

**REPUBLIC OF KENYA
MINISTRY OF WATER AND IRRIGATION**

**SUSTAINABLE SMALLHOLDER IRRIGATION
DEVELOPMENT AND MANAGEMENT
IN SEMI-ARID LANDS PROJECT
(SIDEMAN-SAL)**

**FINAL REPORT
VOLUME 2
Annexes**

JUNE 2016

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

NIPPON KOEI CO., LTD.

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**Sustainable Smallholder Irrigation Development and Management
in Semi-Arid Lands Project**

Final Report

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- Annex 2: Feasibility Study and Detailed Design
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Annex 1

Site Selection of Pilot Schemes

**Sustainable Smallholder Irrigation Development and Management
in Semi-Arid Lands Project**

Final Report

Annex 1: Site Selection of Pilot Schemes

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CHAPTER 1 Selection of Batch-1 Pilot Schemes

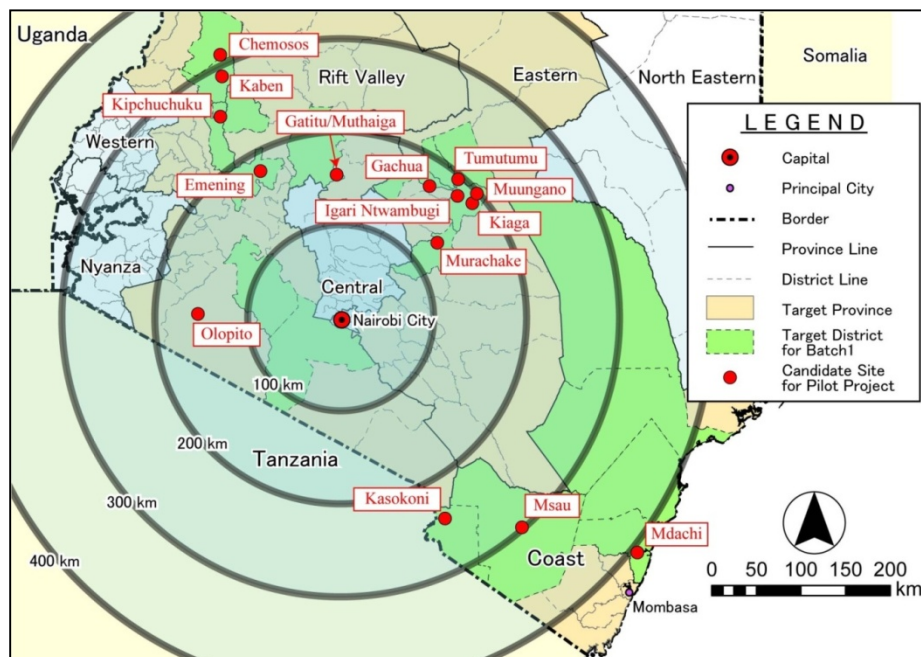
1.1 General

The candidate schemes and its location for the Pilot Project Sites in Batch-1 are shown below. The Pilot Project Sites of 8 schemes were to be selected out of 15 candidate schemes based on a scoring of the schemes applying selection criteria.

Table 1.1.1 Candidate Schemes for Pilot Project Sites in Batch-1

No	Province	County	District	Scheme	
1.	Coast	Taita-Taveta	Taveta	Kasokoni	
2.			Mwatate	Msau	
3.		Kilifi	Ganze	Mdachi	
4.	Rift Valley	Narok	Narok North	Olopito	
5.		Laikipia	Laikipia West	Gatitu/Muthaiga	
6.		Baringo	Mogotio	Emining	
7.		Elgeyo Marakwet	Keiyo North	Kipchuchuku	
8.			Marakwet East	Kaben	
9.	West Pokot	Pokot Central	Chemosos		
10.	Eastern	Embu	Mbeere North	Murachake	
11.			Meru	Imenti North	Gachua
12.				Igembe South	Tumutumu
13.		Tigania East		Igari Antuambugi	
14.		Tharaka Nithi	Thalaka South	Muongano	
15.				Kiaga	

Source: JICA Team



Source: JICA Team

Figure 1.1.1 Location of Candidate Schemes for Pilot Project Sites in Batch-1

1.2 Field Reconnaissance of Candidate Project Sites

Field reconnaissance of the candidate schemes for the Pilot Project Sites in Batch-1 were carried out by the PMT for fact-finding of the schemes as follows:

Table 1.2.1 Field Reconnaissance of Candidate Schemes for Pilot Project Sites in Batch-1

N o.	Province	County	District	Scheme	Date of Visit	
1.	Coast	Taita-Taveta	Taveta	Kasokoni	Sep. 4, 2012	
2.			Mwatate	Msau	Sep. 5, 2012	
3.		Kilifi	Ganze	Mdachi	Sep. 6, 2012	
4.	Rift Valley	Narok	Narok North	Olopito	Sep. 17, 2012	
5.		Laikipia	Laikipia West	Gatitu/Muthaiga	Sep. 18, 2012	
6.		Baringo	Mogotio	Emining	Sep. 19, 2012	
7.		Elgeyo Marakwet		Keiyo North	Kipchuchuku	Sep. 19, 2012
8.				Marakwet East	Kaben	Sep. 20, 2012
9.		West Pokot	Pokot Central	Chemosos	Sep. 21, 2012	
10.	Eastern	Embu	Mbeere North	Murachake	Sep. 26, 2012	
11.		Meru		Imenti North	Gachua	Sep. 26, 2012
12.				Igembe South	Tumutumu	Sep. 27, 2012
13.				Tigania East	Igari Antuambugi	Sep. 27, 2012
14.		Tharaka Nithi		Thalaka South	Muongano	Sep. 28, 2012
15.				Kiaga		Sep. 28, 2012

Source: JICA Team

During the field reconnaissance, the objective and methodology of the Project, and the selection procedure for the Pilot Project Sites were briefed to the respective SCIOs (SCIOs) and DAOs (SCAOs).

1.3 Preparation of Selection Criteria

In October 2012, in order to select the Batch-1 Pilot Project Sites, a Pilot Project Sites Selection Committee (PPSSC) was established. The PPSSC consisted of the PMT (JICA Team and Counterparts), the MWI (MOALF)-JICA Advisor, and the PIOs of Coast Province, Rift Valley Province and Eastern Province.

The selection criteria for selection of the Pilot Project Sites in Batch-1 was prepared and finalized through discussion among the members of the PPSSC.

The indicators in the criteria are, (1) Climate Condition, (2) Land Tenure, (3) Area, (4) Water Resources, (5) Crop Production, (6) Irrigation Facilities, (7) Organization in the Scheme, (8) Accessibility, (9) Markets and Market Information, and (10) Environmental Issues. The agreed selection criteria with scoring are as follows:

Table 1.3.1 Selection Criteria for selection of the Pilot Project Sites in Batch-1

No.	Category Score	Max. Distribution	Item
1	2		Climatic Conditions
1.1		1	Rainfall (Annual rainfall 700 mm or less: 1, more than 700 mm: 0)
1.2		1	Temperature (Max. temperature 30°C or more: 1, less than 30°C: 0)
2	5	5	Land Tenure (Owner/freehold: 5, Communal/GOK: 3, Tenant/lease: 0)
3	10		Area
3.1		5	Scheme gross area per household (2 ac. or less: 5, more than 2 ac.: 2)
3.2		5	Proposed/target irrigation area per household (1.5 ac. or less: 5, more than 1.5 ac.: 2)
4	15		Water Resources
4.1		15	Water Facility Construction Authority and Water Abstraction Permit (WRMA) (Construction of some facilities with both Water Facility Construction Authority & Water Abstraction Permit: 15, Construction of some facilities with Water Facility Construction Authority but no Water Abstraction Permit yet: 12, Water Facility Construction Authority was obtained but no facility constructed: 8, Construction of some facilities without both Water Facility Construction Authority & Water Abstraction Permit: 8, Ready to apply for the Authority/Permit: 5, not applicable: 8)
5	15		Crop Production
5.1		5	Farmers experience for irrigated agriculture
5.2		5	Potential growth in farm production
5.3		5	Awareness of constraints in crop production
6	10		Irrigation Facilities
6.1		10	Existing irrigation facilities (proper maintenance: 10, poor maintenance: 5, not applicable: 5)
7	20		Organization in the Scheme
7.1		5	Registration (registered: 5, in process: 3, none: 0)
7.2		10	Fee Collection and/or any other contribution by the scheme organization (collected: 10, not collected: 3)
7.3		5	Frequency of meetings (10 times or more a year: 5, less than 10 times a year: 2)
8	6		Accessibility
8.1		4	Accessibility to and from major town (DIO/DAO Office) by 4WD car during rainy season (1.5 hrs or less: 4, more than 1.5 hrs: 2)
8.2		2	Accessibility to major irrigation facilities such as intake weir and control structures, etc. (20 minutes walk or less: 2, more than 20 minutes walk: 1)
9	10		Markets and Market Information
9.1		4	Accessibility to and from nearest market by Matatu (public transportation vehicle) during rainy season (1 hr or less: 4, more than 1 hr: 2)
9.2		1	Existing marketing groups (existing: 1, none: 0)
9.3		5	Awareness of constraints in marketing
10	7		Environmental Issues
10.1		2	Other existing irrigation schemes (upstream and downstream of the scheme within 60 km) (5 schemes or less: 2, 6-10 schemes: 1, more than 10 schemes: 0)
10.2		5	Anticipated negative environmental impacts (low: 5, medium: 2, high: 0)
Total	100	100	

Source: JICA Team

1.4 Selection of Pilot Project Sites in Batch-1

1.4.1 Scoring of Candidate Schemes for Pilot Project Sites in Batch-1

The scoring of the candidate schemes for the Pilot Project Sites in Batch-1 were made based on the answers to the Questionnaire, which were sent to the SCIOs.

A Workshop to select the Pilot Scheme Site in Batch-1 was held on 22nd October 2012 at Silver Spring Hotel in Nairobi.

At the workshop, presentation on the candidate schemes was made by the SCIOs in collaboration and selection criteria prepared by the PPSSC was outlined to the participants. The PPSSC meetings for selection of the Pilot Project Sites in Batch-1 were held as follows:

- 1) October 30, 2012 at Kenyatta International Conference Centre (KICC)
- 2) October 31, 2012 - November 2, 2012 at Maji House

The scoring of the candidate schemes for the Pilot Project Sites in Batch-1 and its details made by the PPSSC are summarized Table 1.4.1 - Table 1.4.4:

Table 1.4.1 Summary of Scoring of Candidate Schemes for Pilot Project Sites in Batch-1

No.	Category Score	Max. Distribution	Item	Coast			Rift Valley						Eastern					
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
				Taita-Taveta		Kilifi	Narok	Laikipia	Baringo	Elgeyo Marakwet	West Pokot	Embu	Meru		Tharaka Nithi		Tharaka South	Tharaka South
				Taveta	Mwatate	Ganze	Narok North	Laikipia West	Mogotio	Keiyo North	Marakwet East	Pokot Central	Mbeere North	Imenti North	Igembe South	Tigania East	Igari Antuambugi	Muungano
1	2		Climatic Conditions															
1.1	1	1	Rainfall (Annual rainfall 700 mm or less: 1, more than 700 mm: 0)	1	0	1	1	0	1	0	1	1	1	0	1	1		
1.2	1	1	Temperature (Max. temperature 30°C or more: 1, less than 30°C: 0)	1	1	1	0	1	1	1	0	1	1	1	1	1		
2	5	5	Land Tenure (Owner/freehold: 5, Communal/GOK: 3, Tenant/lease: 0)	3	5	3	5	5	5	3	3	3	5	5	5	5		
3	10		Area															
3.1	5	5	Scheme gross area per household (2 ac. or less: 5, more than 2 ac.: 2)	5	5	2	5	2	2	2	5	2	5	5	5	5		
3.2	5	5	Proposed/target irrigation area per household (1.5 ac. or less: 5, more than 1.5 ac.: 2)	5	5	5	5	2	2	2	5	2	5	5	5	5		
4	15		Water Resources															
4.1	15	15	Water Facility Construction Authority and Water Abstraction Permit (WRMA) (Construction of some facilities with both Water Facility Construction Authority & Water Abstraction Permit: 15, Construction of some facilities with Water Facility Construction Authority but no Water Abstraction Permit yet: 12, Water Facility Construction Authority was obtained but no facility constructed: 8, Construction of some facilities without both Water Facility Construction Authority & Water Abstraction Permit: 8, Ready to apply for the Authority/Permit: 5, not applicable: 8)	8	8	8	8	12	5	8	8	8	12	12	15	12	8	5
5	15		Crop Production															
5.1	5	5	Farmers experience for irrigated agriculture 1) Irrigation methods (more than 3 options: 2, 2 options or less: 1) 2) Percentage of scheme members (over 50%: 4, 25-50%: 3, less than 25%: 2, nil: 1) 3) Experience of farmers (over 3 years: 4, 1-3 year(s): 3, less than 1 year: 2, none: 1) 4) Add all points in 1) to 3), then divide by 2 (and round it)	5	5	3	5	5	4	4	5	5	3	5	4	4	3	3
5.2	5	5	Potential growth in farm production Percentage increase in average gross margin per HH (more than 10% increase: 5, between 5 to 10% increase: 3, less than 5% increase: 1)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
5.3	5	5	Awareness of constraints in crop production (All (3) constraints relating: 5, 2 constraints relating: 3, Only 1 or less constraint relating: 1)	5	3	1	3	5	3	1	3	1	3	3	3	3	5	5
6	10		Irrigation Facilities															
6.1	10	10	Existing irrigation facilities (proper maintenance: 10, poor maintenance: 5, not applicable: 5)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
7	20		Organization in the Scheme															
7.1	5	5	Registration (registered: 5, in process: 3, none: 0)	5	5	3	5	5	5	5	5	5	5	5	5	5	5	5
7.2	10	10	Fee Collection and/or any other contribution by the scheme organization (collected: 10, not collected: 3)	10	3	3	3	10	3	3	10	3	10	10	10	10	10	10
7.3	5	5	Frequency of meetings (10 times or more a year: 5, less than 10 times a year: 2)	2	2	2	5	5	2	2	2	2	5	2	2	2	2	2
8	6		Accessibility															
8.1	4	4	Accessibility to and from major town (DIO/DAO Office) by 4WD car during rainy season (1.5 hrs or less: 4, more than 1.5 hrs: 2)	4	4	4	4	4	4	2	4	2	4	4	4	4	4	4
8.2	2	2	Accessibility to major irrigation facilities such as intake weir and control structures, etc. (20 minutes walk or less: 2, more than 20 minutes walk: 1)	2	1	2	2	2	2	1	2	1	2	2	2	2	2	1
9	10		Markets and Market Information															
9.1	4	4	Accessibility to and from nearest market by Matatu (public transportation vehicle) during rainy season (1 hr or less: 4, more than 1 hr: 2)	4	4	4	2	4	4	4	4	4	4	4	4	4	4	4
9.2	1	1	Existing marketing groups (existing: 1, none: 0)	0	1	1	1	1	1	1	1	0	0	0	0	0	0	1
9.3	5	5	Awareness of constraints in marketing (All (3) constraints relating: 5, 2 constraints relating: 3, Only 1 or less constraint relating: 1)	5	3	5	3	5	3	3	5	3	5	5	5	1	5	5
10	7		Environmental Issues															
10.1	2	2	Other existing irrigation schemes (upstream and downstream of the scheme within 60 km) (5 schemes or less: 2, 6-10 schemes: 1, more than 10 schemes: 0)	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2
10.2	5	5	Anticipated negative environmental impacts (low: 5, medium: 2, high: 0)	0	5	2	5	5	5	5	5	5	5	5	5	5	5	5
Total	100	100		77	72	62	74	85	64	59	78	61	87	85	87	81	82	79

Table 1.4.2 Details of Scoring of Candidate Schemes for Pilot Project Sites in Batch-1 (Coast Province)

No.	Category Score	Max. Distribution	Item	Reference	Coast Province							
					1		2		3			
					Taveta		Taita-Taveta		Mwatate		Kilifi	
					Kasokoni	Score	Mtsu	Score	Mdachi	Score		
1	2		Climatic Conditions									
1.1	1		Rainfall (Annual rainfall 700 mm or less: 1, more than 700 mm: 0)	Questionnaire 3.1.1/ Presentation	<700 mm	1	>700 mm	0	<700 mm	1		
1.2	1		Temperature (Max. temperature 30°C or more: 1, less than 30°C: 0)	Questionnaire 3.1.2/ Presentation	>30 °C	1	>30 °C	1	>30 °C	1		
2	5	5	Land Tenure (Owner/freehold: 5, Community/GOK: 3, Tenant/lease: 0)	Questionnaire 3.1.6/ Presentation	Community	3	Owner	5	Community	3		
3	10		Area									
3.1		5	Scheme gross area per household (2 ac. or less: 5, more than 2 ac.: 2)	Questionnaire 3.1.9/ Presentation	1.62	5	0.21	5	2.96	2		
3.2		5	Proposed/target irrigation area per household (1.5 ac. or less: 5, more than 1.5 ac.: 2)	Questionnaire 3.1.10/ Presentation	1.38	5	0.21	5	1.24	5		
4	15		Water Resources									
4.1		15	Water Facility Construction Authority and Water Abstraction Permit (WRMA) a) Construction of some facilities with both Water Facility Construction Authority & Water Abstraction Permit: 15, b) Construction of some facilities with Water Facility Construction Authority but no Water Abstraction Permit yet: 12, c) Water Facility Construction Authority was obtained but no facility constructed: 8, d) Construction of some facilities without both Water Facility Construction Authority & Water Abstraction Permit: 8, e) Ready to apply for the Authority/Permit: 5, f) not applicable: 8	Questionnaire 5.4, 5.5/ Presentation	d)	8	d)	8	f)	8		
5	15		Crop Production									
5.1		5	Farmers experience for irrigated agriculture 1) Irrigation methods (more than 3 options: 2, 2 options or less: 1) 2) Percentage of scheme members (over 50%: 4, 25-50%: 3, less than 25%: 2, nil: 1) 3) Experience of farmers (over 3 years: 4, 1-3 year(s): 3, less than 1 year: 2, none: 1) 4) Add all points in 1) to 3), then divide by 2 (and round it)	1) Questionnaire 3.3.1/ Presentation 2) Addendum 2 3) Addendum 3	1): 1 2): 4 3): 4 (1+4+4)/2 = 4.5	5	1): 1 2): 4 3): 4 (1+4+4)/2 = 4.5	5	1): 1 2): 3 3): 1 (1+3+1)/2 = 2.5	3		
5.2		5	Potential growth in farm production 1) Estimate the variables on 3 major crops (in 2011) a) Cropping acreage per HH = Total acreage / Total households b) Average gross margin per Acre = (Gross total income - Total production cost) / Total acreage then, multiply by the cropping acreage per HH (a) c) Average gross margin per HH = (Gross total income - Total production cost) / Total acreage then, multiply by the cropping acreage per HH (a) 2) Estimate the proposed irrigated area (Acre) per HH d) Proposed Irrigated Area (Ha) / No. of HH for proposed Irrigated Area then, multiply by 2.47 (* 1 Ha = 2.47 Acre) 3) Calculate the percentage increase for each major crops $((a + d) * b) - c) / c * 100$ (for the Crop A, B, C) 4) Then calculate the "Geometric Mean (GM)" for crop A, B, C $3 \sqrt{(A * B * C)}$ Percentage increase in average gross margin per HH (more than 10% increase: 5, between 5 to 10% increase: 3, less than 5% increase: 1)	1) Questionnaire 7.2/ Presentation Major crops: A, B, C i) Total acreage ii) Total households iii) Gross total income iv) Total production cost then, a = i) / ii) b = [(iii) - (iv)] / i) c = b * a 2) Questionnaire 3.1.10/ Presentation v) Proposed irrigation area vi) No. of HH for proposed then, d = [v] / vi) * 2.47 3) $(((a + d) * b) - c) / c * 100$ (for Crop A, B, C) 4) $3 \sqrt{(A * B * C)}$ (for Crop A, B, C)	Major crops A: Banana B: Tomato C: Onion 1) a: A: 0.6 B: 2.0 C: 2.0 b: A: 70,000 B: 100,909 C: 57,857 c: A: 44,681 B: 201,818 C: 115,714 2) d: A, B, C: 1.38 3) A: 216.5 B: 69.2 C: 69.2 d): 101%	5	Major crops A: Beans B: Fr.Bean C: Kale 1) a: A: 0.1 B: 0.3 C: 0.1 b: A: 32,800 B: 47,958 C: 80,000 c: A: 4,100 B: 14,387 C: 6,250 2) d: A, B, C: 0.18 3) A: 144.9 B: 60.4 C: 144.9 d): 108%	5	Major crops A: Tomato B: Kale C: Cabbage 1) a: A: 0.06 B: 0.03 C: 0.03 b: A: 400,000 B: 266,667 C: 233,333 c: A: 24,000 B: 8,000 C: 7,000 2) d: A, B, C: 1.24 3) A: 205.8 B: 411.7 C: 411.7 d): 327%	5		
5.3		5	Awareness of constraints in crop production a) Inappropriate crop production technique b) High costs of the farm inputs (seed, chemicals, fertilizer) c) High pest and disease infestation (All (3) constraints relating: 5, 2 constraints relating: 3, Only 1 or less constraint relating: 1)	Questionnaire 8.1.1/ Presentation	3 [a], b), c]	5	2 [a], b]	3	1 [a]	1		
6	10		Irrigation Facilities									
6.1		10	Existing irrigation facilities (proper maintenance: 10, poor maintenance: 5, not applicable: 5)	Questionnaire 3.4/ Presentation	poor	5	poor	5	N/A	5		
7	20		Organization in the Scheme									
7.1		5	Registration (registered: 5, in process: 3, none: 0)	Questionnaire 4.1/ Presentation	registered	5	registered	5	in process	3		
7.2		10	Fee Collection and/or any other contribution by the scheme organization (collected: 10, not collected: 3)	Questionnaire 4.1/ Presentation Yes: 10, No: 3	Yes	10	No	3	No	3		
7.3		5	Frequency of meetings (10 times or more a year: 5, less than 10 times a year: 2)	Questionnaire 4.1/ Presentation	3	2	2	2	7	2		
8	6		Accessibility									
8.1		4	Accessibility to and from major town (DIO/DAO Office) by 4WD car during rainy season (1.5 hrs or less: 4, more than 1.5 hrs: 2)	Addendum	Taveta 15 km 30 min	4	Mwatate 24 km 45 min	4	Kilifi 25 km 45 min	4		
8.2		2	Accessibility to major irrigation facilities such as intake weir and control structures, etc. (20 minutes walk or less: 2, more than 20 minutes walk: 1)	Questionnaire 6.6/ Presentation	5 min.	2	30 min.	1	15 min.	2		
9	10		Markets and Market Information									
9.1		4	Accessibility to and from nearest market by Matatu (public transportation vehicle) during rainy season (1 hr or less: 4, more than 1 hr: 2)	Addendum	Kasokoni 0.8 km 20 min. walk	4	Mtsu 1.2 km 30 min. walk	4	Jiribuni 3 km 10 min.	4		
9.2		1	Existing marketing groups (existing: 1, none: 0)	Questionnaire 12.2/ Presentation	none	0	existing	1	existing	1		
9.3		5	Awareness of constraints in marketing a) Inadequate market information b) Poor road accessibility c) Low farm-gate price d) Lack of marketing group and bargaining power (All (3) constraints relating: 5, 2 constraints relating: 3, Only 1 or less constraint relating: 1)	Questionnaire 8.1.2/ Presentation	3 [a], b), d]	5	2 [a], d]	3	3 [a], b), d]	5		
10	7		Environmental Issues									
10.1		2	Other existing irrigation schemes (upstream and downstream of the scheme within 60 km) (5 schemes or less: 2, 6-10 schemes: 1, more than 10 schemes: 0)	Questionnaire 5.7/ Presentation	5 schemes	2	1 scheme	2	1 scheme	2		
10.2		5	Anticipated negative environmental impacts (low: 5, medium: 2, high: 0) a) Soil erosion and sedimentation b) Salinity and alkalinity c) Flooding d) Effect on downstream users e) Wildlife conflicts	Questionnaire 9.2/ Presentation No. of negative impacts 0-2: low, 3: medium, 4-5: high	4 [a], b), d), e]	0	1 [e]	5	3 [b], d), e]	2		
Total	100	100				77		72		62		

Source: JICA Team

Table 1.4.3 Details of Scoring of Candidate Schemes for Pilot Project Sites in Batch-1 (Rift Valley Province)

No.	Category Score	Max. Distribution	Item	Reference	Rift Valley Province											
					4		5		6		7		8		9	
					Narok		Laikipia		Baringo		Elgeyo Marakwet		Marakwet East		West Pokot	
					Narok North	Laikipia West	Mogotio	Keijo North	Marakwet West	Pokot Central						
Obito	Gatira/ Muthaiga	Emining	Kipchuchuku	Kabon	Chemosis											
Data	Score	Data	Score	Data	Score	Data	Score	Data	Score	Data	Score					
1	2		Climatic Conditions													
1.1	1		Rainfall (Annual rainfall 700 mm or less: 1, more than 700 mm: 0)	Questionnaire 3.1.1/ Presentation	< 700 mm	1	> 700 mm	0	< 700 mm	1	> 700 mm	0	< 700 mm	1	> 700 mm	0
1.2	1		Temperature (Max. temperature 30°C or more: 1, less than 30°C: 0)	Questionnaire 3.1.2/ Presentation	< 30°C	0	> 30°C	1	< 30°C	1	> 30°C	0	< 30°C	1	> 30°C	0
2	5	5	Land Tenure (Owner/freehold: 5, Community/GOK: 3, Tenant/lease: 0)	Questionnaire 3.1.6/ Presentation	Owner	5	Owner	5	Community	3	Community	3	Community	3	Community	3
3	10		Area													
3.1	5		Scheme gross area per household (2 ac. or less: 5, more than 2 ac.: 2)	Questionnaire 3.1.9/ Presentation	1.57	5	2.26	2	4.94	2	2.06	2	1.86	5	3.49	2
3.2	5		Proposed target irrigation area per household (1.5 ac. or less: 5, more than 1.5 ac.: 2)	Questionnaire 3.1.10/ Presentation	1.48	5	1.95	2	4.94	2	1.98	2	1.12	5	3.49	2
4	15		Water Resources													
4.1	15		Water Facility Construction Authority and Water Abstraction Permit (WRMA) a) Construction of some facilities with both Water Facility Construction Authority & Water Abstraction Permit: 15, b) Construction of some facilities with Water Facility Construction Authority but no Water Abstraction Permit yet: 12, c) Water Facility Construction Authority was obtained but no facility constructed: 8, d) Construction of some facilities without both Water Facility Construction Authority & Water Abstraction Permit: 8, e) Ready to apply for the Authority/Permit: 5, f) not applicable: 8	Questionnaire 5.4, 5.5/ Presentation	d)	8	b)	12	e)	5	f)	8	f)	8	f)	8
5	15		Crop Production													
5.1	5		Farmers experience for irrigated agriculture 1) Irrigation methods (more than 3 options: 2, 2 options or less: 1) 2) Percentage of scheme members (over 50%: 4, 25-50%: 3, less than 25%: 2, nil: 1) 3) Experience of farmers (over 3 years: 4, 1-3 years(s): 3, less than 1 year: 2, none: 1) 4) Add all points in 1) to 3), then divide by 2 (and round it)	1) Questionnaire 3.3.1/ Presentation 2) Addendum 2 3) Addendum 3	1): 1 2): 4 3): 4 (1+4+4)/2 = 4.5	5	1): 1 2): 4 3): 4 (1+4+4)/2 = 4.5	5	1): 1 2): 3 3): 4 (1+3+4)/2 = 4	4	1): 1 2): 2 3): 4 (1+2+4)/2 = 3.5	4	1): 1 2): 4 3): 4 (1+4+4)/2 = 4.5	5	1): 1 2): 4 3): 4 (1+4+4)/2 = 4.5	5
5.2	5		Potential growth in farm production 1) Estimate the variables on 3 major crops (in 2011) a) Cropping acreage per HH = Total acreage / Total households b) Average gross margin per Acre = (Gross total income - Total production cost) / Total acreage c) Average gross margin per HH = (Gross total income - Total production cost) / Total acreage then, multiply by the cropping acreage per HH (a) 2) Estimate the proposed irrigated area (Acre) per HH d) Proposed Irrigated Area (Acre) per Household (HH) = Proposed Irrigated Area (Ha) / No. of HH for proposed Irrigated Area then, multiply by 2.47 (* Ha = 2.47 Acre) 3) Calculate the percentage increase for each major crop [(a+d) * b] - c] / c * 100 (for the Crop A, B, C) 3√(A*B*C) 4) Then calculate the "Geometric Mean (GM)" for crop A to C 3√(A*B*C) Percentage increase in average gross margin per HH (more than 10% increase: 5, between 5 to 10% increase: 3, less than 5% increase: 1)	1) Questionnaire 7.2/ Presentation Major crops: A, B, C i) Total acreage ii) Total households iii) Gross total income iv) Total production cost then, a = i) / ii) b = [(iii) - iv) / i) c = b * a 2) Questionnaire 3.1.10/ Presentation v) Proposed irrigation area vi) No. of HH for proposed then, d = [v] / (vi) * 2.47 3) [(a+d) * b] - c] / c * 100 (for Crop A, B, C) 4) 3√(A*B*C) (for Crop A, B, C)	Major crops A: Cabbage B: Tomato C: Kale 1)a: A: 0.3 B: 0.2 C: 0.2 b: A: 295,800 B: 247,850 C: 289,900 c: A: 88,740 B: 49,570 C: 57,800 2)d: A, B, C: 1.98 3) A: 658.7 B: 98.8 C: 98.0 4) 40.1%	5	Major crops A: Ft. Beans B: Cabbage C: SnowPea 1)a: A: 0.5 B: 0.8 C: 0.25 b: A: 84,000 B: 29,381 C: 264,000 c: A: 42,000 B: 24,680 C: 100,000 2)d: A, B, C: 1.95 3) A: 389.7 B: 232.0 C: 779.4 4) 43.8%	5	Major crops A: Watermelon B: Tomato C: Capsicum 1)a: A: 0.46 B: 0.21 C: 0.33 b: A: 350,000 B: 650,000 C: 390,000 c: A: 161,538 B: 135,417 C: 100,000 2)d: A, B, C: 4.94 3) A: 107.0 B: 237.1 C: 148.2 4) 156%	5	Major crops A: Mango B: Banana C: Tomato 1)a: A: 0.17 B: 0.2 C: 0.3 b: A: 45,938 B: 343,500 C: 510,682 c: A: 31,957 B: 108,700 C: 113,100 2)d: A, B, C: 1.12 3) A: 197.6 B: 98.8 C: 592.8 4) 255%	5	Major crops A: Mango B: Gr. Gram C: Mango 1)a: A: 0.15 B: 0.06 C: 0.06 b: A: 12,000 B: 18,000 C: 27,500 c: A: 1,765 B: 1,059 C: 1,618 2)d: A, B, C: 3.49 3) A: 237.1 B: 592.8 C: 741.0 4) 437%	5	Major crops A: Maize B: Gr. Gram C: Mango 1)a: A: 0.15 B: 0.06 C: 0.06 b: A: 12,000 B: 18,000 C: 27,500 c: A: 1,765 B: 1,059 C: 1,618 2)d: A, B, C: 3.49 3) A: 237.1 B: 592.8 C: 741.0 4) 437%	5
5.3	5		Awareness of constraints in crop production a) Inappropriate crop production technique b) High costs of the farm inputs (seed, chemicals, fertilizer) c) High pest and disease infestation (All 3) constraints relating: 5, 2 constraints relating: 3, Only 1 or less constraint relating: 1)	Questionnaire 8.1.1/ Presentation	2 [b], c]	3	3 [a], [a], [b]	5	2 [b], c]	3	1 [a]	1	2 [a], [b]	3	1 [c]	1
6	10		Irrigation Facilities													
6.1	10		Existing irrigation facilities (proper maintenance: 10, poor maintenance: 5, not applicable: 5)	Questionnaire 3.4/ Presentation	poor	5	poor	5	N/A	5	N/A	5	poor	5	poor	5
7	20		Organization in the Scheme													
7.1	5		Registration (registered: 5, in process: 3, none: 0)	Questionnaire 4.1/ Presentation	registered	5	registered	5	registered	5	registered	5	registered	5	registered	5
7.2	10		Fees Collection and/or any other contribution by the scheme organization (collected: 10, not collected: 3)	Questionnaire 4.1/ Presentation	No	3	Yes	10	No	3	No	3	Yes	10	No	3
7.3	5		Frequency of meetings (10 times or more a year: 5, less than 10 times a year: 2)	Questionnaire 4.1/ Presentation	12	5	27	5	3	2	3	2	5	2	7	2
8	6		Accessibility													
8.1	4		Accessibility to and from major town (DIO/DAO Office) by 4WD car during rainy season (1.5 hrs or less: 4, more than 1.5 hrs: 2)	Addendum	Narok 15 km 1 hr.	4	Rumuruti 35 km 1 hr.	4	Mogotio 25 km 40 min.	4	Iten 55 km 2.5 hrs.	2	Kapsovar 60 km 1.5 hrs.	4	Kapenguria 95 km 2.5 hrs.	2
8.2	2		Accessibility to major irrigation facilities such as intake weir and control structures, etc. (20 minutes walk or less: 2, more than 20 minutes walk: 1)	Questionnaire 6.6/ Presentation	5 min.	2	5 min.	2	10 min.	2	35 min.	1	20 min.	2	30 min.	1
9	10		Markets and Market Information													
9.1	4		Accessibility to and from nearest market by Matatu (public transportation vehicle) during rainy season (1 hr or less: 4, more than 1 hr: 2)	Addendum	Narok 15 km 80 min.	2	Kiamaiga 1.5 km 40 min. walk	4	Emining 0.5 km 10 min. walk	4	Kahulwo 2 km 50 min. walk	4	Chesogon 2 km 20 min. walk	4	Lomut 1 km 20 min. walk	4
9.2	1		Existing marketing groups (existing: 1, none: 0)	Questionnaire 12.2/ Presentation	existing	1	existing	1	existing	1	existing	1	existing	1	existing	1
9.3	5		Awareness of constraints in marketing a) Inadequate market information b) Poor road accessibility c) Low farm-gate price d) Lack of marketing group and bargaining power (All 3) constraints relating: 5, 2 constraints relating: 3, Only 1 or less constraint relating: 1)	Questionnaire 8.1.2/ Presentation	2 [b], [d]	3	3 [a], [c], [d]	5	2 [c], [d]	3	2 [a], [d]	3	3 [b], [c], [d]	5	2 [a], [c]	3
10	7		Environmental Issues													
10.1	2		Other existing irrigation schemes (upstream and downstream of the scheme within 60 km) (5 schemes or less: 2, 6-10 schemes: 1, more than 10 schemes: 0)	Questionnaire 5.7/ Presentation	none	2	2 schemes	2	none	2	none	2	11 schemes	0	3 schemes	2
10.2	5		Anticipated negative environmental impacts (low: 5, medium: 2, high: 0) a) Soil erosion and sedimentation b) Salinity and alkalinity c) Flooding d) Effect on downstream users e) Wildlife conflicts	Questionnaire 9.2/ Presentation	No. of negative impacts 0-2: low, 3: medium, 4-5: high	2 [a], [d]	1 [d]	5	2 [c], [d]	5	1 [a]	5	2 [a], [d]	5	2 [a], [b]	5
Total	100	100				74	85	64	59	78	61					

