

# ***TABLES***

**Table 1.1.1 Description of Typical Soil Profile (1/2)**

**Mapping Unit Mgt-1**

Soil Pit No.:	Mgeta-16
Soil Classification:	Eutric Cambisols
Date of Examination:	4 July 1997
Elevation:	1,390 m above sea level
Land-form:	Terraced field on the mountainous steep slope
Slope:	25 - 30%
Land Use/Vegetation:	Terraced field, cultivated with beans or vegetables
Parent Material:	Tuff
Drainage:	Well drained
Soil Moisture Condition:	Moist throughout
Groundwater Depth:	> 150 cm
Surface Stone or Rock Outcrop:	none
Erosion:	Slightly eroded

**Brief Description of the Profile:**

Moderately deep, brownish black, loam to sandy clay loam texture soil. The profile plot is in terraced field on the mountainous steep slope, and was selected at cut and embankment. The soil is well drained with very porous and moderate developed structure. The root distribution is many, and the majority of roots in the top of 55 cm.

**Soil Profile Description**

Ap	0 - 33 cm	Brownish black (10YR 2/2) moist and brownish black (2.5Y 3/1) dry, fine sandy clay loam; moderate medium granular structure; slightly sticky, slightly plastic, very friable moist; many medium pores; many fine and medium roots; gradual smooth boundary.
AB	33 - 55 cm	Brownish black (10YR 3/2) moist; sandy clay loam; moderate fine subangular blocky structure; slightly sticky; slightly plastic, very friable moist; many fine pores; very many fine and medium roots; gradual smooth boundary.
B2	55 - 90 cm	Brown (10YR 4/4) moist, sandy clay loam; moderate fine subangular blocky breaking easily to fine aggregates; slightly sticky, slightly plastic, friable moist; many very fine mica fragments (1 to 2 mm); few fine and medium roots; gradual smooth boundary.
C	90 -130 cm +	Dull yellowish brown (10YR 5/4) moist; sandy clay loam; weak medium subangular blocky; slightly sticky, slightly plastic, friable moist; common fine and medium pores; very few medium roots.

Land Class (for paddy rice/for upland crops):                      NRr/SU3awe

**Table 1.1.1 Description of Typical Soil Profile (2/2)**

**Mapping Unit: Mgt-2**

Soil Pit No.:	Mgeta-11
Soil Name:	Eutric Cambisols, stony phase
Date of Examination:	5 July 1997
Elevation:	1,030 m above sea level
Land-form:	Mountainous very steep slope
Slope:	25 - 30%
Land Use/Vegetation:	Terraced field, cultivated with maize
Parent Material:	Tuff
Drainage:	Well drained
Soil Moisture Condition:	Moist throughout
Groundwater Depth:	> 150 cm
Surface Stone or Rock Outcrop:	Under 3%, existing large rocks (1 to 3 m) around the pit site
Erosion:	Extremely eroded

**Brief Description of the Profile:**

This soil is eroded and stony phase of Mgt-1 soil. The surface soil is shallower and lighter in color than it of Mgt-1, and contains gravel and stones. A slightly weathered tuff layer appears below a depth of 80 cm, with surface soil of dark brown to yellowish brown sandy loam to sandy clay loam texture.

**Soil Profile Description:**

Ap	0 - 18 cm	Dark brown (10YR 3/3) moist and dull yellowish orange (10YR 6/3) dry; gravely sandy clay loam; moderate fine subangular structure; slightly sticky, slightly plastic, friable moist; few rounded stones and gravel (3 to 15 cm); many fine roots; clear smooth boundary.
AB	18 - 40 cm	Dull yellowish brown (10YR 4/3) moist; gravely sandy loam; moderate fine subangular blocky structure; slightly sticky, slightly plastic, friable moist; few fine quartz gravel and few rounded stones and gravel (3 to 15 cm); common medium pores; clear smooth boundary.
BC	40 - 80 cm	Dull yellowish brown (10YR 5/3) moist; gravely sandy clay loam; weak medium subangular blocky structure; slightly sticky, slightly plastic, friable moist; few rounded stones and gravel (3 to 15 cm); many fine and medium pores; few fine roots; gradual smooth boundary.
R	80 cm +	Yellowish gray (2.5Y 5/1) moist; slightly weathered tuff base-rock.

**Land Class (paddy rice/upland crops):**

Mapping unit Mgt-2 was divided into to two sub-units, Mgt-2a and Mgt-2b, The former is land having slopes less than 40%, and the later is land having steeper slopes.

NRrwe/SU3rawle (Mgt-2a) or  
NRrwlw/Nurwlw (Mgt-2b)

Table 1.3.1 Present Farming Practices for Major Crops - Mgeta Scheme

Item	Maize	Cabbage
1 Land preparation	- Plowing by hand - Harrowing by hand	- Plowing by hand - Harrowing by hand
2 Nursery	Not applied	- 400 ~ 500 g of seeds for one ha
3 Broadcasting	- 70cm x 70cm ~ 90cm x 100cm - 20 to 25 kg kg per ha (2 ~3 seeds per hill)	Not applied
4 Transplanting	Not applied	- One seedling per hill (20,000-40,000 hills per ha) - 50cm x 50cm ~ 70cm x 70cm
5 Application of fertilizer Nursery Basal application 1st top dressing 2nd top dressing Total application	Not applied	- no application of fertilizer - 5 g of Urea per hill  100 ~ 200 kg of Urea per ha
6 Weeding	- depending on the situation	- One or twice during growing season
7 Application of agro-chemicals	Not applied	- not so common - Major insects / disease Diamond backmoth
8 Water control	Not applied	- Once or twice a week
9 Harvesting	- depending on the degree on home consumption	- around 3 months after transplanting

Item	Potato	Pulse
1 Land preparation	- Plowing by hand - Harrowing by hand	- Plowing by hand - Harrowing by hand
2 Nursery	Not applied	Not applied
3 Broadcasting	Not applied	- 20cm x 40cm ~ 30cm x 50cm - 20 kg per ha (2 ~3 seeds per hill)
4 Transplanting	- One seed potato per hill (around 30,000 hills per ha) - 50cm x 50cm ~ 70cm x 70cm	Not applied
5 Application of fertilizer Nursery Basal application 1st top dressing 2nd top dressing Total application		Not applied
6 Weeding	- depending on the situation	- depending on the situation
7 Application of agro-chemicals	Not applied	Not applied
8 Water control	- Once or twice a week	Not applied
9 Harvesting	- around 4 months after transplanting	- around 4 months after sowing

Table 1.3.2 Present Crop Budget for Major Crops in Mgeta Scheme

Mgeta Scheme	Unit	Maize			Pulse			Cabbage			Potato		
		Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)
<b>Production Cost</b>													
(A) Farm Input	kg/ha	590	20	11,800	800	20	16,000	30,000	0.2	6,000	100	800	80,000
1 Seed	kg/ha	240	0	0	240	0	0	240	0	0	240	0	0
2 Fertilizer	kg/ha	180	0	0	180	0	0	180	150	27,000	180	125	22,500
: Urea (46 %-N)	kg/ha												
: SA (21 %-N)	kg/ha												
: TSP (46 %-P <sub>2</sub> O <sub>5</sub> )	kg/ha												
3 Agro-chemical	lit./ha	5,500	0.0	0	5,500	0.0	0	5,500	2.0	11,000	5,500	0.0	0
: Pesticide	lit./ha	3,500	0.0	0	3,500	0.0	0	3,500	0.0	0	3,500	0.0	0
: Herbicide	lit./ha	4,000	0.0	0	4,000	0.0	0	4,000	0.0	0	4,000	0.0	0
: Fungicide	lit./ha	500	11	5,500	500	8	4,000	500	100	50,000	500	30	15,000
4 Packing material				17,300			20,000			94,000			117,500
<b>Sub-total (A)</b>													
(B) Labour Requirement													
1 Family labour		500	60	0	500	50	0	500	150	0	500	110	0
2 Hired labour			25	12,500		25	12,500		34	17,000		25	12,500
<b>Sub-total (B)</b>			85	12,500		75	12,500		184	17,000		135	17,500
(C) Machinery or draught cattle	L.S	30,000	0	0	30,000	0	0	30,000		0	30,000		0
1 Ploughing by tractor	L.S	25,000	0	0	25,000	0	0	25,000		0	25,000		0
2 Ploughing by hand tractor	L.S	17,500	0	0	17,500	0	0	17,500		0	17,500		0
3 Puddling by hand tractor				0			0			0			0
<b>Sub-total (C)</b>				1,490			1,625			5,550			6,500
(D) Miscellaneous cost				31,290			34,125			116,550			136,500
5 % of (A) and (B)													
<b>Total Production Cost</b>													
Gross Return	kg/ha	150	1,000	150,000	200	700	140,000	90	10,000	900,000	300	3,000	900,000
(A) Yield	per kg			118,710			105,875			783,450			763,500
(B) Producer price													
Gross return													
<b>Net return</b>													

Table 1.3.3 Annual Programme for Monthly Training Session for Morogoro District

Month	1996/97		1997/98	
	Main Subject	Resource	Main Subject	Resource
July	- Storage structure	DEO DSMSs	- Storage management - inspection - Soil & water conservation - evaluation - Monthly report writing - Livestock parasite control	DSMS plant protection land use
August	- Soil conservation & agroforestry - Oxenization - Livestock deworming	DEO DSMSs	- Coconut and cashewnuts - Oxenization - Irrigation - simple diversification structure - water quality for irrigation	DSMS tree crops agro-machinery irrigation
September	- Poultry feed formulation - Dairy cattle management - Soil testing	DEO DSMSs	- Current land use technology - Storage - fumigation - Horticulture (use of chemicals & fertilizer, identification of cabbage pest) - Poultry management	DSMS land use plant protection horticulture poultry
October	- Pasture establishment for dairy cattle and goats - Coconut nursery establishment	DEO DSMSs	- Coconut and cashewnuts - pest & disease control - Bananas - site selection, land preparation, planting - Agric. & livestock statistics	DSMS tree crops horticulture statistics
November	- Tobacco nursery establishment - Rearing of local chicken on large scale	DEO DSMSs	- Safety use of chemicals & calculation - Citrus - seed selection, planting, budding - Farm records	DSMS plant protection horticulture DIM & EO
December	- Identification of disease symptoms and pest in cassava - Establishment of temperate fruit tree nurseries - Poultry new castle vaccination	DEO DSMSs	- Irrigation in paddy - construction of earth bands - Citrus - pruning, control of flower for quality fruits - Pasture establishment	DSMS irrigation horticulture range
January	- Banana production (planting) - Use of agro-chemicals - Use of livestock drugs	DEO DSMSs	- Use of herbicide in paddy - Use of tree crop products - cashew & coconut - Dairy husbandry	DSMS plant protection tree crops dairy
February	- Use of herbicides - Proper milling techniques and hygiene - Coconut pests and diseases control	DEO DSMSs	- Cashew & coconut - transplanting, intercropping - How to produce own vegetable seeds - Livestock - feeds and feeding	DSMS tree crops horticulture
March	- Fish planting in paddy field and ponds - Identification of disease symptoms in paddy - Pig husbandry	DEO DSMSs	- Identification of disease symptoms in paddy - Vermin control techniques - Hides & skins	Rice researcher DSMS plant protection meat inspector
April	- Identification of disease symptoms in cabbage - Citrus production (planting)	DEO DSMSs	- Land use technologies - evaluation - Identification of disease symptoms in cabbage - Farm structure	DSMS land use horticulture DIM&EO
May	- Poultry new castle vaccination	DEO DSMSs	- Pests & disease control in tomato - Rotational grazing	DSMS horticulture range
June	- Preparation of District Annual Work Plan for 1997/98	DEO DSMSs	- Identification of potential areas for irrigation - Poultry breeding	DSMS irrigation poultry

Source) Morogoro regional office, 1997

Table 1.3.4 Target and Progress for Extension Services in Morogoro Region in 1996/97

(as of March 1997)

	Districts in Morogoro Region							
	Morogoro		Kilosa		Kilombero		Ulanga	
	Target	Progress	Target	Progress	Target	Progress	Target	Progress
<b>1 Extension Targets</b>								
No. of village to be reached	215	131	91	58	38	36	64	35
No. of farmers to be reached	94,971	39,266	39,653	25,273	8,436	4,443	64,000	3,500
No. of active VEOs	215	131	91	58	38	36	64	35
No. of contact farmers	6,096	5,808	4,368	2,784	429	249	2,476	1,488
No. of active farmer groups	360	77	-	-	76	39	128	70
No. of group meetings	6,096	6,760	4,368	2,784	912	194	-	-
No. of adoption plots/units								
Crops		1,345					114	59
Livestock		484					14	11
Total	6,240	1,829	4,368	1,108	1,900	1,041	128	70
No. of message disseminated	30	7	96	3	84	3	24	2
Adoption rate (%)	80	55	100	69	100	60	100	60
No. of trials / demo	-	-	-	-	-	-	2	0
No. of visits by								
DEO	144	0	60	3	108	25	72	5
DIVEOs	96	0	120	24	-	-	-	20
DSMS	-	-	120	6	72	30	106	10
VEOs	-	-	-	-	-	-	-	-
<b>2 Extension Training Targets</b>								
No. of MTS	12	0	12	0	12	0	12	1
<b>3 Equipment</b>								
DEO Extension Kits	3	3	15	3	3	3	10	0
VEO Extension Kits	145	141	97	77	38	34	35	35
Veterinary Kits	5	4	6	4	7	2	3	2
<b>4 Vehicles</b>								
4WD	1	1	1	1	1	1	1	1
Motor Cycle	25	23	14	14	8	8	34	7
Bicycles	215	157	91	59	-	-	21	21

Source) Regional Agriculture Office

Table 1.3.5 Retraining Programme of VEOs in Morogoro Region

	District				Total
	Morogoro	Kilosa	Kilombero	Ulanga	
<b>Total VEOs</b>					
Diploma holder *1	57	27	20	10	114
Certificate holder *2	74	38	16	20	148
<b>Total</b>	<b>131</b>	<b>65</b>	<b>36</b>	<b>30</b>	<b>262</b>
<b>Retraining Programme up to 1996/97</b>					
Diploma holder *1					
Crops	0	0	0	0	0
Livestock	0	0	0	0	0
Certificate holder *2					
Crops	41	31	8	4	84
Livestock	16	7	6	7	36
<b>Total</b>					
Crops	41	31	8	4	84
Livestock	16	7	6	7	36
<b>in 1997/98</b>					
Diploma holder *1					
Crops	14	6	0	0	20
Livestock	14	6	0	0	20
Certificate holder *2					
Crops	9	0	1	3	13
Livestock	8	0	1	6	15
<b>Total</b>					
Crops	23	6	1	3	33
Livestock	22	6	1	6	35
<b>VEOs who received or will receive retraining programme by 1997/98</b>					
Diploma holder *1	28	12	0	0	40
Certificate holder *2	74	38	16	20	148
<b>VEOs who needs retraining programme in 1998/99 onward</b>					
Diploma holder *1	29	15	20	10	74
Certificate holder *2	0	0	0	0	0

Note )

\*1 Diploma holder : VEO who graduated from college (Two years diploma course after Form VI or certificated in Agriculture)

\*2 Certificate holder : VEO who graduated from secondary school (Two years course after Form IV)



**Table 1.5.1 Present Condition for Water Users' Groups in Mgeta Scheme**

	Mgeta	
	Langali	Bumu
Village	Langali	Bumu
Population	3,000	1,400
Household	600	290
WUG	*1	*1
Year established	Before independence - present *2	
No. of farmer	4 - 170 farmers/group *3	n.a.
Organizational structure		(Almost same situation with Langali village)
Water allocation	<p>- A WUG has been organized by each intake weir or each branch canal. These groups have very simple organizational structure which has only one leader elected by farmers or no leader with loose organization.</p> <p>- WUGs in the villages are divided into two types: one is the WUGs having rotational irrigation system and another one is for non-rotational irrigation. The former WUGs have generally a problem of water shortage, and the farmers take water in turn with fixed interval. Irrigation interval in each system varies from 3 to 8 days. The latter WUGs have a lot of water resource, and within a WUG, any farmer can take water at any time under traditional rule. For both WUGs, irrigation has been carried out in the daytime, but in case of water shortage, the farmers have taken water in the nighttime.</p>	
Maintenance	<p>- In general, canal clearing has been carried out before season, and all families of the farmers join to this cleaning.</p> <p>- Absentees of communal work are punished with a fine.</p>	
Water charge	No irrigation service charge (ISC)	
Registration	-	
Water right	-	
By-laws	-	
Water dispute among the farmers within WUG	There are some water dispute among the farmers, and these have been settled by themselves or the leaders. If it is difficult, the village governments settle it.	
Water dispute among WUG	<p>- There are some water dispute among the irrigation groups in the dry season.</p> <p>- These are settled by the farmers themselves, then by the village governments.</p>	
Major problems	<p>- Water shortage</p> <p>- Damage of canals due to over flow of water</p> <p>- Damage of intake due to flood and stone</p> <p>- Leakage of intake weir and canals</p>	
VEO *4	1	1
IT *4	-	-
Remarks	The farmers in the Langali and Bumu villages have a long experience for irrigation farming over 50 years.	

\*1 There are many irrigation groups established by each intake or branch canal.

\*2 The farmers had constructed many irrigation facilities before the independence. Within the facilities surveyed by the study team, the most oldest facility is in 1936 and the latest one is in 1996.

\*3 The size of each WUG differs largely. According to the interview survey to the farmers, the largest WUG is 170 farmers and smallest one is 4 farmers. No data is available for irrigation area.

\*4 VEO: Village extension officer, IT: Irrigation technician

Source: Information and data obtained from village executive officer, village extension officer and farmers.

**Table 1.5.2 Present Condition for O&M of Existing Irrigation Facilities - Mgeta Scheme (1/5)**

Sample No.	1	2	3	4	5
<b>1. Irrigation Facilities</b>					
1.1 Construction year of facilities	After independ.	Before independ.	1970	Before independence	Before indepe.
1.2 Number of farmers	12	10	110-130	100	25
<b>2. Operation and maintenance of Irrigation facilities</b>					
2.1 Irrigation period					
Starting	4	6	5	7	5
Closing	11	10	10	3	10
Duration (Months)	8	5	6	9	6
2.2 Availability of irrigation water					
(1) Did you take enough water?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
(2) Did you take water on time?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2.3 Water allocation among the farmers	- No fixed schedule. Water can take any time.	- No fixed schedule. Some one starts irrigation, then each farmer takes water in turn.	- Rotational irrigation at 2-day intervals	- No fixed schedule. Basically, each farmer takes water in turn, but it is very loose.	- Rotational irrigation at 3-day intervals
2.4 Problems/troubles for water allocation among the farmers	- There are some irrigation dispute among the farmers.	- Some farmers take a lot of water because of no leader.	- Irrigation dispute	- Irrigation dispute among the farmers but not so serious.	- Irrigation dispute
How to settle them?	- Leader and village government	- Contact to cell leader, then take to court.	- Village government	- Farmers themselves, then cell leaders.	- Village government, then take to court.
2.5 Maintenance of irrigation facilities					
(1) Irrigation service charge	- No ISC	- No ISC	- No ISC	- No ISC	- No ISC
(2) Maintenance method	- Communal work Punished with a fine which is decided by the group based on work volume.	- Communal work (unclear punishment rule)	- Communal work Punished with a fine (Tsh.300-500) to absentees.	- Before the season, all farmers carry out cleaning of canal by communal work, then each farmer also make cleaning his portion during the season.	- Communal work.
<b>3. Irrigation Group</b>					
3.1 Year established	After independ.	No organization	1970	No organization	None
3.2 Leader of irrigation group	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
3.3 Regular meeting for O&M	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
3.4 Major problems of irrigation group	- Water shortage	- Difficulty to carry out maintenance by communal work - Loose allocation of water	- Water shortage - Damage of canals due to over-topping. - Damage of intake by flood and stone.	- Poor facilities	- Water shortage
<b>4. Water dispute among irrigation groups</b>					
If there are serious problems or troubles, how to settle them?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No - Village government	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No - Village government	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No - Village government	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No - Talking between groups, then take to court.
<b>5. If it is propose to establish "Federation of Irrigation Groups", do you agree?</b>					
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>6. Remarks</b>			- These facilities were constructed under technical support from DALDO office. - Consisting of 15-20 branch canals, and each branch has a small group which consists of a leader and 5-7 farmers.		

