ANNEX Q

PROJECT COSTS

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Table Q.2-1 Project Cost and Disbursement Schedule for Rupingazi Ngerwe Irrigation Scheme

(Unit: Ksh)

Project Component	Total Cost	Disbursement Schedule							Remarks
		1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	
1. Construction Cost									
1) Irrigation & Drainage Improvement	3,713,856	-	1,856,928	1,856,928	-	-	-	-	
2) Marketing Improvement	0	-	-	-	-	-	-	-	
3) Access Roads Improvement	3,694,300	-	1,847,150	1,847,150	-	-	-	-	
4) Village/Farm Roads Improvement	684,000	-	342,000	342,000	-	-	-	-	
5) Domestic Water Supply Improvement	0	-	-	-	-	-	-	-	
Sub-total	**8,092,156**	**0**	**4,046,078**	**4,046,078**	**0**	**0**	**0**	**0**	
2. Community Development & Support Services									
1) Agricultural Support Services	10,640,000	-	-	2,128,000	2,128,000	2,128,000	2,128,000	2,128,000	
2) Community Development	7,078,500	2,477,475	1,769,625	1,415,700	707,850	353,925	353,925	-	
3) Water Management Services	2,600,000	-	940,000	830,000	830,000	-	-	-	
4) Marketing Support Services	376,000	-	336,000	40,000	-	-	-	-	
5) Public Health Services	150,000	50,000	-	-	50,000	-	-	50,000	
Sub-total	**20,844,500**	**2,527,475**	**3,045,625**	**4,413,700**	**3,715,850**	**2,481,925**	**2,481,925**	**2,178,000**	
3. Associated Cost									
1) Pre-Engineering Cost	306,481	-	306,481	-	-	-	-	-	7% of 1
2) Administration Cost	2,025,563	176,923	496,419	592,184	260,109	173,734	173,734	152,460	7% of 1 & 2
3) Consulting Services	2,893,663	252,747	709,170	845,977	371,585	248,192	248,192	217,800	10% of 1 & 2
Sub-total	**5,225,707**	**429,670**	**1,512,070**	**1,438,161**	**631,694**	**421,926**	**421,926**	**370,260**	
4. Physical Contingency	**809,214**	**0**	**404,607**	**404,607**	**0**	**0**	**0**	**0**	10% of 1
Total	**34,971,577**	**2,957,145**	**9,008,380**	**10,302,546**	**4,347,544**	**2,903,851**	**2,903,851**	**2,548,260**	

Note: 1) Pre-engineering cost for irrigation & drainage improvement is not included since survey works have been conducted by JICA Study Team.

Table Q.2-2 Project Cost and Disbursement Schedule for Ngomano/Nyangati Water Furrow Project

(Unit: Ksh)

Project Component	Total Cost	Disbursement Schedule							Remarks
		1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	
1. Construction Cost									
1) Irrigation & Drainage Improvement	3,563,767	-	1,781,884	1,781,883	-	-	-	-	
2) Marketing Improvement	0	-	-	-	-	-	-	-	
3) Access Roads Improvement	0	-	-	-	-	-	-	-	
4) Village/Farm Roads Improvement	1,824,000	-	912,000	912,000	-	-	-	-	
5) Domestic Water Supply Improvement	0	-	-	-	-	-	-	-	
Sub-total	**5,387,767**	**0**	**2,693,884**	**2,693,883**	**0**	**0**	**0**	**0**	
2. Community Development & Support Services									
1) Agricultural Support Services	12,950,000	-	-	2,590,000	2,590,000	2,590,000	2,590,000	2,590,000	
2) Community Development	7,080,000	2,478,000	1,770,000	1,416,000	708,000	354,000	354,000	-	
3) Water Management Services	1,810,000	-	940,000	435,000	435,000	-	-	-	
4) Marketing Support Services	374,000	-	334,000	40,000	-	-	-	-	
5) Public Health Services	150,000	50,000	-	-	50,000	-	-	50,000	
Sub-total	**22,364,000**	**2,528,000**	**3,044,000**	**4,481,000**	**3,783,000**	**2,944,000**	**2,944,000**	**2,640,000**	
3. Associated Cost									
1) Pre-Engineering Cost	227,680	-	227,680	-	-	-	-	-	7% of 1
2) Administration Cost	1,942,622	176,960	401,651	502,241	264,810	206,080	206,080	184,800	7% of 1 & 2
3) Consulting Services	2,775,176	252,800	573,788	717,488	378,300	294,400	294,400	264,000	10% of 1 & 2
Sub-total	**4,945,478**	**429,760**	**1,203,119**	**1,219,729**	**643,110**	**500,480**	**500,480**	**448,800**	
4. Land Acquisition	**175,000**	**0**	**175,000**	**0**	**0**	**0**	**0**	**0**	@500,000*0.35ha
5. Physical Contingency	**538,776**	**0**	**269,388**	**269,388**	**0**	**0**	**0**	**0**	10% of 1
Total	**33,411,021**	**2,957,760**	**7,385,391**	**8,664,000**	**4,426,110**	**3,444,480**	**3,444,480**	**3,088,800**	

Note: 1) Pre-engineering cost for irrigation & drainage improvement is only for geological investigation cost at intake site since survey works have been conducted by JICA Study Team.

Table Q.2-3 Project Cost and Disbursement Schedule for Nkunjumo Water Project

(Unit: Ksh)

Project Component	Total Cost	Disbursement Schedule							Remarks
		1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	
1. Construction Cost									
1) Irrigation & Drainage Improvement	5,455,106	-	2,727,553	2,727,553	-	-	-	-	
2) Marketing Improvement	286,600,000	-	143,300,000	143,300,000	-	-	-	-	
3) Access Roads Improvement	0	-	-	-	-	-	-	-	
4) Village/Farm Roads Improvement	1,425,000	-	712,500	712,500	-		-	-	
5) Domestic Water Supply Improvement	0	-	-	-	-	-	-	-	
Sub-total	**293,480,106**	**0**	**146,740,053**	**146,740,053**	**0**	**0**	**0**	**0**	
2. Community Development & Support Services									
1) Agricultural Support Services	10,640,000	-	-	2,128,000	2,128,000	2,128,000	2,128,000	2,128,000	
2) Community Development	7,086,000	2,480,100	1,771,500	1,417,200	708,600	354,300	354,300	-	
3) Water Management Services	1,960,000	-	940,000	510,000	510,000	-	-	-	
4) Marketing Support Services	21,280,000	-	340,000	40,000	5,225,000	5,225,000	5,225,000	5,225,000	
5) Public Health Services	0	-	-	-	-	-	-	-	
Sub-total	**40,966,000**	**2,480,100**	**3,051,500**	**4,095,200**	**8,571,600**	**7,707,300**	**7,707,300**	**7,353,000**	
3. Associated Cost									
1).Pre-Engineering Cost	8,697,750	-	8,697,750	-	-	-	-	-	3 - 7% of 1
2) Administration Cost	10,484,226	173,607	4,753,408	4,826,467	234,262	173,761	173,761	148,960	3 - 7% of 1 & 2
3) Consulting Services	11,292,610	248,010	4,948,155	5,052,525	334,660	248,230	248,230	212,800	3 - 10% of 1 & 2
Sub-total	**30,474,586**	**421,617**	**18,399,313**	**9,878,992**	**568,922**	**421,991**	**421,991**	**361,760**	
4. Physical Contingency	**15,018,010**	**0**	**7,509,005**	**7,509,005**	**0**	**0**	**0**	**0**	5 - 10% of 1
Total	**379,938,702**	**2,901,717**	**175,699,871**	**168,223,250**	**9,140,522**	**8,129,291**	**8,129,291**	**7,714,760**	

Note: 1) Pre-engineering cost for irrigation & drainage improvement is not included since survey works have been conducted by JICA Study Team.

Table Q.2-4 Project Cost and Disbursement Schedule for Ruungu/Karocho Irrigation Project

(Unit: Ksh)

Project Component	Total Cost	Disbursement Schedule							Remarks
		1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	
1. Construction Cost									
1) Irrigation & Drainage Improvement	4,520,200	2,260,100	2,260,100	-	-	-	-	-	Include associate cost
2) Marketing Improvement	1,500,000	-	750,000	750,000	-	-	-	-	
3) Access Roads Improvement	19,660,000	-	9,830,000	9,830,000	-	-	-	-	
4) Village/Farm Roads Improvement	1,710,000	-	855,000	855,000	-	-	-	-	
5) Domestic Water Supply Improvement	0	-	-	-	-	-	-	-	
Sub-total	**27,390,200**	**2,260,100**	**13,695,100**	**11,435,000**	**0**	**0**	**0**	**0**	
2. Community Development & Support Services									
1) Agricultural Support Services	14,050,000	-	-	2,810,000	2,810,000	2,810,000	2,810,000	2,810,000	
2) Community Development	7,120,000	2,492,000	1,780,000	1,424,000	712,000	356,000	356,000	-	
3) Water Management Services	1,810,000	-	940,000	435,000	435,000	-	-	-	
4) Marketing Support Services	284,000	-	284,000	-	-	-	-	-	
5) Public Health Services	150,000	50,000	-	-	50,000	-	-	50,000	
Sub-total	**23,414,000**	**2,542,000**	**3,004,000**	**4,669,000**	**4,007,000**	**3,166,000**	**3,166,000**	**2,860,000**	
3. Associated Cost									
1) Pre-Engineering Cost	1,600,900	-	1,600,900	-	-	-	-	-	7% of 1
2) Administration Cost	3,239,880	177,940	1,010,730	1,127,280	280,490	221,620	221,620	200,200	7% of 1 & 2
3) Consulting Services	4,628,400	254,200	1,443,900	1,610,400	400,700	316,600	316,600	286,000	10% of 1 & 2
Sub-total	**9,469,180**	**432,140**	**4,055,530**	**2,737,680**	**681,190**	**538,220**	**538,220**	**486,200**	
4. Physical Contingency	**2,287,000**	**0**	**1,143,500**	**1,143,500**	**0**	**0**	**0**	**0**	10% of 1
Total	**62,560,380**	**5,234,240**	**21,898,130**	**19,985,180**	**4,688,190**	**3,704,220**	**3,704,220**	**3,346,200**	

Note: 1) Pre-engineering cost for irrigation & drainage improvement is not included since survey works have been conducted by JICA Study Team.

Table Q.2-5 Project Cost Sharing and Disbursement Schedule by Sector and by Agency for Rupingazi Ngerwe Irrigation Scheme

(Unit: Ksh)

Project Component	Total Cost	Private Sector	Government Public Sector				Remarks
		WUA	MOALD	MPWH	MENR	Embu CC	
1. Construction Cost							
1) Irrigation & Drainage Improvement	3,713,856	3,713,856	0	0	0	0	A=40ha
2) Marketing Improvement	0	0	0	0	0	0	
3) Access Roads Improvement	3,694,300	0	0	3,694,300	0	0	L=6.3km
4) Village/Farm Roads Improvement	684,000	0	0	0	0	684,000	L=1.2km
5) Domestic Water Supply Improvement	0	0	0	0	0	0	
Sub-total	**8,092,156**	**3,713,856**	**0**	**3,694,300**	**0**	**684,000**	
2. Community Development & Support Services							
1) Agricultural Support Services	10,640,000	0	10,640,000	0	0	0	
2) Community Development	7,078,500	0	7,078,500	0	0	0	
3) Water Management Services	2,600,000	0	2,600,000	0	0	0	
4) Marketing Support Services	376,000	0	376,000	0	0	0	
5) Public Health Services	150,000	0	0	0	150,000	0	
Sub-total	**20,844,500**	**0**	**20,694,500**	**0**	**150,000**	**0**	
3. Associated Cost							
1) Pre-Engineering Cost	306,481	0	0	258,601	0	47,880	7% of 1
2) Administration Cost	2,025,563	0	1,708,582	258,601	10,500	47,880	7% of 1 & 2
3) Consulting Services	2,893,663	371,385	2,069,448	369,430	15,000	68,400	10% of 1 & 2
Sub-total	**5,225,707**	**371,385**	**3,778,030**	**886,632**	**25,500**	**164,160**	
4. Physical Contingency	**809,214**	**371,384**	**0**	**369,430**	**0**	**68,400**	10% of 1
Total	**34,971,577**	**4,456,625**	**24,472,530**	**4,950,362**	**175,500**	**916,560**	
(Disbursement Schedule)							
- 1st year	2,957,145	0	2,898,645	0	58,500	0	
- 2nd year	9,008,380	2,228,312	3,693,366	2,604,482	0	482,220	
- 3rd year	10,302,546	2,228,313	5,294,013	2,345,880	0	434,340	
- 4th year	4,347,544	0	4,289,044	0	58,500	0	
- 5th year	2,903,851	0	2,903,851	0	0	0	
- 6th year	2,903,851	0	2,903,851	0	0	0	
- 7th year	2,548,260	0	2,489,760	0	58,500	0	
Total	**34,971,577**	**4,456,625**	**24,472,530**	**4,950,362**	**175,500**	**916,560**	

Note : WUA : Rupingazi Ngerwe Irrigation Association as a water users association
MENR : Ministry of Environment and Natural Resources
MOALD : Ministry of Agriculture and Livestock Development
Embu CC : Embu County Council
MPWH : Ministry of Public Works and Housing
1) Administration cost for private sector projects shall be borne by the government.

Table Q.2-6 Project Cost Sharing and Disbursement Schedule by Sector and by Agency for Ngomano/Nyangati Water Furrow Project

(Unit: Ksh)

Project Component	Total Cost	Private Sector	Government Public Sector				Remarks
		WUA	MOALD	MPWH	MENR	Kirinyaga CC	
1. Construction Cost							
1) Irrigation & Drainage Improvement	3,563,767	3,563,767	0	0	0	0	A=48ha
2) Marketing Improvement	0	0	0	0	0	0	
3) Access Roads Improvement	0	0	0	0	0	0	
4) Village/Farm Roads Improvement	1,824,000	0	0	0	0	1,824,000	L=3.2km
5) Domestic Water Supply Improvement	0	0	0	0	0	0	
Sub-total	**5,387,767**	**3,563,767**	**0**	**0**	**0**	**1,824,000**	
2. Community Development & Support Services							
1) Agricultural Support Services	12,950,000	0	12,950,000	0	0	0	
2) Community Development	7,080,000	0	7,080,000	0	0	0	
3) Water Management Services	1,810,000	0	1,810,000	0	0	0	
4) Marketing Support Services	374,000	0	374,000	0	0	0	
5) Public Health Services	150,000	0	0	0	150,000	0	
Sub-total	**22,364,000**	**0**	**22,214,000**	**0**	**150,000**	**0**	
3. Associated Cost							
1) Pre-Engineering Cost	227,680	100,000	0	0	0	127,680	7% of 1
2) Administration Cost	1,942,622	0	1,804,442	0	10,500	127,680	7% of 1 & 2
3) Consulting Services	2,775,176	356,376	2,221,400	0	15,000	182,400	10% of 1 & 2
Sub-total	**4,945,478**	**456,376**	**4,025,842**	**0**	**25,500**	**437,760**	
4. Land Acquisition	**175,000**	**175,000**	**0**	**0**	**0**	**0**	
5. Physical Contingency	**538,776**	**356,376**	**0**	**0**	**0**	**182,400**	10% of 1
Total	**33,411,021**	**4,551,519**	**26,239,842**	**0**	**175,500**	**2,444,160**	
(Disbursement Schedule)							
- 1st year	2,957,760	0	2,899,260	0	58,500	0	
- 2nd year	7,385,391	2,413,260	3,686,211	0	0	1,285,920	
- 3rd year	8,664,000	2,138,259	5,367,501	0	0	1,158,240	
- 4th year	4,426,110	0	4,367,610	0	58,500	0	
- 5th year	3,444,480	0	3,444,480	0	0	0	
- 6th year	3,444,480	0	3,444,480	0	0	0	
- 7th year	3,088,800	0	3,030,300	0	58,500	0	
Total	**33,411,021**	**4,551,519**	**26,239,842**	**0**	**175,500**	**2,444,160**	

Note : WUA : Rupingazi Ngerwe Irrigation Association as a water users association MENR : Ministry of Environment and Natural Resources
MOALD : Ministry of Agriculture and Livestock Development Kirinyaga CC : Kirinyaga County Council
MPWH : Ministry of Public Works and Housing
1) Administration cost for private sector projects shall be borne by the government.

Table Q.2-7 Project Cost Sharing and Disbursement Schedule by Sector and by Agency for Nkunjumo Water Project

(Unit: Ksh)

Project Component	Total Cost	Private Sector	Government Public Sector					Remarks
		WUA	MOALD	HCDA	MENR	Meru CC	Meru MC	
1. Construction Cost								
1) Irrigation & Drainage Improvement	5,455,106	5,455,106	0	0	0	0	0	A=56ha
2) Marketing Improvement	286,600,000	0	0	0	0	0	286,600,000	Meru market improvement
3) Access Roads Improvement	0	0	0	0	0	0	0	
4) Village/Farm Roads Improvement	1,425,000	0	0	0	0	1,425,000	0	L=2.5km
5) Domestic Water Supply Improvement	0	0	0	0	0	0	0	
Sub-total	**293,480,106**	**5,455,106**	**0**	**0**	**0**	**1,425,000**	**286,600,000**	
2. Community Development & Support Services								
1) Agricultural Support Services	10,640,000	0	10,640,000	0	0	0	0	
2) Community Development	7,086,000	0	7,086,000	0	0	0	0	
3) Water Management Services	1,960,000	0	1,960,000	0	0	0	0	
4) Marketing Support Services	21,280,000	0	380,000	20,900,000	0	0	0	
5) Public Health Services	0	0	0	0	0	0	0	
Sub-total	**40,966,000**	**0**	**20,066,000**	**20,900,000**	**0**	**0**	**0**	
3. Associated Cost								
1) Pre-Engineering Cost	8,697,750	0	0	0	0	99,750	8,598,000	3 - 7% of 1
2) Administration Cost	10,484,226	0	1,786,476	0	0	99,750	8,598,000	3 - 7% of 1 & 2
3) Consulting Services	11,292,610	545,510	2,006,600	0	0	142,500	8,598,000	3 - 10% of 1 & 2
Sub-total	**30,474,586**	**545,510**	**3,793,076**	**0**	**0**	**342,000**	**25,794,000**	
4. Physical Contingency	**15,018,010**	**545,510**	**0**	**0**	**0**	**142,500**	**14,330,000**	5 - 10% of 1
Total	**379,938,702**	**6,546,126**	**23,859,076**	**20,900,000**	**0**	**1,909,500**	**326,724,000**	
(Disbursement Schedule)								
- 1st year	2,901,717	0	2,901,717	0	0	0	0	
- 2nd year	175,699,871	3,273,063	3,761,183	0	0	1,004,625	167,661,000	
- 3rd year	168,223,250	3,273,063	4,982,312	0	0	904,875	159,063,000	
- 4th year	9,140,522	0	3,915,522	5,225,000	0	0	0	
- 5th year	8,129,291	0	2,904,291	5,225,000	0	0	0	
- 6th year	8,129,291	0	2,904,291	5,225,000	0	0	0	
- 7th year	7,714,760	0	2,489,760	5,225,000	0	0	0	
Total	**379,938,702**	**6,546,126**	**23,859,076**	**20,900,000**	**0**	**1,909,500**	**326,724,000**	

Note : WUA : Rupingazi Ngerwe Irrigation Association as a water users association
MENR : Ministry of Environment and Natural Resources
MOALD : Ministry of Agriculture and Livestock Development
Meru CC : Meru County Council
HCDA : Horticultural Crops Development Authority
Meru MC : Meru Municipal Council
1) Administration cost for private sector projects shall be borne by the government.

Table Q.2-8 Project Cost Sharing and Disbursement Schedule by Sector and by Agency for Ruungu/Karocho Irrigation Project

(Unit: Ksh)

Project Component	Total Cost	Private Sector	Government Public Sector				Remarks
		WUA	MOALD	MPWH	MENR	Tharaka. CC	
1. Construction Cost							
1) Irrigation & Drainage Improvement	4,520,200	4,520,200	0	0	0	0	A=68ha
2) Marketing Improvement	1,500,000	1,500,000	0	0	0	0	Antena shop/storage, etc.
3) Access Roads Improvement	19,660,000	0	0	14,810,000	0	4,850,000	L=37.5km
4) Village/Farm Roads Improvement	1,710,000	0	0	0	0	1,710,000	L=3.0km
5) Domestic Water Supply Improvement	0	0	0	0	0	0	
Sub-total	**27,390,200**	**6,020,200**	**0**	**14,810,000**	**0**	**6,560,000**	
2. Community Development & Support Services							
1) Agricultural Support Services	14,050,000	0	14,050,000	0	0	0	
2) Community Development	7,120,000	0	7,120,000	0	0	0	
3) Water Management Services	1,810,000	0	1,810,000	0	0	0	
4) Marketing Support Services	284,000	0	284,000	0	0	0	
5) Public Health Services	150,000	0	0	0	150,000	0	
Sub-total	**23,414,000**	**0**	**23,264,000**	**0**	**150,000**	**0**	
3. Associated Cost							
1) Pre-Engineering Cost	1,600,900	105,000	0	1,036,700	0	459,200	7% 0f 1
2) Administration Cost	3,239,880	0	1,733,480	1,036,700	10,500	459,200	7% of 1 & 2
3) Consulting Services	4,628,400	150,000	2,326,400	1,481,000	15,000	656,000	10% of 1 & 2
Sub-total	**9,469,180**	**255,000**	**4,059,880**	**3,554,400**	**25,500**	**1,574,400**	
4. Physical Contingency	**2,287,000**	**150,000**	**0**	**1,481,000**	**0**	**656,000**	10% of 1
Total	**62,560,380**	**6,425,200**	**27,323,880**	**19,845,400**	**175,500**	**8,790,400**	
(Disbursement Schedule)							
- 1st year	5,234,240	2,260,100	2,915,640	0	58,500	0	
- 2nd year	21,898,130	3,265,100	3,567,180	10,441,050	0	4,624,800	
- 3rd year	19,985,180	900,000	5,515,230	9,404,350	0	4,165,600	
- 4th year	4,688,190	0	4,629,690	0	58,500	0	
- 5th year	3,704,220	0	3,704,220	0	0	0	
- 6th year	3,704,220	0	3,704,220	0	0	0	
- 7th year	3,346,200	0	3,287,700	0	58,500	0	
Total	**62,560,380**	**6,425,200**	**27,323,880**	**19,845,400**	**175,500**	**8,790,400**	

Note : WUA : Rupingazi Ngerwe Irrigation Association as a water users association MENR : Ministry of Environment and Natural Resources
MOALD : Ministry of Agriculture and Livestock Development Tharaka. CC : Tharaka Nithi County Council
MPWH : Ministry of Public Works and Housing
1) Administration cost for private sector projects shall be borne by the government.