Source: JICA Team

SIDEMAN-SAL, Final Report

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Table 1.4.4 Details of Scoring of Candidate Schemes for Pilot Project Sites in Batch-1 (Eastern Province)

No.	Category Score	Max. Distribution	Item	Reference	Eastern Province											
					10		11		12		13		14		15	
					Embu		Meru		Tharaka North		Tharaka South		Tharaka South		Tharaka South	
					Mbeere North	Murachake	Imuti North	Gachua	Igembe South	Tumutumu	Tigania East	Igariri Antuambagi	Munungano	Kinga	Munungano	Kinga
Data	Score	Data	Score	Data	Score	Data	Score	Data	Score	Data	Score					
1	2		Climatic Conditions													
1.1	1	1	Rainfall (Annual rainfall 700 mm or less: 1, more than 700 mm: 0)	Questionnaire 3.1.1/ Presentation	< 700 mm	1	> 700 mm	0	> 700 mm	0	< 700 mm	1	< 700 mm	1	< 700 mm	1
1.2	1		Temperature (Max. temperature 30°C or more: 1, less than 30°C: 0)	Questionnaire 3.1.2/ Presentation	> 30°C	1	> 30°C	1	> 30°C	1	> 30°C	1	> 30°C	1	> 30°C	1
2	5	5	Land Tenure (Owner/freehold: 5, Community/GOK: 3, Tenant/lease: 0)	Questionnaire 3.1.6/ Presentation	Owner	5	Owner	5	Owner	5	Owner	5	Owner	5	Owner	5
3	10		Area													
3.1	5	5	Scheme gross area per household (2 ac. or less: 5, more than 2 ac.: 2)	Questionnaire 3.1.9/ Presentation	0.99	5	0.99	5	1.10	5	1.98	5	1.98	5	1.98	5
3.2	5	5	Proposed/target irrigated area per household (1.5 ac. or less: 5, more than 1.5 ac.: 2)	Questionnaire 3.1.10/ Presentation	0.99	5	0.49	5	0.49	5	0.47	5	0.49	5	0.49	5
4	15		Water Resources													
4.1	15	15	Water Facility Construction Authority and Water Abstraction Permit (WRMA) a) Construction of some facilities with both Water Facility Construction Authority & Water Abstraction Permit: 15, b) Construction of some facilities with Water Facility Construction Authority but no Water Abstraction Permit yet: 12, c) Water Facility Construction Authority was obtained but no facility constructed: 8, d) Construction of some facilities without both Water Facility Construction Authority & Water Abstraction Permit: 8, e) Ready to apply for the Authority/Permit: 5, f) not applicable: 8	Questionnaire 5.4, 5.5/ Presentation	b)	12	b)	12	a)	15	b)	12	c)	8	e)	5
5	15		Crop Production													
5.1	5	5	Farmers experience for irrigated agriculture 1) Irrigation methods (more than 3 options: 2, 2 options or less: 1) 2) Percentage of scheme members (over 50%: 4, 25-50%: 3, less than 25%: 2, nil: 1) 3) Experience of farmers (over 3 years: 4, 1-3 years(s): 3, less than 1 year: 2, none: 1) 4) Add all points in 1) to 3), then divide by 2 (and round it)	1) Questionnaire 5.3.1/ Presentation 2) Addendum 2 3) Addendum 3	1): 1 2): 2 3): 2 (1+2+2)/2 = 2.5	3	1): 1 2): 4 3): 4 (1+4+4)/2 = 4.5	5	1): 1 2): 3 3): 3 (1+3+3)/2 = 3.5	4	1): 1 2): 3 3): 3 (1+2+2)/2 = 2.5	4	1): 1 2): 2 3): 2 (1+2+2)/2 = 2.5	3	1): 1 2): 3 3): 2 (1+3+2)/2 = 3	3
5.2	5	5	Potential growth in farm production 1) Estimate the variables on 3 major crops (in 2011) a) Cropping acreage per HH = Total acreage / Total households b) Average gross margin per Acre = (Gross total income - Total production cost) / Total acreage c) Average gross margin per HH = (Gross total income - Total production cost) / Total acreage then, multiply by the cropping acreage per HH (a) 2) Estimate the proposed irrigated area (Acre) per HH d) Proposed Irrigated Area (Acre) per Household (HH) = Proposed Irrigated Area (Ha) / No. of HH for proposed Irrigated Area then, multiply by 2.47 (* 1Ha = 2.47 Acres) 3) Calculate the percentage increase for each major crop $\frac{[(a+d) * b] - c}{c} * 100$ (for the Crop A, B, C) 4) Then calculate the "Geometric Mean (GM)" for Crop A to C $3\sqrt{(A * B * C)}$ Percentage increase in average gross margin per HH (more than 10% increase: 5, between 5 to 10% increase: 3, less than 5% increase: 1)	1) Questionnaire 7.2/ Presentation Major crops A, B, C i) Total acreage ii) Total households iii) Gross total income iv) Total production cost then, a = i) / ii) b = [iii) - iv)] / i) c = b * a 2) Questionnaire 3.1.10/ Presentation v) Proposed irrigation area vi) No. of HH for proposed then, d = [vi) / v)] * 2.47 A, B, C: 0.99 3) $\frac{[(a+d) * b] - c}{c} * 100$ (for Crop A, B, C) 4) $3\sqrt{(A * B * C)}$ (for Crop A, B, C)	Major crops A: Cowpea B: Gr. Gram C: Sorghum 1) a: A: 0.3 B: 0.2 C: 0.4 b: A: 2,040 B: 10,850 C: 11,560 c: A: 510 B: 2,170 C: 4,624 2) d: A, B, C: 0.49 3) A: 395.2 B: 494.0 C: 207.0 4) 364%	5	Major crops A: Maize B: Beans C: Miroa 1) a: A: 0.8 B: 1.4 C: 0.5 b: A: 47,464 B: 3,095 C: 344,000 c: A: 38,435 B: 4,377 C: 161,250 2) d: A, B, C: 0.49 3) A: 61.0 B: 34.9 C: 105.4 4) 61%	5	Major crops A: Maize B: Beans C: Cowpea 1) a: A: 1.0 B: 0.4 C: 0.2 b: A: 3,200 B: 6,000 C: 117,500 c: A: 3,200 B: 1,600 C: 71,000 2) d: A, B, C: 0.49 3) A: 49.4 B: 185.3 C: 125.5 4) 104%	4	Major crops A: Maize B: Beans C: Cowpea 1) a: A: 1.0 B: 0.4 C: 0.2 b: A: 19,900 B: 24,500 C: 31,000 c: A: 19,900 B: 9,074 C: 6,200 2) d: A, B, C: 0.47 3) A: 46.7 B: 126.2 C: 231.6 4) 111%	5	Major crops A: Mango B: Maize C: Pigeon peas 1) a: A: 0.3 B: 0.2 C: 0.2 b: A: 75,000 B: 50,000 C: 56,000 c: A: 40,000 B: 7,762 C: 14,983 2) d: A, B, C: 0.49 3) A: 92.6 B: 210.5 C: 211.7 4) 165%	5	Major crops A: Mango B: Maize C: Pigeon peas 1) a: A: 0.3 B: 0.2 C: 0.3 b: A: 50,000 B: 33,200 C: 56,000 c: A: 13,699 B: 3,182 C: 14,933 2) d: A, B, C: 0.49 3) A: 180.3 B: 54.3 C: 185.3 4) 122%	5
5.3	5	5	Awareness of constraints in crop production a) Inappropriate crop production technique b) High costs of the farm inputs (seed, chemicals, fertilizer) c) High pest and disease infestation (All (3) constraints relating: 5, 2 constraints relating: 3, Only 1 or less constraint relating: 1)	Questionnaire 8.1.1/ Presentation	2 [a], c]	3	2 [a], b]	3	2 [a], b]	3	2 [a], b]	3	3 [a], a], a]	5	3 [a], a], a]	5
6	10	10	Irrigation Facilities													
6.1	10	10	Existing irrigation facilities (poor/maintenance: 10, poor/maintenance: 5, not applicable: 5)	Questionnaire 3.4/ Presentation	poor	5	poor	5	poor	5	poor	5	N/A	5	N/A	5
7	20		Organization in the Scheme													
7.1	5	5	Registration (registered: 5, in process: 3, none: 0)	Questionnaire 4.1/ Presentation	registered	5	registered	5	registered	5	registered	5	registered	5	registered	5
7.2	10	10	Fee Collection and/or any other contribution by the scheme organization (collected: 10, not collected: 3)	Questionnaire 4.1/ Presentation Yes: 10, No: 3	Yes	10	Yes	10	Yes	10	Yes	10	Yes	10	Yes	10
7.3	5	5	Frequency of meetings (10 times or more a year: 5, less than 10 times a year: 2)	Questionnaire 4.1/ Presentation	12	5	7	2	4	2	no data	2	5	2	5	2
8	6		Accessibility													
8.1	4	4	Accessibility to and from major town (DIO/DAO Office) by 4WD car during rainy season (1.5 hrs or less: 4, more than 1.5 hrs: 2)	Addendum	Siakago 30 km 1 hr.	4	Meru 35 km 1 hr.	4	Muaa 15 km 30 min.	4	Mutiri 4 km 1.5 hrs.	4	Marimanti 35 km 1 hr.	4	Marimanti 18 km 30 min.	4
8.2	2	2	Accessibility to major irrigation facilities such as intake weir and control structures, etc. (20 minutes walk or less: 2, more than 20 minutes walk: 1)	Questionnaire 6.6/ Presentation	10 min.	2	5 min.	2	15 min.	2	10 min.	2	5 min.	2	30 min.	1
9	10		Markets and Market Information													
9.1	4	4	Accessibility to and from nearest market by Matatu (public transportation vehicle) during rainy season (1 hr or less: 4, more than 1 hr: 2)	Addendum	Ibiara 2.5 km 5 min.	4	Gachua 1.5 km 40 min. walk	4	Ntherone 8 km 20 min.	4	Mulika 4 km 15 min.	4	Mioiponi 5 km 20 min.	4	Gatunga 10 km 20 min.	4
9.2	1	1	Existing marketing groups (existing: 1, none: 0)	Questionnaire 12.2/ Presentation	none	0	none	0	none	0	none	0	none	0	existing	1
9.3	5	5	Awareness of constraints in marketing a) Inadequate market information b) Poor road accessibility c) Low farm-gate price d) Lack of marketing group and bargaining power (All (3) constraints relating: 5, 2 constraints relating: 3, Only 1 or less constraint relating: 1)	Questionnaire 8.1.2/ Presentation	3 [a], c), d]	5	3 [a], c), d]	5	3 [a], b), c]	5	1 [d]	1	3 [a], b), d]	5	3 [a], b), d]	5
10	7		Environmental Issues													
10.1	2	2	Other existing irrigation schemes (upstream and downstream of the scheme within 60 km) (5 schemes or less: 2, 6-10 schemes: 1, more than 10 schemes: 0)	Questionnaire 5.7/ Presentation	1 scheme	2	4 schemes	2	4 schemes	2	3 schemes	2	1 scheme	2	4 schemes	2
10.2	5	5	Anticipated negative environmental impacts (low: 5, medium: 2, high: 0) a) Soil erosion and sedimentation b) Salinity and alkalinity c) Flooding d) Effect on downstream users e) Wildlife conflicts	Questionnaire 9.2/ Presentation No. of negative impacts 0-2: low, 3: medium, 4-5: high	2 [d], e]	5	2 [a], e]	5	2 [d], e]	5	2 [a], d]	5	2 [d], e]	5	2 [d], e]	5
Total	100	100				87		85		87		81		82		79

Source: JICA Team

1.4.2 Result of Selection for Pilot Project Sites in Batch-1

The results of selection of the Pilot Project Sites in Batch-1 are summarized below:

Table 1.4.5 Results of Scoring of Candidate Scheme for Pilot Scheme Sites

No	Province	County	District	Scheme	Scoring
1.	Coast	Taita-Taveta	Taveta	Kasokoni	77
2.			Mwatate	Msau	72
3.		Kilifi	Ganze	Mdachi	62
4.	Rift Valley	Narok	Narok North	Olopito	74
5.		Laikipia	Laikipia West	Gatitu/Muthaiga	85
6.		Baringo	Mogotio	Emining	62
7.		Elgeyo Marakwet	Keiyo North	Kipchuchuku	59
8.			Marakwet East	Kaben	78
9.	West Pokot	Pokot Central	Chemosos	61	
10.	Eastern	Embu	Mbeere North	Murachake	87
11.		Meru	Imenti North	Gachua	85
12.			Igembe South	Tumutumu	87
13.			Tigania East	Igari Antuambugi	81
14.		Tharaka Nithi	Thalaka South	Muongano	82
15.				Kiaga	79

Source: JICA Team

The Pilot Project Sites in Batch-1 were finally selected based on the results of the scoring the candidate schemes taking account of equalization of the counties on site selection.

The finally selected Pilot Project Sites in Batch-1 are shown below:

Table 1.4.6 Selected Pilot Project Sites in Batch-1

No	Province	County	District	Scheme
1.	Coast	Taita-Taveta	Taveta	Kasokoni
2.		Kilifi	Ganze	Mdachi
3.	Rift Valley	Narok	Narok North	Olopito
4.		Laikipia	Laikipia West	Gatitu/Muthaiga
5.		Elgeyo Marakwet	Marakwet East	Kaben
6.	Eastern	Embu	Mbeere North	Murachake
7.		Meru	Igembe South	Tumutumu
8.		Tharaka Nithi	Thalaka South	Muongano

Source: JICA Team

1.5 Start-off Meeting

The purpose of a start-off Meeting is 1)to explain the activities and schedule of the Project for Construction/Rehabilitation of Irrigation Facilities and Improvement of Farming Practice and 2)to clarify roles and responsibilities of the Project, Ministry of Irrigation, Ministry of Agriculture, and Water Users' Association.

To introduce a consultant for upcoming Feasibility Study, Detailed Design, and Environmental Impact Assessment.

The meetings were held in each Batch-1 Pilot Scheme Sites as shown below.

Table 1.5.1 Start-off Meeting Date in Pilot Scheme Sites at Batch-1

No	Province	District	Scheme	Date of Meeting
1.	Coast	Taveta	Kasokoni	10 th December 2012
2.		Ganze	Mdachi	14 th December 2012
3.	Rift Valley	Narok North	Olopito	11 th December 2012
4.		Laikipia West	Gatitu/Muthaiga	04 th January 2013
5.		Marakwet East	Kaben	14 th December 2012
6.	Eastern	Mbeere North	Murachake	05 th January 2013
7.		Igembe South	Tumutumu	17 th December 2012
8.		Thalaka South	Muongano	11 th December 2012

Source: JICA Team

At the Meetings, the following issues were discussed,

- Introduction of the SIDEMAN-SAL Project,
- Output of the Project,
- Project Period and Schedule,
- Program for Irrigation Development,
- Construction and Rehabilitation works by IWUA,
- Training program for farming,
- Establishment of Pilot scheme Coordinating Committee (PSCC),
- Coordination with FS and DD Consultants and the EIA Consultants,
- Community response to EIA public hearing to be conducted by the EIA consultant,
- Implementation and Monitoring of Agricultural Development using SHEP Method, and

- Roles of SCAO and SCIO.

After the Meetings, Field visits at the intake weir sites were conducted so as for the consultants to commence the topographic survey at the sites. The area for the topographic survey was confirmed at presence of the SCIO and members of IWUA, and directed by the JICA Team to the consultants.

CHAPTER 2 Selection and Implementation for Batch-2 Pilot Schemes

2.1 General

Before the selection of the Batch 2 Pilot Project Sites, the JICA Team will discuss with MOALF the selection criteria in the schemes. After the field reconnaissance for the schemes, the Pilot Irrigation Schemes will be selected according to the agreed criteria. It is to be highlighted the Pilot Project Site in Batch 2 will be selected in the SCIO's Office Ranges, in which the prioritized Batch-1 Pilot Projects were implemented.

2.2 Basic Approach for the Implementation of Batch-2 Pilot Schemes

In order to achieve the outputs under the Project, the following common understandings would be shared among the stakeholders.

- The implementation is led by the SCIOs/SCAOs based on lessons learnt obtained from Batch-1.
- The construction works should be completed within the Project Period.
- Training of O&M and Farming would be carried out utilizing the completed irrigation facilities.

2.3 Selection of Batch-2 Pilot Schemes

2.3.1 Candidates for Batch 2 Pilot Sites

(1) General

Both Batch-1 and Batch-2 sites will be selected in the same Sub-Counties so that capacity of the technical officers at Sub-County level will be enhanced continuously throughout the Project period.

The JICA Team conducted a preparatory works, such as preparation of draft questionnaire, and draft selection criteria. Simultaneously, after the discussion at the PMT meeting in December 2013, selection of the candidate schemes has commenced taking in consideration the following aspects.

- Registration status of IWUA/CBO in the sites,
- Election of committee members as per a by-law,
- Proposed irrigation facilities with length of canals/pipelines to be constructed/rehabilitated,
- Status of WRMA Authorisation

In January 2014, the following candidates and the filled questionnaires were obtained from the relevant SCIOs.

Table 2.3.1 Candidates for the Batch 2 Pilot Project Sites

No.	Sub-County	Name of Scheme
1	Taveta	Challa Tuhire
2	Taveta	Kimala
3	Taveta	Kimorigo
4	Ganze	Mwangutho
5	Narock North	Shulakino
6	Narock North	Ewaso N'giro
7	Narock North	Muchorui/Muchuha
8	Laikipia West	Munand
9	Laikipia West	Kiamariga/Ray
10	Laikipia West	Kiangoru
11	Igembe South	Kaumbura
12	Igembe South	Mpanguene

Source: JICA Team

2.3.2 Field Investigation for Candidate Sites

Field reconnaissance of the candidate schemes for the Pilot Project Sites in Batch 2 were carried out by the PMT for fact-finding of the schemes as follows:

Table 2.3.2 Field Investigation of Candidate Schemes for Pilot Project Sites in Batch 2

Date	Sub-County	Name of Scheme	Proposed Irrigated Area (ha)	Features
29 th Jan. 2014	Narock North	Muchorui/Muchuha	100	New Construction for head works and irrigation canal
30 th Jan. 2014	Narock North	Shulakino	40	Existing intake weir and pipeline to be extended
30 th Jan. 2014	Narock North	Ewaso N'giro	200	New Construction for head works and irrigation canal
30 th Jan. 2014	Laikipia West	Munanda	78	Existing intake weir and pipeline to be extended
31 st Jan. 2014	Laikipia West	Kiamariga/Ray	120	Existing intake weir and pipeline to be extended
31 st Jan. 2014	Laikipia West	Kiangoru	63	Existing intake weir and pipeline to be extended
3 rd Feb. 2014	Taveta	Challa Tuhire	300	Existing intake weir and canals to be rehabilitated
4 th Feb. 2014	Taveta	Kimala	222	Existing intake weir and canals to be rehabilitated
4 th Feb. 2014	Taveta	Kimorigo	126	Existing intake weir and canals to be rehabilitated
10 th Feb. 2014	Igembe South	Kaumbura	160	Canals to be rehabilitated and extended
11 th Feb. 2014	Igembe South	Mpanguene	60	Pipeline to be constructed
18 th Mar. 2014	Ganze	Mwangutho	16	Pump is to be rehabilitated. Pipeline to be extended

Source: JICA Team

Based on the filled questionnaires, the information was clarified and updated with the SCIO/SCAO and beneficiaries in the Sites. Special attention was paid to present irrigation practice, proposed irrigation system, current activities of the IWUAs, if any, and status of authorization by WRMA.

2.3.3 Preparation of Selection Criteria

The selection criteria for selection of the Pilot Project Sites in Batch-2 was prepared and finalized through discussion at the PMT.

The indicators in the criteria are, (1) Climate Condition, (2) Land Tenure, (3) Area, (4) Water Resources, (5) Crop Production, (6) Irrigation Facilities, (7) Organization in the Scheme, (8) Accessibility, (9) Markets and Market Information, and (10) Environmental Issues. The agreed selection criteria with scoring are as follows:

Table 2.3.3 Selection Criteria for Selection of the Pilot Project Sites in Batch-2

No.	Category Score	Max Distribution	Item
1	2		Climatic Conditions
1.1		1	Rainfall (Annual rainfall 700 mm or less: 1, more than 700 mm: 0)
1.2		1	Temperature (Max. temperature 30°C or more: 1, less than 30°C: 0)
2	5	5	Land Tenure (Owner/freehold: 5, Communal/GOK: 3, Tenant/lease: 0)
3	10		Area
3.1		5	Scheme gross area per household (2 ac. or less: 5, more than 2 ac.: 2)
3.2		5	Proposed/target irrigation area per household (1.5 ac. or less: 5, more than 1.5 ac.: 2)
4	15		Water Resources
4.1		7	Water Source (River: 4, Spring/Stream: 2, Dam/Borehole: 1)
4.2		4	Abstraction Method (Gravity: 3, Pump: 1, Submergeable Pump: 0)
4.3		4	Volume of Abstract (High: 3, Medium: 1, Low 0)
5	15		Crop Production
5.1		8	Farmers experience for irrigated agriculture (Irrigated agriculture under Canal/Pipeline: 8, Irrigated agriculture individually: 4, No experience: 0)
5.2		7	Awareness of constraints in crop production (The number of relevant answer is 3: 7, The number of relevant answer is 2: 5, The number of relevant answer is 1: 3, No answer: 0)
6	10		Irrigation Facilities
6.1		5	Existing irrigation facilities (proper maintenance: 5, poor maintenance: 0, not applicable: 0)
6.2		5	Length of proposed main canal/pipeline (Less than 5 km: 5, More than 5 km: 2)
7	20		Organization in the Scheme
7.1		5	Registration status (Registered: 4, Under Registration: 1, Not Yet: 0)
7.2		10	Fee Collection and/or any other contribution rate by the scheme organization (More than 50%: 6, Less than 50% and More than 20%: 3, Less than 20%: 1)
7.3		5	Election of Committee Members (Elected as per By-law: 4, Forced by member and others: 1, Never been done: 0)
8	6		Accessibility
8.1		4	Accessibility to and from major town (SCIO/SCAO Office) by 4WD car during rainy season (1.5 hrs or less: 4, more than 1.5 hrs: 2)
8.2		2	Accessibility to major irrigation facilities such as intake weir and control structures, etc. (20 minutes walk or less: 2, more than 20 minutes walk: 1) *Time from head of scheme to intake weir site
9	10		Markets and Market Information
9.1		2	Accessibility to and from nearest market by Matatu (public transportation vehicle) during rainy season (1 hr or less: 4, more than 1 hr: 2)
9.2		1	Existing marketing groups (existing: 1, none: 0)
9.3		7	Awareness of constraints in marketing (The number of relevant answer is 3: 7, The number of relevant answer is 2: 5, The number of relevant answer is 1: 3, No answer: 0)
10	7		Environmental Issues
10.1		2	Other existing irrigation schemes (upstream and downstream of the scheme within 60 km) (5 schemes or less: 2, 6-10 schemes: 1, more than 10 schemes: 0)
10.2		5	Anticipated negative environmental impacts (low: 5, medium: 2, high: 0)
Total	100	100	

Source: JICA Team

2.3.4 Scoring of Candidate Schemes for Pilot Project Sites in Batch 2

The scoring of the candidate schemes for the Pilot Project Sites in Batch 2 were made based on the answers to the Questionnaire, which were sent to the SCIOs.

The scoring of the candidate schemes for the Pilot Project Sites in Batch-1 and its details made

by the PMT are presented in Table 2.3.4 - Table 2.3.8.

Table 2.3.4 Result of Scoring in Taveta Sub-County in Batch-2

No.	Category Score	Max. Distribution	Item	Open Channel Rehabilitation		Open Channel Rehabilitation		Open Channel Rehabilitation	
				Challa Tuhire		Kimata		Kimorigo	
1	2		Climatic Conditions						
1.1		1	Rainfall (Annual rainfall 700 mm or less: 1, more than 700 mm: 0)	525mm	1	500mm	1	525mm	1
1.2		1	Temperature (Max. temperature 30°C or more: 1, less than 30°C: 0)		1		1		1
2	5	5	Land Tenure (Owner/freehold: 5, Communal/GOK: 3, Tenant/lease: 0)	Communal	3	Private	5	Private	5
3	10		Area						
3.1		5	Scheme gross area per household (2 ac. or less: 5, more than 2 ac.: 2)	5.36	2	7.15	2	1.54	5
3.2		5	Proposed/target irrigation area per household (1.5 ac. or less: 5, more than 1.5 ac.: 2)	1.07	5	4.27	2	0.92	5
4	15		Water Resources						
4.1		7	Water Source (River: 4, Spring/Stream: 2, Dam/Borehole: 1)		4		4		4
4.2		4	Abstraction Method (Gravity: 3, Pump: 1, Submergeable Pump: 0)		3		3		3
4.3		4	Volume of Abstract (High: 3, Medium: 1, Low 0)		1		1		1
5	15		Crop Production						
5.1		8	Farmers experience for irrigated agriculture (Irrigated agriculture under Canal/Pipeline: 8, Irrigated agriculture individually: 4, No experience: 0)		8		8		8
5.2		7	Awareness of constraints in crop production (The number of relevant answer is 3: 7, The number of relevant answer is 2: 5, The number of relevant answer is 1: 3, No answer: 0)		7		7		7
6	10		Irrigation Facilities						
6.1		5	Existing irrigation facilities (proper maintenance: 5, poor maintenance: 0, not applicable: 0)		5		5		5
6.2		5	Length of proposed main canal/pipeline (Less than 5 km: 5, More than 5 km: 2)	1.75 km Lining	5	7 km Lining	2	6 km Lining	2
7	20		Organization in the Scheme						
7.1		5	Registration status (Registered: 4, Under Registration: 1, Not Yet: 0)		4		4		4
7.2		10	Fee Collection and/or any other contribution rate by the scheme organization (More than 50%: 6, Less than 50% and More than 20%: 3, Less than 20%: 1)		6		6		6
7.3		5	Election of Committee Members (Elected as per By-law: 4, Forced by member and others: 1, Never been done: 0)		4		1		1
8	6		Accessibility						
8.1		4	Accessibility to and from major town (SCIO/SCAO Office) by 4WD car during rainy season (1.5 hrs or less: 4, more than 1.5 hrs: 2)		4		4		4
8.2		2	Accessibility to major irrigation facilities such as intake weir and control structures, etc. (20 minutes walk or less: 2, more than 20 minutes walk: 1) *Time from head of scheme to intake weir site		2		2		2
9	10		Markets and Market Information						
9.1		2	Accessibility to and from nearest market by Matatu (public transportation vehicle) during rainy season (1 hr or less: 4, more than 1 hr: 2)		2		2		2
9.2		1	Existing marketing groups (existing: 1, none: 0)		0		0		1
9.3		7	Awareness of constraints in marketing (The number of relevant answer is 3: 7, The number of relevant answer is 2: 5, The number of relevant answer is 1: 3, No answer: 0)		7		7		7
10	7		Environmental Issues						
10.1		2	Other existing irrigation schemes (upstream and downstream of the scheme within 60 km) (5 schemes or less: 2, 6-10 schemes: 1, more than 10 schemes: 0)		2		2		2
10.2		5	Anticipated negative environmental impacts (low: 5, medium: 2, high: 0)		2		2		2
Total	100	100			78		71		78

Source: JICA Team

Table 2.3.5 Result of Scoring in Ganze Sub-County in Batch-2

No.	Category Score	Max Distribution	Item	Pipeline Rehabilitation/Extension	
				Mangudho	
1	2		Climatic Conditions		
1.1		1	Rainfall (Annual rainfall 700 mm or less: 1, more than 700 mm: 0)		1
1.2		1	Temperature (Max. temperature 30°C or more: 1, less than 30°C: 0)		1
2	5	5	Land Tenure (Owner/freehold: 5, Communal/GOK: 3, Tenant/lease: 0)	Private	3
3	10		Area		
3.1		5	Scheme gross area per household (2 ac. or less: 5, more than 2 ac.: 2)	3.00	2
3.2		5	Proposed/target irrigation area per household (1.5 ac. or less: 5, more than 1.5 ac.: 2)	1.00	5
4	15		Water Resources		
4.1		7	Water Source (River: 4, Spring/Stream: 2, Dam/Borehole: 1)		4
4.2		4	Abstraction Method (Gravity: 3, Pump: 1, Submergeable Pump: 0)		1
4.3		4	Volume of Abstract (High: 3, Medium: 1, Low: 0)		1
5	15		Crop Production		
5.1		8	Farmers experience for irrigated agriculture (Irrigated agriculture under Canal/Pipeline: 8, Irrigated agriculture individually: 4, No experience: 0)		8
5.2		7	Awareness of constraints in crop production (The number of relevant answer is 3: 7, The number of relevant answer is 2: 5, The number of relevant answer is 1: 3, No answer: 0)		7
6	10		Irrigation Facilities		
6.1		5	Existing irrigation facilities (proper maintenance: 5, poor maintenance: 0, not applicable: 0)		5
6.2		5	Length of proposed main canal/pipeline (Less than 5 km: 5, More than 5 km: 2)	1.6 km	5
7	20		Organization in the Scheme		
7.1		5	Registration status (Registered: 4, Under Registration: 1, Not Yet: 0)		4
7.2		10	Fee Collection and/or any other contribution rate by the scheme organization (More than 50%: 6, Less than 50% and More than 20%: 3, Less than 20%: 1)		3
7.3		5	Election of Committee Members (Elected as per By-law: 4, Forced by member and others: 1, Never been done: 0)		1
8	6		Accessibility		
8.1		4	Accessibility to and from major town (SCIO/SCAO Office) by 4WD car during rainy season (1.5 hrs or less: 4, more than 1.5 hrs: 2)		4
8.2		2	Accessibility to major irrigation facilities such as intake weir and control structures, etc. (20 minutes walk or less: 2, more than 20 minutes walk: 1) *Time from head of scheme to intake weir site		2
9	10		Markets and Market Information		
9.1		2	Accessibility to and from nearest market by Matatu (public transportation vehicle) during rainy season (1 hr or less: 4, more than 1 hr: 2)		4
9.2		1	Existing marketing groups (existing: 1, none: 0)		1
9.3		7	Awareness of constraints in marketing (The number of relevant answer is 3: 7, The number of relevant answer is 2: 5, The number of relevant answer is 1: 3, No answer: 0)		7
10	7		Environmental Issues		
10.1		2	Other existing irrigation schemes (upstream and downstream of the scheme within 60 km) (5 schemes or less: 2, 6-10 schemes: 1, more than 10 schemes: 0)		2
10.2		5	Anticipated negative environmental impacts (low: 5, medium: 2, high: 0)		2
Total	100	100			73

Source: JICA Team

Table 2.3.6 Result of Scoring in Narok North Sub-County in Batch-2

No.	Category Score	Max Distribution	Item	Pipeline	New Scheme		New Scheme		
				Extension	Shulakino	Ewaso N'giro	Mochuru/Machuha	Mochuru/Machuha	
1	2		Climatic Conditions						
1.1		1	Rainfall (Annual rainfall 700 mm or less: 1, more than 700 mm: 0)	700mm	1	700mm	1	700mm	1
1.2		1	Temperature (Max. temperature 30°C or more: 1, less than 30°C: 0)	0		0		0	0
2	5	5	Land Tenure (Owner/freehold: 5, Communal/GOK: 3, Tenant/lease: 0)	Freehold	5	Leased	0	Freehold	5
3	10		Area						
3.1		5	Scheme gross area per household (2 ac. or less: 5, more than 2 ac.: 2)	0.73	5	8.33	2		5
3.2		5	Proposed/target irrigation area per household (1.5 ac. or less: 5, more than 1.5 ac.: 2)	0.58	5	8.33	2	0.25	5
4	15		Water Resources						
4.1		7	Water Source (River: 4, Spring/Stream: 2, Dam/Borehole: 1)		4		4		4
4.2		4	Abstraction Method (Gravity: 3, Pump: 1, Submergeable Pump: 0)		3		3		3
4.3		4	Volume of Abstract (High: 3, Medium: 1, Low: 0)		1		1		1
5	15		Crop Production						
5.1		8	Farmers experience for irrigated agriculture (Irrigated agriculture under Canal/Pipeline: 8, Irrigated agriculture individually: 4, No experience: 0)		8		4		4
5.2		7	Awareness of constraints in crop production (The number of relevant answer is 3: 7, The number of relevant answer is 1: 3, No answer: 0)		7		7		7
6	10		Irrigation Facilities						
6.1		5	Existing irrigation facilities (proper maintenance: 5, poor maintenance: 0, not applicable: 0)		5		0		0
6.2		5	Length of proposed main canal/pipeline (Less than 5 km: 5, More than 5 km: 2)	1.5 km	5	8 km	2	4 km	5
7	20		Organization in the Scheme						
7.1		5	Registration status (Registered: 4, Under Registration: 1, Not Yet: 0)		4		0		0
7.2		10	Fee Collection and/or any other contribution rate by the scheme organization (More than 50%: 6, Less than 50% and More than 20%: 3, Less than 20%: 1)		3		1		1
7.3		5	Election of Committee Members (Elected as per By-law: 4, Forced by member and others: 1, Never been done: 0)		4		0		0
8	6		Accessibility						
8.1		4	Accessibility to and from major town (SCIO/SCAO Office) by 4WD car during rainy season (1.5 hrs or less: 4, more than 1.5 hrs: 2)		4		4		2
8.2		2	Accessibility to major irrigation facilities such as intake weir and control structures, etc. (20 minutes walk or less: 2, more than 20 minutes walk: 1) *Time from head of scheme to intake weir site		1		1		1
9	10		Markets and Market Information						
9.1		2	Accessibility to and from nearest market by Matatu (public transportation vehicle) during rainy season (1 hr or less: 4, more than 1 hr: 2)		2		2		2
9.2		1	Existing marketing groups (existing: 1, none: 0)		0		1		0
9.3		7	Awareness of constraints in marketing (The number of relevant answer is 3: 7, The number of relevant answer is 2: 5, The number of relevant answer is 1: 3, No answer: 0)		7		7		7
10	7		Environmental Issues						
10.1		2	Other existing irrigation schemes (upstream and downstream of the scheme within 60 km) (5 schemes or less: 2, 6-10 schemes: 1, more than 10 schemes: 0)		2		2		2
10.2		5	Anticipated negative environmental impacts (low: 5, medium: 2, high: 0)		2		2		2
Total	100	100			78		46		57

