TABLES

Table 1.1.1 Description of Typical Soil Profile (1/3)

Mapping Unit: Mgl-1

Soil Pit No.:	Mgongola 11-3
Soil Classification:	Eutric Cambisols
Date of Examination:	26 July 1996
Elevation:	351 m above sea level
Land-form:	Alluvial plain
Slope:	Flat
Land Use/Vegetation:	Extensively cultivated with paddy rice during the rainy season, and fallow during the dry season
Parent Material:	Alluvial deposits
Drainage:	Imperfectly drained
Soil Moisture Condition:	Moist throughout
Groundwater Depth:	> 150 cm
Surface Stone or Rock Outcrop:	None
Erosion:	None

Brief Description of the Profile:

The soil is deep, brownish black, clay loam to clay, moderately developed granular and subangular blocky structure profile; imperfectly drained and highly fertile. The surface soil has many medium and coarse pores, but relatively compact in the lower horizon. Root distribution is abundant with the majority of roots in the top 43 cm. B2 and C horizons have brown or brownish mottles, the B2 horizon is well developed with clay cutans. The permeability is estimated at low; groundwater depth is estimated to be more than 150 cm in the dry season, and generally flooded in the rainy season.

Soil Profile Description:

Ap	0 - 20 cm	Brownish black (10YR 2/2) moist and grayish brown (7.5YR 4/2) dry; sandy clay loam; moderate medium granular structure; sticky, plastic, friable moist; many medium and coarse pores; many fine roots; abrupt, smooth boundary.
AB	20 - 43 cm	Brownish black (10YR 3/2) and few fine distinct dull brown (7.5YR 5/4) mottles moist; clay; moderate medium subangular blocky structure; very sticky, very plastic, firm moist; common medium pores; common fine roots; gradual smooth boundary.
B2	43 - 75 cm	Olive black (5Y 3/2) and few fine distinct dull brown (7.5YR 5/4) mottles moist; clay; moderate medium angular blocky structure; very sticky, very plastic, firm moist; patchy thin clay cutans on ped faces; few medium pores; few fine roots; gradual wavy boundary.
C	75 - 110 cm +	Yellowish brown (2.5Y 5/4) and common medium faint dull yellowish brown (10YR 5/3) mottles moist; clay; weak medium angular blocky structure, very sticky, very plastic, firm moist; patchy thin clay cutans on ped faces; few fine soft Fe/Mn concretions; few fine roots.

Land Class (for paddy rice/for upland crops): SR2ad/NUf

Table 1.1.1 Description of Typical Soil Profile (2/3)

Mapping Unit: Mgl-2

Soil Pit No.:	Mgongola 11-1
Soil Classification:	Eutric Fluvisols
Date of Examination:	26 July 1996
Elevation:	356 m above sea level
Land-form:	Alluvial plain, old natural levee by Dizingwi River
Slope:	Flat
Land Use/Vegetation:	Extensively cultivated with paddy rice in the rainy season, and fallow during the dry season
Parent Material:	Alluvial deposits, natural levee deposits
Drainage:	Moderately well drained
Soil Moisture Condition:	Moist throughout
Groundwater Depth:	> 150 cm from surface
Surface Stone or Rock Outcrop:	None
Erosion:	None

Brief Description of the Profile:

The soil has a overlaid surface horizon on Eutric Cambisols (the mapping unit Mgl-1). The top 38 cm of surface soil is coarse to medium sandy loam, with weak subangular blocky structure or structureless (single grain). Profile of under 38 cm is similar with Mgl-1, such as clay texture, subangular to subangular blocky structure, existing brown or yellow brown mottles and Fe/Mn concretions.

Soil Profile Description:

Ap	0 - 14 cm	Brownish black (10YR 3/2) moist and dark grayish yellow (2.5Y 4/2) dry; sandy loam; weak fine subangular blocky structure; slightly sticky, slightly plastic, friable moist; many medium pores; many fine roots; abrupt smooth boundary.
AB	14 - 38 cm	Dark brown (7.5YR 3/3); sandy loam; structureless, single grain; non-sticky, non-plastic, friable moist; many medium pores; common fine roots; clear smooth boundary.
IIA1	38 - 53 cm	Dark brown (10YR 3/3) moist; clay; moderate fine angular blocky structure; very sticky, plastic moist; few fine Fe/Mn concretions; few fine and medium pores; very few fine roots; clear smooth boundary.
IIB2	53 - 80 cm	Dark grayish yellow (2.5Y 4/2) and few fine distinct dull reddish brown (5YR 4/4) mottles moist; clay; weak medium angular blocky structure; very sticky and very plastic, firm moist; patchy thin clay cutans on ped faces; very few fine Fe/Mn concretions; few fine pores; clear smooth boundary.
IIC	80 -120 cm +	Olive brown (2.5Y 4/3) and common medium faint dull yellowish brown (10YR 4/3) mottles moist; clay; massive to weak angular blocky structure; very sticky, very plastic moist; patchy thin clay cutans on ped faces; very few fine Fe/Mn concretions; few fine pores.

Land Class (paddy rice/upland crops): SR2a/SU3afd

Table 1.1.1 Description of Typical Soil Profile (3/3)

Mapping Unit: Mgl-3

Soil Pit No.:	Mgongola 11-3
Soil Classification:	Eutric Gleysols
Date of examination:	20 June 1996
Elevation:	355 m above sea level
Land-form:	Levee or recent alluvial plain
Slope:	Flat
Land Use/Vegetation:	Extensively cultivated with paddy rice in the rainy season, and fallow during the dry season
Parent Material:	Resent alluvial deposits
Drainage:	Poorly drained
Soil Moisture Condition:	Moist and wet (under groundwater)
Groundwater Depth:	95 cm
Surface Stone or Rock Outcrop:	None
Erosion:	None

Brief Description of the Profile:

Deep, imperfectly drained, sandy loam to clay loam textured soil. The topsoil is black, sandy loam with weak medium granular structure, very friable when moist and slightly sticky and slightly plastic when wet. The subsoil is extremely hard dry, friable moist and slightly sticky and non-plastic when wet. The soils below 45 cm is gley reduction by groundwater with olive color (5Y) and brown mottles.

Soil Profile Description:

Ap	0 - 18 cm	Brownish black (10YR 3/2) moist and dull yellowish brown (10YR 5/4) dry; sandy loam; weak medium granular structure; slightly sticky, non-plastic, friable moist; many medium pores; many fine roots; clear smooth boundary.
AB	18 - 45 cm	Dark brown (10YR 3/3) and few medium dull brown (7.5YR 5/4) mottles moist; loam; weak medium subangular blocky structure; slightly sticky, slightly plastic friable moist; common medium pores; common fine roots; abrupt wavy boundary.
B2g	45 - 70 cm	Dark olive (5Y 4/3) and common medium faint dull reddish brown (5YR 4/3) mottles moist; loam; weak medium subangular blocky structure; slightly sticky, slightly plastic, friable moist; common fine pores; few fine roots; abrupt smooth boundary.
C1g	70-100 cm +	Dark olive (5Y 4/4) and few fine distinct grayish yellow brown (10YR 4/2); sandy clay loam; moderate medium angular blocky structure, slightly sticky, slightly plastic, friable moist; common fine pores; few fine roots; existing groundwater at 95 cm from surface; clear smooth boundary.
C2g	100 cm +	Olive (5Y 5/4) moist silty clay loam; weak angular blocky structure; slightly plastic, slightly sticky moist.

Land Class (for paddy rice/for upland crops): SR2fad/Nufd

Table 1.3.1 Present Farming Practices for Major Crops - Mgongola Scheme

Item	Paddy (Transplanted)	Paddy (Broadcasted)
1 Land preparation	- Plowing by hand tractor or hand - No harrowing - Puddling by hand tractor or hand (over the nursery period)	- Plowing by tractor or hand - No harrowing - No puddling
2 Nursery	- 40 ~ 50 kg of seeds per ha - around 600 m^2 per ha	Not applied
3 Broadcasting	Not applied	- 50 ~ 100 kg of seeds per ha
4 Transplanting	- 1 to 2 seedlings per hill - 10cm x 10cm ~ 10cm x 20cm of planting density	Not applied
5 Application of fertilizer		Not applied
Nursery	- 2 kg of Urea per 250 m^2	
Basal application	- 125 kg of Urea per ha	
1st top dressing		
Total application	130 kg of Urea per ha	
6 Weeding	- by rotary weeder - by herbicide (2,4-D : 2 lit. per ha)	Not applied
7 Application of agro-chemicals	Not applied	Not applied
8 Water control	- Once a week up to 20 days before harvesting	No control
9 Harvesting	- around 2/3 of panicle from top side is changed to yellowish collar.	When panicle is dried.

Table 1.3.2 Crop Production under Special Programme of FAO (1/2)

Maize (Group : Mbuyuni Maize Farmers Group in Hembeti Village)

	1994/95 *1						1995/96 *2					
	Variety	Kind of Fertilizer Applied	Kind of Chemical Applied	Total Yield (kg)	Cultivated Area (acre)	Unit Yield (ton/acre)	Variety	Kind of Fertilizer Applied	Kind of Chemical Applied	Total Yield (kg)	Cultivated Area (acre)	Unit Yield (ton/ha)
1	Local	-	-	1,260	2.5	1.3	STAHA	DAP, Urea	Marshall	1,260	2.5	1.3
2	Local	-	-	630	1.5	1.1	TMV 1	-	-	630	1.5	1.1
3	Local	-	-	810	2.0	1.0	TMV 1	-	-	810	2.0	1.0
4	Local	-	-	1,440	3.0	1.2	TMV 1	-	-	1,440	3.0	1.2
5	Local	-	-	405	1.0	1.0	TMV 1	-	-	405	1.0	1.0
6	Local	-	-	360	1.0	0.9	TMV 1	-	-	360	1.0	0.9
7	Local	-	-	1,350	2.0	1.7	TMV 1	-	-	1,350	2.0	1.7
8	Local	-	-	450	1.0	1.1	TMV 1	-	-	450	1.0	1.1
9	Local	-	-	450	1.0	1.1	TMV 1	-	-	450	1.0	1.1
10	Local	-	-	990	2.5	1.0	TMV 1	-	-	990	2.5	1.0
11	Local	-	-	495	1.0	1.2	TMV 1	-	-	495	1.0	1.2
12	Local	-	-	405	1.0	1.0	TMV 1	-	-	405	1.0	1.0
13	Local	-	-	-	-	-	TMV 1	-	-	-	-	-
14	Local	-	-	450	1.0	1.1	TMV 1	-	-	450	1.0	1.1
15	Local	-	-	450	2.0	0.6	TMV 1	-	-	450	2.0	0.6
16	Local	-	-	405	1.0	1.0	TMV 1	-	-	405	1.0	1.0
17	Local	-	-	450	1.0	1.1	TMV 1	-	-	450	1.0	1.1

Note)
*1 Data before the implementation of Special Programme of FAO
*2 Data after the implementation of Special Programme of FAO
Source) Agricultural Office in Morogoro District, 1996

Paddy (Group : Jembe Ni Mali Rice Production Group in Hembeti Village)

	1994/95 *1						1995/96 *2					
	Variety	Kind of Fertilizer Applied	Kind of Chemical Applied	Total Yield (kg)	Cultivated Area (acre)	Unit Yield (ton/acre)	Variety	Kind of Fertilizer Applied	Kind of Chemical Applied	Total Yield (kg)	Cultivated Area (acre)	Unit Yield (ton/acre)
1	SUPA	-	-	1,350	3.0	1.1	Line 88	Urea	2,4-D	1,350	1.0	3.4
2	SUPA	-	-	1,050	2.0	1.3	Line 88	Urea	2,4-D	1,369	1.0	3.4
3	SUPA	-	-	975	2.0	1.2	SUPA	-	2,4-D	1,313	1.0	3.3
4	SUPA	-	-	487	1.0	1.2	SUPA	-	2,4-D	1,275	1.0	3.2
5	SUPA	-	-	-	-	-	SUPA	-	2,4-D	1,200	1.0	3.0
6	SUPA	-	-	413	1.0	1.0	SUPA	-	2,4-D	1,125	1.0	2.8
7	SUPA	-	-	975	1.0	2.4	SUPA	-	2,4-D	1,200	1.0	3.0
8	SUPA	-	-	450	1.0	1.1	SUPA	-	2,4-D	1,163	1.0	2.9
9	SUPA	-	-	900	2.0	1.1	SUPA	-	2,4-D	1,088	1.0	2.7
10	SUPA	-	-	450	1.0	1.1	SUPA	-	2,4-D	1,275	1.0	3.2
11	SUPA	-	-	-	-	-	SUPA	-	2,4-D	1,238	1.0	3.1
12	SUPA	-	-	450	1.0	1.1	SUPA	-	2,4-D	1,125	1.0	2.8
13	SUPA	-	-	413	1.0	1.0	SUPA	-	2,4-D	1,238	1.0	3.1
14	SUPA	-	-	450	1.0	1.1	SUPA	-	2,4-D	1,163	1.0	2.9

Note)
*1 Data before the implementation of Special Programme of FAO
*2 Data after the implementation of Special Programme of FAO
Source) Agricultural Office in Morogoro District, 1996

Table 1.3.2 Crop Production under Special Programme of FAO (2/2)

Paddy (Group : Mwanzo Mgumu Rice Farmers Group in Mkindo Village)

No.	1996/97					
	Variety	Amount of Urea (kg)	Amount of 2,4-D (litter)	Total Yield (kg)	Cultivated Area (acre)	Unit Yield (ton/acre)
1	Line 88	100	1	2,560	1.0	6.4
2	Line 88	50	0	2,050	1.0	5.1
3	Line 88	-	-	2,400	1.0	6.0
4	Line 88	100	0	2,480	1.0	6.2
5	Line 88	-	-	2,480	1.0	6.2
6	Line 88	50	0	2,080	1.0	5.2
7	Line 88	50	0	2,050	1.0	5.1
8	Line 88	50	0	2,240	1.0	5.6
9	Line 88	50	0	1,680	1.0	4.2
10	Line 88	50	1	1,920	1.0	4.8
11	Line 88	50	0	1,760	1.0	4.4
12	Line 88	-	-	2,480	1.0	6.2
Average				2,182	1.0	5.5

Note) " - " means no application of fertilizer or agro-chemicals
Source) Agricultural Office in Morogoro District and Village Extension Officer in Mkindo village

Paddy (Group : Nguvu Kazi Rice Production Group in Mkindo Village)

No.	1996/97					
	Variety	Amount of Urea (kg)	Amount of 2,4-D (litter)	Total Yield (kg)	Cultivated Area (acre)	Unit Yield (ton/acre)
1	Line 88	100	1	2,640	1.0	6.6
2	Line 88	100	2	2,480	1.0	6.2
3	Line 88	50	-	2,240	1.0	5.6
4	Line 88	50	1	2,080	1.0	5.2
5	Line 88	50	1	1,840	1.0	4.6
6	Line 88	-	1	1,520	1.0	3.8
7	Line 88	-	-	1,360	1.0	3.4
8	Line 88	-	-	1,760	1.0	4.4
9	Line 88	-	-	1,040	1.0	2.6
Average				1,884	1.0	4.7

Note) " - " means no application of fertilizer or agro-chemicals
Source) Agricultural Office in Morogoro District and Village Extension Officer in Mkindo village

Table 1.3.3 Present Crop Budget for Major Crops in Mgogola Scheme

Mgongola Scheme	Unit	Paddy (Transplanting)			Paddy (Direct sowing)		
		Unit Price (TSh)	Q'ty	Value (TSh)	Unit Price (TSh)	Q'ty	Value (TSh)
Production Cost							
(A) Farm Input							
1 Seed	kg/ha	120.00	50	6,000	120.00	90	10,800
2 Fertilizer							
: Urea (46 %-N)	kg/ha	240.0	125	30,000	240.0	0	0
: SA (21 %-N)	kg/ha	180.0	0	0	180.0	0	0
: TSP (46 %-P_2O_5)	kg/ha						
3 Agro-chemical							
: Pesticide	lit./ha	5,500	0.0	0	5,500	0.0	0
: Herbicide	lit./ha	3,500	2.5	8,750	3,500	0.0	0
: Fungicide	lit./ha	4,000	0.0	0	4,000	0.0	0
4 Packing material		500	51	25,500	500	21	10,500
Sub-total (A)				70,250			21,300
(B) Labour Requirement				0			0
1 Family labour			100	0		50	0
2 Hired labour		500	62	31,000	500	40	20,000
Sub-total (B)			162	31,000		90	20,000
(C) Machinery or draught cattle							
1 Ploughing by tractor	L.S	30,000	0	0	30,000	1	30,000
2 Ploughing by hand tractor	L.S	25,000	1	25,000	25,000	0	0
3 Puddling by thand ractor	L.S	17,500	1	17,500	17,500	0	0
Sub-total (C)				42,500			30,000
(D) Miscellanious cost				7,188			3,565
5 % of (A) and (B)							
Total Production Cost				150,938			74,865
Gross Return							
(A) Yield	kg/ha		3,800			1,600	
(B) Producer price	per kg	160			160		
Gross return				608,000			256,000
Net return				457,062			181,135