Table Q.2-9 **Construction Cost for Irrigation/Drainage and Roads Improvement for Rupingazi Ngerwe Irrigation Scheme**

Item	Description	Q'ty	Unit	Unit cost (Ksh)	Amount (Ksh)	Remarks
1. Irrigation & Drainage Improvement						A=40ha
1) Direct cost						
a) Canal line						
- Concrete pipe	ϕ 450mm	1,300	m	1,600	2,080,000	
- Fittings	Joint mortar, etc	l.s.			208,000	10% of pipes
- Skilled labour cost		l.s.			228,800	10% of material
- Transport cost		l.s.			114,400	5% of material
Sub-total					2,631,200	
b) Structures						
- Division box	Concrete	2	no.	30,000	60,000	
Sub-total					60,000	
Total of direct cost					2,691,200	
2) Temporary works						
- Temporary works	Camp, mobilization, etc.	l.s.			403,680	15% of direct cost
3) Contractor's cost						
- Contractor's cost	Engineers, overhead & profit	l.s.			618,976	20% of direct and temporary works cost
Total					**3,713,856**	
Note: 1) Rupingazi Ngerwe Irrigation Association shall provide casual labours for pipe laying works, earth canal trimming, and excavation and backfilling for structures.						
2. Access Roads Improvement						
1) Tarmac surface pavement		1.0	km	3,000,000	3,000,000	
2) Partial rehabilitation	With spot gravelling	5.3	km	131,000	694,300	
Total					**3,694,300**	
3. Village/Farm Roads Improvement						
1) Spot improvement	With grading, regravelling, etc.	1.2	km	570,000	684,000	
Total					**684,000**	

Table Q.2-10 **Construction Cost for Irrigation/Drainage and Roads Improvement for Ngomano/Nyangati Water Furrow Project**

Item	Description	Q'ty	Unit	Unit cost (Ksh)	Amount (Ksh)	Remarks
1. Irrigation & Drainage Improvement						A=48ha
1) Direct cost						
a) Intake						
- Intake weir concrete		30	cu.m	8,000	240,000	
- Form work				50%	120,000	
- Gabion	2.0m * 1.0m * 0.5m	112	no.	4,100	459,200	
- Excavation	By machine	560	cu.m	150	84,000	
- G.I pipe	ϕ 450mm, L=6.0m	1	no.	80,000	80,000	
- Intake box		1	no.	30,000	30,000	
- Cofferdam	For diversion works	l.s.		40%	405,280	
- Diversion canal	For diversion works	l.s.		30%	303,960	
Sub-total					1,722,440	
b) Structures						
- Division box	Concrete	2	no.	30,000	60,000	
- Drops	H=0.50m/no.	102	no.	5,000	510,000	
Sub-total					570,000	
c) Drainage canal						
- Drainage canal		1,450	m	200	290,000	
Sub-total					290,000	
Total of direct cost					2,582,440	
2) Temporary works						
- Temporary works	Camp, mobilization, etc.	l.s.			387,366	15% of direct cost
3) Contractor's cost						
- Contractor's cost	Engineers, overhead & profit	l.s.			593,961	20% of direct and temporary works cost
Total					**3,563,767**	
2. Village/Farm Roads Improvement						
1) Spot improvement	With grading, regravelling, etc.	3.2	km	570,000	1,824,000	
Total					**1,824,000**	

Note: 1) Ngomano/Nyangati Water Furrow Association shall provide casual labours for earth canal trimming, and manpower excavation and backfilling for structures.

Table Q.2-11 **Construction Cost for Irrigation/Drainage and Roads Improvement for Nkunjumo Water Project**

Item	Description	Q'ty	Unit	Unit cost (Ksh)	Amount (Ksh)	Remarks
1. Irrigation & Drainage Improvement						A=56ha
1) Direct cost						
a) Pipeline						
- Material cost						
- PVC pipe	ϕ 250mm, L=6.0m, class-B	25	no.	7,500	187,500	
- do	ϕ 200mm, L=6.0m, class-B	178	no.	4,400	783,200	
- do	ϕ 150mm, L=6.0m, class-D	197	no.	5,000	985,000	
- do	ϕ 100mm, L=6.0m, class-D	117	no.	2,900	339,300	
- do	ϕ 75mm, L=6.0m, class-D	75	no.	2,000	150,000	
- do	ϕ 63mm, L=6.0m, class-D	0	no.	1,300	0	
- do	ϕ 50mm, L=6.0m, class-D	200	no.	850	170,000	
- Fittings		1	s.		261,500	10% of pipes
					(2,876,500)	Total of material
- Skilled labour cost		1	s.		287,650	10% of material
- Transport cost		1	s.		143,825	5% of material
Sub-total					3,307,975	
b) Intake						
- Intake weir	L=5.0m, H=0.5m, concrete	1	no.	100,000	100,000	
- Intake box		1	no.	30,000	30,000	
- G.I pipe	ϕ 250mm, L=6.0m	2	no.	45,000	90,000	
Sub-total					220,000	
c) Structures						
- Valve chamber	Concrete	17	no.	5,000	85,000	
- Storage tank	V= 10 cu.m	1	no.	240,000	240,000	For secondary school
- do	V= 3 cu.m	1	no.	100,000	100,000	For polytechnics
Sub-total					425,000	
Total of direct cost					3,952,975	
2) Temporary works						
- Temporary works	Camp, mobilization, etc.	1	s.		592,946	15% of direct cost
3) Contractor's cost						
- Contractor's cost	Engineers, overhead & profit	1	s.		909,184	20% of direct and temporary works cost
Total					**5,455,106**	

Note: 1) Nkunjumo Water Association shall provide casual labours for pipe laying works, and manpower excavation and backfilling for structures.
2) Domestic water supply improvement is included in this cost estimate.

2. Village/Farm Roads Improvement						
1) Spot improvement	With grading, regravelling, etc.	2.5	km	570,000	1,425,000	
Total					**1,425,000**	

Table Q.2-12 **Construction Cost for Irrigation/Drainage and Roads Improvement for Ruungu/Karocho Irrigation Project**

Item	Description	Q'ty	Unit	Unit cost (Ksh)	Amount (Ksh)	Remarks
1. Irrigation & Drainage Improvement						A=68ha
1) Intake and concrete structure					3,638,000	
2) Trenching, infilling embankment compacting					518,400	
3) Design and supervision					363,800	
Total					**4,520,200**	
Note: 1) Above cost is taken from the detailed design report prepared by SISDO since the construction is under implementation.						
2. Access Roads Improvement						
1) Partial rehabilitation	With spot gravelling	20.0	km	131,000	2,620,000	For C92 road
2) Spot improvement	With grading, regravelling, etc.	11.5	km	1,060,000	12,190,000	For E788 road
3) Spot improvement	With grading, regravelling, etc.	6.0	km	570,000	3,420,000	For rural road
4) Spillway type brige	Concrete	5.0	no.	286,000	1,430,000	For rural road
Total					**19,660,000**	
3. Village/Farm Roads Improvement						
1) Spot improvement	With grading, regravelling, etc.	3.0	km	570,000	1,710,000	
Total					**1,710,000**	

Table Q.2-13 **Project Cost for Agricultural Support Services**

Category	Rupingazi Ngerwe				Ngomano/Nyangati				Nkunjumo				Ruungu/Karocho				Remarks
	Q'ty	Unit	Unit cost ('000 Ksh)	Amount ('000 Ksh)	Q'ty	Unit	Unit cost ('000 Ksh)	Amount ('000 Ksh)	Q'ty	Unit	Unit cost ('000 Ksh)	Amount ('000 Ksh)	Q'ty	Unit	Unit cost ('000 Ksh)	Amount ('000 Ksh)	
1) Training	4	time	1,200	4,800	5	time	1,200	6,000	4	time	1,200	4,800	5	time	1,400	7,000	
2) Demonstration	7	time	120	840	13	time	150	1,950	7	time	120	840	11	time	150	1,650	
3) Trials	8		250	2,000	8		250	2,000	8		250	2,000	8		300	2,400	
4) Associated support costs	5	year	300	1,500	5	year	300	1,500	5	year	300	1,500	5	year	300	1,500	
5) Extension Materials	5	year	300	1,500	5	year	300	1,500	5	year	300	1,500	5	year	300	1,500	
Total				**10,640**				**12,950**				**10,640**				**14,050**	
Cost per year				**2,128**				**2,590**				**2,128**				**2,810**	

Note : Agricultural support services are provided for five years from 3rd year upto 7th year.

Table Q.2-14 Project Cost for Community Development

RUPINGAZI / NGERWE

COST OF PROVIDING TRAINING AND INSTITUTIONAL CAPACITY BUILDING FOR MODEL AREAS

	Cost Item	Unit	Number of units	Unit Cost USD	Total Cost USD	Funding Source
1	Training IDB & DAO Staff					
	1.1 Accomodation (Participants)	man-day	40	50	2,000	Donor
	1.2 Field Allowance (Participants)	man-day	40	20	800	MOA
	1.3 Consultant	man-day	7.5	500	3,750	Donor
	1.4 Training Materials	item	item	1000	1,000	Donor
	1.4 Travel	km	1250	0.5	625	Donor
		Sub-Total			8,175	
2	Training NGOs Staff					
	2.1 Accommodation (participants)	man-made	20	50	1,000	Donor
	2.2 Field Alloawance (participants)	man-made	20	20	400	NGO
	2.3 Consultant	man-made	7.5	500	3,750	Donor
	2.4 Training Materials	item	item	2500	2,500	Donor
	2.5 Travel	km	3000	0.6	1,800	Donor
		Sub-Total			9,450	
3	Social Preparation Facilitation:					
	3.1 Accommodation (IDB/NGO staff)	man-day	5	50	250	Donor
	3.2 Field Allowance (IDB/NGO staff)	man-day	5	20	100	MoA/NGO
	3.3 Consultant	man-day	5	500	2,500	Donor
	3.4 Training Materials	item	item	1500	1,500	Donor
	3.5 Travel	km	3000	0.5	1,500	Donor
		Sub-Total			5,850	
4	Training WUA:					
	4.1 Accommodation (IDB/NGO staff)	man-day	20	50	1,000	Donor
	4.2 Field Allowance (IDB/NGO staff)	man-day	20	20	400	MOA/NGO
	4.3 Consultant	man-day	7.5	500	3,750	Donor
	4.4 Training Materials	item	item	2000	2,000	Donor
	4.5 Travel	km	1250	0.5	625	Donor
		Sub-Total			7,775	
5	Training WUA & Co-op Committees:					
	5.1 Accommodation (IDB/NGO staff)	man-day	10	50	500	Donor
	5.2 Field Allowance (IDB/NGO staff)	man-day	10	20	200	MOA/NGO
	5.3 Consultants	man-day	7.5	400	3,000	Donor
	5.4 Training Materials	item	item	1000	1,000	Donor
	5.5 Travel	km	750	0.5	375	Dohor
		Sub-Total			5,075	
6	Training Women Groups:					
	6.1 Accommodation (MoA/NGO staff)	man-day	5	50	250	Donor
	6.2 Field Allowance (MoA/NGO staff)	man-day	5	20	100	MoA/NGO
	6.3 Consultant	man-day	3.75	500	1,875	Donor
	6.4 Training Materials	item	item	1500	1,500	Donor
	6.5 Travel	km	750	0.5	375	Donor
		Sub-Total			4,100	
7	Training Production /Marketing Gps:					
	7.1 Accommodation (MoA/NGO staff)	man-day	5	50	250	Donor
	7.2 Field Allowance (MoA/NGO staff)	man-day	5	20	100	MoA/NGO
	7.3 Consultant	man-day	5	500	2,500	Donor
	7.4 Training Materials	item	item	1000	1,000	Donor
	7.5 Travel	km	750	0.5	375	Donor
		Sub-Total			4,225	
8	NGO Restructuring Support:					
	8.1 Accommodation (for staff in field)	man-day	5	50	250	Donor
	8.2 Field Allowance (for staff in field)	man-day	5	20	100	NGO
	8.3 Consultant	man-day	22.5	500	11,250	Donor
	8.4 Training materials	item	item	1500	1,500	Donor
	8.5 Travel	km	750	0.5	375	Donor
		Sub-Total			13,475	
9	General Community Development:					
	9.1 Community Organizer	month	2	750	1,500	Donor
	9.2 Consultant Back-stopper	day	4	500	2,000	Donor
		Sub-Total			3,500	
10	Equipment & Facilities Support:					
	10.1 4wd vehicle to IDB HQs *	unit	0.25	30000	7,500	Donor
	10.2 Motor Cycle to DAO's Office	unit	3	5000	15,000	Donor
	10.3 Computer to IDB Hqs *	unit	0.25	4000	1,000	Donor
	10.4 Computer to DAO's Offices	unit	1	4000	4,000	Donor
	10.5 Computer to local NGO	unit	1	4000	4,000	Donor
	10.6 Auger, Ph meter, Tensiometer	unit	item	4000	4,000	Donor
		Sub-Total			56,350	
		Grand Total			117,975	

* Apportionment to Rupingazi / Ngerwe for the cost of supplying the item to IDB HQS

Funds Disbursement (USD)

Year	1	2	3	4	5	6	7	Total
Disbursement	41291	29494	23595	11798	5899	5899	0	117975
Percentage	35%	25%	20%	10%	5%	5%	0%	100%

NYANGATI / NGAMANO

COST OF PROVIDING TRAINING AND INSTITUTIONAL CAPACITY BUILDING FOR MODEL AREAS

	Cost Item	Unit	Number of units	Unit Cost USD	Total Cost USD	Funding Source
1	Training IDB & DAO Staff					
	1.1 Accomodation (Participants)	man-day	40	50	2,000	Donor
	1.2 Field Allowance (Participants)	man-day	40	20	800	MoA
	1.3 Consultant	man-day	7.5	500	3,750	Donor
	1.4 Training Materials	item	item	1000	1,000	Donor
	1.4 Travel	km	1250	0.6	750	Donor
		Sub-Total			8,300	
2	Training NGOs Staff					
	2.1 Accommodation (participants)	man-made	20	50	1,000	Donor
	2.2 Field Allowance (participants)	man-made	20	20	400	NGO
	2.3 Consultant	man-made	7.5	500	3,750	Donor
	2.4 Training Materials	item	item	2500	2,500	Donor
	2.5 Travel	km	1500	0.5	750	
		Sub-Total			8,400	
3	Social Preparation Facilitation:					
	3.1 Accommodation (IDB/NGO staff)	man-day	5	50	250	Donor
	3.2 Field Allowance (IDB/NGO staff)	man-day	5	20	100	MoA/NGO
	3.3 Consultant	man-day	5	500	2,500	Donor
	3.4 Training Materials	item	item	1500	1,500	Donor
	3.5 Travel	km	800	0.5	400	Donor
		Sub-Total			4,750	
4	Training WUA:					
	4.1 Accommodation (IDB/NGO staff)	man-day	20	50	1,000	Donor
	4.2 Field Allowance (IDB/NGO staff)	man-day	20	20	400	MoA/NGO
	4.3 Consultant	man-day	7.5	500	3,750	Donor
	4.4 Training Materials	item	item	2000	2,000	Donor
	4.5 Travel	km	1250	0.5	625	Donor
		Sub-Total			7,775	
5	Training WUA & Co-op Committees:					
	5.1 Accommodation (IDB/NGO staff)	man-day	10	50	500	Donor
	5.2 Field Allowance (IDB/NGO staff)	man-day	10	20	200	MoA/NGO
	5.3 Consultants	man-day	7.5	400	3,000	Donor
	5.4 Training Materials	item	item	1000	1,000	Donor
	5.5 Travel	km	800	0.5	400	Donor
		Sub-Total			5,100	
6	Training Women Groups:					
	6.1 Accommodation (MoA/NGO staff)	man-day	5	50	250	Donor
	6.2 Field Allowance (MoA/NGO staff)	man-day	5	20	100	MoA/NGO
	6.3 Consultant	man-day	3.75	500	1,875	Donor
	6.4 Training Materials	item	item	1500	1,500	Donor
	6.5 Travel	km	800	0.5	400	Donor
		Sub-Total			4,125	
7	Training Production /Marketing Gps:					
	7.1 Accommodation (MoA/NGO staff)	man-day	5	50	250	Donor
	7.2 Field Allowance (MoA/NGO staff)	man-day	5	20	100	MoA/NGO
	7.3 Consultant	man-day	5	500	2,500	Donor
	7.4 Training Materials	item	item	1000	1,000	Donor
	7.5 Travel		750	0.5	375	Donor
		Sub-Total			4,225	
8	NGO Restructuring Support:					
	8.1 Accommodation (for staff in field)	man-day	5	50	250	Donor
	8.2 Field Allowance (for staff in field)	man-day	5	20	100	NGO
	8.3 Consultant	man-day	22.5	500	11,250	Donor
	8.4 Training materials	item	item	1500	1,500	Donor
	8.5 Travel	km	750	0.5	375	Donor
		Sub-Total			13,475	
9	General Community Development:					
	9.1 Community Organizer	month	2	750	1,500	Donor
	9.2 Consultant Back-stopper	day	4	500	2,000	Donor
		Sub-Total			3,500	
10	Equipment & Facilities Support:					
	10.1 4wd vehicle to IDB HQs *	unit	0.25	30000	7,500	Donor
	10.2 Motor Cycle to DAO's Office	unit	3	5000	15,000	Donor
	10.3 Computer to IDB Hqs *	unit	0.25	4000	1,000	Donor
	10.4 Computer to DAO's Office	unit	1	4000	4,000	Donor
	10.5 Computer to local NGOs	unit	1	4000	4,000	Donor
	10.6 Auger, Ph meter, Tensiometer	unit	item	4000	4,000	Donor
		Sub-Total			56,350	
		Grand Total			116,000	

* Apportionment to Nyagati / Ngamano for the cost of supplying the item to IDB HQS

Funds Disbursement (USD)

Year	1	2	3	4	5	6	7	Total
Disbursement	40600	29000	23200	11600	5800	5800	0	116000
Percentage	35%	25%	20%	10%	5%	5%	0%	100%

NKUU - NJUMO

COST OF PROVIDING TRAINING AND INSTITUTIONAL CAPACITY BUILDING FOR MODEL AREAS

	Cost Item	Unit	Number of units	Unit Cost USD	Total Cost USD	Funding Source
1	Training IDB & DAO Staff					
	1.1 Accomodation (Participants)	man-day	40	50	2,000	Donor
	1.2 Field Allowance (Participants)	man-day	40	20	800	MOA
	1.3 Consultant	man-day		500	3,750	Donor
	1.4 Training Materials	item	item	1000	1,000	Donor
	1.4 Travel	km	1500	0.5	750	Donor
		Sub-Total			8,300	
2	Training NGOs Staff					
	2.1 Accommodation (participants)	man-made	20	50	1,000	Donor
	2.2 Field Alloawance (participants)	man-made	20	20	400	NGO
	2.3 Consultant	man-made	7.5	500	3,750	Donor
	2.4 Training Materials	item	item	2500	2,500	Donor
	2.5 Travel	km	3000	0.6	1,800	Donor
		Sub-Total			9,450	
3	Social Preparation Facilitation:					
	3.1 Accommodation (IDB/NGO staff)	man-day	5	50	250	Donor
	3.2 Field Allowance (IDB/NGO staff)	man-day	5	20	100	MoA/NGO
	3.3 Consultant	man-day	5	500	2,500	Donor
	3.4 Training Materials	item	item	1500	1,500	Donor
	3.5 Travel	km	3000	0.5	1,500	Donor
		Sub-Total			5,850	
4	Training WUA:					
	4.1 Accommodation (IDB/NGO staff)	man-day	20	50	1,000	Donor
	4.2 Field Allowance (IDB/NGO staff)	man-day	20	20	400	MoA/NGO
	4.3 Consultant	man-day	7.5	500	3,750	Donor
	4.4 Training Materials	item	item	2000	2,000	Donor
	4.5 Travel	km	1250	0.5	625	Donor
		Sub-Total			7,775	
5	Training WUA & Co-op Committees:					
	5.1 Accommodation (IDB/NGO staff)	man-day	10	50	500	Donor
	5.2 Field Allowance (IDB/NGO staff)	man-day	10	20	200	MoA/Donor
	5.3 Consultants	man-day	7.5	400	3,000	Donor
	5.4 Training Materials	item	item	1000	1,000	Donor
	5.5 Travel	km	750	0.5	375	Donor
		Sub-Total			5,075	
6	Training Women Groups:					
	6.1 Accommodation (MoA/NGO staff)	man-day	5	50	250	Donor
	6.2 Field Allowance (MoA/NGO staff)	man-day	5	20	100	MoA/NGO
	6.3 Consultant	man-day	3.75	500	1,875	Donor
	6.4 Training Materials	item	item	1500	1,500	Donor
	6.5 Travel	km	750	0.5	375	Donor
		Sub-Total			4,100	
7	Training Production /Marketing Gps:					
	7.1 Accommodation (MoA/NGO staff)	man-day	5	50	250	Donor
	7.2 Field Allowance (MoA/NGO staff)	man-day	5	20	100	MoA/Donor
	7.3 Consultant	man-day	5	500	2,500	Donor
	7.4 Training Materials	item	item	1000	1,000	Donor
	7.5 Travel	km	750	0.5	375	Donor
		Sub-Total			4,225	
8	NGO Restructuring Support:					
	8.1 Accommodation (for staff in field)	man-day	5	50	250	Donor
	8.2 Field Allowance (for staff in field)	man-day	5	20	100	NGO
	8.3 Consultant	man-day	22.5	500	11,250	Donor
	8.4 Training materials	item	item	1500	1,500	Donor
	8.5 Travel	km	750	0.5	375	Donor
		Sub-Total			13,475	
9	General Community Development:					
	9.1 Community Organizer	month	2	750	1,500	Donor
	9.2 Consultant Back-stopper	day	4	500	2,000	Donor
		Sub-Total			3,500	
10	Equipment & Facilities Support:					
	10.1 4wd vehicle to IDB HQs *	unit	0.25	30000	7,500	Donor
	10.2 Motor Cycle to DAO's Office	unit	3	5000	15,000	Donor
	10.3 Computer to IDB Hqs *	unit	0.25	4000	1,000	Donor
	10.4 Computer to DAO's Offices	unit	1	4000	4,000	Donor
	10.5 Computer to local NGOs	unit	1	4000	4,000	Donor
	10.6 Auger, Ph meter, Tensiometer	unit	item	4000	4,000	Donor
		Sub-Total			56,350	
		Grand Total			118,100	

* Apportionment to Nkuu-Njumo for the cost of suppling the item to IDB HQS

Funds Disbursement (USD)

Year	1	2	3	4	5	6	7	Total
Disbursement	41388	29563	23650	11825	5913	5913	0	118100
Percentage	35%	25%	20%	10%	5%	5%	0%	100%