Source: JICA Team

Table 2.3.7 Result of Scoring in Laikipia West Sub-County in Batch-2

No.	Category Score	Max. Distribution	Item	Pipeline Extension	Pipeline Extension	Pipeline Extension	Pipeline Extension
				Munanda	Kiamariga/Raya	Kiangoru	Kiangoru
1	2		Climatic Conditions				
1.1		1	Rainfall (Annual rainfall 700 mm or less: 1, more than 700 mm: 0)	700mm	1	700mm	1
1.2		1	Temperature (Max. temperature 30°C or more: 1, less than 30°C: 0)	0		0	0
2	5	5	Land Tenure (Owner/freehold: 5, Communal/GOK: 3, Tenant/lease: 0)	Private	5	Private	5
3	10		Area				
3.1		5	Scheme gross area per household (2 ac. or less: 5, more than 2 ac.: 2)	3.91	2	2.86	2
3.2		5	Proposed/target irrigation area per household (1.5 ac. or less: 5, more than 1.5 ac.: 2)	2.03	2	2.14	2
4	15		Water Resources				
4.1		7	Water Source (River: 4, Spring/Stream: 2, Dam/Borehole: 1)	4		4	4
4.2		4	Abstraction Method (Gravity: 3, Pump: 1, Submergeable Pump: 0)	3		3	3
4.3		4	Volume of Abstract (High: 3, Medium: 1, Low: 0)	1		1	1
5	15		Crop Production				
5.1		8	Farmers experience for irrigated agriculture (Irrigated agriculture under Canal/Pipeline: 8, Irrigated agriculture individually: 4, No experience: 0)	8		8	8
5.2		7	Awareness of constraints in crop production (The number of relevant answer is 3: 7, The number of relevant answer is 2: 5, The number of relevant answer is 1: 3, No answer: 0)	7		7	7
6	10		Irrigation Facilities				
6.1		5	Existing irrigation facilities (proper maintenance: 5, poor maintenance: 0, not applicable: 0)	5		5	5
6.2		5	Length of proposed main canal/pipeline (Less than 5 km: 5, More than 5 km: 2)	2.5 km	5	1.6 km	5
7	20		Organization in the Scheme				
7.1		5	Registration status (Registered: 4, Under Registration: 1, Not Yet: 0)	4		4	4
7.2		10	Fee Collection and/or any other contribution rate by the scheme organization (More than 50%: 6, Less than 50% and More than 20%: 3, Less than 20%: 1)	1		1	3
7.3		5	Election of Committee Members (Elected as per By-law: 4, Forced by member and others: 1, Never been done: 0)	0		1	1
8	6		Accessibility				
8.1		4	Accessibility to and from major town (SCIO/SCAO Office) by 4WD car during rainy season (1.5 hrs or less: 4, more than 1.5 hrs: 2)	4		4	4
8.2		2	Accessibility to major irrigation facilities such as intake weir and control structures, etc. (20 minutes walk or less: 2, more than 20 minutes walk: 1) *Time from head of scheme to intake weir site	1		1	1
9	10		Markets and Market Information				
9.1		2	Accessibility to and from nearest market by Matatu (public transportation vehicle) during rainy season (1 hr or less: 4, more than 1 hr: 2)	2		2	2
9.2		1	Existing marketing groups (existing: 1, none: 0)	0		0	0
9.3		7	Awareness of constraints in marketing (The number of relevant answer is 3: 7, The number of relevant answer is 2: 5, The number of relevant answer is 1: 3, No answer: 0)	7		7	7
10	7		Environmental Issues				
10.1		2	Other existing irrigation schemes (upstream and downstream of the scheme within 60 km) (5 schemes or less: 2, 6-10 schemes: 1, more than 10 schemes: 0)	2		2	2
10.2		5	Anticipated negative environmental impacts (low: 5, medium: 2, high: 0)	2		2	2
Total	100	100		66		67	66

Source: JICA Team

Table 2.3.8 Result of Scoring in Igembe South Sub-County in Batch-2

No.	Category Score	Max Distribution	Item	Open Channel Rehabilitation/Extension		Pipeline New	
				Kaumbura	Mpanguene	Kaumbura	Mpanguene
1	2		Climatic Conditions				
1.1		1	Rainfall (Annual rainfall 700 mm or less: 1, more than 700 mm: 0)	600mm	1	600mm	1
1.2		1	Temperature (Max. temperature 30°C or more: 1, less than 30°C: 0)		0		0
2	5	5	Land Tenure (Owner/freehold: 5, Communal/GOK: 3, Tenant/lease: 0)	Private	5	Private	5
3	10		Area				
3.1		5	Scheme gross area per household (2 ac. or less: 5, more than 2 ac.: 2)	2.50	2	2.50	2
3.2		5	Proposed/target irrigation area per household (1.5 ac. or less: 5, more than 1.5 ac.: 2)	0.80	5	0.94	5
4	15		Water Resources				
4.1		7	Water Source (River: 4, Spring/Stream: 2, Dam/Borehole: 1)		2		2
4.2		4	Abstraction Method (Gravity: 3, Pump: 1, Submergeable Pump: 0)		3		3
4.3		4	Volume of Abstract (High: 3, Medium: 1, Low: 0)		1		1
5	15		Crop Production				
5.1		8	Farmers experience for irrigated agriculture (Irrigated agriculture under Canal/Pipeline: 8, Irrigated agriculture individually: 4, No experience: 0)		8		4
5.2		7	Awareness of constraints in crop production (The number of relevant answer is 3: 7, The number of relevant answer is 2: 5, The number of relevant answer is 1: 3, No answer: 0)		7		7
6	10		Irrigation Facilities				
6.1		5	Existing irrigation facilities (proper maintenance: 5, poor maintenance: 0, not applicable: 0)		5		5
6.2		5	Length of proposed main canal/pipe/line (Less than 5 km: 5, More than 5 km: 2)	5 km	5	5 km	5
7	20		Organization in the Scheme				
7.1		5	Registration status (Registered: 4, Under Registration: 1, Not Yet: 0)		4		4
7.2		10	Fee Collection and/or any other contribution rate by the scheme organization (More than 50%: 6, Less than 50% and More than 20%: 3, Less than 20%: 1)		3		3
7.3		5	Election of Committee Members (Elected as per By-law: 4, Forced by member and others: 1, Never been done: 0)		1		1
8	6		Accessibility				
8.1		4	Accessibility to and from major town (SCIO/SCAO Office) by 4WD car during rainy season (1.5 hrs or less: 4, more than 1.5 hrs: 2)		4		4
8.2		2	Accessibility to major irrigation facilities such as intake weir and control structures, etc. (20 minutes walk or less: 2, more than 20 minutes walk: 1) *Time from head of scheme to intake weir site		2		2
9	10		Markets and Market Information				
9.1		2	Accessibility to and from nearest market by Matatu (public transportation vehicle) during rainy season (1 hr or less: 4, more than 1 hr: 2)		2		2
9.2		1	Existing marketing groups (existing: 1, none: 0)		0		0
9.3		7	Awareness of constraints in marketing (The number of relevant answer is 3: 7, The number of relevant answer is 2: 5, The number of relevant answer is 1: 3, No answer: 0)		7		7
10	7		Environmental Issues				
10.1		2	Other existing irrigation schemes (upstream and downstream of the scheme within 60 km) (5 schemes or less: 2, 6-10 schemes: 1, more than 10 schemes: 0)		2		2
10.2		5	Anticipated negative environmental impacts (low: 5, medium: 2, high: 0)		2		2
Total	100	100			71		67

Source: JICA Team

Table 2.3.9 Result of Scoring in Batch-2

County	Sub-County	Name of Scheme	Scoring
Taita-Taveta	Taveta	Challa Tuhire	78
	Taveta	Kimala	71
	Taveta	Kimorigo	78
Kilifi	Ganze	Mwangutho	73
Narok	Narock North	Shulakino	78
	Narock North	Ewaso N'giro	46
	Narock North	Muchorui/Muchuha	57
Laikipia	Laikipia West	Munanda	66
	Laikipia West	Kiamariga/Ray	67
	Laikipia West	Kiangoru	66
Meru	Igembe South	Kaumbura	71
	Igembe South	Mpanguene	67

Source: JICA Team

In Taveta Sub-county, Challe Tuhire scheme was selected as the IWUA in the scheme is activated more than that in Kimorigo Scheme. Furthermore, in the scheme, impacts on the

rehabilitation of the irrigation infrastructures are highly expected.

2.3.5 Result of Selection for Pilot Project Sites in Batch 2

The Pilot Project Sites in Batch 2 were finally selected based on the results of the scoring the candidate schemes.

Table 2.3.10 Selected Sites in Batch-2

County	Sub-County	Name of Scheme	Proposed Irrigation Area	Number of Beneficiaries
Taita-Taveta	Taveta	Challa Tuhire		
Kilifi	Ganze	Mwangutho		
Narok	Narock North	Shulakino		
Laikipia	Laikipia West	Kiamariga/Ray		
Meru	Igembe South	Kaumbura		

Source: JICA Team

2.4 Start off Meeting

The purpose of a start-off Meeting is 1) to explain the activities and schedule of the Project for Construction/Rehabilitation of Irrigation Facilities and Improvement of Farming Practice and 2) to clarify roles and responsibilities of the Project, Ministry of Irrigation, Ministry of Agriculture, and Water Users' Association.

The meetings were held in each Batch-2 Pilot Scheme Sites as shown below.

Table 2.4.1 Start-off Meeting Date in Pilot Scheme Sites at Batch-2

No	Sub-county	Scheme	Date of Meeting
1.	Taveta	Challa/Tuhire	29 th April 2014
2.	Ganze	Mangudho	28 th May 2014
3.	Narok North	Shulakino	09 th May 2014
4.	Laikipia West	Kiamariga/Raya	07 th May 2014
7.	Igembe South	Kaumbura	15 th May 2014

Source: JICA Team

At the Meetings, the following issues were explained to IWUA and discussed,

- Introduction of the SIDEMAN-SAL Project,
- Output of the Project,
- Project Period and Schedule,
- Program for Irrigation Development,
- Construction and Rehabilitation works by IWUA,

- Training program for i) IWUA capacity building; ii) construction/ irrigation system O&M; iii) farming,
- Establishment of Pilot scheme Coordinating Committee (PSCC),
- Coordination with SCIO/ SCAO, the EIA Consultants, hydrologist for the implementation of Feasibility Study (F/S) and Detailed Design (D/D)
- Community response to EIA public hearing to be conducted by the EIA consultant,
- Implementation and Monitoring of Agricultural Development using SHEP Method,
- Roles of SCAO and SCIO,
- Roles of IWUA (especially during farmers' participatory construction stage),
- Environmental Management and EIA,
- Application of "Authorisation to Construct"/ "Water Permit" to WRMA by initiative of IWUA, and
- Water Storage Facility issue with WRMA (Construction of Storage by IWUA)

After the Meetings, Field visits at the intake weir/ water source sites were conducted so as for the SCIO/ his staffs to commence the topographic survey at the sites. The area for the topographic survey was confirmed at presence of the SCIO and members of IWUA, and directed by the JICA Team to the EIA consultants/ hydrologist.

Annex 2

Feasibility Study and Detailed Design

**Sustainable Smallholder Irrigation Development and Management
in Semi-Arid Lands Project**

Final Report

Annex 2: Feasibility Study and Detailed Design

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CHAPTER 1 Feasibility Study and Detailed Design for Batch-1 Pilot Schemes

1.1 General

Local Consultant Firms for the Feasibility Study, the Detailed Design, and Environmental Impact Assessment (EIA) Study was procured in accordance with the JICA Procurement Guidelines. Further, Terms of Reference (TOR) for the activities by the Local Consultant was discussed among the PMT.

1.2 Selection of Local Consultants

Reviewing available data and information and discussion with officials in MOALF and DOA, the Terms of Reference (TOR) for Feasibility Study (FS), Detailed Design (DD) for the Batch-1 Pilot Schemes was prepared. Series of Discussion with the officers were concluded to prepare Tender Documents for the Study. Contract packages for the Study were discussed and decided as 8 taking into consideration time schedule and capabilities of consultants in the country

Selection of candidate consultancy firms was conducted in consultation with the MOALF Officials. As per recommendation by MOALF, it was decided that invitation letters for the work would be distributed to consultants, which were registered to NIB.

The number of the consultants for the Feasibility Study and Detailed Design was 33. The invitation letters to the study were e-mailed to those consultants. Distribution of the tender document to respondent consultants with explanation of the studies was carried out as shown below.

Table 1.2.1 Number of Consultants receiving the Tender Documents

Package Number	Description of Study	Date and Time	Number of Consultants receiving the Tender Documents
1	FS and DD in Kasokoni Scheme	20 th November 2012, 10:00 a.m.	4
2	FS and DD in Mdachi Scheme	20 th November 2012, 11:30 a.m.	6
3	FS and DD in Olopito Scheme	20 th November 2012, 03:00 p.m.	9
4	FS and DD in Gatitu/Muthaiga Scheme	21 st November 2012, 10:00 a.m.	9
5	FS and DD in Kaben Scheme	21 st November 2012, 11:30 a.m.	9
6	FS and DD in Murachake Scheme	21 st November 2012, 03:00 p.m.	12
7	FS and DD in Tumutumu Scheme	22 nd November 2012, 10:00 a.m.	9
8	FS and DD in Muungano Scheme	22 nd November 2012, 11:30 a.m.	9
			69

Source: JICA Team

Tender opening and evaluation of the tender with contract negotiation was conducted as shown below.

Table 1.2.2 Summary of Tender opening and evaluation

Package Number	Description of Study	Date and Time of Tender Open	Number of Consultants Submitting the Tender Documents	Number of Consultants Passing the Technical Evaluation
1	FS and DD in Kasokoni Scheme	03 rd December 2012, 09:00 a.m.	2	2
2	FS and DD in Mdachi Scheme	03 rd December 2012, 11:00 a.m.	2	2
3	FS and DD in Olopito Scheme	03 rd December 2012, 03:00 p.m.	5	5
4	FS and DD in Gatitu/Muthaiga Scheme	04 th December 2012, 09:00 a.m.	1	-
	(Re-Tender of package 04)	06 th December 2012, 03:00 p.m.	3	3
5	FS and DD in Kaben Scheme	04 th December 2012, 11:00 a.m.	3	3
6	FS and DD in Murachake Scheme	04 th December 2012, 03:00 p.m.	5	4
7	FS and DD in Tumutumu Scheme	05 th December 2012, 09:00 a.m.	2	2
8	FS and DD in Muungano Scheme	05 th December 2012, 11:00 a.m.	2	2

Source: JICA Team

After contract negotiation, the works were awarded to the following consultants.

Table 1.2.3 Selected consultants after tender negotiation

Package Number	Description of Study	Name of Consultants	Date of Signing of Agreements
1	FS and DD in Kasokoni Scheme	Finix Consulting Ltd	07 th December 2012
2	FS and DD in Mdachi Scheme	Interphase Consultants	07 th December 2012
3	FS and DD in Olopito Scheme	Ocro Company Limited	07 th December 2012
4	FS and DD in Gatitu/Muthaiga Scheme	Bhundia Associates	04 th January 2013
5	FS and DD in Kaben Scheme	Finix Consulting Ltd	07 th December 2012
6	FS and DD in Murachake Scheme	Bhundia Associates	03 th January 2013
7	FS and DD in Tumutumu Scheme	Bhundia Associates	14 th December 2012
8	FS and DD in Muungano Scheme	Batch Associate Limited	07 th December 2012

Source: JICA Team

1.3 Procedure of Study

1.3.1 Feasibility Study

Field investigation will be carried out by the local consultant. Items for investigation shown below were discussed and finalized among the PMT.

- Number of Households and Population
- Topography, Soil, Land Use
- Climate and Water Resource
- Present condition of Irrigation Infrastructures, if any
- Rural Infrastructures, such as rural road, water supply
- Agriculture, such as cultivated crops, farming practice, farm gate price, and

marketing

- Access to Market
- Irrigation Water Users' Association, such as number of IWUA members, activities, financial status
- Government Organizations, Staffing and equipment in DIO (SCIO)'s Office and DAO (SCAO)'s Office
- Gender Issue
- Field Investigation to identify needs of rehabilitation/construction of irrigation facilities with prioritization of the work,
- Topographic survey with cross section of river at the head works, and leveling along main canal/pipelines according to the standard of survey

The Feasibility Study Report was prepared on the basis of the collected data and information and consequent analysis, and submitted to MWI (MOALF). The contents of the feasibility study report are indicated below.

- Present condition of the schemes
- Agriculture Development Plan
- Irrigation Development Plan
- Assessment of IWUA and Strengthening Plan of IWUA
- Operation and Maintenance Plan
- Preliminary Cost Estimate
- Economic/Financial Evaluation

1.3.2 Detailed Design

Following the results of the Feasibility Study, the Detailed Design was conducted by the Local Consultants, including the following aspects.

- Additional field investigation
- Design and cost estimate of the facilities
- Preparation of the Detailed Design Report in consultation with MOALF, including longitudinal sections of the main canals/pipelines, plan of major structures, work quantity calculation sheets, breakdown of the cost, implementation plan and schedule.
- Preparation of draft tender documents for outsourced contract and farmers' work with farmers' contribution portion

1.4 Present Condition

1.4.1 Agriculture

Crops presently cultivated in the Schemes are outlined below.

Table 1.4.1 Presently Cultivated Crops

Crop/ Scheme	Kasokoni	Mdachi	Olopito	Gatitu/M uthaiga	Kaben	Murachake	Tumutumu	Muongano
Maize	○	○	○	○	○	○	○	○
Beans*	○	○		○		○	○	○
Tomato	○		○	○			○	
Onion	○		○	○			○	
French bean			○	○				
Cabbage				○				
Sweet potato						○		
Irish potato			○					
Water melon								○
Mango					○			
Banana	○				○		○	○
Greengram		○			○			
Cawpea		○				○		
Cassava		○			○			
Sorghum						○		

Source: JICA Team

1.4.2 Irrigation

(1)Kasokoni Scheme

The following irrigation and drainage infrastructure were identified in the Kasokoni Irrigation Scheme:

- * Water abstraction works (diversions, intake head works, etc.);
- * Main canal and structures;
- * Secondary canals
- * In-field irrigation system (canals and drains) and related structures;
- * Drainage system;

(2)Gatitu/Muthaiga Scheme

The current concrete weir was done through farmers' efforts and technical support from the SCAO. The total length of the current canals serving Gatitu and Muthaiga farmers is 3,471.33m where the Gatitu canal is 1,615.88m and Muthaiga canal is 1,855.47m long.

(3)Kaben Scheme

The following irrigation and drainage infrastructure were identified in the Kaben Irrigation Scheme

- Water abstraction point

- Main canal and structures;
- Secondary canals
- In-field irrigation system (canals and drains) and related structures;

(4)Murachake Scheme

The existing weir will require rehabilitation works, proper off-take chamber, river bank protection works upstream, sluice way & gate and downstream of the weir and rising of southern side wing wall. Besides the above works, farmers have also procured and installed a few pipes for the project.

(5)Tumutumu Scheme

Currently the farmers have constructed a permanent Diversion weir and intake box. However, the weir will require rehabilitation works, proper off take chamber, river bank protection works upstream and downstream of the weir and wing walls.

(6)Muungano Scheme

Currently, irrigation farming in the area is limited to bucket irrigation and pumping by use of portable pumps along the two rivers.

1.4.3 Irrigation Water Users' Association

Self-Help Groups (SHGs) were established under al the Batch-1 schemes guided by the government. The present condition of the organizations is summarized below.

Table 1.4.2 Present Condition of IWUA

	Name of Scheme	Status of Registration of IWUA	Selection of IWUA Committee Members	By-law			Regular Meeting			Financial Management		
				Availability of By-law	Amendment of the By-law	Understanding of the By-Law among the members	Frequency of Meeting	Attendance of Meeting	Minutes of the Meeting	Open of Bank Account	Balance amount	Collection of O&M Fees
1	Kasokoni	Registered as a SHG	Elected with a 1-year term	Yes	Amended	Not all members understand the By-law.	Every week	Nearly 100%	Available	Opened	Ksh 100,000	Water fee for Ksh 10 per hour
2	Mdachi	Registered as a SHG	Elected but the term is not specified in the by-law	Yes	Under process of amending	Few members understand the by-law.	Every week	Less than 50%	Available	Opened	Ksh.7,000	Ksh 20 per week per member
3	Olopiro	Registered as a SHG	Elected with a 1-year term	Yes	Under process of amending	All members understand the By-law as they are involved in the revision of it.	Every month	50% – 80%	Available	Opened	Ksh 6,000	Ksh 50 per member per week
4	Gatitu/Muthaiga	Registered as a SHG	Elected with a 1-year term	Yes	Amended	Members are not aware of the By-law.	Every month	Nearly 90%	Available	Opened	Ksh. 20,000	Ksh 50 per member per week
5	Kaben	Registered as a SHG	Elected but the term is not specified in the by-law	Yes	Amended	After the amendment of the By-law, all members understand it.	Every week	Nearly 95%	Available	Opened	None	Ksh. 1,200 per member per year
6	Murachake	Registered as a SHG	Elected but the term is not specified in the by-law	Yes	Under process of amending	Not all members understand the By-law.	Bi-weekly	Nearly 100%	Available	Opened	None	Collected when required
7	Tumutumu	Registered as a SHG	Elected but the term is not specified in the by-law	Yes	Under process of amending	Not understand the by-law except the committee members.	Every month	Nearly 80%	Available	Opened	Ksh 250,000	Collected when required
8	Muungano	Registered as a SHG	Elected with a 3-years term	Yes	Under process of amending	All members understand the By-law.	Every month	Nearly 50%	Available	Opened	Ksh. 300,000	Ksh 100 per month

Source: JICA Team

The capacity development program for each IWUA will be prepared on the basis of the above-mention situation.

1.5 Summary of Feasibility Study

Results of the Feasibility Study are described in Appendices 7 and 8 of the Report and outlined hereinafter.

1.5.1 Agricultural Development Plan

Based on the provided agro-economical data (obtained/ rendered) from regional agricultural service stations, national agronomical census and the interviews with regional agricultural service officials, local farmers and relating personnel, the proposed enterprises, crop calendars and prospective/ estimated revenues for pilot schemes are shown below;

(1) Proposed Crops

Considered with the farmers' preference and economical efficiency, the enterprises proposed under projected conditions are listed below;

Table 1.5.1 Proposed Crops

Crop/ Scheme	Kasokon i	Mdachi	Olopito	Gatitu/M uthaiga	Kaben	Muracha ke	Tumutu mu	Muunga no
Maize	○	○	○	○	○	○	○	○
Beans*	○	○		○	○	○	○	○
Tomato	○	○	○	○	○	○	○	○
Onion	○		○		○	○	○	○
French bean	○		○	○				
Cabbage				○				
Kale		○	○					
Okra		○						
Amaranth		○						
Ground nut						○	○	
Sweet potato					○			
Irish potato			○					
Water melon								
Mango					○			
Banana	○					○	○	○

*Beans including Green gram for intercropping

Source: JICA Team

(2) Cropping Calendar

Based on the agro-ecology and agro-meteorological condition in the each pilot scheme, trial/ prototype models of cropping calendars for schemes are presented hereinafter;

Table 1.5.2 01: Kasokoni scheme of Cropping Calendar

	Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Season 1													
Maize(Green)/	42%												
Tomatoes	12%												
Onion	07%												
French bean	12%												
Banana	27%												
Total	100%												
Season 2													
Maize(Green)/	15%												
Tomatoes	11%												
Onion	15%												
French bean	12%												
Banana	27%												
Total	80%												

Table 1.5.3 02: Mdachi scheme of Cropping Calendar

	Area %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Season 1													
Maize/Beans	40%												
Tomatoes	20%												
Okra	15%												
Kale	15%												
Amaranth	10%												
Total	100%												
Season 2													
Maize/Beans	40%												
Tomatoes	10%												
Okra	15%												
Kale	15%												
Amaranth	20%												
Total	100%												

Table 1.5.4 03: Olopito scheme of Cropping Calendar

	Area %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Season 1													
Maize	25%												
Tomatoes	25%												
Onions	25%												
French bn/Pulse	25%												
Total	100%												
Season 2													
Maize	25%												
Tomatoes	25%												
Onions	25%												
French bn/Pulse	25%												
Total	100%												

Source: JICA Team

Table 1.5.5 04: Gatitu/Muthaiga scheme of Cropping Calendar

	Area %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Season 1													
Passion fruits	20%	[Green bar from Jan to Dec]											
Maize/ beans	30%				[Yellow bar from Apr to Aug]								
Tomato	20%				[Red bar from Apr to Sep]								
French bean	20%						[Purple bar from Jun to Sep]						
Cabbage	10%						[Blue bar from Jun to Sep]						
Total	100%												
Season 2													
Passion fruits	20%	[Green bar from Jan to Dec]											
Maize/ beans	20%	[Yellow bar from Jan to Feb]										[Yellow bar from Nov to Dec]	
Tomato	10%	[Yellow bar from Jan to Feb]									[Yellow bar from Oct to Dec]		
French bean	20%	[Red bar from Jan to Mar]									[Red bar from Oct to Dec]		
Cabbage	10%	[Purple bar from Jan to Feb]										[Purple bar from Dec to Dec]	
Total	80%												

Source: JICA Team

Table 1.5.6 05: Kaben scheme of Cropping Calendar

	Area %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Season 1													
Maize/ GGram	44%						[Green bar from Jun to Sep]						
Tomatoes	15%	[Red bar from Jan to Mar]										[Red bar from Nov to Dec]	
Onions	15%	[Purple bar from Jan to Feb]									[Purple bar from Oct to Dec]		
Sweet potato	15%						[Yellow bar from Jun to Sep]						
Mango	11%	[Brown bar from Jan to Dec]											
Total	100%												
Season 2													
Maize/ GGram	15%	[Yellow bar from Jan to Apr]											
Tomatoes	15%					[Purple bar from May to Sep]							
Onions	15%				[Red bar from Apr to Sep]								
Sweet potato	44%	[Green bar from Jan to Feb]										[Green bar from Nov to Dec]	
Mango	11%	[Brown bar from Jan to Dec]											
Total	100%												

Source: JICA Team

Table 1.5.7 06: Murachake scheme of Cropping Calendar

	Area %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Season 1													
Maize/ Beans	30%						■	■	■	■			
Tomatoes	20%	■	■	■	■							■	■
Onions	20%	■	■								■	■	■
Groundnut	10%	■	■	■	■	■							
Banana	20%	■	■	■	■	■	■	■	■	■	■	■	■
Total	100%												
Season 2													
Maize/ Beans	20%	■	■	■	■	■							
Tomatoes	10%						■	■	■	■	■		
Onions	20%					■	■	■	■	■	■		
Groundnut	10%	■	■	■	■							■	■
Banana	20%	■	■	■	■	■	■	■	■	■	■	■	■
Total	80%												

Source: JICA Team

Table 1.5.8 07: Tumutumu scheme of Cropping Calendar

	Area %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Season 1													
Maize/ Beans	30%						■	■	■	■			
Tomatoes	20%	■	■	■	■							■	■
Onions	20%	■	■								■	■	■
Groundnut	10%	■	■	■	■	■							
Banana	20%	■	■	■	■	■	■	■	■	■	■	■	■
Total	100%												
Season 2													
Maize/ Beans	20%	■	■	■	■	■							
Tomatoes	10%						■	■	■	■	■		
Onions	20%					■	■	■	■	■	■		
Groundnut	10%	■	■	■	■							■	■
Banana	20%	■	■	■	■	■	■	■	■	■	■	■	■
Total	80%												

Source: JICA Team

Table 1.5.9 08: Muungano scheme of Cropping Calendar

	Area %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Season 1													
Maize/Beans	37%												
Tomatoes	15%												
Onions	20%												
Water Melon	10%												
Bananas	18%												
Total	100%												
Season 2													
Maize/Beans	37%												
Tomatoes	20%												
Onions	10%												
Water Melon	15%												
Bananas	18%												
Total	100%												

Source: JICA Team

(3) Cultivation Area

Improvement and rehabilitation of the irrigation facilities in the pilot schemes contribute the expansion/ effective utilization of the farmers' lands.

Table 1.5.10 Cultivation Area of each scheme

(Unit acre)

Scheme	Without Project	With Project	Increment
Kasokoni	113.0	125.0	12.0
Mdachi	24.0	120.0	96.0
Olopito	292.5	380.0	87.5
Gatitu/Muthaiga	149.0	158.5	9.5
Kaben	244.5	1,660.0	1,415.0
Murachake	658.5	679.5	21.2
Tumutumumu	333.5	355.7	22.2
Muungano	300.0	364.0	64.0

Source: JICA Team

(4) Gross Revenue

Estimated/ prospective gross revenues for projected schemes and their increments per acre in schemes are listed below;

Table 1.5.11 Gross Revenue under without/with Project Conditions

(Unit Ksh per acre)

Scheme	Without Project	With Project	Increase
Kasokoni	26,246	133,815	107,568
Mdachi	15,118	203,670	188,552
Olopito	26,510	57,237	30,727
Gatitu/Muthaiga	46,180	106,723	60,543
Kaben	13,804	60,333	46,528
Murachake	14,654	109,429	94,774
Tumutumu	14,095	102,773	88,678
Muongano	34,087	131,837	97,749

Source: JICA Team

1.5.2 Irrigation Development Plan

(1) Land Holding Size for Irrigated Agriculture

The irrigated land per household and the total irrigated area in the scheme are shown below.

Table 1.5.12 Irrigated land and area in the schemes

Name of Scheme	Irrigated land per household (ha)	Number of IWUA Members	Total Irrigated Area (ha)
Kasokoni	0.75	44	33
Mdachi	0.48	62	30
Olopito	0.94	82	77
Gatitu/Muthaiga	0.36	159	57
Kaben	0.68	530	360
Murachake	0.40	430	172
Tumutumu	0.2	450	90
Muongano	0.40	418	167

Source: JICA Team

(2) Irrigation water Requirement

Irrigation water requirements are calculated in accordance with the proposed cropping pattern. The peak irrigation water requirement is estimated as follows.

Table 1.5.13 Irrigation water requirements in the schemes

Name of Scheme	Irrigation Area in Net (ha)	Project Diversion Requirement (m ³ /sec)
Kasokoni	33	0.044
Mdachi	30	0.056
Olopito	77	0.044
Gatitu/Muthaiga	57	0.100
Kaben	362	0.300
Murachake	172	0.250
Tumutumu	90	0.120
Muongano	167	0.165

Source: JICA Team

(3) Irrigation Infrastructure

1) Head Works

Under the Project, 4 Intake Weirs are to be constructed while 3 Intake Weirs will be rehabilitated as summarized below

Table 1.5.14 Head Works at each scheme

Name of Scheme	Category	Description
Kasokoni	Rehabilitation	Improvement of head works by: Desilting upstream of the structure Wing walls Scour outlets Replace head regulator Extension of apron Riprap down stream
Mdachi	New Construction	L=16m, H=1.70m
Olopito	New Construction	L=16m, H=1.50m Construction of Sedimentation Tank
Gatitu/Muthaiga	Existing	L=4m, H=2m
Kaben	New	L=16m, H=1.75m
Murachake	Rehabilitation	L=20m, H=1.50m Construction of Scoring Sluice Repair of Intake Chamber Construction of Retaining Wall Construction of Sedimentation Tank
Tumutumu	Rehabilitation	L=8m, H=1.20m Improvement of Weir Body with Apron Construction of Intake Chamber Construction of Retaining Wall Construction of Sedimentation Tank
Muongano	New Construction	L=24m, L=1.0m Construction of Sedimentation Tank

Source: JICA Team

2)Open Channels

Under the Kasokoni and Kaben Schemes, open irrigation canals will be rehabilitated while new canal system will be constructed under the Mdachi Scheme.

Table 1.5.15 Open Channel irrigation system in the schemes

Description		Unit	Kasokoni	Mdachi	Kaben
Area		Ha	33	30	430
IWUA Members			44	62	530
Length	Conveyance+Main	m	1,891	445	16,500
	Secondary Canal	m	5,600	1,247	2,400
	Tertiary Canal	m		2,185	7,100

Source: JICA Team

3)Pipeline

Under 5 schemes, pipeline irrigation system will be constructed

Table 1.5.16 Pipeline irrigation system in the schemes

Description		Unit	Olopito	Gatitu/Muthaiga	Murachake	Tumutumu	Muongano
Area		Ha	77	57	172	90	167
IWUA Members			82	159	430	450	418
Length	Conveyance+Main	m	3,670	9,230	14,016	12,815	11,175
	Sub-main	m	4,627	0	25,336	11,358	20,366

Source: JICA Team

(4)Irrigation Method

The following irrigation method will be applied for each irrigation scheme.

