EPA	331	836	289	301	428	
Demonstration of improved stove per EPA	32	30	46	30	36	
No. of improved stove per EPA	85	57	121	97	93	
Demonstration of botanical pesticide per EPA	53	39	96	67	66	
Demonstration of improved storage per EPA	19	19	33	34	26	
No. of Bocashi per demonstration	6	19	7	7	9	
No. of improved stove per demonstration	3	2	3	3	3	

3.9 Training Achievement by the Objectives

At the end of the training course, the participants were asked how much they have achieved the objectives of the training in a level of 1 to 5; level-1 is the least achieved while level-5 is the most achieved. None of the participants answered level-1 or level-2 achievement. Lilongwe group as shown in Figure 3.9.1 indicated that objectives No.1-4 have

Objectives are at the end of the training the participants are able to:

1. Sum up experiences of the AEDOs & AEDCs on the smallholder irrigation development,
2. Share the skills and attitude to solve the problems encountered during the implementation,
3. Gain collective insights on what needs to be improved further relative to implementing smallholder irrigation development,
4. Enumerate and discuss local resources based agriculture development in conjunction with irrigation,
5. Acquire knowledge and skill to construct an energy efficient cooking stove, which contributes to conserving catchment area,
6. Prepare EPA and RDP basis entry program for year 2004/05, and
7. Discuss way-forward for smallholder irrigated agriculture development in Malawi.

been achieved at level-5 by about 40-50% participants and at level-4 by about 40%, which are relatively low as compared to objectives No.5-7 and also to the results of the 1st AEDO training course. This may be because objectives No.1-3 are related to collective insight and achievement, which makes participants difficult to highly achieve the objectives. Several participants in fact commented some participants were not fully engaged while their colleagues were presenting, somewhat resulting to the lower achievement of the objectives No.1-3. Session relative to objective No.4 included many sub-sessions such as compost manure, botanical pesticide, bamboo liquid, liquid fertilizer, grain storage, etc., and this arrangement may have made the participants a little difficult to understand the whole contents. Also no field practice except for compost manure has been done for the session relating to objective No.4, and this may have resulted in the lower achievement.

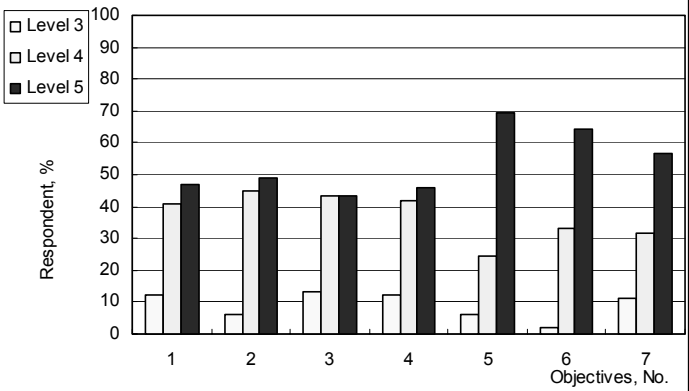


Figure 3.9.1 Achievement in a Level of 1-5 by Objectives: Lilongwe G.

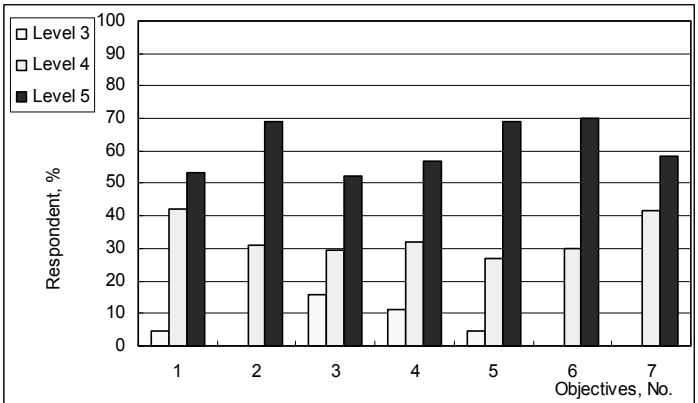


Figure 3.9.2 Achievement in a Level of 1-5 by Objectives: Kasungu G.

On the weekend right after Nathenje group has been finished, the trainers together with the JICA team once sit down together and looked into the achievement of the Lilongwe group. The trainers and JICA study team had above insight and discussed how well they could get all the participants actively to participate especially during group work and during presentation by their colleagues. Trainers decided to well attend the participants during the group work and also the presenter, not letting them alone. With this in mind, the facilitation for the Kasungu group has proceeded well, and this must have resulted in the higher achievement of the Kasungu group as shown in the Figure 3.9.2.

3.10 Participants' Satisfaction

3.10.1 Satisfaction by Activity

At the end of each day's activities, the participants were asked of what extend he/she was satisfied by each activity: level 1 is the least satisfied while level 5 is the most satisfied. Figure 3.10.1 summarizes the level of satisfaction of Lilongwe group: relatively low satisfaction was observed in such sessions of "1.1 Program Orientation", "1.4 Output Presentation by EPA" and "3.1 Field visit to

Activities	
1.1	Program orientation
1.2	Feedback from the 1st AEDO training
1.3	Summing up of the 1st Generation Projects
1.4	Output Presentation by EPA
1.5	Problems arisen and Actions taken (G. work)
2.1	Problems arisen and Actions taken (discussion)
2.2	Tools required (Workshop)
2.3	Bocashi, and Liquid Fertilizer
2.4	Botanical Pesticide, and Bamboo Liquid
2.5	An Improved Storage
2.6	An Energy Saving Cooking Stove
3.1	Field visit to Mr. Aybu's field
3.2	Practice on Bocashi
4.1	Field visit to Tikolore and Tilime
4.2	Practice on improved storage
5.1	Gender and HIV/AIDS
5.2	Dissemination Material
5.3	Entry planning and output presentation
5.4	Training Evaluation

Mr. Aybu's farm", while very high satisfaction observed in the session of "5.1 Gender and HIV/AIDS". In the program orientation, the official opening was delayed due to an unforeseen reason. During the output presentation, there were some participants who did not engage themselves while their peers were presenting. These resulted in the relatively low satisfaction level.