RUUNGU/KAROCHO

COST OF PROVIDING TRAINING AND INSTITUTIONAL CAPACITY BUILDING FOR MODEL AREAS

	Cost Item	Unit	Number of units	Unit Cost USD	Total Cost USD	Funding Source
1	Training IDB & DAO Staff					
	1.1 Accomodation (Participants)	man-day	40	50	2,000	Donor
	1.2 Field Allowance (Participants)	man-day	40	20	800	MoA
	1.3 Consultant	man-day	7.5	500	3,750	Donor
	1.4 Training Materials	item	item	1000	1,000	Donor
	1.4 Travel	km	2400	0.5	1,200	Donor
		Sub-Total			8,750	
2	Training NGOs Staff					
	2.1 Accommodation (participants)	man-made	20	50	1,000	Donor
	2.2 Field Allowance (participants)	man-made	20	20	400	NGO
	2.3 Consultant	man-made	7.5	500	3,750	Donor
	2.4 Training Materials	item	item	2500	2,500	Donor
	2.5 Travel	km	1400	0.5	700	Donor
		Sub-Total			8,350	
3	Social Preparation Facilitation:					
	3.1 Accommodation (IDB/NGO staff)	man-day	5	50	250	Donor
	3.2 Field Allowance (IDB/NGO staff)	man-day	5	20	100	MoA/NGO
	3.3 Consultant	man-day	5	500	2,500	Donor
	3.4 Training Materials	item	item	1500	1,500	Donor
	3.5 Travel	km	1600	0.5	800	Donor
		Sub-Total			5,150	
4	Training WUA:					
	4.1 Accommodation (IDB/NGO staff)	man-day	20	50	1,000	Donor
	4.2 Field Allowance (IDB/NGO staff)	man-day	20	20	400	MoA/NGO
	4.3 Consultant	man-day	7.5	500	3,750	Donor
	4.4 Training Materials	item	item	2000	2,000	Donor
	4.5 Travel	km	2400	0.5	1,200	Donor
		Sub-Total			8,350	
5	Training WUA & Co-op Committees:					
	5.1 Accommodation (IDB/NGO staff)	man-day	10	50	500	Donor
	5.2 Field Allowance (IDB/NGO staff)	man-day	10	20	200	MoA/NGO
	5.3 Consultants	man-day	7.5	400	3,000	Donor
	5.4 Training Materials	item	item	1000	1,000	Donor
	5.5 Travel	km	1600	0.5	800	Donor
		Sub-Total			5,500	
6	Training Women Groups:					
	6.1 Accommodation (MoA/NGO staff)	man-day	5	50	250	Donor
	6.2 Field Allowance (MoA/NGO staff)	man-day	5	20	100	MoA/NGO
	6.3 Consultant	man-day	3.75	500	1,875	Donor
	6.4 Training Materials	item	item	1500	1,500	Donor
	6.5 Travel	km	1600	0.5	800	Donor
		Sub-Total			4,525	
7	Training Production /Marketing Gps:					
	7.1 Accommodation (MoA/NGO staff)	man-day	5	50	250	Donor
	7.2 Field Allowance (MoA/NGO staff)	man-day	5	20	100	MoA/NGO
	7.3 Consultant	man-day	5	500	2,500	Donor
	7.4 Training Materials	item	item	1000	1,000	Donor
	7.5 Travel	km	1600	0.5	800	Donor
		Sub-Total			4,650	
8	NGO Restructuring Support:					
	8.1 Accommodation (for staff in field)	man-day	5	50	250	Donor
	8.2 Field Allowance (for staff in field)	man-day	5	20	100	NGO
	8.3 Consultant	man-day	22.5	500	11,250	Donor
	8.4 Training materials	item	item	1500	1,500	Donor
	8.5 Travel	km	800	0.5	400	Donor
		Sub-Total			13,500	
9	General Community Development:					
	9.1 Community Organizer	month	2	750	1,500	Donor
	9.2 Consultant Back-stopper	day	4	500	2,000	Donor
		Sub-Total			3,500	
10	Equipment & Facilities Support:					
	10.1 4wd vehicle to IDB HQs *	unit	0.25	30000	7,500	Donor
	10.2 Motor Cycle to DAO's Office	unit	3	5000	15,000	Donor
	10.3 Computer to IDB Hqs *	unit	0.25	4000	1,000	Donor
	10.4 Computer to DAO's Office	unit	1	4000	4,000	Donor
	10.5 Computer to local NGOs	unit	1	4000	4,000	Donor
	10.6 Auger, Ph meter, Tensiometer	unit	item	4000	4,000	Donor
		Sub-Total			56,400	
		Grand Total			118,675	

* Apportionment to Ruungu / Karocho for the cost of supplying the item to IDB HQS

Funds Disbursement (USD)

Year	1	2	3	4	5	6	7	Total
Disbursement	41536	29563	23650	11825	5913	5913	0	118675
Percentage	35%	25%	20%	10%	5%	5%	0%	100%

Table Q.2-15 Project Cost for Effective Water Management

1. Preparation of W/M manual

(Unit : per scheme)

	Unit	Unit cost (kshs)	Quant.	Total cost (1,000kshs)
Consultunts	man-day	30,000	26	780
MOALD Staff	man-day	1,200	16	20
Transportation	km	40	1000	40
Report	set	100,000	1	100
Total				940

2. Training of WUA Members on water management

This program will be implemented for two(2) years

(1) Rupingazi Ngerwe Irrigation Project

	Unit	Unit cost (kshs)	Number of person/car	Number of day	Quant.	Total cost (1,000kshs)
a)Development of training materials	set	100	200	-	200	20
b)Stationary and printing	set	300	200	-	200	60
c) Allowance						
Participant	man-day	1,200	200	5	1,000	1,200
MOALD Staff	man-day	1,200	7	5	35	42
d)Transportation						
Participant	man-day	600	200	-	200	120
MOALD Staff	car-day	1,500	2	5	10	15
Total						1,460

(2) Ngomano/Nyangati Water Furrow Project

	Unit	Unit cost (kshs)	Number of person/car	Number of day	Quant.	Total cost (1,000kshs)
a)Development of training materials	set	100	120	-	120	12
b)Stationary and printing	set	300	120	-	120	36
c) Allowance						
Participant	man-day	1,200	120	5	600	720
MOALD Staff	man-day	1,200	4	5	20	24
d)Transportation						
Participant	man-day	600	120	-	120	72
MOALD Staff	car-day	1,500	1	5	5	8
Total						870

(3) Nkunjumo Water Project

	Unit	Unit cost (kshs)	Number of person/car	Number of day	Quant.	Total cost (1,000kshs)
a)Development of training materials	set	100	140	-	140	14
b)Stationary and printing	set	300	140	-	140	42
c) Allowance						
Participant	man-day	1,200	140	5	700	840
MOALD Staff	man-day	1,200	5	5	25	30
d)Transportation						
Participant	man-day	600	140	-	140	84
MOALD Staff	car-day	1,500	2	5	10	15
Total						1,020

(4) Ruungu /Karocho Irrigation Project

	Unit	Unit cost (kshs)	Number of person/car	Number of day	Quant.	Total cost (1,000kshs)
a)Development of training materials	set	100	170	-	170	17
b)Stationary and printing	set	300	170	-	170	51
c) Allowance						
Participant	man-day	1,200	170	5	850	1,020
MOALD Staff	man-day	1,200	6	5	30	36
d)Transportation						
Participant	man-day	600	170	-	170	102
MOALD Staff	car-day	1,500	2	5	10	15
Total						1,240

Table Q.2-16 Project Costs for Marketing and Post-harvest Development

(unit: Ksh)

Component	Stakeholders	Place	Project Area: Rupingazi Ngerwe Irrigation Scheme	Ngaomao/ Nyangati Water Furrow Project	Nkunjumo Water Project	Ruungu/ Karocho Irrigation Project
1. Marketing Plan						
1) Training of smallholders in grading, post-harvest and marketing	-	at farm level	Referring to d) Institutional Plan of 1.3.1. 1) Agricultural Infrastructure Plan			
2) Improved access road network in irrigated areas	-	at farm to market	Referring to b) Rural Roads Plan of 1.3.1. 2) Rural Infrastructure Plan			
3) Strengthening the price collection and dissemination system in the areas	farmers	at farm level	All costs shall be borne by farmers' groups.			
4) Seminars to smallholers on horticultural produce marketing at JKUAT	JKUAT staff	at JKUAT				
a) Market oriented farm planning and cultivation technique (2.0days)	University lecturer	at JKUAT	80,000	80,000	80,000	80,000
b) Organisation of marketing group and its function/operation through PCM method (5.0days)	JICA expert	at JKUAT	140,000	140,000	140,000	140,000
b) Market prices information analysis at each local market and core wholesale markets (0.5days)	Marketing officer of MOALDM	at JKUAT	11,000	11,000	11,000	11,000
c) Contract farming techniques (0.5days)	Marketing expert of HCDA	at JKUAT	11,000	11,000	11,000	-
d) Grading and MRLs evaluation from buyer side (0.5days)	Marketing expert of FPEAK or exporter	at JKUAT	11,000	11,000	11,000	-
e) Selection and procurement of certified seeds and seedlings (0.5days)	Seed expert of KARI	at JKUAT	11,000	11,000	11,000	11,000
d) Field trips pursuing marketing routes (1.0day)	JKUAT staff	at markets and exporter's facility	22,000	22,000	22,000	22,000
Other transporting costs (1 round)			10,000	8,000	14,000	20,000
Sub-total			296,000	294,000	300,000	284,000
5) Coordination with HCDA Horticultural Produce Handling Facilities Project for export produce						
a) Holding seminars at major town (1.0day)	Marketing expert of HCDA	at Wanguru, Embu & Meru	50,000	50,000	50,000	-
b) Dispatch of marketing experts (1.0day x 2 persons x 5 times)	- ditto -	at farm level	30,000	30,000	30,000	-
Sub-total			80,000	80,000	80,000	0
Total (1)			376,000	374,000	380,000	284,000
2. Post-harvest and processing plan of horticultural produce						
1) Construction of antenna shop/storage	only for Ruungu farmers	at Mitunguu	-	-	-	1,500,000
2) Construction of grading shed and charcoal cooling store	Farmers	at farm level	All costs shall be borne by farmers' groups.			
Total (2)						1,500,000
3. Regional market improvement plan for transaction modes and information flows of horticultural produce at Gakoromone wholesale market					Cennected	
1) Market facility improvement plan	Meru Municial Council	at Gakoromone, Meru	-	-	286,600,000	
2) Auction coordinating plan	HCDA	at Gakoromone, Meru	-	-	20,400,000	
3) Market information sources improvement pilot plan	Marketing officer of Meru DAO and price enumerators	at Gakoromone & Nkubu, Meru	-	-	500,000	
Total (3)			0	0	307,500,000	

Table Q.2-17 **Unit Costs**

As of 1998 Aug. (1/3)

Item	Unit	Unit Cost (Ksh)	Source/Remarks

1. Contract Basis Cost for Irrigation & Rural Water Supply

1) Earth work

- Excavation (soil), by labour	cu.m	200	
- do , by machine	cu.m	150	
- Excavation (rock)	cu.m	600	
- Backfilling (for structure)	cu.m	350	
- Earth canal	m	200	

2) Concrete & pipeline work

- Reinforced concrete	cu.m	8,000	6,500 for material
- Plain concrete	cu.m	6,500	5,500 for material
- Concrete flume	m	500	Dimension: B=0.2m, H=0.3m
- Drop structure	no.	5,000	H=0.5m, W=0.3m
- Pipe culvert (L=10m)	no.	15,000	Concrete pipe ϕ 8" (200mm), include earth work and mortar,
- do	no.	15,000	Concrete pipe ϕ 12" (300mm), include earth work and mortar,
- do	no.	17,000	Concrete pipe ϕ 18" (450mm), include earth work and mortar,
- do	no.	19,000	Concrete pipe ϕ 24" (600mm), include earth work and mortar,
- do	no.	25,000	Concrete pipe ϕ 36" (900mm), include earth work and mortar,
- Spillway type bridge	no.	286,000	Width : 4.0m, length: 4m+10m*2
- Weir	no.	500,000	L= 10m, concrete
- do	no.	100,000	L=5m, concrete H=0.5m on the rock, WD manual, 75,000*1.3,
- do	no.	130,000	L=10m, concrete H=0.5m on the rock, WD manual, 100,000*1.3,
- Gabion	no.	4,100	2m*1m*0.5m, boulders are included,
- Storage tank (V=100cu.m)	no.	380,000	Design sample, concrete tank
- do (V=10cu.m)	no.	240,000	-do-
- do (V=3cu.m)	no.	100,000	-do-
- Communal stand	no.	250	-do-
- Valve chamber	no.	5,000	-do-
- Division box, intake box	no.	30,000	-do-
- Treatment works	l.s	400,000	-do-, filtration tank with pot chlorination
- Labour cost		30 %	of material cost
- do (only for skilled labour)		10 %	of material cost
- Transport cost		5 %	of material cost

3) Material From annual tender 97-98, only for material

- Concrete pipe (ϕ 200mm)	m	1,300			
- do (ϕ 300mm)	m	1,400			
- do (ϕ 450mm)	m	1,600			
- do (ϕ 600mm)	m	1,700			
- do (ϕ 900mm)	m	2,300			
- PVC pipe		(class B) H=90m	(class C) H=120m	(class D) H=150m	
- do (ϕ 12.5mm)	6m			100	
- do (ϕ 25mm)	6m			210	
- do (ϕ 38mm)	6m		450	550	
- do (ϕ 50mm)	6m	400	700	850	
- do (ϕ 63mm)	6m		750	1,300	
- do (ϕ 75mm)	6m	900	1,400	2,000	
- do (ϕ 100mm)	6m	1,600	2,000	2,900	
- do (ϕ 150mm)	6m	3,000	4,100	5,000	
- do (ϕ 200mm)	6m	4,400	5,800	9,500	
- do (ϕ 250mm)	6m	7,500	9,600	13,600	

Cont.

Item	Unit	Unit Cost (Ksh)	Source/Remarks
- Steel pipe (ϕ 100mm)	6m	6,500	
- GI pipe (ϕ 12.5mm)	6m	500	class A
- do (ϕ 25mm)	6m	1,600	class B
- do (ϕ 50mm)	6m	2,400	class B
- do (ϕ 75mm)	6m	4,200	class B
- do (ϕ 100mm)	6m	7,600	class B
- do (ϕ 150mm)	6m	11,000	class B
- do (ϕ 200mm)	6m	18,000	class B
- do (ϕ 250mm)	6m	45,000	class B
- do (ϕ 250mm)	6m	21,000	class A
- do (ϕ 450mm)	6m	80,000	class A
- Gate valve (ϕ 12.5mm)	unit	250	
- do (ϕ 25mm)	unit	350	
- do (ϕ 50mm)	unit	500	
- do (ϕ 75mm)	unit	1,000	
- do (ϕ 100mm)	unit	2,000	
- Suluce valve (ϕ 150mm)	unit	2,400	
- do (ϕ 200mm)	unit	3,800	
- do (ϕ 250mm)	unit	4,500	
- Water flow meter (ϕ 50)	unit	35,000	
- Fittings	l.s.	10 %	of pipes
- Galvanized storage tank	no.	6,000	V=1.0 cu.m
- do	no.	10,000	V=3.0 cu.m
- do	no.	13,000	V=5.0 cu.m
- Plastic storage tank	no.	220,000	V=5.0 cu.m
- Gabion box	no.	2,800	2m*1m*0.5m
- Murram (gravel)	ton	800	
- Sand	ton	1,000	
- Fine aggregate	ton	1,800	
- RSB (16mm)	ton	770	
- RSB (12mm)	ton	450	
- Concrete block	nos	45	225*100*450
- do	nos	55	225*150*450
- Cement (50kg bag)	bag	550	
4) Equipment			
- Support vehicle, 4*2	unit	1,400,000	
- Motor cycle, 125cc	unit	300,000	
- Pick-up	unit	1,400,000	
5) Manpower (contract basis)			
- Manager	month	60,000	
- Senior engineer/officer	month	50,000	
- Engineer/officer	month	40,000	
- Clark/casual	month	25,000	
- Unskilled labour	day	150-200	
2. Roads			For Contract works with labour intensive method,
1) General			
- Gravel pavement	cu.m	900	
- Concrete pavement	cu.m	8,000	
- Asphalt pavement	sq.m	500	25 mm bitumimen
- Road grading	sq.m	25	
- Embankment (for road, etc)	cu.m	1000	
- Road side drain (earth)	m	40	
- Road side drain (block)	m	100	

Cont.

Item	Unit	Unit Cost (Ksh)	Source/Remarks
2) Access roads			SIDA Roads 2000
- Spot improvement	km *	1,060,000	Improvement with grading, regravelling, repair bridges, etc
- Partial rehabilitation	km *	131,000	Restoration to maintenable conditions by labour or graders
- Tarmac surface pavement			
* Improvement		1,060,000	
* Asphalt pavement		2,000,000	
* Total	km *	3,000,000	Apply to steep sections of roads,
3) Village/farm roads			SIDA Roads 2000
- Spot improvement	km *	570,000	1,060,000*3.5/6.5=570,000
- Partial rehabilitation	km *	70,000	131,000*3.5/6.5=70,000
3. O&M Cost (annual)			
1) Roads			
- Routine maintenance	km *	20,000	Roads 2000 assisted by SIDA, For M/P and F/S
			By lengthman method including grading, For access roads only,
- do	km *	10,000	For village/farm roads, and for M/P and F/S
2) Rural water supply facilities	*	1.0 - 2.0 %	
3) Irrigation facilities	*	1.0 - 2.0 %	
4. Associate Cost and Others			
* Pre-engineering cost		3% - 7%	
* Administration cost		3% - 7%	
* Consulting services		3% - 10%	
* Physical contingency		5% - 10%	
* Land acquisition	acre	200,000	For farm land
	ha	500,000	-do-
* Profit & Overhead		30%-50%	For contract works inclusive temporary works
			50% is maximum with temporary works in river
* Exchange rate		1.0 US$ = 60 Ksh = 135 J Yen	

ANNEX R

PROJECT IMPLEMENTATION AND O&M

List of Tables and Figures

R.1 Master Plan

Figure R.1-1 Proposed Organization for Project Implementation

Figure R.1-2 Proposed Organization for Operation and Maintenance of Facilities

R.2 Feasibility Study

Table R.2-1 Implementation Process of Facility Construction for Rupingazi Ngerwe Irrigation Scheme

Table R.2-2 Implementation Process of Facility Construction for Ngomano/Nyangati Water Furrow Project

Table R.2-3 Implementation Process of Facility Construction for Nkunjumo Water Project

Table R.2-4 Implementation Process of Facility Construction for Ruungu/Karocho Irrigation Project

Table R.2-5 Annual Operation and Maintenance Cost for facilities by Sector and by Agency

Figure R.2-1 Implementation Flow for Self-help Project (Rupingazi Ngerwe Irrigation Scheme)

Figure R.2-2 Implementation Flow for Government Public Project (Rupingazi Ngerwe Irrigation Scheme)

Figure R.2-3 Implementation Flow for Self-help Project (Ngomano/Nyangati Water Furrow Project)

Figure R.2-4 Implementation Flow for Government Public Project (Ngomano/Nyangati Water Furrow Project)

Figure R.2-5 Implementation Flow for Self-help Project (Nkunjumo Water Project)

Figure R.2-6 Implementation Flow for Government Public Project (Nkunjumo Water Project)

Figure R.2-7 Implementation Flow for Self-help Project (Ruungu/Karocho Irrigation Project)

Figure R.2-8 Implementation Flow for Government Public Project (Ruungu/Karocho Irrigation Project)

Figure R.2-9 Proposed Organization Chart for Operation and Maintenance for Rupingazi Ngerwe Irrigation Scheme

Figure R.2-10 Proposed Organization Chart for Operation and Maintenance for Ngomano/Nyangati Water Furrow Project

Figure R.2-11 Proposed Organization Chart for Operation and Maintenance for Nkunjumo Water Project

Figure R.2-12 Proposed Organization Chart for Operation and Maintenance for Ruungu/Karocho Irrigation Project

Figure R.2-13 Proposed Organization Chart of WUA for Model Areas

Figure R.1-1 Proposed Organization for Project Implementation

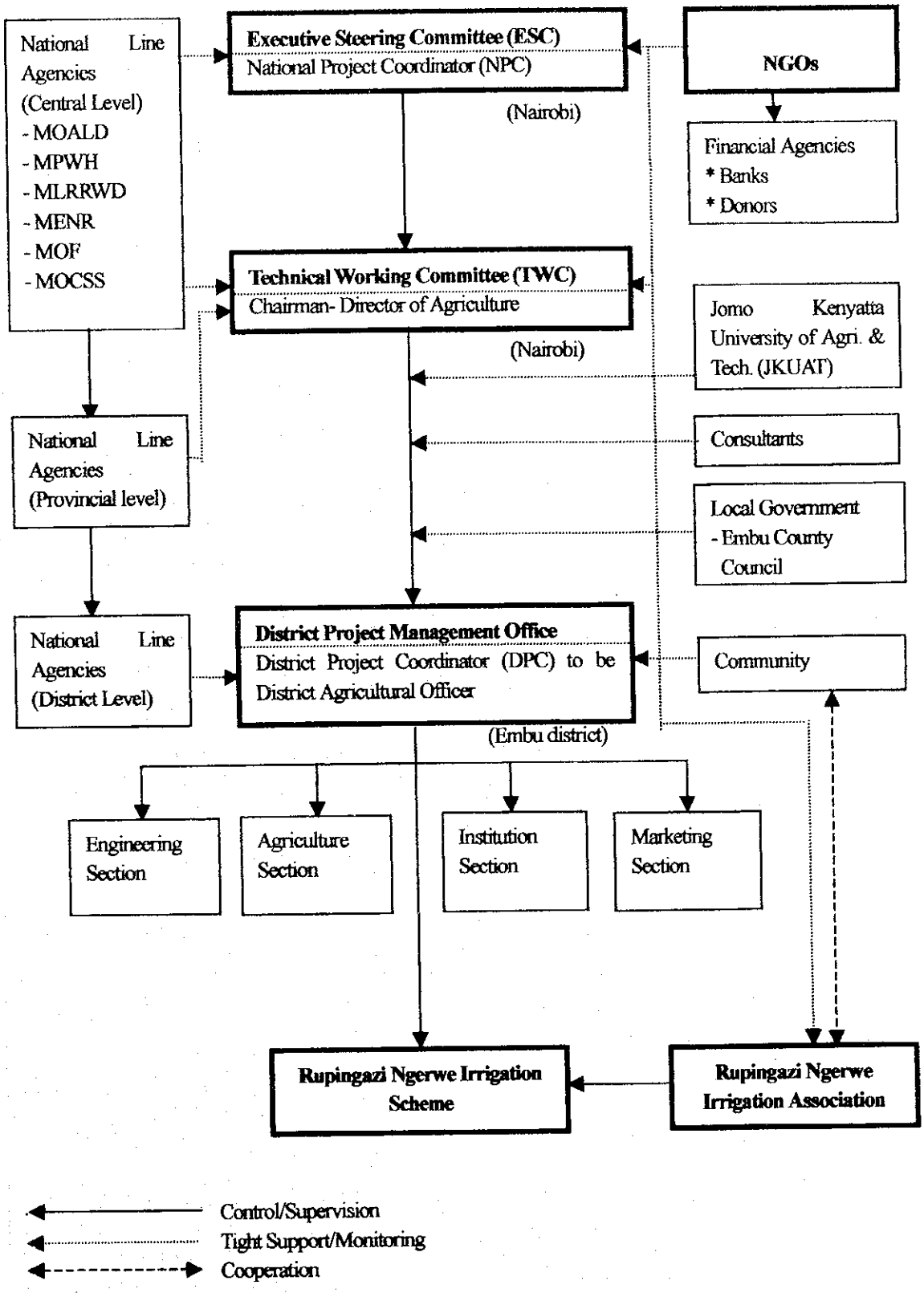


Figure R.1-2 Proposed Organization for Operation and Maintenance of Facilities

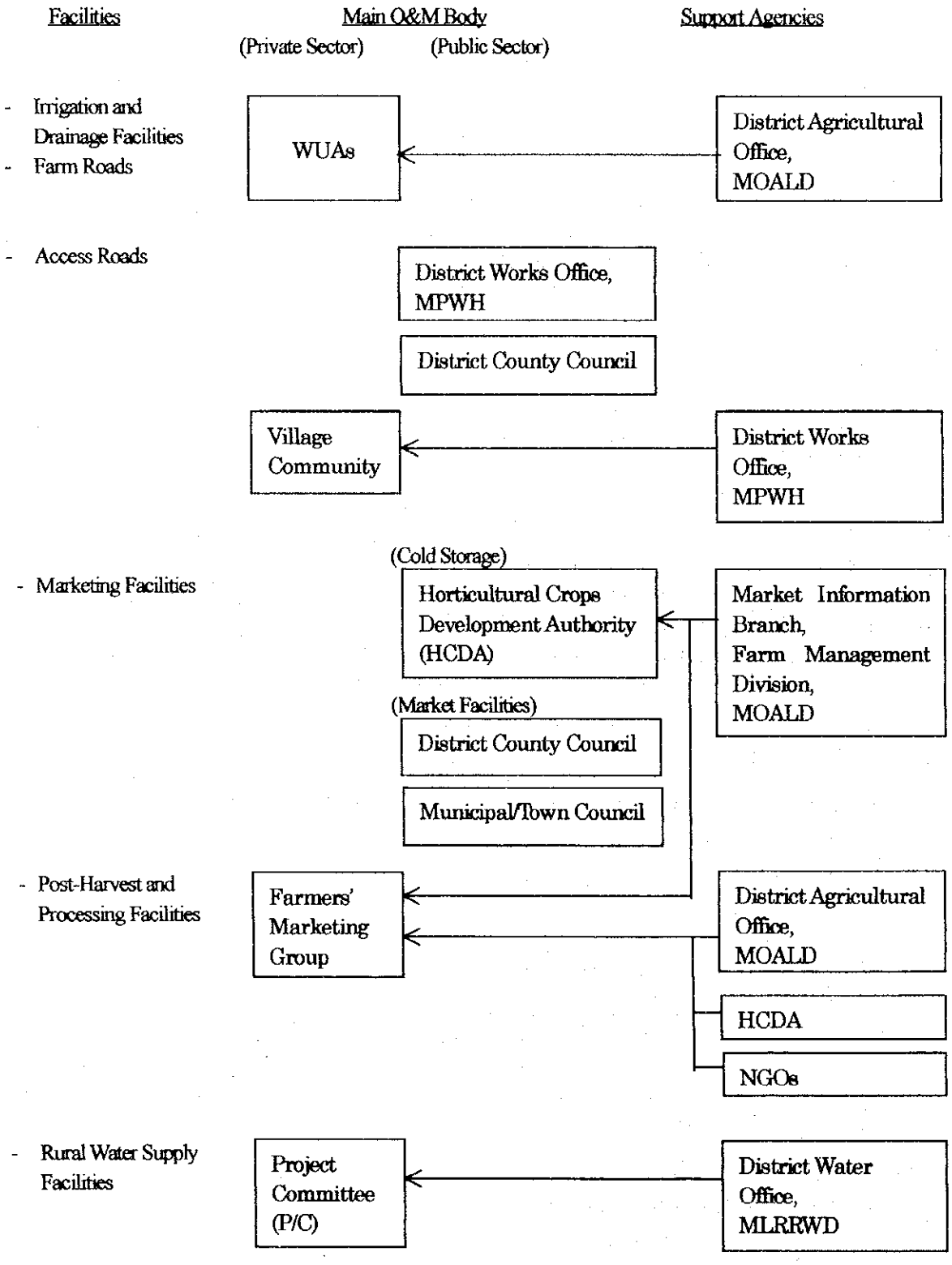


Table R.2-1 Implementation Process of Facility Construction for Rupingazi Ngerwe Irrigation Scheme

(1/3)

a) Self-Help Projects

(1) Beneficiaries self-help group shall form WUA, and register to Ministry of Culture and Social Services (MOCSS), then open bank account of WUA to build a fund for project.
(Rupingazi Ngerwe Irrigation Association has been formed, registered and functioned.)