Note: Data and information obtained through the farmers' intention survey carried out by the JICA Study Team in June 1997.

**Table 1.5.2 Present Condition for O&M of Existing Irrigation Facilities - Mgeta Scheme (2/5)**

Sample No.	6	7	8	9	10
<b>1. Irrigation Facilities</b>					
1.1 Construction year of facilities	1936	Before inde.	Before independence	Before independ.	1970
1.2 Number of farmers	8	25	20	15	110-130
<b>2. Operation and maintenance of irrigation facilities</b>					
2.1 Irrigation period					
Starting	5	6	5	7	7
Closing	(During the dry	12	12	11	10
Duration (Months)	season)	6	7	5	4
2.2 Availability of irrigation water					
(1) Did you take enough water?	<input type="checkbox"/> Yes <input type="checkbox"/> No	-	-	-	-
(2) Did you take water on time?	<input type="checkbox"/> Yes <input type="checkbox"/> No	1	1	1	1
2.3 Water allocation among the farmers	- Continuous and rotational irrigation. Irrigating hours are decided by leader depending on the size of each plot.	- No fixed schedule. Any farmers can take water at any time.	- Consisting of 2 groups, and 3 days for one group and 2 days for another group. Remaining 2 days are free to all farmers for taking water.	- No fixed schedule. Any farmers can take water at any time.	- Rotational irrigation at 8-day intervals. This irrigation group consists of 4 small groups, and a small group can take water for 2 days.
2.4 Problems/troubles for water allocation among the farmers	- No problem because of a lot of water.	- No problem	- There are some irrigation dispute among the farmers.	- There are some irrigation dispute among the farmers.	- There are some irrigation dispute among the farmers.
How to settle them?		- Talking among the farmers	- All problems are settled by a leader.	- Talking among the farmers	- Settle by themselves in cooperation with leaders.
2.5 Maintenance of irrigation facilities					
(1) Irrigation service charge	- No ISC	- No ISC	- No ISC	- No ISC	- No ISC
(2) Maintenance method	- Communal work.	- Communal work.	- Communal work. - Punished with a fine to absentees.	- Communal work. Absentees can not take water.	- Communal work - Maintenance works have been carried out only to branch canals for small groups and main canal has very poor maintenance.
<b>3. Irrigation Group</b>					
3.1 Year established	Before independ.	Before inde.	Before independence	No organization	1970
3.2 Leader of irrigation group	<input type="checkbox"/> Yes <input type="checkbox"/> No	1	1	-	1
3.3 Regular meeting for O&M	<input type="checkbox"/> Yes <input type="checkbox"/> No	1	-	1	1
3.4 Major problems of irrigation group	- No problem	- Leakage of intake weir	- Water shortage - Non-permanent intake	- Damage of canal due to over flow/ over-topping of water	- Water shortage during the dry season. Main canal had damaged by flood in 1996, and no improvement were done until present. Lack of fund and equipment.
<b>4. Water dispute among irrigation groups</b>					
<input type="checkbox"/> Yes <input type="checkbox"/> No	1	1	1	1	1
If there are serious problems or troubles, how to settle them?	- Settled between leaders		- Not so serious, and settled by the leaders of groups.	- Not so serious, and settled by the farmers themselves.	- Not so serious, and settled by the farmers themselves.
<b>5. If it is propose to establish "Federation of Irrigation Groups", do you agree?</b>					
<input type="checkbox"/> Yes <input type="checkbox"/> No	1	1	1	1	1
<b>6. Remarks</b>					- Same canal with Sample No. 3 - This group has 1-group leader and 4-small group leaders.

**Table 1.5.2 Present Condition for O&M of Existing Irrigation Facilities - Mgeta Scheme (3/5)**

Sample No.	11	12	13	14	15
<b>1. Irrigation Facilities</b>					*
1.1 Construction year of facilities	After independence	After independence	1970	Before inde.	1985, 1986 & 1996
1.2 Number of farmers	15	15	50	7	15, 10 & 4
<b>2. Operation and maintenance of irrigation facilities</b>					
2.1 Irrigation period					
Starting	7	6	6	6	6
Closing	10	12	12	12	10
Duration (Months)	4	6	6	6	5
2.2 Availability of irrigation water					
(1) Did you take enough water? <input type="checkbox"/> Yes <input type="checkbox"/> No	1 -	- 1	- 1	1 -	- 1
(2) Did you take water on time? <input type="checkbox"/> Yes <input type="checkbox"/> No	1 -	- 1	- 1	- 1	- 1
2.3 Water allocation among the farmers	- No fixed schedule because of enough water.	- No fixed schedule Basically, farmer takes water in turn	- No fixed schedule and no rotational irrigation Water is allocated to the farmers through the talking among neighborhood farmers.	- Rotational irrigation at 7-day intervals (one farmer one day)	- Rotational irrigation (twice per week)
2.4 Problems/troubles for water allocation among the farmers  How to settle them?	- No problem for water allocation	- There are some irrigation dispute among the farmers.  - Settled by farmers themselves	- No problem for water allocation	- No problem	- There are some water dispute, but those are not serious problems.  - Settled by farmers themselves.
2.5 Maintenance of irrigation facilities					
(1) Irrigation service charge	- No ISC	- No ISC	- No ISC	- No ISC	- No ISC
(2) Maintenance method	- Communal work	- Communal work	- Communal work - Punished with a fine of Tsh.500 (fixed rate) to absentees.	- Communal work	- Communal work
<b>3. Irrigation Group</b>					
3.1 Year established	No organization	No organization	No organization	None	1985, 1986 & 1996
3.2 Leader of irrigation group <input type="checkbox"/> Yes <input type="checkbox"/> No	- 1	- 1	- 1	- 1	1 -
3.3 Regular meeting for O&M <input type="checkbox"/> Yes <input type="checkbox"/> No	- 1	1 -	1 Before season	1 Before season	1 Before season
3.4 Major problems of irrigation group	- No problem	- Disconnected cropping among the farmers. The flow of water sometime get worse, because upstream farmers which carried out harvesting earlier stop maintenance.	- Soil erosion - Leakage of water	- No problem	- Soil erosion along the canal - Leakage of water - Canal embankment is often damaged due to overtopping and leakage of water.
<b>4. Water dispute among irrigation groups</b>					
If there are serious problems or troubles, how to settle them? <input type="checkbox"/> Yes <input type="checkbox"/> No	- 1	- 1	- 1	- 1	1 -
	- There are some water dispute with upstream group, but these are not serious problem.	- There are some water dispute with upstream group. Settled by themselves.	- Not serious and settled by cell leaders.		- Not serious and settled by farmers themselves.
<b>5. If it is propose to establish "Federation of Irrigation Groups", do you agree?</b>					
<input type="checkbox"/> Yes <input type="checkbox"/> No	1 -	1 -	1 -	1 -	1 -
<b>6. Remarks</b>	No organization for irrigation group with no group leader		No leader and no group. All operation and maintenance works are decided by meeting attending all farmers.		* This farmer has jointed to 3 irrigation groups which have intake weirs separately.

**Table 1.5.2 Present Condition for O&M of Existing Irrigation Facilities - Mgeta Scheme (4/5)**

Sample No.	16	17	18	19 & 20 (Non irrigated farmers)	21
<b>1. Irrigation Facilities</b>					
1.1 Construction year of facilities	1982	Before 1981	1954		After independence
1.2 Number of farmers	10	20	16		15
<b>2. Operation and maintenance of irrigation facilities</b>					
2.1 Irrigation period					
Starting	7	6	7		5
Closing	11	11	11		11
Duration (Months)	5	5	5		6
2.2 Availability of irrigation water					
(1) Did you take enough water? <input type="checkbox"/> Yes <input type="checkbox"/> No	- 1	- 1	- 1		1 -
(2) Did you take water on time? <input type="checkbox"/> Yes <input type="checkbox"/> No	- 1	- 1	- 1		1 -
2.3 Water allocation among the farmers	- No fixed schedule. Any farmers can take water at any time.	- No fixed schedule. Any farmers can take water at any time.	- Rotational irrigation (Unclear interval)		- Rotational irrigation (twice a week). If need more water, ask to farmers who have an interest.
2.4 Problems/troubles for water allocation among the farmers	- Water dispute among farmers, but not serious problem.	- No problem for water allocation	- No problem for water allocation		- There are some water dispute, but these are not serious.
How to settle them?	- Settled by farmers themselves.				- Settled by farmers themselves.
2.5 Maintenance of irrigation facilities					
(1) Irrigation service charge	- No ISC	- No ISC	- No ISC		- No ISC
(2) Maintenance method	- Communal work	- Communal work	- Communal work - Punished with a fine to absentees. (An amount is decided by the farmers depending on work quantity of maintenance.)		- Communal work
<b>3. Irrigation Group</b>					
3.1 Year established	1982	No organization	1954		After independence
3.2 Leader of irrigation group <input type="checkbox"/> Yes <input type="checkbox"/> No	1 -	1 -	1 -		1 -
3.3 Regular meeting for O&M <input type="checkbox"/> Yes <input type="checkbox"/> No	1 Before season	1 Before season	1 Before season		1 Before season
3.4 Major problems of irrigation group	- Land sliding of embankment.	- Soil erosion along the canal	- No permanent intake.		- Water shortage
<b>4. Water dispute among irrigation groups</b>					
<input type="checkbox"/> Yes <input type="checkbox"/> No	1 -	1 -	1 -		1 -
If there are serious problems or troubles, how to settle them?			Settled by leaders. In case of serious problem, village government or take to court		Not serious and settled by farmers themselves.
<b>5. If it is propose to establish "Federation of Irrigation Groups", do you agree?</b>					
<input type="checkbox"/> Yes <input type="checkbox"/> No	1 -	1 -	1 -		1 -
<b>6. Remarks</b>	- Intake weir and main canal were constructed by a farmer in 1982, and these facilities belong to this farmer. The facilities have been rented to the farmers without rental charge.		- These irrigation facilities were constructed by a farmer in 1954, and still belong to this farmer who is group leader.		

**Table 1.5.2 Present Condition for O&M of Existing Irrigation Facilities - Mgeta Scheme (5/5)**

Sample No.	22	23	24	25	Whole
<b>1. Irrigation Facilities</b>					
1.1 Construction year of facilities	1950	1984	Before independence	Before 1976	4 - 130/group*
1.2 Number of farmers	30	30	20	40	
<b>2. Operation and maintenance of irrigation facilities</b>					
2.1 Irrigation period					
Starting	7	6	6	7	5 - 7
Closing	12	10	12	11	10 - 12
Duration (Months)	6	5	6	6	6
2.2 Availability of irrigation water					
(1) Did you take enough water?	<input type="checkbox"/> Yes <input type="checkbox"/> No	1 -	1 -	- 1	32% 68%
(2) Did you take water on time?	<input type="checkbox"/> Yes <input type="checkbox"/> No	- 1	1 -	- 1	23% 77%
2.3 Water allocation among the farmers	- No fixed schedule. - Water is allocated to each farmer by mutual consent among the farmers.	- Rotational irrigation at 3-day intervals. Irrigation is carried out in the daytime and free in the nighttime. 6 hrs/one time and 2 times per week	- No fixed schedule. Any farmers can take water. Basically irrigation is carried out in the daytime. (7:00-18:00)	- Rotational irrigation at 3-day intervals. - Leader arranges irrigation schedule.	- No fixed schedule 12 groups (52%) - Rotational irrigation 11 groups (48%)
2.4 Problems/troubles for water allocation among the farmers	- There are some water dispute, but these are not serious. - Farmers consult to cell leaders for those settlement.	- There are often water dispute, especially in August. Not so serious. - Village leaders	- There are often water dispute among the farmers. - Village leaders and take to court.	- Several farmers do not follow schedule and take a lot of water.	
2.5 Maintenance of irrigation facilities					
(1) Irrigation service charge	- No ISC	- No ISC	No ISC	No ISC	No ISC
(2) Maintenance method	- Communal work	- Communal work (after rainy season)	Communal work (after rainy season)	Communal work	Communal work
<b>3. Irrigation Group</b>					
3.1 Year established	No organization	1984	No organization	(Unclear)	
3.2 Leader of irrigation group	<input type="checkbox"/> Yes <input type="checkbox"/> No	1 -	- 1	1 -	50% 50%
3.3 Regular meeting for O&M	<input type="checkbox"/> Yes <input type="checkbox"/> No	1 Before season	1 May or June	1 Before season	68% 32%
3.4 Major problems of irrigation group	- Soil erosion and deposit of soils in canals	- Some farmers do not follow rotational irrigation.	- Water dispute among the farmers.	- Water dispute among the farmers.	<i>Common problems among the groups</i> - Slashing out of intake weir by flood - Damage of canal embankment and soil erosion - Water leakage
<b>4. Water dispute among irrigation groups</b>					
If there are serious problems or troubles, how to settle them?	<input type="checkbox"/> Yes <input type="checkbox"/> No	1 Not serious and settled by farmers themselves.	1 - - There are often water dispute with another group. Settled by farmers themselves.	1 - - There are water dispute with another group.	68% 32%
<b>5. If it is propose to establish "Federation of Irrigation Groups", do you agree?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	1 -	(No answer) 1 -	1 -	100%
<b>6. Remarks</b>		<i>This facility was constructed by farmers themselves and without technical services from the Government.</i>	<i>This group own jointly one intake weir with another irrigation group.</i>		* <i>Almost all farmers do not know detailed number of farmers in their groups, and these figures were roughly estimated by them. No data is available for acreage.</i>

**Table 2.1.1 Criteria for Land Suitability Assessment for Irrigated Farming**

Land Class Determination Factors	(unit) Rating	For Paddy Rice Cultivation				For Upland Crop Cultivation (maize, vegetables)			
		1	2	3	4	1	2	3	4
<b>[A] Agronomic Factors</b>									
<b>1 (r) Conditions of Root Zone</b>									
Texture of surface soil		Loam - friable-Clay	Sl., SL firm-C	I.S, Si	Sand, Gravel	Sl., I., Sl., Cl. SCL, SiCl	Si, IS	SC, SiC friable-C	S, firm-C
Effective soil depth	(cm)	>60	>60	60 - 30	<30	>100	100 - 60	100 - 60	<60
Drainage class		moderate - poor	moderate - poor	well, very poor	excessive	imperfect - well	imperfect - well	poor, excessive	very poor
Percolation	(mm/day)	<2	2 - 5	5 - 10	>10	-	-	-	-
Water holding capacity	(mm/100cm)	-	-	-	-	>200	200 - 150	150 - 100	<100
<b>2 (n) Soil Nutrients of Surface Soil</b>									
Organic carbon	(%)	>2.25	2.25 - 0.75	0.75 - 0.15	<0.15	>2.25	2.25 - 0.75	0.75 - 0.15	<0.15
Total nitrogen	(%)	>0.15	0.15 - 0.05	0.05 - 0.01	<0.01	>0.15	0.15 - 0.05	0.05 - 0.01	<0.01
Available Phosphate	(ppm)	>15	15 - 10	10 - 5	<5	>15	15 - 10	10 - 5	<5
Cation exchange capacity	(me/100g)	>16	16 - 8	8 - 4	<4	>16	16 - 8	8 - 4	<4
Exchangeable K	(me/100g)	>0.4	0.4 - 0.2	0.2 - 0.1	<0.1	>0.4	0.4 - 0.2	0.2 - 0.1	<0.1
Total cations	(me/100g)	>14	14 - 8	8 - 2	<2	>14	14 - 8	8 - 2	<2
Micro-nutrients		sufficient	sufficient	slightly deficient	severe deficient	sufficient	sufficient	slightly deficient	severe deficient
<b>3 (t) Soil Toxities</b>									
EC	(dS/m)	<3	3 - 5	5 - 8	>8	<1.7	1.7 - 3.5	3.5 - 6	>6
Sodium absorption ratio		<8	8 - 18	18 - 38	>38	<8	8 - 18	18 - 38	>38
pH		5.5 - 7.0	5.0 - 5.5, 7.0 - 8.0	4.0 - 5.0, 8.0 - 8.5	<4.0, >8.5	5.5 - 7.0	5.0 - 5.5, 7.0 - 8.0	4.5 - 5.0	<4.5, >8.0
Others (chloride, boron, etc.)		non toxic	non toxic	slightly toxic	severe toxic	non toxic	non toxic	slightly toxic	severe toxic
<b>4 (f) Flooding Risk</b>									
Frequency	(times/10years)	-	-	-	-	<1	1 - 2	2 - 5	>5
Inundated period		<4 weeks	<8 weeks	<8 weeks	>8weeks	>2days	2 - 7days	1 - 2weeks	>2weeks
<b>[M] Management Factors</b>									
<b>5 (a) Accessibility to Farm</b>									
Distance from village	(km)	<1	1 - 3	3 - 6	>6	<1	1 - 3	3 - 6	>6
Farm-road condition		improved	seasonal	footpath		improved	seasonal	footpath	
<b>6 (w) On-farm Workability</b>									
Slope	(%)	<0.5	0.5 - 2	2 - 3	>3	<1	1 - 5	terraced	>5
Micro-relief (difference in height)	(cm)	<5	5 - 10	10 - 20	>20	<30	30 - 60	60 - 90	>90
Stones/rocks	(%)	<0.01	0.01 - 0.1	0.1 - 3	>3	<0.01	0.01 - 0.1	0.1 - 3	>3
Soil consistence (wet): Stickiness		non - sticky	very sticky			non - slightly	sticky	very sticky	
Soil consistence (wet): Plasticity		non - plastic	very plastic			non - slightly	plastic	very plastic	
Soil consistence (dry)		loose - hard	very hard	extrem. hard		loose - slightly	hard	very hard	extrem. hard
Farm size	(ha)	>0.04	0.04 - 0.005	<0.005		>0.2	0.2 - 0.02	<0.02	
Irrigation management		easy	moderate	intensive		easy	moderate	intensive	
<b>[D] Land Development Factors</b>									
<b>7 (l) Grading/Leveling, Ridging</b>									
Grading/Leveling		no-required	low cost	moderate cost	high cost	no-required	low cost	moderate cost	high cost
Ridging		no-required	low cost	moderate cost	high cost	no-required	low cost	moderate cost	high cost
Consolidation		no-required	low cost	moderate cost	high cost	no-required	low cost	moderate cost	high cost
Clearing		no-required	low cost	moderate cost	high cost	no-required	low cost	moderate cost	high cost
<b>8 (d) Drainage, Flood Protection</b>									
Drainage		no-required	low cost	moderate cost	high cost	no-required	low cost	moderate cost	high cost
Flood protection		no-required	low cost	moderate cost	high cost	no-required	low cost	moderate cost	high cost
<b>[E] Conservation and Environmental Factors</b>									
<b>9 (s) Long-term Prevention of Salinity/Sodicity</b>									
Prevention for salinity/sodicity		not subject	not subject	somewhat	with severe	not subject	not subject	somewhat	with severe
<b>10 (h) Prevention of Groundwater and Surface Water</b>									
Groundwater		no affecting	no affecting	somewhat	with severe	no affecting	no affecting	somewhat	with severe
Surface water		no affecting	no affecting	somewhat	with severe	no affecting	no affecting	somewhat	with severe
Watershed control of upstream		good condition	required	degraded	extremely degraded	good condition	required	degraded	extremely degraded
<b>11 (e) Soil Erosion Control</b>									
Soil erosion		no occurrence	no occurrence	slight erosion	severe erosion	no occurrence	no occurrence	slight erosion	severe erosion