Table 1.3.4 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 & agroforestr - Oxenization - Livestock deworming	DEO DSMSs	- Coconut and cashewnuts - Oxenization - Irrigation - simple diversification structur - 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 1.3.5 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
1 Extension Targets								
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	-	-	-	-	-	-	-	-
2 Extension Training Targets								
No. of MTS	12	0	12	0	12	0	12	1
3 Equipment								
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
4 Vehicles								
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 1.3.6 Retraining Programme of VEOs in Morogoro Region

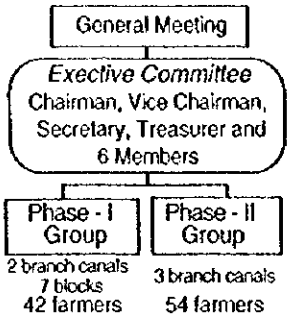
	District				Total
	Morogoro	Kilosa	Kilombero	Ulanga	
Total VEOs					
Diploma holder *1	57	27	20	10	114
Certificate holder *2	74	38	16	20	148
Total	131	65	36	30	262
Retraining Programme					
up to 1996/97					
Diploma holder *1					
Crops	0	0	0	0	0
Livestock	0	0	0	0	0
Certificate holder *2					
Crops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

	Mgongola		
Village	Mkindo	Dihombo	Hembeti
Population	4,220	1,850	2,400
Household	840	370	480
WUG	Mkindo Farmers Irrigation Agr. Marketing Primary Cooperative Society Ltd.	-	-
Year established	Phase-I: 1984 Phase-II: 1986	-	-
No. of farmer	96	-	-
Organizational structure	 *Mkindo Farmers Irrigation Agr. Marketing Primary Cooperative Society Ltd.* No leader in each group.	*(No water users' group)*	
Water allocation	The farmers are divided into two groups; Phase-I and Phase-II groups. The former group consists of 7 irrigation blocks, and each block takes water for one day. It means that water is distributed to individual farmers at 7-day intervals. The latter group has three branch canals, and each canal takes water for one day. Namely, a farmer in the Phase-II group can take water at 3-day intervals.		
Maintenance	- Communal work: 2 times/year and one week/time - Absentees: punished with a fine	-	-
Water charge	One bag (70kg) of paddy / year *1	-	-
Registration	Registered in 1997	-	-
Water right	-	-	-
By-laws	Exist	-	-
Water dispute among the farmers in WUG	-	-	-
Water dispute among WUGs	- Water dispute with the outside farmers for steal of water from upstream main canal.	-	-
Major problems	- Water leakage - Inappropriate design of canal profile - Weeds along the canals - Water dispute with outside farmers.	-	-
VEO *4	1	1	1
IT *4	1	-	-
Remarks		*No irrigation System*	

*1 In 1995, the Mkindo WUG had a plan for collecting fixed irrigation services charge of 1,000/year/acre, and its collecting progress was about 90% as of August 1997. In 1997, the cooperative has a plan for changing of payment method from "cash" to "in kind" with increasing of its amount.

*2 VEO : Village Extension Officer, IT : Irrigation Technician

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

Table 2.1.1 Criteria for Land Suitability Assessment for Irrigated Farming

Land Class Determination Factors	(unit)	Rating	For Paddy Rice Cultivation 1	2	3	4	For Upland Crop Cultivation (maize, vegetables) 1	2	3	4
[A] Agronomic Factors										
1 (r) Conditions of Root Zone										
Texture of surface soil			Loam - friable-Clay	Sil., SL firm-C	LS, Si	Sand, Gravel	SL, L, SiL, CL SCL, SiCL	Si, LS	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
2 (n) Soil Nutrients of Surface Soil										
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
3 (t) Soil Toxities										
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
4 (f) Flooding Risk										
Frequency	(times/10years)		-	-	-	-	<1	1 - 2	2 - 5	>5
Inundated period			<4 weeks	<8 weeks	<8 weeks	>8weeks	>2days	2 - 7days	1 - 2weeks	>2weeks
[M] Management Factors										
5 (a) Accessibility to Farm										
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	
6 (w) On-farm Workability										
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	
[D] Land Development Factors										
7 (l) Grading/Leveling, Ridging										
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
8 (d) Drainage, Flood Protection										
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
[E] Conservation and Environmental Factors										
9 (s) Long-term Prevention of Salinity/Socidity										
Prevention for salinity/socidity			not subject	not subject	somewhat	with severe	not subject	not subject	somewhat	with severe
10 (h) Prevention of Groundwater and Surface Water										
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
11 (e) Soil Erosion Control										
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	Rainy season : paddy Dry season : paddy, maize, beans, vegetables - Inter-cropping to be preferable - Demonstration to be confirmed promising crops and arming practices - Shortage of vegetables is serious point. - Upland crops as income source	Rainy season : maize, pulse crops Dry season : cabbage, Irish potato, pulse crops - In the future, promising market should be checked before starting the cultivation of new crops.	Rainy season : maize, paddy Dry season : maize, pulse crops, vegetables - Sugarcane should be changed to another crops. - It is difficult to take out sugarcane completely because of its marketability. - Farmers have lack of knowledge on vegetable cultivation. - Beans should be included as promising crop.	Rainy season : maize, paddy Dry season : onion, maize, pulse crops, vegetables - Shortage of vegetables is to be solved. - Farmers have lack of knowledge on vegetable cultivation. - Farmers desired to expand the area of onion and paddy cultivation.
2. Cropping pattern	- Double cropping of paddy and rotational cropping with paddy and upland crops are agreeable.	- Proposed cropping pattern is acceptable. - Water in the rainy season is enough, while August to November in the dry season there is water shortage.	- Proposed cropping pattern is acceptable.	- Concerning expansion of the onion cultivation, there is no serious labour shortage in the future. - Water shortage should be solved for expansion of irrigated area. - Prevailing harvesting season for onion is August and September. - If onion will be planted late, farmers suffer to protect them against pests and diseases.
3. Farming practices	*Guideline of Special Programme of FAO was discussed.* - Special Programme is acceptable. - Transplanting is laborious, so that it can not cover big area. - Production with transplanting is higher than one with broadcasting.	- Concerning cabbage, club root disease (fungus) is most serious in the village. - As one of the countermeasures, rotational cropping is conducted. - Due to feeding problems, animal keeping has not been promoted. - During animal keepers, application of manure is common.	- They are not aware of Special Programme of FAO. - Farmers are not aware of importance, necessity, etc. of field band.	- Mixing-up of paddy varieties in the paddy fields due to flooding - Peak season of water shortage is in March/April for the upstream and August/September for the down stream.

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

Topics	Outline of Dialogue in Each Project Scheme			
	Mgongola	Mgeta	Mkula	Mwega
4. Seeds	- Farmers multiply seeds by themselves. - Sometimes, seeds are bought from another farmers. - In Mkindo pilot area, Line 88 is cultivated, while Supa India in the Mgongola area. - Line 88 was obtained in 1993. - Quality of Line 88 has been deteriorated year by year. - Qualified seeds should be supplied. - Line 88 is a promising variety for the Project.	- Except cabbage and other minor vegetable, seeds are produced by farmers themselves. - Quality of seeds is generally not satisfied. - Local potatoes for consumption are adopted as seed potatoes. - Storage for seed potatoes is not available. - Seed potatoes which is bought from local market have been infected by some disease or insects - Price of vegetable seeds is expensive. - Local seed potato is of low price and low quality. - Some farmers try to organize group and try to arrange seeds by group. - Vegetable seeds are available in Morogoro town. - There is no problem on seed availability of vegetable seeds.	- Farmers multiply seeds by themselves. - They prefer to apply Line 88 as promising variety of paddy. - Cowpea is not in good quality.	- Seeds are generally multiplied by farmers themselves. - Qualified seeds are from informal sectors in Arusha. - Sometimes, commercial seeds to be sold by traders are not in good quality. - Concerning onion, some farmers produce their own seeds by themselves, while some of them buy commercial seeds from Arusha. - Some traders sell onion seeds of other sources under the pretext of seeds from Arusha. - Onion seeds is available in town, those seeds are imported, so that its price is expensive.
5. Land preparation	- They have used tractor. - Availability of tractors is low. - Number of tractors is insufficient. - Hiring charge is not stable and expensive. - Farm land is not prepared properly, due to few tractors. - Farmers believe that they are ready to buy tractors.		- Farmers have used tractor or hand hoe for land preparation. - Availability of tractors is low. - Number of tractors is insufficient. - Farmers organized group and tried to contact with tractor owners. However, owner broke their contract.	- Land preparation is conducted by manpower. - Neither tractor nor draught cattle is not applied in the area.

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

Topics	Outline of Dialogue in Each Project Scheme			
	Mgongola	Mgeta	Mkula	Mwega
	- Formulation of farmer's organization was tried before, but farmers in charge were not trustful.			
6. Oxenization	- Oxenization in the area is very difficult to be applied due to hard soil. - It is difficult for oxen to perform well, as oxen may be stuck in wet soil condition. - Oxenization project was failed. - Farmers have no experience concerning keeping cattle.		- Oxenization in the area is very difficult to be applied due to hard soil. - There are a lot of weeds and then it is difficult to use oxen. - Once some oxen were brought to the school but later they were withdrawn because of tsetse fly.	- They hired draught cattle and ploughing by them is completed successfully. However, cattle is fell sick.
7. Fertilizer	- No application of fertilizer in the Project area - Price is expensive. - Fertilizer is not available. - Application of fertilizer is not effective due to the seasonal flooding condition.	- Fertilizer is available in town and even village. - Price at village is expensive, compared with one at Morogoro town. - Except beans, fertilizer are generally applied.	- No application of fertilizer in the Project area - If apply fertilizer for paddy, it will be tall and lodged. - Fertilizer is available, but expensive.	- Major farmers for onion cultivation apply fertilizer. - For paddy, fertilizer is mainly not applied. - For beans, fertilizer is applied. - Farmers are not aware of proper dosage of fertilizer.
8. Agro-chemials	- Some farmers apply 2,4-D of herbicide in the Project area. - Grass hopper and stalk-eyed shoot fly are major insects in the Project area. - Shortage of agro-chemicals, price, quality are problem. - It is not available in time - There are no stockists near the Project area. - Expired and mixed/diluted agro-chemicals are sold.	- Agro-chemicals is available in town and even village. - Price is expensive. - Side-effect is appeared due to lack of protective gears.	- Some farmers apply 2,4-D of herbicide in the Project area.	- Availability of agro-chemicals is not in good condition. - Agro-chemicals is expensive.

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

Topics	Outline of Dialogue in Each Project Scheme			
	Mgongola	Mgeta	Mkula	Mwega
9. Drying	- Drying is done in the field, that is dried grains are harvested. - Drying after cutting is not necessary. - Shattering loss and breakage are many due to over-dried condition before cutting. - Early harvesting and drying at home yard are necessary. - In the case which fields are controlled well, it is possible to dry grains in the fields.		- Paddy is dried in the field. - After cutting paddy, it is left to dry in the field for a few days.	- Drying is done in the field, that is dried grains are harvested. - Drying after cutting is not necessary. - Shattering loss and breakage are many due to over-dried condition before cutting.
10. Marketing	- Price is cheap and flexible. - Due to lack of milling machine, it is difficult to sell milled rice.	- For products, middleman come and buy products. - Farmers should have knowledge concerning market power, so that they can negotiate with traders. - Farm gate price of cabbage is fluctuated. - Farmers can not decide selling price, but by traders. - Farmers have tried to organize farmer's group for selling products and farm inputs.	- Formerly, farmers used to sell to Co-op society, but since they were collapsed , farmers depend on traders who offer low prices. - Farmers can not decide selling price, but by traders. - Traders check the quality of dried paddy, if breakage is too much, they will not buy them.	- Farmers are ready to organize themselves to facilitate purchase of farm inputs and sell products. - Fertilizer is available in Iringa of Iringa Region. - Products is sold in the trader's price which is relatively low.

Table 3.3.2 Proposed Farming Practices in Mgongola Scheme

Item	Paddy	Maize
1 Land preparation	- Plowing by hand tractor or hand - No harrowing - Puddling by hand tractor or hand (over the nursery period)	- Plowing by hand - Harrowing by hand
2 Nursery	- 40 ~ 50 kg of seeds per ha - around 600 m^2 per ha - Seed selection by water before sowing	Not applied
3 Broadcasting	Not applied	- 70cm x 70cm ~ 90cm x 100cm - 20~25 kg per ha (2 ~3 seeds per hill)
4 Transplanting	- 1 to 2 seedlings per hill - 10cm x 10cm ~ 10cm x 20cm of planting density - Gap filling to be required	Not applied
5 Application of fertilizer		
Nursery	- 7 kg of Urea per ha (3 kg N/ha)	
Basal application	- 87 kg of Urea per ha (40 kg N/ha) - 125 kg of TSP per ha (25 kg P_2O_5/ha)	- 71 kg of AS per ha (15 kg N/ha) - 100 kg of TSP per ha (20 kg P_2O_5/ha)
1st top dressing	- 87 kg of Urea per ha (40 kg N/ha)	- 71 kg of AS per ha (15 kg N/ha)
Total application	174 kg Urea, 125 kg TSP (NPK = 80:25:0)	142 kg AS, 100 kg TSP (NPK = 30:20:0)
6 Weeding	- by rotary weeder - by herbicide (2,4-D : 2 lit. per ha)	- 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	- Once a week up to 20 days before harvesting	- Furrow irrigation every one week - Critical period : from flowering to 20 days before maturing
9 Harvesting	- around 2/3 of panicle from top side is changed to yellowish collar.	-