(2) WUA shall apply for water permit to the district water engineer of MLRRWD, and obtain authorization to commence construction work after investigation and examination of water availability conducted by MLRRWD.
(Water permit has not officially obtained yet.)

(3) It is a basic condition to proceed to the project implementation that either water permit or authorization to commence the work is obtained from MLRRWD.

(4) NGOs will be selected and a contract is made between WUA and NGOs under witness of ESC. The role of NGOs will include the followings:

- Survey, detailed design and costing
- Procurement of funds with cooperation of ESC
- Tendering for the selection of contractors
- Construction supervision
- Training of WUA members on water management, management of association, etc.
- Monitoring of the projects at O/M stage, which may need a few years
- Workshop meetings shall be held with WUA at stage by stage as physical work progresses.

(5) For procurement of funds, since WUA has no access to financial agencies such as commercial banks, government banks, international development banks, foreign donor countries, financing NGOs, etc., strong support is required by ESC and NGOs. Possible fund resources will be the followings:

- WUA members contribution
- Loan from bank in Kenya such as Co-operative Bank of Kenya (CBK), Development Bank of Kenya (DBK) and Agricultural Finance Corporation (AFC)
- Loan from international development bank such as World Bank (WB), African Development Bank (ADB)
- Loan from donor countries
- Grant from donor countries
- Financing NGOs

(6) After selection of NGOs, NGOs shall conduct workshop seminar as a part of preparation work to finalize basic improvement plan based on the result of F/S.

(Cont.)

(7) Then, after basic plan is confirmed with WUA, NGOs will start field survey, and conduct detailed design and costing. Field survey as an important step of the project implementation will include workshop seminar among WUA members and physical survey for intake site topo-map, canal/pipeline longitudinal profiles, project area topo-map, etc. whatsoever necessary for design of new/improvement facilities.
(Topo-maps and longitudinal canal profile have been made by JICA Study Team)

(8) MOALD will conduct appraisal survey after NGOs design is made, and prepare an appraisal report to submit to ESC and WUA.

(9) Workshop meeting will be held with WUA members at the time when design report, costing, MOALD appraisal report and financial arrangement are made. This is one of the most important workshop meeting in the project. All conditions on system design and functions, project cost and loan arrangement shall be presented for discussion and examination, then final decision be made by WUA members who have to bear all project cost and system functions.

(10) After approved all conditions stated above, a loan agreement will be made between WUA and funding agencies under witness of ESC.

(11) Tender for construction work is also held to select local contractors who is capable to execute the works through labour-based method.

(12) A contract for construction work is signed between WUA, NGOs and Contractor(s) under witness of ESC. Then the construction work is commenced.

(13) NGOs, WUA and Contractor(s) shall keep good relationship during the construction. NGOs conduct overall construction supervision. WUA supplies unskilled labour for breaking of hard rocks, canal excavation and trimming, bush clearing, etc. if necessary. Contractor(s) provide skilled labour and necessary construction materials and equipment, and carry out concrete work, masonry work, pipe work, etc.

(14) NGOs shall also conduct training of WUA members in relation to community development and support services during the construction period on the followings:

- Water management including water distribution and on-farm water application.
- Farming techniques including cropping calendar, crop and seed selection, fertilizer application.
- Operation and maintenance of facilities such as intake operation, canal maintenance and structure maintenance.
- Management of WUA which includes collection of maintenance fee, project committee management, members meeting management, irrigation rules and regulations.

However, assistance from ESC, MOALD and other related agencies would be required particularly on technical matters such as agricultural farming techniques, water management and so on.

(Cont.)

(15) When construction is completed the test operation will be carried out by Contractor(s), checked by NGOs and witnessed by WUA. After successful test operation, all facilities shall be handed over to WUA and operation of improved irrigation system is commenced.

(16) NGOs shall undertake monitoring work particularly on irrigation system operation and structure maintenance, which probably needs for two to three years.

b) Government Public Projects

(1) ESC shall make an effort to secure the funds for road improvement works. Financial arrangement may be done with MOF.

(2) After the budget is obtained, consultants to render the services will be selected and a contract is made between ESC and Consultants. The role of Consultants will include the followings:

- Survey, detailed design and costing
- Tendering for the selection of contractors
- Construction supervision

(3) Consultants will start field survey to identify road sections to be improved, and conduct detailed design and costing.

(4) Tender for roads improvement is held to select local contractors who have capabilities to execute the works through recommended construction method as stated below:

- For access roads improvement, equipment-based big contractor will be selected.
- For village/farm roads, labour-based small contractor will be selected.
- For both of them, labour intensive method will be used.

(5) After selection of contractors, contracts for road works will be signed between MPWH and Contractor(s) for access roads and between County Council and Contractor(s) for village/farm roads. Both of them are witnessed by ESC.

(6) Consultants conduct overall supervision during the road improvement works.

(7) When the works are completed, improved access roads are handed over to MPWH and village/farm roads are to County Council. However, village/farm roads will be then handed over to communities for actual maintenance operation under community contract which will be arranged during workshop seminars held by NGOs.

(8) Then operation and maintenance of roads is commenced by MPWH and village communities for their respective roads.

Table R.2-2 Implementation Process of Facility Construction for Ngomano/Nyangati Water Furrow Project

(1/3)

a) Self-Help Projects

(1) Beneficiaries self-help group shall form WUA, and register to Ministry of Culture and Social Services (MOCSS), then open bank account of WUA to build a fund for project.
(Ngomano/Nyangati Water Furrow Association has been formed, registered and functioned.)

(2) WUA shall apply for water permit to the district water engineer of MLRRWD, and obtain authorization to commence construction work after investigation and examination of water availability conducted by MLRRWD.
(Obtaining of water permit is under process.)

(3) It is a basic condition to proceed to the project implementation that either water permit or authorization to commence the work is obtained from MLRRWD.

(4) NGOs will be selected and a contract is made between WUA and NGOs under witness of ESC. The role of NGOs will include the followings:

- Survey, detailed design and costing
- Procurement of funds with cooperation of ESC
- Tendering for the selection of contractors
- Construction supervision
- Training of WUA members on water management, management of association, etc.
- Monitoring of the projects at O/M stage, which may need a few years
- Workshop meetings shall be held with WUA at stage by stage as physical work progresses.

(5) For procurement of funds, since WUA has no access to financial agencies such as commercial banks, government banks, international development banks, foreign donor countries, financing NGOs, etc., strong support is required by ESC and NGOs. Possible fund resources will be the followings:

- WUA members contribution
- Loan from bank in Kenya such as Co-operative Bank of Kenya (CBK), Development Bank of Kenya (DBK) and Agricultural Finance Corporation (AFC)
- Loan from international development bank such as World Bank (WB), African Development Bank (ADB)
- Loan from donor countries
- Grant from donor countries
- Financing NGOs

(6) After selection of NGOs, NGOs shall conduct workshop seminar as a part of preparation work to finalize basic improvement plan based on the result of F/S.

(Cont.)

(7) Then, after basic plan is confirmed with WUA, NGOs will start field survey, and conduct detailed design and costing. Field survey as an important step of the project implementation will include workshop seminar among WUA members and physical survey for intake site topo-map, canal/pipeline longitudinal profiles, project area topo-map, etc. whatsoever necessary for design of new/improvement facilities.
(Topo-maps and longitudinal canal profile have been made by JICA Study Team)

(8) MOALD will conduct appraisal survey after NGOs design is made, and prepare an appraisal report to submit to ESC and WUA.

(9) Workshop meeting will be held with WUA members at the time when design report, costing, MOALD appraisal report and financial arrangement are made. This is one of the most important workshop meeting in the project. All conditions on system design and functions, project cost and loan arrangement shall be presented for discussion and examination, then final decision be made by WUA members who have to bear all project cost and system functions.

(10) After approved all conditions stated above, a loan agreement will be made between WUA and funding agencies under witness of ESC.

(11) Tender for construction work is also held to select local contractors who is capable to execute the works through labour-based method.

(12) A contract for construction work is signed between WUA, NGOs and Contractor(s) under witness of ESC. Then the construction work is commenced.

(13) NGOs, WUA and Contractor(s) shall keep good relationship during the construction. NGOs conduct overall construction supervision. WUA supplies unskilled labour for breaking of hard rocks, canal excavation and trimming, bush clearing, etc. if necessary. Contractor(s) provide skilled labour and necessary construction materials and equipment, and carry out concrete work, masonry work, pipe work, etc.

(14) NGOs shall also conduct training of WUA members in relation to community development and support services during the construction period on the followings:

- Water management including water distribution and on-farm water application.
- Farming techniques including cropping calendar, crop and seed selection, fertilizer application.
- Operation and maintenance of facilities such as intake operation, canal maintenance and structure maintenance.
- Management of WUA which includes collection of maintenance fee, project committee management, members meeting management, irrigation rules and regulations.

However, assistance from ESC, MOALD and other related agencies would be required particularly on technical matters such as agricultural farming techniques, water management and so on.

(Cont.)

(15) When construction is completed the test operation will be carried out by Contractor(s), checked by NGOs and witnessed by WUA. After successful test operation, all facilities shall be handed over to WUA and operation of improved irrigation system is commenced.

(16) NGOs shall undertake monitoring work particularly on irrigation system operation and structure maintenance, which probably needs for two to three years.

b) Government Public Projects

(1) ESC shall make an effort to secure the funds for road improvement works. Financial arrangement may be done with MOF.

(2) After the budget is obtained, consultants to render the services will be selected and a contract is made between ESC and Consultants. The role of Consultants will include the followings:

- Survey, detailed design and costing
- Tendering for the selection of contractors
- Construction supervision

(3) Consultants will start field survey to identify road sections to be improved, and conduct detailed design and costing.

(4) Tender for roads improvement is held to select local contractors who have capabilities to execute the works through recommended construction method as stated below:

- For village/farm roads, labour-based small contractor will be selected.
- For village/farm roads, labour intensive method will be used.

(5) After selection of contractors, contracts for road works will be signed between County Council and Contractor(s) for village/farm roads and witnessed by ESC.

(6) Consultants conduct overall supervision during the road improvement works.

(7) When the works are completed, improved village/farm roads are handed over to County Council. However, village/farm roads will be then handed over to communities for actual maintenance operation under community contract which will be arranged during workshop seminars held by NGOs.

(8) Then operation and maintenance of roads is commenced by village communities.

Table R.2-3 Implementation Process of Facility Construction for Nkunjumo Water Project

(1/3)

a) Self-Help Projects

(1) Beneficiaries self-help group shall form WUA, and register to Ministry of Culture and Social Services (MOCSS), then open bank account of WUA to build a fund for project.
(Nkunjumo Water Association has been formed, registered and functioned.)

(2) WUA shall apply for water permit to the district water engineer of MLRRWD, and obtain authorization to commence construction work after investigation and examination of water availability conducted by MLRRWD.
(Water permit and authorization has been officially obtained from MLRRWD.)

(3) It is a basic condition to proceed to the project implementation that either water permit or authorization to commence the work is obtained from MLRRWD.

(4) NGOs will be selected and a contract is made between WUA and NGOs under witness of ESC. The role of NGOs will include the followings:

- Survey, detailed design and costing
- Procurement of funds with cooperation of ESC
- Tendering for the selection of contractors
- Construction supervision
- Training of WUA members on water management, management of association, etc.
- Monitoring of the projects at O/M stage, which may need a few years
- Workshop meetings shall be held with WUA at stage by stage as physical work progresses.

(5) For procurement of funds, since WUA has no access to financial agencies such as commercial banks, government banks, international development banks, foreign donor countries, financing NGOs, etc., strong support is required by ESC and NGOs. Possible fund resources will be the followings:

- WUA members contribution
- Loan from bank in Kenya such as Co-operative Bank of Kenya (CBK), Development Bank of Kenya (DBK) and Agricultural Finance Corporation (AFC)
- Loan from international development bank such as World Bank (WB), African Development Bank (ADB)
- Loan from donor countries
- Grant from donor countries
- Financing NGOs

(6) After selection of NGOs, NGOs shall conduct workshop seminar as a part of preparation work to finalize basic improvement plan based on the result of F/S.

(Cont.)

(7) Then, after basic plan is confirmed with WUA, NGOs will start field survey, and conduct detailed design and costing. Field survey as an important step of the project implementation will include workshop seminar among WUA members and physical survey for intake site topo-map, canal/pipeline longitudinal profiles, project area topo-map, etc. whatsoever necessary for design of new/improvement facilities.
(Topo-maps and longitudinal pipeline profile have been made by JICA Study Team)

(8) MOALD will conduct appraisal survey after NGOs design is made, and prepare an appraisal report to submit to ESC and WUA.

(9) Workshop meeting will be held with WUA members at the time when design report, costing, MOALD appraisal report and financial arrangement are made. This is one of the most important workshop meeting in the project. All conditions on system design and functions, project cost and loan arrangement shall be presented for discussion and examination, then final decision be made by WUA members who have to bear all project cost and system functions.

(10) After approved all conditions stated above, a loan agreement will be made between WUA and funding agencies under witness of ESC.

(11) Tender for construction work is also held to select local contractors who is capable to execute the works through labour-based method.

(12) A contract for construction work is signed between WUA, NGOs and Contractor(s) under witness of ESC. Then the construction work is commenced.

(13) NGOs, WUA and Contractor(s) shall keep good relationship during the construction. NGOs conduct overall construction supervision. WUA supplies unskilled labour for breaking of hard rocks, canal excavation and trimming, bush clearing, etc. if necessary. Contractor(s) provide skilled labour and necessary construction materials and equipment, and carry out concrete work, masonry work, pipe work, etc.

(14) NGOs shall also conduct training of WUA members in relation to community development and support services during the construction period on the followings:

- Water management including water distribution and on-farm water application.
- Farming techniques including cropping calendar, crop and seed selection, fertilizer application.
- Operation and maintenance of facilities such as intake operation, pipeline maintenance and structure maintenance.
- Management of WUA which includes collection of maintenance fee, project committee management, members meeting management, irrigation rules and regulations.

However, assistance from ESC, MOALD and other related agencies would be required particularly on technical matters such as agricultural farming techniques, water management and so on.

(Cont.)

(15) When construction is completed the test operation will be carried out by Contractor(s), checked by NGOs and witnessed by WUA. After successful test operation, all facilities shall be handed over to WUA and operation of improved irrigation system is commenced.

(16) NGOs shall undertake monitoring work particularly on pipeline system operation and structure maintenance, which probably needs for two to three years.

b) Government Public Projects

(1) ESC shall make an effort to secure the funds for road improvement works. Financial arrangement may be done with MOF.

(2) After the budget is obtained, consultants to render the services will be selected and a contract is made between ESC and Consultants. The role of Consultants will include the followings:

- Survey, detailed design and costing
- Tendering for the selection of contractors
- Construction supervision

(3) Consultants will start field survey to identify road sections to be improved, and conduct detailed design and costing.

(4) Tender for roads improvement is held to select local contractors who have capabilities to execute the works through recommended construction method as stated below:

- For village/farm roads, labour-based small contractor will be selected.
- For village roads, labour intensive method will be used.

(5) After selection of contractors, contracts for road works will be signed between County Council and Contractor(s) and witnessed by ESC.

(6) Consultants conduct overall supervision during the road improvement works.

(7) When the works are completed, improved village/farm roads are handed over to County Council. However, village/farm roads will be then handed over to communities for actual maintenance operation under community contract which will be arranged during workshop seminars held by NGOs.

(8) Then operation and maintenance of roads is commenced by village communities.

Table R.2-4 Implementation Process of Facility Construction for Ruungu/Karoch Irrigation Project

(1/3)

a) Self-Help Projects

(1) Beneficiaries self-help group shall form WUA, and register to Ministry of Culture and Social Services (MOCSS), then open bank account of WUA to build a fund for project.
(Ruungu/Karoch Irrigation Association has been formed, registered and functioned.)

(2) WUA shall apply for water permit to the district water engineer of MLRRWD, and obtain authorization to commence construction work after investigation and examination of water availability conducted by MLRRWD.
(Water permit has been obtained from MLRRWD.)

(3) It is a basic condition to proceed to the project implementation that either water permit or authorization to commence the work is obtained from MLRRWD.

(4) NGOs will be selected and a contract is made between WUA and NGOs under witness of ESC. The role of NGOs will include the followings:
(SISDO has undertaken survey and detailed design and the implementation is on-going. However, damaged intake weir will need reconsideration on design)

- Survey, detailed design and costing
- Procurement of funds with cooperation of ESC
- Tendering for the selection of contractors
- Construction supervision
- Training of WUA members on water management, management of association, etc.
- Monitoring of the projects at O/M stage, which may need a few years
- Workshop meetings shall be held with WUA at stage by stage as physical work progresses.

(5) For procurement of funds, since WUA has no access to financial agencies such as commercial banks, government banks, international development banks, foreign donor countries, financing NGOs, etc., strong support is required by ESC and NGOs. Possible fund resources will be the followings:
(Funds for on-going construction works were obtained from CKB, however it will be transferred to DKB)

- WUA members contribution
- Loan from bank in Kenya such as Co-operative Bank of Kenya (CBK), Development Bank of Kenya (DBK) and Agricultural Finance Corporation (AFC)
- Loan from international development bank such as World Bank (WB), African Development Bank (ADB)
- Loan from donor countries
- Grant from donor countries
- Financing NGOs

(Cont.)

(6) After selection of NGOs, NGOs shall conduct workshop seminar as a part of preparation work to finalize basic improvement plan based on the result of F/S.

(7) Then, after basic plan is confirmed with WUA, NGOs will start field survey, and conduct detailed design and costing. Field survey as an important step of the project implementation will include workshop seminar among WUA members and physical survey for intake site topo-map, canal/pipeline longitudinal profiles, project area topo-map, etc. whatsoever necessary for design of new/improvement facilities.
(Topo-maps and longitudinal canal profile have been made by JICA Study Team)

(8) MOALD will conduct appraisal survey after NGOs design is made, and prepare an appraisal report to submit to ESC and WUA.
(An appraisal report was prepared by IDB, MOALD in September 1996)

(9) Workshop meeting will be held with WUA members at the time when design report, costing, MOALD appraisal report and financial arrangement are made. This is one of the most important workshop meeting in the project. All conditions on system design and functions, project cost and loan arrangement shall be presented for discussion and examination, then final decision be made by WUA members who have to bear all project cost and system functions.

(10) After approved all conditions stated above, a loan agreement will be made between WUA and funding agencies under witness of ESC.
(A loan agreement was made between WUA and CBK, however another loan arrangement will be required with DBK)

(11) Tender for construction work is also held to select local contractors who is capable to execute the works through labour-based method.

(12) A contract for construction work is signed between WUA, NGOs and Contractor(s) under witness of ESC. Then the construction work is commenced.

(13) NGOs, WUA and Contractor(s) shall keep good relationship during the construction. NGOs conduct overall construction supervision. WUA supplies unskilled labour for breaking of hard rocks, canal excavation and trimming, bush clearing, etc. if necessary. Contractor(s) provide skilled labour and necessary construction materials and equipment, and carry out concrete work, masonry work, pipe work, etc.

(14) NGOs shall also conduct training of WUA members in relation to community development and support services during the construction period on the followings:

- Water management including water distribution and on-farm water application.
- Farming techniques including cropping calendar, crop and seed selection, fertilizer application.
- Operation and maintenance of facilities such as intake operation, canal maintenance and structure maintenance.
- Management of WUA which includes collection of maintenance fee, project committee management, members meeting management, irrigation rules and regulations.

(Cont.)

However, assistance from ESC, MOALD and other related agencies would be required particularly on technical matters such as agricultural farming techniques, water management and so on.

(15) When construction is completed the test operation will be carried out by Contractor(s), checked by NGOs and witnessed by WUA. After successful test operation, all facilities shall be handed over to WUA and operation of improved irrigation system is commenced.

(16) NGOs shall undertake monitoring work particularly on irrigation system operation and structure maintenance, which probably needs for two to three years.

b) Government Public Projects

(1) ESC shall make an effort to secure the funds for road improvement works. Financial arrangement may be done with MOF.

(2) After the budget is obtained, consultants to render the services will be selected and a contract is made between ESC and Consultants. The role of Consultants will include the followings:

- Survey, detailed design and costing
- Tendering for the selection of contractors
- Construction supervision

(3) Consultants will start field survey to identify road sections to be improved, and conduct detailed design and costing.

(4) Tender for roads improvement is held to select local contractors who have capabilities to execute the works through recommended construction method as stated below:

- For access roads improvement, equipment-based big contractor will be selected.
- For village/farm roads, labour-based small contractor will be selected.
- For both of them, labour intensive method will be used.

(5) After selection of contractors, contracts for road works will be signed between MPWH and Contractor(s) for classified access roads, and between County Council and Contractor(s) for unclassified access roads and village/farm roads. Both of them are witnessed by ESC.

(6) Consultants conduct overall supervision during the road improvement works.

(7) When the works are completed, improved classified access roads are handed over to MPWH, and unclassified access roads and village/farm roads are to County Council. However, village/farm roads will be then handed over to communities for actual maintenance operation under community contract which will be arranged during workshop seminars held by NGOs.

(8) Then operation and maintenance of roads is commenced by MPWH, County Council and village communities for their respective roads.