Table 3.3.1 Outline of Group Discussion with Farmers (1/4)

Topics	Outline of Dialogue in Each Project Scheme			
	Mgongola	Mgeta	Mkula	Mwega
1. Preferable crops	<p>Rainy season : paddy Dry season : paddy, maize, beans, vegetables</p> <ul style="list-style-type: none"> <li>- Inter-cropping to be preferable</li> <li>- Demonstration to be confirmed promising crops and arming practices</li> <li>- Shortage of vegetables is serious point.</li> <li>- Upland crops as income source</li> </ul>	<p>Rainy season : maize, pulse crops Dry season : cabbage, Irish potato, pulse crops</p> <ul style="list-style-type: none"> <li>- In the future, promising market should be checked before starting the cultivation of new crops.</li> </ul>	<p>Rainy season : maize, paddy Dry season : maize, pulse crops, vegetables</p> <ul style="list-style-type: none"> <li>- Sugarcane should be changed to another crops.</li> <li>- It is difficult to take out sugarcane completely because of its marketability.</li> <li>- Farmers have lack of knowledge on vegetable cultivation.</li> <li>- Beans should be included as promising crop.</li> </ul>	<p>Rainy season : maize, paddy Dry season : onion, maize, pulse crops, vegetables</p> <ul style="list-style-type: none"> <li>- Shortage of vegetables is to be solved.</li> <li>- Farmers have lack of knowledge on vegetable cultivation.</li> <li>- Farmers desired to expand the area of onion and paddy cultivation.</li> </ul>
2. Cropping pattern	<ul style="list-style-type: none"> <li>- Double cropping of paddy and rotational cropping with paddy and upland crops are agreeable.</li> </ul>	<ul style="list-style-type: none"> <li>- Proposed cropping pattern is acceptable.</li> <li>- Water in the rainy season is enough, while August to November in the dry season there is water shortage.</li> </ul>	<ul style="list-style-type: none"> <li>- Proposed cropping pattern is acceptable.</li> </ul>	<ul style="list-style-type: none"> <li>- Concerning expansion of the onion cultivation, there is no serious labour shortage in the future.</li> <li>- Water shortage should be solved for expansion of irrigated area.</li> <li>- Prevailing harvesting season for onion is August and September.</li> <li>- If onion will be planted late, farmers suffer to protect them against pests and diseases.</li> </ul>
3. Farming practices	<p><i>Guideline of Special Programme of FAO was discussed.</i></p> <ul style="list-style-type: none"> <li>- Special Programme is acceptable.</li> <li>- Transplanting is laborious, so that it can not cover big area.</li> <li>- Production with transplanting is higher than one with broadcasting.</li> </ul>	<ul style="list-style-type: none"> <li>- Concerning cabbage, club root disease (fungus) is most serious in the village.</li> <li>- As one of the countermeasures, rotational cropping is conducted.</li> <li>- Due to feeding problems, animal keeping has not been promoted.</li> <li>- During animal keepers, application of manure is common.</li> </ul>	<ul style="list-style-type: none"> <li>- They are not aware of Special Programme of FAO.</li> <li>- Farmers are not aware of importance, necessity, etc. of field band.</li> </ul>	<ul style="list-style-type: none"> <li>- Mixing-up of paddy varieties in the paddy fields due to flooding</li> <li>- Peak season of water shortage is in March/April for the upstream and August/September for the down stream.</li> </ul>



Table 3.3.1 Outline of Group Discussion with Farmers (2/4)

Topics	Outline of Dialogue in Each Project Scheme		
	Mgongola	Mgeta	Mkula
4. Seeds	<ul style="list-style-type: none"> <li>- Farmers multiply seeds by themselves.</li> <li>- Sometimes, seeds are bought from another farmers.</li> <li>- In Mkindo pilot area, Line 88 is cultivated, while Supa India in the Mgongola area.</li> <li>- Line 88 was obtained in 1993.</li> <li>- Quality of Line 88 has been deteriorated year by year.</li> <li>- Qualified seeds should be supplied.</li> <li>- Line 88 is a promising variety for the Project.</li> </ul>	<ul style="list-style-type: none"> <li>- Except cabbage and other minor vegetable, seeds are produced by farmers themselves.</li> <li>- Quality of seeds is generally not satisfied.</li> <li>- Local potatoes for consumption are adopted as seed potatoes.</li> <li>- Storage for seed potatoes is not available.</li> <li>- Seed potatoes which is bought from local market have been infected by some disease or insects</li> <li>- Price of vegetable seeds is expensive.</li> <li>- Local seed potato is of low price and low quality.</li> <li>- Some farmers try to organize group and try to arrange seeds by group.</li> <li>- Vegetable seeds are available in Morogoro town.</li> <li>- There is no problem on seed availability of vegetable seeds.</li> </ul>	<ul style="list-style-type: none"> <li>- Farmers multiply seeds by themselves.</li> <li>- They prefer to apply Line 88 as promising variety of paddy.</li> <li>- Cowpea is not in good quality.</li> </ul>
5. Land preparation	<ul style="list-style-type: none"> <li>- They have used tractor.</li> <li>- Availability of tractors is low.</li> <li>- Number of tractors is insufficient.</li> <li>- Hiring charge is not stable and expensive.</li> <li>- Farm land is not prepared properly, due to few tractors.</li> <li>- Farmers believe that they are ready to buy tractors.</li> </ul>	<ul style="list-style-type: none"> <li>- Farmers have used tractor or hand hoe for land preparation.</li> <li>- Availability of tractors is low.</li> <li>- Number of tractors is insufficient.</li> <li>- Farmers organized group and tried to contact with tractor owners. However, owner broke their contract.</li> </ul>	<ul style="list-style-type: none"> <li>- Seeds are generally multiplied by farmers themselves.</li> <li>- Qualified seeds are from informal sectors in Arusha.</li> <li>- Sometimes, commercial seeds to be sold by traders are not in good quality.</li> <li>- Concerning onion, some farmers produce their own seeds by themselves, while some of them buy commercial seeds from Arusha.</li> <li>- Some traders sell onion seeds of other sources under the pretext of seeds from Arusha.</li> <li>- Onion seeds is available in town, those seeds are imported, so that its price is expensive.</li> </ul>

Table 3.3.1 Outline of Group Discussion with Farmers (3/4)

Topics	Outline of Dialogue in Each Project Scheme			
	Mgongola	Mgeta	Mkula	Mweta
	<ul style="list-style-type: none"> <li>- Formulation of farmer's organization was tried before, but farmers in charge were not trustful.</li> </ul>			
6. Oxenization	<ul style="list-style-type: none"> <li>- Oxenization in the area is very difficult to be applied due to hard soil.</li> <li>- It is difficult for oxen to perform well, as oxen may be stuck in wet soil condition.</li> <li>- Oxenization project was failed.</li> <li>- Farmers have no experience concerning keeping cattle.</li> </ul>		<ul style="list-style-type: none"> <li>- Oxenization in the area is very difficult to be applied due to hard soil.</li> <li>- There are a lot of weeds and then it is difficult to use oxen.</li> <li>- Once some oxen were brought to the school but later they were withdrawn because of tsetse fly.</li> </ul>	<ul style="list-style-type: none"> <li>- They hired draught cattle and ploughing by them is completed successfully.</li> <li>- However, cattle is fell sick.</li> </ul>
7. Fertilizer	<ul style="list-style-type: none"> <li>- No application of fertilizer in the Project area</li> <li>- Price is expensive.</li> <li>- Fertilizer is not available.</li> <li>- Application of fertilizer is not effective due to the seasonal flooding condition.</li> </ul>	<ul style="list-style-type: none"> <li>- Fertilizer is available in town and even village.</li> <li>- Price at village is expensive, compared with one at Morogoro town.</li> <li>- Except beans, fertilizer are generally applied.</li> </ul>	<ul style="list-style-type: none"> <li>- No application of fertilizer in the Project area</li> <li>- If apply fertilizer for paddy, it will be tall and lodged.</li> <li>- Fertilizer is available, but expensive.</li> </ul>	<ul style="list-style-type: none"> <li>- Major farmers for onion cultivation apply fertilizer.</li> <li>- For paddy, fertilizer is mainly not applied.</li> <li>- For beans, fertilizer is applied.</li> <li>- Farmers are not aware of proper dosage of fertilizer.</li> </ul>
8. Agro-chemicals	<ul style="list-style-type: none"> <li>- Some farmers apply 2,4-D of herbicide in the Project area.</li> <li>- Grass hopper and stalk-eyed shoot fly are major insects in the Project area.</li> <li>- Shortage of agro-chemicals, price, quality are problem.</li> <li>- It is not available in time</li> <li>- There are no stockists near the Project area.</li> <li>- Expired and mixed/diluted agro-chemicals are sold.</li> </ul>	<ul style="list-style-type: none"> <li>- Agro-chemicals is available in town and even village.</li> <li>- Price is expensive.</li> <li>- Side-effect is appeared due to lack of protective gears.</li> </ul>	<ul style="list-style-type: none"> <li>- Some farmers apply 2,4-D of herbicide in the Project area.</li> </ul>	<ul style="list-style-type: none"> <li>- Availability of agro-chemicals is not in good condition.</li> <li>- Agro-chemicals is expensive.</li> </ul>

Table 3.3.1 Outline of Group Discussion with Farmers (4/4)

Topics	Outline of Dialogue in Each Project Scheme		
	Mgongola	Mgeta	Mkula
9. Drying	<ul style="list-style-type: none"> <li>- Drying is done in the field, that is dried grains are harvested.</li> <li>- Drying after cutting is not necessary.</li> <li>- Shattering loss and breakage are many due to over-dried condition before cutting.</li> <li>- Early harvesting and drying at home yard are necessary.</li> <li>- In the case which fields are controlled well, it is possible to dry grains in the fields.</li> </ul>		<ul style="list-style-type: none"> <li>- Paddy is dried in the field.</li> <li>- After cutting paddy, it is left to dry in the field for a few days.</li> </ul>
10. Marketing	<ul style="list-style-type: none"> <li>- Price is cheap and flexible.</li> <li>- Due to lack of milling machine, it is difficult to sell milled rice.</li> </ul>	<ul style="list-style-type: none"> <li>- For products, middleman come and buy products.</li> <li>- Farmers should have knowledge concerning market power, so that they can negotiate with traders.</li> <li>- Farm gate price of cabbage is fluctuated.</li> <li>- Farmers can not decide selling price, but by traders.</li> <li>- Farmers have tried to organize farmer's group for selling products and farm inputs.</li> </ul>	<ul style="list-style-type: none"> <li>- Formerly, farmers used to sell to Co-op society, but since they were collapsed, farmers depend on traders who offer low prices.</li> <li>- Farmers can not decide selling price, but by traders.</li> <li>- Traders check the quality of dried paddy, if breakage is too much, they will not buy them.</li> </ul>
			<ul style="list-style-type: none"> <li>- Farmers are ready to organize themselves to facilitate purchase of farm inputs and sell products.</li> <li>- Fertilizer is available in Iringa of Iringa Region.</li> <li>- Products is sold in the trader's price which is relatively low.</li> </ul>

Table 3.3.2 Proposed Farming Practices in Mgeia Scheme

Item	Maize	Cabbage
1 Land preparation	- Plowing by hand - Harrowing by hand	- Plowing by hand - Harrowing by hand
2 Nursery	Not applied	- 400 ~ 500 g of seeds for one ha
3 Broadcasting	- 70 ~ 90 cm x 70 ~ 100cm - 20 kg per ha (2 ~3 seeds per hill)	Not applied
4 Transplanting	Not applied	- One seedling per hill (20,000-40,000 hills per ha) - 50 ~ 70cm x 70 ~ 90cm
5 Application of fertilizer		
Basal application	- 71 kg of AS per ha (15 kg N/ha) - 100 kg of TSP per ha (20 kg P <sub>2</sub> O <sub>5</sub> /ha)	- 238 kg of AS per ha (50 kg N/ha) - 200 kg of TSP per ha (40 kg P <sub>2</sub> O <sub>5</sub> /ha)
1st top dressing	- 71 kg of AS per ha (15 kg N/ha)	- 238 kg of AS per ha (50 kg N/ha)
Total application	142 kg AS, 100 kg TSP (NPK = 30:20:0)	476 kg AS, 200 kg TSP (NPK = 100:40:0)
6 Weeding	- One or twice during growing season	- One or twice during growing season
7 Application of agro-chemicals	see Tables 3.3.3 and 3.3.4	see Tables 3.3.3 and 3.3.4
8 Water control	- Furrow irrigation every one week - Critical period : from flowering to 20 day before maturing	- Furrow irrigation - Excess water to young plants causes rank growth, thick necks, and poor bulbing
9 Harvesting	-	-

Item	Potato	Pulse
1 Land preparation	- Plowing by hand - Harrowing by hand	- Plowing by hand - Harrowing by hand
2 Nursery	Not applied	Not applied
3 Broadcasting	Not applied	- 20 ~ 30cm x 40 ~ 50cm - 20kg per ha
4 Transplanting	- around 30,000 hills per ha - 50cm (interhill) x 100cm (interrow)	Not applied
5 Application of fertilizer		
Basal application	- 71 kg of AS per ha (15 kg N/ha) - 150 kg of TSP per ha (30 kg P <sub>2</sub> O <sub>5</sub> /ha)	- 190 kg of AS per ha (40 kg N/ha)
1st top dressing	- 71 kg of AS per ha (15 kg N/ha)	
Total application	142 kg AS, 150 kg TSP (NPK = 30:30:0)	190 kg AS (NPK = 40:0:0)
6 Weeding	- depending on the situation	- depending on the situation
7 Application of agro-chemicals	see Tables 3.3.3 and 3.3.4	see Tables 3.3.3 and 3.3.4
8 Water control	- Furrow irrigation every one week - Critical period : from flowering to 20 days before maturing	- Furrow irrigation every one week - Critical period : from flowering to 20 days before maturing
9 Harvesting	-	-

Table 3.3.3 (1/4) Schedule of Proposed Farming Practices by Crops

Crop : Maize

Days after Sowing	Growth Stage	Days after Planting	Proposed Farming Practices	Remarks
			↓ Land Preparation	( Plowing ( Harrowing
0	Germination	-2 0	Basal Dressing Sowing	Basal Dressing (NPK = 15 : 20 : 0) AS = 71 kg per ha TSP = 100 kg per ha
10			↑	
20			Weeding	by hand
30	Tassel Formation		Plant Protection	see Tables 3.3.4 and 3.3.5
40	Ear Formation	40	Top Dressing	Top Dressing (NPK = 15 : 0 : 0) AS = 71 kg per ha
50			↑	
60			↑	
75	Tassel Emergence		↑	
85	Silking stage		Weeding	by hand
90			↑	
105	Milk Ripe Stage		Plant Protection	see Tables 3.3.4 and 3.3.5
115	Dough Ripe Stage		↑	
125	Yellow Ripe Stage		↑	
135	Full Ripe Stage	135	Harvesting	

Table 3.3.3 (2/4) Schedule of Proposed Farming Practices by Crops

Crop : Cabbage

Days after Sowing	Growth Stage	Days after Planting	Proposed Farming Practices	Remarks
0	Germination	-35	Nursery Preparation	
10	Nursery Period	-30	Sowing in nursery	
20		Land Preparation	( Plowing ( Harrowing ( Ridging	
30		Plant Protection	see Tables 3.3.4 and 3.3.5	
40		Basal dressing	Basal Dressing (NPK = 50 : 40 : 0) AS = 238 kg per ha TSP = 200 kg per ha	
50	Head Thickening Growth Stage	0	Transplanting	
60		Weeding	by hand	
70		Plant Protection	see Tables 3.3.4 and 3.3.5	
80		Top Dressing	Top Dressing (NPK = 50 : 0 : 0) AS = 238 kg per ha	
90	Head Formation		Weeding	Manual
100			Plant Protection	see Tables 3.3.4 and 3.3.5
110	Maturity			
120			90	Harvesting

Table 3.3.3 (3/4) Schedule of Proposed Farming Practices by Crops

Crop : Potato

Days after Sowing	Growth Stage	Days after Planting	Proposed Farming Practices	Remarks
		-50	Land Preparation	( Plowing ( Harrowing ( Ridging
0	Germination	-2	Basal Dressing	Basal Dressing (NPK = 15 : 30 : 0) AS = 71 kg per ha TSP = 150 kg per ha
		0	Sowing	
10			↑	
20			↑	
30	Sprouting		Weeding	by hand
40			↑	
50			↑	
60			↑	
70		70	Top Dressing	Top Dressing (NPK = 15 : 0 : 0) AS = 71 kg per ha
80	Maximum Groth Stage		↑	
90			Weeding	by hand
100			↑	
110			Plant Protection	see Tables 3.3.4 and 3.3.5
120	Maturing Stage		↑	
120	Maturity	120	Harvesting	

Table 3.3.3 (4/4) Schedule of Proposed Farming Practices by Crops

Crop : Pulse

Days after Sowing	Growth Stage	Days after Planting	Proposed Farming Practices	Remarks
			↓ Land Preparation	( Plowing ( Harrowing
0	Germination	-2 0	Basal Dressing Sowing	Basal Dressing (NPK = 40 : 0 : 0) AS = 190 kg per ha
10			↑	
20				
30	Appearance of lateral branches		Weeding	by hand
45	Start of Flowering		Plant Protection	see Tables 3.3.4 and 3.3.5
50				
60				
70				
80	End of Flowering			
90				
100	Maturing Stage			
110				
120	Full Ripe Stage	120	↓ Harvesting	



Table 3.3.4 Recommendable Agro-Chemicals by Crops

Agro-chemicals		Paddy	Maize	Cabbage	Onion	Pulse	Potato
Common Name	Trade Name						
Endosulfan	Thiodan	Bugs	Aphids Cutworms	Cutworms Bugs	Aphids Thrips Bugs	Aphids Cutworms Bugs	
Carbaryl	Sevin	Green leafhopper Planthoppers Rice leaf beetle	Stalk borer	C. armyworm C. cutworm Diamond moth		S. pod borer Aphids C. armyworm	Ladybirds C. armyworm
Trichlorfon	Dipterex	Armyworm	Armyworm Stalk borer Aphids	C. C. worm Diamond moth C. armyworm Cutworms	Aphids	Aphids C. armyworm Cutworms Scarabs Bean webworm Bugs	C. armyworm
Diazinon	Diazinon	Stem Borer Paddy borer Plant/leafhopper Rice leafroller Rice skipper Stem maggot Rice leaf beetle	Cutworms Stalk borer Pink borer	Seedcorn maggot Diamond moth Cutworms C. C. worm S. leaf beetle		Cutworms Scarabs Maggot Bean fly	
Fenitrothion	Sumithion	Stem Borer Paddy borer Bugs Rice skipper Armyworm Ladybirds	Aphids Stalk borer Pink borer		Aphids	S. pod borer Aphids	Ladybirds
Phosphamidon	Actellic			C. C. worm Aphids Diamond moth C. armyworm	Aphids		
Malathion	Malathion	Planthoppers Green leafhopper Black rice bug			Aphids Thrips	S. pod borer Scarabs Aphids Mites	
Copper Hydroxide	Kocide			Downy mildew	Downy mildew P. blight	Downy mildew	Late blight
Mancozeb	Dithane			Downy mildew	Downy mildew P. blight	Downy mildew	Late blight
Fenvalerate	Sumicidin			Diamond moth			
Cypermethrin	Cymbush				Aphids Thrips Diamond moth	S. pod borer Scarabs Aphids Mites	
Carbofuran	Furadan			Nematodes	Aphids		Beetles
Thiophanate	Topsin	Seed dressing			Purple blotch	Stem rot	