Table 3.3.3 (1/2) Schedule of Proposed Farming Practices by Crops

Crop : Paddy

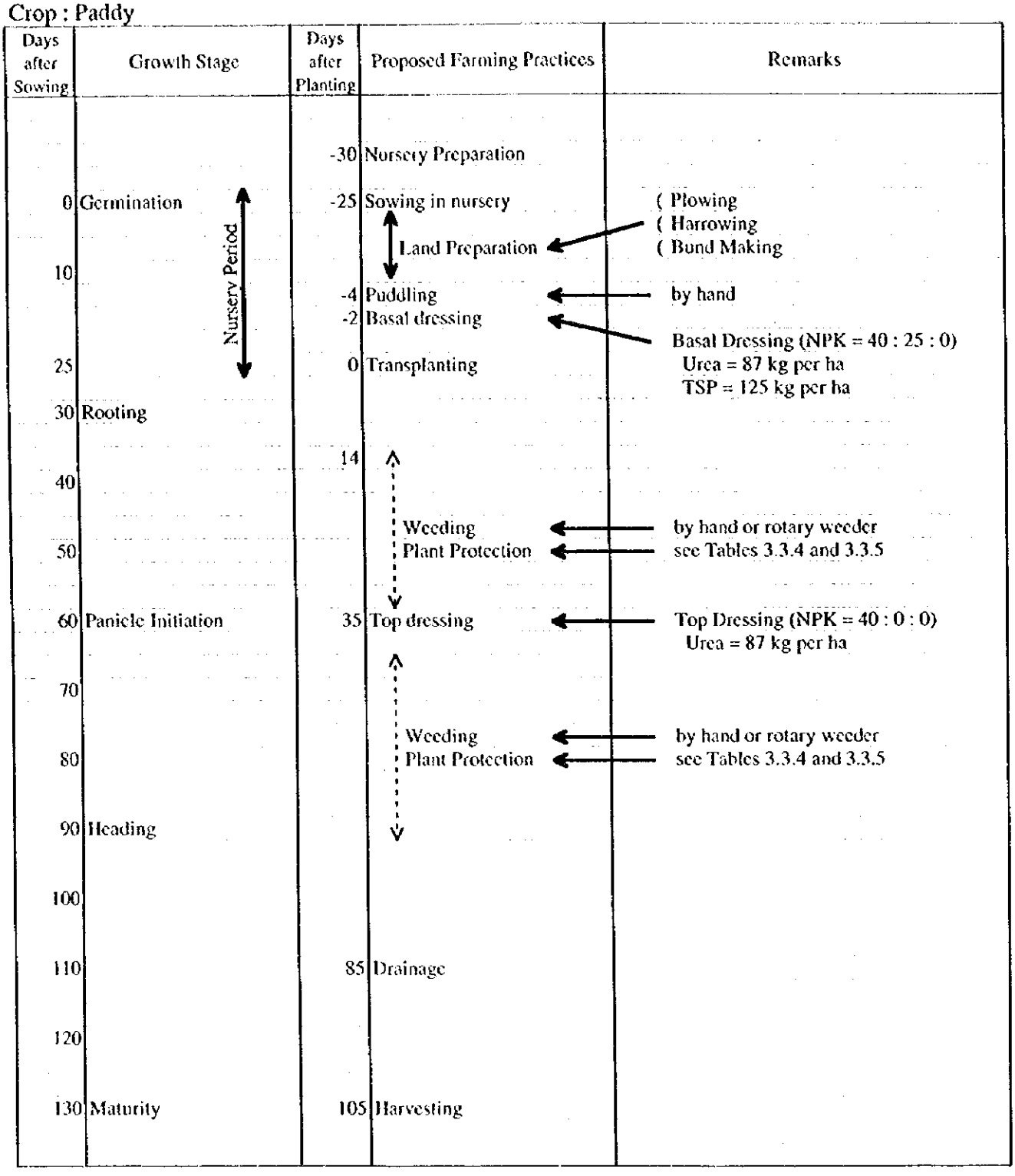


Table 3.3.3 (2/2) Schedule of Proposed Farming Practices by Crops

Crop : Maize

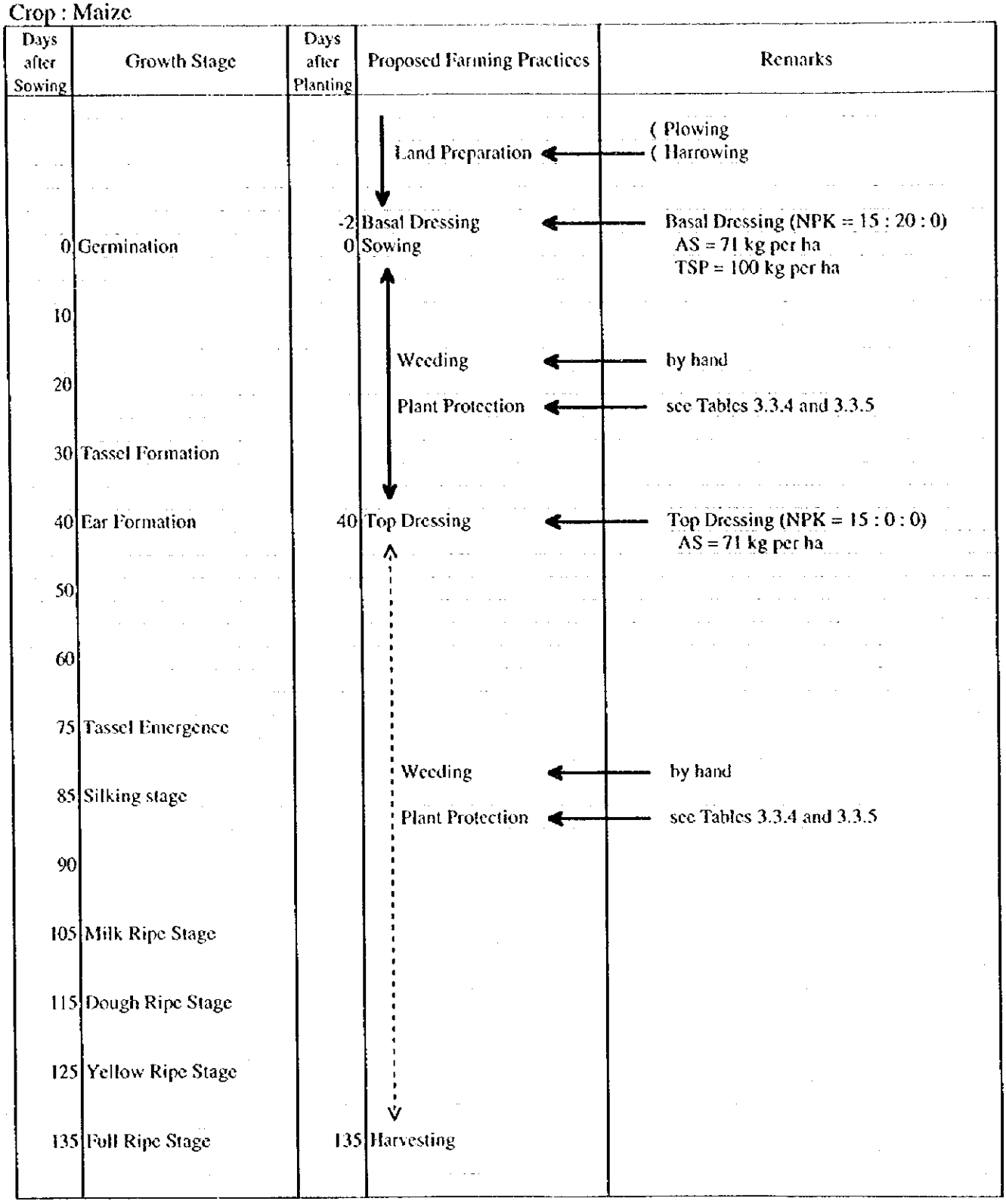


Table 3.3.4 Recommendable Agro-Chemicals by Crops

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
Pirimiphos-methyl	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 bright
Mancozeb	Dithane			Downy mildew	Downy mildew P. blight	Downy mildew	Late bright
Fenvalerate	Sumicidin			Diamond moth			
Cypermethrin	Cymbush			Diamond moth	Aphids Thrips	S. pod borer Scarabs Aphids Mites	
Carbofuran	Furadan			Nematodoes	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 Mgongola Scheme

	Unit	Paddy in Mkindo Pilot Scheme			Paddy in Mgongola area			Maize		
		Unit Price (TSh)	Q'ty	Value (TSh)	Unit Price (TSh)	Q'ty	Value (TSh)	Unit Price (TSh)	Q'ty	Value (TSh)
Production Cost										
(A) Farm Input										
1 Seed	kg/ha	120.00	50	6,000	120.00	50	6,000	120.00	20	2,400
2 Fertilizer										
: Urea (46 %-N)	kg/ha	240	174	41,760	240	174	41,760	240	0	0
: AS (21 %-N)	kg/ha	180	0	0	180	0	0	180	142	25,560
: TSP (20 %-P_2O_5)	kg/ha	220	125	27,500	220	125	27,500	220	100	22,000
3 Agro-chemical										
: Pesticide	lit./ha	5,500	4.0	22,000	5,500	4.0	22,000	5,500	4.0	22,000
: Herbicide	lit./ha	3,500	2.0	7,000	3,500	2.0	7,000	3,500	0.0	0
: Fungicide	lit./ha	4,000	0.0	0	4,000	0.0	0	4,000	0.0	0
4 Packing material		500	67	33,500	500	67	33,500	500	40	20,000
Sub-total (A)				137,760			137,760			91,960
(B) Labour Requirement				0			0			0
1 Family labour			140	0		140	0		100	0
2 Hired labour		500	87	43,500	500	97	48,500	500	45	22,500
Sub-total (B)			227	43,500		237	48,500		145	22,500
(C) Machinery or draught cattle										
1 Ploughing by tractor	L.S	30,000	0	0	30,000	1	30,000	30,000	1	30,000
2 Ploughing by hand tractor	L.S	25,000	1	25,000	25,000	0	0	25,000	0	0
3 Puddling by hand ractor	L.S	17,500	1	17,500	17,500	0	0	17,500	0	0
Sub-total (C)				42,500			30,000			30,000
(D) Miscellanious cost				11,188			10,813			7,223
5 % of (A) and (B)										
Total Production Cost				234,948			227,073			151,683
Gross Return										
(A) Yield	kg/ha		5,000			5,000			3,000	
(B) Producer price	per kg	160			160			120		
Gross return				800,000			800,000			360,000
Net return				565,052			572,927			208,317

Table 3.4.1 Project Irrigation Water Requirement for Mgongola Scheme

(Total Area : 620 ha in net)

(1) Diversion Water Requirement for Project Overall Cropping Pattern

Unit : litre/sec

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
1971	27	251	489	648	973	865	1,294	1,327	235	847	23	187
1972	26	257	539	610	907	1,113	1,129	1,208	287	593	0	583
1973	25	253	512	760	737	1,097	1,258	1,327	832	0	417	0
1974	27	254	525	787	993	1,097	786	1,286	423	0	0	213
1975	27	253	539	787	993	802	843	613	952	481	774	0
1976	27	255	453	755	781	1,038	544	1,327	312	584	42	385
1977	25	246	442	673	961	1,245	1,129	751	304	0	0	0
1978	27	257	517	745	786	1,299	1,351	502	235	0	98	333
1979	27	255	523	765	941	1,245	750	880	969	453	173	703
1980	27	250	476	755	886	1,224	1,356	398	986	246	248	0
1981	24	255	537	787	644	1,299	1,358	898	1,205	847	755	686
1982	25	257	539	595	754	781	1,356	1,327	304	462	558	144
1983	23	252	514	765	900	1,299	1,008	1,122	235	0	398	101
1984	27	248	509	735	983	1,081	1,356	630	551	931	586	763
1985	23	252	531	750	998	1,168	1,050	777	1,046	396	821	0
1986	23	244	513	705	827	1,299	1,129	527	807	0	173	462
1987	26	257	483	690	697	577	544	347	602	0	652	187
1988	24	255	474	782	943	1,224	1,356	1,327	687	621	539	428
1989	27	245	514	685	961	591	1,279	889	1,063	237	61	178
Average	26	253	507	725	877	1,071	1,099	919	633	352	333	282

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
1971	441	382	342	223	54	269	637	826	649	723	716	752
1972	279	142	154	223	77	271	622	859	813	723	716	700
1973	0	377	338	223	74	271	637	871	725	723	495	743
1974	286	355	356	198	77	271	623	844	813	723	716	752
1975	631	70	221	223	77	269	637	871	775	723	675	752
1976	350	382	370	223	77	271	638	870	800	614	502	657
1977	0	545	0	85	77	271	616	871	810	723	706	752
1978	0	410	377	160	77	271	637	871	813	721	698	565
1979	427	415	342	223	71	268	628	868	800	438	683	746
1980	596	399	342	209	77	269	637	871	795	723	716	752
1981	322	191	317	205	78	269	637	871	735	723	716	743
1982	0	224	377	223	77	271	618	871	813	694	704	749
1983	462	0	93	223	77	271	638	871	811	716	716	629
1984	714	519	353	188	56	271	638	871	813	723	628	643
1985	19	153	356	223	77	271	637	799	795	658	710	686
1986	476	153	289	223	65	268	637	871	813	694	636	752
1987	385	525	370	200	56	271	637	871	807	716	713	740
1988	603	377	239	195	77	271	631	850	795	723	707	752
1989	308	202	306	223	77	270	637	871	813	723	716	572
Average	332	306	292	205	72	270	633	861	789	695	677	707

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
1971	880	768	904	834	455	363	288	170	38	0	0	10
1972	645	603	904	244	599	369	99	29	38	0	0	10
1973	890	911	714	828	590	357	206	60	38	0	0	10
1974	890	911	904	834	599	369	288	175	75	0	0	10
1975	692	898	891	834	599	294	288	175	56	0	0	10
1976	887	908	891	834	599	326	0	29	59	0	0	10
1977	825	904	580	834	543	369	278	175	38	0	0	10
1978	849	791	904	618	240	298	266	175	38	0	0	10
1979	890	911	627	22	70	312	288	29	38	0	0	10
1980	890	791	904	834	510	116	0	29	38	0	0	10
1981	890	893	904	834	599	309	269	78	74	0	0	10
1982	841	904	904	654	590	319	253	29	62	0	0	10
1983	890	911	904	825	565	230	200	29	38	0	0	10
1984	880	728	897	788	581	266	80	29	72	0	0	10
1985	884	911	904	625	587	352	231	29	44	0	0	10
1986	817	838	721	470	599	73	288	175	38	0	0	10
1987	890	901	745	795	599	284	184	29	75	0	0	10
1988	890	911	891	548	599	369	269	173	38	0	0	10
1989	841	911	904	738	599	194	288	175	38	0	0	10
Average	851	858	842	684	533	293	214	94	49	0	0	10

(2) Diversion Water Requirement for Wet Season Paddy (620 ha)

Unit : litre/sec

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
1971	27	251	489	648	973	865	1,291	1,327	235	817	23	187
1972	26	257	539	610	907	1,113	1,129	1,208	287	593	0	583
1973	25	253	512	760	737	1,097	1,258	1,327	832	0	417	0
1974	27	251	525	787	993	1,097	786	1,286	423	0	0	213
1975	27	253	539	787	993	802	843	613	952	481	774	0
1976	27	255	453	755	781	1,038	544	1,327	312	584	42	385
1977	25	246	442	673	961	1,245	1,129	751	304	0	0	0
1978	27	257	517	745	786	1,299	1,351	502	235	0	98	333
1979	27	255	523	765	941	1,245	750	880	969	453	173	703
1980	27	250	476	755	886	1,224	1,356	398	986	246	248	0
1981	24	255	537	787	644	1,299	1,358	898	1,205	847	755	686
1982	25	257	539	595	754	781	1,356	1,327	304	462	558	144
1983	23	252	514	765	900	1,299	1,008	1,122	235	0	398	101
1984	27	248	509	735	983	1,081	1,356	630	551	931	586	763
1985	23	252	531	750	998	1,168	1,050	777	1,046	396	821	0
1986	23	244	513	705	827	1,299	1,129	527	807	0	173	462
1987	26	257	483	690	697	577	544	347	602	0	652	187
1988	24	255	474	782	943	1,224	1,356	1,327	687	621	539	428
1989	27	245	514	685	961	591	1,279	889	1,063	237	61	178
Average	26	253	507	725	877	1,071	1,099	919	633	352	333	282

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
1971	441	382	342	211	27	0	0	0	0	0	0	0
1972	279	142	154	211	49	0	0	0	0	0	0	0
1973	0	377	338	211	47	0	0	0	0	0	0	0
1974	286	355	356	186	49	0	0	0	0	0	0	0
1975	631	70	221	211	49	0	0	0	0	0	0	0
1976	350	382	370	211	49	0	0	0	0	0	0	0
1977	0	545	0	73	49	0	0	0	0	0	0	0
1978	0	410	377	148	49	0	0	0	0	0	0	0
1979	427	415	342	211	44	0	0	0	0	0	0	0
1980	596	399	342	198	49	0	0	0	0	0	0	0
1981	322	191	317	193	50	0	0	0	0	0	0	0
1982	0	224	377	211	49	0	0	0	0	0	0	0
1983	462	0	93	211	49	0	0	0	0	0	0	0
1984	714	519	353	177	30	0	0	0	0	0	0	0
1985	19	153	356	211	49	0	0	0	0	0	0	0
1986	476	153	289	211	38	0	0	0	0	0	0	0
1987	385	525	370	188	30	0	0	0	0	0	0	0
1988	603	377	239	184	49	0	0	0	0	0	0	0
1989	308	202	306	211	49	0	0	0	0	0	0	0
Average	332	306	292	193	45	0	0	0	0	0	0	0

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
1971	0	0	0	0	0	0	0	0	0	0	0	10
1972	0	0	0	0	0	0	0	0	0	0	0	10
1973	0	0	0	0	0	0	0	0	0	0	0	10
1974	0	0	0	0	0	0	0	0	0	0	0	10
1975	0	0	0	0	0	0	0	0	0	0	0	10
1976	0	0	0	0	0	0	0	0	0	0	0	10
1977	0	0	0	0	0	0	0	0	0	0	0	10
1978	0	0	0	0	0	0	0	0	0	0	0	10
1979	0	0	0	0	0	0	0	0	0	0	0	10
1980	0	0	0	0	0	0	0	0	0	0	0	10
1981	0	0	0	0	0	0	0	0	0	0	0	10
1982	0	0	0	0	0	0	0	0	0	0	0	10
1983	0	0	0	0	0	0	0	0	0	0	0	10
1984	0	0	0	0	0	0	0	0	0	0	0	10
1985	0	0	0	0	0	0	0	0	0	0	0	10
1986	0	0	0	0	0	0	0	0	0	0	0	10
1987	0	0	0	0	0	0	0	0	0	0	0	10
1988	0	0	0	0	0	0	0	0	0	0	0	10
1989	0	0	0	0	0	0	0	0	0	0	0	10
Average	0	0	0	0	0	0	0	0	0	0	0	10

(3) Diversion Water Requirement for Upland crop (310 ha)

Unit : litre/sec

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
1971	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0
Average	0	0	0	0	0	0	0	0	0	0	0	0