Mr. Aybu is a very unique organic farmer. He is actually a very innovative organic farmer who sells the vegetables to the Shopright, a big supermarket, almost exclusively. When he started his farming, he could not receive any extension services because he operated on his own (extension service usually operates on a farmer group). What he has been doing to date is almost try and error basis. There are many things that extension officers can learn but at the same time those things may look a little bit uncomfortable to accept for those who are used to conventional approach. This point must have resulted in the lower satisfaction rate.

The trainers once sat down after the training for the Lilongwe group had finished and looked through the satisfaction rate together with the comments given by the participants. The comments were: more interactive than one-way lecture, more practice, more participation by the participants, etc, which have been incorporated in the Kasungu group training session. Therefore, the training mechanics in Kasungu group have been improved, which in fact gave the higher satisfaction rate than the Lilongwe group as shown in Figure 3.10.2. So was the Mr. Aybu's case. Asked to allocate more time on the farm, he could deliver his message more to the Kasungu group, giving improved satisfaction rate.

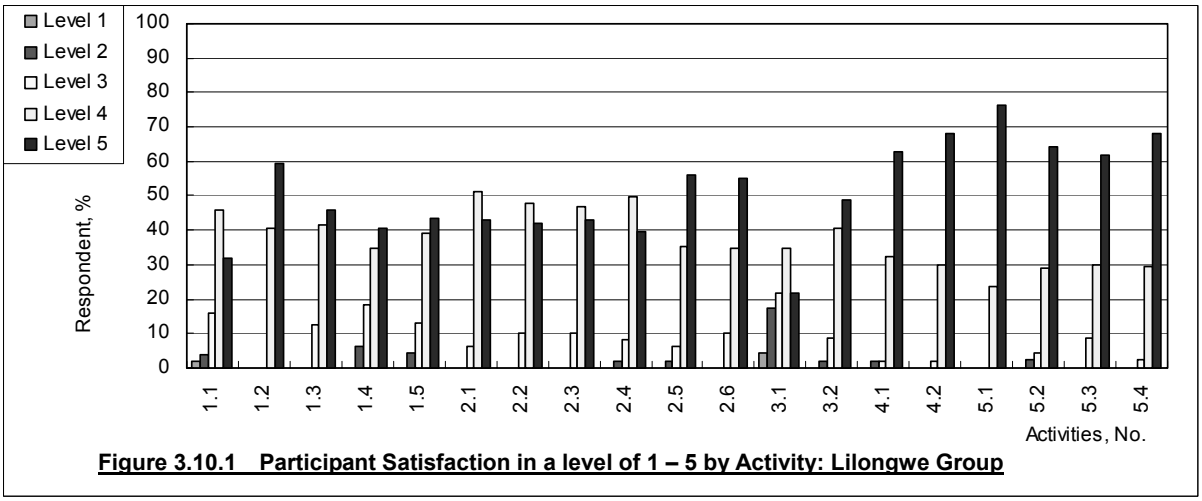


Figure 3.10.1 Participant Satisfaction in a level of 1 – 5 by Activity: Lilongwe Group

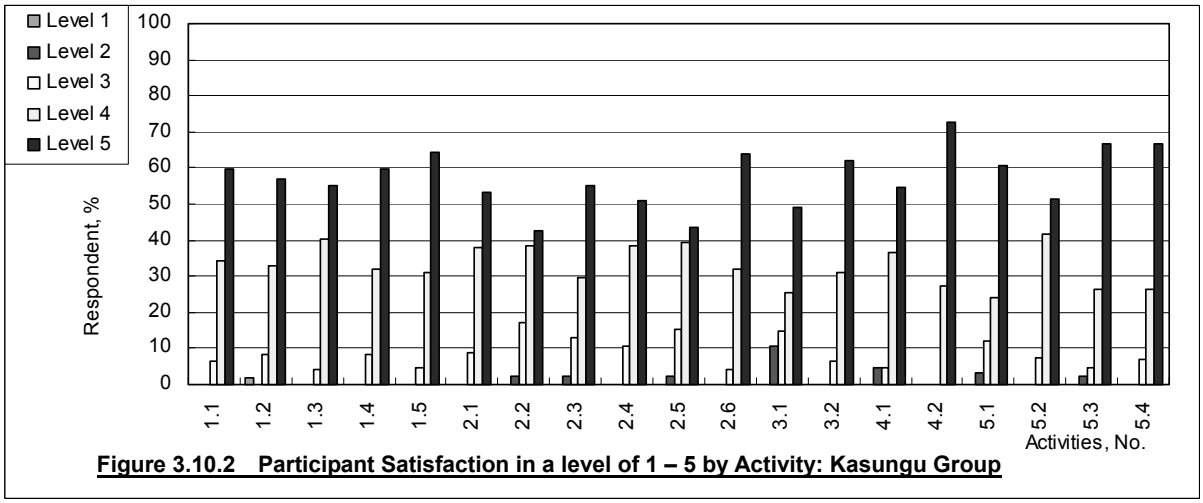


Figure 3.10.2 Participant Satisfaction in a level of 1 – 5 by Activity: Kasungu Group

3.10.2 Satisfaction by as a whole, logistics, theory, practice, and own participation

Aside from asking the participants their satisfaction by activity, satisfaction by as a whole, logistics, theory, practice and own participation in a level of 1-5 were also asked. Figure 3.10.3 shows the satisfactions for Lilongwe group and Figure 3.10.4 for Kasungu group. Most of the participants gave such high level of satisfaction as level-4 and level-5 to those issues; namely, more than 80% of the participants gave the level-4 or more higher level of the satisfaction to all the issues.