Table R.2--5 Annual Operation and Maintenance Cost for Facilities by Sector and by Agency

(Unit: Ksh/year)

Item	Q'ty	Unit	Unit Cost	Total Amount	Private Sector	Government Public Sector			Remarks
					WUA	MPWH	Tharaka CC	Meru MC	
1. Rupingazi Ngerwe Irrigation Scheme									
1) Irrigation & Drainage Facilities	1.0	l.s.		74,000	74,000	-	-	-	2.0% of construction cost
2) Marketing Facilities	-		-	0	-	-	-	-	
3) Access Roads	10.40	km	20,000	208,000	-	208,000	-	-	Routine maintenance
4) Village/Farm Roads	5.70	km	10,000	57,000	57,000	-	-	-	Routine maintenance
5) Domestic Water Supply Facilities	-		-	0	-	-	-	-	
Total				**339,000**	**131,000**	**208,000**	-	-	
2. Ngomano/Nyangati Water Furrow Project									
1) Irrigation & Drainage Facilities	1.0	l.s.		71,000	71,000	-	-	-	2.0% of construction cost
2) Marketing Facilities	-		-	0	-	-	-	-	
3) Access Roads	-		-	0	-	-	-	-	
4) Village/Farm Roads	15.70	km	10,000	157,000	157,000	-	-	-	Routine maintenance
5) Domestic Water Supply Facilities	-		-	0	-	-	-	-	
Total				**228,000**	**228,000**	**0**	-	-	
3. Nkunjumo Water Project									
1) Irrigation & Drainage Facilities	1.0	l.s.		109,000	109,000	-	-	-	2.0% of construction cost
2) Marketing Facilities	1.0	l.s.	-	2,866,000	-	-	-	2,866,000	1.0% of construction cost
3) Access Roads	-		-	0	-	-	-	-	
4) Village/Farm Roads	6.20	km	10,000	62,000	62,000	-	-	-	Routine maintenance
5) Domestic Water Supply Facilities	-		-	0	-	-	-	-	
Total				**3,037,000**	**171,000**	**0**	-	**2,866,000**	
4. Ruungu/Karocho Irrigation Project									
1) Irrigation & Drainage Facilities	1.0	l.s.		62,300	62,300	-	-	-	From SISDO D/D report
2) Marketing Facilities	1.0	l.s.	-	30,000	30,000	-	-	-	2.0% of construction cost
3) Access Roads	49.70	km	20,000	994,000	-	874,000	120,000	-	Routine maintenance
4) Village/Farm Roads	7.50	km	10,000	75,000	75,000	-	-	-	Routine maintenance
5) Domestic Water Supply Facilities	-		-	0	-	-	-	-	
Total				**1,161,300**	**167,300**	**874,000**	**120,000**	-	

Figure R.2-1 **Implementation Flow for Self-help Project (Rupingazi Ngerwe Irrigation Scheme)**

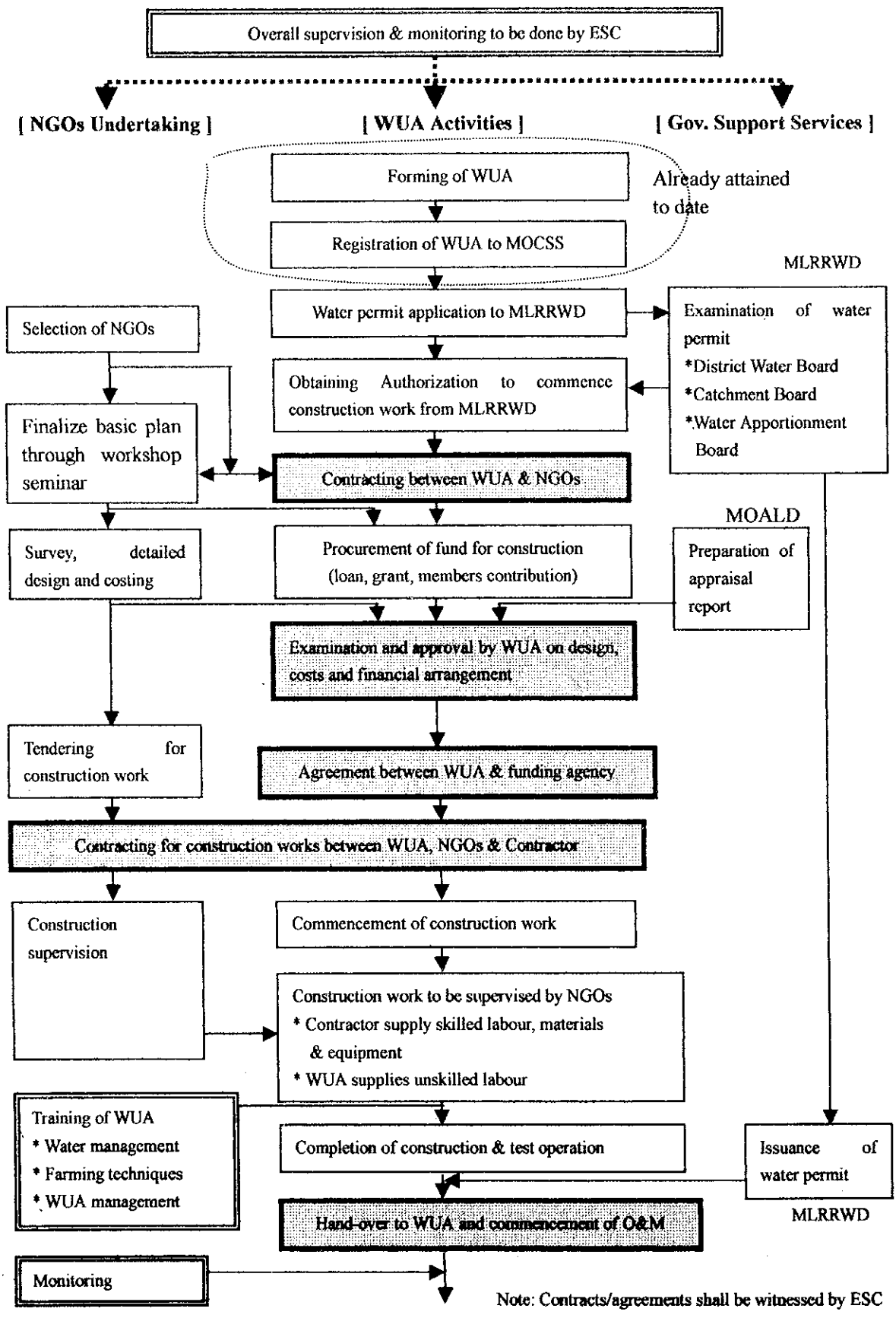
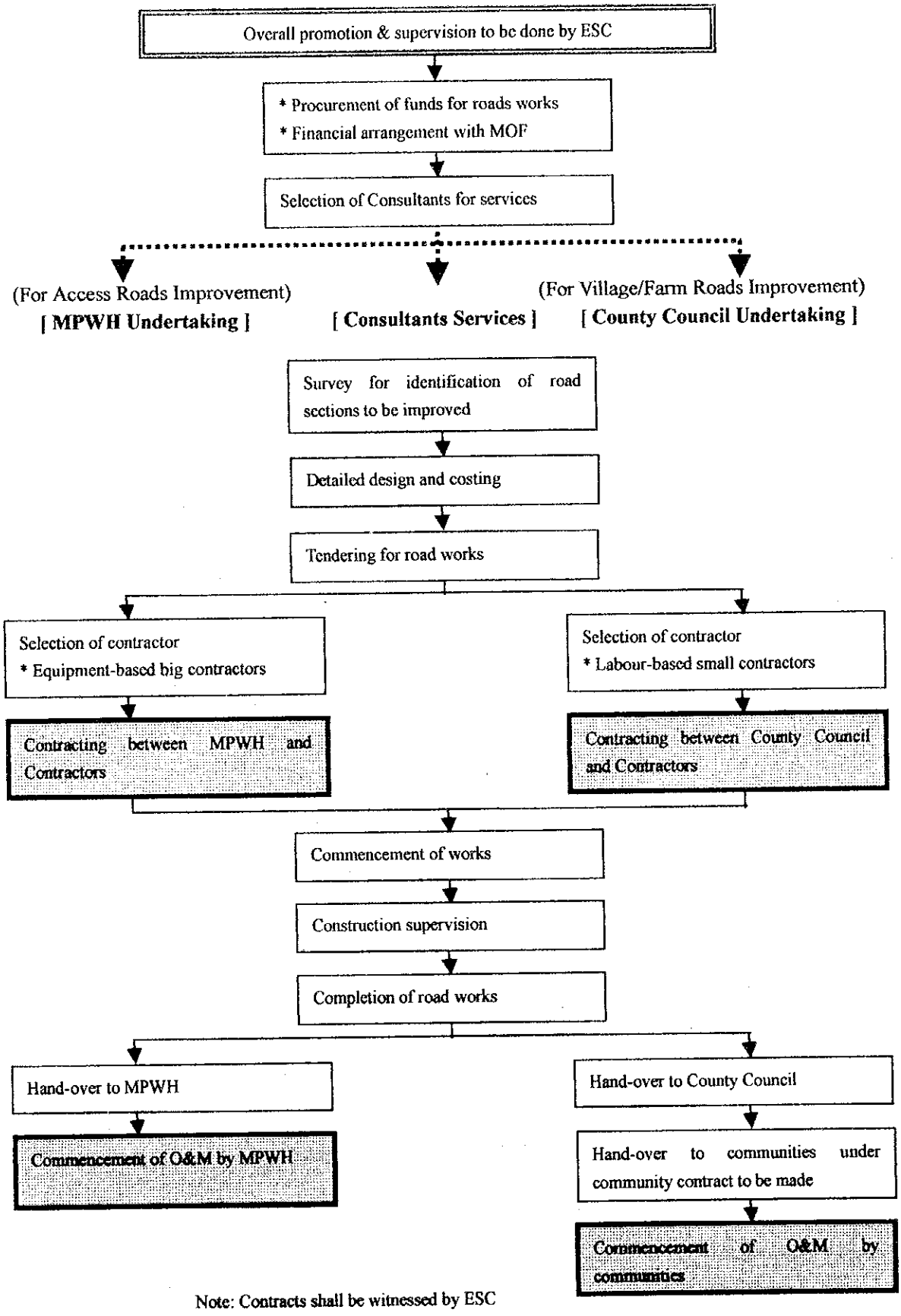


Figure R.2-2 **Implementation Flow for Government Public Project (Rupingazi Ngerwe Irrigation Scheme)**



Note: Contracts shall be witnessed by ESC

Figure R.2-3 **Implementation Flow for Self-help Project (Ngomano/Nyangati Water Furrow Project)**

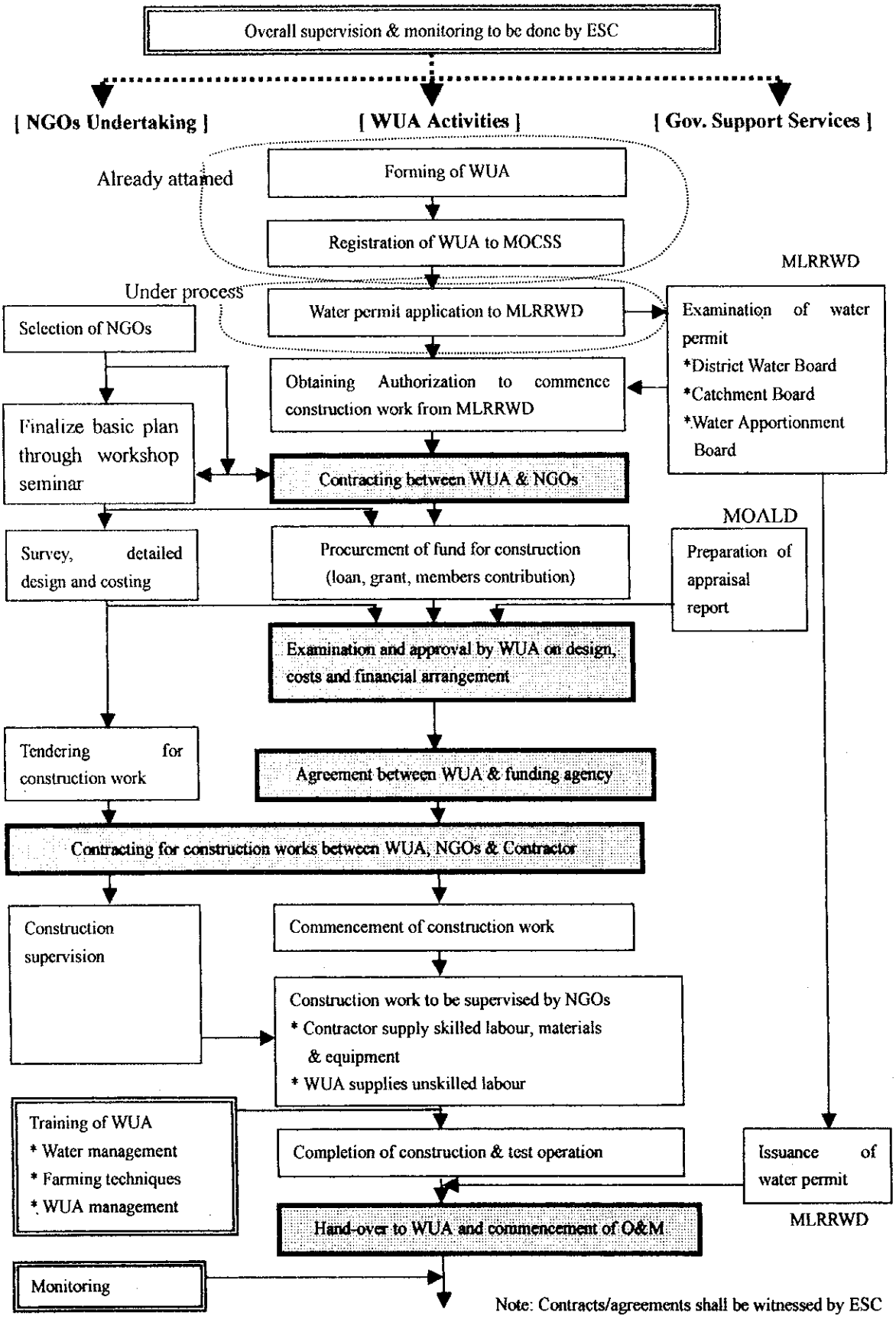
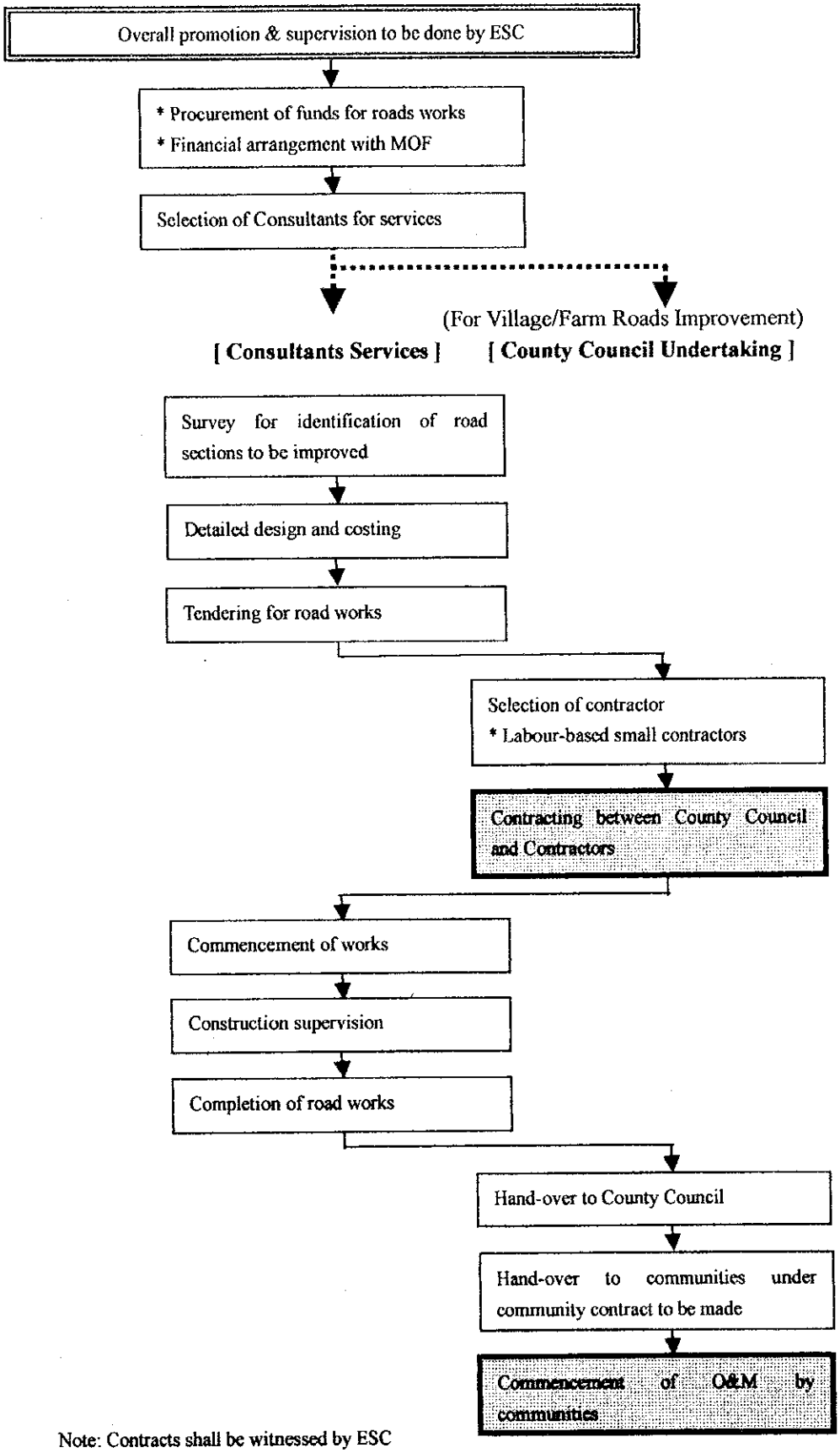


Figure R.2-4 **Implementation Flow for Government Public Project (Ngomano/Nyangati Water Furrow Project)**



Note: Contracts shall be witnessed by ESC

Figure R.2-5 **Implementation Flow for Self-help Project (Nkunjumo Water Project)**

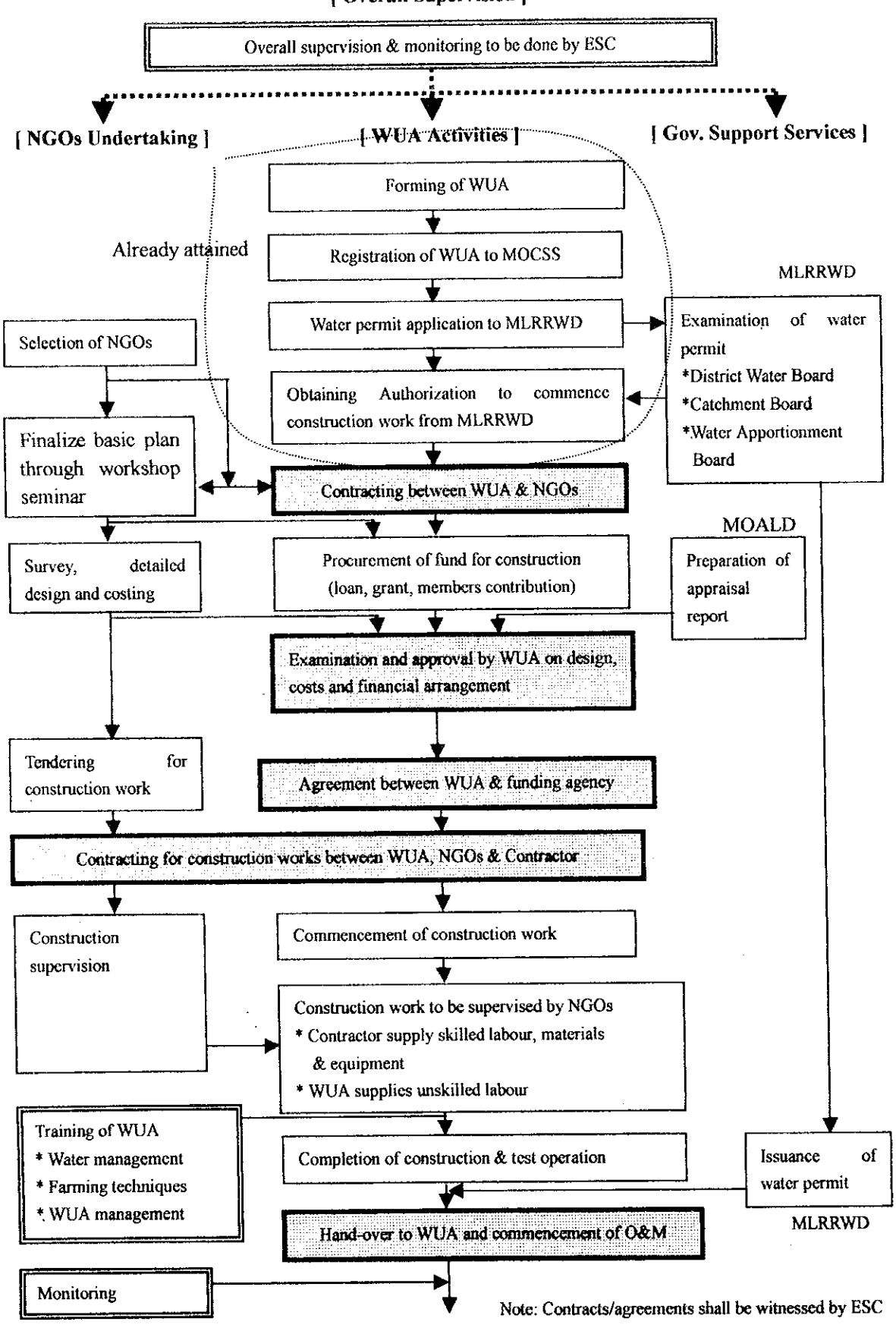
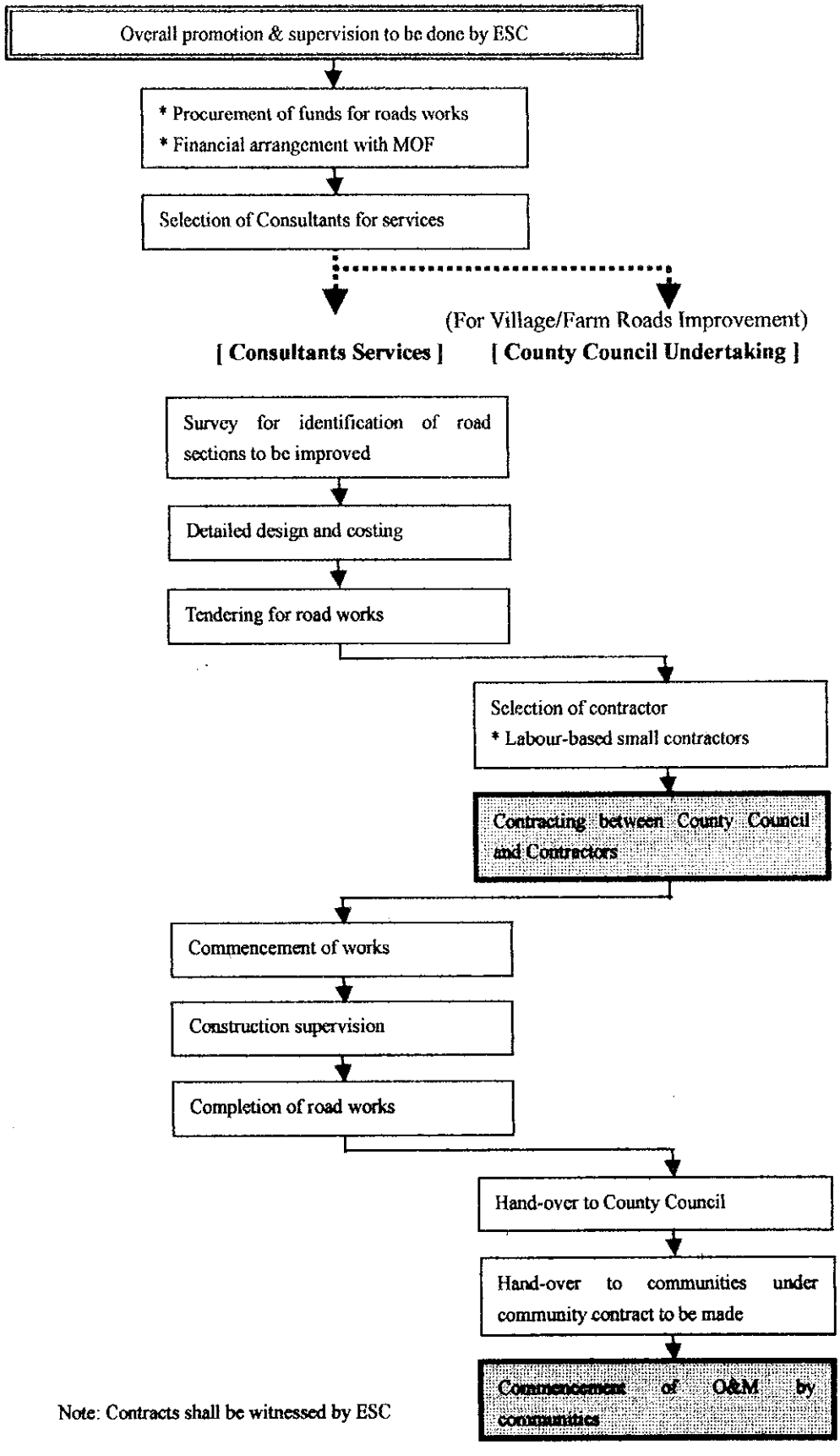