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
1971	0	0	0	0	0	0	56	124	117	188	174	198
1972	0	0	0	0	0	0	56	130	170	188	174	167
1973	0	0	0	0	0	0	56	135	138	188	73	184
1974	0	0	0	0	0	0	56	127	170	188	174	198
1975	0	0	0	0	0	0	56	135	153	188	145	198
1976	0	0	0	0	0	0	56	133	160	138	76	150
1977	0	0	0	0	0	0	56	135	167	188	158	198
1978	0	0	0	0	0	0	56	135	170	185	155	112
1979	0	0	0	0	0	0	56	131	160	75	148	193
1980	0	0	0	0	0	0	56	135	158	188	174	198
1981	0	0	0	0	0	0	56	135	141	188	174	184
1982	0	0	0	0	0	0	56	135	170	167	161	196
1983	0	0	0	0	0	0	56	135	168	175	174	138
1984	0	0	0	0	0	0	56	135	170	188	126	144
1985	0	0	0	0	0	0	56	119	158	154	167	161
1986	0	0	0	0	0	0	56	135	170	167	129	198
1987	0	0	0	0	0	0	56	135	164	180	170	187
1988	0	0	0	0	0	0	56	128	158	188	164	198
1989	0	0	0	0	0	0	56	135	170	188	174	115
Average	0	0	0	0	0	0	56	132	160	174	152	175

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
1971	262	227	312	367	258	314	288	170	38	0	0	0
1972	161	161	312	93	349	320	99	29	38	0	0	0
1973	271	297	223	361	340	308	206	60	38	0	0	0
1974	271	297	312	367	349	320	288	175	75	0	0	0
1975	180	284	299	367	349	257	288	175	56	0	0	0
1976	268	293	299	367	349	282	0	29	59	0	0	0
1977	234	290	170	367	308	320	278	175	38	0	0	0
1978	243	237	312	260	135	260	266	175	38	0	0	0
1979	271	297	189	0	37	271	288	29	38	0	0	0
1980	271	237	312	367	289	114	0	29	38	0	0	0
1981	271	278	312	367	349	268	269	78	74	0	0	0
1982	240	290	312	276	340	277	253	29	62	0	0	0
1983	271	297	312	358	321	205	200	29	38	0	0	0
1984	256	212	305	336	330	234	80	29	72	0	0	0
1985	265	297	312	263	337	302	231	29	44	0	0	0
1986	230	256	227	194	349	73	288	175	38	0	0	0
1987	271	287	236	339	349	248	184	29	75	0	0	0
1988	271	297	299	228	349	320	269	173	38	0	0	0
1989	240	297	312	313	349	177	288	175	38	0	0	0
Average	250	270	282	294	307	256	214	94	49	0	0	0

(4) Diversion Water Requirement for Dry Season Paddy (310 ha)

Unit : litre/sec

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
1971	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0
Average	0	0	0	0	0	0	0	0	0	0	0	0

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
1971	0	0	0	12	27	269	581	702	532	535	543	553
1972	0	0	0	12	28	271	566	729	643	535	543	533
1973	0	0	0	12	28	271	581	736	586	535	422	559
1974	0	0	0	12	28	271	568	717	643	535	543	553
1975	0	0	0	12	28	269	581	736	622	535	530	553
1976	0	0	0	12	28	271	582	736	640	476	427	508
1977	0	0	0	12	28	271	560	736	643	535	549	553
1978	0	0	0	12	28	271	581	736	643	535	541	452
1979	0	0	0	12	27	268	572	737	640	363	534	553
1980	0	0	0	12	28	269	581	736	636	535	543	553
1981	0	0	0	12	28	269	581	736	593	535	543	559
1982	0	0	0	12	28	271	562	736	643	527	543	553
1983	0	0	0	12	28	271	583	736	643	541	543	491
1984	0	0	0	12	27	271	582	736	643	535	502	499
1985	0	0	0	12	28	271	581	680	636	504	543	525
1986	0	0	0	12	27	268	581	736	643	527	506	553
1987	0	0	0	12	27	271	581	736	643	535	543	553
1988	0	0	0	12	28	271	575	722	636	535	543	553
1989	0	0	0	12	28	270	581	736	643	535	543	456
Average	0	0	0	12	28	270	577	729	629	521	525	532

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
1971	619	540	592	467	197	49	0	0	0	0	0	0
1972	484	442	592	151	250	49	0	0	0	0	0	0
1973	619	614	490	467	250	49	0	0	0	0	0	0
1974	619	614	592	467	250	49	0	0	0	0	0	0
1975	512	614	592	467	250	38	0	0	0	0	0	0
1976	619	614	592	467	250	44	0	0	0	0	0	0
1977	592	614	410	467	234	49	0	0	0	0	0	0
1978	606	554	592	359	105	38	0	0	0	0	0	0
1979	619	614	439	22	33	41	0	0	0	0	0	0
1980	619	554	592	467	220	2	0	0	0	0	0	0
1981	619	615	592	467	250	41	0	0	0	0	0	0
1982	601	614	592	378	250	43	0	0	0	0	0	0
1983	619	614	592	467	244	25	0	0	0	0	0	0
1984	624	517	592	452	251	32	0	0	0	0	0	0
1985	619	614	592	362	250	49	0	0	0	0	0	0
1986	587	583	495	276	250	0	0	0	0	0	0	0
1987	619	614	509	456	250	36	0	0	0	0	0	0
1988	619	614	592	319	250	49	0	0	0	0	0	0
1989	601	614	592	425	250	18	0	0	0	0	0	0
Average	601	588	560	390	226	37	0	0	0	0	0	0

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	- District Commissioner, District Executive Director, District Administrative Officer. - Senior officials of the offices of RALDO, and RCO, and the Zonal Irrigation Office. - Senior officials of the offices involved in WUG's activities (DALDO, District Water Engineers, District Community Development Officers, DCO, etc.).	- Outline of the project - Farmers' participant management system - Outline of O&M by WUG - Organization and activities of WUG - Necessity of agricultural supporting services - Field investigation, etc.
Course-B (for each district)	5	20	1	- Officials involved in O&M (Zonal Irrigation Office, RALDO and DALDO's offices, Division Extension Officers, DCO). - Village Extension Officers and Irrigation Technicians to be attached to the project.	- Development plan of smallholder irrigation project - Estimation of water requirement - Preparation of irrigation schedule - O&M of facilities - Strengthening of WUG, articles and by-laws, water right, registration - Management of WUG - Collection of irrigation service charge - Monitoring system, measuring and surveying methods - Agricultural supporting services to WUG - Promoting women in development - Study tour at advanced areas, etc.
Course-C (for each scheme)	10	20 - 30	2	Farmer's level training to leaders of WUG, gate keepers and key farmers.	- Outline of the project - O&M of facilities, water requirement, water delivery, etc. - Irrigation schedule and cropping calendar - Management of WUG such as accounting and book keeping and auditing - Articles and by-laws, water right, registration - Collection of irrigation service charge - Monitoring system, measuring and surveying methods - Marketing and credit, etc. - Promoting women in development. - Study tour at advanced areas, etc.
Course-D (for each scheme)	2	20	2	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.	- Outline of the project - Organization and activities of WUG - Required agricultural supporting services - Promoting women in development, etc.

Table 3.5.2 Training Schedule for Proposed Farming Practices by Crops in Mgongola Scheme

Training Subjects	Major Points	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Crop : Paddy													
1 Nursery preparation	- Size / formation												
	- Seedling management												
2 Land preparation	- Plowing depth												
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.
Crops : Upland crops (maize)													
1 Land preparation	- Plowing depth												
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												

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	- Demonstration of proper farming practices to general farmers - Guidance for proper farming practices - Guidance for proper water management - Guidance for method on the yield analysis	- DEO - DIVEO - VEO	- Aggressive farmers should be selected for the field training. - Demonstration will be carried out through the construction period. - Farmer's field to be selected.
	after the project implementation	- Practical training for proper farming practices (Proper farming practices for major crops will be transferred to the farmers concerned through the actual crop cultivation.) - Guidance for proper water management	- DEO - SMS - DIVEO - VEO	- Group training will be required. - Aggressive farmers should be selected as block leader each block of every tertiary blocks. - Group training will be required. - Training schedule for each scheme is shown in relevant tables in each Division.) - Farmer's field to be selected. Mgeta scheme (see Table 3.5.4 in Division 2) Mgongola scheme (see Table 3.5.4 in Division 3) Mkula scheme (see Table 3.5.4 in Division 4) Mwega scheme (see Table 3.5.4 in Division 5)
3. Field Tour	after the project implementation	- Inspection to the advanced area - Exchange of information and experience with farmers in the advanced area.	- SMS - DIVEO - VEO	- Upland crops in high altitude and cool-climate - Lushoto, Iringa, Mbeya - Paddy and Maize - Major fields in FAO special programme
4. Special training in KATC	through the project implementation	- Training of advanced practices	- KATC	- Key-farmer's course (20 days per course)

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	- Enlightenment of proper farming practices Theory for crop cultivation - Training for monitoring and evaluation method - Review and monitor of the demonstration activities - Guidance for method on the yield analysis - Guidance for proper water management	- REO - SMSs - DEO	- VEOs concerned select some aggressive farmers. - Farm inputs such as seeds and agro-chemicals to be supplied from the Committee. - Farmer's field to be selected.
	after the project implementation	- Training of proper cultivation of major crops - Preparation of guideline for fertilizer dosage - Approach of high yielding practices - Guidance for method on the yield analysis - Guidance for proper water management	- REO - SMSs - DEO	- Farmer's field to be selected.
2. Workshop	through the project implementation	- Enlightenment of agricultural development plan - Training for the dissemination method to farmers - Monitoring and review on the progress of implementation of the demonstration.	- REO - SMSs - DEO	
	after the project implementation	- Monitoring and review on the progress of training programme - Review of the activities on proposed farming practices	- REO - SMSs - DEO	
3. Special training in KATC	through the project implementation	- Training of advanced practices	- KATC	- Rice cultivation course (45 days per course) - Water management course (30 days per course)

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

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

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 : 30 blocks (30 block leaders)
   - Period for each farming practice: 2 months (see Table 3.5.2 in Division 3)
   - Training days per month: 2 days
   - Total training days : 4 days
   - Participants for each training day: 8 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
Operater for heavy equipment	Man-Day	3,800
Ass.operator for heavy equipment	Man-Day	2,450
Operater for ligth equipment	Man-Day	3,360
Ass.operator for ligth 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		84,800
Fine aggregate(sand)	m3	Collection in situ	
Coarse aggregates	m3	for concrete	39,860
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 site	
RC Pipe	lin m	Dia.1.2m	85,680
RC Pipe	lin m	Dia.1.0m	71,400
RC Pipe	lin m	Dia.0.7m	49,980
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
Turf	m2		510
Sluice Gate	No.	B:1.0m H:1.0n	1,257,500
Screen	No.	B:1.5m H:1.0n	487,500
Screen	No.	B:1.0m H:1.0n	325,000

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
Pick Hammer	7.5kg	h	310

Table 4.1.4 List of Construction Unit Prices

No.	Work Item	Unit	Unit Price Foreign (Tsh)	Local (Tsh)	Total (Tsh)
1	Stripping	m3	2,085	624	2,708
2	Excavation(Common,Removal HD=0.3km)	m3	2,500	1,084	3,584
3	Excavation(Rock ,Canal)	m3	9,184	15,755	24,940
4	Excavation(Man-Power)	m3	0	2,484	2,484
5	Excavation(Common,without Removal)	m3	1,186	520	1,706
6	Embankment(HD<50 m)	m3	1,634	540	2,174
7	Embankment Material Transportation(HD=5 Km,Mgongola)	m3	2,885	1,252	4,137
8	Back Filling	m3	0	1,691	1,691
9	Sod Facing	m2	637	294	931
10	Land Leveling	ha	387,414	158,462	545,875
11	Concrete (240kg/cm2, Reinforced Concrete in Mgongola)	m3	17,660	90,898	108,558
12	Concrete (210kg/cm2, Lining/Plain Concrete in Mgongola)	m3	17,780	88,924	106,705
13	Concrete (180kg/cm2, Foundation Concrete in Mgongola)	m3	17,693	76,007	93,700
14	Reinforce Bar(Processing & Assembly, HD<60 m)	ton	483,004	52,164	535,168
15	Concrete Form	m2	0	3,970	3,970
16	Chipping	m2	943	740	1,683
17	Plastering	m2	377	2,910	3,287
18	Demolishing of Existing Structure	m3	8,672	13,862	22,534
19	Riprap(in Mgongola)	m3	22,974	8,031	31,005
20	Sluice Gate(B=1.0m, H=1.0m)	no.	0	1,634,750	1,634,750
21	Screen(B:1.5m H:1.0m)	no.	0	633,750	633,750
22	Screen(B:1.0m H:1.0m)	no.	0	422,500	422,500
23	Stoplog	m3	0	237,510	237,510
24	RC Pipe (Dia. 1.2m)	m	8,354	114,309	122,663
25	RC Pipe (Dia. 1.0m)	m	8,354	95,745	104,099
26	RC Pipe (Dia. 0.7m)	m	4,177	63,881	68,057
27	RC Pipe (Dia. 0.6m)	m	4,177	55,509	59,685
28	RC Pipe (Dia. 0.5m)	m	4,177	49,776	53,952
29	RC Pipe (Dia. 0.4m)	m	4,177	44,043	48,219
30	Storage Construction	m2	0	219,556	219,556

Table 4.1.5 Breakdown of Direct Construction Cost of Mgongola Scheme (1/2)

(Unit : 1,000 Tshs)

Item	Unit	Q'ty	F.C.	L.C.	Total
Headworks					
Coffering	m3	152	180	399	579
Demolishing of Existing Structure	m3	31	269	430	699
Excavation(Man-Power)	m3	73	0	181	181
Excavation(Rock Canal)	m3	33	303	520	823
Concrete(240kg/cm2)	m3	73	1,289	6,636	7,925
Reinforcement Bar	ton	6	2,898	313	3,211
Concrete Form	m2	186	0	738	738
Chipping	m2	82	77	61	138
Plastering	m2	60	23	175	197
Back Filling	m3	46	0	78	78
Sluice Gate	no.	4	0	6,539	6,539
Screen	no.	2	0	845	845
Sub-total			5,039	16,914	21,953
Irrigation System					
Main Canal					
Demolishing of Existing Structure	m3	686	5,949	9,510	15,458
Stripping	m3	2,861	5,965	1,784	7,749
Embankment	m3	19,784	89,400	35,468	124,868
Excavation(Common)	m3	8,582	21,455	9,307	30,762
Excavation(Rock Canal)	m3	486	4,464	7,657	12,121
Lining	m3	1,208	21,479	107,421	128,899
Sod Facing	m2	10,811	6,888	3,178	10,066
Related Structure					
Excavation(Common)	m3	105	262	114	376
Refilling	m3	105	0	178	178
Concrete(240kg/cm2)	m3	93	1,642	8,454	10,096
Concrete(180kg/cm2)	m3	52	920	3,952	4,872
Reinforcement Bar	ton	8	3,864	417	4,281
Concrete Form	m2	828	0	3,287	3,287
RC.Pipe(Dia.1.2m)	m	50	418	5,715	6,133
RC.Pipe(Dia.0.7m)	m	5	21	319	340
RC.Pipe(Dia.0.6m)	m	5	21	278	298
RC.Pipe(Dia.0.5m)	m	2	8	100	108
RC.Pipe(Dia.0.4m)	m	30	125	1,321	1,447
Riprap	m3	7	161	56	217
Stoplog	m3	0.7	0	166	166
Screen	no.	1	0	634	634
Secondary Canal					
Stripping	m3	4,570	9,528	2,850	12,377
Embankment	m3	28,308	127,918	50,749	178,667
Excavation(Common)	m3	7,720	19,300	8,372	27,672
Lining	m3	1392	24,750	123,783	148,533
Sod Facing	m2	18,015	11,478	5,296	16,774
Related Structure					
Concrete(240kg/cm2)	m3	72	1,272	6,545	7,816
Concrete(180kg/cm2)	m3	26	460	1,976	2,436
Reinforcement Bar	ton	6	2,898	313	3,211
Concrete Form	m2	657	0	2,609	2,609
RC.Pipe(Dia.0.9m)	m	15	125	1,237	1,363
RC.Pipe(Dia.0.7m)	m	19	79	1,214	1,293
RC.Pipe(Dia.0.6m)	m	4	17	222	239
RC.Pipe(Dia.0.5m)	m	39	163	1,941	2,104
RC.Pipe(Dia.0.4m)	m	114	476	5,021	5,497
Stoplog	m3	0.8	0	190	190
Tertiary Canal					
Stripping	m3	6,463	13,474	4,030	17,504
Embankment	m3	36,734	165,994	65,855	231,848
Excavation(Common)	m3	7,385	18,462	8,009	26,471
Sub-total			559,435	489,526	1,048,961

Table 4.1.5 Breakdown of Direct Construction Cost of Mgongola Scheme (2/2)

(Unit : 1,000 Tshs)