Table 1.5.17 Irrigation Method in the schemes

Name of Scheme	Method of Irrigation
Kasokoni	Furrow
Mdachi	Furrow
Olopito	Furrow/Sprinkler
Gatitu/Muthaiga	Furrow
Kaben	Furrow
Murachake	Sprinkler
Tumutumu	Sprinkler
Muongano	Sprinkler

Source: JICA Team

1.5.3 Cost Estimate

Results of the preliminary cost estimate for each irrigation scheme are indicated below

Table 1.5.18 Cost Estimation with Open Channel irrigation system

Description	Unit	Kasokoni	Mdachi	Kaben
Intake	ksh 1000	2,067	7,197	10,656
Conveyance+Main	ksh 1000	6,983	1,256	65,726
Secondary Canal	ksh 1000		1,568	
Tertiary Canal	ksh 1000		994	
Drainage Canal	ksh 1000	14,577	3,113	
In-field System	ksh 1000	17,147	2,536	
Others	ksh 1000	2,100	2,777	
Total	ksh 1000	42,874	19,441	76,382

Source: JICA Team

Remarks: Cost of Secondary canals, tertiary canals and in-field system in Kaben Scheme is to be reviewed and updated.

Table 1.5.19 Cost Estimation with Pipeline irrigation system

Description	Unit	Olopiro	Gatitu/Muthaiga	Murachake	Tumutumu	Muongano
Intake	ksh 1000	7,729	1,200	3,127	5,237	5,790
Conveyance+Main	ksh 1000	15,470	26,514	54,368	51,141	48,973
Sub-main	ksh 1000	5,040	0	18,993	14,277	39,278
In-field	ksh 1000	5,444	3,123	12,900	6,750	7,192
Others	ksh 1000	4,594	1,668	1,668	1,667	1,534
Less available materials/ Already achieved	ksh 1000		-3,038	-3,652		
Total	ksh 1000	38,277	29,467	87,404	79,072	102,767

Source: JICA Team

1.6 Summary of Detailed Design

1.6.1 Design of Irrigation Facilities

(1) Kasokoni Irrigation Scheme

Summary of Kasokoni Irrigation Scheme (33 ha) is outlined as follows:

Table 1.6.1 Kasokoni Irrigation Scheme

Name of Scheme	Category	Description
Kasokoni Intake Weir	Rehabilitation	Improvement of head works by: Desilting upstream of the structure Wing walls Scour outlets Replace head regulator Extension of apron Riprap down stream

Canal Name	Line (No)	Length (m)	Canal Dimension (m)	Structures (No.)								
				OT	SW	DB	BR	CD	DC	Gate	AQ	DS
Main Canal	1	1,886	Rectangular B = 0.30 H = 0.40-0.28	1	1	20	3	1	1	6	1	5
Feeder Canal	20	5,546	Trapezoid B = 0.12-0.06 H = 0.11-0.08 Slope 1:1	20	0	0	0	0	0	0	0	172

OT: Off take, SW: Spillway, DB: Diversion Box, BR: Bridge, CD: Cross Drainage, DC: Double Culvert, AQ: Aqueduct, DS: Drop Structure

(2)Mdachi Irrigation Scheme

Summary of Mdachi Irrigation Scheme (30 ha) is outlined as follows:

Table 1.6.2 Mdachi Irrigation Scheme

Name of Scheme	Category	Description
Mdachi Intake Weir	New Construction	L=16m, H=1.70m

Canal Name	Line (No)	Length (m)	Canal Dimension (m)	Structures (No.)							
				FB	Drop	TO	OF	DB	RoC	RiC	TE
Main Canal	1	458	Rectangular B = 0.40 H = 0.50	1	2	1	0	1	0	0	0
Sub Branch Canal	2	1,231	Trapezoid B = 0.35 H = 0.40-0.35 Slope 1:1	0	5	0	3	6	4	0	1
Tertiary Canal	10	2,548	Trapezoid B = 0.10 H = 0.10 Slope 1:1	0	13	69	0	10	0	6	10

FB: Foot Bridge, TO: Turnout, OT: Offtake, DB: Division Box, RoC: Road Crossing, RiC: Ring Culvert, TE: Tail End

(3)Olopito Irrigation Scheme

Summary of Olopito Irrigation Scheme (77 ha) is outlined as follows:

Table 1.6.3 Olopito Irrigation Scheme

Name of Scheme	Category	Description
Olopito Intake Weir	New Construction	L=16m, H=1.50m Construction of Sedimentation Tank

Pipeline Name	Line No.	Length (m)	Pipe Type, dia. (mm)	Structures (No.)								
				WMM	AV	WO	GC	CC	RC	SC	OT	PRV
Main Pipeline	1	3,646	GI: ϕ 300 uPVC: ϕ 300-255	1	8	7	1	1	2	1	5	0
Sub-main Pipeline	5	2,943	uPVC: ϕ 140-63	0	5	7	2	0	0	0	2	0
Distribution	3	564	uPVC: ϕ 90-50	0	0	0	0	0	0	0	6	0

Pipeline												
Feeder Pipeline	5	6,455	uPVC: ϕ 75-32	0	0	0	0	0	0	0	1	4

WMM: Water Master Meter, AV: Air Valve, WO: Wash Out, GC: Gully Crossing, CC: Cattle Crossing, RC: Road Crossing, SC: Stream Crossing, OT Offtake

(4) Gatitu/Muthaiga Irrigation Scheme

Summary of Gatitu-Muthaiga Irrigation Scheme (57 ha) is outlined as follows:

Table 1.6.4 Gatitu/Muthaiga Irrigation Scheme

Name of Scheme	Category	Description
Gatitu/Muthaiga Intake Weir	Existing	L=4m, H=2m

Pipeline Name	Line No.	Length (m)	Pipe Type, dia. (mm)	Structures (No.)						
				WMM	AV	WO	TB	GC	FOT	OFFP
Gatitu										
Main Pipeline	1	5,250	uPVC: ϕ 315-40	1	2	6	15	1	9	17
Feeder Pipeline	13	3,645	uPVC: ϕ 140-63	0	0	0	0	0	5	61
Muthaiga										
Main Pipeline	1	3,815	uPVC: ϕ 355-40	1	3	2	4	0	6	8
Feeder Pipeline	12	5,093	uPVC: ϕ 140-63	0	0	0	0	0	6	77

WMM: Water Master Meter, AV: Air Valve, WO: Wash Out, TB: Thrust Block, GC: Gully Crossing, FOT Feeder Offtake, OFFP: Offtake for Plot

(5) Kaben Irrigation Scheme

Summary of Kaben Irrigation Scheme (XX ha) is outlined as follows:

Table 1.6.5 Kaben Irrigation Scheme

Name of Scheme	Category	Description
Kaben Intake Weir	New	L=16m, H=1.75m

Canal Name	Line (No)	Length (m)	Canal Dimension (m)	Structures (No.)						
				CP	CL	Chute	BC	CD	CPC	TO
Conveyance Canal	1	13,000	Rectangular & Trapezoid B = 0.40 H = 1.00-0.70 Slope 1:0,1:1.5	16	4 3,053 m	4 1,150 m	3 639 m	5	3	1
Main Canal	1	5,853	Trapezoid B = 0.40-0.30 H = 0.70-0.50 Slope 1:1.5	0	9 1,356 m	0	0	0	3	10
Feeder Canal	11	6,733		0	0	0	0	0	0	65

CP: Canal Protection, CL: Canal Lining, BC: Box Culvert, CD: Cross Drainage, CPC: Concrete Pipe Culvert,

TO: Turnout

(6) Murachake Scheme

Summary of Gatitu-Muthaiga Irrigation Scheme (172 ha) is outlined as follows:

Table 1.6.6 Murachake Irrigation Scheme

Name of Scheme	Category	Description
Murachake Intake Weir	Rehabilitation	L=20m, H=1.50m Construction of Scoring Sluice Repair of Intake Chamber Construction of Retaining Wall Construction of Sedimentation Tank

Pipeline Name	Line (No)	Pipe Type, dia. (mm)	Length (m)	Structures (No.)							
				WMM	SB	AV	WO	OT	SV	RC	PRV
Conveyance Pipe Line	1	GI: ϕ 350 uPVC: ϕ 400	2,125	1	1	6	2	1	2	0	0
Main Pipe Line	1	GI: ϕ 350 uPVC: ϕ 400-75	10,875	-	0	18	3	42	0	6	1
Sub-main Pipe Line	19	uPVC: ϕ 200-25	13,000	-	0	21	0	186	0	0	6
Feeder Pipe Line	46	uPVC: ϕ 110-25	29,667	-	0	0	0	192	0	0	0

SB: Sedimentation Basin, AV: Air Valve, WO: Wash Out, OT: Offtake, SV: Section Valve,
RC: Road Crossing, Gully Crossing

(7) Tumutumu Scheme

Summary of Gatitu-Muthaiga Irrigation Scheme (90 ha) is outlined as follows:

Table 1.6.7 Murachake Irrigation Scheme

Name of Scheme	Category	Description
Tumutumu Intake Weir	Rehabilitation	L=8m, H=1.20m Improvement of Weir Body with Apron Construction of Intake Chamber Construction of Retaining Wall Construction of Sedimentation Tank

Pipeline Name	Line (No)	Length (m)	Pipe Type, dia. (mm)	Structures (No.)									
				WMM	AV	WO	SB	OT	TB	RiC	RoC	GC	PRV
Conveyance Pipeline	1	0	GI: ϕ 300 uPVC: ϕ 355	1	5	1	1	1	1	1	0	0	0
Main Pipeline	3	0	uPVC: ϕ 355-75	-	4	5	0	51	15	0	2	1	2
Sub-main Pipeline	3	0	uPVC: ϕ 355-75	-	1	1	0	43	16	0	0	0	6
Feeder Pipeline	100	0	uPVC: ϕ 355-75	-	1	5	0	458	1	0	0	0	10

WMM: Water Master Meter, AV: Air Valve, WO: Wash Out, SB: Sedimentation Basin, OF: Offtake,
TB: Thrust Block, RiC: River Crossing, RoC: Road Crossing, Gully Crossing

Source: JICA Team

(8) Muungano Scheme

Summary of Gatitu-Muthaiga Irrigation Scheme (162 ha) is outlined as follows:

Table 1.6.8 Muungano Irrigation Scheme

Name of Scheme	Category	Description
Muungano Intake Weir	New Construction	L=24m, L=1.0m Construction of Sedimentation Tank

Source: JICA Team

Pipeline Name	Line (No)	Pipe Type, dia. (mm)	Length (m)	Structures (No.)						
				WMM	AV	WO	OT	RC	SC	TO
Main Pipe Line	2	uPVC: ϕ 400-63	12,613	1	9	10	0	20	1	49
Distribution Line	224	uPVC:	12,613	-	0	0	418	0	0	0

AV: Air Valve, WO: Wash Out, OT Offtake, RC: Road Crossing, SC: Stream Crossing, TO: Turnoff

1.6.2 Cost Estimate**(1) Summary of Construction Cost (Irrigation Schemes with Open Channels)**

The construction cost for the irrigation schemes with open channels is summarized below.

Table 1.6.9 Summary of Construction Cost (Open Channel Irrigation Schemes)

Unit: Ksh. 1000

Description of Works	Kasokoni	Mdachi	Kaben
Preliminaries & Generals	1,726	4,463	2,864
Head Works	5,712	7,055	8,884
Conveyance Canal			72,257
Main Canal	9,180	1,502	10,796
Secondary Canals		1,433	
Tertiary Canals		2,114	
Feeder Canal	2,000	1,874	8,120
Drainage Canal	2,000	2,195	
Flood Protection Dike	2,806		
Total	23,424	20,636	102,921

Source: JICA Team

(2) Summary of Construction Cost (Irrigation Schemes with Pipelines)

The construction cost for the irrigation schemes with pipelines is summarized below.

Table 1.6.10 Summary of Constriction Cost (Pipeline Irrigation Schemes)

Unit: Ksh. 1000

Description of Works	Olopito	Gatitu/ Muthaiga	Murachake	Tumutumu	Muongano
Preliminaries & Generals	2,545		1,941	2,885	3,790
Head Works	6,388		3,406	5,252	4,955
Conveyance Pipeline			14,954	12,738	12,795
Main Pipeline	19,338	16,808	46,244	19,539	32,874
Sub-Main Pipeline	2,818		26,572	8,857	
Distributory Pipeline	321			16,353	19,651
Feeder Pipeline	1,083	3,907	13,666		
In-field System	1,116	1,460	10,012	11,904	6,565
Gully Crossing	574				
Stream Crossing	212				
Total	34,395	22,175	116,795	77,528	80,630

Source: JICA Team

CHAPTER 2 Feasibility Study, Detailed Design, and EIA Study for Batch-2 Sites

2.1 Preparatory Works

2.1.1 Kick off Meeting for Feasibility Study and Detailed Design

For an efficient and smooth implementation of the Feasibility Study (F/S) and the Detailed Design (D/D) by SCIO/ SCAO for the Batch 2 schemes (5 selected schemes), “Kick off Meeting”, consisted of “introduction” and 5 sessions, was held on April 24, 2014. The Programme conducted for “Batch 2 Kick off & Briefing Meeting” is tabulated as below, followed by session objectives:

Table 2.1.1 Programme for Batch 2 Kick-off & Briefing Meeting

TIME	TOPIC/SESSION
8.00 – 8.30am	Registration of participants
8.30 – 9.00am	Opening Program
9.00 – 10.00am	Introduction: Briefing on Selected Sites, Implementation Schedule and Remarkable Issues
10.30 – 11.30am	1. Feasibility Study Brief-1: Data Collection, Cropping Calendar and Gross Margin
11.30 – 12.30pm	2. Feasibility Study Brief -2: Hydrological Report, Irrigation Water requirement and Preparation of FS report
1.30 – 2.30pm	3. Detail Design Brief-1: Setting-Out Survey, Hydraulic calculation (Open channels/ Pipelines) and Structural Design & Calculation, Quantity and Cost Calculation (BoQ)
2.30 – 3.30pm	4. Detail Design Brief-1: Batch-2: Preparation of DD report, Tender Document;
3.30pm 4.00pm	Batch-1: Logistics and Supervision Tips Batch 2: Logistics for Survey and Design Works
4.30 – 5.30pm	5. Discussion, Experience sharing/ Way forward on Batch-2 Implementation (focusing on F/S, D/D), Batch 1, S/V
5.30 – 6.00pm	Closing Programme

Source: JICA Team

<Session objectives>:

- 1) Introduction: Brief explanation on the selected 5 sites in 5 Sub-counties and proposed implementation schedule particularly for F/S, D/D, and overview the outline of implementation procedure. Then, a further guidance was made on remarkable issues;
- 2) Sessions 1 – 4: focused on feedback from SCIO/ SCAO by clarifying: i) what topics /work had been understood through the previous technical training (March 3-7, 2014) and shall be executed by SCIO/ SCAO with relatively ease; ii) what topics/ work might be challenges (rather difficult to conduct) by SCIO/ SCAO so as to be further guided; iii) discussion on Solutions to ii), including aids such as equipments, computer programs,

transportation means, etc.

3) Session 5: Follow-up discussion arose in the Session 1-4, and Way forward focusing on coming up program of F/S, D/D as well as time management with Batch 1 construction supervision work. It was also requested to SCIO to seek 3 candidates of assistant supervision personnel (clerk of works), so as PMT to select and appoint 1 personnel for each scheme.

4) Additional Session: For efficient operation of F/S, D/D implementation, logistic procedures such as i) budget planning and ii) application for fund remittance as well as iii) settlement of expenditure, were explained with sample format.

2.1.2 Logistic Support

To conduct the Feasibility Study and the Detailed Design smoothly, six sets of survey equipment and six sets of digital cameras are procured. Further, rental of vehicles are arranged under the Project.

2.2 Feasibility Study and Detailed Design

2.2.1 Feasibility Study

Field investigation will be mainly carried out by the SCIO/ SCAO of each scheme, with assistance of the PMT. On the other hand, EIA consultants as well as hydrologists will be procured by the PMT for special studies and reports, i.e. EIA study report and hydrological study report, in accordance with the regulations of NEMA (National Environment Management Authority) and WRMA (Water Resource Management Authority). General items for investigation shown below were discussed and finalized with assistance of the PMT.

- Number of Households and Population
- Topography, Soil, Land Use
- Climate and Water Resource
- Present condition of Irrigation Infrastructures, if any
- Rural Infrastructures, such as rural road, water supply
- Agriculture, such as cultivated crops, farming practice, farm gate price, and marketing
- Access to Market
- Irrigation Water Users' Association, such as number of IWUA members, activities, financial status
- Government Organizations, Staffing and equipment in SCIO's and SCAO's Offices
- Gender Issue
- Field Investigation to identify needs of rehabilitation/ construction of irrigation facilities (overall scope) as well as prioritization of the work (narrowed down target scope),
- Topographic survey with levelling (profile survey) along main canal/ pipelines according to the standard of survey, and cross sectional survey of river and existing structure at the head works, if required

The Feasibility Study Report was prepared on the basis of the collected data and information and consequent analysis, and submitted to MOALF. The contents of the feasibility study report are indicated below.

- Present condition of the schemes
- Agriculture Development Plan
- Irrigation Development Plan
- Assessment of IWUA and Strengthening Plan of IWUA
- Operation and Maintenance Plan
- Preliminary Cost Estimate
- Economic/ Financial Evaluation

2.2.2 Detailed Design

Following the results of the Feasibility Study, the Detailed Design was conducted by the Local Consultants, including the following aspects.

- Additional field investigation
- Design and cost estimate of the facilities
- Preparation of the Detailed Design Report in consultation with the PMT, including longitudinal sections of the main canals/pipelines, plan of major structures, work quantity calculation sheets, breakdown of the cost, implementation plan and schedule.
- Preparation of draft tender documents for outsourced contract and farmers' work with farmers' contribution portion

2.3 Studies Undertaken by Local Consultants

2.3.1 Preparation of TOR

Reviewing available data and information and discussion with the PMT members, the Terms of Reference (TOR) for Hydrological Study and Environmental Impact Assessment Study for the Batch 2 Pilot Schemes were prepared. Series of Discussion with the officers were concluded to prepare Tender Documents for the Study.

2.3.2 Hydrological Study

(1) TOR of Local Consultants for Hydrological Study

After the finalization of the TOR, the PMT decided that the number of package for the Study is five, taking into consideration the limited time frame and experience and capacity of the consultants.

Invitation of the tenders on the hydrological study has been sent to all of 15 hydrologist registered in WRMA.

Specific tasks for the Study will include the followings:

- (a) Comprehensive drainage network analysis,
- (b) Historical analysis of the hydrological trends in the project river ways,
- (c) Field measurements of the current hydrological status of the project river ways,
- (d) Comprehensive analysis of community livelihood systems and water demand patterns
- (e) Assess the hydrological viability and community acceptability of the proposed project.

(2) Selection of Local Consultants for Hydrological Study

The number of consultants submitting the proposals for 5 packages is 14 and summarized in Table 2.3.1.

Table 2.3.1 Number of Consultants Receiving the Proposals

Package Number	Description of Study	Date and Time to close the submission	Number of Consultants submitting the Proposals
1	Hydrological Study in Challa/Tuhire Scheme	12 th August 2014, 12:00 a.m.	2
2	Hydrological Study in Mangudho Scheme	12 th August 2014, 12:00 a.m.	2
3	Hydrological Study in Shulakino Scheme	12 th August 2014, 12:00 a.m.	2
4	Hydrological Study in Kiamariga/Raya Scheme	12 th August 2014, 12:00 a.m.	4
5	Hydrological Study in Kaumbura Scheme	12 th August 2014, 12:00 a.m.	4

Source: JICA Team

Tender opening and evaluation of the tender with contract negotiation was conducted. After contract negotiation, the works were awarded to the following consultants.

Table 2.3.2 Selected Consultants after Tender Negotiation

Package Number	Description of Study	Name of Consultants	Date of Signing of Agreements
1	Hydrological Study in Challa/Tuhire Scheme	Dr. John Moenga Nyangaga	3 rd September 2014
2	Hydrological Study in Mangudho Scheme	Dr. John Moenga Nyangaga	3 rd September 2014
3	Hydrological Study in Shulakino Scheme	Dr. John Moenga Nyangaga	3 rd September 2014
4	Hydrological Study in Kiamariga/Raya Scheme	Dr. John Moenga Nyangaga	3 rd September 2014
5	Hydrological Study in Kaumbura Scheme	Mr. James Kibe Waititu	3 rd September 2014

Source: JICA Team

2.3.3 Kick-off Meeting for the Commencement of the Study

After the signing of the Contract Agreements, the consultants were introduced by the PMT members to the SCIO/SCAO and the IWUA members so that they can carry out the data collection and the field investigation smoothly.

2.4 Present Condition of the Batch 2 Sites

2.4.1 Agriculture

Crops presently cultivated in the Schemes are outlined below.

Table 2.4.1 Presently Cultivated Crops

Crop/ Scheme	Challa/Tuhire	Mangudho	Shulakino	Kiamariga/Raya	Kaumbura
Maize	X		X	X	X
Beans*	X		X	X	X
Tomato	X	X	X	X	
Onion	X	X		X	
French bean			X		
Cabbage			X	X	
Sweet potato			X	X	
Irish potato			X		
Water melon			X	X	
Mango		X			
Banana	X	X		X	
Green gram	X	X			X
Cowpea	X	X			X
Cassava		X		X	
Sorghum				X	X
Cashew nut		X			
Coconuts		X			
Oranges		X		X	
Tangerine		X			
Pawpaw		X			
Passion fruits		X			
ABEC (Chillies)		X			
Kale	X	X	X		
Rice	X				
Okra	X				
Karella	X				
Brinjals	X		X		
Pigeon pea	X				X
Garden Pea			X	X	
Potato			X		

Crop/ Scheme	Challa/Tuhire	Mangudho	Shulakino	Kiamariga/Raya	Kaumbura
Wheat			X		
Barley			X		
Baby Corn			X		
Courgette			X		
Spinach			X		
Capsicum			X	X	
Chilli			X		
Coriander			X		
Snow peas			X		
Lettuce			X		
Cucumber			X		
Carrots			X		
Sweet pepper				X	
Finger millet				X	
Field beans				X	
Yam				X	
Bulrush					X
Millet					X
Dolichos					X

Source: JICA Team

2.4.2 Irrigation

(1) Challa/Tuhire Scheme

4) Intake Weir

The existing weir which was constructed in 1990, including the intake structure, is in good condition. The covered box culvert channel from the intake structure extending for about 10m and opening to the lined main conveyance is also in good condition, having been reconstructed in 2013.

The opening wheel for the intake steel gate requires some rehabilitation including the locking devise.

Table 2.4.2 Features of Headwork of Challa Tuhire Scheme

Features of Headwork's	Structure Dimensions	Existing Condition
Type of Weir	Broad crested weir	good
Length of Weir	12.7 m	
Height of Weir	0.95 m	
Design Intake Discharge Intake Water Level		

Features of Headwork's	Structure Dimensions	Existing Condition
Design Flood / Water Level		
Sedimentation Basin (s)	none	
Intake Gate	Concrete pipe culvert	Diameter 600 mm
Scouring Sluice Gate	Scour pipe	Diameter 300 mm
Remarks		

Source: JICA Team

5) Chala Tuhire main conveyance canal

The main canal measuring 1083m is in good condition, the first 250m having been reconstructed in 2013, while the remainder was constructed in 2009. Its width is 630mm and its height 690, at slope of 0.002, it has a full capacity of about 344 l/s assuming a freeboard of 150mm.

The road crossing structure at chainage. 720m requires reconstruction as the culverts are broken and the wing walls were not constructed.

Table 2.4.3 Features of conveyance canal of Challa/Tuhire Scheme

Features of Challa conveyance canal	
Canal Type	Rectangular lined cross section
Canal Length (m)	1083 m,depth 690 mm,bed width 630 mm
Design Discharge (L/s)	344
Full capacity (l/s)	419
Number of Existing Off-takes/ division boxes	2 No(for branch canal and secondary canal number 1)
Existing Condition (Summary)	Good

Source: JICA Team

6) Branch canal

The Branch canal measuring 783.5m is in good condition, having been reconstructed in 2012. It includes the 3 division boxes for secondary canals 2, 3 and 4, from which the secondary canals draw water. Its dimensions are similar to those of the main canal and designed to convey the same discharge.

Table 2.4.4 Features of Branch Canal of Challa/Tuhire Scheme

Features of branch canal	
Canal Type	Rectangular lined cross section
Canal Length (m)	745 m ,depth 690 mm,bed width 630 mm
Design Discharge (L/s)	344
Number of Existing Off-takes/ division boxes	SC2,SC3 and SC4
Existing Condition (Summary)	GOOD

Source: JICA Team

7) Secondary canals

The secondary canals are all different in lengths but are of the same dimensions because

they convey the same amount of discharge. The distribution system of water for Tuhire Challa scheme is such that two secondary canals convey water to the blocks at a time, dividing the scheme flow into two equal parts. At peak season the scheme design flow is 376 l/s i.e. in the month of August and therefore the design flow for the secondary canals is 188 l/s.

The existing channel dimensions i.e. $b = 0.5\text{m}$ and $D = 0.5\text{m}$ are found to be adequate.

Table 2.4.5 Features of Secondary Canals of Challa/Tuhire Scheme

Name of Secondary Canal	Type	Length (m)			Discharge (l/s)	Dimensions (mm)	Nos. of division boxes
		Total	Existing	Extension			
SC1	Rectangular x sectioned lined	2760	1260	1500		Bed width =500, Depth =480,	37
SC2	Rectangular x sectioned lined	2640	912	1728		Bed width =500 Depth =480,	30
SC3	Rectangular x sectioned lined	3322	794	2528		Bed width =500 Depth =480	44
SC4	Rectangular x sectioned lined	2980	895	2085		Bed width =500 Depth =480,	31
SC5	Rectangular x sectioned lined	3200	1217	1983		Bed width =500 Depth =480	33
Total		14902	5078	9824			175

Source: JICA Team

8) Secondary canals off takes

Table 2.4.6 Features of Secondary canals offtakes of Challa/Tuhire Scheme

Name of Secondary Canal	Total No of off takes	Existing off takes	No of off takes to be provided
SC1	37	8	29
SC2	30	6	24
SC3	44	7	37
SC4	31	7	24
SC5	33	9	24
Total	175	37	138

Source: JICA Team

(2) Mangudho Scheme

Irrigation practice started way back in the year 2005, with farmers using a small portable pump for irrigation. In 2007, the Irrigation and drainage department intervened and carried out a survey which culminated with a design for a pump fed irrigation project. Funding for project implementation was received in 2008 and the project was implemented with the following components;

- Pump House.
- Water pump with a belt drive engine of 20 HP.
- Main supply pipeline, 4” diameter PVC pipe, 800 m long with 8 Division boxes.

The implementation was not completed due to shortage of funds.

However the pump house, the main line and 3 out of the 8 Division boxes were completed.

In 2012, the DIO sought to revive the group activity by merging them with neighboring Barikiwani group who were practicing bucket irrigation and providing the following;

- Supplying a portable pump for each group.
- Construction of a 3” PVC supply line.
- Provision and installation of a storage tank.
- Supply and installation of 2 (1 acre) drip irrigation kits for Barikiwani Group.
- Supply and installation of 1 (1 acre) drip kit for Mangudho group.

Table 2.4.7 Existing infrastructure – Mangudho and Barikiwani groups

Name of group	Type of structure	When developed	Funding agency	Condition/Status.
Mangudho	Pump house	2008	GOK	Good, but very high above the normal water level, causing high suction head.
	Diesel Engine driven water pump.	2008	GOK	Engine failed a few months after use but was repaired. However has not been used for the last 6 years and will require major service/overhaul.
	Main water supply pipeline – 4” PVC – 800m long	2008	GOK	Has not been utilized for the last 6 years and recent efforts to use the line resulted in many leakages in almost all the joints.
	3” pipeline	2012	GOK	Used to extend main line to drip irrigation tank supplied to farmers during 2011/2012 FY. Pipeline section not buried and exposed to weather conditions.
	8 HP portable, diesel engine water pump.	2012	GOK	Good condition and was supplied to assist supply of water to drip irrigation plot.
	Drip irrigation tank – 10,000 lt	2012	GOK	Mounted on a 2 m masonry stand and in good working condition.
	1 acre drip kit	2012	GOK	Good condition but is underutilized.
Barikiwani	3” pipeline – 200 m.	2012	GOK	Supplies water to drip irrigation tank
	8 HP portable, diesel engine water pump.	2012	GOK	Good condition used to supply water to drip irrigation plot and surface irrigation plot.
	Drip irrigation tank – 6,000 lt	2012	GOK	Mounted on a 2 m masonry stand and in good working condition.
	1 acre drip kit	2012	GOK	Good condition but is underutilized.

Source: JICA Team

	
<p>Intake Point for Mangudho IWUA</p>	<p>Pump house for Mangudho IWUA</p>
	
<p>Intake point for Barikiwani S/H Group</p>	<p>Storage Tank for Drip Irrigation at Mangudho</p>
	
<p>Land under Irrigation at Mangudho</p>	

Source: JICA Team

Figure 2.4.1 Photos of existing infrastructure Existing infrastructure

(3) Shulakino Scheme**9) Headworks**

Table 2.4.8 Features of Headworks of Shulakino Irrigation Scheme

Features of Headwork's	Structure Dimensions	Existing Condition
Type of Weir	Rectangular Weir	-
Length (m) & Height (m)	W: 11.3 m x H: 3.0 m	Relatively good
Design Intake Discharge	Q = 0.0172 m ³ /s	Crest EL 1902.406
Intake Water Level	EL 1902.406 m	
Design Flood / Water Level	Q _{Flood 50} = 3.065 m ³ /s	-
Sedimentation Basin (s)	W:1.5m x H: 2m x L: 7.5m	Not included
Intake Gate	W:0.2 x H: 0.2	Need replacement, broken
Scouring Sluice Gate	W:0.5m x H: 0.6m	Need replacement due to broken
Remarks		Foot of Right wing wall is heavily damaged, thus newly constructed S.B will replace the damaged wing wall

Source: JICA Team

10) Right Mainline

Table 2.4.9 Features of Right Mainline of Shulakino Scheme

	Structure Dimensions	Existing Condition
Pipe Type	uPVC PN6	
Pipe Length (km)/ Dia.(mm)	0.600 km/ Ø200	Leaking in several parts
Design Discharge (l/s)	17.2, 10.3	
Command Target Area (ha)	15 ha	Some area under irrigation
Number of Blocks	1	1
Number of Existing Off-takes/ Hydrants	16	No hydrants use of broken pipe points and along canal
Existing Condition (Summary)		Major leakages along the pipeline and no established off take points.

Source: JICA Team

11) Left Mainline

The left line does not exist but one farmer has improvised a way to convey water from a

canal across the river to irrigate one farm. This brought about the introduction of the left mainline to serve that farmer and other potential farmers in this block. This mainline has 1 block and targeted area for irrigation is 10 ha. Flow for the pipeline is 6.9 l/s

(4) Kiamariga/Raya Scheme

The following irrigation and drainage infrastructure were identified in the Kiamariga-Raya irrigation Scheme during the feasibility study field assessment exercise:

Weir with two intake chambers

Kiamariga pipe line consisting of 250 mm, 160 mm and 100 dia. uPVC class B pipes fitted with 15 hydrants and 1 washout.

Raya pipe line consisting of 200 mm, 160 mm and 100 mm dia. uPVC class B pipes fitted with 14 hydrants.

Intake weir is already designed and constructed in such a way that maximum flow that can be abstracted to the two sides is 83 l/sec. Design of conveyance systems will be designed for a maximum flow of 83 l/s. The current concrete weir was done through farmers' efforts and technical support from the SCIO. The scheme's headwork structure comprises of a weir across Mutara river and an off take structures for both Kiamariga and Raya mainlines. The intake structure has an orifice instead of gate valve. There were no scour pipes. The wing walls on either side were of good condition. Table 4.9.10 summarizes the main features of the intake weir.

Table 2.4.10 Features of Intake Weir of Kiamariga/Raya Scheme

Features of Headworks	
Type of Weir	Rectangular
Length of Weir (m)	4.5
Height of Weir (m)	1
Bottom width (m)	1
Length of apron (m)	none
Downstream (m)	2
Upstream (m)	1.5
Scouring Sluice Gate	none
Intake Gate	none

Source: JICA Team

(5)Kaumbura Scheme

The Kaumbura scheme is fed by 2150m long earth main canal without division boxes. The water is abstracted from swamp without an intake structures.

2.4.3 Irrigation Water Users' Association

Self-Help Groups (SHGs) were established under all the Batch-2 schemes guided by the government. The present condition of the organizations is summarized below.