Figure R.2-6 **Implementation Flow for Government Public Project (Nkunjumo Water Project)**

[Overall Supervision] (1/2)

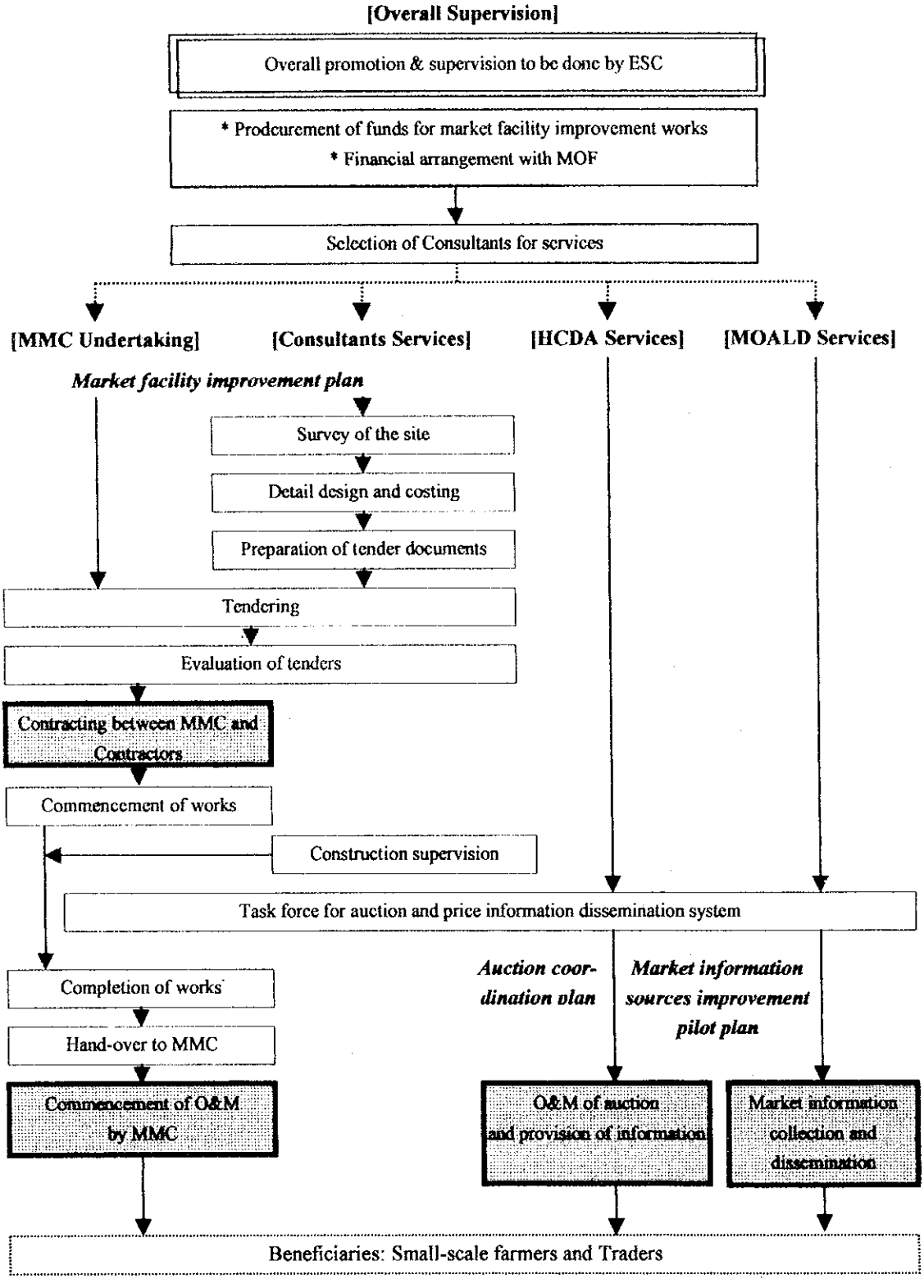


Note: Contracts shall be witnessed by ESC

(Cont.)

(For Marketing Improvement for Kunjumo Water Project)

Regional Market Improvement Plan for Transaction Modes and Information Flows of Horticultural Produce at Gakoromone Wholesale Market



Note: Contracts shall be witnessed by ESC.

Figure R.2-7 **Implementation Flow for Self-help Project (Ruungu/Karocho Irrigation Project)**

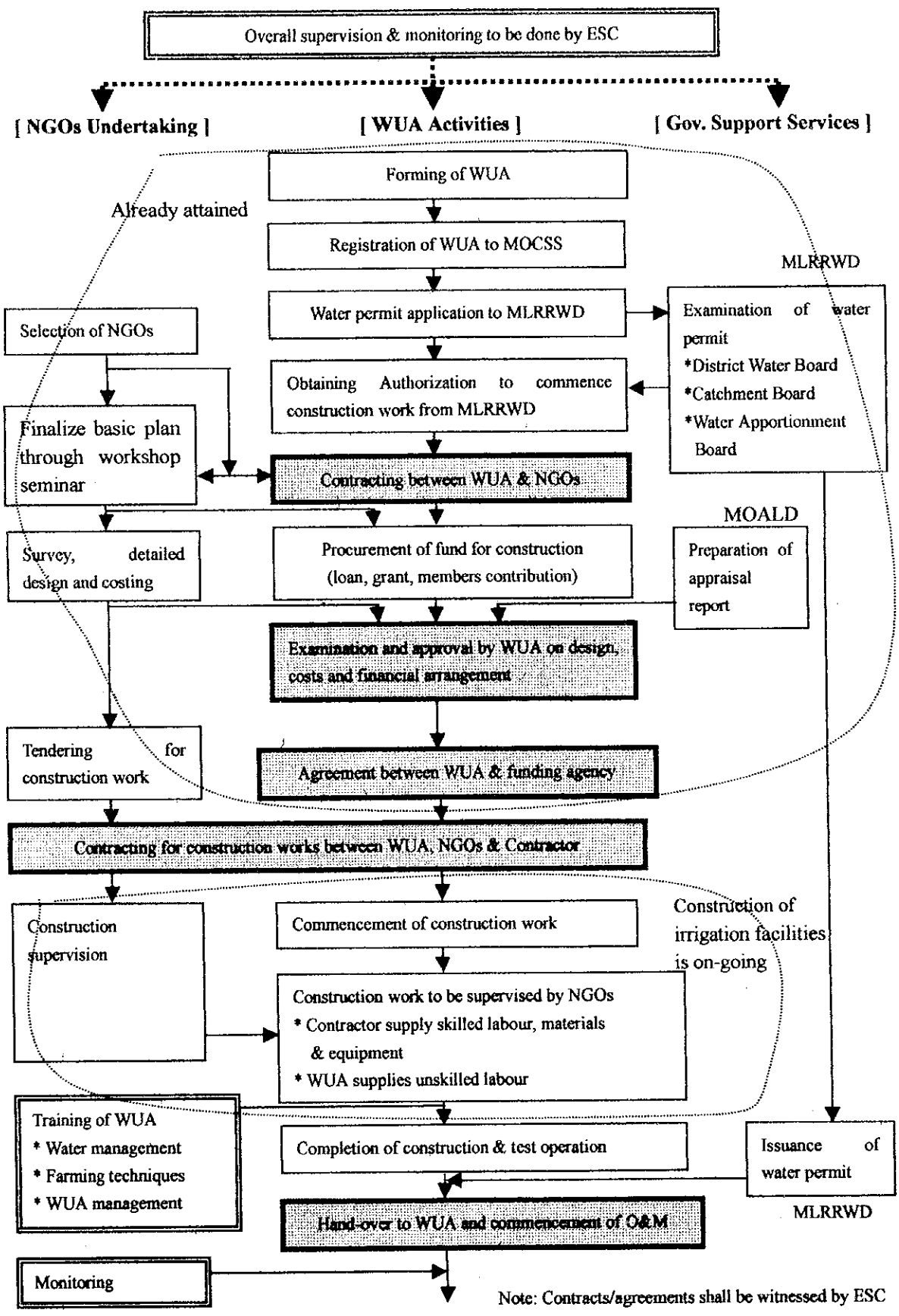
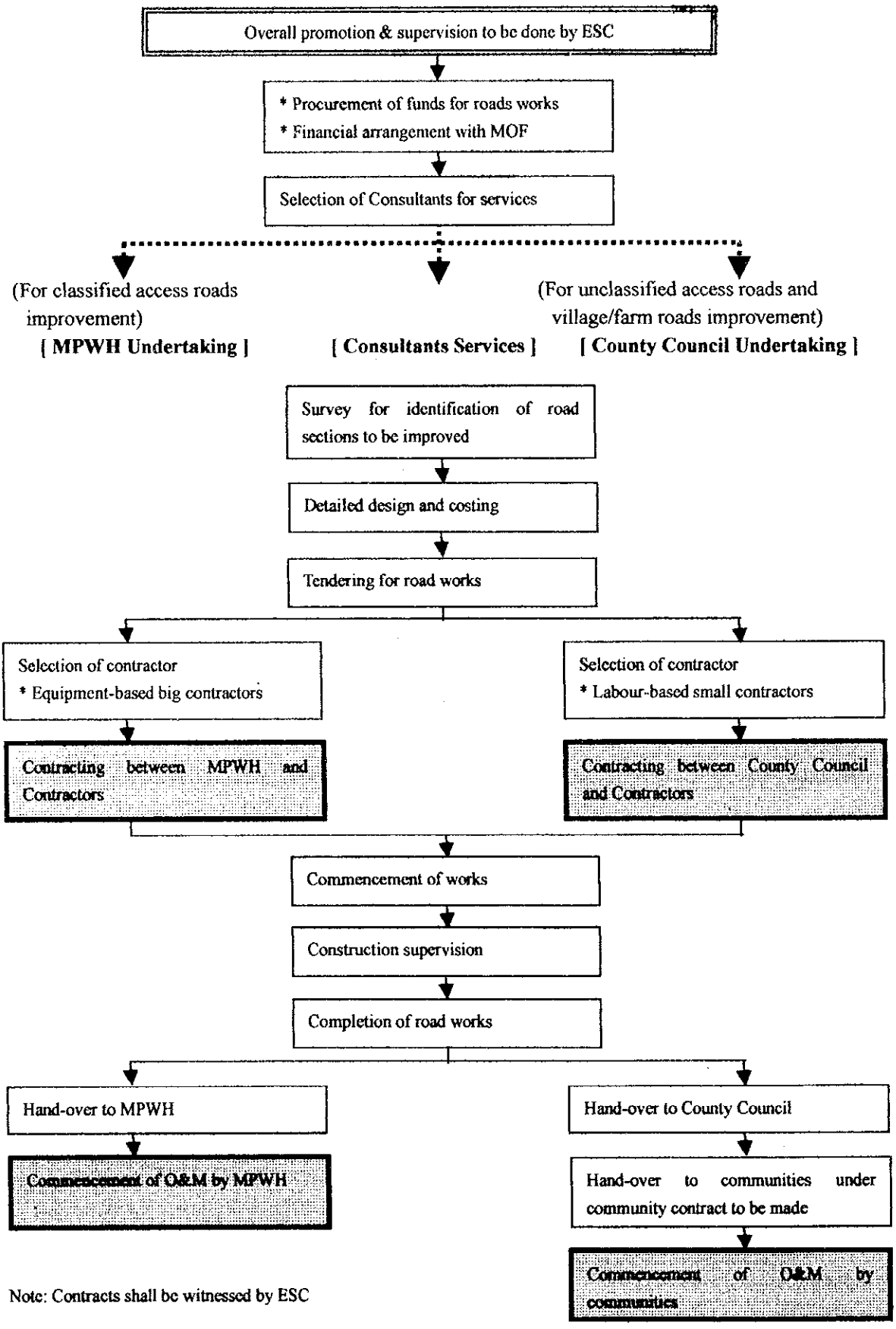


Figure R.2-8 **Implementation Flow for Government Public Project (Ruungu/Karocho Irrigation Project)**



Note: Contracts shall be witnessed by ESC

Figure R.2- 9 **Proposed Organization Chart for Operation and Maintenance for Rupingazi Ngerwe Irrigation Scheme**

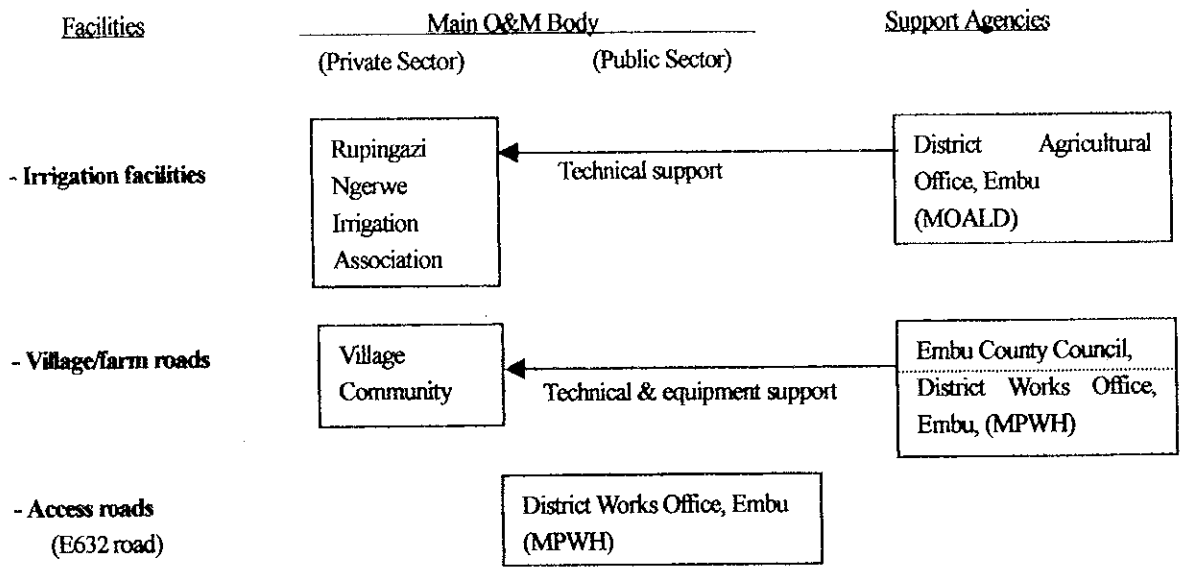


Figure R.2-10 **Proposed Organization Chart for Operation and Maintenance for Ngomano/Nyangati Water Furrow Project**

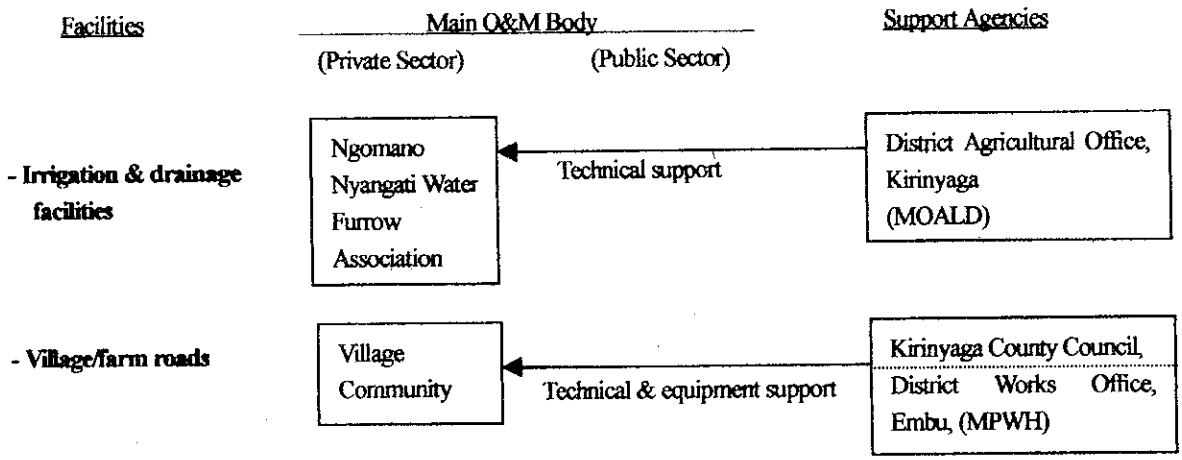


Figure R.2- 11 **Proposed Organization Chart for Operation and Maintenance for Nkunjumo Water Project**

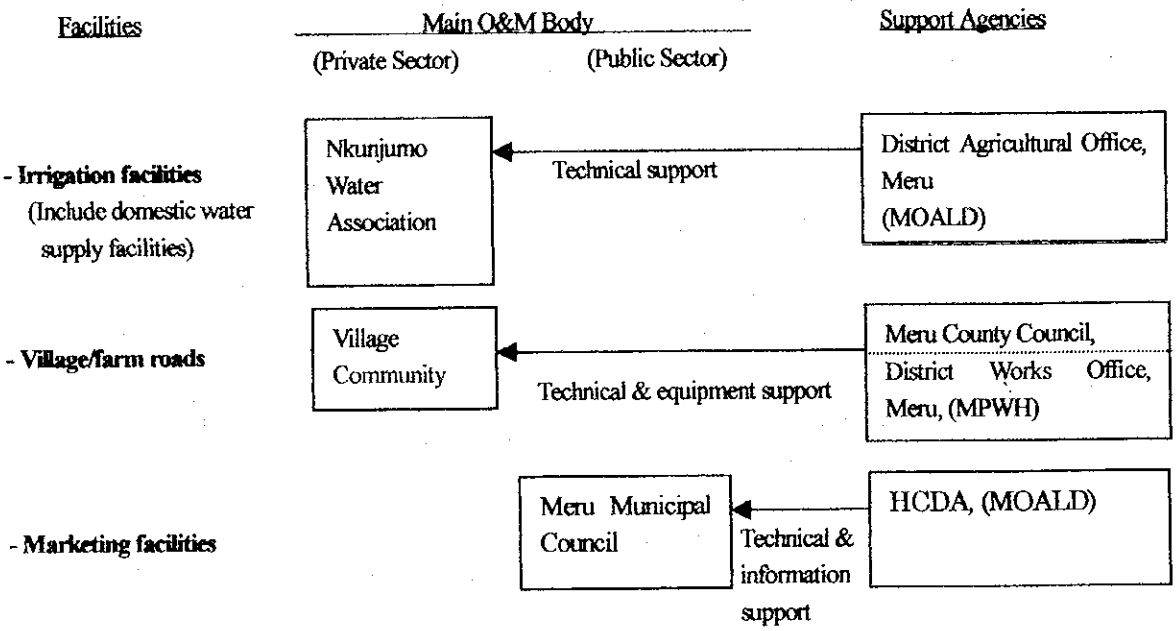


Figure R.2- 12 **Proposed Organization Chart for Operation and Maintenance for Ruungu/Karocho Irrigation Project**

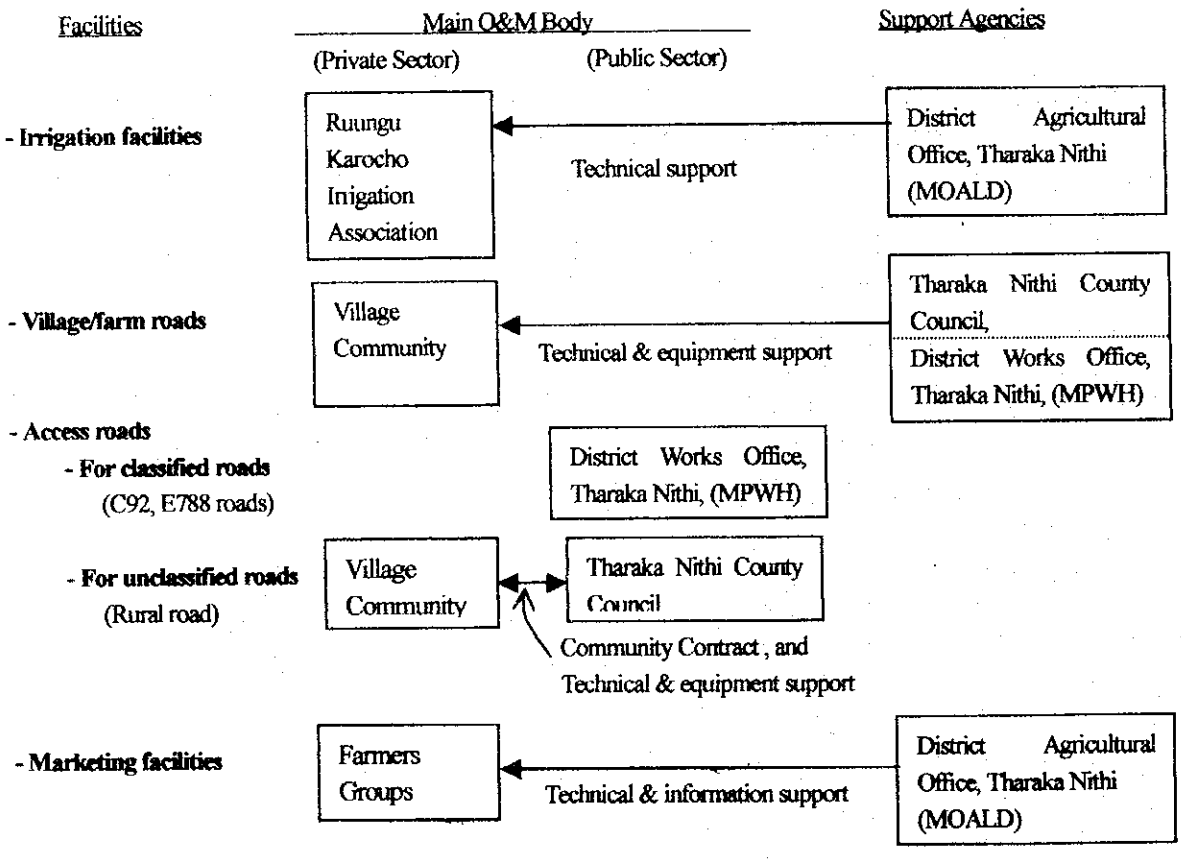
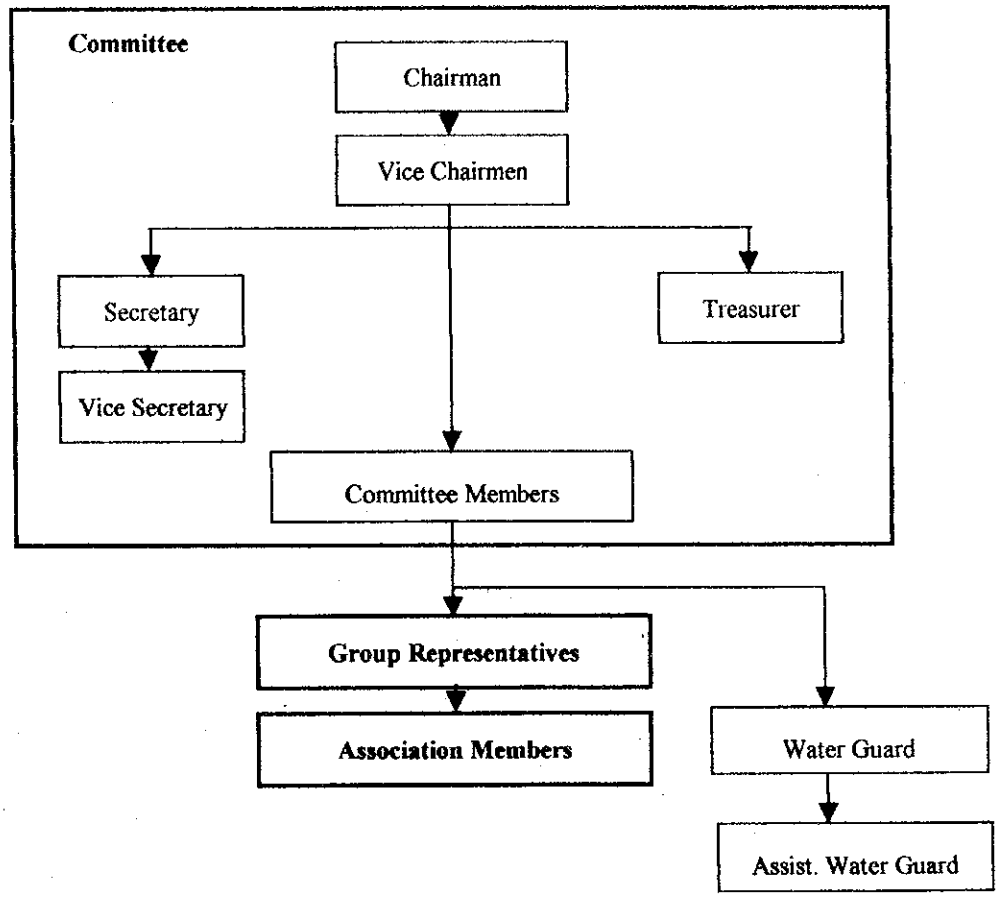