Item	Unit	Q'ty	F.C.	L.C.	Total
Drainage System					
Drainage Canal					
Excavation(Common,without removal)	m3	51,413	60,984	26,733	87,717
Related Structure					
Concrete(240kg/cm2)	m3	78	1,377	7,090	8,467
Concrete(180kg/cm2)	m3	53	938	4,028	4,966
Reinforcement Bar	ton	7	3,381	365	3,746
Concrete Form	m2	455	0	1,807	1,807
RC.Pipe(Dia.1.2m)	m	46	384	5,258	5,643
RC.Pipe(Dia.1.0m)	m	72	601	6,894	7,495
RC.Pipe(Dia.0.7m)	m	6	25	383	408
Riprap	m3	44	1,011	353	1,364
Sub-total			68,702	52,911	121,613
Road Network					
Farm Road					
Stripping	m3	5,102	10,637	3,181	13,818
Embankment	m3	27,618	124,800	49,512	174,312
Sod Facing	m2	19,164	12,210	5,634	17,844
Acess Road					
Embankment	m3	1,840	8,315	3,299	11,613
Evcavation(Rock)	m3	12	110	189	299
Sub-total			156,072	61,815	217,886
Flood Protection Dike					
Stripping	m3	6423	13,391	4,005	17,396
Embankment	m3	51,289	231,765	91,948	323,713
Sod Facing	m2	41,954	26,730	12,333	39,063
Sub-total			271,886	108,286	380,172
River Improvement					
Demolishing of Existing Structure	m3	15	130	208	338
Evcavation(Common)	m3	7,000	17,500	7,591	25,091
Sub-total			17,630	7,799	25,429
On-farm Development					
Land Leveling	ha	510	197,581	80,815	278,396
Sub-total			197,581	80,815	278,396
Agricultural Supporting Facility					
Storage Construction	m2	250	0	54,889	54,889
Sub-total			0	54,889	54,889
Miscellaneous Works	L. S.		63,817	43,648	107,465
		G.Total	1,340,161	916,604	2,256,765

Table 5.1.1 Financial Crop Budget under the Present and Without-Project Condition in Mgongola Scheme

	Unit	Paddy (Transplanting)			Paddy (Direct sowing)		
		Unit Price (TSh)	Q'ty	Value (TSh)	Unit Price (TSh)	Q'ty	Value (TSh)
Production Cost							
(A) Farm Input							
1 Seed	kg/ha	120.00	50	6,000	120.00	90	10,800
2 Fertilizer							
: Urea (46 %-N)	kg/ha	240.0	125	30,000	240.0	0	0
: SA (21 %-N)	kg/ha	180.0	0	0	180.0	0	0
: TSP (46 $_{\%-P_2O_5}$)	kg/ha						
3 Agro-chemical							
: Pesticide	lit./ha	5,500	0.0	0	5,500	0.0	0
: Herbicide	lit./ha	3,500	2.5	8,750	3,500	0.0	0
: Fungicide	lit./ha	4,000	0.0	0	4,000	0.0	0
4 Packing material		500	51	25,500	500	21	10,500
Sub-total (A)				70,250			21,300
(B) Labour Requirement				0			0
1 Family labour			100	0		50	0
2 Hired labour		500	62	31,000	500	40	20,000
Sub-total (B)			162	31,000		90	20,000
(C) Machinery or draught cattle							
1 Ploughing by tractor	L.S	30,000	0	0	30,000	1	30,000
2 Ploughing by hand tractor	L.S	25,000	1	25,000	25,000	0	0
3 Puddling by thand ractor	L.S	17,500	1	17,500	17,500	0	0
Sub-total (C)				42,500			30,000
(D) Miscellanious cost				7,188			3,565
5 % of (A) and (B)							
				150,938			74,865
Total Production Cost							
Gross Return							
(A) Yield	kg/ha		3,800			1,600	
(B) Producer price	per kg	160			160		
Gross return				608,000			256,000
Net return				457,062			181,135

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

	Unit	Paddy (Transplanting)			Paddy (Direct sowing)			Maize		
		Unit Price (TSh)	Q'ty	Value (TSh)	Unit Price (TSh)	Q'ty	Value (TSh)	Unit Price (TSh)	Q'ty	Value (TSh)
Production Cost										
(A) Farm Input										
1 Seed	kg/ha	120	50	6,000	120	50	6,000	120	20	2,400
2 Fertilizer										
: Urea (46 %-N)	kg/ha	240	174	41,760	240	174	41,760	240	0	0
: SA (21 %-N)	kg/ha	180	0	0	180	0	0	180	142	25,560
: TSP (46 %-P_2O_5)	kg/ha	220	125	27,500	220	125	27,500	220	100	22,000
3 Agro-chemical										
: Pesticide	lit./ha	5,500	4	22,000	5,500	4	22,000	5,500	4	22,000
: Herbicide	lit./ha	3,500	2	7,000	3,500	2	7,000	3,500	0	0
: Fungicide	lit./ha	4,000	0	0	4,000	0	0	4,000	0	0
4 Packing material		500	67	33,500	500	67	33,500	500	40	20,000
Sub-total (A)				137,760			137,760			91,960
(B) Labour Requirement				0			0			0
1 Family labour			140	0		140	0		100	0
2 Hired labour		500	87	43,500	500	97	48,500	500	45	22,500
Sub-total (B)			227	43,500		237	48,500		145	22,500
(C) Machinery or draught cattle										
1 Ploughing by tractor	L.S	30,000	0	0	30,000	1	30,000	30,000	1	30,000
2 Ploughing by hand tractor	L.S	25,000	1	25,000	25,000	0	0	25,000	0	0
3 Puddling by thand ractor	L.S	17,500	1	17,500	17,500	0	0	17,500	0	0
Sub-total (C)				42,500			30,000			30,000
(D) Miscellanious cost				11,188			10,813			7,223
5 % of (A) and (B)										
				234,948			227,073			151,683
Total Production Cost										
Gross Return										
(A) Yield	kg/ha		5,000			5,000			3,000	
(B) Producer price	per kg	160			160			120		
Gross return				800,000			800,000			360,000
Net return				565,052			572,927			208,317

Table 5.1.3 Economic Crop Budget under the Present and Without-Project Condition in Mgongola Scheme

	Unit	Paddy (Transplanting)			Paddy (Direct sowing)		
		Unit Price (TSh)	Q'ty	Value (TSh)	Unit Price (TSh)	Q'ty	Value (TSh)
Production Cost							
(A) Farm Input							
1 Seed	kg/ha	120.00	50	6,000	120.00	90	10,800
2 Fertilizer							
: Urea (46 %-N)	kg/ha	126.0	125	15,750	126.0	0	0
: SA (21 %-N)	kg/ha	73.0	0	0	73.0	0	0
: TSP (46 %-P_2O_5)	kg/ha	114.0	0	0	114.0	0	0
3 Agro-chemical							
: Pesticide	lit./ha	5,500	0.0	0	5,500	0.0	0
: Herbicide	lit./ha	3,500	2.5	8,750	3,500	0.0	0
: Fungicide	lit./ha	4,000	0.0	0	4,000	0.0	0
4 Packing material		500	51	25,500	500	21	10,500
Sub-total (A)				56,000			21,300
(B) Labour Requirement							
1 Family labour		400	100	40,000	400	50	20,000
2 Hired labour		400	62	24,800	400	40	16,000
Sub-total (B)			162	64,800		90	36,000
(C) Machinery or draught cattle							
1 Ploughing by tractor	L.S	24,000	0	0	24,000	1	24,000
2 Ploughing by hand tractor	L.S	20,000	1	20,000	20,000	0	0
3 Puddling by hand ractor	L.S	14,000	1	14,000	14,000	0	0
Sub-total (C)				34,000			24,000
(D) Miscellanious cost				7,740			4,065
5 % of (A) and (B)				162,540			85,365
Total Production Cost							
Gross Return							
(A) Yield	kg/ha		3,800			1,600	
(B) Producer price	per kg	160			160		
Gross return				607,050			255,600
Net return				444,510			170,235

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

	Unit	Paddy (Transplanting)			Paddy (Direct sowing)			Maize		
		Unit Price (TSh)	Q'ty	Value (TSh)	Unit Price (TSh)	Q'ty	Value (TSh)	Unit Price (TSh)	Q'ty	Value (TSh)
Production Cost										
(A) Farm Input										
1 Seed	kg/ha	120	50	6,000	120	50	6,000	120	20	2,400
2 Fertilizer										
: Urea (46 %-N)	kg/ha	126	174	21,924	126	174	21,924	126	0	0
: SA (21 %-N)	kg/ha	73	0	0	73	0	0	73	142	10,366
: TSP (46 %-P_2O_5)	kg/ha	114	125	14,250	114	125	14,250	114	100	11,400
3 Agro-chemical										
: Pesticide	lit./ha	5,500	4	22,000	5,500	4	22,000	5,500	4	22,000
: Herbicide	lit./ha	3,500	2	7,000	3,500	2	7,000	3,500	0	0
: Fungicide	lit./ha	4,000	0	0	4,000	0	0	4,000	0	0
4 Packing material		500	67	33,500	500	67	33,500	500	40	20,000
Sub-total (A)				104,674			104,674			66,166
(B) Labour Requirement										
1 Family labour		400	140	56,000	400	140	56,000	400	100	40,000
2 Hired labour		400	87	34,800	400	97	38,800	400	45	18,000
Sub-total (B)				90,800			94,800			58,000
(C) Machinery or draught cattle										
1 Ploughing by tractor	L.S	24,000	0	0	24,000	1	24,000	24,000	1	24,000
2 Ploughing by hand tractor	L.S	20,000	1	20,000	20,000	0	0	20,000	0	0
3 Puddling by thand ractor	L.S	14,000	1	14,000	14,000	0	0	14,000	0	0
Sub-total (C)				34,000			24,000			24,000
(D) Miscellanious cost				11,474			11,174			7,408
5 % of (A) and (B)										
				240,948			234,648			155,574
Total Production Cost										
Gross Return										
(A) Yield	kg/ha		5,000			5,000			3,000	
(B) Producer price	per kg	160			160			120		
Gross return				798,750			798,750			360,000
Net return				557,802			564,102			204,426

Table 5.1.5(a) Economic Farm Gate Prices Calculation for Paddy

Item	Unit	PADDY (1) US$	PADDY (1) TSh
FOB Price F.O.B. Bangkok US$		278.90	
Add: freight		25.00	
insurance (1.5%)		4.18	
C.I.F. Price	per ton	308.08	
Add: wharfage (1.5%)	"	4.62	
clearing charges (2%)	"	6.16	
handling	"	4.00	
Landed Price	"	322.87	200,177.18
Add: transport to main market in	"		2,000.00
Dar-es-Salaam	"		
financial charges (3%-one-month)	"		6,005.32
Wholesale Price	"		208,182.50
	per kg.		208.18
Add: 30% adjustment for quality (2)			270.64
Deduct: milling			
extraction (minus 35%)			94.72
charges			5.00
in-land transport			6.00
losses/rebagging (2%)			4.16
local handling/storage			1.00
Economic Farm Gate Price			159.75

(1) Thai, white, milled, 5% broken, FOB, Bangkok

(2) Irrigators in the schemes are using local seed variety which produces a rice much preferred to the imported types.
The price of this local rice is about 30% higher than the foreign type.

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

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

		UREA (1)		TSP (2)		SA (3)	
Item	Unit	US$	TSh	US$	TSh	US$	TSh
FOB Price F.O.B. Bangkok US$		142.70		125.50		65.15	
Add: freight		25.00		25.00		25.00	
insurance (1.5%)		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	111466.65	161.72	100263.85	98.31	60953.52
Add: transport to main market in	"		2000.00		2000.00		2000.00
Dar-es-Salaam	"						
financial charges (3%-one-month)	"		3344.00		3007.92		1828.61
Wholesale Price	"		116810.65		105271.77		64782.13
	per kg.		116.81		105.27		64.78
Add: in-land transport			6.00		6.00		6.00
losses/rebagging (2%)			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 5.1.6 Financial and Economic Prices of Inputs and Crops

(Unit : TSh.)

	Unit	Paddy (Transplanting)		Paddy (Direct Sowing)		Maize	
		Economic Price	Financial Price	Economic Price	Financial Price	Economic Price	Financial Price
(A) Farm Input							
1) Seed	kg.	120	120	120	120	120	120
2) Fertilizer							
Urea	kg.	126	240	126	240	126	240
SA	kg.	73	180	73	180	73	180
TSP	kg.	114	220	114	220	114	220
3) Agro-chemical							
Pesticide	lit.	5500	5500	5500	5500	5500	5500
Herbicide	lit.	3500	3500	3500	3500	3500	3500
Fungicide	lit.	4000	4000	4000	4000	4000	4000
4) Packing Material		500	500	500	500	500	500
(B) Labour Requirement							
1) Family Labour	day	400	0	400	0	400	0
2) Hired labour	day	400	500	400	500	400	500
(C) Machinery or draught cattle							
1) Ploughing by tractor	L.S	24000	30000	24000	30000	24000	30000
2) Ploughing by hand tractor	L.S	20000	25000	20000	25000	20000	25000
3) Puddling by hand tractor	L.S	14000	17500	14000	17500	14000	17500
(D) Crop Price		159.75	160	180	160	120	120

Table 5.1.7 Calculation of Economic Net Benefit for Mgongola Scheme

	Without-Project Situation			With-Project Situation			
	Cultivated Area (ha)	Net Return per ha (Million Tsh)	Benefit (Million TSh)	Cultivated Area (ha)	Net Return per ha (Million Tsh)	Benefit (Million TSh)	Net Benefit (Million TSh)
Paddy (Mkindo)	60	0.44	26.67	0	0.56	0	-26.67
Paddy (Mgongola)	580	0.17	98.74	930	0.56	524.61	425.88
Maize	0	0	0	310	0.20	63.37	63.37
TOTAL							462.58

Table 5.1.8 Estimation of Costs for Economic Evaluation (Mgongola)

(Unit : Million TSh)

Direct construction cost	1,805.41
Preparatory works	72.22
O&M facilities and equipment	38.97
Administration cost	6.60
Engineering services	551.78
Total	2,474.98

Table 5.1.9 EIRR Estimation for Mgongola Scheme

(Unit : Million TSh)

Year	Construction Cost	O/M Cost	Benefit	Net Benefit
1	195.47			-195.47
2	1479.32			-1479.32
3	790.31	9.03	115.65	-683.70
4	27.92	9.03	231.29	194.34
5		9.03	346.94	337.91
6		9.03	462.58	453.55
7		9.03	462.58	453.55
8		9.03	462.58	453.55
9		9.03	462.58	453.55
10		9.03	462.58	453.55
11		9.03	462.58	453.55
12		9.03	462.58	453.55
13		9.03	462.58	453.55
14		9.03	462.58	453.55
15		9.03	462.58	453.55
16		9.03	462.58	453.55
17		9.03	462.58	453.55
18		9.03	462.58	453.55
19		9.03	462.58	453.55
20		9.03	462.58	453.55
21		9.03	462.58	453.55
22		9.03	462.58	453.55
23		9.03	462.58	453.55
24		9.03	462.58	453.55
25		9.03	462.58	453.55
26		9.03	462.58	453.55
27		9.03	462.58	453.55
28		9.03	462.58	453.55
29		9.03	462.58	453.55
30		9.03	462.58	453.55
31		9.03	462.58	453.55
32		9.03	462.58	453.55
33		9.03	462.58	453.55
34		9.03	462.58	453.55
35		9.03	462.58	453.55
36		9.03	462.58	453.55
37		9.03	462.58	453.55
38		9.03	462.58	453.55
39		9.03	462.58	453.55
40		9.03	462.58	453.55
41		9.03	462.58	453.55
42		9.03	462.58	453.55
43		9.03	462.58	453.55
44		9.03	462.58	453.55
45		9.03	462.58	453.55
46		9.03	462.58	453.55
47		9.03	462.58	453.55
48		9.03	462.58	453.55
49		9.03	462.58	453.55
50		9.03	462.58	453.55
			EIRR	15.3%

Table 5.1.10 (a) Sensitivity Analysis for Mgongola Scheme
(Increase of Costs)

(Unit : Million TSh)

Year	Construction Cost	O/M Cost	Benefit	Net Benefit
1	228.70			-228.70
2	1730.81			-1730.81
3	924.67	11.46	115.65	-820.49
4	32.67	11.46	231.29	187.15
5		11.46	346.94	335.47
6		11.46	462.58	451.12
7		11.46	462.58	451.12
8		11.46	462.58	451.12
9		11.46	462.58	451.12
10		11.46	462.58	451.12
11		11.46	462.58	451.12
12		11.46	462.58	451.12
13		11.46	462.58	451.12
14		11.46	462.58	451.12
15		11.46	462.58	451.12
16		11.46	462.58	451.12
17		11.46	462.58	451.12
18		11.46	462.58	451.12
19		11.46	462.58	451.12
20		11.46	462.58	451.12
21		11.46	462.58	451.12
22		11.46	462.58	451.12
23		11.46	462.58	451.12
24		11.46	462.58	451.12
25		11.46	462.58	451.12
26		11.46	462.58	451.12
27		11.46	462.58	451.12
28		11.46	462.58	451.12
29		11.46	462.58	451.12
30		11.46	462.58	451.12
31		11.46	462.58	451.12
32		11.46	462.58	451.12
33		11.46	462.58	451.12
34		11.46	462.58	451.12
35		11.46	462.58	451.12
36		11.46	462.58	451.12
37		11.46	462.58	451.12
38		11.46	462.58	451.12
39		11.46	462.58	451.12
40		11.46	462.58	451.12
41		11.46	462.58	451.12
42		11.46	462.58	451.12
43		11.46	462.58	451.12
44		11.46	462.58	451.12
45		11.46	462.58	451.12
46		11.46	462.58	451.12
47		11.46	462.58	451.12
48		11.46	462.58	451.12
49		11.46	462.58	451.12
50		11.46	462.58	451.12
			EIRR	13.2%