Note) C. armyworm : Cabbage armyworm, C.cutworm : Common cutworm, Diamond moth : Diamondback moth  
S leaf beetle : Stripped leaf beetle, S. pod borer : Soybean pod borer, C.C.worm : Common cabbageworm  
Leafhopper : Rice green leafhopper, P blight : Phytophthora blight

Table 3.3.5 Recommendable Application Rate of Agro-Chemicals by Crops

Common Name*	Trade Name	Paddy	Vegetables	Pulse	Potato
Endosulfan	Thiodan		1. Spraying 2. Up to 7 DBH 3. less than 3 times 4. 3 lit./ha	1. Spraying 2. Up to 7 DBH 3. less than 3 times 4. 2 lit./ha	
Carbaryl	Sevin	1. Spraying 2. Up to 45 DBH 3. less than 5 times 4. 2 lit./ha	1. Spraying 2. Up to 14 DBH 3. less than 3 times 4. 3 lit./ha	1. Spraying 2. Up to 7 DBH 3. less than 3 times 4. 2 lit./ha	
Trichlorfon	Dipterex		1. Spraying 2. Up to 14 DBH 3. less than 6 times 4. 3 lit./ha		
Diazinon	Diazinon	1. Spraying 2. Up to 21 DBH 3. less than 4 times 4. 2 lit./ha	1. Spraying 2. Up to 30 DBH 3. less than 2 times 4. 3 lit./ha		
Fenitrothion	Sumithion	1. Spraying 2. Up to 21 DBH 3. less than 4 times 4. 2 lit./ha	1. Spraying 2. Up to 21 DBH 3. less than 2 times 4. 3 lit./ha	1. Spraying 2. Up to 21 DBH 3. less than 4 times 4. 2 lit./ha	1. Spraying 2. Up to 3 DBH 3. less than 6 times 4. 3 lit./ha
Pirimiphos-methyl	Actellic		1. Spraying 2. Up to 7 DBH 3. less than 4 times 4. 3 lit./ha		
Malathion	Malathion	1. Spraying 2. Up to 7 DBH 3. less than 6 times 4. 2 lit./ha	1. Spraying 2. Up to 14 DBH 3. less than 3 times 4. 3 lit./ha	1. Spraying 2. Up to 7 DBH 3. less than 3 times 4. 2 lit./ha	
Copper Hydroxide	Kocide		1. Spraying 2. not specified 3. not specified 4. 3 kg/ha		1. Spraying 2. not specified 3. not specified 4. 3 kg/ha
Mancozeb	Dithane		1. Spraying 2. Up to 3 DBH 3. less than 5 times 4. 3 lit./ha		1. Spraying 2. Up to 7 DBH 3. less than 7 times 4. 3 lit./ha
Fenvalerate	Sumicidin		1. Spraying 2. Up to 30 DBH 3. less than 3 times 4. 3 lit./ha		
Thiophanate	Topsin	1. Soaking 2. before sowing 3. once 4.	1. Spraying 2. Up to 7 DBH 3. less than 2 times 4. 3 lit./ha	1. Spraying 2. Up to 7 DBH 3. less than 4 times 4. 2 lit./ha	

Note) DBH : Days before harvesting

Table 3.3.6 Proposed Crop Budget for Major Crops in Migeta Scheme

	Unit	Maize			Cabbage			Potato			Pulse		
		Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)
<b>Production Cost</b>													
(A) Farm Input													
1 Seed	kg/ha	590	20	11,800	30,000	0.2	6,000	100	800	80,000	800	20	16,000
2 Fertilizer	kg/ha	240	0	0	240	0	0	240	0	0	240	0	0
: Urea (46 %-N)	kg/ha	180	142	25,560	180	190	34,200	180	142	25,560	180	190	34,200
: SA (21 %-N)	kg/ha	220	100	22,000	220	65	14,300	220	65	14,300	220	0	0
: TSP (20 %-P <sub>2</sub> O <sub>5</sub> )	kg/ha												
3 Agro-chemical	lit./ha	5,500	4.0	22,000	5,500	4.0	22,000	5,500	4.0	22,000	5,500	4.0	22,000
: Pesticide	lit./ha	3,500	0.0	0	3,500	0.0	0	3,500	0.0	0	3,500	0.0	0
: Herbicide	lit./ha	4,000	0.0	0	4,000	2.0	8,000	4,000	2.0	8,000	4,000	0.0	0
: Fungicide	lit./ha	500	33	16,500	500	150	75,000	500	60	30,000	500	17	8,500
4 Packing material													
Sub-total(A)				97,860			159,500			179,860			80,700
(B) Labour Requirement													
1 Family labour			90	0		180	0		140	0		90	0
2 Hired labour		500	45	22,500	500	47	23,500	500	41	20,500	500	40	20,000
Sub-total(B)			135	22,500		227	23,500		181	20,500		130	20,000
(C) Machinery or draught cattle													
1 Ploughing by tractor	L.S	30,000	0	0	30,000		0			0			0
2 Ploughing by hand tractor	L.S	25,000	0	0	25,000		0			0			0
3 Puddling by hand tractor	L.S	17,500	0	0	17,500		0			0			0
Sub-total(C)				0			0			0			0
(D) Miscellaneous cost													
5 % of (A) and (B)				6,018			9,150			10,018			5,035
Total Production Cost				126,378			192,150			210,378			105,735
Gross Return													
(A) Yield	kg/ha		3,000		90	15,000			6,000			1,500	
(B) Producer price	per kg	150		450,000			1,350,000			1,800,000			300,000
Gross return				323,622			1,157,850			1,589,622			194,265
Net return													

Table 3.4.1 Unit Irrigation Water Requirement for Mgeta Scheme

Unit : litre/sec/ha												
Year	Jan			Feb			Mar			Apr		
	1-10	11-20	21-end	1-10	11-20	21-end	1-10	11-20	21-end	1-10	11-20	21-end
1975	0.00	0.49	0.00	0.00	0.17	0.21	0.02	0.08	0.00	0.00	0.14	0.00
1976	0.14	0.49	0.00	0.35	0.00	0.15	0.21	0.12	0.10	0.00	0.13	0.06
1977	0.00	0.00	0.31	0.00	0.31	0.34	0.07	0.08	0.11	0.02	0.00	0.00
1978	0.00	0.70	0.28	0.00	0.20	0.30	0.21	0.05	0.11	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.14	0.21	0.12	0.00	0.09	0.00	0.21
1980	0.67	0.11	0.00	0.41	0.08	0.28	0.09	0.08	0.11	0.09	0.00	0.00
1981	0.11	0.71	0.65	0.00	0.20	0.34	0.00	0.06	0.06	0.00	0.12	0.00
1982	0.71	0.74	0.03	0.00	0.00	0.34	0.00	0.04	0.11	0.00	0.14	0.00
1983	0.52	0.74	0.00	0.00	0.00	0.34	0.16	0.09	0.11	0.06	0.13	0.04
1984	0.52	0.47	0.59	0.29	0.25	0.23	0.21	0.12	0.11	0.00	0.00	0.00
Average	0.27	0.45	0.19	0.10	0.12	0.27	0.12	0.08	0.08	0.03	0.07	0.03
Year	May			Jun			Jul			Aug		
	1-10	11-20	21-end	1-10	11-20	21-end	1-10	11-20	21-end	1-10	11-20	21-end
1975	0.00	0.31	0.00	0.00	0.00	0.01	0.09	0.42	0.00	0.00	0.23	0.00
1976	0.00	0.00	0.00	0.00	0.02	0.00	0.28	0.44	0.00	0.00	0.32	0.09
1977	0.14	0.29	0.00	0.00	0.00	0.48	0.11	0.31	0.00	0.31	0.10	0.00
1978	0.00	0.00	0.00	0.00	0.14	0.11	0.36	0.37	0.39	0.12	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.42	0.50	0.49	0.08	0.00	0.00	0.00	0.00
1980	0.00	0.21	0.09	0.00	0.23	0.50	0.46	0.13	0.25	0.39	0.00	0.05
1981	0.24	0.00	0.00	0.00	0.23	0.50	0.48	0.22	0.00	0.07	0.32	0.00
1982	0.24	0.31	0.00	0.21	0.11	0.00	0.49	0.44	0.15	0.00	0.00	0.00
1983	0.10	0.00	0.00	0.00	0.00	0.04	0.39	0.44	0.32	0.33	0.06	0.03
1984	0.00	0.31	0.00	0.00	0.00	0.50	0.46	0.44	0.39	0.39	0.00	0.00
Average	0.07	0.14	0.01	0.02	0.11	0.26	0.36	0.33	0.15	0.16	0.10	0.02
Year	Sep.			Oct.			Nov.			Dec.		
	1-10	11-20	21-end	1-10	11-20	21-end	1-10	11-20	21-end	1-10	11-20	21-end
1975	0.14	0.08	0.00	0.00	0.04	0.00	0.43	0.54	0.62	0.60	0.78	0.71
1976	0.20	0.03	0.00	0.00	0.19	0.30	0.40	0.54	0.58	0.70	0.42	0.82
1977	0.00	0.00	0.00	0.00	0.00	0.24	0.41	0.37	0.58	0.00	0.00	0.00
1978	0.12	0.00	0.00	0.00	0.07	0.24	0.24	0.54	0.61	0.75	0.06	0.70
1979	0.00	0.00	0.00	0.00	0.00	0.30	0.19	0.54	0.61	0.39	0.86	0.00
1980	0.00	0.00	0.00	0.03	0.00	0.30	0.43	0.51	0.38	0.34	0.68	0.00
1981	0.00	0.11	0.00	0.00	0.18	0.30	0.43	0.07	0.67	0.17	0.33	0.00
1982	0.09	0.11	0.04	0.00	0.21	0.08	0.00	0.50	0.36	0.00	0.00	0.00
1983	0.20	0.00	0.00	0.00	0.00	0.18	0.00	0.54	0.00	0.35	0.71	0.00
1984	0.01	0.11	0.00	0.00	0.00	0.28	0.38	0.54	0.67	0.00	0.86	0.00
Average	0.08	0.05	0.00	0.00	0.07	0.22	0.29	0.47	0.51	0.33	0.47	0.22

**Table 3.5.1 Proposed Training Courses for O&M and Strengthening of WUG**

Training Course	Total Period of Course (day)	Persons/ Course (Person)	Times/ Year (Time)	Trainees	Contents of Training
Course-A	2	4 - 5	1	<ul style="list-style-type: none"> <li>- District Commissioner, District Executive Director, District Administrative Officer.</li> <li>- Senior officials of the offices of RALDO, and RCO, and the Zonal Irrigation Office.</li> <li>- Senior officials of the offices involved in WUG's activities (DALDO, District Water Engineers, District Community Development Officers, DCO, etc.).</li> </ul>	<ul style="list-style-type: none"> <li>- Outline of the project</li> <li>- Farmers' participant management system</li> <li>- Outline of O&amp;M by WUG</li> <li>- Organization and activities of WUG</li> <li>- Necessity of agricultural supporting services</li> <li>- Field investigation, etc.</li> </ul>
Course-B	5	20	1	<ul style="list-style-type: none"> <li>- Officials involved in O&amp;M (Zonal Irrigation Office, RALDO and DALDO's offices, Division Extension Officers, DCO).</li> <li>- Village Extension Officers and Irrigation Technicians to be attached to the project.</li> </ul>	<ul style="list-style-type: none"> <li>- Development plan of smallholder irrigation project</li> <li>- Estimation of water requirement</li> <li>- Preparation of irrigation schedule</li> <li>- O&amp;M of facilities</li> <li>- Strengthening of WUG, articles and by-laws, water right, registration</li> <li>- Management of WUG</li> <li>- Collection of irrigation service charge</li> <li>- Monitoring system, measuring and surveying methods</li> <li>- Agricultural supporting services to WUG</li> <li>- Promoting women in development</li> <li>- Study tour at advanced areas, etc.</li> </ul>
Course-C (for each scheme)	10	20 - 30	2	<p>Farmer's level training to leaders of WUG, gate keepers and key farmers.</p>	<ul style="list-style-type: none"> <li>- Outline of the project</li> <li>- O&amp;M of facilities, water requirement, water delivery, etc.</li> <li>- Irrigation schedule and cropping calendar</li> <li>- Management of WUG such as accounting and book keeping and auditing</li> <li>- Articles and by-laws, water right, registration</li> <li>- Collection of irrigation service charge</li> <li>- Monitoring system, measuring and surveying methods</li> <li>- Marketing and credit, etc.</li> <li>- Promoting women in development.</li> <li>- Study tour at advanced areas, etc.</li> </ul>
Course-D (for each scheme)	2	20	2	<p>Village Chairmen, Village Executive Officers, Chairmen of Ward Council, Ward Executive Officers, elder people, informal rural leaders in the villages related to the project, etc.</p>	<ul style="list-style-type: none"> <li>- Outline of the project</li> <li>- Organization and activities of WUG</li> <li>- Required agricultural supporting services</li> <li>- Promoting women in development, etc.</li> </ul>

Table 3.5.2 (1/2) Training Schedule for Proposed Farming Practices by Crops in Mgeta Scheme

Training Subjects	Major Points	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Crop : Cabbage													
1 Nursery preparation	- Size / formation - Seedling management			-----									
2 Land preparation	- Plowing depth - Size/orientation of ridge				-----								
3 Planting	- Planting density				-----								
4 Application of fertilizer					-----								
4.1 Basal dressing	- Amount and timing				-----								
4.2 Top dressing	- Amount and timing					-----							
5 Plant protection	- Identification of pests and disease - Amount and timing			- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -
6 Water management	- Timing and condition			- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -
7 Harvesting	- Timing							-----					

Training Subjects	Major Points	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
Crop : Maize / Beans														
1 Land preparation	- Plowing depth - Size/orientation of ridge										-----			
2 Planting	- Planting density										-----			
3 Application of fertilizer											-----			
4.1 Basal dressing	- Amount and timing										-----			
4.2 Top dressing	- Amount and timing											-----		
4 Plant protection	- Identification of pests and disease - Amount and timing	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	
5 Water management	- Timing and condition	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	
Improvement of soil fertility														
6 Harvesting	- Timing													

Table 3.5.2 (2/2) Training Schedule for Proposed Farming Practices by Crops in Mgeta Scheme

Training Subjects	Major Points	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Crop : Potato													
1 Land preparation	- Plowing depth - Size/orientation of ridge												
2 Planting	- Planting density												
3 Application of fertilizer													
3.1 Basal dressing	- Amount and timing												
3.2 Top dressing	- Amount and timing												
4 Plant protection	- Identification of pests and disease - Amount and timing												
5 Water management	- Timing and condition												
6 Harvesting	- Timing												

Training Subjects	Major Points	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Crop : Pulse													
1 Land preparation	- Plowing depth - Size/orientation of ridge												
2 Planting	- Planting density												
3 Application of fertilizer													
3.1 Basal dressing	- Amount and timing												
4 Plant protection	- Identification of pests and disease - Amount and timing												
5 Water management	- Timing and condition												
6 Harvesting	- Timing												

Table 3.5.3 Training Plan for Farmers Concerned

Subject	Stage	Objectives	Resource	Remarks
1. Field training (Implementation of demonstration plots)	through the project implementation	<ul style="list-style-type: none"> <li>- Demonstration of proper farming practices to general farmers</li> <li>- Guidance for proper farming practices</li> <li>- Guidance for proper water management</li> <li>- Guidance for method on the yield analysis</li> </ul>	<ul style="list-style-type: none"> <li>- DEO</li> <li>- DIVEO</li> <li>- VEO</li> </ul>	<ul style="list-style-type: none"> <li>- Aggressive farmers should be selected for the field training.</li> <li>- Demonstration will be carried out through the construction period.</li> <li>- Farmer's field to be selected.</li> </ul>
	after the project implementation	<ul style="list-style-type: none"> <li>- Practical training for proper farming practices (Proper farming practices for major crops will be transferred to the farmers concerned through the actual crop cultivation.)</li> <li>- Guidance for proper water management</li> </ul>	<ul style="list-style-type: none"> <li>- DEO</li> <li>- SMS</li> <li>- DIVEO</li> <li>- VEO</li> </ul>	<ul style="list-style-type: none"> <li>- Group training will be required.</li> <li>- Aggressive farmers should be selected as block leader each block of every tertiary blocks.</li> <li>- Group training will be required.</li> <li>- Training schedule for each scheme is shown in relevant tables in each Division.)</li> <li>- Farmer's field to be selected.</li> </ul> <p>Mgeta scheme (see Table 3.5.4 in Division 2)</p> <p>Mgongola scheme (see Table 3.5.4 in Division 3)</p> <p>Mkula scheme (see Table 3.5.4 in Division 4)</p> <p>Mwega scheme (see Table 3.5.4 in Division 5)</p>
3. Field Tour	after the project implementation	<ul style="list-style-type: none"> <li>- Inspection to the advanced area</li> <li>- Exchange of information and experience with farmers in the advanced area.</li> </ul>	<ul style="list-style-type: none"> <li>- SMS</li> <li>- DIVEO</li> <li>- VEO</li> </ul>	<ul style="list-style-type: none"> <li>- Upland crops in high altitude and cool climate</li> <li>- Lushoto, Iringa, Mbeya</li> <li>- Paddy and Maize</li> <li>- Major fields in FAO special programme</li> </ul>
4. Special training in KATC	through the project implementation	<ul style="list-style-type: none"> <li>- Training of advanced practices</li> </ul>	<ul style="list-style-type: none"> <li>- KATC</li> </ul>	<ul style="list-style-type: none"> <li>- Key-farmer's course (20 days per course)</li> </ul>

Table 3.5.5 Training Plan for DIVEOs and VEOs Concerned

Subject	Stage	Objectives	Resource	Remarks
1. Field training (Implementation of demonstration plots)	through the project implementation	<ul style="list-style-type: none"> <li>- Enlightenment of proper farming practices</li> <li>- Theory for crop cultivation</li> <li>- Training for monitoring and evaluation method</li> <li>- Review and monitor of the demonstration activities</li> <li>- Guidance for method on the yield analysis</li> <li>- Guidance for proper water management</li> </ul>	<ul style="list-style-type: none"> <li>- REO</li> <li>- SMSs</li> <li>- DEO</li> </ul>	<ul style="list-style-type: none"> <li>- VEOs concerned select some aggressive farmers.</li> <li>- Farm inputs such as seeds and agro-chemicals to be supplied from the Committee.</li> <li>- Farmer's field to be selected.</li> </ul>
	after the project implementation	<ul style="list-style-type: none"> <li>- Training of proper cultivation of major crops</li> <li>- Preparation of guideline for fertilizer dosage</li> <li>- Approach of high yielding practices</li> <li>- Guidance for method on the yield analysis</li> <li>- Guidance for proper water management</li> </ul>	<ul style="list-style-type: none"> <li>- REO</li> <li>- SMSs</li> <li>- DEO</li> </ul>	<ul style="list-style-type: none"> <li>- Farmer's field to be selected.</li> </ul>
2. Workshop	through the project implementation	<ul style="list-style-type: none"> <li>- Enlightenment of agricultural development plan</li> <li>- Training for the dissemination method to farmers</li> <li>- Monitoring and review on the progress of implementation of the demonstration.</li> </ul>	<ul style="list-style-type: none"> <li>- REO</li> <li>- SMSs</li> <li>- DEO</li> </ul>	
	after the project implementation	<ul style="list-style-type: none"> <li>- Monitoring and review on the progress of training programme</li> <li>- Review of the activities on proposed farming practices</li> </ul>	<ul style="list-style-type: none"> <li>- REO</li> <li>- SMSs</li> <li>- DEO</li> </ul>	
3. Special training in KATC	through the project implementation	<ul style="list-style-type: none"> <li>- Training of advanced practices</li> </ul>	<ul style="list-style-type: none"> <li>- KATC</li> </ul>	<ul style="list-style-type: none"> <li>- Rice cultivation course (45 days per course)</li> <li>- Water management course (30 days per course)</li> </ul>



Table 3.5.4 Schedule of Field Training for Proposed Farming Practices by Crops in Mgeta Scheme

Training Practices	Crops	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.												
1 Land preparation	Cabbage			1	1	1	1																		
	Maize									1	1	1	1												
	Potato					1	1	1	1																
	Pulse			1	1	1	1																		
2 Nursery preparation	Cabbage		1	1	1	1																			
3 Planting	Cabbage				1	1	1	1																	
	Maize										1	1	1												
	Potato					1	1	1	1																
	Pulse				1	1	1	1																	
4 Basal dressing of fertilizer	Cabbage			1	1	1	1					1	1												
	Maize										1	1	1												
	Potato					1	1	1	1																
	Pulse				1	1	1	1																	
5 Top dressing of fertilizer	Cabbage					1	1	1	1																
	Maize											1	1												
	Potato							1	1	1	1														
	Pulse								1	1	1	1	1												
6 Plant protection																									
7 Water management																									
8 Harvesting	Cabbage								1	1	1	1													
	Maize			1	1	1	1																		
	Potato									1	1	1	1												
	Pulse								1	1	1	1	1												
Number of training days		0	0	0	1	1	5	5	7	8	8	5	5	3	1	4	2	5	3	5	4	3	3	1	1

Note)

\*1 On occurrence of damage by insects and diseases, VEOs will rapidly take guidance to farmers concerned.