Table 2.4.11 Present Condition of IWUA

SIDEMAN-SAL							
BASIC INFORMATION OF IWUA NEEDED FOR EVALUATION OF PERFORMANCE							
			Mangudho	Shulakino	Kiamariga/Raya	Kaumbura	Tuhire Challa
1	General	Name of IWUA	Mangudho Irrigation Water Users Association	Shulakino Water Users Association	Kiamariga/Raya Irrigation Scheme	Kaumbura Irrigation Water Users Association	Tuhire Challa Harambee Irrigation Scheme
		Registration No	To be confirmed	NRK/DSS/11934	To be confirmed	To be confirmed	TTA/CD/2/3353
		Date of establishment	Previously Women group in 2005, reconstituted to include men in 2014	2007	Started in 2008 and registered in 2014	1989	1990
		No of members	50	57	104	400	601
2	Committee members	Elected or Appointed	Elected	Appointed as per family	Election	Elected (Tenure 3years)	Elected (tenure 3 years)
		Sub-committee	Newly constituted	Not constituted	Not constituted	Not constituted	Not constituted
3	By-law	Available	Yes	No	No	Available	Available

SIDEMAN-SAL							
BASIC INFORMATION OF IWUA NEEDED FOR EVALUATION OF PERFORMANCE							
			Mangudho	Shulakino	Kiamariga/Raya	Kaumbura	Tuhire Challa
		Status of by-law	Well formulated with the help of SIDEMAN-SAL guideline and SCSDO	Formulation in progress but following SIDMEMAN-SAL formulation guideline	Formulation of Bylaw in progress	Newly constituted as at December 2014	Generally okay but reviewing and addition of some important clauses necessary
		Understanding of by-law among the members	Not yet operationalized as they are still new	N/A	N/A	Not yet operationalized	Newly revised and yet to be passed for lack of quorum
4	General meeting	Frequency	Weekly	No particular period or date set. Meets when need arises	Monthly (3 rd Saturday of the month)	No particular period or date set. Meets when need arises	AGM held annually in August. Other general assembly meetings held when need arises
		Rate of attendance (%)	60-75%	About 50%	38% on average	About 50%	About 50% - 74% and other times less
		Availability of minutes of meeting	Minutes recorded by Secretary in the Minutes book provided by SIDEMAN-SAL	Minutes taken but some misplaced. Not utilizing the minutes book provided by SIDEMAN-SAL	Available and currently being recorded in the minutes book provided by SIDEMAN-SAL	Minutes being taken after Unit 1 follow-up. Secretary in charge	Minutes of meetings available

SIDEMAN-SAL							
BASIC INFORMATION OF IWUA NEEDED FOR EVALUATION OF PERFORMANCE							
			Mangudho	Shulakino	Kiamariga/Raya	Kaumbura	Tuhire Challa
5	Membership fee		Ksh.500 and subscription Ksh.3,000	Ksh.1,000	Ksh. 2,000 currently being raised to Ksh.5,000 after training	Ksh.5,000	N/A
	Fee for O&M		Monthly Ksh.50 per member	Initially charged Ksh.20/- per member. Now in the process of setting the O&M fee	Ksh.500 per month per member and tenants Ksh.3,000 per season previously (tenancy fees under revision after training on WRMA charges to be proportional to land size with 1/4acre at Ksh.4,000 per season)	Fees charged when need arises between Ksh.2,000 – 3,000	Ksh.1,100 per year for WRMA and O&M
6	Financial status	Bank account	Newly opened after Unit 3 training in Cooperative Bank Kilifi	Equity Bank in Narok	Equity Bank, Nyahururu	Cooperative Bank in Maua	Barclays Bank, Taveta
		Funds available	Ksh.10,000	Ksh.5,000	TBC	Ksh.35,000	Ksh.180,000

SIDEMAN-SAL							
BASIC INFORMATION OF IWUA NEEDED FOR EVALUATION OF PERFORMANCE							
			Mangudho	Shulakino	Kiamariga/Raya	Kaumbura	Tuhire Challa
7	Communication	With DIO	Through mobile phone. Communication good.	Through mobile phone, mostly unreachable	Through mobile phone. Communication Good	Through mobile phone. Communication good	Through mobile phones. Communication good.
		With DAO & Extension Officers	Communication through mobile when need arises	Communication mostly when there is a training or during normal extension work by the Agricultural officers	Communication good and mostly whenever there is an agricultural activity to be conducted	Rare, only when there is a training or normal visits by extension officers	Mostly consulting on agricultural products and markets
		Frequency of communication	More frequent with SCIO than with SCAO	When need arises. Rare for SCAO, more with SCIO	When need arises. Rare for SCAO, more with SCIO	Mostly on need basis	Rare as and when need arises
		Subject of communication	Project activities updates , members queries and conflict management	Updates on the project activities and IWUA leadership	Updates of IWUA activities	Updates of project activities	Project activities, Agricultural activities

SIDEMAN-SAL							
BASIC INFORMATION OF IWUA NEEDED FOR EVALUATION OF PERFORMANCE							
			Mangudho	Shulakino	Kiamariga/Raya	Kaumbura	Tuhire Challa
8	Conflict Management and Resolution	Recent conflicts with members	Some members refusing to give their plot numbers during membership registration	Leadership conflicts experienced in December to January	Water conflict with some members diverting water to their farms without consent and threatening when water is disconnected as per Bylaws	None documented	General water conflicts during the dry season
		Recent conflicts with external members (non-scheme/Govt/Private sector)	None. To be confirmed	None documented	None	None documented	Over abstraction of water from upstream farmers using pumps and without permit
		Actions taken to resolve the problem	SCIO consulted to make decision	Elections held to replace current leadership	SCIO involved in the resolution. Bylaws to be followed to resolve the conflict	N/A	Internal conflicts are resolved by the management committee while external are resolved with involvement of WRMA and SCIO

SIDEMAN-SAL							
BASIC INFORMATION OF IWUA NEEDED FOR EVALUATION OF PERFORMANCE							
			Mangudho	Shulakino	Kiamariga/Raya	Kaumbura	Tuhire Challa
9	Other groups in the village	Agriculture production groups	Previous Barikiwani Self Help Group now merged to become Mangudho Irrigation Scheme	None	None	None	None
		SACCOS & other social groups	None	None	None	None	2 Women groups within the area are members of the Scheme; Majengo and Kivumbi women groups
		Other CBOs	None	None	None	None	None

Source: JICA Team

The capacity development program for each IWUA will be prepared on the basis of the above-mention situation.

2.5 Summary of Feasibility Study and Detailed Design

Results of the Feasibility Study are described in Appendices 7 and 8 of the Report and outlined hereinafter.

2.5.1 Agricultural Development Plan

Based on the provided agro-economical data (obtained/ rendered) from regional agricultural service stations, national agronomical census and the interviews with regional agricultural service officials, local farmers and relating personnel, the proposed enterprises, crop calendars and prospective/ estimated revenues for pilot schemes are shown below;

(1) Proposed Crops

Considered with the farmers' preference and economical efficiency, the enterprises proposed under projected conditions are listed below;

Table 2.5.1 Proposed Crops

Crop/ Scheme	Challa/Tuhire	Mangudho	Shulakino	Kiamariga/Raya	Kaumbura
Maize	X		X	X	X
BeansX	X		X		
Tomato	X	X	X	X	X
Onion	X	X	X	X	X
Cabbage			X	X	
Water melon		X			X
Banana	X				
Green maize		X			
Amaranth		X			
Capsicum			X	X	
Garlic				X	
Pawpaw					X

*Beans including Green gram for intercropping

Source: JICA Team

(2) Cropping Calendar

Based on the agro-ecology and agro-meteorological condition in the each pilot scheme, trial/ prototype models of cropping calendars for schemes are presented hereinafter;

Table 2.5.2 Proposed Cropping Calendar under Challa/Tuhire Scheme

SEASON 1												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Maize			█									
Tomato			█									
Beans			█									
Onions			█									
Bananas	█											
SEASON 2	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Maize	█								█			
Tomato	█											█
Beans	█									█		
Onions	█									█		
Bananas	█											

Source: JICA Team

Table 2.5.3 Proposed Cropping Calendar under Mangudho Scheme

	Area %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Season 1													
Amaranth	15%	█										█	
Tomatoes	20%	█										█	
Water melon	20%										█		
Onions	15%	█											
Green maize	30%							█					
Total	100%												
Season 2													
Fallow	15%												
Tomatoes	20%							█					
Water melon	20%		█										
Onions	15%								█				
Green maize	30%	█											
Total	85%												

Source: JICA Team

Table 2.5.4 Proposed Cropping Calendar under Shulakino Scheme

Crop/Variety	Area in %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Season 1														
Maize/Beans	30			█										
Cabbages	15		█											
Onions	20					█								
Tomatoes	20		█											
Capsicum/Vegs	15	█												
Total	100													
Season 2														
Onions	30	█									█			
Maize/Beans	15	█							█					
Tomatoes	20	█										█		
Cabbage	20	█									█			
Capsicum/Vegs	15								█					
Total	100								█					

Source: JICA Team

Table 2.5.5 Proposed Cropping Calendar under Kiamariga/Raya Scheme

	Crop area	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Season 1													
Maize	60%				Orange bar								
Tomatoes	20%	Green bar											
Cabbage	5%	Purple bar											
BulbOnions	10%	Red bar											
Garlic	3%	Black bar											
Capsicum	2%	Cyan bar											
Season 2													
Maize	5%										Black bar		
Tomatoes	40%								Orange bar				
Cabbage	30%								Red bar				
Bulb onion	20%								Green bar				
Garlic	3%								Purple bar				
Capsicum	2%								Purple bar				

Source: JICA Team

Table 2.5.6 Proposed Cropping Calendar under Kaumbura Scheme

Crop Variety	% Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Season 1													
Bed1: Maize	50						[Yellow bar from Jun to Oct]						
Bed2: Tomatoes /Pawpaw intercrop	50	[Blue bar from Jan to Dec]											
Total	100												
Season 2													
Bed1: Onions	50	[Yellow bar from Jan to Feb]										[Yellow bar from Nov to Dec]	
Bed2: Water Melon/ Pawpaws	50	[Orange bar from Jan to Mar]										[Orange bar from Nov to Dec]	
Total	100												

Source: JICA Team

(3) Cultivation Area

Improvement and rehabilitation of the irrigation facilities in the pilot schemes contribute the expansion/ effective utilization of the farmers' lands.

Table 2.5.7 Cultivation Area of each scheme

Scheme	(Unit acre)		
	Without Project	With Project	Increase
Challa/Tuhire	1,805.00	2,075.00	270.00
Mangudho	40.00	46.26	6.26
Shulakino	150.00	200.00	50.00
Kiamariga/Raya	174.70	314.00	139.30
Kaumbura	610.00	707.00	97.00

Source: JICA Team

(4) Gross Margins

Estimated/ prospective gross margins for projected schemes and their increments per acre in schemes are listed below;

Table 2.5.8 Gross Margins under without/with Project Conditions

(Unit Ksh per acre)

Scheme	Without Project	With Project	Increase
Challa/Tuhire	295,444	524,655	229,211
Mangudho	(11,800)	1,004,200	1,016,000
Shulakino	260,100	511,491	251,391
Kiamariga/Raya	515,056	885,836	370,780
Kaumbura	1,924,300	2,618,300	694,000

Source: JICA Team

2.5.2 Irrigation Development Plan

(1) Land Holding Size for Irrigated Agriculture

The irrigated land per household and the total irrigated area in the scheme are shown below.

Table 2.5.9 Irrigated land and area in the schemes

Name of Scheme	Irrigated land per household (ha)	Number of IWUA Members	Total Irrigated Area (ha)
Challa/Tuhire	0.40	601	241
Mangudho	0.21	50	10.6
Shulakino	0.44	57	25
Kiamariga/Raya	0.62	104	64.8
Kaumbura	0.40	400	160

Source: JICA Team

(2) Irrigation water Requirement

Irrigation water requirements are calculated in accordance with the proposed cropping pattern. The peak irrigation water requirement is estimated as follows.

Table 2.5.10 Irrigation water requirements in the schemes

Name of Scheme	Irrigation Area in Net (ha)	Project Diversion Requirement (m ³ /sec)
Challa/Tuhire	241	0.101
Mangudho	10.6	0.012
Shulakino	25	0.017
Kiamariga/Raya	64.8	0.083
Kaumbura	160	0.100

Source: JICA Team

2.5.3 Design of Irrigation Facilities

(1) Challa/Tuhire Irrigation Scheme

Summary of Challa Tuhire Irrigation Scheme (241 ha) is outlined as follows:

Table 2.5.11 Features and Scope of Challa Tuhire Irrigation Scheme (Draft)

Features of Challa Tuhire Intake Weir		
Category	Description	
Existing (Out of Scope under SIDEMAN-SAL Project) Rehabilitation (Mid-term Scope)	Replacement of intake gate (Mid-Term Scope), omit Rehabilitation of Downstream Apron (ditto), omit Installation of Scouring Sluice gate (ditto), omit	
Design Dimensions	Description	
Type of Weir	Broad Crested Concrete Fixed Weir	
Weir Length, Height, Crest Level	12.7 m x 0.95 m, EL=XX.XXm	
Design Flood/Discharge, R. P 50 Yrs	Intake: 0.101 m ³ /sec (101 l/sec.)	Flood : 4.34 m ³ /sec
Design Water Level	Intake: 825.19m	Flood : 827.36m
Scouring Sluice Pipes	Pipe ϕ 300mm x 3 Nos. (existing, 1 fully functioning)	
Intake Gate	Concrete pipe culvert 600 mm Diameter (existing) Sliding Gate, Height 760 mm Width 600 mm	

Features of Irrigation Network										
Canal Name	Line (No)	Canal Dimension (m)	Total Length (m)	Structures (No.)						Remarks
				Canal			OT/DB			
				Existing (m)	New (m)	Remaining (m)	Existing (Good) (Nos)	New (Rehab) (Nos)	Remaining (Nos)	
Convey-ance Canal	1	Rectangular B = 0.63 H = 0.69	1,083	1,083	-	-	0	2	-	Canal: Out of Scope
Branch Canal	1	Rectangular B = 0.63 H = 0.69	745	745	-	-	3		-	Out of Scope
Secondary Canals	5	Rectangular B = 0.50 H = 0.48	2,760	1,260	550	950	8	11	18	Scope SC-1
			2,640	912	550	1,178	6	8	16	Scope SC-2
			3,322	794	550	1,978	7	8	29	Scope SC-3
			2,980	895	550	1,535	7	7	17	Scope SC-4
			3,200	1,217	550	1,433	9	7	17	Scope SC-5
			Sub-Total Secondary	14,902	5,078	2,750	7,074	37	41	97

OT: Offtake, DB: Diversion Box; New: Scope under SIDEMAN-SAL Project; Remaining: Scope under Other fund

Source: JICA Team

(2) Mangudho Irrigation Scheme

Summary of Mangudho Irrigation Scheme (20 ha) is outlined as follows:

Table 2.5.12 Features and Scope of Mangudho Irrigation Scheme (Draft)

Features of Mangudho Intake Works	
Category	Description
New/ Reconstruction of Intake Structure (Partially Scope under SIDEMAN-SAL Project)	- Reconstruction of Pump House (Scope) - Replacement of Pump and Engine (Scope) - Installation of Small Reservoir (Scope) - Construction of intake Weir (Mid-Term Scope)
Design Dimensions	Description
Type of Weir	Broad Crested Fixed Weir
Weir Length, Height, Crest Level	40.00 m x 1.52 m, EL=81.50m
Design Discharge/ Flood (T=50yr)	Intake: 0.012 m ³ /sec (12.2 l/sec.) Flood : 3.2 m ³ /sec
Design Water Level (Ditto)	Intake: 81.50m - 81.63m Flood : 82.13m
Pump	φ 80 x TDH= 92 m, 2 Nos (Replacement)
Engine	17.9 kW, 2 Nos. (Replacement)
Pump House	B: 31 m x W: 15 m x H: X.X (Replacement)
Small Reservoir	B: 31-27 m x W: 15-11 m x H: 2.0 m; 701 m ³ (New)

Features of Irrigation Network										
Pipeline Name	Line (No)	Pipeline Dimension (m)	Total Length (m)	Structures (No.)						Remarks
				Pipeline			Related Structures			
				Existing (m)	New (m)	Remain-ing (m)	Existing (Good) (Nos)	New (Rehab) (Nos)	Remain-ing (Nos)	
Main Pipeline (Rising)	1	uPVC: φ 110	738	-	738	-	-	3	-	Scope
Main Pipeline	1	uPVC: φ 110-φ 75	1,239	-	1,239	-	-	7	-	Scope
Link Pipeline	1	uPVC: φ 75	100	-	100	-	-	-	-	Scope
Submain Pipeline	7	uPVC: φ 50	70	-	70	-	-	3	-	Scope SM-1-1
		uPVC: φ 50	50	-	50	-	-	2	-	Scope SM-2-1
		uPVC: φ 50-φ 32	108	-	108	-	-	-	-	Scope SM-3-1
		uPVC: φ 32-φ 25	148	-	148	-	-	1	-	Scope SM-1-2
		uPVC: φ 50-φ 25	140	-	140	-	-	-	-	Scope SM-2-2
		uPVC: φ 50-φ 32	207	-	207	-	-	2-	-	Scope SM-1-3
		uPVC: φ 50-φ 25	200	-	200	-	-	1	-	Scope SM-2-3
		Sub-Total Submain	923	-	923	-	-	9	-	7 Lines
Distri-Bution line	10	uPVC: φ 25	740	-	740	-	-	10	-	Scope DLs

OT: Offtake, DB: Diversion Box; New: Scope under SIDEMAN-SAL Project; Remaining: Scope under Other fund

Source: JICA Team

(3) Shulakino Irrigation Scheme

Summary of Shulakino Irrigation Scheme (100 ha) is outlined as follows:

Table 2.5.13 Features and Scope of Shulakino Irrigation Scheme (Draft)

Features of Shulakino Intake Weir		
Category	Description	
Existing (Rehabilitation: Scope under SIDEMAN-SAL Project)	Rehabilitation of Sedimentation Basin (Scope) Replacement of intake gate (ditto) Replacement of Scouring Sluice gate (ditto) Installation of Water Meter (ditto)	
Design Dimensions	Description	
Type of Weir	Fixed Weir	
Weir Length, Height, Crest Level	B: 11.3 m x H: 3.5 m, EL of crest =1,910.49m	
Design Discharge/ Flood (T=50yr)	Intake: 0.120 m ³ /sec (120 l/sec.)	Flood : 89.77 m ³ /sec
Design Water Level	Intake: 1,910.44 m	Flood : 1,912.0 m
Sedimentation Basin	B: 2.7 m x L: 9.0 m x H: 3.5 m	
Scouring Sluice Gate	Slide gate 0.6 x 0.6 x 1 No.	
Intake Gate	Slide gate 0.6 x 0.6 x 1 No.	

Features of Irrigation Network											
Pipeline Name	Line (No)	Pipeline Dimension (m)	Total Length (m)	Structures (No.)						Remarks	
				Pipeline			Related Structures				
				Existing (m)	New (m)	Remaining (m)	Existing (Good) (Nos)	New (Rehab) (Nos)	Remaining (Nos)		
Main Line Right	1	uPVC ϕ 225	600	600	240	-	0	0	13	-	Scope
		uPVC ϕ 200	800	-	800	0					
Main Line Left	1	GI ϕ 200 uPVC ϕ 200	50 1,345	- -	50 395	- 950	0	0	3	9	Partial Scope

OT: Offtake, DB: Diversion Box; New: Scope under SIDEMAN-SAL Project; Remaining: Scope under Other fund

Source: JICA Team

(4) Kiamariga/Raya Irrigation Scheme

Summary of Kiamariga Raya Irrigation Scheme (64.8 ha) is outlined as follows:

Table 2.5.14 Features and Scope of Kiamariga Raya Irrigation Scheme (Draft)

Features of Mangudho Intake Structure		
Category	Description	
Rehabilitation of Intake Structure (Scope 1 under SIDEMAN-SAL Project)	Rehabilitation of intake Weir (Scope) Installation of sluice gate, trash rack and screen for both Kiamariga and Raya side 2 Water meters	
Design Dimensions	Description	
Type of Weir	Broad Crest Fixed Weir	
Weir Length, Height, Crest Level	4.5 m x 1m, EL of crest =2,038.509m	
Design Discharge	Intake: 0.083 m ³ /sec (83 l/sec.)	Flood : 72.76 m ³ /sec
Design Water Level	Intake: 2,038.459m	Flood : XX.Xm

Features of Irrigation Network										
Pipeline Name	Line (No)	Pipeline Dimension (m)	Total Length (m)	Structures (No.)						Remarks
				Pipeline			Related Structures			
				Existing (m)	New (m)	Remaining (m)	Existing (Good) (Nos)	New (Rehab) (Nos)	Remaining (Nos)	
Main Pipeline Kiamariga	1	Upvc: ø250 – ø160	2,440	1,820	620 580	0	0	19 (SC), 4 (OC)		Scope 2
	1	Upvc: ø200 – ø110	1460	1,460		0	0	15 (SC), 2 (OC)		Scope 2
Secondary Pipeline Kiamariga:	4	Upvc: ø125– ø75	594	0	594	0		(1)	0	Scope SC-K1
		Upvc: ø160	547	0	547	0		(1)	0	Scope SC-K2
		Upvc: ø160	420	0	420	0		(1)	0	Scope SC-K3
		Upvc: ø160	340	0	340	0		(1)	0	Scope SC-K4
Secondary Pipeline Raya:	4	Upvc: ø110	500	0	500	0		(1)	0	Scope SC-R1
		Upvc: ø75	340	0	340	0		(1)	0	Scope SC-R2
		Upvc: ø90 – ø75	660	0	660	0		(1)	0	Scope SC-R3
		Upvc: ø90	160	0	160	0		(1)	0	Scope SC-R4
		Sub-Total Secondary	3,561	0	3,561	0		(8)	0	Scope Total 8

SC (Section chambers) OC (Other chambers), (): Structure already considered in Main pipeline Scope under SIDEMAN-SAL Project; Remaining: Scope under Other fund

Source: JICA Team

(5) Kaumbura Irrigation Scheme

Summary of Kaumbura Irrigation Scheme (90ha =Irrigation / 450 ha = whole scheme) is outlined as follows:

Table 2.5.15 Features and Scope of Kaumbura Irrigation Scheme (Draft)

Features of Kaumbura Intake Structure		
Category	Description	
New (Scope under SIDEMAN-SAL Project)	Installation of Guide wall (Scope) Installation of Side spillway Structure (ditto) Installation of Measuring device (ditto)	
Design Dimensions	Description	
Type of Intake Structure	Free Intake Structure with Guide Wall	
Wall Length, Height, Bed Level	10.0 m x 1.50 m, EL=834.25m	
Design Discharge/ Flood (T=50yr)	Intake: 0.100 m ³ /sec (100 l/sec.)	Flood : 0.2 m ³ /sec
Design Water Level	Intake: 834.48m (=834.25+0.23)	Flood : 834.65m
Side Spillway	B = 3.00m, EL. 834.65m (New, Non-gated)	

Features of Irrigation Network										
Canal Name	Line (No)	Canal Dimension (m)	Total Length (m)	Structures (No.)						Remarks
				Canal			OT/ DB			
				Existing (m)	New (m)	Remaining (m)	Existing (Good) (Nos)	New (Rehab) (Nos)	Remaining (Nos)	
Main Canal	1	Rectangular B=0.60-0.20 H= 0.50	3,190	(2,360)	2,360	830	0	4	4	Partial Scope
Secondary Canals	5	Trapezoidal B = 0.20 H = 0.30 M = 1.0	630	-	-	630	-	-	12	Out of Scope SC-1
			320	-	-	320	-	-	6	Ditto SC-2
			643	-	-	643	-	-	13	Ditto SC-3
			650	-	-	650	-	-	13	Ditto SC-4
			125	-	-	125	-	-	3	Ditto SC-5
			297	-	-	297	-	-	6	Ditto SC-6
			150	-	-	150	-	-	3	Ditto SC-7
			200	-	-	200	-	-	4	Ditto SC-8
		Sub-Total Secondary	3,015	-	-	3,015	-	-	60	Ditto Total 8
Tertiary Canals	60	Sub-Total Tertiary	6,000	-	-	6,000	-	-	120	Ditto Total 60
Drainage Canal		Sub-Total Drainage	3,000	-	-	3,000	-	-	8	Ditto Total 8

OT: Offtake, DB: Diversion Box; New: Scope under SIDEMAN-SAL Project; Remaining: Scope under Other fund

Source: JICA Team

2.5.4 Cost Estimate

The construction cost for the irrigation schemes is summarized below.

Table 2.5.16 Estimated Project Cost for Challa Tuhire Irrigation Scheme (Draft)

Bill No	Description	Project Total by Bills(Ksh)
1	Preliminaries and Generals	-
2	Intake Works	-
3	Conveyance canal (2 Division box only)	140,000
4	Branch Canal	-
5	Secondary Canal 1 (SC-1, Lining 550m) and Division Box (11)	1,790,000
6	Secondary Canal 2 (SC-2, Lining 550m) and Division Box (8)	1,790,000
7	Secondary Canal 3 (SC-3, Lining 550m) and Division Box (8)	1,790,000
8	Secondary Canal 4 (SC-4, Lining 550m) and Division Box (7)	1,790,000
9	Secondary Canal 5 (SC-5, Lining 550m) and Division Box (7)	1,790,000
	Sub Total	9,090,000
	Contingencies @ 10%	910,000
	Total	10,000,000

Source: JICA Team

Table 2.5.17 Estimated Project Cost for Mangudho Irrigation Scheme (Draft)

Bill No	Description	Project Total by Bills(Ksh)
1	Preliminaries and Generals	-
2	Intake Works	-
2	Pump Works	3,163,000
3	Reservoir	1,905,000
4	Road Crossings	416,000
5	Rising Main Line (RM, uPVC: ϕ 110, L=738m)	702,000
6	Gravity Main Line (M, uPVC: ϕ 110- ϕ 75, L=1,239m)	1,423,000
7	Submain Pipeline (7 SMs, L=923m) and Related Structures (9)	406,000
8	Distribution line (10 DLs, L=740m) and Related Structures (10)	288,000
9	Infield System	787,000
	Sub Total	9,090,000
	Contingencies @ 10%	910,000
	Total	10,000,000

Source: JICA Team

Table 2.5.18 Estimated Project Cost for Shulakino Irrigation Scheme (Draft)

Bill No	Description	Project Total by Bills(Ksh)
1	Preliminaries and Generals	-
2	Intake Works (Sedimentation basin)	2,400,000
3	Main Line Right (L=240m, Repair (by GI ϕ 225) & L=800m (uPVC ϕ 200, including All related structures)	5,200,000
4	Main Line Left (L=50m, (GI ϕ 200) & L=395m (uPVC ϕ 200, including 3 related structures)	1,490,000
	Sub Total	9,090,000
	Contingencies @ 10%	910,000
	Total	10,000,000

Source: JICA Team

Table 2.5.19 Estimated Project Cost for Kiamariga/Raya Irrigation Scheme (Draft)

Bill No	Description	Project Total by Bills(Ksh)
1	Preliminaries and Generals	-
2	Intake Structure (Gravity system)	1,720,000
3	Kiamariga Main Pipeline (MPK, L=620 m, extention) and Related Structures (19 section chambers, 3 chambers for wash outs, 1 air valve chamber and fittings,)	2,550,000
4	Kiamariga Main Pipeline (MPK, L=260m out of 580m, Replacement to G.I)	1,840,000
5	Raya Main Pipeline Related Structures (15 section chambers)	363,000
6	Kiamariga Secondary pipelines SC-K1, 2, 3, 4; Sub-Total L=1,901m	1,779,000
7	Raya Secondary pipelines SC-R1, 2, 3, 4; Sub-Total L=1,660m	838,000
	Sub Total	9,090,000
	Contingencies @ 10%	910,000
	Total	10,000,000

Source: JICA Team

Table 2.5.20 Estimated Project Cost for Kaumbura Irrigation Scheme (Draft)

Bill No	Description	Project Total by Bills(Ksh)
1	Preliminaries and Generals	-
2	Intake Works (Guide wall/ Side spillway)	590,000
3	Main Canal (Lining L=2,360, 4 Division boxes)	8,500,000
	Sub Total	9,090,000
	Contingencies @ 10%	910,000
	Grand Total	10,000,000

Source: JICA Team

Annex 3

Construction of Irrigation Infrastructures

**Sustainable Smallholder Irrigation Development and Management
in Semi-Arid Lands Project**

Final Report

Annex 3: Construction of Irrigation Infrastructures

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CHAPTER 1 Irrigation Development Plan

1.1 General

According to the SHIDD Guidelines, the construction of the irrigation facilities will be basically carried out with farmers' participation. Through the construction works, special attention will be paid to strengthen capacities of the farmers and the IWUAs for organizational strengthening and operation and maintenance of the facilities.

As described in above, the construction works of the irrigation facilities will be conducted by the IWUA and private contractors. Before the commencement of the construction work, necessary arrangements, such as the approval of NEMA and WRMA, application of the Way leave, and signing of the MOU, will be made by SCIO under the assistance of the PMT.

The construction of the irrigation canals and pipelines will be basically undertaken by the IWUA under the technical guidance of the SCIOs and the PMT so as to enhance capacities of the IWUA members towards sustainable management of the irrigation schemes. After the tendering process, a private contractor will be awarded for the construction of major irrigation facilities, such "intake weirs" and some of "conveyance/ main pipelines". The SCIO attached to each scheme will be responsible for the supervision of the construction works.

1.2 Basic Concept of Construction Management by Farmers

A smooth implementation of construction works by farmers is one of the most important key factors of irrigation development in the scheme area. Therefore, taking into consideration the below-mentioned aspects, facilitation of IWUA leaders and key members will be conducted for an efficient planning as well as enhancement of farmers' participation to the works.

- Schedule Management
- Financial Management
- Labour Management
- Basic Construction Procedure/ Methods
- Material and Quality Management
- Reporting/ Information Management
- Social/ Environmental Management

1.2.1 Schedule Management

Schedule management focuses on the time control of the farmers' construction works. In the

program, the progress or degree of construction accomplishment for each term will be explained.

1.2.2 Financial Management

Financial management focuses on the fund control of the farmers' construction works. Basically, materials and skilled labor will be supplied by the Project; however each IWUA is requested to learn the quantities of material as well as skilled labour inputs along the time line.

1.2.3 Labor Management

Labor Management focuses on controlling the schedule and daily input of farmers' participation to the construction works to accomplish the aimed progress. Each member of IWUA is requested to participate 3 days a week in average, so that the farmers could work for both the Project and daily agricultural activities, etc., based on their crop calendar and annual social program.

1.2.4 Basic Construction Procedure/ Methods

Basic construction procedure program focuses on typical components of the farmers' participatory construction works, such as excavation, canal lining, and pipeline installation, etc. In the programme, i) the amount of standard excavation volume of 1 m³/ man-day as well as efficient and safe excavation method, basic procedures of ii) canal lining and iii) pipeline installation are introduced. Farmers are also encouraged to learn the above skills from skilled labours for their future maintenance works over the structures.

1.2.5 Material and Quality Management

Material management focuses on i) an adequate (safety and weather proof) material storage and ii) record keeping over the material consumption along the construction works, including the basic procedure for measurement of work performance. On the other hand, quality management focuses on i) basic knowledge on the quality management of the construction works, such as importance of compaction over canal/ pipeline base and backfill, ii) canal lining method aiming for prolonging the life time of structures.

1.2.6 Reporting/ Information Management

Reporting and information management focuses on record keeping of the progress as well as material and labour input for the overall management of the construction and reporting to the SCIOs. Several kinds of reporting forms will be introduced for efficient record keeping.

1.2.7 Social/ Environmental Management

Social management especially focuses on i) the realization of a smooth and efficient participatory construction works by farmers through avoiding confusion and conflict of the farmer's community and enhancement of the participatory work that harmonizes/ synchronizes with their crop and social calendar. On the other hand environmental management focuses on the health related matter as well as reducing the environmental impact through activities such as soil and water conservation, soil run-off prevention, avoids excess run-off/ infiltration of chemical substances. The guidance will be conducted for these topics, in conjunction with the environmental related trainings.

1.3 Activities before Construction Works

1.3.1 Signing of the MOU

(1) General

After completion of the Detailed Design, a meeting will be held to obtain concurrence of the IWUA members on the development plan. The SCIO as well as other government officers concerned will attend the meeting. The amount of the farmers' contribution as well as schedule of the construction works will also be discussed and agreed. A Memorandum of Understanding (MOU) will be signed among three (3) parties; i) National government of Kenya - JICA represented by M.O.A.L.F and JICA Mission representative, ii) IWUA in each scheme, iii) County government concerned (SCIO, other county officers). The MOU will cover the following items:

- Component of the farmers works and Contractor's works
- Amount of the farmers' contribution
- Schedule of construction works
- Farmers' obligation to the construction works
- GOK-JICA's obligation to the construction works
- County government's obligation to the construction works
- Quality control
- Safety control, etc.

(2) Purpose of MOU

The Purpose of the MoU is,

- To provide for the establishment of the smallholder community based irrigation scheme for horticultural production,
- To provide for the participation of all the parties to the agreement in the survey/ investigations, design and implementation of the irrigation scheme construction,

- To provide for the strengthening of the farmers organization for effective operation and maintenance (O&M) of the scheme, and
- To provide for the strengthening of extension, training and support services to the irrigation scheme.

(3) Role and Responsibilities of MoALF

Ministry of Agriculture, Livestock & Fisheries (SIDEMAN-SAL Project), on the terms of this Agreement to:-

- A.1 Carry out or arrange for survey, investigations and designs for the scheme as agreed with the farmers.
- A.2 Strengthen the capacity of the IWUA through provision of irrigation extension and training.
- A.3 The Government through the Ministry with the assistance of JICA (SIDEMAN-SAL Project) will provide funds for the construction of the main infrastructure of Irrigation facilities (cost sharing basis).

The rehabilitation will involve the main infrastructure works i.e. the intake works, main canals works and feeder canals as shown below:

•Scope of works

- A.4 The estimated cost of the above works is KShs _____ that will be a grant to the IWUA by the Government in collaboration with JICA.
- A.5 Supervise the construction of the irrigation works to ensure that they adhere to the design specifications and standards.
- A.6 Prepare an operation and maintenance manual for the irrigation system and train farmers on its use.
- A.7 Liaise with scheme's IWUA management and arrange for assistance of other institutions if necessary.
- A.8 Assist in the operationalization of the PSCC
- A.9 Provide the following hand tools: Mattock, Shovel, Wheel barrow and Fork jembe.

(4) Role and Responsibility of IWUA

The Farmers through their IWUA agree, on the terms of this Agreement to:-

- B.1 Provide all necessary labour, locally available materials and undertake to do all earthworks for the main canal, group feeders, water storage pan and infield system as guided by the SCIO and according to the design.