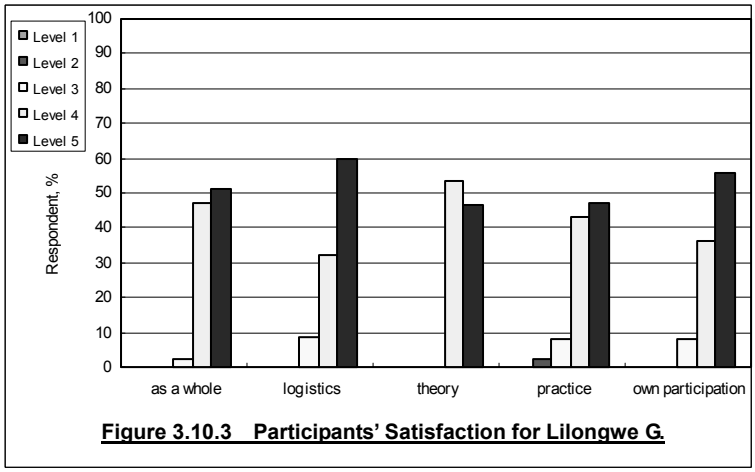


Figure 3.10.3 Participants' Satisfaction for Lilongwe G.

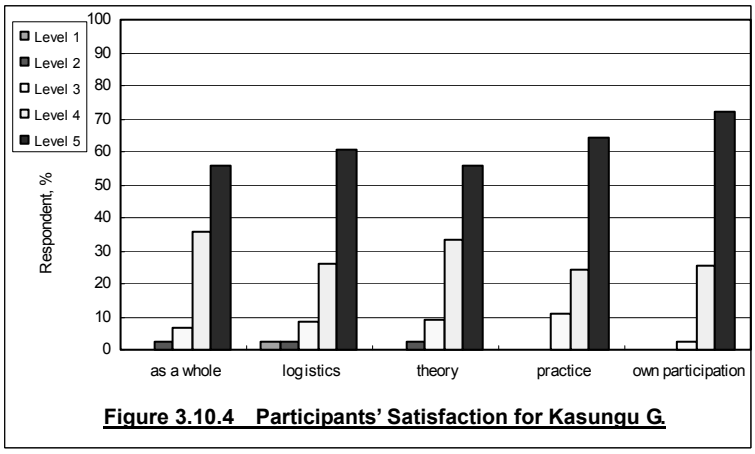


Figure 3.10.4 Participants' Satisfaction for Kasungu G.

For Practice in Lilongwe group, lower level of satisfaction is observed, for which the material for making compost was not enough for the 1st day. Logistics was a concern for some of the participants especially in terms of lodging in Kasungu group. Since there are many better lodging places in Mponela than the RTC, the participants expected to stay in those hotels. Also sanitation in both Nathenje and Mponela RTCs was a problem with former worse. These concerns rated the satisfaction of Logistics a little lower as compared to others.

3.11 Participants' Comments to Improve

In addition to rating the satisfactions above, the participants were asked to make comments to improve if any with respect to: 1) as a whole, 2) logistics, 3) theory, 4) practice, 5) own participation, and 6) how to best improve the training course in future. Tables 3.11.1 to 3.11.12 summarize the comments respectively, key points of which are as follows:

1. Training has satisfied most of the participants in terms of all the aspects as shown in the tables that comment to come first is "well organized, well presented, contents were enough, much handout for reference, well achieved, so on so forth" in most cases.
2. Some participants pointed out more practicals than theory since they are the frontline officers who work on the ground. Though this is very important point, the training course had to deal with both theory and practices within a limited duration of net 5 days. Therefore only important components such as Bocashi compost manure and improved cooking stove have incorporated the practice. The other component such as botanical

pesticide, liquid fertilizer, etc. which are relatively simpler could be practiced at EPA level.

3. Some participants suggested a follow up/ review meeting. Since this training has set targets of such composts as manure making, botanical pesticide, improved grain storage, improved cooking stove, etc., these must be followed up. The irrigation officers together with crop officers in the respective RDPs are requested to make regular visit to follow up, and the AEDCs are expected to report their achievement against the targets to their DADOs. The EPAs were given pro-form to fill the achievement by specific month till the end of June 2005 which is corresponding to the end of Malawian fiscal year. The pro-form is finally to be submitted to their DADOs.
4. During 1st AEDO training sessions, some participants emphasized more participatory way of facilitating the sessions. The facilitators this time have hardly heard such comments as they have already acquired enough skills to lead/ facilitate the sessions. They are now confident to be the trainer to promote smallholder irrigation development, and ready to render the services upon request. Also, pointed out is that recruiting facilitators from government officers is much more sustainable in running such training course than dependent on outside facilitators.
5. Some participants pointed that the training centers are not comfortable in lodging due to dilapidated facilities, especially toilet facility. Faced with limited recurrent budget, these RTCs have a difficulty to improve the facilities. This was a background that we have asked the participants to stay in the RTCs so that the RTCs may replenish the recurrent budget out of the lodging fee. Also GOM/ADD is expected to improve the facilities so that the participants can more concentrate on the training course free from such bothering.