Agricultural Coordinating Committee will also have to support VEOs and farmers in collaboration with relevant institutes such as SUA, Research centres, etc.

\*2 Guidance concerning proper water management is given as required, depending on the schedule of other training practices. Major training subjects on proper water management are (i) proper timing of irrigation and drainage, (ii) proper condition of irrigated fields, (iii) proper interval of irrigation, etc.

Remarks)

1. Figures in the table mean number of days for field training in the first and second halves of month.

2. Training day: -One-day field training is required for each farming practice by crop.  
-Block leaders as representatives of farmers in each tertiary block are strictly requested to participate in training programmes and also other farmers are requested to participate in the field training as much as possible.

3. Farmer's group: - Estimated total beneficiaries : around 100 peoples

- Total training days: 4 days

(to be estimated based on the following conditions)

- Period for each farming practice : Cabbage : 4 months

(see Table 3.5.2 in Division 2) Maize/Pulse : 2 months

Potato : 2 months

Pulse : 2 months

- Training days per month : Cabbage : 1 day

Maize/Pulse : 2 days

Potato : 2 days

Pulse : 2 days

- Total training days : 4 days each crop

- Participants for each training day : 25 peoples

**Table 4.1.1 List of Labour Cost**

Item	Unit	Rate(Tsh)
Foreman	Man-Day	4,400
Skilled labour	Man-Day	3,600
Semi-skilled labour	Man-Day	2,450
Unskilled labour	Man-Day	1,600
Operator for heavy equipment	Man-Day	3,800
Ass.operator for heavy equipment	Man-Day	2,450
Operator for lighth equipment	Man-Day	3,360
Ass.operator for lighth equipment	Man-Day	2,170
Civil engineer	Man-Day	12,000

**Table 4.1.2 List of Material Cost**

Item	Unit	Spec.	Rate(Tsh)
Diesel	litre		383
Engine oil	litre	for diesel	1,200
Ordinary portland cement	ton		83,200
Fine aggregate(sand)	m <sup>3</sup>		10,360
Coarse aggregates	m <sup>3</sup>	for concrete	31,860
Admixture	kg	AE/water reducing	1,400
Mild steel reinforcement	ton		360,720
Hardwood timber	m <sup>3</sup>		150,000
Softwood timber	m <sup>3</sup>		94,920
Nail	kg		600
Cobble stone	m <sup>3</sup>	Production in situ	
Reinforced concrete pipe	lin m	Dia 0.3m	27,930
PVC pipe	lin 4m	Dia 0.1m, w/socket	38,000
PVC bent	No.	Dia 0.1m	15,500
Control valve	No.	Dia 0.1m, w/valve socket	80,500
Angle valve	No.	Dia 0.05m	49,850
Dressor cheese	No.	Dia 0.1m	52,350
Steel pipe	lin 4m	Dia 0.05m	19,550
Float valve	No.	Dia 0.1m, w/valve socket	4,335,000

**Table 4.1.3 List of Machine Cost**

Equipment	Spec.	Unit	Rate(Tsh)
Crane truck	10t	h	21,100
Compressor	5 m <sup>3</sup> /m	h	8,900
Concrete blaker	20 kg	h	470
Concrete Mixer	0.2m <sup>3</sup>	h	3,800
Generator	10KVA	h	1,800

**Table 4.1.4 List of Unit Construction Cost**

No.	Work Item	Unit	Unit Cost		
			Foreign (Tsh)	Local (Tsh)	Total (Tsh)
1	Excavation(Rock ,Canal)	m3	9,184	15,755	24,940
2	Excavation(Man-Power)	m3	0	2,484	2,484
3	Embankment & Back Filling	m3	0	1,691	1,691
4	Concrete (240kg/cm2, Reinforced Concrete in Mgeta)	m3	9,100	89,163	98,263
5	Concrete (210kg/cm2, Lining/Plain Concrete in Mgeta)	m3	9,100	87,791	96,891
6	Concrete (180kg/cm2, Foundation Concrete in Mgeta)	m3	9,100	75,094	84,194
7	Reinforce Bar(Processing & Assembly, HD<60 m)	ton	483,004	52,164	535,168
8	Concrete Form	m2	0	3,970	3,970
9	Wet Stone Masonary(in Mgeta)	m2	1,656	16,476	18,133
10	Riprap(in Mgeta)	m3	0	5,261	5,261
11	Cobble Stone Layering(in Mgeta)	m3	3,549	35,166	38,715
12	Stoplog	m3	0	237,510	237,510
13	Reinforced Concrete Pipe (Dia. 0.3m)	m	4,177	38,310	42,486
14	PVC Pipe (Dia. 0.1m,VP, with Socket)	m	12,597	338	12,935
15	PVC Bent (Dia. 0.1m)	no.	20,553	451	21,004
16	Control Valve(Dia. 0.1m, with Valve Socket)	no.	106,743	451	107,194
17	Angle Valve(Dia. 0.05m)	no.	66,101	451	66,552
18	Dressor Cheese(Dia. 0.1m)	no.	69,416	451	69,867
19	Steel Pipe(Dia. 0.05 m)	m	6,481	451	6,932
20	Float Valve (Dia. 0.1m, with Valve Socket)	no.	5,635,500	451	5,635,951

**Table 4.1.5 Breakdown of Direct Construction Cost of Mindu System in Mgeta Scheme**

Item	Unit	Qty	(Unit : 1,000 Tsh)		
			F.C.(Tsh)	L.C.(Tsh)	Total(Tsh)
<b>Headworks</b>					
Excavation(Man-Power)	m3	62	0	154	154
Excavation(Rock Canal)	m3	82	753	1,292	2,045
Concrete(240kg/cm2)	m3	4	36	357	393
Concrete(210kg/cm2)	m3	6	55	527	581
Reinforcement Bar	ton	0.3	155	17	171
Concrete Form	m2	23	0	91	91
Wet Stone Masonary	m2	139	230	2,290	2,520
Riprap	m3	284	0	1,494	1,494
Stoplog	m3	0.13	0	31	31
Sub-Total			1,229	6,253	7,482
<b>Canal System</b>					
<b>Upper Canal</b>					
Excavation(Man-Power)	m3	321	0	797	797
Embankment	m3	200	0	338	338
Cobble Stone Layering	m3	73	259	2,567	2,826
<b>Related Structure</b>					
Concrete(240kg/cm2)	m3	33	300	2,897	3,197
Reinforcement Bar	ton	2.6	1,256	136	1,391
Concrete Form	m2	456	0	1,810	1,810
Back Filling	m3	28	0	47	47
Riprap	m3	6	0	32	32
Stoplog	m3	0.19	0	45	45
Sub-Total			1,815	8,670	10,485
<b>Lower Canal</b>					
Excavation(Man-Power)	m3	149	0	370	370
Embankment	m3	100	0	169	169
Cobble Stone Layering	m3	23	82	809	890
<b>Related Structure</b>					
Excavation(Man-Power)	m3	3	0	7	7
Concrete(240kg/cm2)	m3	7	64	615	678
Concrete(180kg/cm2)	m3	0.3	3	23	25
Reinforcement Bar	ton	0.6	290	31	321
Concrete Form	m2	85	0	337	337
Back Filling	m3	5	0	8	8
Riprap	m3	3	0	16	16
RC.Pipe(Dia.0.3m)	m	5	21	192	212
Sub-Total			459	2,577	3,036
<b>Miscellaneous Works</b>					
	L. S.		175	875	1,050
<b>Grand-Total</b>			<b>3,678</b>	<b>18,375</b>	<b>22,053</b>

**Table 4.1.6 Breakdown of Direct Construction Cost of Mzingo System in Mgeta Scheme**

		(Unit : 1,000 Tsh)				
Item	Unit	Qty	F.C.(Tsh)	L.C.(Tsh)	Total(Tsh)	
<b>Headworks</b>						
Excavation(Man-Power)	m3	3	0	7	7	
Excavation(Rock Canal)	m3	9	83	142	224	
Concrete(240kg/cm2)	m3	2	14	134	147	
Concrete(210kg/cm2)	m3	2	16	158	174	
Reinforcement Bar	ton	0.2	77	8	86	
Concrete Form	m2	9	0	36	36	
Wet Stone Masonary	m2	14	23	231	254	
Riprap	m3	4	0	21	21	
Stoplog	m3	0.03	0	7	7	
Sub-Total			213	744	957	
<b>Main System</b>						
<b>Mzingo Canal</b>						
Excavation(Man-Power)	m3	691	0	1,717	1,717	
Embankment & Backfilling	m3	657	0	1,111	1,111	
Lining	m3	0.8	7	70	78	
PVC Pipe(Dia. 0.1m,VP,with Socket)	m	1270	15,998	430	16,428	
PVC Bent(Dia. 0.1m)	no.	35	719	16	735	
Thrust Block Concrete(210kg/cm2)	m3	1.3	12	116	128	
<b>Related Structure</b>						
Excavation(Man-Power)	m3	7	0	18	18	
Excavation(Rock Canal)	m3	7	66	113	180	
Concrete(240kg/cm2)	m3	21	191	1,872	2,064	
Reinforcement Bar	ton	1.7	821	89	910	
Concrete Form	m2	160	0	635	635	
Back Filling	m3	2	0	3	3	
Riprap	m3	5	0	26	26	
Stoplog	m3	0.03	0	7	7	
PVC Pipe(Dia. 0.1m,VP,with Socket)	m	3	38	1	39	
Control Valve(Dia. 0.1m, with Valve Socket)	no.	2	213	1	214	
Angle Valve( Dia. 0.05m)	no.	13	859	6	865	
Dressor Cheese(Dia. 0.1m)	no.	13	902	6	908	
Steel Pipe(Dia. 0.05 m)	no.	13	84	6	90	
Float Valve (Dia. 0.1m, with Valve Socket)	no.	5	28,178	2	28,180	
Sub-Total			48,090	6,245	54,335	
<b>Miscellaneous Works</b>						
	L. S.		2,415	349	2,765	
<b>Grand Total</b>			<b>50,718</b>	<b>7,339</b>	<b>58,057</b>	

Table 5.1.1 Financial Crop Budget under the Without-Project Condition in Mgeta Scheme

	Unit	Maize			Pulse Crops			Cabbage			Potato		
		Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)
<b>Production Cost</b>													
(A) Farm Input													
1 Seed	kg/ha	590	20	11,800	800	20	16,000	30,000	0.2	6,000	100	800	80,000
2 Fertilizer	kg/ha	240	0	0	240	0	0	240	0	0	240	0	0
: Urea (46 %-N)	kg/ha	180	0	0	180	0	0	180	150	27,000	180	125	22,500
: SA (21 %-N)	kg/ha												
: TSP (46 %-P <sub>2</sub> O <sub>5</sub> )	kg/ha												
3 Agro-chemical	lit./ha	5,500	0.0	0	5,500	0.0	0	5,500	2.0	11,000	5,500	2.0	11,000
: Pesticide	lit./ha	3,500	0.0	0	3,500	0.0	0	3,500	0.0	0	3,500	0.0	0
: Herbicide	lit./ha	4,000	0.0	0	4,000	0.0	0	4,000	0.0	0	4,000	0.0	0
: Fungicide	lit./ha	500	11	5,500	500	8	4,000	500	100	50,000	500	30	15,000
4 Packing material													
Sub-total(A)				17,300			20,000			94,000			128,500
(B) Labour Requirement													
1 Family labour			60	0		50	0		150	0		110	0
2 Hired labour		500	25	12,500	500	25	12,500	500	34	17,000	500	25	12,500
Sub-total(B)			85	12,500		75	12,500		184	17,000		135	12,500
(C) Machinery or draught cattle													
1 Ploughing by tractor	L.S	30,000	0	0	30,000		0	30,000		0	30,000		0
2 Ploughing by hand tractor	L.S	25,000	0	0	25,000		0	25,000		0	25,000		0
3 Puddling by hand tractor	L.S	17,500	0	0	17,500		0	17,500		0	17,500		0
Sub-total(C)				0			0			0			0
(D) Miscellaneous cost				1,490			1,625			5,550			7,050
5 % of (A) and (B)													
Total Production Cost				31,290			34,125			116,550			148,050
Gross Return													
(A) Yield	kg/ha		1,000	150,000		700	140,000		10,000	900,000		3,000	900,000
(B) Producer price	per kg	150			200			90			300		
Gross return				118,710			105,875			783,450			751,950
Net return													

Table 5.1.2 Financial Crop Budget under the With Project Condition in Mgeta Scheme

	Unit	Maize			Cabbage			Potato			Pulse Crops		
		Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)
<b>Production Cost</b>													
(A) Farm Input	kg/ha	590	20	11,800	30,000	0.2	6,000	100	800	80,000	800	20	16,000
1 Seed	kg/ha	240	0	0	240	0	0	240	0	0	240	0	0
2 Fertilizer	kg/ha	180	142	25,560	180	190	34,200	180	142	25,560	180	190	34,200
: Urea (46 %-N)	kg/ha	220	100	22,000	220	65	14,300	220	65	14,300	220	0	0
: SA (21 %-N)	kg/ha												
: TSP (46 %-P <sub>2</sub> O <sub>5</sub> )	kg/ha												
3 Agro-chemical	lit./ha	5,500	4	22,000	5,500	4	22,000	5,500	4	22,000	5,500	4	22,000
: Pesticide	lit./ha	3,500	0	0	3,500	0	0	3,500	0	0	3,500	0	0
: Herbicide	lit./ha	4,000	0	0	4,000	2	8,000	4,000	2	8,000	4,000	0	0
: Fungicide	lit./ha	500	33	16,500	500	150	75,000	500	60	30,000	500	17	8,500
4 Packing material				<u>97,860</u>			<u>159,500</u>			<u>179,860</u>			<u>80,700</u>
Sub-total(A)													
(B) Labour Requirement													
1 Family labour		500	90	0	500	180	0	500	140	0	500	90	0
2 Hired labour			45	22,500		47	23,500		41	20,500		40	20,000
Sub-total(B)			<u>135</u>	<u>22,500</u>		<u>227</u>	<u>23,500</u>		<u>181</u>	<u>20,500</u>		<u>130</u>	<u>20,000</u>
(C) Machinery or draught cattle	L.S	30,000	0	0	30,000		0	30,000		0	30,000		0
1 Ploughing by tractor	L.S	25,000	0	0	25,000		0	25,000		0	25,000		0
2 Ploughing by hand tractor	L.S	17,500	0	0	17,500		0	17,500		0	17,500		0
3 Puddling by thand tractor	L.S			0			0			0			0
Sub-total(C)				0			0			0			0
(D) Miscellaneous cost				6,018			9,150			10,018			5,035
5 % of (A) and (B)													
Total Production Cost				126,378			192,150			210,378			105,735
Gross Return	kg/ha	150	3,000	450,000	90	15,000	1,350,000	300	6,000	1,800,000	200	1,500	300,000
(A) Yield	per kg												
(B) Producer price													
Gross return				323,622			1,157,850			1,589,622			194,265
Net return													

Table 5.1.3 Economic Crop Budget under the Without-Project Condition in Mgeta Scheme

	Unit	Maize			Pulse Crops			Cabbage			Potato		
		Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)
<b>Production Cost</b>													
(A) Farm Input													
1 Seed	kg/ha	590	20	11,800	800	20	16,000	30,000	0.2	6,000	100	800	80,000
2 Fertilizer													
: Urea (46 %-N)	kg/ha	126	0	0	126	0	0	126	0	0	126	0	0
: SA (21 %-N)	kg/ha	73	0	0	73	0	0	73	150	10,950	73	125	9,125
: TSP (46 %-P <sub>2</sub> O <sub>5</sub> )	kg/ha	114	0	0	114	0	0	114	0	0	114	0	0
3 Agro-chemical													
: Pesticide	lit./ha	5,500	0.0	0	5,500	0.0	0	5,500	2.0	11,000	5,500	2.0	11,000
: Herbicide	lit./ha	3,500	0.0	0	3,500	0.0	0	3,500	0.0	0	3,500	0.0	0
: Fungicide	lit./ha	4,000	0.0	0	4,000	0.0	0	4,000	0.0	0	4,000	0.0	0
4 Packing material													
		500	11	5,500	500	8	4,000	500	100	50,000	500	30	15,000
Sub-total (A)				17,300			20,000			77,950			115,125
(B) Labour Requirement													
1 Family labour		400	60	24,000	400	50	20,000	400	150	60,000	400	110	44,000
2 Hired labour		400	25	10,000	400	25	10,000	400	34	13,600	400	25	10,000
Sub-total (B)			85	34,000		75	30,000		184	73,600		135	54,000
(C) Machinery or draught cattle													
1 Ploughing by tractor	L.S	24,000	0	0	24,000	0	0	24,000	0	0	24,000	0	0
2 Ploughing by hand tractor	L.S	20,000	0	0	20,000	0	0	20,000	0	0	20,000	0	0
3 Pudding by hand tractor	L.S	14,000	0	0	14,000	0	0	14,000	0	0	14,000	0	0
Sub-total (C)				0			0			0			0
(D) Miscellaneous cost													
5 % of (A) and (B)				2,565			2,500			7,578			8,456
Total Production Cost				53,865			52,500			159,128			177,581
Gross Return													
(A) Yield	kg/ha		1,000	150,000		700	140,000		10,000	900,000		3,000	900,000
(B) Producer price	per kg	150			200			90			300		
Gross return				96,135			87,500			740,872			722,419
Net return													