Table 5.1.10 (b) Sensitivity Analysis for Mgongola Scheme
(Decrease of Benefits)

(Unit : Million TSh)

Year	Construction Cost	O/M Cost	Benefit	Net Benefit
1	195.47			-195.47
2	1479.32			-1479.32
3	790.31	9.03	104.08	-695.26
4	27.92	9.03	208.16	171.21
5		9.03	312.24	303.21
6		9.03	416.32	407.29
7		9.03	416.32	407.29
8		9.03	416.32	407.29
9		9.03	416.32	407.29
10		9.03	416.32	407.29
11		9.03	416.32	407.29
12		9.03	416.32	407.29
13		9.03	416.32	407.29
14		9.03	416.32	407.29
15		9.03	416.32	407.29
16		9.03	416.32	407.29
17		9.03	416.32	407.29
18		9.03	416.32	407.29
19		9.03	416.32	407.29
20		9.03	416.32	407.29
21		9.03	416.32	407.29
22		9.03	416.32	407.29
23		9.03	416.32	407.29
24		9.03	416.32	407.29
25		9.03	416.32	407.29
26		9.03	416.32	407.29
27		9.03	416.32	407.29
28		9.03	416.32	407.29
29		9.03	416.32	407.29
30		9.03	416.32	407.29
31		9.03	416.32	407.29
32		9.03	416.32	407.29
33		9.03	416.32	407.29
34		9.03	416.32	407.29
35		9.03	416.32	407.29
36		9.03	416.32	407.29
37		9.03	416.32	407.29
38		9.03	416.32	407.29
39		9.03	416.32	407.29
40		9.03	416.32	407.29
41		9.03	416.32	407.29
42		9.03	416.32	407.29
43		9.03	416.32	407.29
44		9.03	416.32	407.29
45		9.03	416.32	407.29
46		9.03	416.32	407.29
47		9.03	416.32	407.29
48		9.03	416.32	407.29
49		9.03	416.32	407.29
50		9.03	416.32	407.29
			EIRR	13.9%

Table 5.1.10 (c) Sensitivity Analysis for Mgongola Scheme
(Combination of Increase of Costs and Decrease of Benefits)

(Unit : Million TSh)

Year	Construction Cost	O/M Cost	Benefit	Net Benefit
1	228.70			-228.70
2	1730.81			-1730.81
3	924.67	11.46	104.08	-832.05
4	32.67	11.46	208.16	164.03
5		11.46	312.24	300.78
6		11.46	416.32	404.86
7		11.46	416.32	404.86
8		11.46	416.32	404.86
9		11.46	416.32	404.86
10		11.46	416.32	404.86
11		11.46	416.32	404.86
12		11.46	416.32	404.86
13		11.46	416.32	404.86
14		11.46	416.32	404.86
15		11.46	416.32	404.86
16		11.46	416.32	404.86
17		11.46	416.32	404.86
18		11.46	416.32	404.86
19		11.46	416.32	404.86
20		11.46	416.32	404.86
21		11.46	416.32	404.86
22		11.46	416.32	404.86
23		11.46	416.32	404.86
24		11.46	416.32	404.86
25		11.46	416.32	404.86
26		11.46	416.32	404.86
27		11.46	416.32	404.86
28		11.46	416.32	404.86
29		11.46	416.32	404.86
30		11.46	416.32	404.86
31		11.46	416.32	404.86
32		11.46	416.32	404.86
33		11.46	416.32	404.86
34		11.46	416.32	404.86
35		11.46	416.32	404.86
36		11.46	416.32	404.86
37		11.46	416.32	404.86
38		11.46	416.32	404.86
39		11.46	416.32	404.86
40		11.46	416.32	404.86
41		11.46	416.32	404.86
42		11.46	416.32	404.86
43		11.46	416.32	404.86
44		11.46	416.32	404.86
45		11.46	416.32	404.86
46		11.46	416.32	404.86
47		11.46	416.32	404.86
48		11.46	416.32	404.86
49		11.46	416.32	404.86
50		11.46	416.32	404.86
			EIRR	12.0%

Table 5.1.11 Calculation of Financial Net Benefit for Mgongola Scheme

	Without-Project Situation			With-Project Situation			
	Cultivated Area (ha)	Net Return per ha (Million Tsh)	Benefit (Million TSh)	Cultivated Area (ha)	Net Return per ha (Million Tsh)	Benefit (Million TSh)	Net Benefit (Million TSh)
Paddy (Mkindo)	60	0.46	27.42	0	0.57	0	-27.42
Paddy (Mgongola)	580	0.18	105.06	930	0.57	532.82	427.76
Maize	0	0.00	0.00	310	0.21	64.58	64.58
TOTAL							464.92

Table 5.1.12 Estimation of Costs for Financial Evaluation (Mgongola)

(Unit : Million TSh)

Direct construction cost	2,256.76
(-) On-farm development cost	83.52
Direct const. cost without on-farm dev.	2,173.24
Preparatory works	108.66
O&M facilities and equipment	48.00
Administration cost	8.25
Engineering services	561.39
Total	2,899.55

Table 5.1.13 FIRR Estimation for Mgongola Scheme

(Unit : Million TSh)

Year	Construction Cost	O/M Cost	Benefit	Net Benefit
1	227.34			-227.34
2	1720.55			-1720.55
3	919.19	10.87	116.23	-813.82
4	32.48	10.87	232.46	189.12
5		10.87	348.69	337.82
6		10.87	464.92	454.05
7		10.87	464.92	454.05
8		10.87	464.92	454.05
9		10.87	464.92	454.05
10		10.87	464.92	454.05
11		10.87	464.92	454.05
12		10.87	464.92	454.05
13		10.87	464.92	454.05
14		10.87	464.92	454.05
15		10.87	464.92	454.05
16		10.87	464.92	454.05
17		10.87	464.92	454.05
18		10.87	464.92	454.05
19		10.87	464.92	454.05
20		10.87	464.92	454.05
21		10.87	464.92	454.05
22		10.87	464.92	454.05
23		10.87	464.92	454.05
24		10.87	464.92	454.05
25		10.87	464.92	454.05
26		10.87	464.92	454.05
27		10.87	464.92	454.05
28		10.87	464.92	454.05
29		10.87	464.92	454.05
30		10.87	464.92	454.05
31		10.87	464.92	454.05
32		10.87	464.92	454.05
33		10.87	464.92	454.05
34		10.87	464.92	454.05
35		10.87	464.92	454.05
36		10.87	464.92	454.05
37		10.87	464.92	454.05
38		10.87	464.92	454.05
39		10.87	464.92	454.05
40		10.87	464.92	454.05
41		10.87	464.92	454.05
42		10.87	464.92	454.05
43		10.87	464.92	454.05
44		10.87	464.92	454.05
45		10.87	464.92	454.05
46		10.87	464.92	454.05
47		10.87	464.92	454.05
48		10.87	464.92	454.05
49		10.87	464.92	454.05
50		10.87	464.92	454.05
			FIRR	13.4%

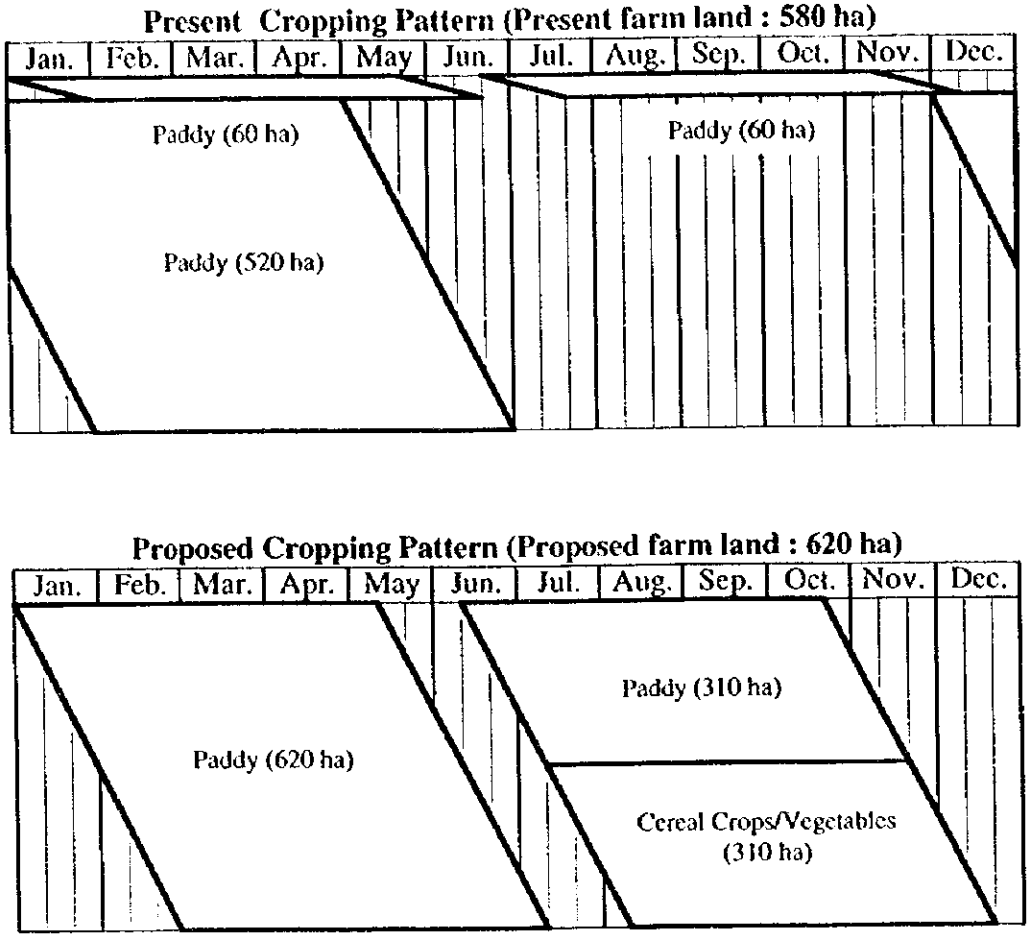
Table 5.1.14 Capacity-to-Pay Analysis for Mgongola Scheme

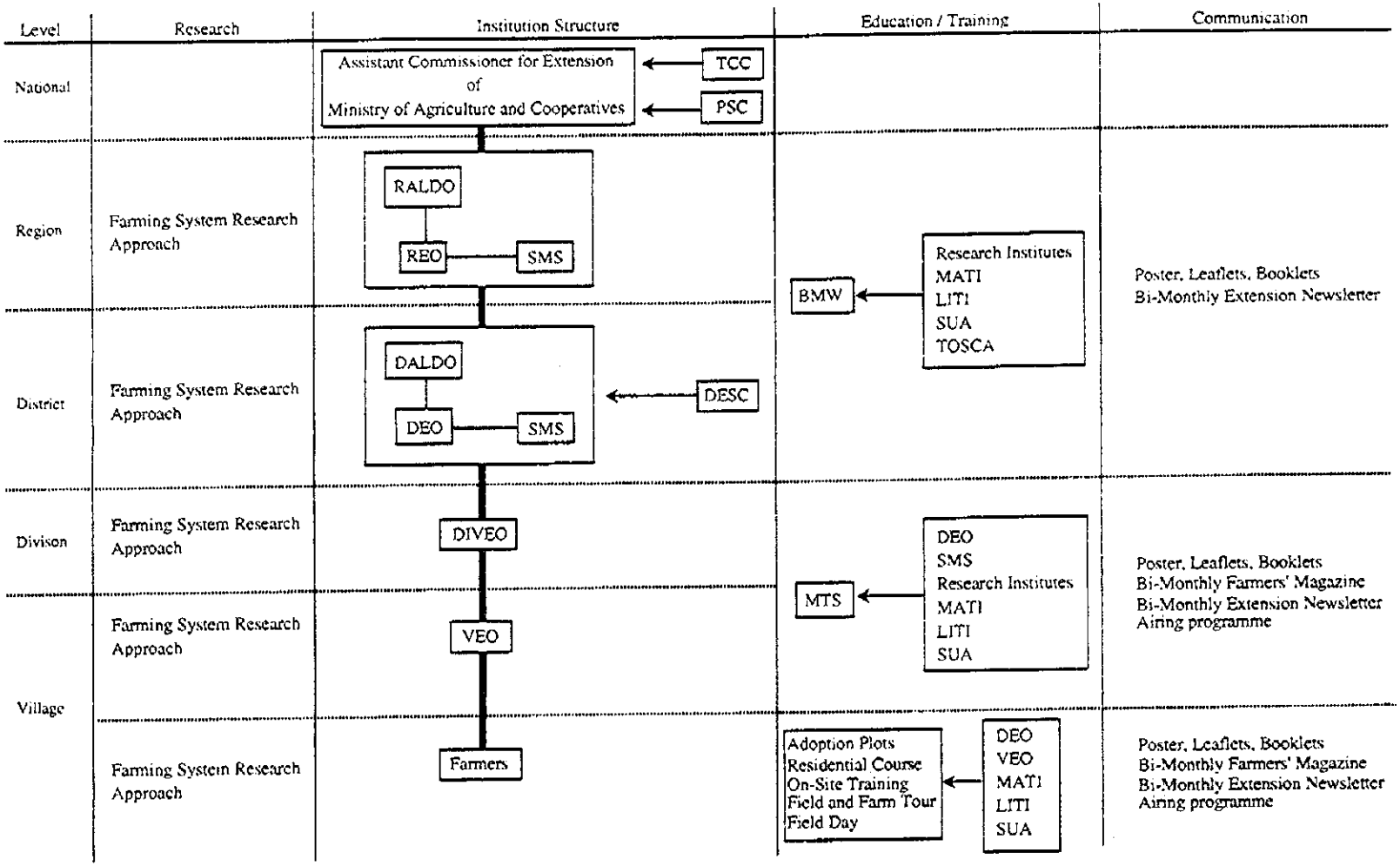
(unit : 1,000 TSh)

	Holding Size (ha)	Total Harvetsed Area(ha)	Farm Income	Production Cost	Net Farm Income	Income Tax	O/M Costs	Amotization Cost	Net Profit
Mgongola Scheme									
Irrigated Area	0.36								
Crops									
Paddy		0.54	432	123					
Maize		0.18	65	27					
Total			497	150	347	7	6	102	232

FIGURES

Figure 1.3.1 Present and Proposed Cropping Pattern in Mgongola Scheme





RALDO : Regional Agriculture and Livestock Development
REO : Regional Extension Officer
DALDO : District Agriculture and Livestock Development
DEO : District Extension Officer

DIVEO : Division Extension Officer
VEO : Village Extension Officer
SMS : Subject Matter Specialist
PSC : Project Steering Committee
SUA : Sokoine University of Agriculture
TOSCA : Tanzania Official Seeds Certification Agency

TCC : Training Coordinating Committee
DESC : District Extension Steering Committee
BMW : Bi-Monthly Workshop
MTS : Monthly Training Session
MATI : Ministry of Agriculture Training Institute
LITI : Livestock Training Institute