- B.2 Settle disputes over land, and allow each other the right of way for water to their plots.
- B.3 Apply, pay for water permit and other water charges.
- B.4 Open water operation and maintenance fee account.
- B.5 Provide leeway/way leave on land or working space for required works free, for (canals and related structures especially the water storage). In this regard, the farmers will undertake to negotiate for the same with affected farmers who are not members of the project.
- B.6 Establish and maintain farmers groups and scheme committee rules and regulations (by-laws) specifying the requirements and the discipline as well as give rewards and sanctions to be observed by all the members for the success of the irrigation scheme.
- B.7 Organize equitable water distribution within the irrigation scheme.
- B.8 Clean, repair and maintain irrigation and drainage system as required.
- B.9 Organize farmers to raise funds for the installation of the infield Irrigation system as a part of their contribution to the development of their irrigation scheme.
- B.10 Agree to cost sharing for training and tours.
- B.11 Provide storage facilities for project tools, scheme equipment, spare parts and materials, and provide security.
- B.12 Farmers are responsible for safety during construction works by the IWUA including PPE.
- B.13 Cooperate with SCIO in order to operationalize the PSCC for the Monitoring & Evaluation during construction and O & M phase
- B.14 Cooperate with the PSCC in the implementation of Environmental Management Monitoring Plan
- B.15 Form construction sub-committee at block basis by IWUA.

(5) Role and Responsibilities of the County Government

The County Government agrees, on the terms of this Agreement to:-

- C.1 Assist the farmers groups and schemes committee when they require support to enforce their regulation in solving of disputes during irrigation scheme planning, design, implementation operation and maintenance phases.
- C.2 Collaborate with the Ministry and other institutions to implement the irrigation scheme successfully.

1.3.2 Pre-construction Guidance to IWUA

After the MOU has been settled among the above mentioned three (3) parties, especially SCIO and IWUA, in line with the aspects mentioned in section 3.2, pre-construction guidance to

farmers will be also conducted so that farmers understand clearly what will be done in the construction together with quality and safety management, how much labour contribution is required to each IWUA member family along the time frame of construction works.

1.3.3 Implementing Organization for IWUA Works

(1) General

For smooth implementation of the construction works, the IWUA will be required to organize the following sub-committees.

- Overall Management,
- Material Management,
- Labour Management, and
- Technical and Quality Management

Membership of each sub-committee and its function is described hereinafter.

(2) Overall Management Sub-committee

Members: Chairman and Block Leaders

- Monitor the overall construction activities by IWUA members for overall and block basis
- Check Progress along the schedule and Report to SCIO and PMT members regularly
- Feed back the progress and condition of farmers' construction works to IWUA members for encouragement through block leaders

(3) Material Management Sub-committee

Members: Treasury and appropriate members for overall and block basis

- Check the quantities of delivered materials by suppliers and approve
- Stock and Keep the materials in safe condition from weather (rain, etc.) and from theft
- Check and record the quantities of material used for construction by each block
- Check and record the balance quantities of material

(4) Labour Management Sub-committee

- Members: Secretary and appropriate members for overall and block basis
- Prepare the list of IWUA members for each block to conduct farmers' contribution works
- Check and Record the daily attendance of IWUA members to farmers' contribution works
- Advise/ Encourage IWUA members towards regular attendance to the work
- Solve conflict, if any

(5) Technical and Quality Management Sub-committee

Member: Appropriate members for overall and block basis

- Gain knowledge on construction procedure and methods through SCIO and skilled labour/ contractor
- Supervise and advise to the farmers' contribution works on technical and quality basis together with SCIO and skilled labour
- Identify and Report technical problems to SCIO/ skilled labour to improve performance
- Monitor the health related matter and environmental impact along the construction and advise IWUA members for improvement

1.3.4 Authorization by WRMA

(1) General (The Water Act 2002 & WRMA)

The organization (Water user) to operate the irrigation project shall obtain "Water Right Permission" from "Water Resources Management Authority" (hereinafter referred to as "WRMA") formed by "The Water Act 2002". Here's an outline of "The Water Act 2002" and "WRMA".

The Water Act 2002 went into effect to provide for 1) improved management, conservation, use and control of water resources, 2) acquisition and regulation of rights to use water, 3) management of water supply and sewerage services and 4) ensuring public participation in Water Resource Management through CAACs & WRUAs (Note: CAAC: Catchment Area Advisory Committee; WRUA: Water Resource User Association). The act is buttressed by various subsidiary legislations such as the "Water Resources Management Rules (2007)" which has been promulgated and gazetted as to enable provisions of that.

The act gives the clear legal definition of "Water Right Permission" as below.

"Every water resource is hereby vested in the state, subject to any right of user granted or under this act or any other written law and any person intending or undertaking any water activity defined in the Act including the activities listed in WRM rules 2007 fifth schedule (Pg 1698) shall obtain approval from the Authority for:

- Temporary abstraction for construction
- Diversion of water from a water course
- Abstraction from surface water
- Diversion of a water course among others

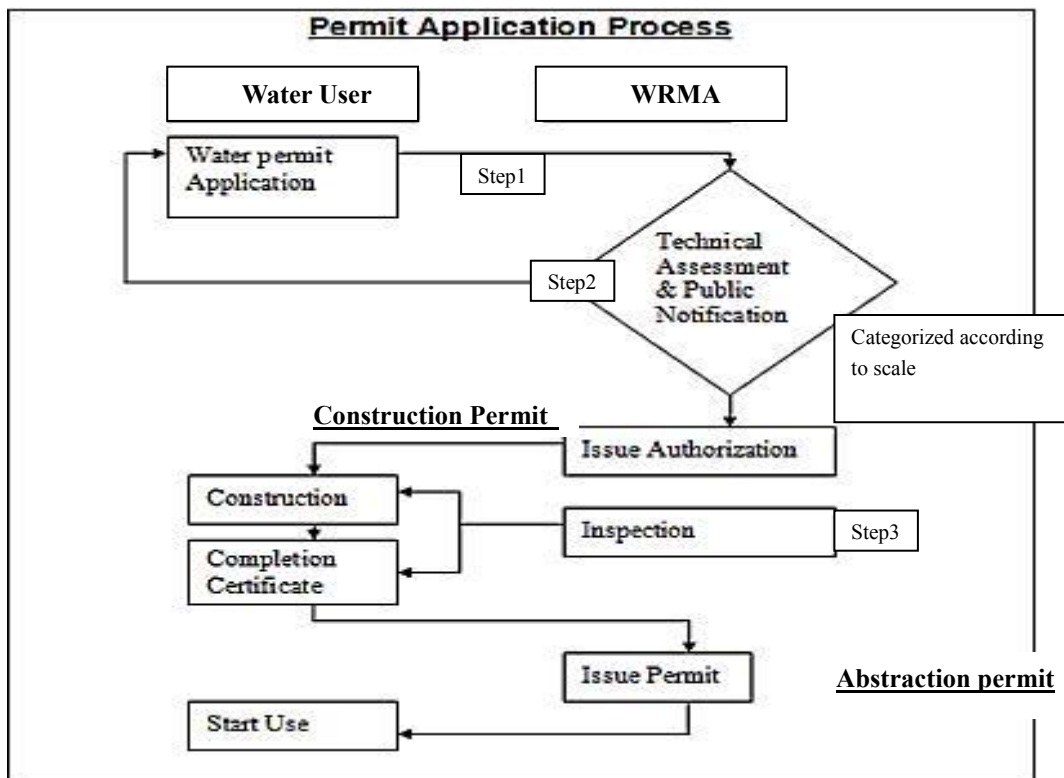
Meanwhile, WRMA was established as implementation organization to carry out the activities described above in the act No.8140, 14th November 2003. WRMA's principal mandate is to work as the lead agency to the management of water resources in the whole

country. The specific responsibilities are shown as below:

- Water allocation and apportionment
- Monitoring and assessment of water resources
- Gathering and publishing information on water resources
- Receiving and determining applications for permits of water use
- Regulation and protection of water quality
- Management and protection of water catchments
- Water conservation and control
- Determine and collect water use charges
- Coordination with other bodies for better water management
- Advising the minister with respect to water resources management

(2) Application Process of Water Right Permission

The process to obtain “Water Right Permission” is described. Under the process, each scheme is categorized from A to D, based on the definition described in Table 1.3.1. Permit fees of Construction and Abstraction is shown below



Source : WWW.WRMA.or.ke

Figure 1.3.1 Permit Application Detail Process 1(Class A-D)

Step 1 - Application received at the WRMA Sub Regional Office (SRO) with all the documents

Step 2.1 - Submission to Regional office for Technical assessment and approval in case of

Category A & B (Refer to Table 1.3.1) and then returned to SRO for printing of authorization/ permit for issuance to the applicant

Step 2.2 - Category C & D (Refer to Table 1.3.1) applications are advertised after the technical assessment, forwarded to CAAC for approval in case of category C and for recommendations in case of category D

Step 3 - Forwarded to Headquarter (HQ) for approval after “step 2” and Issue the Authorization/ permission

[Notes]

The Construction Permit period is effective in 24 month.

There sometime is difference in quantity of water between “Construction Permit” and “Abstraction permit”.

Table 1.3.1 Category of Water Resource Use Activities

Category	Definition
A	Water use activity deemed by virtue of its scale to have a low risk of impacting the water resource
B	Water use activity deemed by virtue of its scale to have the potential to make a significant impact on the water resource
C	Water use activity deemed by virtue of its scale to have a significant impact on the water resource
D	Water use activity which involves either two different catchment areas ,or is a <u>large scale or complexity</u> and which is deemed by virtue of its scale to have a measurable impact on the water resource

Source : WRMA office MWEA

Table 1.3.2 WRMA Construction Permit Fees

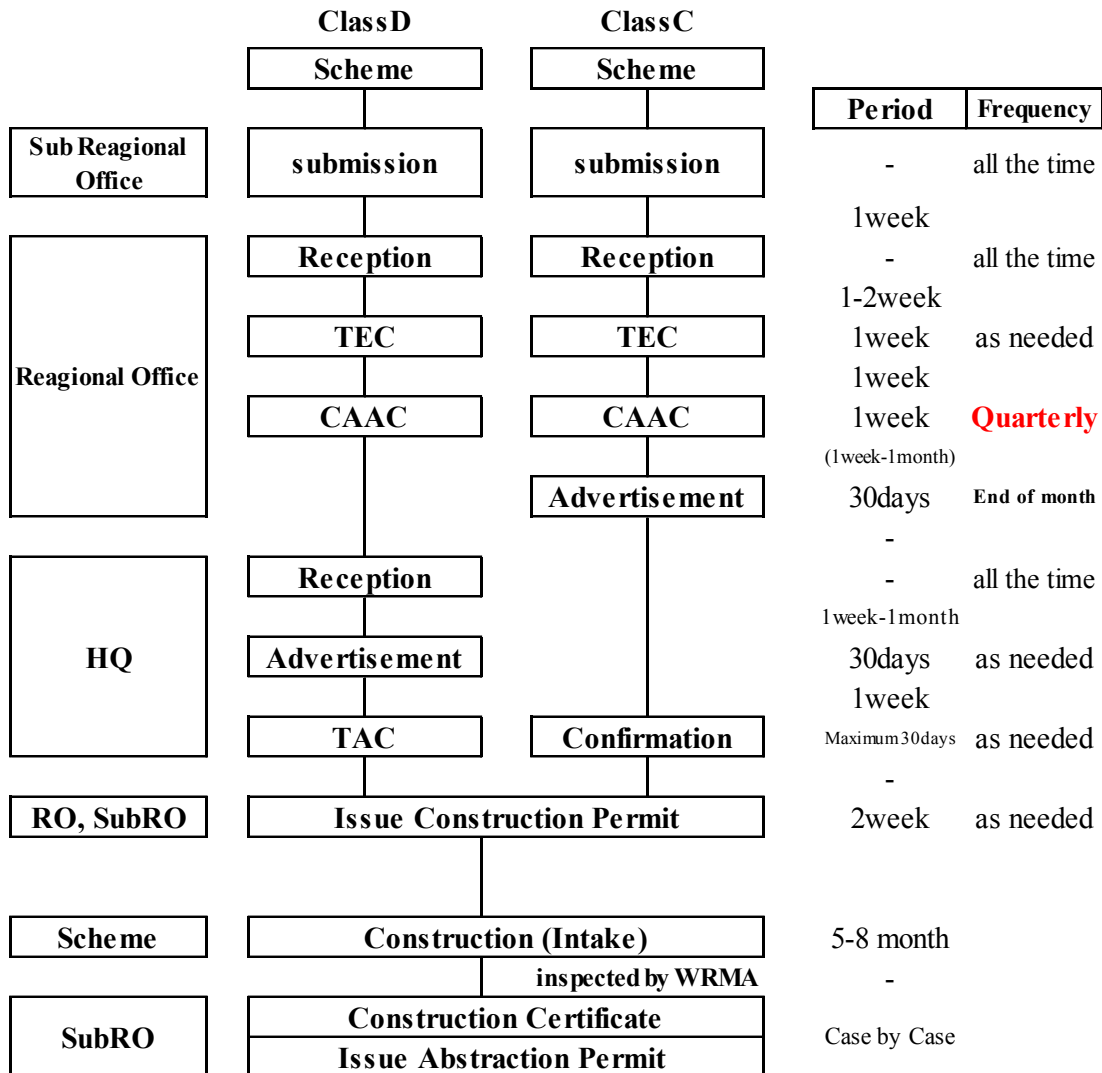
Application	Assessment of application (Ksh)	Issuance or renewal of permit for 5 years (Ksh)
Category A	1,000	Nil
Category B	5,000	7,500
Category C	20,000	25,000
Category D	40,000	50,000

Source : WRMA office MWEA

Table 1.3.3 WRMA Abstraction Permit Fees

First 300 m ³ /day	50 cents / m ³
Over 300 m ³ /day	70 cents / m ³

Source : WRMA office MWEA



*1 RO: Regional Office; TEC: Technical Evaluation Committee; TAC: Technical Authorization Committee

*2 Advertisement can be done after reception to RO. But usually they cannot because RO doesn't have money.

Source: JICA Team

Figure 1.3.2 Permit Application Detail Process 2(Class C, D)

(3) Present condition of Application

“The Water Resources allocation thresholds for classification of permit, First Edition, October 2007” by WRMA specifies that the application of each scheme is classified in Class D.

The progress of the authorization is shown in Table 1.3.4. The threshold of WRMA Category and Water Abstraction Amount is shown Table 1.3.5.

It is further to be remarked that the Class indicated in the table should be confirmed with the above information. The process of the authorization should be monitored carefully as the progress is a critical for the implementation of the new intake weirs.

Table 1.3.4 Present Progress of WRMA Application as of 15th March 2015

Scheme	WRMA Authorization										
	Class	Sub-RO	RO				HQ			Authorization letter (Expected month)	
		Submission	Receipt	TEC	CAAC	Advertisement	Receipt	Advertisement	TAC	Construction	Abstraction
Olopito	D	Resubmitted 20/Nov/2013	Done 21/Nov/2013	Done	Done 21/Nov/2013	/	Done	Done 3/ Dec /2013	Done Jan/2014	Received Mar/2014	Not yet Aug/2015
Kaben	D	Resubmitted 20/Nov/2013	Done 21/Nov/2013	Done	Done 21/Nov/2013	/	Done	Done 3/ Dec /2013	Done Jan/2014	Received Mar/2014	Not yet May/2015*2
Gatitu/	D	Resubmitted By Jun 2014	Done	Not yet	Not yet	/	Not yet	Not yet	Not yet	/	Not yet Jun/2015
Muthaiga	D	Resubmitted By Jun 2014	Done	Not yet	Not yet	/	Not yet	Not yet	Not yet	/	Not yet Jun/2015
Tumutumumu	D	Resubmitted 5/Oct/2013	Done Nov/2013	Done	Done	/	Done	Done 3/12/13	Done 24 th Mar 2014	Not yet Mar/2015	Not yet Aug/2015
Muungano	D	Resubmitted 28/Nov/2013	Done Nov/2013	Done	Done	/	Done	Done 3/12/13	Done 24 th Mar 2014	Not yet Mar/2015	-*2
Murachaki	D	Done 29/Jul/2013	Done	Done	Done 17/Sep/2013	/	Done	Done 3/12/13	Done 24 th Mar 2014	Not yet Mar/2015	-*2
Kasokoni	D (C)	To be resubmitted By Jul 2015	Not yet	Not yet	Not yet	/	Not yet	Not yet	Not yet	Received Nov/2013*1	Not yet May/2015
Mdachi	C	Submitted 26/Nov/2013	Done	Not yet Scheduled 2nd/ Mar /2015	Not yet	Not yet	/	/	/	Not yet May/2015	Not yet Aug/2015

Source : JICA Team

*1 Kasokoni irrigation scheme acquired the Construction Authorization as Class C. Therefore they resubmit and varied the amount to Class D.

*2 Hand over the part of project according to PSC decision to Each County Government

Table 1.3.5 Threshold of WRMA Category and Water Abstraction Amount

Scheme	Water Abstraction Amount(m ³ /day)			Threshold of WRMA Category ^{*2}				Remarks
	Actual application		Recommended ^{*1} for irrigation	A	B	C	D	
	Submit (First time)	Resubmit						
Olopito ^{*3}	1,629	3,758	3,758 (43.5 L/S)	0-20	20 - 500	500 - 1,000	1,000<	Rift valley catchment, Sikinder River,2KA
Kaben ^{*3}	5,400	25,944	25,920 (300 L/S)	0-20	20 - 500	500 - 1,000	1,000<	Rift valley catchment
Gatitu/Muthaiga ^{*3}	1,500	To be clarified	8,640 (100 L/S)	0-50	50 - 500	500 - 5,000	5,000<	Ewaso Ng'iro north catchment
Tumutumu ^{*3}	315	10,368	10,368 (120 L/S)	0-100	100 - 500	500 - 2,500	2,500<	Tana catchment, Ura-Tharaka River,4FC
Muongano ^{*3}	5,400	14,428	12,625 (146.125 L/S)	0-100	100 - 500	500 - 2,500	2,500<	Tana catchment, Thanantu River,4FA
Murachaki	22,880		21,600 (250 L/S)	0-100	100 - 500	500 - 2,500	2,500<	Tana catchment, Thanantu River,4FB
Kasokoni ^{*3}	125	To be clarified	3,888 (45 L/S)	0-2	2 - 100	100 - 2,000	2,000<	Athi catchment, Upper Lumi River,Middle zone
Mdachi	4,838	2,419	2,419 (28 L/S)	0-10	10 - 500	500 - 5,000	5,000<	Athi catchment, Coastal zone, Sabaki River

*1 Required Daily peak amount of irrigation water in the year

Source : JICA Team

*2 Water Resources Management Authority Water resources allocation thresholds for classification of permit First edition October 2007

*3 JICA team recommended to change the application amount.

(4) Water Storage for Authorization

1) Legal Background

Based on the Water Act 2007, water storage for supplying irrigation water during dry season is required as mentioned in clause 53-55, referred to as the followings

THE WATER RESOURCES MANAGEMENT RULES, 2007

(IN EXERCISE of the powers conferred by Section 110 of the Water Act, 2002, the Minister for Water and Irrigation, makes the following Rules –)

PART III-SURFACE WATER

53. Allocation of water for irrigation.

(1) In allocating water for irrigation, the Authority shall

(a) give priority to subsistence irrigation; and

(b) be guided by crop water requirements in the area and the efficiency of water use.

(2) When considering aggregate water demand for subsistence irrigation, the Authority may declare by public notification of each catchment area or part thereof an upper limit for the allocation of water either in aggregate or for one permit where the allocation is shared among more than one household.

54. Prior right to water for storage.

The right to store water shall be subject to prior right to its uninterrupted flow for as much as it is required for actual and beneficial use, and to the obligations imposed by the Act.

55. Need for storage.

The Authority may require a water use permit applicant to develop adequate storage in respect of the application for water use.

2) Overall Approach of Discussion for Consensus among WRMA and the Project

There has been series of discussion between the Project and WRMA to deal with the issues on the water storage.

- The Project basically agreed with WRMA to allow the Project with adoption of storage with block basis, and/ or storage with farm plot basis;
- The Project proposed to WRMA that the scheme would provide storage to supply water to 10% of total irrigable area during the dry season (90 days). Under the condition, the water storage requirement per ha is 315 m³ as shown below.

$3.5 \text{ mm/day} \times 10,000 \text{ m}^2/\text{ha} \times 90 \text{ days} \times 10\% = 315 \text{ m}^3/\text{ha}$

- At the time of MoU for the Farmers Construction Work, the Project assisted the SCIO and explaining the IWUA importance of adoption of the storage, and the location and the number of storage would be discussed on block basis/ plot basis.
- The design layout, typical design as well as installation schedule of the said storage will be prepared and submitted/ explained to WRMA, within three months after the MoU, so that WRMA could issue the “Abstraction Permit” at the time of completion of the Intake weir.
- The storages shall be installed based on the above submitted schedule before the completion of the Farmers’ Construction Works
- Expected water storages under each scheme are outlined below.

Table 1.3.6 Description of Storage Facilities for each Irrigation Scheme

	Name of Scheme	Irrigation Area (ha)	Nos of Proposed Storage	Area by each storage (ha)	Cropped Area fed by each storage (ha)	Capacity per each Storage (m ³)	Total Storage Capacity (m ³)	Total Construction Cost by Farmers (Ksh Mill.)
		(1)	(2)	(3)	(4)=(3)*0.1	(5)=3150*(3)	(6)=(5)*(2)	(7)
1	Kasokoni	33	3	11	1.1	3,465	10,395	1.04
2	Mdachi	30	3	10	1.0	3,150	9,450	0.95
3	Olopito	77	5	15	1.5	4,725	23,625	2.36
4	Gatitu/Muthaiga	57	4	15	1.5	4,725	18,900	1.89
5	Kaben	362	15	24	2.4	7,560	113,400	11.34
6	Murachake	172	8	22	2.2	6,930	55,440	5.54
7	Tumutumu	90	6	15	1.5	4,725	28,350	2.84
8	Muungano	167	8	21	2.1	6,615	52,920	5.29
	Total						312,480	31.25

Remarks: Construction cost by farmers is Ksh 100 per m³

Source : JICA Team

1.3.5 Land Acquisition Plan

Though any resettlement is not required in all the 8 schemes since the scale of the projects is quite small, the following procedures for way leave acquisitions and permission for crossing road are required:

- Consents from land owners out of the scheme
- Consents from farmers within the schemes
- Permission for road crossing of pipelines

(1) Consents from land owners out of the scheme

This process is required for way leave acquisition of canals/pipelines out of the schemes in all schemes.

The main pipelines/canals will pass through lands of people out of the scheme who will not benefit from the project. The detailed description of projects will explain to all the owners

to convince them and collect signatures on a memorandum of understanding (MOU) which includes consents on canals/ pipelines passing through their lands. The process and a sample of the MOU are as shown below:

<Process for Collection of Consents from land owners out of the scheme>

- i) Identify the area which the canals/pipelines will pass through based on the detailed designs.
- ii) Explain detailed description of projects to all the farmers.
- iii) Collect signatures from all WUA members on the MOU.

<Sample for MOU>

Consent for acquisition of wayleave

I/We.....*[full name(s), address(es) of client(s)]* , the IWUA , signed an agreement with..... *[full name, address of farmer]* , the land owner/farmer, in respect of a transaction relating to acquisition of a section of the land for construction of irrigation channel in..... *(name of the scheme and plot number)* I/We¹ consent to the IWUA conducting excavation works for construction of irrigation conveyance channel, as described above:

.

I/We¹ confirm that, before signing this form, I was/we were¹ approached by the IWUA Official for acquisition of wayleave to commence with construction works. With a design of the conveyance route

I confirm that—

(a) The IWUA Official has informed me/us¹ that the land as described above is temporarily acquired for construction and I/we will retain ownership of the land.

(b) I/we¹ have given my/our¹ agreement to the wayleave acquisition during construction of the irrigation system

I/we hereby declare that the particulars given above are true. I request that I may be given permission to dispose of property as described above to the IWUA.

Scheme: _____ : Signature: _____

Date: _____ Designation: _____

Source: JICA Team

Figure 1.3.3 Sample of the MOU for Way-leave

(2) Consents from farmers within the schemes

This process is required for way leave acquisition of canals/pipelines inside of the schemes in all schemes. The main pipeline will pass through lands of the farmers within the scheme who will benefit from the project. The detailed description of projects will explain to all the farmers to convince them and collect signatures on a memorandum of understanding (MOU) which includes consents on canals/ pipelines passing through the farm lands. The process is same as the above.

(3) Permission for road crossing of pipelines

This procedure is required in Kaben, Murachake, Tumutumu and Muungano irrigation schemes where the pipelines proposed are going to cut across main roads.

The JICA team visited Kenya National Highways Authority (KENHA) and Kenya Rural Roads Authority (KERRA) and interviewed their representatives who advised that the various authorities have rules where the farmers are supposed to apply for authority to cut across the various roads and running along the road reserve.

It was noted in the interviews with the authorities that there are written regulations that the public is supposed to be given to guide on way leaves but a breakdown process for way leave application was provided.

- i) After submission of preliminary designs or final detailed designs, the client will identify the area/s where the canals/ main pipeline will pass through the main road i.e. KENHA road (Roads Class A, B, C) or KERRA roads (Class E and below) / road reserve. This application is done at the district levels who present it to their various headquarters.
- ii) The client will write a request letter to KENHA/KERRA with the following Contents:
 - Identify the road of particular concern i.e. Roads Class A, B, C, E
 - Indicate whether the canal/ pipeline will pass under the road or along the road reserve.
 - Giving the sizes of the pipes that will pass through the roads.
 - Attach preliminary designs/detailed design for review by KENHA/KERRA.
- iii) KENHA/KERRA will write back to the client giving their conditions depending on the road/reserve and indicate the amount of money the client is to pay the authority.
- iv) The client will write back to KENHA/KERRA accepting the conditions and payment.
- v) KENHA/KERRA will issue the client with consent/ letter of authority.
- vi) The committee members from the various irrigation schemes were told to liaise with the SCIOs to ensure they start the process of application.

(4) Present condition of Application

Present status of each scheme is shown below.

Table 1.3.7 Present progress of Way Leave Application as of 2013/Oct/08

Scheme	Way leave	
	Consent from Stakeholders	Road crossing
Kasokoni	To be Continued	N.A
Mdachi	To be Continued	N.A
Olopito	Done	N.A
Gatitu/Muthaiga	Done	Have applied
Kaben	Done	Done
Murachaki	Done	Done
Tumutumu	Done	Done
Muongano	Done	Done

Source JICA Team

1.4 Implementation Procedure of Construction Works

The Construction works will be undertaken by the IWUAs and private contractors if the IWUAs are in difficulty to conduct the works technically.

1.4.1 Construction Work by IWUA

(1) Implementation Method

The SCIO will be responsible for the implementation of the construction works by the IWUAs. PMT will provide the IWUA with necessary materials, equipment with operators, skilled labor, if required while the IWUA will contribute unskilled labor for common excavation, backfilling with compaction, and transportation of construction materials, etc and local materials available to the Project.

(2) Pre-construction Guidance to Farmers

Before the commencement of the work, the farmers will be guided on how to manage the rehabilitation/construction works smoothly and efficiently, based on the concept shown in the previous section 3.2.2. Formats will be developed for the construction management including attendance of farmers to the rehabilitation/construction works.

(3) Mobilization of Construction Works

The PSCC members will assist the IWUA to set up the rehabilitation/construction works at

the work site.

(4) Technical Guidance to Farmers

The SCIO assisted by the PMT will provide the IWUA Members with necessary technical guidance, covering records keeping for attendance of labor, use of materials, daily activities, and cash books and so on, based on the basic concept as shown in the section 4.2.2. The guidance may lead to enhance capacity building of the IWUA for future maintenance of the irrigation scheme.

(5) Inspection for Construction Work by Contractors

The IWUA members will visit the site of outsourced works so as for them to obtain knowledge of required quality of the works.

(6) Joint Inspection

The SCIO in collaboration with the PMT will conduct a joint inspection to provide necessary guidance to the IWUA Leader.

(7) Field Exposure Visit

In order to share experience among the farmers, who experienced the SIDEMAN Project, field visit will be arranged by the PMT.

(8) Measurement of Work Performance

The SCIO will check performance of the works periodically. The activities will be supported by the PMT.

(9) Final Inspection

Final Inspection will be conducted by the Members of the PSCC whether the work is done appropriately according to the design. Outstanding works to be done will be identified through the inspection for the completion of the work.

(10) Preparation of Handing-over Documents

The JICA Team will prepare Handing-over Document of the Facilities in collaboration with the SCIO. The document will be handed over to the IWUA at the completion ceremony of the works.

1.4.2 Construction Works by Contractors

The Construction works undertaken by the private contractors are conducted except Gatitu-Muthaiga schemes and their works cover mainly the construction weir and some of the conveyance/ main pipelines and related structures; those are rather difficult to conduct the works by IWUAs in technically and/ or in the time frame.

(1) Organization for Implementation

Role of each organization for the Construction Works undertaken by Private Contractors is set as follows.

- The Employer : SIDEMAN-SAL Project, Project Manager/Nippon Koei Co., Ltd.
- Project Manager : Project Director (Director of Irrigation, Drainage, (The Engineer) Ministry of Agriculture, Livestock and Fishery)
- Field Representative : SCIO (Appointed by the Project Manager, Assisted by the PMT)

(2) Preparation of Tender Documents

The PMT will prepare a draft Bid Document and with consensus then submit it to the Employer for authorization. The document will adopt the sample tender documents published by the Public Procurement Oversight Authority, PPOA.

(3) Tendering

The Employer conducts, in consensus with the Project Manager, the tendering process, including the tender advertisement, pre-tender meeting together with site visit, tender opening and the tender evaluation.

(4) Signing Agreement

Contract agreements will be signed between the Employer, the Project Manager and the Contractor.

(5) Mobilization

The PMT will assist the SCIO to supervise mobilization of the Contractors.

(6) Coordination Meeting with Farmers

Before the commencement of the construction work by the Contractor, the PMT will assist the SCIO to hold a meeting with the farmers to explain the works.

(7) Construction Supervision

The PMT will assist the SCIO to supervise the works including quality control and safety management based on the procedures discussed and consent among the PMT.

(8) Social/ Environmental Management

As per the recommendation by NEMA, the PMT will assist the SCIO and give guidance and monitoring over the contractors' construction works to avoid/ mitigate the impacts to the social/ environmental aspects; water pollution/ water resource degradation; resource conflicts such as water resources, conflict of interest; diseases such as HIV/AIDS, Malaria, Bilharzia. The detail of the plan is described in Chapter 6.

(9) Interim Payment to Contractors

The PMT will assist the SCIO to carry out measurement of achieved work quantities and to check the statement submitted by the Contractors. The statement will be recommended by the PMT and forwarded to the Employer for the payment.

(10) Regular Site Meeting for Progress Monitoring

A Progress Review Meeting will be organized to monitor the progress of the works. The Employer's Representative, the Project Manager (PMT), and SCIO, the Contractor as well as IWUA representatives will participate in the meeting.

(11) Final Inspection

Final inspection will be conducted at the presence of the Employer's Representative, the SCIO, the Project Manager (PMT), and representative of the IWUA, together with the Contractor, so as to confirm if the work is done properly according to the design and the technical specification. The list of outstanding works to be rectified will be prepared to conclude the work successfully.

(12) Issuance of Completion Certificate

The Project Manager will issue a Certificate of Completion to be prepared by the Field Representative (SCIO) and send its copy to the Employer.

(13) Preparation of Handing-over Documents

The PMT will assist the SCIO to prepare Handing over Documents including O&M manuals and submit it to the Project Manager/ SCIO so that the completed facilities can be

handed over to the IWUA.

CHAPTER 2 Achievement of Activities

2.1 Signing of the MOU

(1) Briefing of the MOU

In prior to the signing of the MOU, briefing of the MOU was carried out. The explanation and discussion were made during the meeting.

Table 2.1.1 Explanation under the MoU Briefing

	Item	Description	Results of Discussion
1	Briefing of main text of the MoU	Briefing of the clauses and responsibilities of the Ministry, the IWUA, and County Government	The participants basically agree with the draft MOU, and they will hold a general meeting to discuss the issue.
		Necessity to install the water storage as per the regulation by WRMA with type and storage capacity of the facility.	The participants basically accept the requirement. Meanwhile, necessary assistance by the Project was proposed in terms of technical and financial aspects.
		Signatories in the MoU	The signatories in the MOU will be discussed with a representative of the Counties.
2	Briefing of the Attachment	Results of detailed design and cost estimate, scope and construction cost of contractor's work and IWUA works, and contribution of the IWUA.	Basic understanding has been obtained
3	Role and Responsibility of IWUA during the construction	Explanation of Construction sub-committees, such as overall and management, material management, labour management, and technical and quality control, with their functions. Establishment of Irrigation block and its leader for the construction works	Basic understanding has been obtained It was agreed that the IWUA will prepare the irrigation blocks and their representative by the signing of the MOU.
4	Social issue related to the IWUA construction works	Outline of social issues to be solved during the construction period and operation periods.	The outstanding issues, including wayleave, WRMA Authorisation for construction, land issue, were understood by the participants for further actions.
5	Way Forward	Identification of the outstanding issue to sign the MOU, such as concurrence of the clause in the MOU, revision of the clauses in the MOU, if any, selection of	

	Item	Description	Results of Discussion
		block leaders and members of the sub-committee, and preparation of basic plan for provision of the storage required by WRMA.	

Source: JICA Team

(2) Signing of the MOU

The MoU in the four schemes were signed in the following schedule.

Table 2.1.2 Date of the MoU Signing

	Name of Pilot Sites	Date
1	Olopito	28 th January 2014
2	Gatitu/Muthaiga	29 th January 2014
3	Kasokoni	6 th February 2014
4	Tumutumu	14 th February 2014
5	Mdachi	29 th April 2014
6	Kaben	24 th July 2014
7	Tuhire/Challa Harambee	29 th April 2015
8	Mangudho	29 th April 2015
9	Shulakino	14 th May 2015
10	Kiamariga/Raya	07 th May 2015
11	Kaumbura	07 th May 2015

Source: JICA Team

In prior to the signing, a discussion was made with the SCIO, the SCIO and the committee members of the IWUA so that the contents of the MoU with decision of signatories from the County were confirmed, focusing on the role and responsibility of the Project, the IWUA, and the County Government, and the scope of the IWUA works and the contractor's works. The signing of the MOU was conducted with over 70% participation of each IWUA member. The contents of the MOU was confirmed to the participants, and after an agreement in the document, the signature was made by the representatives of the Project, the IWUA, the County Government, as well as the JICA Mission, respectively.