Table 5.1.4 Economic Crop Budget under the With-Project Condition in Mgeta Scheme

	Unit	Maize			Cabbage			Potato			Pulse Crops		
		Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)	Unit Price (TSh)	Qty	Value (TSh)
<b>Production Cost</b>													
(A) Farm Input													
1 Seed	kg/ha	590	20	11,800	30,000	0.2	6,000	100	800	80,000	800	20	16,000
2 Fertilizer													
: Urea (46 %-N)	kg/ha	126	0	0	126	0	0	126	0	0	126	0	0
: SA (21 %-N)	kg/ha	73	142	10,366	73	190	13,870	73	142	10,366	73	190	13,870
: TSP (46 %-P <sub>2</sub> O <sub>5</sub> )	kg/ha	114	100	11,400	114	65	7,410	114	65	7,410	114	0	0
3 Agro-chemical													
: Pesticide	lit./ha	5,500	4	22,000	5,500	4	22,000	5,500	4	22,000	5,500	4	22,000
: Herbicide	lit./ha	3,500	0	0	3,500	0	0	3,500	0	0	3,500	0	0
: Fungicide	lit./ha	4,000	0	0	4,000	2	8,000	4,000	2	8,000	4,000	0	0
4 Packing material													
		500	33	16,500	500	150	75,000	500	60	30,000	500	17	8,500
<b>Sub-total (A)</b>				<u>72,066</u>			<u>132,280</u>			<u>157,776</u>			<u>60,270</u>
(B) Labour Requirement													
1 Family labour		400	90	36,000	400	180	72,000	400	140	56,000	400	90	36,000
2 Hired labour		400	45	18,000	400	47	18,800	400	41	16,400	400	40	16,000
<b>Sub-total (B)</b>			<u>135</u>	<u>54,000</u>		<u>227</u>	<u>90,800</u>		<u>181</u>	<u>72,400</u>		<u>130</u>	<u>52,000</u>
(C) Machinery or draught cattle													
1 Ploughing by tractor	L.S	24,000	0	0	24,000		0	24,000		0	24,000		0
2 Ploughing by hand tractor	L.S	20,000	0	0	20,000		0	20,000		0	20,000		0
3 Puddling by hand tractor	L.S	14,000	0	0	14,000		0	14,000		0	14,000		0
<b>Sub-total (C)</b>				<u>0</u>			<u>0</u>			<u>0</u>			<u>0</u>
(D) Miscellaneous cost													
5 % of (A) and (B)				6,303			11,154			11,509			5,619
<b>Total Production Cost</b>				<u>132,369</u>			<u>234,234</u>			<u>241,685</u>			<u>117,989</u>
<b>Gross Return</b>													
(A) Yield	kg/ha		3,000	450,000	90	15,000	1,350,000	300	6,000	1,800,000	200	1,500	300,000
(B) Producer price	per kg												
<b>Gross return</b>				<u>317,631</u>			<u>1,115,766</u>			<u>1,558,315</u>			<u>182,011</u>
<b>Net return</b>													



Table 5.1.5 (a) Economic Farm Gate Prices Calculation for Urea. TSP, SA

Item	Unit	UREA (1)		TSP (2)		SA (3)	
		US\$	TSh	US\$	TSh	US\$	TSh
FOB Price F.O.B. Bangkok US\$		142.70		125.50		65.15	
Add: freight insurance (1.5%)		25.00		25.00		25.00	
		2.14		1.88		0.98	
C.I.F. Price	per ton	169.84		152.38		91.12	
Add: wharfage (1.5%)	"	2.55		2.29		1.37	
clearing charges (2%)	"	3.40		3.05		1.82	
handling	"	4.00		4.00		4.00	
Landed Price	"	179.78	111,466.65	161.72	100,263.85	98.31	60,953.52
Add: transport to main market in Dar-es-Salaam	"		2,000.00		2,000.00		2,000.00
financial charges (3%-one-month)	"		3,344.00		3,007.92		1,828.61
Wholesale Price	"		116,810.65		105,271.77		64,782.13
Add: in-land transport losses/rebagging (2%)	per kg.		116.81		105.27		64.78
			6.00		6.00		6.00
			2.34		2.11		1.30
local handling/storage			1.00		1.00		1.00
Economic Farm Gate Price			126.15		114.38		73.08

(1) Varying origins, bagged, spot, FOB, West Europe

(2) Standard grade, Spot, FOB, Vancouver

(3) Calculated based on its own nitrogen contents (21%) and that of urea (46%)

Source : Commodity Markets and Developing Countries, World Bank, 1997. Additional information from MAC and MDV.

Table 5.1.5 (b) Financial and Economic Prices of Inputs and Crops

(unit : TSh.)

	Unit	Maize		Pulse		Cabbage		Potato	
		Economic Price	Financial Price	Economic Price	Financial Price	Economic Price	Financial Price	Economic Price	Financial Price
<b>(A) Farm Input</b>									
1) Seed	kg.	590	590	800	800	30,000	30,000	100	100
2) Fertilizer									
Urea	kg.	126	240	126	240	126	240	126	240
SA	kg.	73	180	73	180	73	180	73	180
TSP	kg.	114	220	114	220	114	220	114	220
3) Agro-chemical									
Pesticide	lit.	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500
Herbicide	lit.	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
Fungicide	lit.	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
4) Packing Material									
		500	500	500	500	500	500	500	500
<b>(B) Labour Requirement</b>									
1) Family Labour	day	400	500	400	500	400	500	400	500
2) Hired labour	day	400	500	400	500	400	500	400	500
<b>(C) Machinery or draught cattle</b>									
1) Ploughing by tractor	L.S	24,000	30,000	24,000	30,000	24,000	30,000	24,000	30,000
2) Ploughing by hand tractor	L.S	20,000	25,000	20,000	25,000	20,000	25,000	20,000	25,000
3) Puddling by hand tractor	L.S	14,000	17,500	14,000	17,500	14,000	17,500	14,000	17,500
<b>(D) Crop Price</b>									
		150	150	200	200	90	90	300	300

Table 3.5.4 Schedule of Field Training for Proposed Framing Practices by Crops in Mwega Scheme

Malolo area

Training Programme	Crops	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.												
1 Land preparation	Paddy	1										1	1												
	Maize/Pulse	1			1	1	1					1	1												
	Onion						1	1	1																
2 Nursery preparation	Paddy	1										1	1												
	Onion				1	1	1																		
3 Planting	Paddy	1	1	1									1												
	Maize/Pulse	1	1			1	1	1	1				1												
	Onion						1	1	1	1															
4 Basal dressing of fertilizer	Paddy	1	1	1									1												
	Maize/Pulse	1			1	1	1	1				1	1												
	Onion					1	1	1	1																
5 1st top dressing of fertilizer	Paddy		1	1	1																				
	Onion						1	1	1	1															
6 2nd top dressing of fertilizer	Onion							1	1	1	1														
7 Plant protection		←----- Note *1 ----->																							
8 Water management		←----- Note *2 ----->																							
9 Harvesting	Paddy					1	1	1	1																
	Maize/Pulse					1	1	1	1																
	Onion									1	1	1	1												
Number of training days		7	3	3	1	1	1	2	5	6	8	7	5	4	3	2	1	3	2	2	2	0	4	5	7

Note)

\*1 On occurrence of damage by insects and diseases, VEOs will rapidly take guidance to farmers concerned. Agricultural Coordinating Committee will also have to support VEOs and farmers in collaboration with relevant institutes such as SUA, Research centres, etc.

\*2 Guidance concerning proper water management is given as required, depending on the schedule of other training practices. Major training subjects on proper water management are (i) proper timing of irrigation and drainage, (ii) proper condition of irrigated fields, (iii) proper interval of irrigation, etc.

Remarks)

1. Figures in the table mean number of days for field training in the first and second halves of month.

2. Training day: -One-day training is required for each farming practice by crops.

-Block leaders as representatives of farmers in each tertiary block are strictly requested to participate in training programmes and also other farmers are requested to participate in the field training as much as possible.

3. Farmer's group: No. of tertiary block : 21 blocks (21 block leaders)

Period for each farming practice: 2 months (see Table 3.5.2 in Division 5)

Training days per month: 2 days

Total training days : 4 days

Participants for each training day: 6 block leaders and other farmers

**Table 4.1.1 List of Labour Cost**

Item	Unit	Rate(Tsh)
Foreman	Man-Day	4,400
Skilled labour	Man-Day	3,600
Semi-skilled labour	Man-Day	2,450
Unskilled labour	Man-Day	1,600
Operator for heavy equipment	Man-Day	3,800
Ass.operator for heavy equipment	Man-Day	2,450
Operator for ligh equipment	Man-Day	3,360
Ass.operator for ligh equipment	Man-Day	2,170
Civil engineer	Man-Day	12,000

**Table 4.1.2 List of Material Cost**

Item	Unit	Spec.	Rate(Tsh)
Diesel	litre		383
Engine oil	litre	for diesel	1,200
Ordinary portland cement	ton		91,730
Fine aggregate(sand)	m3	Collection in situ	
Coarse aggregates	m3	for concrete	45,570
Admixture	kg	AE/reducing	1,400
Mild steel reinforcement	ton		360,720
Hardwood timber	m3		150,000
Nail	kg		600
Cobble stone	m3	Production in situ	
Gabion box	m3		27,000
RC Pipe	lin m	Dia.1.2m	85,680
RC Pipe	lin m	Dia.1.0m	71,400
RC Pipe	lin m	Dia.0.9m	64,260
RC Pipe	lin m	Dia.0.8m	57,120
RC Pipe	lin m	Dia.0.6m	41,160
RC Pipe	lin m	Dia.0.5m	36,750
RC Pipe	lin m	Dia.0.4m	32,340
RC Pipe	lin m	Dia.0.3m	27,930
Turf	m2		510
Sluice Gate	No.	B:1.2m H:1.2m	1,532,900
Sluice Gate	No.	B:1.2m H:1.0m	1,509,000
Screen	No.	B:1.0m H:1.0m	325,000
Wood (Dia. 0.25m)	m		7,360

**Table 4.1.3 List of Machine Cost**

Equipment	Spec.	Unit	Rate(Tsh)
Bulldozer	15t	h	32,600
Backhoe	0.6m3	h	25,400
Backhoe	0.35m3	h	16,900
Dump truck	11t	h	13,400
Tire roller	8t	h	12,600
Water tanker	5.5kl	h	11,600
Crane truck	10t	h	21,100
Bacher Plant	0.5m3	h	36,300
Agitator	1.6m3	h	8,300
Generator	35KVA	h	3,200
Hydraulic Blaker	1,300kg	h	28,800
Compressor	5 m3/m	h	8,900
Concrete blaker	20 kg	h	470
Water pump	10 m	h	1,400
Winche	3m/m.	h	2,900

Table 5.1.9 (a) Sensitivity Analysis for Mgeta Scheme  
(Increase of Costs)

Year	Construction Cost	O/M Cost	Replacement	Benefit	Net Benefit
1	12.96				-12.96
2	120.98	0.41		3.63	-120.98
3	0.86	0.41		7.26	2.36
4		0.41		10.89	6.85
5		0.41		14.52	10.48
6		0.41		18.15	14.11
7		0.41		21.78	17.74
8		0.41		25.41	21.37
9		0.41		29.04	25.00
10		0.41		32.67	28.63
11		0.41		36.30	32.26
12		0.41		39.93	35.89
13		0.41		43.56	39.52
14		0.41		47.19	43.15
15		0.41		50.82	46.78
16		0.41		54.45	50.41
17		0.41		58.08	54.04
18		0.41		61.71	57.67
19		0.41		65.34	61.30
20		0.41		68.97	64.93
21		0.41		72.60	68.56
22		0.41		76.23	72.19
23		0.41		79.86	75.82
24		0.41		83.49	79.45
25		0.41		87.12	83.08
26		0.41		90.75	86.71
27		0.41		94.38	90.34
28		0.41	35.60	98.01	93.97
29		0.41		101.64	97.60
30		0.41		105.27	101.23
31		0.41		108.90	104.86
32		0.41		112.53	108.49
33		0.41		116.16	112.12
34		0.41		119.79	115.75
35		0.41		123.42	119.38
36		0.41		127.05	123.01
37		0.41		130.68	126.64
38		0.41		134.31	130.27
39		0.41		137.94	133.90
40		0.41		141.57	137.53
41		0.41		145.20	141.16
42		0.41		148.83	144.79
43		0.41		152.46	148.42
44		0.41		156.09	152.05
45		0.41		159.72	155.68
46		0.41		163.35	159.31
47		0.41		166.98	162.94
48		0.41		170.61	166.57
49		0.41		174.24	170.20
50		0.41		177.87	173.83
					8.7%

Table 5.1.9 (b) Sensitivity Analysis for Mgeta Scheme  
(Decrease of Benefits)

Year	Construction Cost	O/M Cost	Replacement	Benefit	Net Benefit
1	10.21				-10.21
2	95.26	0.32		3.27	-95.26
3	0.68	0.32		6.53	2.27
4		0.32		9.80	6.21
5		0.32		13.07	9.46
6		0.32		16.34	12.71
7		0.32		19.61	15.96
8		0.32		22.88	19.21
9		0.32		26.15	22.46
10		0.32		29.42	25.71
11		0.32		32.69	28.96
12		0.32		35.96	32.21
13		0.32		39.23	35.46
14		0.32		42.50	38.71
15		0.32		45.77	41.96
16		0.32		49.04	45.21
17		0.32		52.31	48.46
18		0.32		55.58	51.71
19		0.32		58.85	54.96
20		0.32		62.12	58.21
21		0.32		65.39	61.46
22		0.32		68.66	64.71
23		0.32		71.93	67.96
24		0.32		75.20	71.21
25		0.32		78.47	74.46
26		0.32		81.74	77.71
27		0.32		85.01	80.96
28		0.32	35.60	88.28	84.21
29		0.32		91.55	87.46
30		0.32		94.82	90.71
31		0.32		98.09	93.96
32		0.32		101.36	97.21
33		0.32		104.63	100.46
34		0.32		107.90	103.71
35		0.32		111.17	106.96
36		0.32		114.44	110.21
37		0.32		117.71	113.46
38		0.32		120.98	116.71
39		0.32		124.25	120.06
40		0.32		127.52	123.31
41		0.32		130.79	126.56
42		0.32		134.06	129.81
43		0.32		137.33	133.06
44		0.32		140.60	136.31
45		0.32		143.87	139.56
46		0.32		147.14	142.81
47		0.32		150.41	146.06
48		0.32		153.68	149.31
49		0.32		156.95	152.56
50		0.32		160.22	155.81
					9.9%

Table 5.1.9 (c) Sensitivity Analysis for Mgeta Scheme  
(Combination of Increase of Costs and Decrease of Benefits)

Year	Construction Cost	O/M Cost	Replacement	Benefit	Net Benefit
1	12.96				-12.96
2	120.98	0.41		3.27	-120.98
3	0.86	0.41		6.53	2.00
4		0.41		9.80	6.13
5		0.41		13.07	9.39
6		0.41		16.34	12.66
7		0.41		19.61	15.93
8		0.41		22.88	19.20
9		0.41		26.15	22.47
10		0.41		29.42	25.74
11		0.41		32.69	29.01
12		0.41		35.96	32.28
13		0.41		39.23	35.55
14		0.41		42.50	38.82
15		0.41		45.77	42.09
16		0.41		49.04	45.36
17		0.41		52.31	48.63
18		0.41		55.58	51.90
19		0.41		58.85	55.17
20		0.41		62.12	58.44
21		0.41		65.39	61.71
22		0.41		68.66	64.98
23		0.41		71.93	68.25
24		0.41		75.20	71.52
25		0.41		78.47	74.79
26		0.41		81.74	78.06
27		0.41		85.01	81.33
28		0.41	35.60	88.28	84.58
29		0.41		91.55	87.83
30		0.41		94.82	91.08
31		0.41		98.09	94.33
32		0.41		101.36	97.58
33		0.41		104.63	100.83
34		0.41		107.90	104.08
35		0.41		111.17	107.33
36		0.41		114.44	110.58
37		0.41		117.71	113.83
38		0.41		120.98	117.08
39		0.41		124.25	120.33
40		0.41		127.52	123.58
41		0.41		130.79	126.83
42		0.41		134.06	130.08
43		0.41		137.33	133.33
44		0.41		140.60	136.58
45		0.41		143.87	139.83
46		0.41		147.14	143.08
47		0.41		150.41	146.33
48		0.41		153.68	149.58
49		0.41		156.95	152.83
50		0.41		160.22	156.08
					7.8%

Table 5.1.10 Calculation of Financial Net Benefit for Mgeta Scheme

	Without-Project Situation			With-Project Situation			Net Benefit (Million TSh)
	Cultivated Area (ha)	Net Return per ha (Million Tsh)	Benefit (Million TSh)	Cultivated Area (ha)	Net Return per ha (Million Tsh)	Benefit (Million TSh)	
Maize	20	0.12	2.37	30	0.32	9.71	7.33
Pulse	19	0.11	2.01	21	0.19	4.08	2.07
Cabbage	6	0.78	4.70	6	1.16	6.95	2.25
Potato	3	0.75	2.26	3	1.59	4.77	2.51
<b>TOTAL</b>							<b>14.16</b>

Table 5.1.11 Estimation of Costs for Financial Evaluation (Mgeta)  
(Unit : Million TSh)

Direct construction cost	80.11
Preparatory works	4.01
O&M facilities and equipment	11.63
Administration cost	3.57
Engineering services	26.70
<b>Total</b>	<b>126.01</b>

Table 5.1.12 FIRR Estimation for Mgeta Scheme

(Unit : Million TSh)

Year	Construction Cost	O/M Cost	Replacement	Benefit	Net Benefit
1	12.12				-12.12
2	113.09				-113.09
3	0.81	0.40		3.54	2.33
4		0.40		7.08	6.68
5		0.40		10.62	10.22
6		0.40		14.16	13.76
7		0.40		14.16	13.76
8		0.40		14.16	13.76
9		0.40		14.16	13.76
10		0.40		14.16	13.76
11		0.40		14.16	13.76
12		0.40		14.16	13.76
13		0.40		14.16	13.76
14		0.40		14.16	13.76
15		0.40		14.16	13.76
16		0.40		14.16	13.76
17		0.40		14.16	13.76
18		0.40		14.16	13.76
19		0.40		14.16	13.76
20		0.40		14.16	13.76
21		0.40		14.16	13.76
22		0.40		14.16	13.76
23		0.40		14.16	13.76
24		0.40		14.16	13.76
25		0.40		14.16	13.76
26		0.40		14.16	13.76
27		0.40		14.16	13.76
28		0.40	47.46	14.16	-33.70
29		0.40		14.16	13.76
30		0.40		14.16	13.76
31		0.40		14.16	13.76
32		0.40		14.16	13.76
33		0.40		14.16	13.76
34		0.40		14.16	13.76
35		0.40		14.16	13.76
36		0.40		14.16	13.76
37		0.40		14.16	13.76
38		0.40		14.16	13.76
39		0.40		14.16	13.76
40		0.40		14.16	13.76
41		0.40		14.16	13.76
42		0.40		14.16	13.76
43		0.40		14.16	13.76
44		0.40		14.16	13.76
45		0.40		14.16	13.76
46		0.40		14.16	13.76
47		0.40		14.16	13.76
48		0.40		14.16	13.76
49		0.40		14.16	13.76
50		0.40		14.16	13.76
				FIRR	9.0%