Table 3.11.1 Comments on as a whole for Lilongwe Group

No.	Comments	Nos
1	The training was well organized and well presented.	35
2	The site presenters on practical sites must fully be informed of their role.	3
3	The training needs a review on activities every 3 months.	2
3	The contents were enough and new. Fully understood all the sessions.	2
3	Much handout for reference made available than other trainings	2
6	On botanical pesticides, there is need to improve clarification with practicals	1
6	Those lessons requiring practicals should be practiced.	1
6	The contents were good but some facilitators were unable to explain well.	1
6	For refreshments, snacks were not enough.	1

Table 3.11.2 Comments on as a whole for Kasungu Group

No.	Comments	Nos
1	The training was well organized and well presented.	39
2	The training needs a review on activities every 4 months.	2
3	Increase time on crop storage topic	1
3	Should include practical on crop storage	1
3	Very useful and helpful to farmers adopt the technology	1
3	On Bocashi making theory need to be done after tea break to avoid overdosing	1
3	Change venue	1

Table 3.11.3 Comments on Logistics for Lilongwe Group

No.	Comments	Nos
1	Well organized.	32
2	The venue (Nathenje TC) has poor sanitary toilets and bathrooms.	7
3	There is need to change the venue (due to poor sanitary condition).	5
4	The allowances should go up.	1
4	Soft drinks to be provided in all field visits.	1
4	Improve on self sponsored food during practices.	1
4	Logistics okay but lodging allowances should be given to us.	1
8	Others (not specifically relevant).	2

Table 3.11.4 Comments on Logistics for Kasungu Group

No.	Comments	Nos
1	Well organized.	38
2	Logistics okay but lodging allowances should be given to us.	4
3	The venue (Mponela TC) has poor sanitary toilets and bathrooms.	3
4	There is need to change the venue (due to poor sanitary condition).	2
4	All was good except transport for emergency	2
6	The allowances should go up.	1
6	Improve on self-sponsored food during practices.	1
6	Others (not specifically relevant).	1

Table 3.11.5 Comments on Theory for Lilongwe Group

No.	Comments	Nos.
1	Well organized.	37
2	The trainers must not be doubtful in their presentation and must be fully prepared.	2
3	Much has been done and now has to be done on practice.	1
3	More technical topic has to be introduced.	1
3	More on organic manure should be tackled.	1
3	Well presented but Bocashi manure needs some additional information on dimension.	1
3	Some things covered did not have notes for reference.	1
3	The time is not enough.	1
3	Materials should be in Chichewa.	1

Table 3.11.6 Comments on Theory for Kasungu Group

No.	Comments	Nos.
1	Well organized.	43
2	Much has been done and now has to be done on practice.	2
2	The time is not enough.	2
4	Others (not specifically relevant).	1

Table 3.11.7 Comments on Practice for Lilongwe Group

No.	Comments	Nos
1	Very good that the practical has reflected the exact job on the ground.	42
2	No practice on botanical pesticides.	2
3	Bocashi making was not fully facilitated by the facilitating team.	1
3	Next time choose a better farmer on organic agriculture.	1
3	Encourage full participation.	1
3	Enough materials should be ready (referring to Bocashi material)	1
3	The time is short.	1

Table 3.11.8 Comments on Practice for Kasungu Group

No.	Comments	Nos
1	Very good that the practical has reflected the exact job on the ground.	37
2	The time is short.	7
3	No practice on botanical pesticides.	1
3	Next time choose a better farmer on organic agriculture.	1
3	Encourage full participation.	1
3	Enough materials should be ready (referring to Bocashi material)	1

Table 3.11.9 Comments on Own Participation for Lilongwe Group

No.	Comments	Nos
1	Well achieved.	44
2	It was a two-way communication.	1
2	Increase the period to 2 weeks.	1
2	Next time to see liquid manure.	1
2	Practical needs to be done on improved storage.	1
2	Not much from the participants.	1

Table 3.11.10 Comments on Own Participation for Kasungu Group

No.	Comments	Nos
1	Well achieved.	44
2	Increase the period to 2 weeks.	1
2	Some topics did not include practice	1
2	Practical needs to be done on improved storage.	1

Table 3.11.11 Comments on how to best improve the training course in future for Lilongwe Group

No.	Comments	Nos
1	Extend the period of training.	8
2	Include other AEDOs and other EPAs.	6
3	Change the venue on sanitary issue.	5
4	Prepare the sites for the practicals.	4
5	Farmers should have exchange tours.	3
5	Allocate more time on practicals and have enough materials for practicals.	3
5	Incorporate more subjects.	3
5	Encourage more participation during theory to avoid participants from sleeping.	3
9	Refreshments should be collected especially during field visits.	2
9	Food should be served with refreshments during field trips.	2
9	Make follow up training	2
9	Site to be visited should be new.	2
9	Cover other topics apart from irrigation.	2
9	Select facilitators who speak fluently and are polite.	2
9	Facilitators should stop treating participants as farmers during practicals.	2
16	Maintain the showers at Nathenje RTC.	1
16	Groups for discussion should be smaller.	1
16	Entertainment (movie show) during evening hours should be everyday.	1
16	Increase more time on gender topic.	1
16	More training for AEDOs.	1
16	All deliberations be focused on programme.	1
16	More handouts and practical materials.	1
16	Visit farmers who are practicing so that they can teach from a file.	1
16	Provide enough materials in time.	1
16	Choose sites close to the training center	1
16	Improve allowance.	1
16	Continue trainings.	1

Table 3.11.12 Comments on how to best improve the training course in future for Kasungu Group