After the signing of the MoU, the Project again confirmed that the basic plan on provision of WRMA storage would be prepared within 3 months after the signing of the MOU. In the Gatitu/Muthaiga Scheme, the necessity of fund raising for the permission of water abstraction was stressed.

The SCIO and SCAO in each scheme had an important roles for facilitation and coordination among the stakeholders so that the process can be made properly.

2.2 Scope of Works

The scope of the construction works for each site is presented below.

Table 2.2.1 Scope of Construction Works under Batch 1 Sites

Name of Sites	IWUA Works	Contractors' Works
Kasokoni	Rehabilitation of Main Canal	Rehabilitation of Intake Weir Construction of Flood Protection Dike Construction of Building for O&M
Olopito	Construction of Main, Sub-Main, Distribution and Feeder Pipelines	Construction of Intake Weir Construction of Conveyance Pipeline Construction of Structures in the Main Pipeline Construction of Gully Crossing and Stream Crossing Construction of Building for O&M
Tumutumu	Construction of Main, Sub-Main and Feeder Pipelines	Improvement of the Intake Weir Construction of Conveyance Pipeline Construction of Building for O&M
Gatitu/Muthaiga	Construction of Main and Feeder Pipeline	-
Mdachi	Construction of Main, Secondary and Tertiary Canals	Construction of Intake Weir Construction of Building for O&M
Murachaki	-	Improvement of Intake Weir Construction of Building for O&M
Muongano	-	Construction of Intake Weir Construction of Building for O&M
Kaben	Construction of Structures in the Conveyance Canal	Construction/ Improvement of critical Structures along the Conveyance Canal

Source: JICA Team

Table 2.2.2 Scope of Construction Works under Batch 2 Sites

Name of Sites	IWUA Works	Contractors' Works
Tuhire/Challa Harambee	Rehabilitation of Secondary Canals	None
Mangudho	Construction of Pipeline System	Construction of Pump House and reservoir
Shulakino	Construction of Pipeline System	Rehabilitation of Intake Weir
Kiamariga/Raya	Rehabilitation/Extension of Pipeline System	None
Kaumbura	Rehabilitation of Irrigation Canals	None

Source: JICA Team

2.3 Procurement of Construction Tools and Materials for the IWUA Works

The PMT commenced to necessary arrangement to select candidate suppliers and request quotation for the construction tools and materials. The suppliers are short-listed through the information obtained from each SCIO, based on the “Pre-qualified List of Suppliers”, as the long-list, issued by Sub-County administration for the Fiscal Year 2013/14. The request of

the quotation has been distributed to the suppliers through the SCIO concerned.

As per the signed MOU, the Project would procure tools for the IWUA construction works, such as mattocks, fork jembes, two wheel barrows, shovels and so on. The quotations obtained from suppliers were evaluated by the PMT and a purchased order was sent to a supplier with the lowest price quotation. At the time of the delivery of the site, the IWUA members and the SCIO checked the quantities and quality of the tool so that the IWUA members can proceed the construction works smoothly.

The quotations for the construction materials were evaluated by PMT and the lowest evaluated suppliers were called for a negotiation meeting to discuss the contract amount and schedule of the delivery. After the negotiation, signing of the contract was made between the PMT and the supplier. The suppliers for construction materials are listed below.

Table 2.3.1 List of Contract No. and Suppliers for the Target Schemes

Name of Site	Contract No.	Name of Supplier
Kasokoni (Package 01)	SIDEMAN-SAL/KSN/01/01	Jaffena Enterprises Ltd.
Kasokoni (Package 02)	SIDEMAN-SAL/KSN/06	Jipe Construction Limited
Olopito (Package 01)	SIDEMAN-SAL/OLP/01/01	Mid-Com General Agencies Ltd.
Gatitu/Muthaiga (Package 01)	SIDEMAN-SAL/GTM/01/01	Impress Construction Ltd.
Gatitu/Muthaiga (Package 02)	SIDEMAN-SAL/GTM/04	Impress Construction Ltd.
Tumutumu (Package 01)	SIDEMAN-SAL/TM2/01/01	Katumo Civil Engineering & Building Contractors Ltd.
Mdachi (Package 01)	SIDEMAN-SAL/MDC/01/01	Lampand Enterprises Limited
Mdachi (Package 02)	SIDEMAN-SAL/MDC/05	Lampand Enterprises Limited

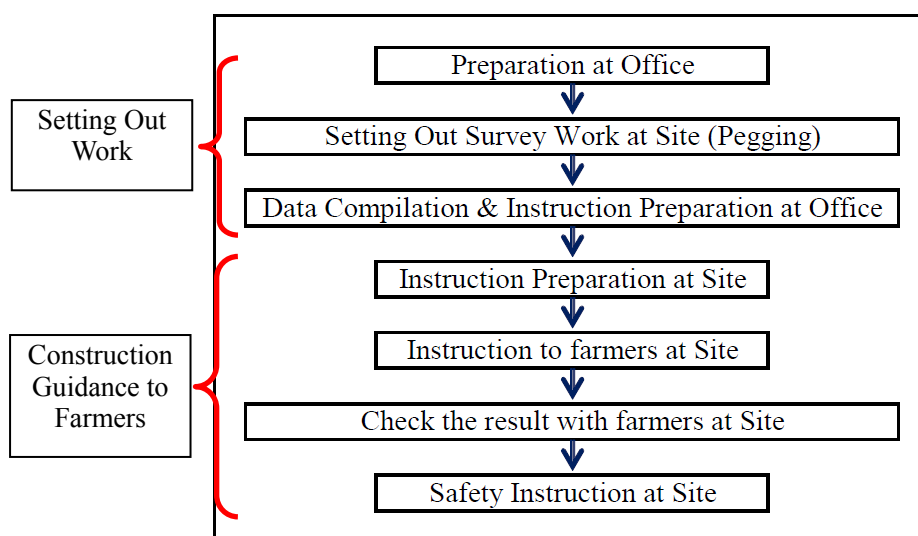
Source: JICA Team

After the signing of the Contract Agreement, the PMT assisted to prepare delivery note and guidance on how to check quality of construction material, which is critical matters to ensure quality of the construction works.

The delivery of the construction materials is in progress. Base on the delivery note signed by the IWUA Committee Members and the SCIO, necessary arrangement of the payment to the supplier is being made.

2.4 Setting Out Work of Pipeline/ Canal Routes for Farmers' Construction Works

In prior to implement farmers' construction works, the setting out of the designed alignments of pipelines/ canals for each scheme were conducted "on the ground" in the following manner:



Source: JICA Team

Figure 2.4.1 Work Flow of Setting out Work and Construction Guidance to Farmers

(1) IP Survey along Pipelines/ Canals routes

Firstly, setting out of intersection points (IPs) (or bending points) along the designed alignment, were carried out by pegging 2-3 points for each IP (1 exact IP points plus 1-2 reserved point(s) (2m on either side/ both sides of IPs)). Especially points for beginning point (BP), ending point (EP), and major division structures, concrete stakes were installed as “control points”. Then the coordinates and elevations (Ground Level (GL)/ canal bed level (CBL), if for existing canal) were recorded by a Differential GPS (DGPS) for each point.

If any IP points/ division structures were found to be difficult to set out due to topographical condition (such as interfering road)/ obstruction (such as too near to a house), these points had been shifted/ adjusted to new points, then the new coordinates and elevations were measured and recorded as revised IPs. Using simple formula and coordinates (X, Y), the distance of two consecutive IPs were computed.

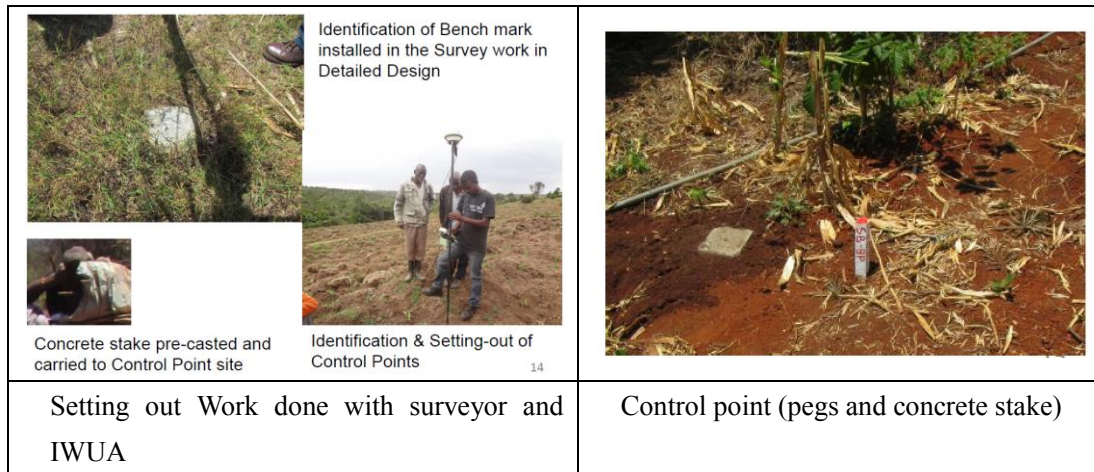
Table 2.4.1 Sample Table for Pegging Points (IPs + Chainages) along Pipelines/ Canals

Pipeline Name	Main AB	Main A	Main B	Sub Main A1	Sub Main B1	Sub Main B2
Length (m)	760	4,780	5,410	4,855	3,227	3,330
No. of Points	40	257	282	255	167	172
(Nos. of Chainage)	(38)	(239)	(271)	(243)	(162)	(167)
(Nos Off-takes/ other structures)	(2)	(18)	(11)	(12)	(6)	(6)
Diversion Major Points	BP: 1	BP: 1		BP: 1	BP: 1	
		EP: 1	EP: 1		EP: 1	EP: 1
Diversion Minor Points	MAB-F1, MAB-F2	MA-F1 ~ MA-F8	MB-F1 ~ MB-F7	SA1-F1 ~ SA1-F5	SB1-F1 ~ SB1-F5	SB2-F1 ~ SB2-F5

Source : JICA Team

(2) Chainage along Pipelines/ Canals routes

Secondary, chainages at 20 m interval were also identified along the revised IP points, then marked in the same manner as IPs (exact IP points plus reserved point (2m on the side of exact IP)).



Source: JICA Team

Figure 2.4.2 Sample Photo of Setting Out Work and Control Point Establishment

(3) Preparation of Data Control Sheet for each Pipeline/ Canal Route

Thirdly, a data control sheet for each pipeline/ canal at 20 m interval as well as IPs was prepared for the following major purposes: showing i) Excavation depth from existing GL to invert level/ canal bed level and canal base level; ii) Excavation width; iii) number and type of pipes between 2 consecutive IPs; iv) bending angle of IPs, etc.

Table 2.4.2 Sample Table for Control Data Sheet along Main Pipeline

IPs & Control Points (CPs)	Chainage	Coordinates		Ground Level	LINE Name	Angle Horiz.	Invert Level (Based on D/D)	Excavation Depth	Excavation Width	Distance betw/ Consec. IP/CP	Pipe Type & SIZE
		(East)	(North)				Z	E _{ij}	D _j	W _j	L _i *
i	j	X	Y	Z			E _{ij}	= Z _j - E _{ij}	W _j	L _i *	
BP	Ch 0+ 0	386022.460	17966.433	1047.299	Mainline		1046.099	1.200	1.000	0.000	PN6 300
2	Ch 0+ 20	386041.384	17972.848	1045.458	Mainline		1044.158	1.300	1.000	(N=16)	PN6 300
3	Ch 0+ 40	386060.393	17979.112	1043.854	Mainline		1042.604	1.250	1.000		
4	Ch 0+ 60	386079.395	17985.294	1042.263	Mainline		1040.923	1.340	1.000		
5	Ch 0+ 80	386098.262	17991.865	1041.490	Mainline		1040.060	1.430	1.000		
IP 1	Ch 0+ 91	386108.954	17995.631	1040.722	Mainline	8	1039.262	1.460	1.000	91.289	PN6 300
6	Ch 0+ 100	386116.716	17999.633	1040.299	Mainline		1038.929	1.370	1.000	(N=9)	PN6 300
7	Ch 0+ 120	386134.487	18008.807	1039.033	Mainline		1037.743	1.290	1.000		PN6 300
<OfftakeM-1>	Ch 0+ 140	386152.258	18017.851	1038.390	Mainline		1036.940	1.450	1.000	48.673	PN6 300
9	Ch 0+ 160	386170.084	18026.925	1037.256	Mainline		1035.936	1.320	1.000	(N=11)	PN6 300
10	Ch 0+ 180	386188.054	18035.753	1036.001	Mainline		1034.591	1.410	1.000		PN6 300
<WO-1>	Ch 0+ 200	386206.047	18044.559	1035.551	Mainline		1034.021	1.530	1.000	60.054	PN6 300
12	Ch 0+ 220	386224.079	18053.296	1034.147	Mainline		1032.887	1.260	1.000	(N=8)	PN6 300
13	Ch 0+ 240	386241.964	18062.073	1032.877	Mainline		1031.567	1.310	1.000		PN6 300
IP-2	Ch 0+ 248	386249.157	18065.585	1031.728	Mainline	6	1030.268	1.460	1.000	47.964	PN6 300
14	Ch 0+ 260	386259.298	18071.955	1030.323	Mainline		1028.973	1.350	1.000	(N=16)	PN6 300
15	Ch 0+ 280	386276.299	18082.583	1029.498	Mainline		1028.208	1.290	1.000		
16	Ch 0+ 300	386293.370	18092.906	1028.247	Mainline		1026.827	1.420	1.000		
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮		⋮
EP	Ch 0+ 740	386695.440	18225.635	1033.816	Mainline		1032.396	1.420	1.000	95.344	PN6 300

$$* L_i = ((X_{i+1} - X_i)^2 + (Y_{i+1} - Y_i)^2)^{0.5}$$

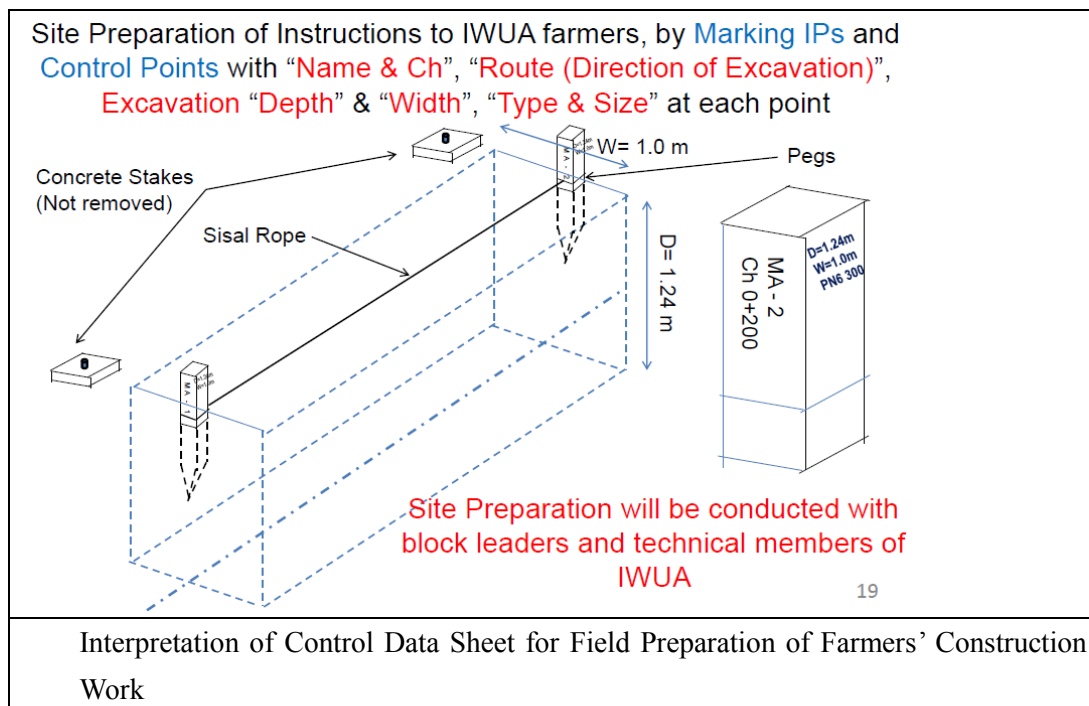
Source: JICA Team

2.5 Construction Guidance to the IWUA Works

After “setting out work” for pipelines/ canals in the target scheme has been done and “control data sheets” have been prepared, construction guidance for farmers’ construction works, which mainly consists of simple works such as i) excavation, ii) pipe laying/ lining, iii) backfilling, will be prepared and conducted to block leaders and key farmers in the scheme in the following manner.

(1) Instruction Preparation at Site

Using the control data sheet (refer to Table 2.4.2), the following work step will be explained to block leaders and key farmers: i) Explain to IWUA leaders how to interpret the table of “IPs and Control Points, Coordinates, Elevation, Excavation Depth”; ii) Mark on pegs with “Excavation Depth” & “Width” at each “IPs, Control Points, and Chainage points”, so that farmers are able to excavate based on the figure marked on pegs; iii) Connect consecutive “IPs, Control Points, and Chainage points”, by sisal rope, etc. so that farmers can excavate along connected pegs.



Source: JICA Team

Figure 2.5.1 Sample of Instruction Preparation at Site for Farmers' Construction Work

(2) Instruction to farmers at Site

Based on the "instruction" prepared at site, SCIO, Chairman, Block leaders, Technical members of IWUA will provide Pre-Guidance to farmers with the following instructions: i) Meaning of "marks on pegs, ropes, etc" prepared at site, i.e. depth and width to be excavated at each control points and chainages, material (type and size) used; ii) Assign each farmer group with "Location" of their work, i.e. explaining responsible section (control points and chainages) of each group, based on "Implementation Plan" of each block; iii) Explain the safety instruction at site, especially prevention of slope failure through placement of excavated materials with safety distance and height of stock pile. Then, the work will be commenced by each farmer group, and progress record is kept by block leaders.

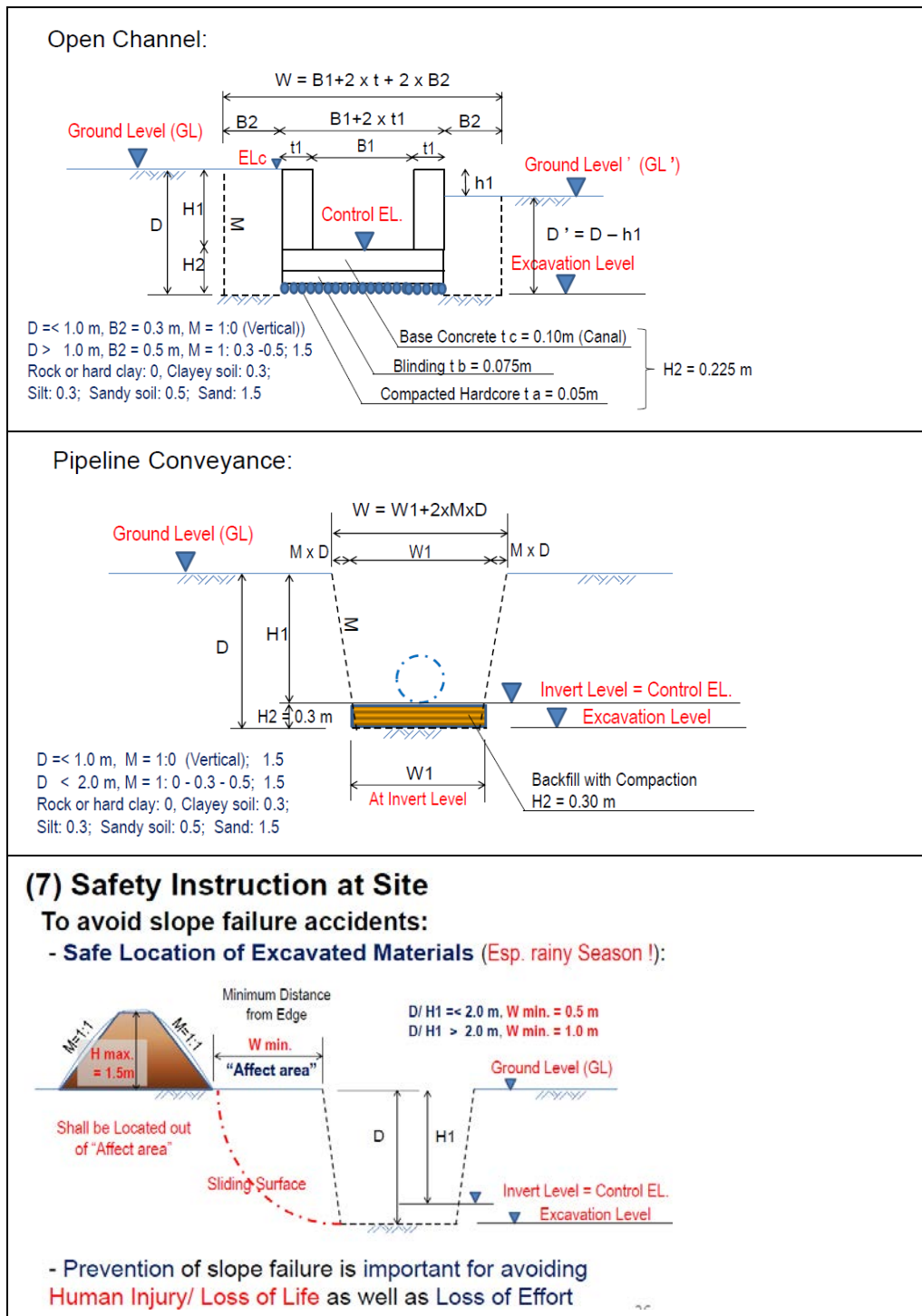


Figure 2.5.2 Instruction Illustration Used for Farmer Groups Construction Guidance

2.6 Monitoring of IWUA Works

After the commencement of the construction works by the IWUA, the PMT has been conducting monitoring and technical guidance of the works, focusing in the following aspects.

At the initial stage of the construction, low participation in the IWUA construction works and subsequent low progress of the excavation works was observed in several schemes. This is because the agreement specified into the MOU, the number of days per week to participate in the construction work, was not shared with the members of the IWUA sufficiently. Thus, the PMT advised the chairman of the IWUA to hold a general meeting to explain the obligation of the members. Further, the IWUA members were suggested to prepare an action plan on how to expedite the construction works.

In connection with the construction materials, the PMT made technical advised to set up storage facilities so as to keep the material good condition. As per the advise, the IWUA made necessary action to decide the location of the storage, taking into consideration access to the working site and security condition, under the guidance of the SCIO. Further, method to check quality of the construction materials is being carried out.

After the excavation works, elevation of the pipe invert level shall be checked so that the excavation works is made properly as per the design. The PMT made technical guidance for methodology.

Whenever, there is conflict among the IWUA members caused by the construction works, the PMT suggested the IWUA committee members and SCIO/SCAO to sort it out.

2.7 Achievement of Construction Works

Table 2.7.1 Achievement of Construction Works (as of December 2015)

Scheme	Facilities	Canals/Pipelines	Length			Remaining work Detail
			Full Scope	JICA Fund	Remaining	
	Nos		M	m	m	
Batch-1						
Kasokoni	1	Main Canal	1,886	1,886	0	(1) Excavation of drainage canal
	(Intake Works)					(2) Rock excavation of drainage canal
Mdachi	1	Main Canal	458	458	0	(1) Construction of secondary canal
	(Intake Works)	Secondary canal	1,231	0	1,231	(2) In-field system
		Tertiary canal	2,556	0	2,556	
Olopiro	1	Main line	3,646	3,511	135	(1) Rock excavation downstream of main pipeline
	(Intake Works)	Sub main line	2,941	311	2,630	(2) Sub-main Downstream
		Distribution line	564	0	564	(3) In-field
		Feeder line	6,431	673	5,758	
Gatitu Muthaiga		Main line	9,105	5,996	3,109	(1) Material and labour cost for construction of chambers and crossing (downstream):
		Feeder line	8,736	3,930	4,806	(2) Feeder pipelines downstream (3) In-field system downstream
Kaben	7	Critical Sections				
	(Critical Sections)					
Murachaki	1	Intake Works				
	(Intake Works)					
Tumutumu	1	Conveyance line	1,271	1,271	0	(1) Main and Sub-main: Material and labour cost for construction of chambers and crossing (downstream)
	(Intake Works)	Main line	11,547	9,153	2,394	(2) Construction of Main and Sub-main pipelines downstream
		Sub main line	11,412	4,457	6,955	(3) Distribution and In-field system downstream
		Distribution line	54,983	15,294	39,689	
Muungano	1	Intake Works				
	(Intake Works)					
Batch-2						
Tuhire Challa		Secondary Line	2,750	1,375	1,375	(1) Lining works for secondary canals
						(2) Construction of road crossing
Mangudho	2	Rising Main Line	738	738	0	
	(Pump House, Reservoir)					
Shulakino	1 (SB)	Main Pipe Line	1,745	1,729	16	
		Distribution	475	0	475	
Kiamariga Raya		Kiamariga Main	2,440	2,440	0	(1) Construction of Distribution Pipelines in Kiamariga
		Kiamariga Distribution	1,901	0	1,901	(2) Rehabilitation of intake weir
		Raya Main	1,460	0	1,460	(3) Rehabilitation of Raya pipeline system
		Raya Distribution	1,660	0	1,660	
Kaumbura		Main Line	2,360	1,000	1,360	(1) Lining works on the main canal

Source : JICA Team

2.8 Procurement of Civil Works

Status of tendering as of the end of September 2014 is as summarised below.

Table 2.8.1 Schedule of Tender

Group	Sub-county	Name of Site	Tender Advertisement	Pre-Tender Meeting	Tender Opening
1	Taveta	Kasokoni	3 rd March 2014	13 th March 2014	3 rd Apr 2014
	Narok North	Olopito		11 th March 2014	
	Igembe South	Tumutumu		11 th March 2014	
2	Mbeere North	Murachaki	28 th March 2014	9 th April 2014	5 th May 2014
	Tharaka South	Muongano		8 th April 2014	
3	Kilifi	Mdachi	20 th May 2014	29 th May 2014	23 rd June 2014
4	Marakwet East	Kaben	4 th August 2014	12 th & 13 th August 2014	2 nd September 2014

Source: JICA Team

At the meeting, clarification to the tender document was made and the visit to the construction site was organized.

Opening of the tender for the 1st group was held on 3rd April 2014 with the following details.

Table 2.8.2 Schedule of Tender

Group	Name of Sites	Tender No.	Nos. of Tenderers
1 st Group	Kasokoni	SIDEMAN-SAL/KSN/01	14
	Olopito	SIDEMAN-SAL/OLP/01	14
	Tumutumu	SIDEMAN-SAL/TM2/01	19
2 nd Group	Murachaki	SIDEMAN-SAL/MRK/01	10
	Muongano	SIDEMAN-SAL/MGN/01	8
3 rd Group	Mdachi	SIDEMAN-SAL/MDC/01	10
4 th Group	Kaben	SIDEMAN-SAL/KBN/01	18

Source: JICA Team

After the technical and financial evaluations were conducted, the lowest evaluated tenderer is selected and approved by the evaluation committee.

The selected tenderer was called for the pre-contract negotiation meeting and after the meeting contract award was made for the following contractors.

Table 2.8.3 Results of Tender

Name of Site	Contract No.	Name of Contractor	Date of Negotiation	Date of Signing
Kasokoni	SIDEMAN-SAL/KSN/01	Nyana Engineering Co. Ltd.	23th May 2014	30 th May 2014
Olopito	SIDEMAN-SAL/OLP/01	Mwanja General Contractors Ltd.	23th May 2014	30 th May 2014
Tumutumu	SIDEMAN-SAL/TM2/01	Silverspread Hardware Ltd.	28 th May 2014	7 th June 2014
Murachaki	SIDEMAN-SAL/MRK/01	J.K. Construction Ltd.	3 rd June 2014	7 th June 2014
Muongano	SIDEMAN-SAL/MGN/01	Bellagio Construction Ltd.	3 rd June 2014	7 th June 2014
Mdachi	SIDEMAN-SAL/MDC/01	Goodlands Africa Ltd.	11 th July 2014	18 th July 2014
Kaben	SIDEMAN-SAL/KBN/01	Mwanja General Contractors Ltd.	26th Sep. 2014	03 rd Oct. 2014

Source: JICA Team

Present status of the contract award is as follows.

Table 2.8.4 Result of Tenders

Name of Site	Contract No.	Name of Contractor	Date of Commencement	Date of Completion	Contract Amount (Ksh)
Kasokoni	SIDEMAN-SAL/KSN/01	Nyana Engineering Co. Ltd.	25 th June 2014	5 th Jan. 2015 (30 th Mar 2015)	Ksh. 12,787,034.74
Olopito	SIDEMAN-SAL/OLP/01	Mwanja General Contractors Ltd.	25 th June 2014	19 th Feb. 2015 (30 th Apr 2015)	Ksh. 29,232,789.32
Tumutumu	SIDEMAN-SAL/TM2/01	Silverspread Hardware Ltd.	2 nd July 2014	11 th Feb. 2015	Ksh. 19,592,852.40
Murachaki	SIDEMAN-SAL/MRK/01	J.K. Construction Ltd.	2 nd July 2014	28 th Dec. 2014 (31 st Mar. 2015)	Ksh. 5,398,528.64
Muongano	SIDEMAN-SAL/MGN/01	Bellagio Construction Ltd.	2 nd July 2014	26 th Feb. 2015 (12 th May 2015)	Ksh. 9,544,126.20
Mdachi	SIDEMAN-SAL/MDC/01	Goodlands Africa Ltd.	5 th August 2014	3 rd Feb. 2015 (19 th Apr 2015)	Ksh. 10,939,979.12
Kaben	SIDEMAN-SAL/KBN/01	Mwanja General Contractors Ltd.	21 st Oct. 2014	17 th Apr. 2015	Ksh. 10,952,782.64

Source: JICA Team

2.9 Mobilisation of Contractors

After the signing of the Contract Agreement, the PMT introduced the Contractors to IWUA members and the officers concerned at each site so that the contractor can proceed work smoothly. The SCIO was appointed as a Field Representative of the Works, having responsible for construction supervision.

2.10 Quality Control Management

In order to maintain the quality of the Contractor’s construction works, the quality control management guidance material, together with “acceptance of site delivery of construction materials”, has been prepared and guidance to the SCIO has been conducted occasionally when PMT members/ staff to PMT make site follow up visit. The guidance material mainly consist of the following topics and contents: Work Stages; Inspection Methods; Reference/ Inspection Items.

Table 2.10.1 Topics and Contents of Quality Control Guidance Material

Work Stages & Topics	Inspection Methods	Reference Specification / Inspection Items
1. Concrete Strength Test 1.1 Trial Mix test 1.2 Mix proportion 1.3 Random cube test 1.4 Inspection	<ul style="list-style-type: none"> -The Contractor Carried out at specified/ approved laboratory - The Contractor submit test results to SCIO. - SCIO examined & submitted the test results to PMT 	Specifications in Tender Docs: “3.10 Trial Mix test” “3.11 Mix proportion” “3.11 Testing of Concrete” “3.12 Failure to Comply with Specified Requirements”
2. Material loaded 2.1 Submission of the Specification documents of materials 2.2 Cement 2.3 Fine Aggregates 2.4 Coarse Aggregates 2.5 Steel Reinforcement 2.6 Pipe	<ul style="list-style-type: none"> • Inspection: Spec. Documents, KEBS mark • Document: Guarantee certificate • Visual: Deformed, flaw, cracked or chipped pipe shall be rejected • Squeezing: Adhesiveness 	“1.27 Material of the Works” “3. Concrete (3.1 to 3.5)” “3.2 Cement” “3.6 Aggregates for Concrete” “3.31 Steel Reinforcement” “5. Pipework” - Acceptance of Site Delivery of Construction Materials
3. Construction Site 3.1 Overall 3.2 Concrete structure 3.2.1 Excavation 3.2.2 Formwork 3.2.3 Steel Reinforcement & cover 3.2.4 Placing concrete 3.2.1 Curing	<ul style="list-style-type: none"> • Inspection: Confirm - rock w/ specified thickness; or - soil layer w/ specified bearing capacity & thickness • Measurement: formwork inner dimension. - Application of release oil to inner formwork.surface • Inspection: Cover betw/ concrete surface & steel reinforcement surface: 50mm. Spacer blocks. • Inspection: as shown below • Cleaning of the formwork; 	“1. General” “3.32 Cover to Reinforcement” 3.33 Formwork” , “3.20 Dimension of Concrete Pours and programme of Placing” “3.23 Compaction of concrete” , “3.22 Distribution and Spreading of Concrete” , “3.21 Transport and Deposition of Concrete” “3.31 Steel Reinforcement” “3.30 Curing and Protection” & “3.24 Protection of Concrete”

Work Stages & Topics	Inspection Methods	Reference Specification / Inspection Items
3.3 Pipeline 3.3.1 Excavation Stage 3.3.2 Placing pipe 3.3.3 Backfill 3.3.4 Running test for Approval/ Acceptance	<ul style="list-style-type: none"> Placing concrete Stable Position Placing surface=horizontal w/ single layer (40~50 cm); Distance betw/ Placing surface & delivery casing: less than 1.5m. 	
	<ul style="list-style-type: none"> Inspection: trench bottom well compacted with smooth, flat surface (avoid uneven pipe sinking) and not angulated (avoid damages to pipes) Measurement: Excavation depth and width after compaction Visual: Removal of stones > 25 mm dia. / clay lumps. 75 mm. Backfill with proper excavated materials other than stone/ soft materials Inspect: Backfilling materials/ soil well compacted Running Test (Pressure Test): BS 8010. No leakage allowed 	<p>“5.7 Laying Pipes in Trenches and Headings”</p> <p>“5.8 Pipe Laid on Natural Ground”</p> <p>“5.9 Pipe laid on Granular Bedding”</p> <p>“5.18 Pressure Testing of Pipeline”</p>

Source: JICA Team

Together with the above quality control material, forms of “Request of Inspection/ Approval” from the Contractor to SCIO (Field Representative of the Works), FORM CSV-1, “Daily Report for Contractor’s Works/ Farmers’ Works (CSV-2A, 2B/ 3A, 3B)”, “Joint Inspection of Contractor’s Work/ Farmers’ Works with photo documents (CSV-4A, 4B/ 5A, 5B)” have been prepared for daily and event/ stage basis quality control material, together with instruction and photo documentation as regular recording of evidences.