Figure R.2-13 Proposed Organization Chart of WUA for Model Areas



ANNEX S

PROJECT BENEFITS AND EVALUATION

S.2 PROJECT BENEFITS AND EVALUATION

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Agricultural Credit Systems in the Selected Countries

Table S.2.1-1 Farmgate Prices at Rupingazi Ngerwe

	Unit	Unit Price(Ksh) Financial	Economic
1. Crops			
Maize	kg	11.5	9.5
Maize Green	kg	10.0	10.0
Sorghum	kg	15.0	15.0
Millet	kg	20.0	20.0
Beans	kg	31.6	31.6
French Beans	kg	29.6	32.6
Irish Potatoes	kg	11.7	11.7
Sweet Potatoes	kg	5.0	5.0
Bulb Onions	kg	24.7	24.7
Tomatoes	kg	24.0	23.0
Cabbage	kg	10.7	10.7
Kale	kg	3.0	3.0
Carrots	kg	16.6	21.4
Okra	kg	23.0	25.1
Banana	Bunch	150.0	150.0
Coffee	kg	25.0	17.2
Tea	kg	16.8	17.7
Milk	kg	23.8	23.8
Macadamia nut	kg	29.0	29.0
2. Seed			
Maize	kg	90	84
Cabbage	kg	1,200	1,121
Bulb onion	kg	4,700	4,390
Tomatoes	kg	6,400	5,978
Carrot	kg	2,400	2,242
Kale	kg	1,200	1,121
3. Fertilizer			
Nitrogen	kg	24.6	27.4
Phosphate	kg	17.0	24.3
Potassium	kg	23.8	16.4
4. Agricultural Chemicals			
Dimethoate	lit.	600	560
Sancozeb	kg	460	430
Milraz	kg	1,450	1,354
Karate	lit.	1,395	1,303
5. Labour			
Labour	MD	70	35
Animal Labour	MAD	1,000	500
6. Nursery			
Banana	plant	50	50
Coffee	plant	50	50
Papaya	plant	40	40
Mango	plant	60	60
Avocado	plant	50	50
Tea	plant	50	50
Passion fruit	plant	50	50
Macadamia nut	plant	60	60
Cashew nut	plant	50	50

Source.Farm Economic Survey(JICA) 1998 and interview survey to stockists

Table S.2.1-2 Standard Conversion Factor (SCF)

(unit:1,000 K.Pound)

	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	Average
(1)Imports	2,545,630	2,645,913	2,945,863	5,056,419	5,753,988	7,758,420	8,424,310	5,018,649
(2)Exports	1,244,010	1,629,467	1,742,268	3,678,247	4,282,132	4,866,950	5,910,000	3,336,153
(3)Import Duties	347,968	334,680	255,939	459,150	739,639	929,910	1,058,780	589,438
(4)Export Duties	729	70	740	222	130	0	0	270
(5)Subsidy on Exports	0	0	0	0	0	0	0	0
(6)=(1)+(2)	3,789,640	4,275,380	4,688,131	8,734,666	10,036,120	12,625,370	14,334,310	8,354,802
(7)=(1)+(2)+(3)-(4)+(5)	4,136,879	4,609,990	4,943,330	9,193,594	10,775,629	13,555,280	15,393,090	8,943,970
(8)SCF=(6)/(7)	0.916	0.927	0.948	0.950	0.931	0.931	0.931	0.934

Source.Economic Survey 1997
Statistical Abstract 1995

Table S.2.1-3 Price Structure of Maize (economic)

1. Projected 2010 world market price($/ton in 1990 price	94.9
2. Projected 2010 world market price($/ton in 1998 price	104.6
3. Quality adjustment(%)	90
4. World market equivalent(US$/ton)	94
5. Freight and insurance(US$/ton)	40
6. CIF Monbasa(US$/ton)	134
7. Unloading and port handling(US$/ton)	9
8. Value Kenya border	
- in US$	143
- in Ksh(61.19Ksh/US$)	8,750
9. Domestic handling, transport, margin(Ksh/ton)	831
10. Processing ratio(%)	100
11. Wholesale price(Ksh/ton)	9,581
12. Transport to/from farm(Ksh/ton)	103
13. Farmgate price(Ksh/ton)	9,478

Source.Commodity markets and the developing countries February 1998, World Bank

Table S.2.1-4 Price Structure of Fertilizer (economic)

	Urea	TSP	Muriate of Potash
1. Projected 2010 World market price($/ton in 1990 price)	131.8	106.7	90.3
2. Projected 2010 World market price($/ton in 1998 price)	145.3	117.6	99.5
3. Freight and insurance(US$/ton)	40	40	40
4. CIF Monbasa(US$/ton)	185.3	157.6	139.5
5. Unloading and port handling(US$/ton)	9	9	9
6. Value Kenya border			
- in US$	194.3	166.6	148.5
- in Ksh(61.19Ksh/US$)	11,889	10,194	9,086
7. Domestic handling, transport, margin(Ksh/ton)	831	831	831
8. Wholesale price(Ksh/ton)	12,720	11,025	9,917
9. Transport to/from farm(Ksh/ton)	103	103	103
10. Farmgate price(Ksh/ton)	12,617	10,922	9,814
11. Farmgate price in nutrient(Ksh/kg)	27.4	24.3	16.4

Source.Commodity markets and the developing countries, February 1998, World Bank

Table S.2.1-5 Price Structure of Coffee and Tea (economic)

	Coffee	Tea
1. Projected 2010 World market price($/ton in 1990 price)	1,812	1,405
2. Projected 2010 World market price($/ton in 1998 price)	1,997	1,549
3. Adjustment for quality(%)	95	90
4. Weighted average export priceFOB price(US$/ton)	1,897	1,471
5. Port charges/handling(US$/ton)	9	9
6. Value at Kenya boder(per ton)		
- in US$	1,888	1,462
- in Ksh(61.19Ksh/US$)	115,526	89,457
7. Domestic handling, transport, margin(Ksh/ton)	766	766
8. Ex-coffee factory price(Ksh/ton)	114,760	88,691
9. Yielding recovery(%)	15	20
10. Input price at coffee factory(Ksh/ton)	17,214	17,738
11. Transport to/from farm(Ksh/ton)	20	20
12. Farmgate price(Ksh/ton)	17,194	17,718

Source.Commodity markets and the developing countries, February 1998, World Bank

Table S.2.1-6 Economic Price of Vegetables

	French Beans	Okra
1. FOB Price	75.00	58.00
2. Handling charge	3.50	3.50
3. Expoter's revenue	24.00	15.00
4. Grading & packing cost	9.34	8.73
5. Transportation cost	5.60	5.60
6. Farmgate price	32.55	25.16

Source. HCDA

	Carrots	Tomatoes
1. FOB Price	48.00	56.00
2. Handling charge	3.69	3.69
3. Expoter's revenue	14.00	19.00
4. Grading & packing cost	3.27	4.67
5. Transportation cost	5.60	5.60
6. Farmgate price	21.44	23.04

Source. HCDA

Table S.2.1-7 Crop Selection for Rupingazi Ngerwe

	Staple Food	Demand for Exporting	Demand for Local Con-sumption	Suitability for Climate	Suitability for Soil	Suitability for Land Form	Profitability per Hectare	Storability	Stability of Price	Farmer's Experience	Suitability for Rainfed Farming	Necessity for Irrigation	Total
Maize(dry)	3	0	3	3	3	2	2	2	3	3	3	1	28
French Beans	0	3	0	2	3	2	3	0	3	1	3	2	22
Snow Peas	0	3	0	1	2	2	3	0	2	0	2	2	17
Cabbage	3	0	3	3	3	2	2	2	2	3	3	2	28
Carrots	2	0	2	3	2	2	3	2	2	2	3	2	25
Tomatoes	3	0	3	2	2	2	3	0	1	2	3	2	23
Bulb Onions	3	0	3	2	2	2	2	2	1	2	3	2	24
Potatoes	3	0	3	2	2	2	3	3	3	2	3	2	28
Sweet Potatoes	3	0	3	3	3	3	2	1	3	3	3	2	29
Kales	3	0	3	3	3	2	2	0	1	3	3	2	25
Beans	3	0	3	3	3	2	2	3	3	3	3	2	30
Coffee	0	3	1	3	3	3	2	3	2	3	3	1	27
Tea	0	3	3	3	3	3	2	1	2	3	3	1	27
Papaya	1	0	2	2	3	3	2	0	3	2	3	1	22
Bananas	3	0	3	3	3	3	2	1	3	3	3	1	28
Macadamia Nut	0	3	0	3	3	3	3	3	3	2	3	1	27

Table S.2.1-8 Cost Budget (Maize / Beans)

Cost and Return of Crops(financial)

Site:Rupingazi

Crop:Maize/Beans

(per ha)

	Unit	Unit Price (Kshs)	Rainfed				Irrigated			
			without Project		with Project		without Project		with Project	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs										
Seeds:Maize	kg	90	100	9,000	100	9,000			100	9,000
Beans	kg	32	15	480	15	480			15	480
Fertilizer:N	kg	24.6	0.0	0	0.0	0			4.0	98
P	kg	17.0	0.0	0	0.0	0			11.0	187
K	kg	23.8	0.0	0	0.0	0			4.0	95
Chemicals:	kg	460	0	0	1	460			1	460
Gunny bags	pieces	40	18	720	20	800			27	1,080
Labour Costs	MD	70	80	5,600	82	5,740			135	9,450
Irrigation	ha									210
Miscellaneous(5% of total)				832		867				1,108
Total Costs				16,632		17,347				22,169
2. Gross Income										
a. Main Product	kg	11.5	1,750	20,125	2,000	23,000			2,250	25,875
b. Beans	kg	31.6	300	9,480	400	12,640			600	18,960
3. Net Profit	Kshs			12,973		18,293				22,666

Cost and Return of Crops(economic)

Site:Rupingazi

Crop:Maize/Beans

(per ha)

	Unit	Unit Price (Kshs)	Rainfed				Irrigated			
			without Project		with Project		without Project		with Project	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs										
Seeds:Maize	kg	84	100	8,400	100	8,400			100	8,400
Beans	kg	32	15	480	15	480			15	480
Fertilizer:N	kg	27.4	0.0	0	0.0	0			4.0	110
P	kg	24.3	0.0	0	0.0	0			11.0	267
K	kg	16.4	0.0	0	0.0	0			4.0	66
Chemicals:	kg	430	0	0	1	430			1	430
Gunny bags	pieces	40	18	720	20	800			27	1,080
Labour Costs	MD	35	80	2,800	82	2,870			135	4,725
Irrigation	ha									210
Miscellaneous(5% of total)				653		683				830
Total Costs				13,053		13,663				16,597
2. Gross Income										
a. Main Product	kg	9.5	1,750	16,625	2,000	19,000			2,250	21,375
b. Beans	kg	31.6	300	9,480	400	12,640			600	18,960
3. Net Profit	Kshs			13,052		17,977				23,738

Table S.2.1-9 Cost Budget (Beans)

Cost and return of Crops(financial)

Site:Rupingazi
Crop:Beans

(per ha)

	Unit	Unit Price (Kshs)	Rainfed				Irrigated			
			without Project		with Project		without Projec		with Project	
			Quant-ity	Value (Kshs)	Quant-ity	Value (Kshs)	Quant-ity	Value (Kshs)	Quant-ity	Value (Kshs)
1. Costs										
Seed	kg	30	25	750	25	750	25	750	25	750
Fertilizer:N	kg	24.6	0	0	2	49	3	74	10	246
P	kg	17.0	0	0	2	34	3	51	10	170
K	kg	23.8	0	0	0	0	0	0	0	0
Manure	kg	1	3,000	3,000	3,000	3,000	4,000	4,000	4,500	4,500
Labour Costs	MD	70	65	4,550	70	4,900	65	4,550	67	4,690
Irrigation	ha									210
Miscellaneous(5% of total)				437		460		496		556
Total Costs				8,737		9,193		9,921		11,122
2. Gross Income										
a. Main Product	kg	31.6	600	18,960	650	20,540	700	22,120	750	23,700
3. Net Profit	Kshs			10,223		11,347		12,199		12,578

Cost and return of Crops(economic)

Site:Rupingazi
Crop:Beans

(per ha)

	Unit	Unit Price (Kshs)	Rainfed				Irrigated			
			without Project		with Project		without Projec		with Project	
			Quant-ity	Value (Kshs)	Quant-ity	Value (Kshs)	Quant-ity	Value (Kshs)	Quant-ity	Value (Kshs)
1. Costs										
Seed	kg	30	25	750	25	750	25	750	25	750
Fertilizer:N	kg	27.4	0	0	2	55	3	82	10	274
P	kg	24.3	0	0	2	49	3	73	10	243
K	kg	16.4	0	0	0	0	0	0	0	0
Manure	kg	1	3,000	3,000	3,000	3,000	4,000	4,000	4,500	4,500
Labour Costs	MD	35	65	2,275	70	2,450	65	2,275	67	2,345
Irrigation	ha									210
Miscellaneous(5% of total)				317		332		378		438
Total Costs				6,342		6,635		7,558		8,760
2. Gross Income										
a. Main Product	kg	31.6	600	18,960	650	20,540	700	22,120	750	23,700
3. Net Profit	Kshs			12,618		13,905		14,562		14,940

Table S.2.1-10 Cost Budget (Green Maize)

Cost and Return of Crops(financial)

Site:Rupingazi
Crop:Green Maize (per ha)

	Unit	Unit Price (Kshs)	without Project		Irrigated with Project	
			Quant-ity	Value (Kshs)	Quant-ity	Value (Kshs)
1. Costs						
Seeds	kg	60	60	3,600	60	3,600
Fertilizer:N	kg	24.6	1.0	25	4.0	98
P	kg	17.0	1.0	17	4.0	68
K	kg	23.8	0.0	0	0.0	0
Chemicals:	kg	460	0	0	1	460
Gunny bags	pieces	40	30	1,200	40	1,600
Labour Costs	MD	70	70	4,900	80	5,600
Irrigation	ha			0		210
Miscellaneous(5% of total)				513		612
Total Costs				10,254		12,249
2. Gross Income						
a. Main Product	kg	10.0	3,000	30,000	4,000	40,000
3. Net Profit	Kshs			19,746		27,751

Cost and Return of Crops(econmic)

Site:Rupingazi
Crop:Green Maize (per ha)

	Unit	Unit Price (Kshs)	Irrigated without Project		Irrigated with Project	
			Quant-ity	Value (Kshs)	Quant-ity	Value (Kshs)
1. Costs						
Seeds	kg	60	60	3,600	60	3,600
Fertilizer:N	kg	27.4	2.0	55	4.0	110
P	kg	24.3	2.0	49	4.0	97
K	kg	16.4	0.0	0	0.0	0
Chemicals:	kg	430	0	0	1	430
Gunny bags	pieces	40	30	1,200	40	1,600
Labour Costs	MD	35	70	2,450	80	2,800
Irrigation	ha					210
Miscellaneous(5% of total)				387		466
Total Costs				7,740		9,312
2. Gross Income						
a. Main Product	kg	10.0	3,000	30,000	4,000	40,000
3. Net Profit	Kshs			22,260		30,688

Table S.2.1-11 Cost Budget (Irish Potatoes)

Cost and Return of Crops(financial)

Site:Rupingazi
Crop:Irish Potatoes

	Unit	Unit Price (Kshs)	Rainfed			
			without Project		with Project	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs						
Seeds	kg	20	2,000	40,000	2,000	40,000
Fertilizer:N	kg	24.6	55	1,353	60	1,476
P		17.0	70	1,190	75	1,275
K		23.8	0	0	0	0
Manure	kg	1	1,000	1,000	1,500	1,500
Chemicals:	kg	1,450	1	1,450	2	2,900
Gunny bags	piece	40	75	3,000	80	3,200
Labour Costs	MD	70	250	17,500	270	18,900
Irrigation	ha			0		0
Miscellaneous(5% of total)				3,447		3,645
Total Costs				68,940		72,896
2. Gross Income						
a. Main Product	kg	11.7	7,500	87,750	8,000	93,600
3. Net Profit	Kshs			18,810		20,704

Cost and Return of Crops(economic)

Site:Rupingazi
Crop:Irish Potatoes

	Unit	Unit Price (Kshs)	Rainfed			
			without Project		with Project	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs						
Seeds	kg	20	2,000	40,000	2,000	40,000
Fertilizer:N	kg	27.4	55	1,507	60	1,644
P		24.3	70	1,701	75	1,823
K		16.4	0	0	0	0
Manure	kg	1	1,000	1,000	1,500	1,500
Chemicals:	kg	1,354	1	1,354	2	2,708
Gunny bags	piece	40	75	3,000	80	3,200
Labour Costs	MD	35	250	8,750	270	9,450
Irrigation	ha			0		0
Miscellaneous(5% of total)				3,016		3,175
Total Costs				60,328		63,499
2. Gross Income						
a. Main Product	kg	11.7	7,500	87,750	8,000	93,600
3. Net Profit	Kshs			27,422		30,101

Table S.2.1-12 Cost Budget (Cabbage / kale)

Cost and Return of Crops(financial)

Site:Rupingazi

Crop:Cabbage/kale (per ha)

	Unit	Unit Price (Kshs)	Rainfed				Irrigated			
			without Project		with Project		without Project		with Project	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs										
Seeds	kg	1,200	0.5	600	0.5	600	0.5	600	0.5	600
Fertilizer:N	kg	24.6	20	492	22	541	45	1,107	90	2,214
P	kg	17.0	20	340	22	374	30	510	95	1,615
K	kg	23.8	0	0	0	0	0	0	0	0
Chemicals	lit.	600	1	300	1	480	1	300	1	480
Labour Costs	MD	70	130	9,100	132	9,240	130	9,100	135	9,450
Irrigation	ha									210
Miscellaneous(5% of total)				570		591		611		767
Total Costs				11,402		11,827		12,228		15,336
2. Gross Income										
a. Main Product	kg	10.7	10,000	107,000	11,000	117,700	14,500	155,150	16,000	171,200
3. Net Profit	Kshs			95,598		105,873		142,922		155,864

Cost and Return of Crops(economic)

Site:Rupingazi

Crop:Cabbage/kale (per ha)

	Unit	Unit Price (Kshs)	Rainfed				Irrigated			
			without Project		with Project		without Project		with Project	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs										
Seeds	kg	1,121	0.5	561	0.5	561	0.5	561	0.5	561
Fertilizer:N	kg	27.4	20	548	22	603	45	1,233	90	2,466
P	kg	24.3	20	486	22	535	30	729	95	2,309
K	kg	16.4	0	0	0	0	0	0	0	0
Chemicals	lit.	560	1	280	1	448	1	280	1	448
Labour Costs	MD	35	130	4,550	132	4,620	130	4,550	135	4,725
Irrigation	ha									210
Miscellaneous(5% of total)				338		356		387		564
Total Costs				6,763		7,122		7,739		11,282
2. Gross Income										
a. Main Product	kg	10.7	10,000	107,000	11,000	117,700	14,500	155,150	16,000	171,200
3. Net Profit	Kshs			100,237		110,578		147,411		159,918

Table S.2.1-13 Cost Budget (French Beans)

Cost and Return of Crops(financial)

Site:Rupingazi

Crop:French Beans

	Unit	Unit Price (Kshs)	Rainfed				Irrigated			
			without Project		with Project		without Project		with Project	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs										
Seeds	kg	500	65	32,500					65	32,500
Fertilizer:N	kg	24.6	15	369					20	492
P	kg	17.0	20	340					25	425
K	kg	23.8	0	0					0	0
Chemicals	lit.	1450	2	2,900					4	5,800
Labour Costs	MD	70	150	10,500					155	10,850
Irrigation	ha									210
Miscellaneous(5% of total)				2,453						2,646
Total Costs				49,062						52,923
2. Gross Income										
a. Main Product	kg	29.6	3,000	88,800					4,000	118,400
3. Net Profit	Kshs			39,738						65,477

Cost and Return of Crops(economic)

Site:Rupingazi

Crop:French Beans

	Unit	Unit Price (Kshs)	Rainfed				Irrigated			
			without Project		with Project		without Project		with Project	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs										
Seeds	kg	467	65	30,355					65	30,355
Fertilizer:N	kg	27.4	15	411					20	548
P	kg	24.3	20	486					25	608
K	kg	16.4	0	0					0	0
Chemicals	lit.	1354	2	2,708					4	5,416
Labour Costs	MD	35	150	5,250					155	5,425
Irrigation	ha									210
Miscellaneous(5% of total)				2,064						2,240
Total Costs				41,274						44,802
2. Gross Income										
a. Main Product	kg	32.6	3,000	97,800					4,000	130,400
3. Net Profit	Kshs			56,526						85,598

Table S.2.1-14 Cost Budget (Sweet Potatoes)

Cost and Return of Crops(financial)