No.	Comments	Nos
1	Extend the period of training.	15
2	No problem all was good	10
3	Allocate more time on practicals and have enough materials for practicals.	3
4	Include other AEDOs and other EPAs.	1
4	Prepare the sites for the practicals.	1
4	Field trips must be close to the training center	1
4	Encourage more participation during theory to avoid participants from sleeping.	1
4	Make follow up training	1
4	Site to be visited should be new.	1
4	Select facilitators who speak fluently and are polite.	1
4	Entertainment (movie show) during evening hours should be everyday.	1
4	Driver to sleep close to participants.	1
4	Since you are rigid in your administration we will just abide by you rules and regulations	1
4	The trainers to practice TOT procedures	1
4	Provide enough materials in time.	1
4	Choose sites close to the training center	1
4	Improve allowance.	1
4	Continue trainings.	1
4	There should be no breakdown between presenter and participants	1
4	Need more technology	1
4	Handouts after each topic should be readily available	1
4	The frontliners as it has been proposed by trainers	1
4	There was a gender in balance	1

Attachment-3.1 Schedule of Activities

SCHEDULE OF ACTIVITIES

DATE / TIME	***ACTIVITIES***	***RESPONSIBLE***
Day 1 (sun): Gathering to the training center		
Day 2 (Mon): Officer of the Day; Mr. Cheyo/ Mr. Mzalule		
Module 1 - Program Orientation		
8:00-9:00	*Registration and Pre-Training Knowledge Inventory*	*Ms. D. Kaunda*
9:00-9:30	*Opening Program*	*OD*
9:30-10:00	*Overview of the Training Program*	*OD*
10:00-10:15	*Tea Break*	
10:15-10:45	*Surfacing of Participants' Expectation*	*Mr. Kilembe/Chingawalu*
10:45-11:15	*Feedback from the First AEDO Training*	*Mr. Hashiguchi*
11:15-12:00	*Summing up of the Outcomes of 1st Generation Projects*	*Mr. Hashiguchi*
12:00-13:00	*Lunch Break*	
Module 2 - Presentation of Smallholder Irrigation Development		
13:00-15:00	*Output Presentation by EPA*	*Mr. Ngwira/ Somanje*
15:00-15:15	*Tea Break*	
15:15-16:30	*Problems arisen and Actions taken (group work)*	*Mr. Ngwira/ Somanje*
16:30-17:00	*Participants Action Reflection*	*OD*
DAY 3(Tue): Officer of the Day; Mr. Luhanga/ Mr. Malunga		
Module 2 - Presentation of Smallholder Irrigation Development		
8:00-8:30	*Recapitulation*	*OD*
8:30-11:00	*Problems arisen and Actions taken (workshop discussion)*	*Mr. Ngwira/ Somanje*
11:00-12:00	*Tools required in implementing Smallholder Irrigation (WS)*	*Mr. Cheyo/ Chabuka*
12:00-13:00	*Lunch Break*	
Module 3 - Local Resources Based Agriculture Development (lecture)		
13:00-14:00	*Bocashi(A Quick Making Compost)/ Liquid Fertilizer*	*Mr. Chingwalu/ Luhanga*
14:00-14:40	*Botanical Pesticide*	*Mr. Kumchulesi*
14:40-15:15	*An Improved Storage*	*Mr. Kumasala*
15:15-15:30	*Tea Break*	
Module 4 - A Mean of Conserving Catchment Area		
15:30-16:30	*An Energy Saving Cooking Stove (lecture)*	*Mr. Malunga/ Lingani*
16:30-17:00	*Participants Action Reflection*	*OD*
DAY 4(Wed): Officer of the Day; Mr. Kilembe/ Mr. Chigwalu/ Mr. Chabuka/ Mr. Lingani		
Module 3&4 on Field Visit and Practice		
8:00-8:30	*Recapitulation*	*OD*
Group A		
8:30-12:00	*Visit to Mr. Ayub's Farm (An innovative organic farmer)*	
12:00-13:00	*Lunch at Lilongwe*	
13:00-17:00	*Practice on Making Bocashi (at Chitedze)*	
17:00-17:30	*Participants Action Reflection*	*OD*
Group B		
8:30-12:00	*Visit to Smallholder Irrigation Sites (two sites)*	
12:00-13:00	*Lunch at Mvera EPA*	
13:00-17:00	*Practice on Making Energy Efficient Stove (at Mvera EPA)*	
17:00-17:30	*Participants Action Reflection*	*OD*

DAY 5(Thu): Officer of the Day; Mr. Kilembe/ Mr. Chingwalu/ Mr. Chabuka/ Mr. Lingani
Module 3&4 on Field Visit and Practice

8:00-8:30	*Recapitulation*	*OD*
Group A		
8:30-12:00	*Visit to Smallholder Irrigation Sites (two sites)*	
12:00-13:00	*Lunch at Mvera EPA*	
13:00-17:00	*Practice on Making Energy Efficient Stove (at Mvera EPA)*	
17:00-17:30	*Participants Action Reflection*	*OD*
Group B		
8:30-12:00	*Visit to Mr. Ayub's Farm (An innovative organic farmer)*	
12:00-13:00	*Lunch at Lilongwe*	
13:00-17:00	*Practice on Making Bocashi (at Chitedze)*	
17:00-17:30	*Participants Action Reflection*	*OD*

DAY 6 (Fri): Officer of the Day; Mr. Lingani/ Mr. Kumchulesi
Module 5 - Entry Planning and Output Presentation