Figure 1.3.2 Prevailing Structure of Extension Services under NAEP II

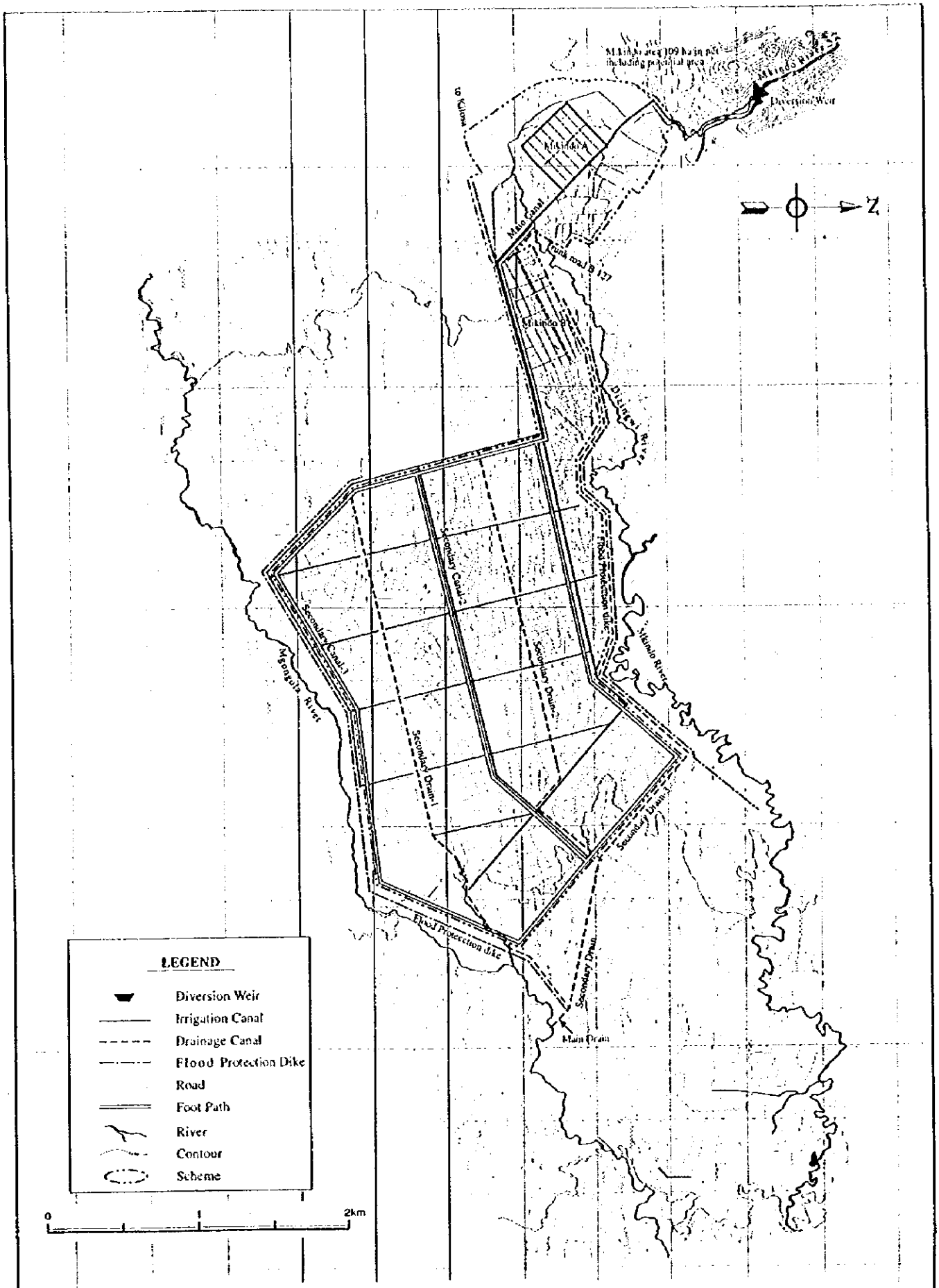


Figure 3.4.1 General Layout Map of Mgonogola Scheme

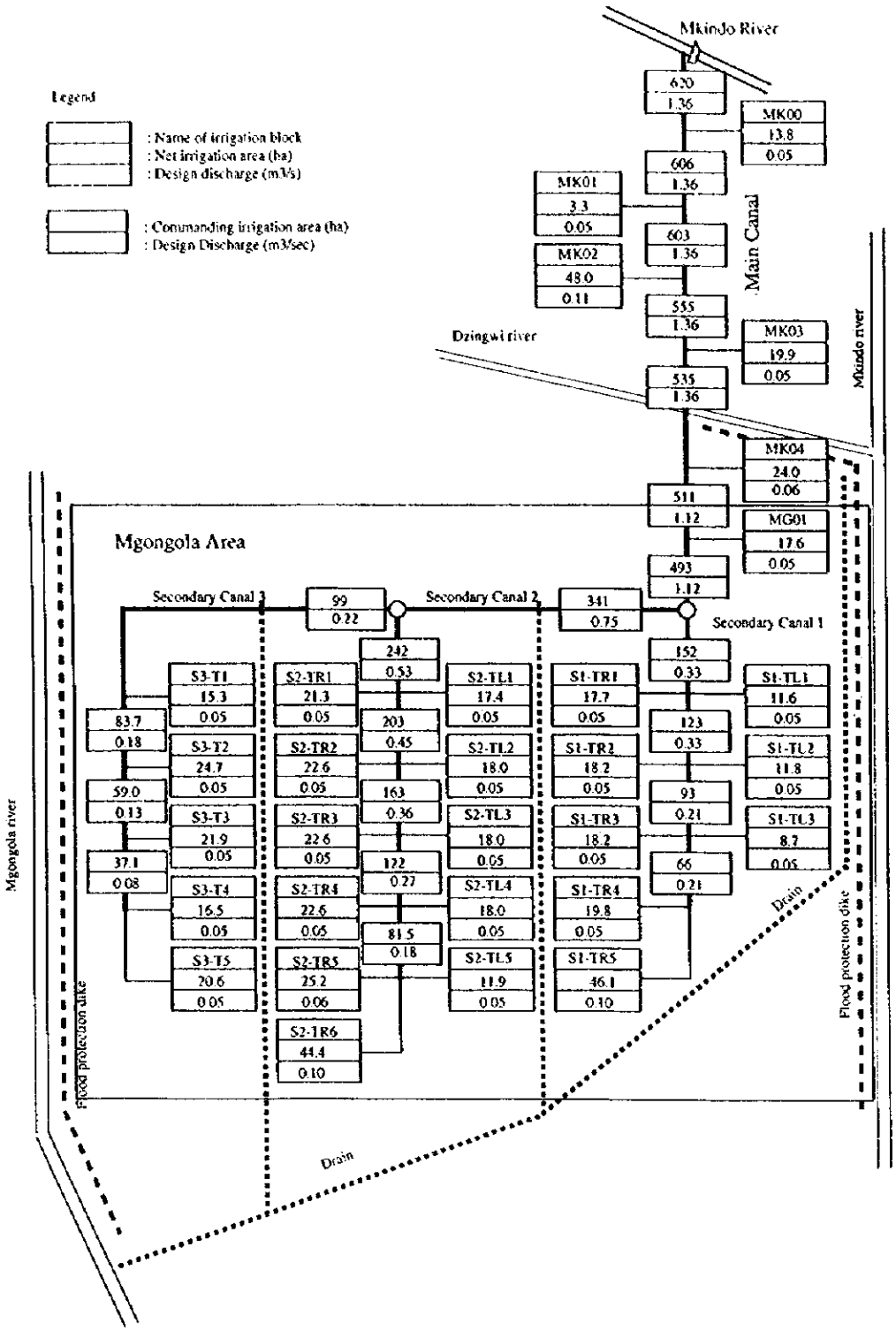


Figure 3.4.2 Proposed Irrigation Diagram of Mgongola Scheme

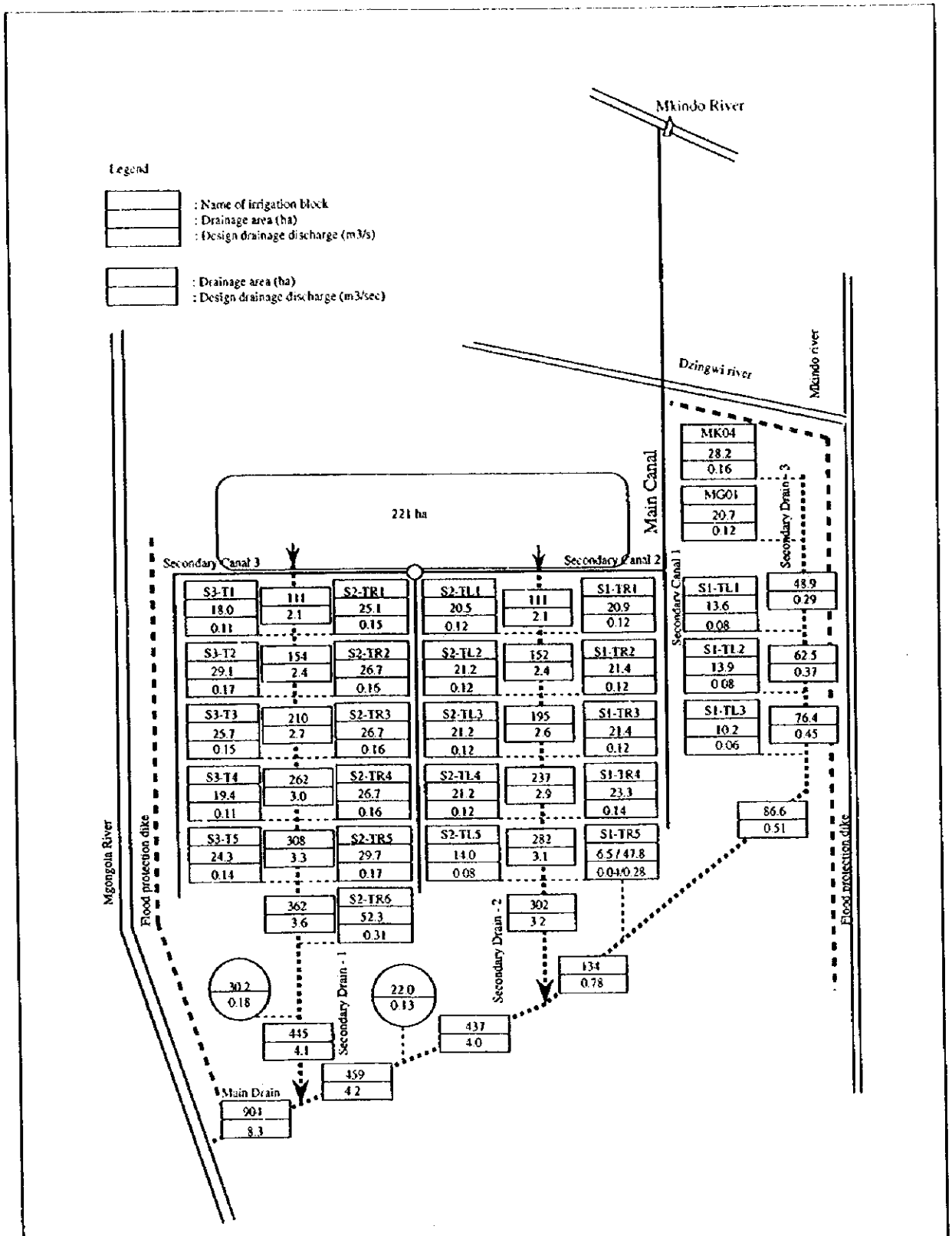
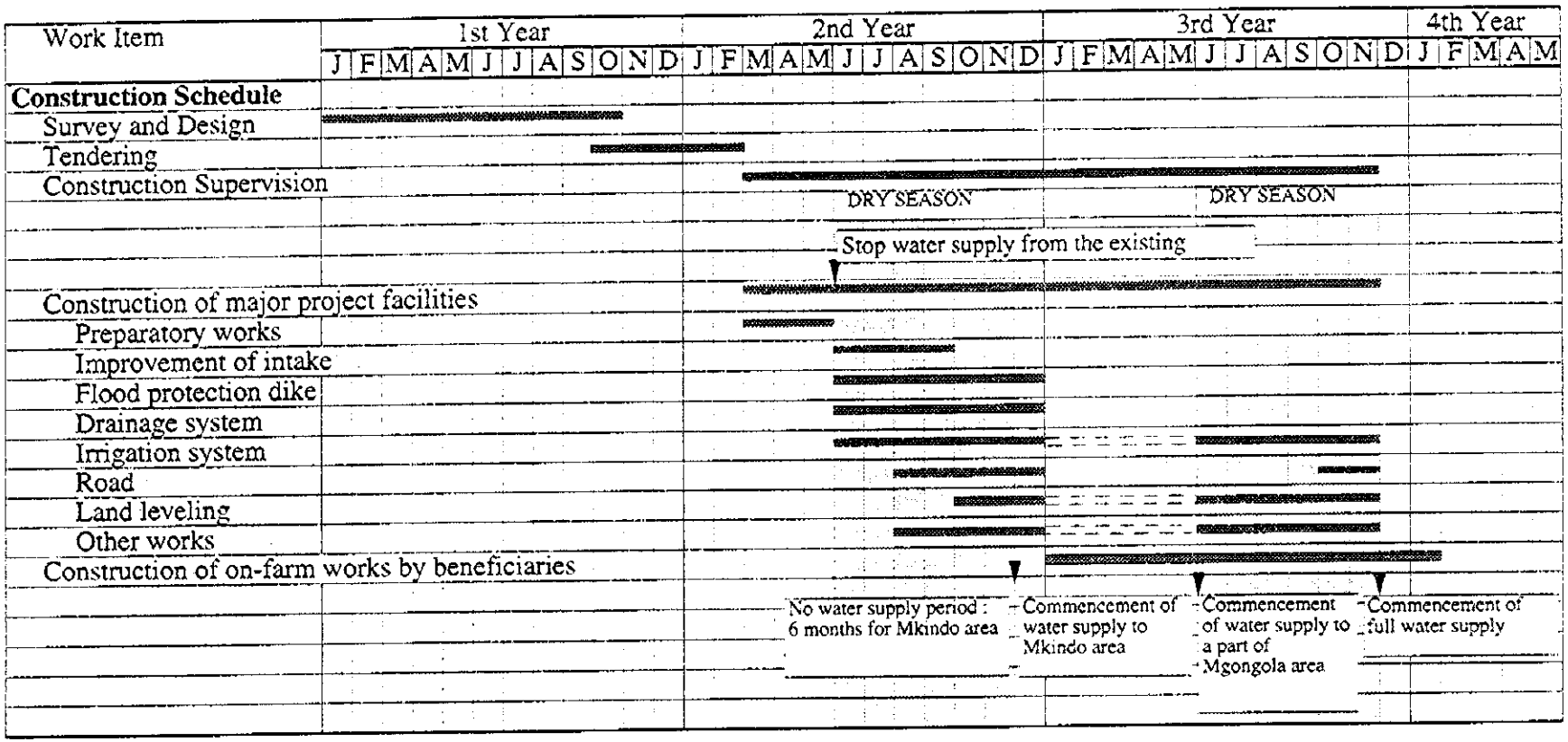