Table 5.1.13 Capacity-to-Pay for Mgeta Scheme

(unit : 1,000 TSh)

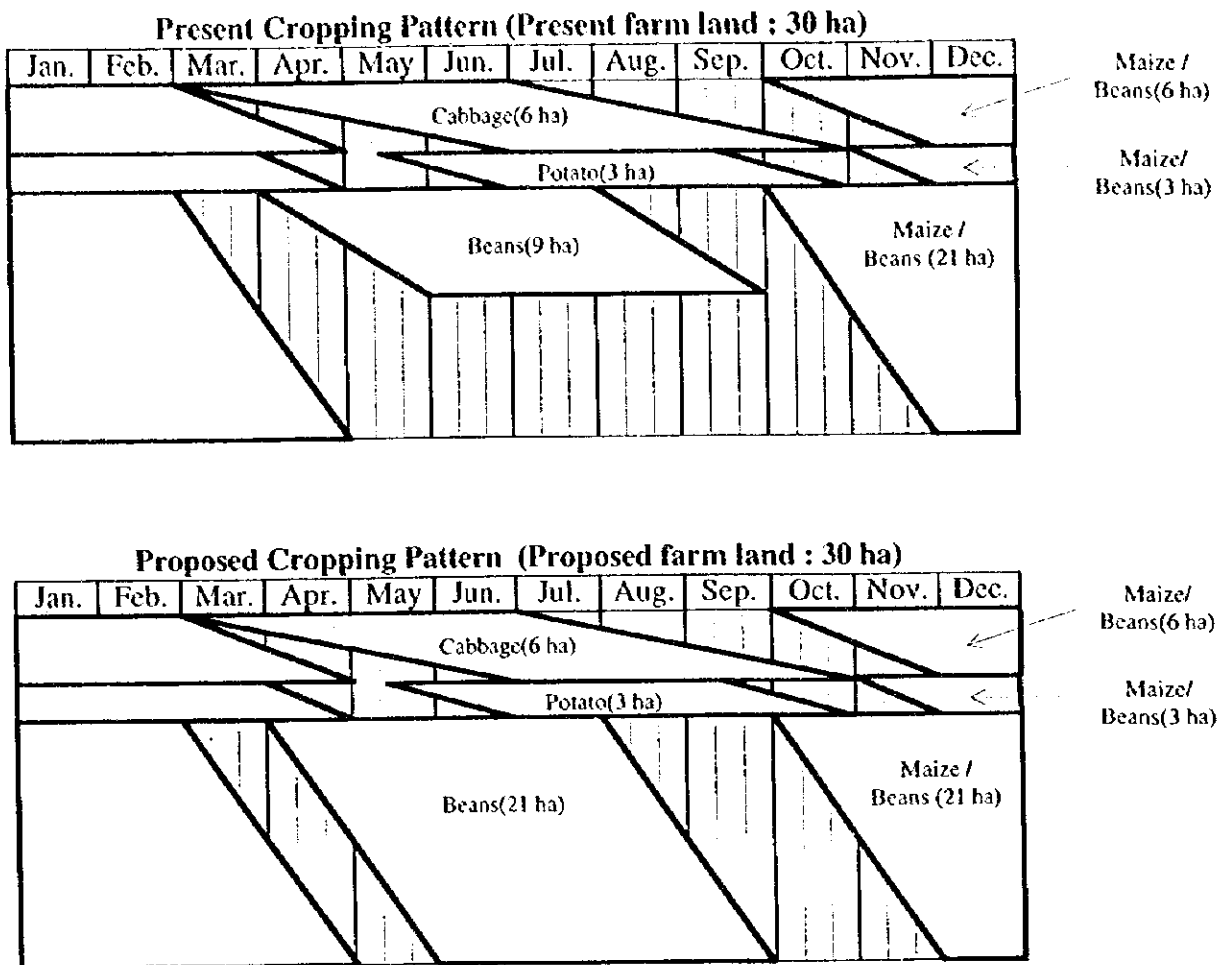
	Holding Size (ha)	Total Harvested Area (ha)	Farm Income	Production Cost	Net Farm Income	Income Tax	O/M Costs	Amortization Cost	Net Profit
Mgeta Scheme									
Irrigated Area	0.3								
Crops									
Maize		0.30	135	38					
Cabbage		0.06	81	12					
Potato		0.03	54	7					
Pulse crops		0.21	63	22					
Total			333	79	254	6	4	70	174

# ***FIGURES***





Figure 1.3.1 Present and Proposed Cropping Pattern in Mgeta Scheme



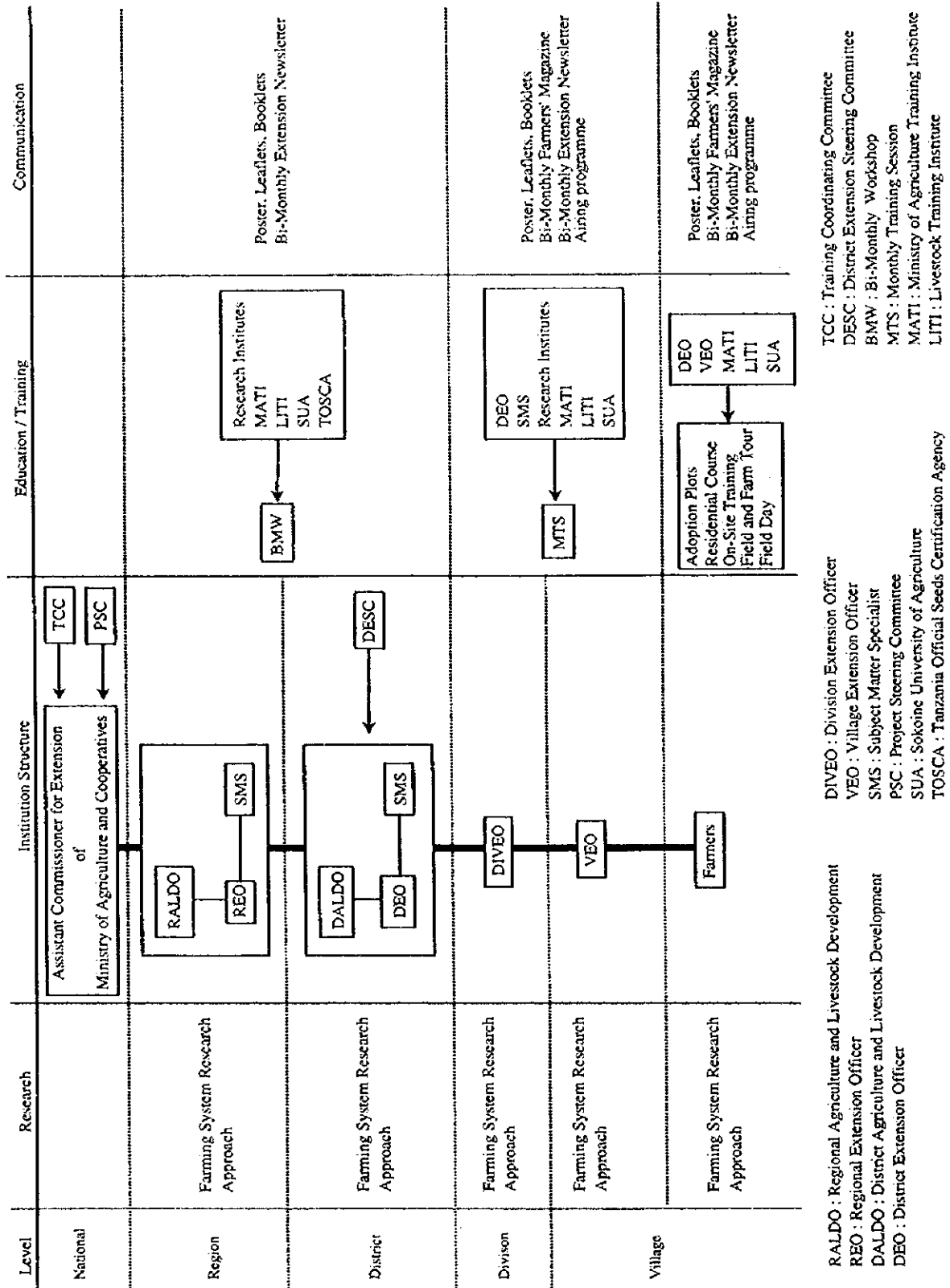
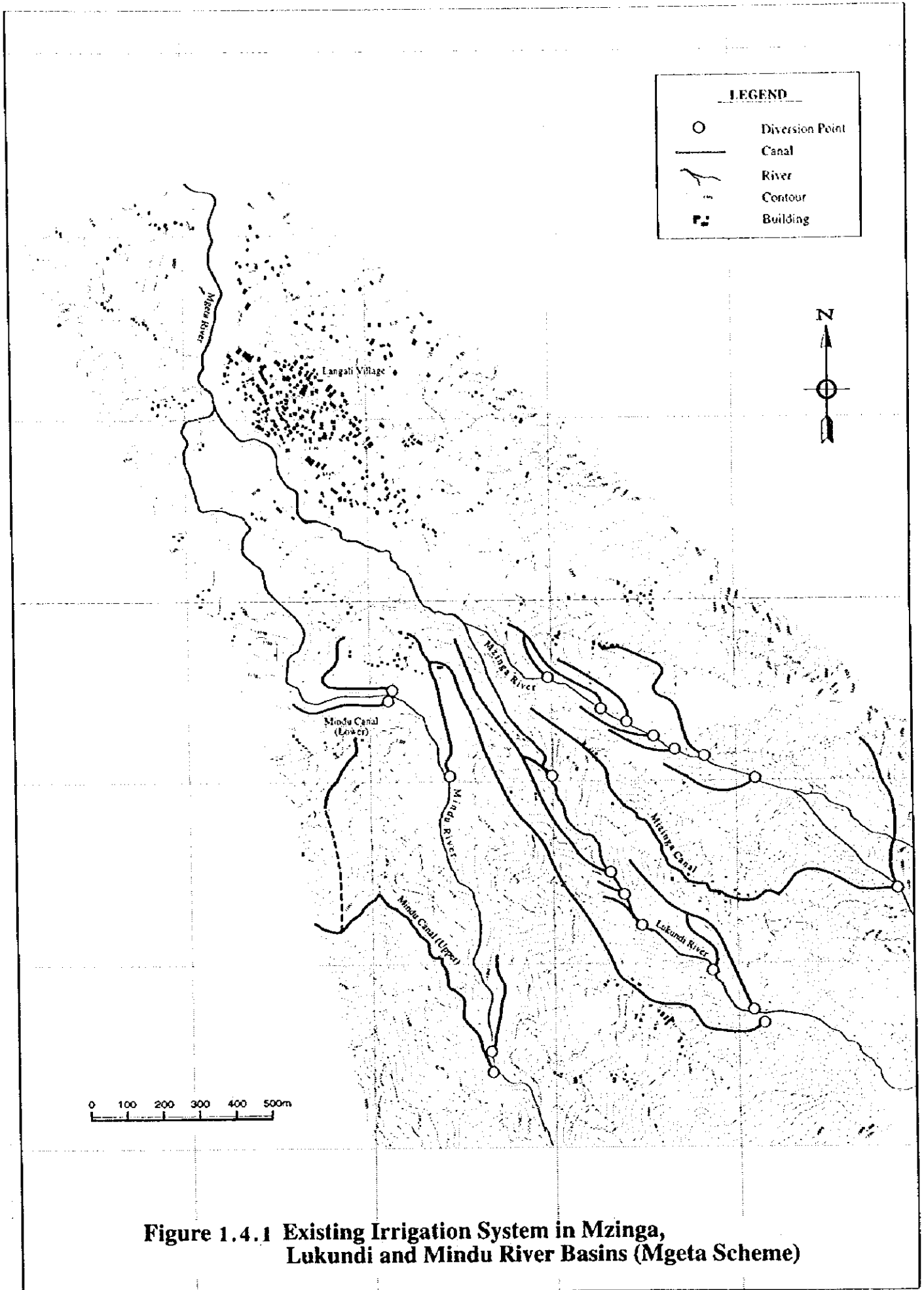
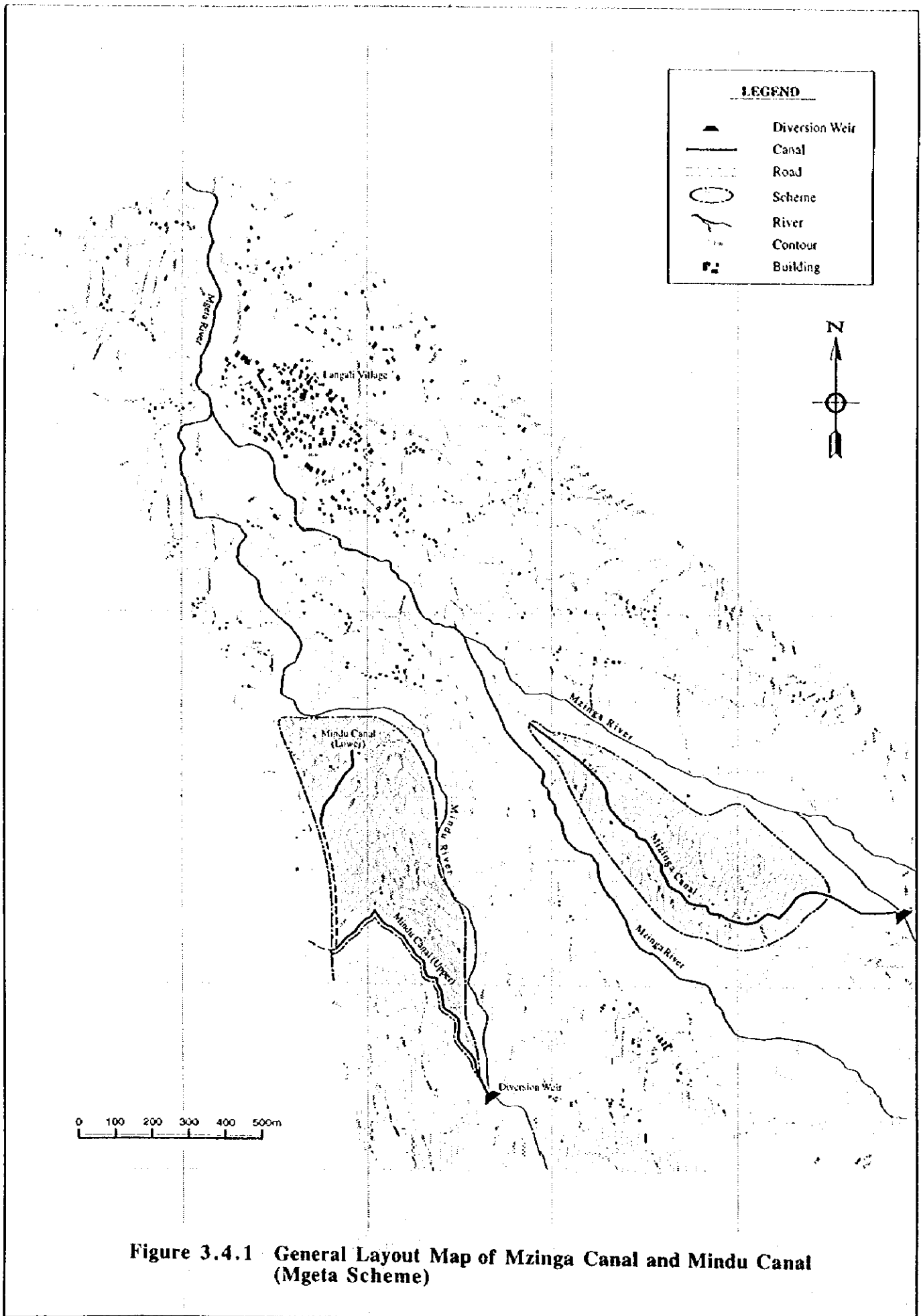


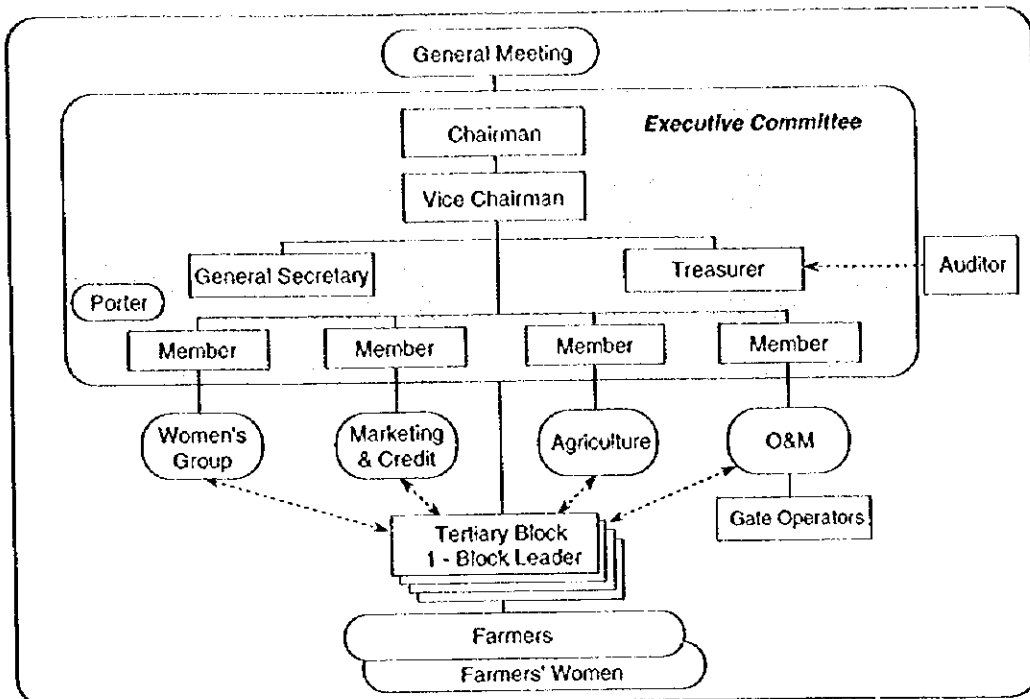
Figure 1.3.2 Prevailing Structure of Extension Services under NAEP II