8:00-8:30	*Recapitulation*	*OD*
8:30-9:15	*Gender Issues*	*Mr. Chabuka*
9:15-10:00	*Dissemination Material (posters/leaflets)*	*Mr. Mzalule*
10:00-10:15	*Tea Break*	
10:15-11:00	*Entry Planning Orientation*	*Mr. Kumasala/Mr. Malunga*
11:00-12:00	*Entry Planning (group work by EPA)*	*Mr. Kumasala/Mr. Malunga*
12:00-13:00	*Lunch Break*	
13:00-15:00	*Output Presentation by EPA/RDP*	*Mr. Kumasala/Mr. Malunga*
15:00-15:15	*Tea Break*	

Module 6 - Training Evaluation

15:15-16:00	*Training Evaluation*	*Mr. Kilembe/Mr. Chingwalu*
16:00-16:30	*Closing Program*	
18:00-	*Participants – JICA Study Team Interaction*	

Day 7 (Sat): Home Sweet Home (transportation to be arranged by JICA)

Objectives of Major Topics

1. Liquid fertilizer
   By the end of the topic, participants should be able to know the following;
   a. Materials needed in making liquid fertilizer
   b. How to make liquid fertilizer
   c. How to apply liquid fertilizer to our crops
   d.
2. Improved storage
   By the end of the topic, participants should be able to know the following;
   a. the materials needed for the construction of improved storage
   b. How to construct an improved storage
   c. How to care about the improved storage

3. Improved cooking stove
   By the end of the topic, participants to acquire knowledge and skill on how construct and maintain an energy efficient cooking stove

4. Disseminate materials
   By the end of this presentation, participants will be able to use leaflets and posters

5. Botanical pesticides
   By the end of the topic, participants should know:
   a. Materials required in producing botanical pesticide
   b. The process of making the pesticide
   c. Methods of application
   d. Appreciate the advantages of using botanical pesticide

6. Gender and HIV
   By the end of the topic, participants will be able to;
   a. Explain the importance of gender issues in Agriculture
   b. Identify institutions that contribute to maintenance and reinforcement of gender roles, relations and responsibility in society.

7. Bocashi Compost making
   By the end of this topic, participants should know;
   a. The materials required for making Bocashi compost
   b. The process followed when making Bocashi compost
   c. How to check the temperature of the Bocashi heap of manure
   d. How to apply Bocashi compost manure
   e. The advantage of Bocashi compost manure

Attachment-3.2 Participants to the Second AEDO Training

LILONGWE ADD: Participant to the Training Course for Smallholder Irrigation Development (JICA)

ADD	RDP	EPA	Irrigation Officer	AEDOs	AEDC or Ass. AEDC	Remarks
Lilongwe	Lilongwe East		1			
		Chitekwere		3	1	
		Nyanja		3	1	
		Mkwinda		3	1	
		Chiwamba		3	1	
		Chitsime		3	1	
		Chigonthi		3	1	
		Mpenu		4	1	
	Above Total		1	22	7	
	RDP Total			30		
	Dedza Hills		1			
		Kanyama		3	1	
		Mayani		3	1	
		Mtakataka		3	1	
		Kaphuka		3	1	
		Golomoti		3	1	
		Bembeke		4	1	
	Above Total		1	19	6	
	RDP Total			26		
Above Total			2	41	13	
ADD Total				**56**		
Resource Person from Above RDPs				6		included in 56 above
Resource Person from Dowa/Ntchisi RDPs				5		
Resource Person from DOI				1		
Participant from Karonga				3		
Total Participants				**65**		
JICA Study Team				2		
JICA Counterpart from DOI HQs				1		same as the RP from DOI

KASUNGU ADD: Participant to the Training Course for Smallholder Irrigation Development (JICA)

ADD	RDP	EPA	Irrigation Officer	AEDOs	AEDC or Ass. AEDC	Remarks
Kasungu	Dowa		1			
		Mvera		3	1	
		Nachisaka		3	1	
		Chivala		4	1	
		Chisepo		3	1	
		Madisi		3	1	
		Mponela		3	1	
		Mndolera		3	1	
		Bowe		3	1	
		Nalunga		3	1	
	Above Total		1	28	9	
	RDP Total			38		
	Ntchisi		2			
		Chipuka		3	1	
		Kalira		3	1	
		Chikwatula		3	1	
		Malomo		3	1	
	Above Total		2	12	4	
	RDP Total			18		
Above Total			3	40	13	
ADD			1			
ADD Total				**57**		
Resource Person from Above RDPs				5		included in 58 above
Resource Person from LL E/Dedza Hills RDPs				6		
Resource Person from DOI				1		
Total Participants				**64**		
JICA Study Team				2		
JICA Counterpart from DOI HQs				1		same as the RP from DOI

Attachment-3.3 Problems & Solutions taken during the Implementation of SH Irrigation

Table 1.1 Problems and Solutions for Group 1 of Lilongwe Group

No	Problems	Solutions	Remarks
1	People are busy molding the bricks	・ Civic education on proper planning	
2	People are busy selling vegetable	・ Same as above mentioned	
3	Negative altitude toward the programme (Land owners)	・ Provide tours/ field days (include land owners) to successful sites	
4	Cultural ceremonies delays operations	・ Conduct practices ・ Seasonal calendar/ Food flow ・ Action planning	
5	Everybody would like to have free input issues (ex.. Seed, fert., etc.)	・ Civic education on cash purchases	
6	Water problems (Water level)	・ Early operations	・ Solution should be different depending on the amount of water. Need the historical date of hydrology.
7	In the package of tools there was no shovels	・ Use hoes. ・ Possibly JICA will provide.	