Site:Rupingazi
Crop:Sweet Potatoes

	Unit	Unit Price (Kshs)	Rainfed				Irrigated			
			without Project		with Project		without Project		with Project	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs										
Seeds	kg	3	400	1,200					400	1,200
Fertilizer:N	kg	24.6	0	0					20	492
P		17.0	0	0					20	340
K		23.8	0	0					0	0
Manure	kg	1	1,000	1,000					1,500	1,500
Chemicals:	kg	600	0	0					1	600
Gunny bags	piece	40	65	2,600					85	3,400
Labour Costs	MD	70	110	7,700					115	8,050
Irrigation	ha			0						210
Miscellaneous(5% of total)				658						831
Total Costs				13,158						16,623
2. Gross Income										
a. Main Product	kg	5.0	6,500	32,500					8,500	42,500
3. Net Profit	Kshs			19,342						25,877

Cost and Return of Crops(economic)

Site:Rupingazi
Crop:Sweet Potatoes

	Unit	Unit Price (Kshs)	Rainfed				Irrigated			
			without Project		with Project		without Project		with Project	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs										
Seeds	kg	3	400	1,200					400	1,200
Fertilizer:N	kg	27.4	0	0					20	548
P		24.3	0	0					20	486
K		16.4	0	0					0	0
Manure	kg	1	1,000	1,000					1,500	1,500
Chemicals:	kg	560	0	0					1	560
Gunny bags	piece	40	65	2,600					85	3,400
Labour Costs	MD	35	110	3,850					115	4,025
Irrigation	ha			0						210
Miscellaneous(5% of total)				455						628
Total Costs				9,105						12,557
2. Gross Income										
a. Main Product	kg	5.0	6,500	32,500					8,500	42,500
3. Net Profit	Kshs			23,395						29,943

Table S.2.1-15 Cost Budget (Millet)

Cost and Return of Crops(financial)

Site:Rupingazi
Crop:Millet

(per ha)

	Unit	Unit Price (Kshs)	Rainfed				Irrigated			
			without Project		with project		without Project		with project	
			Quant-ity	Value (Kshs)	Quant-ity	Value (Kshs)	Quant-ity	Value (Kshs)	Quant-ity	Value (Kshs)
1. Costs										
Seeds	kg	10	4.0	40	4.0	40	4.0	40		
Fertilizer:N	kg	24.6	2.0	49	3.0	74	3.0	74		
P	kg	17	5.0	85	6.0	102	6.0	102		
K	kg	23.8	0.0	0	0.0	0	0.0	0		
Manure	kg	1	250	250	300	300	250	250		
Chemicals	kg	460	0	0	0	0	0	0		
Gunny bags	piece	40	9	360	9	360	9	360		
Labour Costs	MD	70	85	5,950	90	6,300	85	5,950		
Irrigation	ha			0		0		0		
Miscellaneous(5% of total)				354		378		357		
Total Costs				7,089		7,553		7,132		
2. Gross Income										
a. Main Product	kg	20	850	17,000	850	17,000	900	18,000		
3. Net Profit	Kshs			9,911		9,447		10,868		

Cost and Return of Crops(economic)

Site:Rupingazi
Crop:Millet

(per ha)

	Unit	Unit Price (Kshs)	Rainfed				Irrigated			
			without Project		with project		without Project		with project	
			Quant-ity	Value (Kshs)	Quant-ity	Value (Kshs)	Quant-ity	Value (Kshs)	Quant-ity	Value (Kshs)
1. Costs										
Seeds	kg	10	4.0	40	4.0	40	4.0	40		
Fertilizer:N	kg	27.4	2.0	55	3.0	82	3.0	82		
P	kg	24.3	5.0	122	6.0	146	6.0	146		
K	kg	16.4	0.0	0	0.0	0	0.0	0		
Manure	kg	1	250	250	300	300	250	250		
Chemicals	kg	430	0	0	0	0	0	0		
Gunny bags	piece	40	9	360	9	360	9	360		
Labour Costs	MD	35	85	2,975	90	3,150	85	2,975		
Irrigation	ha			0		0		0		
Miscellaneous(5% of total)				200		215		203		
Total Costs				4,001		4,293		4,056		
2. Gross Income										
a. Main Product	kg	20	850	17,000	850	17,000	900	18,000		
3. Net Profit	Kshs			12,999		12,707		13,944		

Table S.2.1-16 Cost Budget (Okra)

Cost and Return of Crops(financial)

Site:Rupingazi

Crop:Okra

(per ha)

	Unit	Unit Price (Kshs)	Rainfed				Irrigated			
			without Project		with Project		without Project		with Project	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs										
Seeds	kg	280	7.0	1,960	7.0	1,960	7.0	1,960	7.0	1,960
Fertilizer:N	kg	24.6	20	492	25	615	25	615	35	861
P	kg	17.0	20	340	20	340	25	425	35	595
K	kg	23.8	0	0	0	0	0	0	0	0
Chemicals	lit	1,450	1	725	1	1,450	1	725	3	4,350
Labour Costs	MD	70	200	14,000	205	14,350	220	15,400	300	21,000
Irrigation	ha			0		0		0		210
Miscellaneous(5% of total)				922		985		1,007		1,525
Total Costs				18,439		19,700		20,132		30,501
2. Gross Income										
a. Main Product	kg	23.0	4,000	92,000	4,500	103,500	5,000	115,000	6,000	138,000
3. Net Profit	Kshs			73,561		83,800		94,868		107,499

Cost and Return of Crops(economic)

Site:Rupingazi

Crop:Okra

(per ha)

	Unit	Unit Price (Kshs)	Rainfed				Irrigated			
			without Project		with Project		without Project		with Project	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs										
Seeds	kg	262	7.0	1,834	7.0	1,834	7.0	1,834	7.0	1,834
Fertilizer:N	kg	27.4	20	548	25	685	25	685	35	959
P	kg	24.3	20	486	20	486	25	608	35	851
K	kg	16.4	0	0	0	0	0	0	0	0
Chemicals	lit	1,354	1	677	1	1,354	1	677	3	4,062
Labour Costs	MD	35	200	7,000	205	7,175	220	7,700	300	10,500
Irrigation	ha			0		0		0		210
Miscellaneous(5% of total)				555		607		605		969
Total Costs				11,100		12,141		12,109		19,385
2. Gross Income										
a. Main Product	kg	25.1	4,000	100,400	4,500	112,950	5,000	125,500	6,000	150,600
3. Net Profit	Kshs			89,300		100,809		113,391		131,215

Table S.2.1-17 Cost Budget (Coffee)

Cost and return of Crops(financial)

Site:Rupingazi
Crop:Coffee

(unit:per ha)

	Unit	Unit Price (Kshs)	Rainfed												Irrigated					
			without Project						with Project						with Project					
			1st Year		2nd Year		3rd Year~		1st Year		2nd Year		3rd Year~		1st Year		2nd Year		3rd Year~	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs																				
Nursery	pieces	50	1,350	67,500	0	0	0	0	1,350	67,500	0	0	0	0	1,350	67,500	0	0	0	0
Fertilizer:N	kg	24.6	70	1,722	75	1,845	75	1,845	70	1,722	75	1,845	75	1,845	80	1,968	80	1,968	80	1,968
P	kg	17.0	30	510	30	510	30	510	30	510	30	510	30	510	30	510	40	680	40	680
K	kg	23.8	30	714	30	714	30	714	30	714	30	714	30	714	30	714	30	714	30	714
Manure	kg	1	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	3,000	3,000	3,000	3,000	3,000	3,000
Labour Costs																				
Spraying	MD	70	30	2,100	30	2,100	30	2,100	30	2,100	30	2,100	30	2,100	35	2,450	35	2,450	35	2,450
Weeding	MD	70	20	1,400	20	1,400	20	1,400	25	1,750	25	1,750	25	1,750	25	1,750	25	1,750	25	1,750
Pruning	MD	70	20	1,400	20	1,400	20	1,400	20	1,400	20	1,400	20	1,400	22	1,540	22	1,540	22	1,540
Picking		2/kg	0	0	0	0	4,500	9,000	0	0	0	0	4,500	9,000	0	0	0	0	5,000	10,000
Irrigation	ha															210		210		210
Miscellaneous(5% of total)				4,045		498		972		4,063		517		990		4,192		648		1,174
Total Costs				80,891		9,967		19,441		81,259		10,336		19,809		83,834		12,960		23,486
2. Gross Income																				
a. Main Product	kg	25.0	0	0	0	0	4,500	112,500	0	0	0	0	4,500	112,500	0	0	0	0	5,000	125,000
3. Net Profit	Kshs			-80,891		-9,967		93,059		-81,259		-10,336		92,691		-83,834		-12,960		101,514

Cost and return of Crops(economic)

Site:Rupingazi
Crop:Coffee

(unit:per ha)

	Unit	Unit Price (Kshs)	Rainfed												Irrigated					
			without Project						with Project						with Project					
			1st Year		2nd Year		3rd Year~		1st Year		2nd Year		3rd Year~		1st Year		2nd Year		3rd Year~	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs																				
Nursery	pieces	50	1,350	67,500	0	0	0	0	1,350	67,500	0	0	0	0	1,350	67,500	0	0	0	0
Fertilizer:N	kg	27.4	70	1,918	75	2,055	75	2,055	70	1,918	75	2,055	75	2,055	80	2,192	80	2,192	80	2,192
P	kg	24.3	30	729	30	729	30	729	30	729	30	729	30	729	30	729	40	972	40	972
K	kg	16.4	30	492	30	492	30	492	30	492	30	492	30	492	30	492	30	492	30	492
Manure	kg	1	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	3,000	3,000	3,000	3,000	3,000	3,000
Labour Costs																				
Spraying	MD	35	30	1,050	30	1,050	30	1,050	30	1,050	30	1,050	30	1,050	35	1,225	35	1,225	35	1,225
Weeding	MD	35	20	700	20	700	20	700	25	875	25	875	25	875	25	875	25	875	25	875
Pruning	MD	35	20	700	20	700	20	700	20	700	20	700	20	700	22	770	22	770	22	770
Picking		1/kg	0	0	0	0	4,500	4,500	0	0	0	0	4,500	4,500	0	0	0	0	5,000	5,000
Irrigation	ha															210		210		210
Miscellaneous(5% of total)				3,926		380		617		3,935		390		626		4,052		512		776
Total Costs				78,515		7,906		12,343		78,699		7,791		12,527		81,045		10,248		15,512
2. Gross Income																				
a. Main Product	kg	17.2	0	0	0	0	4,500	77,400	0	0	0	0	4,500	77,400	0	0	0	0	5,000	86,000
3. Net Profit	Kshs			-78,515		-7,906		65,057		-78,699		-7,791		64,873		-81,045		-10,248		70,488

Table S.2.1-18 Cost Budget (Banana)

Cost and return of Crops(financial)

Site:Rupingazi
Crop:Banana

(unit:per ha)

	Unit	Unit Price (Kshs)	Rainfed												Irrigated					
			without Project						with Project						with Project					
			1st Year		2nd Year		3rd Year		1st Year		2nd Year		3rd Year		1st Year		2nd Year		3rd Year	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Coste																				
Nursery	pieces	50	620	31,000	0	0	0	0	620	31,000	0	0	0	0	620	31,000	0	0	0	0
Fertilizer:N	kg	24.6	20	492	20	492	20	492	20	492	20	492	20	492	40	984	40	984	40	984
P	kg	17.0	20	340	20	340	20	340	20	340	20	340	20	340	40	680	40	680	40	680
K	kg	23.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manure	kg	1	2,000	2,000	2,000	2,000	2,000	2,000	2,500	2,500	2,500	2,500	2,500	2,500	3,000	3,000	3,000	3,000	3,000	3,000
Labour Costs	MD	70	76	5,320	76	5,320	76	5,320	80	5,600	80	5,600	80	5,600	85	5,950	85	5,950	85	5,950
Irrigation	ha			0		0		0		0		0		0		210		210		210
Miscellaneous(5% of total)				2,061		429		429		2,102		470		470		2,201		570		570
Total Costs				41,213		8,581		8,581		42,034		9,402		9,402		44,025		11,394		11,394
2. Gross Income																				
a. Main Product	kg	7.5	6,000	45,000	7,000	52,500	8,500	63,750	6,500	48,750	7,500	56,250	8,500	63,750	7,500	56,250	8,500	63,750	10,000	75,000
3. Net Profit	Kshs			3,787		43,919		55,169		6,716		46,848		54,348		12,225		52,356		63,606

Cost and return of Crops(economic)

Site:Rupingazi
Crop:Banana

(unit:per ha)

	Unit	Unit Price (Kshs)	Rainfed												Irrigated					
			without Project						with Project						with Project					
			1st Year		2nd Year		3rd Year		1st Year		2nd Year		3rd Year		1st Year		2nd Year		3rd Year	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs																				
Nursery	pieces	50	620	31,000	0	0	0	0	620	31,000	0	0	0	0	620	31,000	0	0	0	0
Fertilizer:N	kg	27.4	20	548	20	548	20	548	20	548	20	548	20	548	40	1,096	40	1,096	40	1,096
P	kg	24.3	20	486	20	486	20	486	20	486	20	486	20	486	40	972	40	972	40	972
K	kg	16.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manure	kg	1	2,000	2,000	2,000	2,000	2,000	2,000	2,500	2,500	2,500	2,500	2,500	2,500	3,000	3,000	3,000	3,000	3,000	3,000
Labour Costs	MD	35	76	2,660	76	2,660	76	2,660	80	2,800	80	2,800	80	2,800	85	2,975	85	2,975	85	2,975
Irrigation	ha			0		0		0		0		0		0		210		210		210
Miscellaneous(5% of total)				1,931		300		300		1,965		333		333		2,066		434		434
Total Costs				38,625		5,994		5,994		39,299		6,667		6,667		41,319		8,687		8,687
2. Gross Income																				
a. Main Product	kg	7.5	6,000	45,000	7,000	52,500	8,500	63,750	6,500	48,750	7,500	56,250	8,500	63,750	7,500	56,250	8,500	63,750	10,000	75,000
3. Net Profit	Kshs			6,375		46,506		57,756		9,451		49,583		57,083		14,931		55,063		66,313

Table S.2.1-19 Cost Budget (Tea)

Cost and return of Crops(financial)

Site:Rupingazi
Crop:Tea(rainfed)

(unit:per ha)

	Unit	Unit Price (Kshs)	without Project						with Project					
			1st Year		2nd Year		3rd Year~		1st Year		2nd Year		3rd Year~	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs														
Nursery	pieces	50	750	37,500	0	0	0	0	750	37,500	0	0	0	0
Fertilizer:N	kg	24.6	20	492	20	492	20	492	20	492	20	492	20	492
P	kg	17.0	10	170	10	170	20	340	10	170	10	170	20	340
K	kg	23.8	10	238	10	238	20	476	10	238	10	238	20	476
Manure	kg	1	2,000	2,000	2,000	2,000	2,000	2,000	3,000	3,000	3,000	3,000	3,000	3,000
Chemicals	kg	600	0	0	0	0	1	600	0	0	1	600	1	600
Labour Costs	MD	70	92	6,440	95	6,650	105	7,350	95	6,650	97	6,790	110	7,700
Miscellaneous(5% of total)				2,465		503		593		2,529		594		664
Total Costs				49,305		10,053		11,851		50,579		11,884		13,272
2. Gross Income														
a. Main Product	kg	15.8	0	0	0	0	10,000	168,000	0	0	0	0	10,000	168,000
3. Net Profit	Kshs			-49,305		-10,053		156,149		-50,579		-11,884		154,728

Cost and return of Crops(economic)

Site:Rupingazi
Crop:Tea(rainfed)

(unit:per ha)

	Unit	Unit Price (Kshs)	without Project						with Project					
			1st Year		2nd Year		3rd Year~		1st Year		2nd Year		3rd Year~	
			Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)	Quantity	Value (Kshs)
1. Costs														
Nursery	pieces	50	750	37,500	0	0	0	0	750	37,500	0	0	0	0
Fertilizer:N	kg	27.4	20	548	20	548	20	548	20	548	20	548	20	548
P	kg	24.3	10	243	10	243	20	486	10	243	10	243	20	486
K	kg	16.4	10	164	10	164	20	328	10	164	10	164	20	328
Manure	kg	1	2,000	2,000	2,000	2,000	2,000	2,000	3,000	3,000	3,000	3,000	3,000	3,000
Chemicals	kg	560	0	0	0	0	1	560	0	0	1	560	1	560
Labour Costs	MD	35	92	3,220	95	3,325	105	3,675	95	3,325	97	3,395	110	3,850
Miscellaneous(5% of total)				2,299		331		400		2,357		416		462
Total Costs				45,974		6,611		7,997		47,137		8,326		9,234
2. Gross Income														
a. Main Product	kg	17.7	0	0	0	0	10,000	177,000	0	0	0	0	10,000	177,000
3. Net Profit	Kshs			-45,974		-6,611		169,003		-47,137		-8,326		167,766

Table S.2.1-20 Estimation of the Agricultural Benefits (Rupingazi)

(A) Rainfed Areas

	Maize Green	Maize/ Beans	Beans	Potato	Cabbage/ Kale	French Beans	Sweet Potato	Napier Grass	Millet	Other Veget.	Perennial Crops Coffee	Perennial Crops Banana	Perennial Crops Tea	Total
I. Without Project														
Unit price(Ksh/kg)	0	9.5/31.5	31.6	11.7	10.7	32.6	5.0		20.0	25.1	17.2	7.5	17.7	
Yield(kg/ha)	0	1,750	600	7,500	10,000	3,000	6,500	12,000	850	4,000	4,500	8,500	10,000	
Gross Income(Ksh/ha)	0	26,105	18,960	87,750	107,000	97,800	32,500	0	17,000	100,400	77,400	63,750	177,000	
Cost of Production(Ksh/ha)	0	13,053	6,342	60,328	6,763	41,274	9,105		4,001	11,100	12,343	5,994	7,997	
Net Return(Ksh/ha)	0	13,052	12,618	27,422	100,237	56,526	23,395		12,999	89,300	65,057	57,756	169,003	
Planted Area(ha)	0.00	95.95	53.96	5.11	8.10	0.61	1.00	0.30	0.30	2.74	57.30	0.58	4.26	
Total Net Return(1,000 Ksh)	0	1,252	681	140	812	34	23	0	4	245	3,728	33	720	7,673
II. With Project														
Unit price(Ksh/kg)	0	9.5	31.6	11.7	10.7	0	0.0		20.0	25.1	17.2	7.5	17.7	
Yield(kg/ha)	0	2,000	650	8,000	11,000	0	0	12,000	850	4,500	4,500	8,500	10,000	
Gross Income(Ksh/ha)	0	31,640	20,540	93,600	117,700	0	0	0	17,000	112,950	77,400	63,750	177,000	
Cost of Production(Ksh/ha)	0	13,663	6,635	63,499	7,122	0	0		4,293	12,141	12,527	6,667	9,234	
Net Return(Ksh/ha)	0	17,977	13,905	30,101	110,578	0	0		12,707	100,809	64,873	57,083	167,766	
Planted Area(ha)	0.00	75.79	53.91	5.16	6.67	0.00	0.00	0.32	1.61	2.26	47.13	0.58	4.26	
Total Net Return(1,000 Ksh)	0	1,362	750	155	738	0	0	0	20	228	3,057	33	715	7,059
III. Incremental Benefit(1,000 Ksh)	0	110	69	15	-74	-34	-23	0	17	-17	-670	-0	-5	-614

(B) Irrigated Areas

	Maize Green	Maize/ Beans	Beans	Potato	Cabbage/ Kale	French Beans	Sweet Potato	Napier Grass	Millet	Other Veget.	Perennial Crops Coffee	Perennial Crops Banana	Perennial Crops Tea	Total
I. Without Project														
Unit price(Ksh/kg)	10	0	31.6	0	10.7	0	0.0		20.0	25.1	0	0	0	
Yield(kg/ha)	3,000	0	700	0	14,500	0	0	0	900	5,000	0	0	0	
Gross Income(Ksh/ha)	30,000	0	22,120	0	155,150	0	0	0	18,000	125,500	0	0	0	
Cost of Production(Ksh/ha)	7,740	0	7,558	0	7,739	0	0		4,056	12,109	0	0	0	
Net Return(Ksh/ha)	22,260	0	14,562	0	147,411	0	0		13,944	113,391	0	0	0	
Planted Area(ha)	4.56	0.00	0.30	0.00	2.43	0.00	0.00	0.00	1.22	1.03	0.00	0.00	0.00	
Total Net Return(1,000 Ksh)	102	0	4	0	358	0	0	0	17	117	0	0	0	598
II. With Project														
Unit price(Ksh/kg)	10	9.5	31.6	0	10.7	32.6	5.0		0.0	25.1	17.2	7.5	0	
Yield(kg/ha)	4,000	2,250/600	750	0	16,000	4,000	8,500	15,000	0	6,000	5,000	10,000	0	
Gross Income(Ksh/ha)	40,000	40,335	23,700	0	171,200	130,400	42,500	0	0	150,800	86,000	75,000	0	
Cost of Production(Ksh/ha)	9,312	16,597	8,760	0	11,282	44,802	12,557		0	19,385	15,512	8,687	0	
Net Return(Ksh/ha)	30,688	23,738	14,940	0	159,918	85,598	29,943		0	131,215	70,488	66,313	0	
Planted Area(ha)	4.84	32.02	2.20	0.00	4.00	10.80	5.60	0.16	0.00	0.97	10.01	3.20	0.00	
Total Net Return(1,000 Ksh)	149	760	33	0	640	924	168	0	0	127	706	212	0	3,718
III. Incremental Benefit(1,000 Ksh)	47	760	28	0	281	924	168	0	-17	10	706	212	0	3,120
(C) Incremental Benefit(1,000 Ksh)	47	870	97	15	207	890	144	0	-0	-6	35	212	-5	2,506

Table S.2.1-21 Project Cost (Rupingazi Ngerwe)

	Financial Cost(Ksh)			Economic Cost(Ksh)	
	Total Cost	Of Which, Private Sector	Of Which, Govt/Public Sect.	Total Cost	Of Which, Private Sector
1. Construction cost					
1) Irrigation & drainage improvement	3,713,856	3,713,856	0	3,468,742	3,468,742
2) Marketing improvement	0	0	0	0	0
3) Access roads improvement	3,694,300	0	3,694,300	3,450,476	0
4) Village/farm roads improvement	684,000	0	684,000	638,856	0
5) Rural water supply improvement	0	0	0	0	0
Sub-Total	8,092,156	3,713,856	4,378,300	7,558,074	3,468,742
2. Community Development & Supporting Services					
1) Agricultural support services	10,640,000	0	10,640,000	9,937,760	0
2) Community development	7,078,500	0	7,078,500	6,611,319	0
3) Water management services	2,600,000	0	2,600,000	2,428,400	0
4) Marketing support services	376,000	0	376,000	351,184	0
5) Public health services	150,000	0	150,000	140,100	0
Sub-Total	20,844,500	0	20,844,500	19,468,763	0
3. Associated Cost					
1) Pre-engineering cost	306,481	0	306,481	286,253	0
2) Administration cost	2,025,563	0	2,025,563	1,891,876	0
3) Consulting services	2,893,663	371,385	2,522,278	2,702,681	346,874
Sub-Total	5,225,707	371,385	4,854,322	4,880,810	346,874
4. Physical Contingency	809,214	371,384	437,830	755,806	346,873
Total	34,971,577	4,456,625	30,514,952	32,663,453	4,162,488

Table S.2.1-22 Operation and Maintenance Cost (Rupingazi Ngerwe)

(unit:Ksh/year)

Financial Cost		Economic Cost
Annual Operation and Maintenence Cost		
1) Irrigation & drainage facilities	74,000	69,116
2) Marketing facilities	0	0
3) Access roads	208,000	194,272
4) Village/farm roads	57,000	53,238
5) Rural water supply facilities	0	0
Total	339,000	316,626