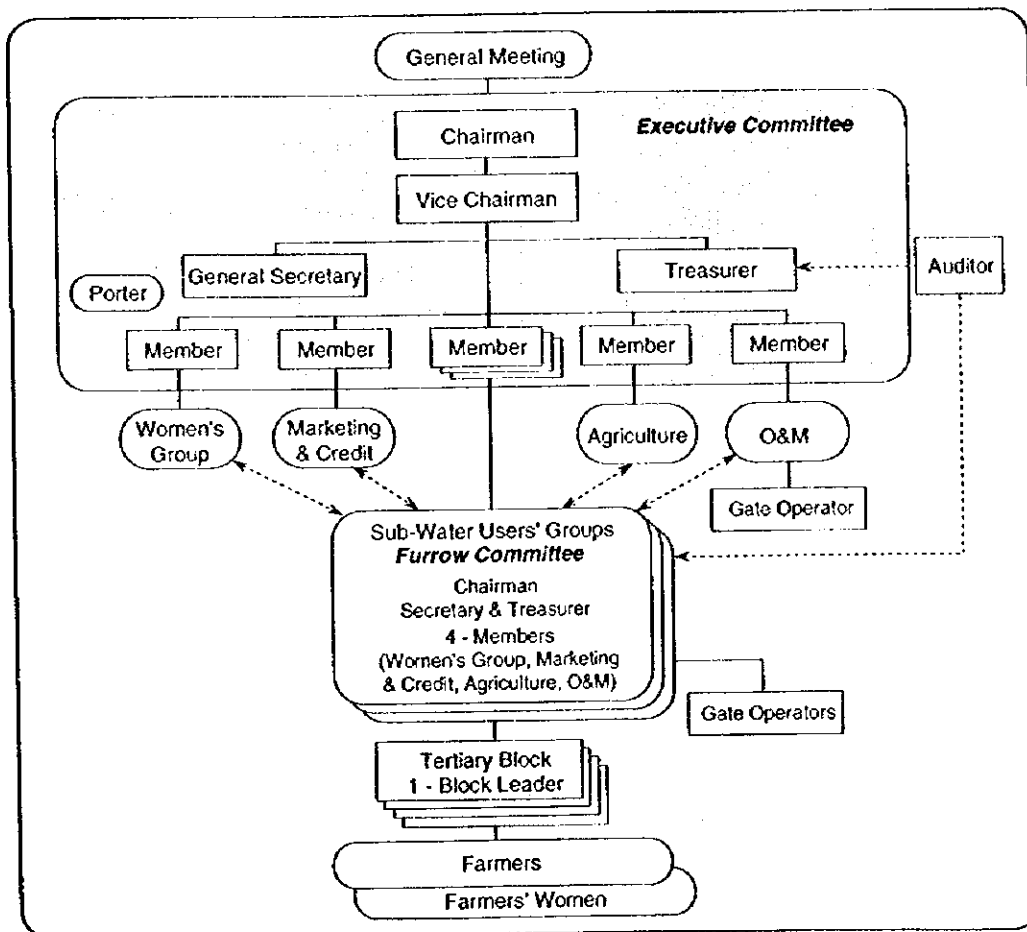
**Figure 1.4.1 Existing Irrigation System in Mzinga, Lukundi and Mindu River Basins (Mgeta Scheme)**



**Figure 3.4.1 General Layout Map of Mzinga Canal and Mindu Canal (Mgeta Scheme)**



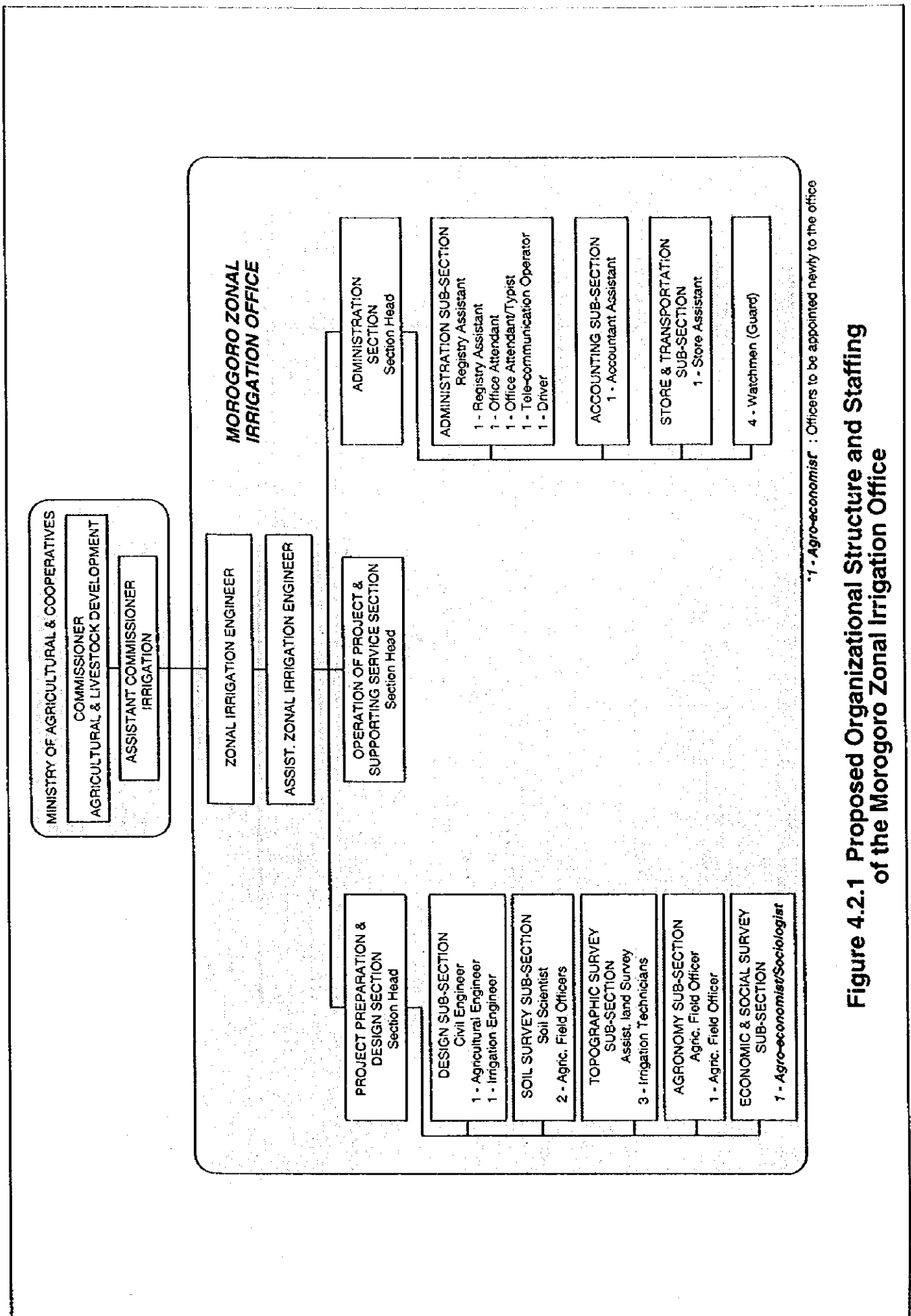
**Proposed Water Users' Group Type-A**  
(Small Scale WUA below 100 Members)



**Proposed Water Users' Group Type-B**  
(Large Scale WUA over 100 Members)

**Figure 3.5.1 Alternative Types for Organisational Structure of Water Users' Group**





\*1 - Agro-economist : Officers to be appointed newly to the office

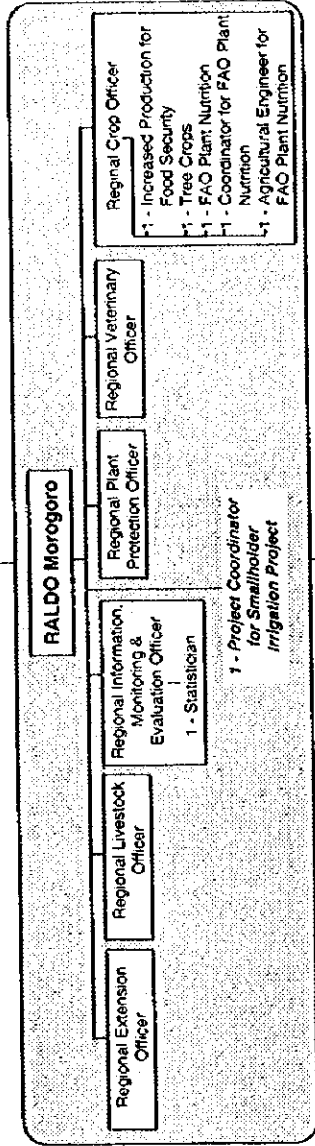
**Figure 4.2.1 Proposed Organizational Structure and Staffing of the Morogoro Zonal Irrigation Office**



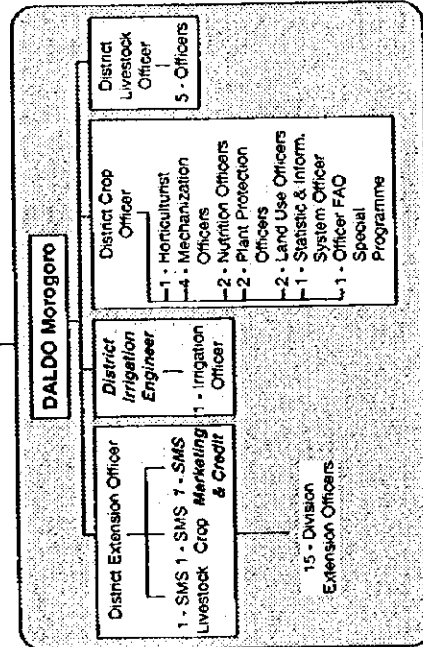
**Figure 4.2.2 Implementation Schedule of Reinforcement Programme for Water User' Group - Mgeta Scheme**

	1st Year		2nd Year		3rd Year		4th Year		Remarks
	I	II	I	II	I	II	I	II	
Zonal Irrigation Office	1. Preparatory Works		2. Project Implementation		Preparation of O&M manual				<ul style="list-style-type: none"> <li>- There are two irrigation systems: Mzingo canal in Langali village and Mindu canal in Bumu village. The public meeting is held at each project site. To all farmers in each system, the Zonal Irrigation Office (ZIO) should explain all of development plan, implementation schedule and farmers' duties for project implementation. The project has to be acknowledged by the farmers. The village governments provide supporting services to the public meeting.</li> <li>- ZIO and existing WUGs have to exchange an agreement document for the plan and farmers' duties, after the WUG's general meeting.</li> <li>- After the public meeting, existing WUG in each system holds the general meeting for the following matters: i) development plan, ii) land acquisition, iii) closing of existing canals during the construction period, and iv) re-organization of WUG. The village governments provide necessary supporting services to those existing WUGs.</li> <li>- Then each existing WUG establish an ad hoc committee for those implementation.</li> <li>- The ad hoc committee consists of leaders of existing WUG and village government.</li> <li>- The committee confirms project boundary, land tenure of right of way, and number of beneficiaries. In addition, the committee prepares member list.</li> <li>- The preparatory works of the committee include: i) preparation of organizational structure, articles and by-laws (draft) and budget estimate (draft), ii) candidates for posts of leaders, and iii) arrangement of first general meeting.</li> <li>- At first, the ad hoc committee takes initiative for first general meeting, and establishment of WUG is decided by the attendants. Then the ad hoc committee is closed, and the first general meeting is managed by new WUG.</li> <li>- At this general meeting, the articles and by-laws and yearly budget are decided by the members, and the leaders prepare minutes of meeting.</li> <li>- The existing WUGs are closed after the establishment of new WUGs.</li> <li>- Supporting to land acquisition.</li> <li>- Supporting to public meeting by the Zonal Irrigation Office and general committee and WUG.</li> <li>- Training Course-A and -B</li> <li>- Training Course-C and -D</li> <li>- Training Course-C</li> <li>- Irrigation technician and VEO provide technical advice to the farmers.</li> <li>- Supporting services for establishment and management of WUG.</li> <li>- The agricultural coordinating committee coordinates all of the governments acquires for the project implementation and agricultural supporting services to WUG/farmers.</li> </ul>
Water Users' Group	<ul style="list-style-type: none"> <li>- General meeting of existing WUGs</li> <li>- Establishment of ad hoc committee of WUG</li> </ul>		<ul style="list-style-type: none"> <li>- Confirmation of project boundary, land tenure and beneficiaries</li> <li>- Land acquisition of right of way</li> <li>- Management of farmers' participation to construction works</li> <li>- Preparatory works for establishment of WUG</li> </ul>		<ul style="list-style-type: none"> <li>- Construction</li> <li>- O&amp;M by WUG</li> <li>- Full water supply</li> </ul>				
District/Ward Governments	<ul style="list-style-type: none"> <li>1. Ward Councilor</li> <li>2. DALDO</li> <li>3. Supporting activities</li> <li>4. Training programme for O&amp;M and WUG management</li> <li>5. Training for officers</li> <li>6. Initial training for farmers</li> <li>7. Field training for farmers</li> <li>8. Flow-up training</li> <li>9. Supporting services for on-farm development</li> <li>10. DCO</li> </ul>		<ul style="list-style-type: none"> <li>1. Project map</li> <li>2. Course-A</li> <li>3. Course-B</li> </ul>		<ul style="list-style-type: none"> <li>1. Construction</li> <li>2. O&amp;M by WUG</li> <li>3. Full water supply</li> </ul>				
Agricultural Coordinating Committee	<ul style="list-style-type: none"> <li>- Irrigation technician and VEO provide technical advice to the farmers.</li> <li>- Supporting services for establishment and management of WUG.</li> </ul>		<ul style="list-style-type: none"> <li>- Training Course-A and -B</li> <li>- Training Course-C and -D</li> <li>- Training Course-C</li> </ul>		<ul style="list-style-type: none"> <li>- Full water supply</li> </ul>				
Institutional Expert	<ul style="list-style-type: none"> <li>- The agricultural coordinating committee coordinates all of the governments acquires for the project implementation and agricultural supporting services to WUG/farmers.</li> </ul>								

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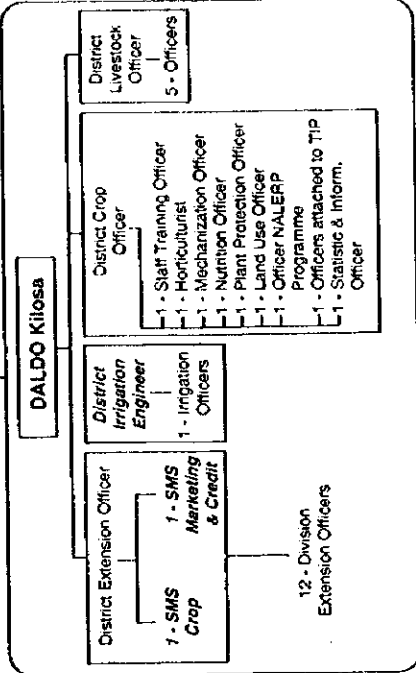


**District Level**



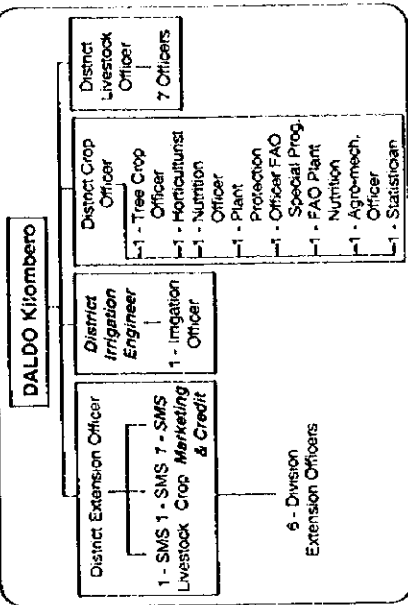
**Irrigation Schemes**

	Villages	VEO	IT
Mgeta	2	2	1
Mgongola	3	3	1



**Supporting Services**

	Villages	VEO	IT
Nyinga	2	2	2
Malolo	1	1	1
Mgogozu	1	1	1



**Supporting Services**

	Villages	VEO	IT
Mkula	1	1	1

\*1 Appointed to each Ward

\*2 Sub-village of Malolo, and covered by VEO and IT in Malolo.

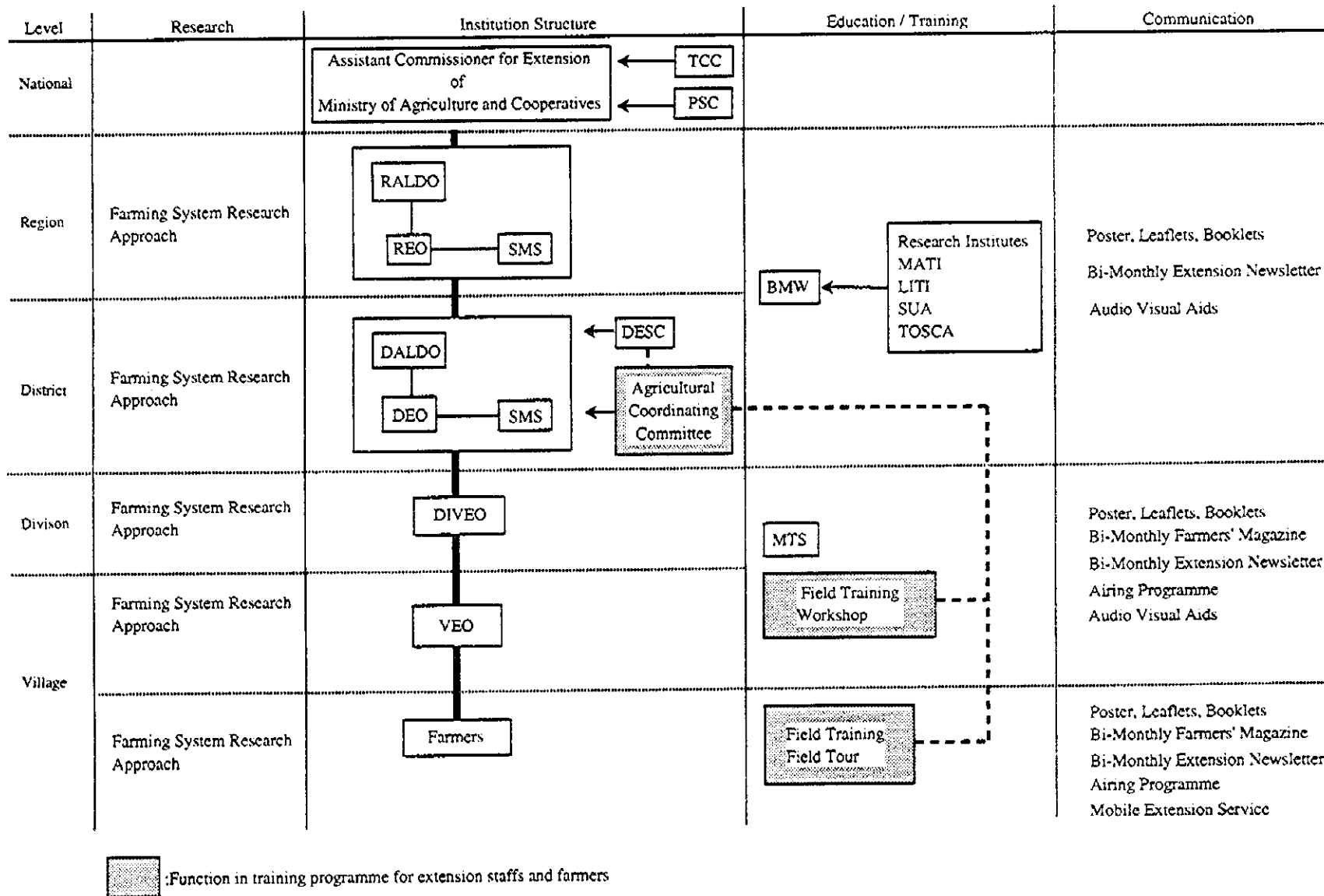
VEO : Village Extension Officer

IT : Irrigation Technician

\* District Irrigation Engineer or \*3 : Officers to be appointed newly to the offices of RALDO and DALDO

**Figure 4.2.3 Proposed Organizational Structure of the Offices of RALDO and DALDO**





Note : Refer Figure 1.3.2 for abbreviations

Figure 4.2.5 Proposed Structure of Extension Services under NAEP - II

Fig.5.1.1 Capacity-to-Pay Graphic Analysis for Mgeta

ha	Income	Production Cost	Prod. Cost + O/M	Prod. Cost + O/M + Amort	Total Expenses	Living Expenses	Prod. Cost	O/M	Amort.
0.2	222	53	55	102	203	101	53	2	47
0.3	333	79	82	152	282	130	79	3	70
0.4	444	105	109	202	353	151	105	4	93
0.5	555	132	137	253	421	168	132	5	116