Table 1.2 Problems and Solution of Group 2 of Lilongwe Group

No.	Problems	Solutions	Remarks
1	Low water level and flow rate / drying up of rivers	・ Early diversion of river to be done as early as March ・ Abandonment of Sites ・ Abandonment of gravity irrigation and use watering cans	・ Appropriate time of the starting should be decided.
2	Boiling because of deep sandy soils	・ Sand should be scraped to get the hard soils replaced with clay soils. ・ Use of plastic paper underneath the weir.	
3	Widening of canal width due to sandy soil (wall breakages)	・ Aligning stones or bricks along the edge of the canals. ・ Vetiver established along the canals.	・ Vetiver should be prepared in June and July
4	Wrong attitude toward the programs	・ Civic education was done	・ It is not sure that civil education is effective.
5	Farmers expected to receive inputs as other NGOs are doing.	・ Civic education to be done to encourage sustainability ・ Contributions to be done for inputs purchasing.	
6	Water leakage of canal (seepage)	・ Compacting with clay soil. ・ Use plastics.	・ After removing the sand change into the mud. ・ Compaction is not effective to some type of soil. ・ Generally it is found out after constructing canals.
7	Rocks in the canal	・ Diversion of the canals ・ Breaking the rocks ・ Digging the canal around the rocks. ・ Lifting the rock using clovers.	
8	Some of the farmers were reluctant to allow the canal to pass through their fields	・ The matters was referred to the local leaders	

Table 1.3 Problems and Solutions of Group 3 of Lilongwe Group

No.	Problems	Solutions	Remarks
1	Rocks in the canals	・ Breaking rocks, or diverting canals	
2	Farmers refused canal to pass their land.	・ Civic educations by local leaders	・ Money solutions. ・ Before starting the construction, they should have a kind of contracts. ・ Should think of appropriate approaches toward to the land owners. ・ To explain why they will do the activities.
3	Insufficient water flow	・ Suspension until next year 2005	
4	Incentive from the other NGOs (less participation without handout)	・ Civic education ・ To take irrigation as the culture	・ Some NGOs have already given the materials to the participants. Thus, farmers expect the materials as same as above-mentioned, when AEDO starts the activities. ・ Should tell them no input before starting. ・ Should clarify that the farmers in future can get the profits from the activities and they can afford the input by themselves.
5	Lack of interest by farmers	・ Change of the site	
6	Other farmers vandalizing weir	・ Voluntary guarding	
7	Materials were not enough	・ Farmers used theirs	

Table 1.4 Problems and Solutions of Group 4 of Lilongwe Group

No	Problems	Solutions	Remarks
1	Resistance of some farmers to accept canal passing through the land	・ Liaising of the local leaders	
2	Land sharing to the interested farmers	・ Liaising of the local leaders ・ Renting	
3	Obstacles of rocks along canals	・ Burning rocks, and pouring cold water and hammering	
4	Collapsing the canal walls	・ Aligning rock bricks along the canals	・ Show photo of the site where farmers constructed canal along a big rock wall
5	Water shortage	・ Reducing service areas ・ Regulating of watering regime	・ Change the shape of the canals depending on the soil.
6	Village conflicts	・ Liaising of the local leaders	・
7	Dependency syndrome	・ Working with interested farmers	・ Rise the interest among farmers. ・ Promote the contribution of input. ・ Clarify which materials are necessary. ・ To rise self-reliance attitude (Ex. Ngoni headman word) ・ Self-reliance.
8	Leakage of brush dam	・ Put clay soils	
9	Inadequate support of donors to farmers of farm input as revolving funds	・ Mobilizing farmers to purchase their own input	

Table 2.1 Problems and Solutions for Group 1 of Kasungu Group

No.	Problems	Solutions	Remarks
1	Low water discharge	・ Reducing the area to be irrigated ・ Planting drought resistant crops ・ Suspension of site ・ Use of watering can/ T. pump	
2	Scramble for water	・ Rationing watering programme	
3	Land disputes	・ Consultation of local leaders	
4	Livestock destruction	・ Encouraged fencing ・ Scaring ・ Herding ・ Use of livestock dung	
5	Expectations of handouts	・ Encouraged farmers to be self reliant	
6	Inadequate working tool	・ Encouraged the spirit of borrowing among farmers	
7	Farmers drop out	・ Civil education	

Table 2.2 Problems and Solutions for Group 2 of Kasungu Group

No.	Problems	Solutions	Remarks
1	Water problems	・ Rationalization ・ Encourage to use treadle pump	・ Deep shallow well and use treadle pump
2	Low adoptions	・ Field days to conduct these technologies	・ For Farmers and AEDOs
3	Land problems	・ Farmers are encouraged to 1) lent land, 2) share freely.	
4	Poor leadership	・ Training the leadership programs / Group dynamics	
5	Mobility	・ asked team ・ AEDC borrow push bikes ・ Bus and bicycles	
6	Lack of inputs	・ Encourage to use recycled seed ・ Encourage to use manure ・ Borrow the materials/ equipments	・ In some case no supplier (ADMARC)
7	ADHOC	・ Re-planning of activities/ work by AEDC/AEDO and farmers	
8	Canal crossing major road	・ Deepen canal ・ Finally EU provide plastic pipe	・ Should dig deeper canals ・ NRA, ask DADO, EU
9	Erosion of canals	・ Vetiver grass	・ Stones ・ How to provide the vetiver: this area has already used vetivers. ・ Vetivers uptake water
10	High expectation of hand out Free input	・ Farmers were encouraged to be culture sensitive by using low cost technologies which sustain cultural values	・ 5 and 11 are opposite