Figure 3.4.3 Proposed Drainage Diagram of Mgongola Scheme

Figure 4.1.1 Proposed Construction Schedule in Mgongola Scheme



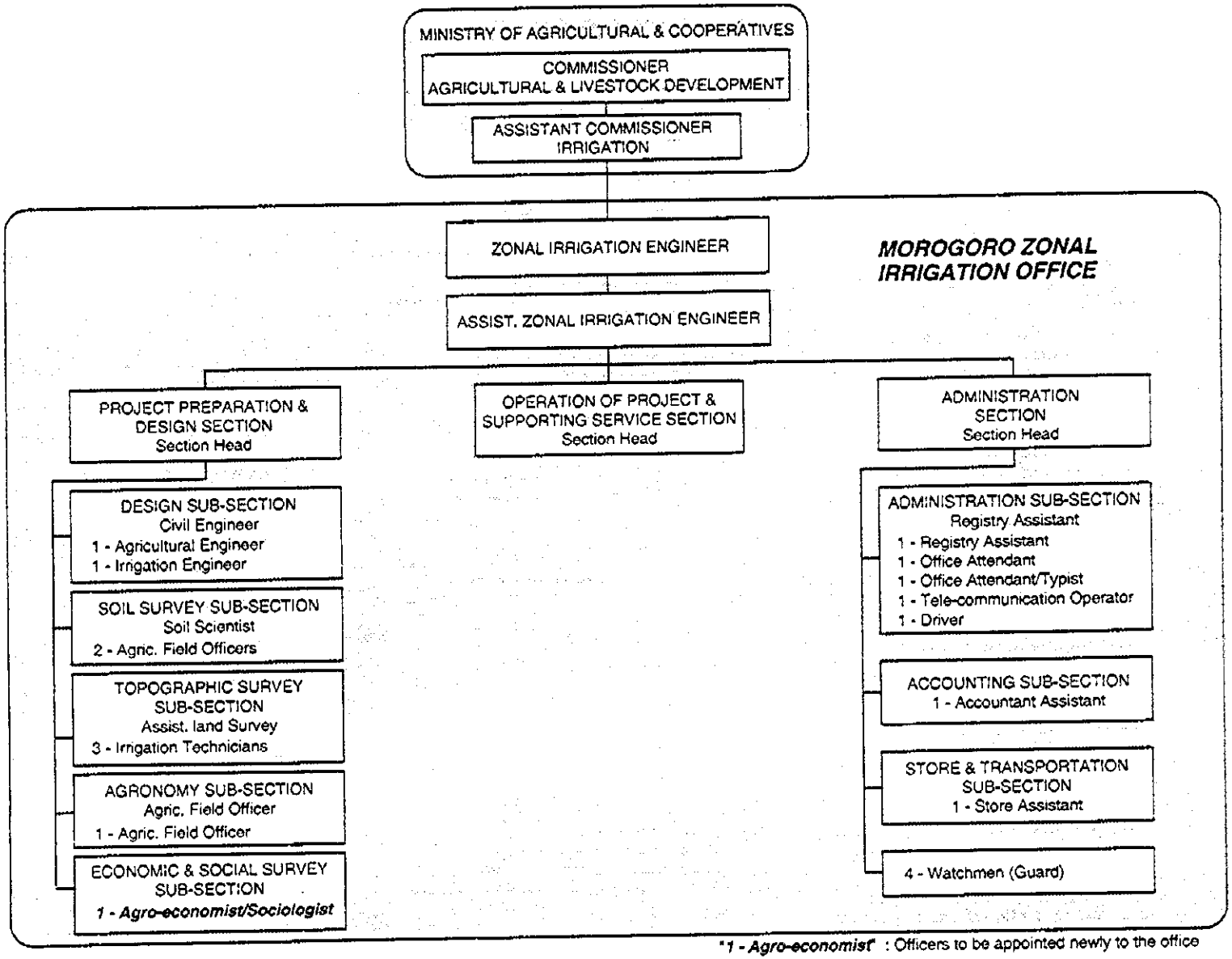
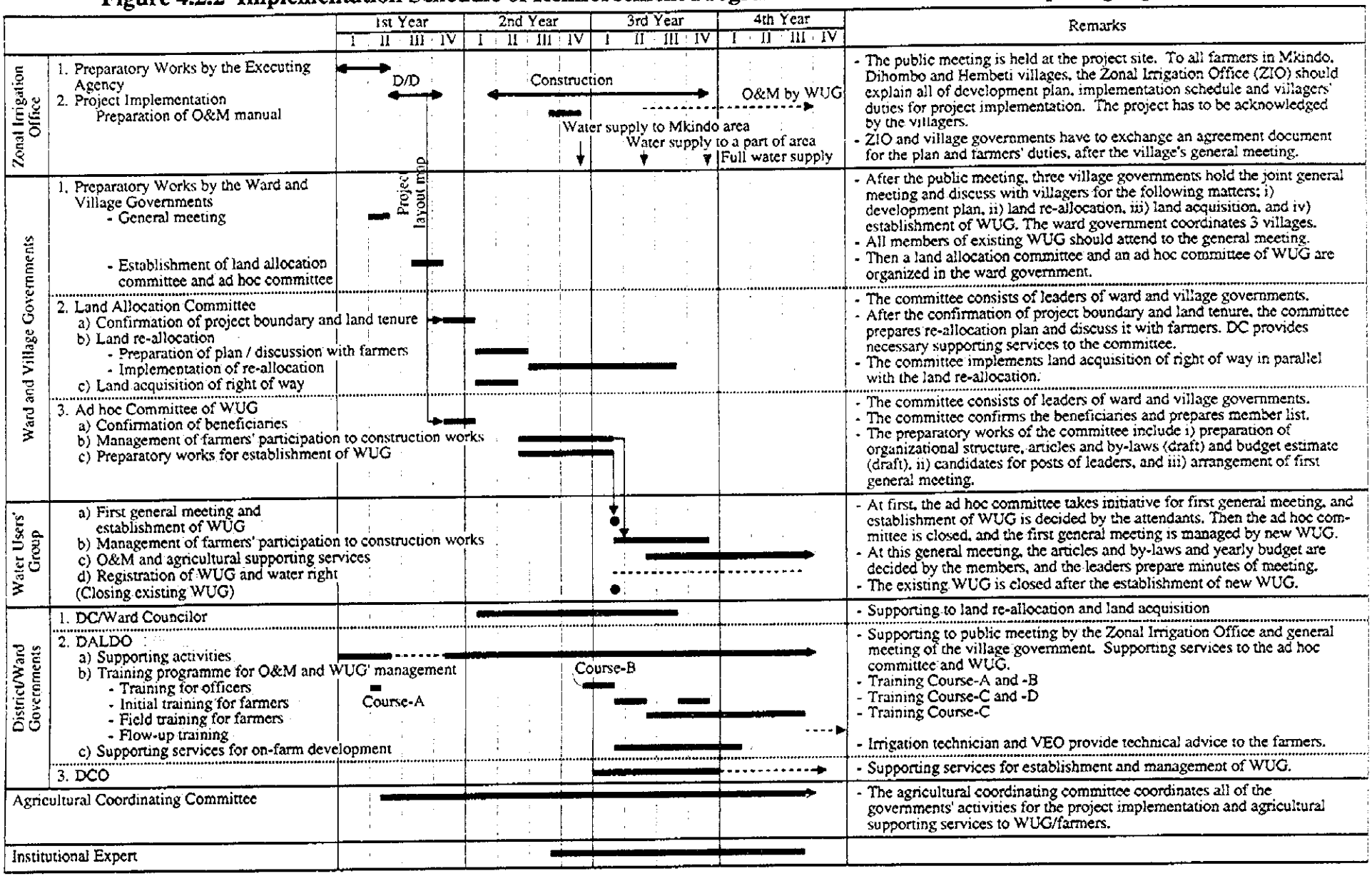


Figure 4.2.1 Proposed Organizational Structure and Staffing of the Morogoro Zonal Irrigation Office

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



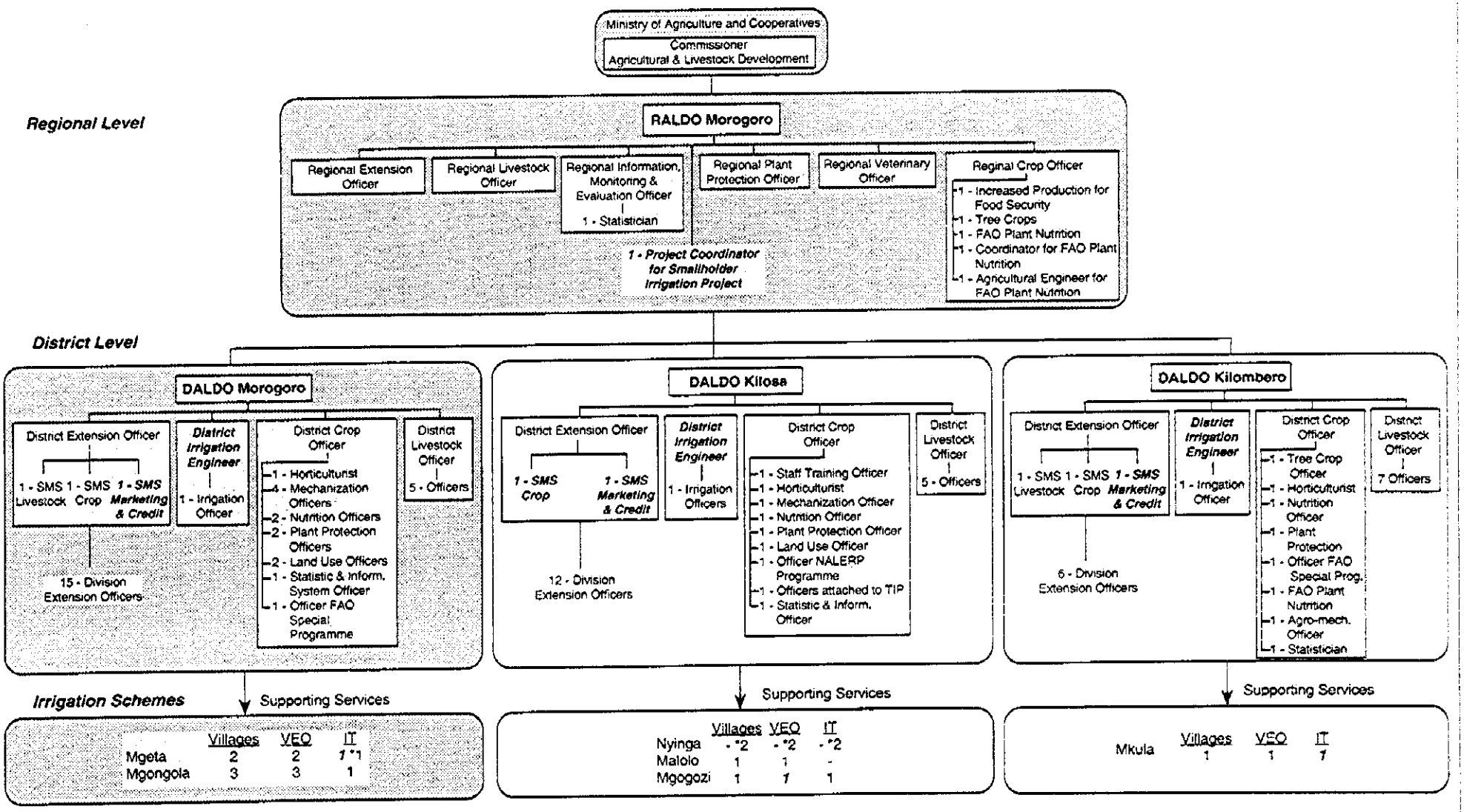
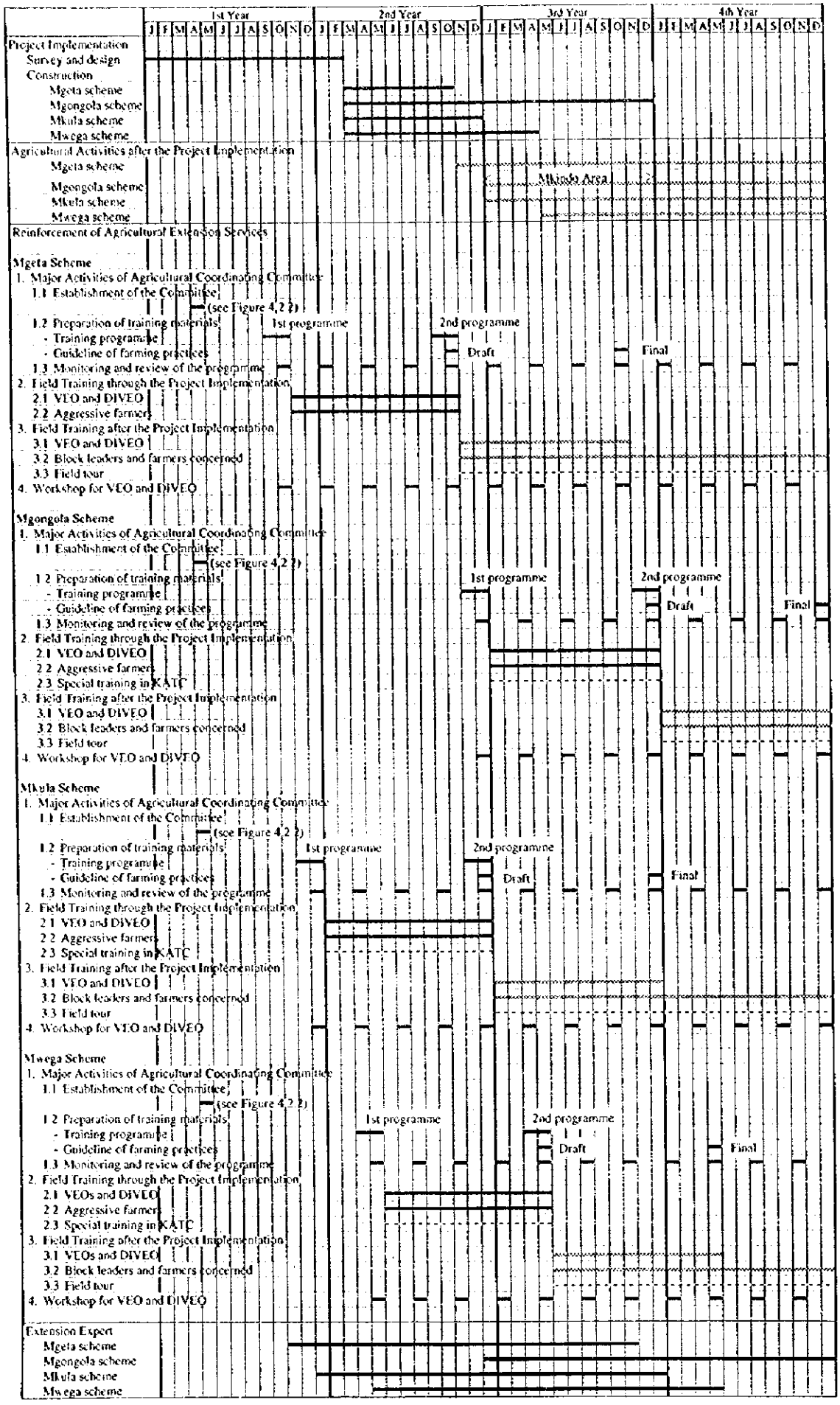
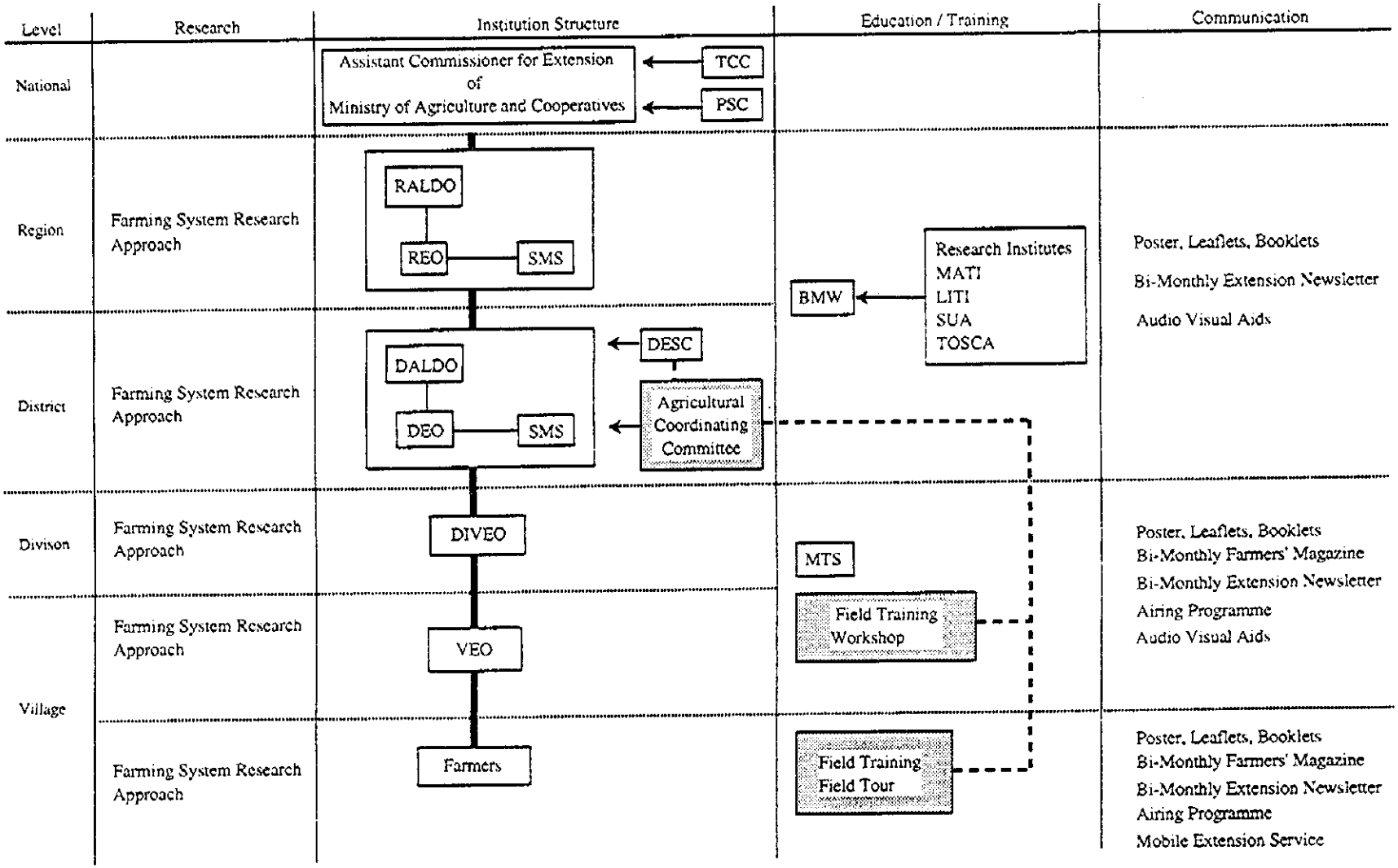


Figure 4.2.3 Proposed Organizational Structure of the Offices of RALDO and DALDO

Figure 4.2.4 Training Programme for Extension Staffs and Farmers





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 Mgongola

ha	Income	Production Cost	Prod. Cost + O/M	Prod. Cost + O/M + Amort	Total Expenses	Living Expenses	Prod. Cost	O/M	Amort
0.3	414	125	130	232	382	150	125	5	102
0.4	552	167	174	310	482	172	167	7	136
0.5	690	208	217	387	577	190	208	9	170
0.6	828	250	261	465	668	203	250	11	204