Table 2.3 Problems and Solutions for Group 3 of Kasungu Group

No.	Problems	Solutions	Remarks
1	Land ownership	・ Discussions with chief and Local leaders	
2	Water shortage	・ Reduction of hectorage and early maturing varieties	
3	Farmers' expectations (Ex. Farm input)	・ Encourage to use low cost technologies and manure ・ Encourage to contribute some money to buy seed and fertilizer	
4	Conflict among farmers over working materials (Ex. Gun boots	・ Share resources and have time frame of activities amongst the groups	
5	Competitions among the stalk holders	・ Discussion among stakeholders and lastly surrender to the other stake holder	・ Competition means the other donors. (Ex. EU, NGO) ・ In JICA sites, there are many of technical knowledge but no input, so what is problem really ・ Mr. Hashiguchi for JICA doesn't matter even if they can get free hand out so long as it well works as starter pack but not implanting a sense of dependency. The farmers should decide. The site is not JICA site but the farmers' site.
6	Late introduction of the project	・ Farmers were persuaded to participate the project next seasons	

Table 2.4 Problems and Solutions for Group 4 of Kasungu Group

No.	Problems	Solutions	Remarks
1	Land ownership	・ Village headman to settle the disagreement between the farmers	
2	Water shortage	・ Reduce the hectorage	
3	Jealousy among members. Some of farmers not in group broke down the weir	・ Invite local leaders	
4	Livestock destroying crops	・ Watchman ・ Owner of animals charged	
5	Food for work	・ Re- planning	
6	Expected the input	・ Encourage to use manure	
7	Lack of collaboration with the others	・ Discussions with other stakeholders	
8	Poor leadership	・ Training on group dynamics	

Attachment-3.4 Achievement of Smallholder Irrigation Development

Attachment-3.5 Target set for Year 2004/05 Season

Attachment-3.6 Tools Provided to EPAs, Essential and Suitable Items

Item	Provided	Lilongwe G.			Kasungu G.			Recommendation		Price		Unit price,MK
		Mnimum	suitable	Priority	Minimum	Suitable	Priority	Essential	Suitable	Essential	Suitable	
Tools												
Panga	10	20	25	o	10	20		**10**	**20**	2,250	4,500	225
Hoes	10	20	30	o	10	20		**10**	**20**	2,750	5,500	275
Picks	5	10	15	o	5	10	o	**5**	**10**	3,750	7,500	750
Files	5	10	15		5	5			**5**	0	1,275	255
Wheel barrows	8	15	20	o	8	20	o	**10**	**20**	59,500	119,000	5,950
Hammers(4lb.)	3	10	15	o	3	5		**3**	**5**	2,175	3,625	725
Hammers(14lb.)	5	10	15	o	5	5	o	**5**	**5**	9,975	9,975	1,995
Strings	10	10	15		10	10		**10**	**10**	6,250	6,250	625
Saw(22")	3	10	15		3	3			**3**	0	2,550	850
Saw(26")	5	10	15		5	5			**5**	0	4,975	995
Gun boots	25	30	40	o	25	50	o	**30**	**40**	49,500	66,000	1,650
Measuring tapes	5	10	15	o	5	5	o	**5**	**5**	4,475	4,475	895
Buckets(a)	3	3	3		3	3			**3**	0	1,350	450
Buckets(b)	3	3	3		3	3			**3**	0	1,425	475
Line levels(50m)	5	10	15	o	5	5	o	**5**	**5**	1,750	1,750	350
Push bike w/o gear	4	6	10	o	4	7	o	**4**	**6**	43,200	64,800	10,800
Pump	1	6	10	o	2	5	o	**2**	**6**	900	2,700	450
Additional												
Shovels	0	20	30	o	5	10	o	**5**	**10**	4,975	9,950	995
Clobers	0	10	15						**5**	0	3,250	650
Carrier bags	0	10	15						**5**	0	1,975	395
Slashers	0	10	15						**5**	0	500	100
Sickels	0	10	15						**5**	0	4,250	850
Rakes	0	10	15						**5**	0	2,975	595
Garden folks	0	10	15						**5**	0	2,975	595
Bow saw	0	10	15	o				**3**	**5**	3,450	5,750	1,150
Axes	0					10			**5**	0	3,250	650
Sub-total										194,900	342,525	
Stationaries												
Paper(A4), rim	2	3	6		2	4	o	**2**	**4**	1,300	2,600	650
Hard cover note	10	10	15		10	10			**10**	0	2,950	295
Level arch files	3	3	6		3	10			**6**	0	1,770	295
Calicurator	1			o	1	10	o	**1**	**5**	1,950	9,750	1,950
Plastic bags	10	10	10		10	10			**10**	0	1,000	100
Ball point pen	10	10	15		10	15			**15**	0	375	25
Pencils	10	10	15		10	10			**10**	0	75	7.5
Shapeners	5	10	15		5	5			**5**	0	248	49.5
Punch	1	2	4		1	5			**2**	0	1,900	950
Rulers	5	10	15		5	6			**6**	0	210	35.00
Paper glue	2	2	4		2	6			**5**	0	1,475	295
Colour pencils, set	1	1	1		1	2			**2**	0	1,400	700
Paper Cutter	1	1	1		1	2			**2**	0	800	400
Thick A-4 Paper (for picture story)					20	20			**20**	0	1,880	94
Staple machine						4	o	**1**	**1**	1,150	1,150	1,150
Flip chart						4	o	**1**	**2**	495	990	495
Marker pen						2 boxes	o	**1**	**2**	450	900	450
Sub-total										5,345	29,473	
G. Total per EPA										200,245	371,998	

Note 1: 2nd column shows the tools provided to EPA in June 2004.
2: Numbers of minimum, suitable, and priority were identified during the Training by AEDOs/AEDCs.
3: Based on the numbers suggested, recommendation is made in terms of essential tools and suitable ones.
Note 4: 1US4 = MK 109 as of October 5,2004