2.11 Safety Control Management

In parallel with the quality control management, “safety control management guidance material, including environmental protection” has also been prepared to comply with the regulations such as: the Circular Ref: KA/17/A/2(4) from Factories Inspectorate, Ministry of Labour, notices No. 79 gazette in the Kenya Gazette No. 56 (Legislative Supplement No. 38) in respect of the appointment of Safety Supervisors on Building and Works of Project Management of Construction.

- The Occupational Safety and Health Act (OSHA) of 2007.
- The Contractor shall at all times comply with any accident prevention regulations and any safety regulations peculiar to the various trades employed on the Works, and any safety regulations published by the Government

The guidance materials mainly consist of the following topics and contents as tabulated below, attached with a “checklist”:

Table 2.11.1 Topics and Contents of Safety Control Guidance Material

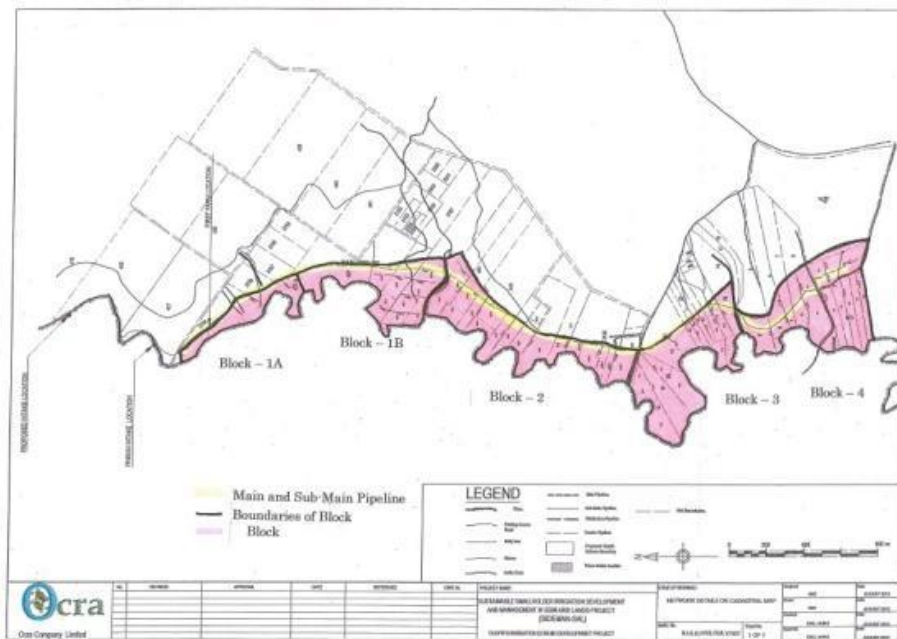
Obligation of the Contractor	Remarks
<ul style="list-style-type: none"> • Appointment of Safety Officer <p><Safety Management Aspect></p> <ul style="list-style-type: none"> • Precautions against risks of the labour accident and the accident of general public accident. • Promptly reporting the accidents • Safety education and safety instructions to the employee • Submission of certificate of training of OSHA • Installation of the fuel storage tank in accordance with the laws and security regulations • Employment competent watchmen • Fence, Lighting <p><Environment Management Aspect></p> <ul style="list-style-type: none"> • Soil conservation measures • Dust abatement measures • Noise control measures • Sanitation • First Aid and Medical Services • HIV/AIDS Awareness • Pollution • Restoration of Drains, Streams, Canals etc. • Site clearance 	<ul style="list-style-type: none"> - Safety Management <ul style="list-style-type: none"> • In the case that there are any accidents/incidents take place, regardless scale of the accidents/incidents, the Contractor should report them immediately to the SCIO so that he can inform it to the Project Manager/JICA immediately - Labor accident <ul style="list-style-type: none"> • Fall, Vehicle-related, Slope failure - Guidance method: SCIO <ul style="list-style-type: none"> • Checks the Safety management plan submitted by the Contractor before construction starts, and advice as necessary • Advices as necessary at the regular inspection of the Site • Holds “Regular joint meeting” among the Contractor and SCIO, safety management is reviewed based on “Checklist” and provides effective instructions

Source : JICA Team

2.12 Intervention by the Project (Olopito Community Mobilization Activity) to improve the Progress of IWUA Works in Olopito Irrigation Scheme

(1) Background

This section describes an intervention by the Project called “Olopito community mobilization activity” implemented from 24th to 28th November in Olopito irrigation scheme so as to identify backgrounds of low progress of the IWUA works and to decide actions to improve the progress.



Source: JICA Team

Figure 2.12.1 Layout of Olopito Irrigation Scheme

As per the signed MOU, IWUA members were required to conduct excavation works along 5.7 km long main pipeline. However due to the following reason, the work progress was far from the expected schedule.

1. Food Shortage because of Drought

Drought had occurred in 2014 and some IWUA members could not have cultivated crops. So, some members have gone out to get works and could not have spent time for excavation works.

2. Inadequate Workers in Olopito Irrigation Scheme

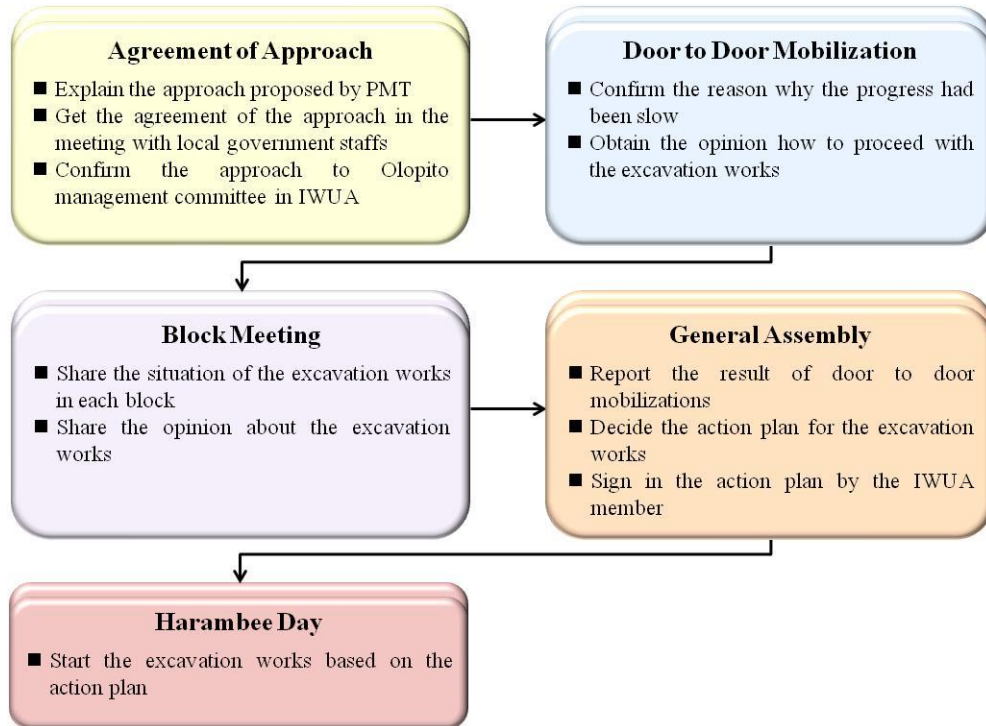
As the number of IWUA members had been more women than men and some members had been not interested in agriculture because of pastoralists, enough workers for excavation works have been ensured.

3. Misunderstanding on the SIDEMAN-SAL Project

The sign board about construction of water distribution system financed by JICA is near scheme. Thus, they have misunderstood that the objective of the Project was to construct water distribution system.

(2) Flow of Olopito Community Mobilization

The project commence to re-mobilise the IWUA in the following procedure.



Source: JICA Team

Figure 2.12.2 Flow of Community Mobilisation

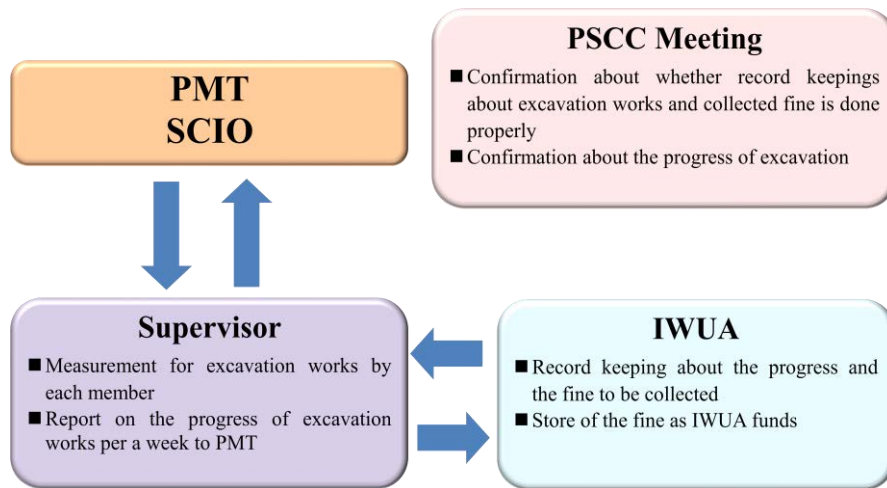
(3) Action Plan prepared by IWUA

After several discussion with the members, an Action Plan was discussed and agreed at through the general assembly indicating,

- Each IWUA member has to excavate 74 m. If members who can not participate in excavation works, they have to ask block leaders to hire workers.
- Each IWUA member has to excavate 12 m per a week under the monitoring by block leaders
- If IWUA member do not excavate:

Fine: 1,000 Ksh (700 Ksh: used for employment of persons who excavate 300 Ksh: stored as IWUA funds)

The implementation of the action plan is monitored by field staff as well as PSCC members as shown below.

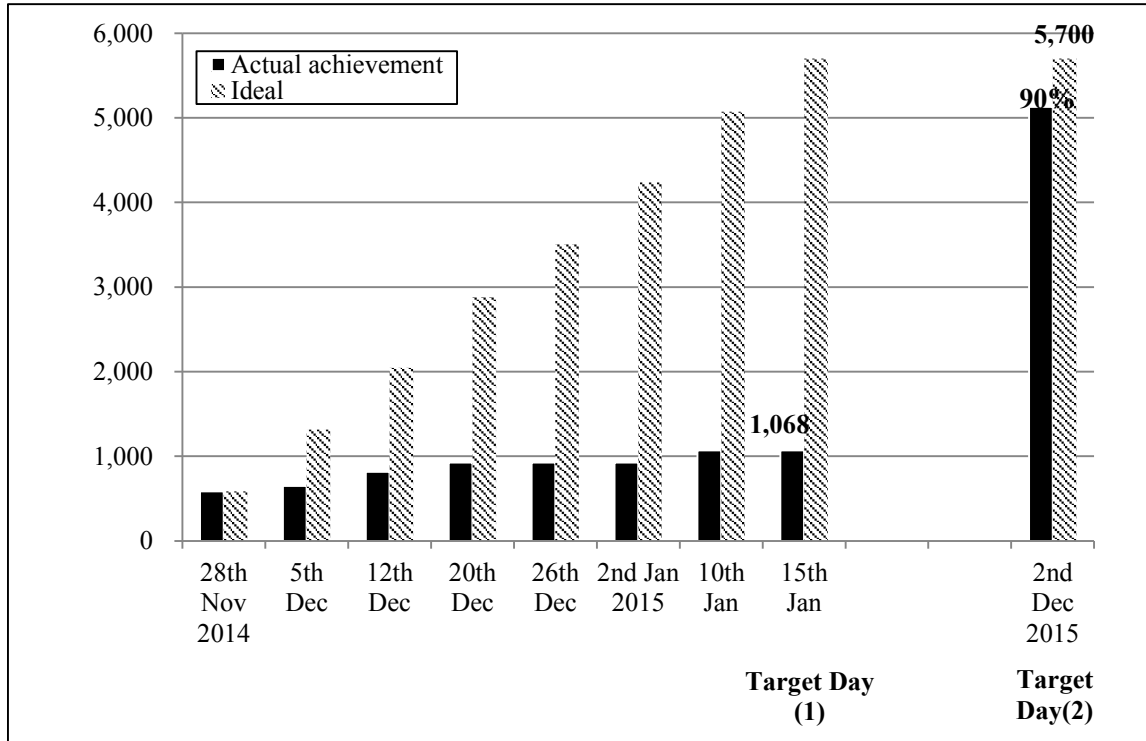


Source: JICA Team

Figure 2.12.3 Monitoring Flow of Community Mobilisation

(4) Work progress after re-mobilisation

After the re-mobilisation work, the progress was gradually improved and finally the progress as of end of December 2015 reached 90% as shown below.



Source: JICA Team

Figure 2.12.4 Progress of IWUA Works

(5) Impact of re-mobilisation

Before mobilisation

The farmers were meeting all of them together and excavation without dividing the area among farmers, others never used to attend the communal work while others attended but really did nothing and were exploiting others.

Each block member was excavating their area; therefore there were very many gaps in the excavation conveyance.

After mobilisation

The farmers were able to do the following:

1. Sub-divide the conveyance to be excavated among the members and costed it. Therefore every member was expected to excavate or contribute Sh.700 per pipe excavated
2. Stiff penalties were set for those who do not excavate or contribute money for excavation and the chief was in place to assist in the penalties enforcement
3. The farmers also resolved to start excavating from Block 1 and continue excavating and that is the reason they have been able to have good progress
4. The few farmers who are committed to excavation decided to continue excavating irrespective of those inactive members for the sake of completion of the project and based on mobilisation
5. Mobilisation made farmers' feel and own the project. It helped them visit the intake and see the project is real and therefore they were motivated
6. The mind is changing from "Group to individual" to "individual to group"
7. Therefore, When a few member is coming to excavate, they did not go back to home but continue excavating,

2.13 Capacity Development for the Officers during Construction Period

Major activities of the capacity development to the Sub-county (SC) level officers (Irrigation Officer (SCIO)/ Agriculture Officer (SCAO)) are summarized below (dates shown under "Category" are conducted dates/ scheduled to be conducted). The detail of the activities is described in Chapters 13 of the Progress Report-4. Since the capacity development/ trainings to the Sub-county level officers are related to/ integrated with some of the capacity development/ trainings to i) IWUA capacity building, ii) Environmental management aspects, iii) Engineering/ Construction management aspects, iv) Agriculture development groups, the summary table below captures the overall aspects of the above mentioned fields (except iv), since iv) is targeting SCAO only and not related with this chapter). Therefore, the details are also referred to relevant chapters of this Progress report.

Table 2.13.1 Activities of Improvement of Capacity Development of Sub-county Level Officers
(SCIO and SCAO)

Category	Major Activities
<p>(1) <u>Improvement of Officer capacities for IWUA Training</u></p> <p>1) Training of Trainer (TOT) Program for the Units 2 and Unit 3 of the IWUA strengthening program Feb. 17-21, 2014</p>	<p>1. Unit 2: Training of Leadership and Conflict Management 2. Unit 3: Training for Financial Management</p>
<p>2) Strengthening of capacity for Unit 4 On-farm water management and Unit 5 Operation and Maintenance (O&M) of Irrigation system, Together with IWUA Training Apr. - July, 2015</p>	<p>1. Training for water management 2. Irrigation planning and scheduling 3. Water distribution and monitoring 4. Training for operation & maintenance activities 5. Preparation of Maintenance plan and budget 6. Collection of O&M Fee 7. On farm water management (Irrigation Agronomy)</p>
<p>(2) <u>Improvement of Officers capacities for Environmental Management, Together with IWUA Training</u></p> <p>Oct. 2013 - Feb, 2015</p>	<p>1. Preparation of Environmental Monitoring and Management Plan (EMMP) 2. Sensitization program of EMMP at each scheme 3. Implementation of EMMP 4. Monitoring and evaluation of EMMP</p>
<p>(3) <u>Improvement of Officer capacities for Batch 1 & 2 Implementation</u></p> <p>Mar. 3-7, 2014 Follow-up-1 Apr. 24, 2014 Follow-up-2 May- Dec., 2014 Follow-up-3 Jan.- Jul., 2015</p>	<p>1. Construction Supervision for Batch-1, Batch-2 <u>(1) Construction Supervision (Contractor's works) (Target: SCIO)</u> - Construction Management - Site supervision/Quality control (intake weir and other contracted works) - Site reports and progress monitoring <u>(2) Construction Supervision (Farmers' works) (Target: SCIO/ SCAO)</u> - Introduction to IWUA construction works - S Management of IWUA construction works - Environmental, Health & Safety management in Irrigation Development - Survey Work for effective instruction to IWUA - Site supervision/ Quality control of IWUA works 2. Feasibility Study (FS) and Detailed Design (D/D) for Batch-2 <u>(1) FS (Target: SCIO/ SCAO)</u> - Introduction to FS, Project identification & selection - Data collection - Cropping calendar and gross margins - Assessment of water resources/ hydrological report - Estimation of irrigation water requirements - FS – Preparation of Feasibility study report <u>(2) DD (Target: SCIO)</u> - Design of weir/ intake/ Irrigation scheme layout - Hydraulic calculation of open channels - Hydraulic calculation of pipelines and preparation of Design Report - Tendering and Tender Documents</p>

Category	Major Activities
	<u>3. Experience sharing (Target: SCIO/ SCAO)</u>
(4) <u>Improvement of Officers capacities for Contract Management</u> June 16-20, 2014	1. Procurement 2. Contract Documents, Conditions of Contract and Bills of Quantities 3. Standard Specifications 4. Contract Administration

Source: JICA Team

Through the above series of trainings followed by the field activities, the following major findings were identified, especially in the iii) Engineering/ Construction management aspects:

Table 2.13.2 Major findings through Capacity Development of Sub-county Level Officers (SCIO and SCAO)

Advantageous Findings	Challenges
Farmers' construction works aspect	
<ul style="list-style-type: none"> - Establishment of collaboration among SCIO/ SCAO towards successful implementation of the Project and its activities - Understand the importance of IWUA mobilisation and building-up of "Trust atmosphere" among the officers and IWUA - Success with mobilisation of IWUA in most of the selected schemes towards farmers' construction works, based on "Trust" above - Application of communication skills of resolution assistance/ consultation in the case of conflict occurrence among IWUA 	<ul style="list-style-type: none"> - Progress control/ management and construction material control/ management (especially avoiding deficit/ lack of material) needed to be improved - Provision of appropriate instruction to the clerk of works (CoW)/ IWUA members at the right timing in prior to commencement of work - Elevation control/ management in the excavation of canal bed/ pipeline trench needed to be improved - Prior consultation to the Project Management Team (PMT) needed to be enhanced when encountering changes in design/ procedures especially with increases in quantity/ volume of works
Contractor's construction works aspect	
<ul style="list-style-type: none"> - Understand the meaning of "measurement based payment (payment based on the volume of works, not lump sum basis)" has been enhanced - Awareness of importance of quality control/ management as well as environmental management with the Contractor's construction works has been gradually built-up - Serious application of quality control manual 	<ul style="list-style-type: none"> - Passive attitude in providing instruction to the Contractor (relying on to PMT for decision/ action) needed to be mind set - While, Overconfidence in Provision of instruction/ approval to the Contractor's work, without confirmation/ consultation/ informing to the PMT needed to be abstained - Capability of preparation/ checking of "measurement sheet" for the Contractor's works still needed to be improved

<p>and communication format (request/ inspection/ approval/ instruction) towards the Contractor's construction works has been gradually enhanced</p> <ul style="list-style-type: none"> - Awareness of importance of technical specification in the Contractor's construction works has been enhanced - Awareness and application of contract management skills has been improved 	<ul style="list-style-type: none"> - Prior consultation to Project Management Team (PMT) needed to be enhanced when encountering change in design/ procedures especially with increases in quantity/ volume of works - Proactive attitude towards construction supervision/ contact management still needed to be enhanced in some schemes
<p>F/S, D/D engineering aspects</p>	
<ul style="list-style-type: none"> - The basic approach and methodologies of implementation of F/S, D/D has been understood and gradually developed - Reports and supporting documents has been prepared by SCIO/ SCAO with assistance of the PMT 	<ul style="list-style-type: none"> - Detailed methodologies & skills for preparation of reports, supporting documents (especially design calculation, drawings, BoQ) still needed to be improved - Responsibility for and proactiveness towards completion of F/S, D/D reports still needed to be improved, even though under heavy duty

Source: JICA Team

Annex 4

Agriculture

**Sustainable Smallholder Irrigation Development and Management
in Semi-Arid Lands Project**

Final Report

Annex 4 IWUA Capacity Development

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CHAPTER 1 Capacity Development Plan for IWUA Members

1.1 General

To ensure sustainable management for the developed scheme, the organization, such as Irrigation Water Users' Associations (IWUAs), Farmers and DIO (SCIO) & DAO (SCAO) should have self-sustaining ability.

Capacity-building under the Project defines the target as "Each organization has power to develop the irrigation scheme by themselves through activities of the knowledge, abilities, skills, attitudes and behavior in irrigation, agriculture, and management field."

As mentioned in Chapter 3, the major activities of the capacity development for IWUA members are set as shown below.

Table 1.1.1 Major Activities for Capacity Development for IWUA Members

Category	Major Activities
Organizational Strengthening	1) Sensitization program for IWUA activities 2) Training of Leadership and Conflict Management 3) Training for Financial Management
Strengthening of capacity for water management and Maintenance	1) Training for water management 2) Irrigation planning and scheduling 3) Water distribution and monitoring 4) Training for maintenance activities 5) Collection of O&M Fee

Source: JICA Team

The above activities are categorized into three, namely, 1) In-house training program, 2) On-the job training or technical guidance at each field level, and 3) Follow-up activities.

1.2 Preparation of Training Program

In order to prepare the Capacity Development Plan under the Project, detailed evaluation on the training materials under the SIDEMAN Project was conducted. After the evaluation, the content of the Program was basically selected from those.

1.2.1 Outline of SIDEMAN Training program

As mentioned in Interim Report Chapter 4, Capacity Building program under the SIDEMAN Project was for 5 years from 2006 to 2010. During this training, 13 modules of training were developed and farmers were trained on them. (Refer to Table 1.2.1). This was done in 2 phases. Phase 1 was conducted 2 years before the construction of the scheme began while Phase 2 was conducted during the construction period.

Table 1.2.1 SIDEMAN Capacity Building Training Modules

PHASE I MODULES	PHASE II MODULES
1. Community Mobilization (Scheme orientation).	1. Development of leadership skills

2. IWUA formation and Management.	2. On farm water management
3. Basic leadership	3. Irrigation agronomy
4. Scheme operation and maintenance.	4. Marketing of Irrigated produce
5. Financial Management	5. Access and utilization of credit.
6. IWUA monitoring and reporting.	6. Environmental issues.
7. Cross cutting issues such as gender and HIV-AIDs.	

Source : JICA Team

1.2.2 Selection of Training Modules from the SIDEMAN Project

Through several discussions with the PMT members and SCIOs, who experienced the SIDEMAN Project, the followings were revealed as challenges:

1. SCIO felt 1) the number of training was too many, 2) taking too much time, and 3) some training should have been interlocked.
2. Training fatigue by farmers due to the long duration (5days) of training
3. As the trainings were held without break-time, the attendance of the farmers was diminishing as days went by.

Thus, taking into consideration the above, the essential to IWUA training modules were selected also taking account of the project period (2013-2015, 2year). Furthermore the plan most effective was made considering the relationship between each module. At the same time, the content of selected training module was chipped off as much as possible to shorten the training period from 5day to 3day and farmer can afford to take a break to maintain the concentration.

It was concluded that the following contents with 6 Modules divided into 5Unit with induction training were sufficient for capacity building program under the Project.

Table 1.2.2 Selected Training Modules from SIDEMAN to SIDEMAN-SAL (Highlighted)

PHASE I MODULES	PHASE II MODULES
1. Community Mobilization (Scheme orientation).	8. Development of leadership skills
2. IWUA formation and Management.	9. On farm water management
3. Basic leadership	10. Irrigation agronomy
4. Scheme operation and maintenance.	11. Marketing of Irrigated produce
5. Financial Management	12. Access and utilization of credit.
6. IWUA monitoring and reporting.	13. Environmental issues.
7. Cross cutting issues such as gender and HIV-AIDs.	

Source: JICA Team

Table 1.2.3 Comparison of SIDEMAN VS SIDEMAN-SAL Capacity building program

ACTIVITY	SIDEMAN	SIDEMAN-SAL
Training Program		
(1) Period	5Years	2.5Years
(2) Training Program	<p>The Capacity Building Program targeted (1)Farmers and (2) IDD staff</p> <p>The farmers' program was comprised of the following trainings:</p> <ol style="list-style-type: none"> (1) Farmers trainings at the scheme level (2) In-country farmers trainings (3) Farmer Field Schools <p>The program for IDD staff comprised of the following:</p> <ol style="list-style-type: none"> (1) Training in Japan (2) In-house mounted trainings (3) Outside/External trainings (4) Technical Exchange visits 	<p>The Capacity Building Program targeted (1)Farmers and (2) SCIOs and SCAOs</p> <p>The farmers' program was comprised of the following trainings:</p> <ol style="list-style-type: none"> (1) Induction Training (2) Farmers trainings at the scheme level <p>The program for SCIOs and SCAOs comprised of the following:</p> <ol style="list-style-type: none"> (1) In-house mounted trainings (2) Outside/External trainings
(3) Farmers Trainings	<p>(1) Farmers trainings at the scheme level</p> <p>This was conducted at the Scheme level. Out of a targeted 14modules, 12 of them were trained including</p> <ol style="list-style-type: none"> 1. Community Mobilization – 2days 2. IWUA formation – 3days 3. Basic Leadership – 4days 4. Financial Management – 4days 5. Irrigation System management 1 – 4days 6. IWUA monitoring and information system – 3days 7. Gender mainstreaming in irrigation development and Impacts of HIV/AIDS – 	<p>(1) Farmers trainings at the scheme level</p> <p>Some of the modules under SIDEMAN were merged to form 1 unit. The main reason for merging them were:</p> <ol style="list-style-type: none"> a) The project duration was shorter b) The modules

	<p>3days</p> <ol style="list-style-type: none"> 8. On farm water management – 5days 9. Leadership skills – 5days 10. Irrigation Agronomy – 5days 11. Marketing of Agricultural Produce – 5days 12. Access and utilization of credit – 5days 13. Environmental Issues – 5days 	<p>content was not so much to warrant single module training</p> <p>c) As a solution to the training fatigue experienced under SIDEMAN</p> <p>Some training content was also added in some of the Units including Conflict Management and Record Keeping in Unit 2 and 3 respectively.</p> <p>The following are the training Units for the Capacity building program.</p> <ol style="list-style-type: none"> 1. Community Mobilization and IWUA formation – 2days 2. Leadership and Conflict Management – 2days 3. Record Keeping and Financial Management – 3days 4. On-farm Water Management – 4days 5. Irrigation System Management
	<p>(1) In-country farmers trainings</p> <p>This was training for farmers all over the country with a condition that each of the training would have at least 4 farmer representatives from the SIDEMAN projects.</p> <p>2 trainings were conducted each year totaling to 10trainings mainly held in MIAD Centre in Mwea for 2 weeks. A total of in-country trainings were held</p> <p>(3) Farmer Field School</p> <p>In Maasai land there were great challenges of illiteracy which led to the PMT decision to abandon the trainings and instead adopted Farmers Field School trainings found to be the better option.</p> <p>This was done for the Narok Schemes</p>	<p>(2) Induction Training</p> <p>This training was conducted for selected leaders of the various schemes under the project. This was a 5day program that was held in MIAD Centre in Mwea.</p> <p>The main objective of these trainings were to induct the IWUA leaders with the knowledge of the</p>

		SIDEMAN-SAL program, its expected outputs, stakeholders roles and responsibilities as well to train them on IWUAs, their formation, leadership, irrigation methodologies and irrigation farming
(1) Review of module 1, 2, 3 and 4 vs. Unit 1, 2 and 3	<p>Module 1: Community Mobilization This was a 2 day training whose content comprised of Scheme design, farmers participation and community action plan</p> <p>Module 2: IWUA formation This was a 2 day program whose content mainly zeroed in on bylaw formulation and IWUA action plan. However, after the TOT training in Philippines, it was revised to include Group dynamics and Legal requirements.</p>	<p>Unit1: Community Mobilization and IWUA formation This was a merger of module 1 and 2 training under SIDEMAN. It was a 3day course whose contents included Scheme design, Implementation activities, Farmers' participation, Group dynamics, IWUA and IWUA formation, IWUA objectives and roles, Legal requirements, Bylaw formulation and IWUA Action Planning.</p>
	<p>Module 3: Basic Leadership This was a 4 day program whose content comprised of IWUA structure and leadership, review of group dynamics, principles of leadership, team work, introduction to IWUA management, management skills and review of IWUA internal leadership</p>	<p>Unit 2: IWUA Leadership and Conflict Management This was a 2 day training program. The content included conflict management. The sessions trained included IWUA organization structure, introduction to leadership, leadership functions, sources of IWUA conflicts, conflict resolution process, conflict management methods and leadership policies</p>
	<p>Module 4: Financial Management This was a 4 day training program. The content included sources of IWUA income, basic accounting principles, basic financial record documents, introduction to budgeting, budget control, auditing and financial reports</p>	<p>Unit 3: Record Keeping and Financial Management This was a 3day training program. Record keeping was</p>

		<p>included in the program. The content included introduction to financial management, IWUA finances, accounting principles, basic financial books including cash book, petty cash book, ledger book, income and expenditure book, membership register and fixed asset register. The IWUAs were provided with these books and guided on how to make the entries in the books</p>
(2) IDD Staff Training	<p>(1) Training in Japan The IDD staffs were each trained in Japan at least once during the project period. These trainings were not only done for the staff involved in the SIDEMAN project but also for other Ministry staff.</p> <p>A total of 5 trainings in 5 years were held</p>	<p>(1) Induction Training This training was held in Naivasha with an aim of inducting the officers on the IWUA capacity building program and the roles they were expected to play in the program.</p>
	<p>(2) In-house mounted trainings These were organized by the Department of Irrigation for the IDD staff.</p>	<p>(2) TOT Training This training was held in Embu with an objective of training the officers the Training Cycle in detail. It was expected that the Officers would gain the skills to enable them to organize and manage the trainings in their respective schemes on their own from preparation, delivery and report writing. The TOT training was held after Unit 1 training. After the training the officers were expected to implement the skills and knowledge gained in Unit 2 training. The PMT would attend the pre-training meetings but the training would be managed by the SCIO and SCAO</p>

	<p>(3) Outside/External trainings These were held by institutions including Kenya Institute of Administration, Gerth Management among others. These were institutions whose proposals to train were evaluated and they were engaged to train the IDD staff.</p> <p>PMT did not attend these trainings as it was not authorized.</p>	<p>(3) External Training - Contract Management Training The training was held in Embu just before construction of Batch 1 schemes had begun. An external consultant was engaged to train the staff. The PMT attended the training</p>
	<p>(4) Technical Exchange visits There were 5 technical visits held during the period of the project</p> <ul style="list-style-type: none"> ▪ Thailand ▪ Philippines ▪ Tanzania ▪ Egypt ▪ Malawi 	<p>(4) Technical Exchange visits Not applicable under the project</p>
(3) Capacity Building Program monitoring	<p>(1) During farmers trainings, every day at the end of the training the facilitators held a consultative meeting to evaluate the day activities and make recommendations for the following day training</p> <p>(2) Every end of year or beginning of the year the PMT and all the IDD staff held a consultative planning meeting to discuss the activities accomplished and the way forward for the year following</p>	<p>Daily evaluation of trainings not done.</p> <p>An evaluation of the conduct of the trainings was done during the TOT training and recommendations for future trainings given for each sub-county. For example, avoidance of market days, training delivery, evaluation questionnaire among others</p>
Baseline/Functionality Survey	<p>There was no Baseline Survey conducted under SIDEMAN. However, at the end of the project, the Baseline Survey incorporated in the IWUA framework was tested.</p> <p>This was conducted by a Ministry Official outside SIDEMAN as the Director felt that he would not be biased</p> <p>The official however after data collection in the field did not carry out data analysis and a PMT member in charge of capacity building wrote the report on the survey</p>	<p>Functionality Survey document was developed borrowing from the Philippine model. This was administered before the beginning of the trainings both for Batch 1 and Batch 2 and is hopes to be administered at the end of the capacity building program</p>
Training Organization and Management		
(1) Training Coordination	<p>The main coordinators of the training were the SCIOs (then DIOs). However, a member of PMT had to be present in almost all of the trainings for backstopping and disbursement of training expenses</p>	<p>Batch 1 induction training was solely coordinated by PMT while Batch 2 induction training incorporated some 2 officers' one SCIO and one SCAO.</p>

		Unit 1 training under Batch 1 was coordinated by PMT but under Batch 2, the PMT only offered an oversight and backstopping role. Unit 2 and 3 training under Batch 1 and Batch 2 was coordinated by SCIOs and SCAO.
(2) Participants selection	The criterion for selection of participants was similar to SIDEMAN-SAL. However, the participant list had to be sent to the PMT before the training. In Maasai schemes, there was a challenge in getting literate IWUA members due to the high illiteracy rates.	The participants' selection criterion was as per SIDEMAN. After Unit 2 training the program also demanded that the names of participants for the trainings be forwarded to the PMT before the training dates. Mobilization for training participants is carried out by the area FEO
(3) Facilitators selection	The SCIOs were tasked to identify the right facilitators for the various sessions.	For the in-house trainings, the PMT recruited the facilitators while the scheme level trainings, the SCIOs and SCAOs recruit the suitable facilitators
(4) Training materials preparation	Preparation of training materials by the SCIOs and other selected facilitators was a big challenged and in most occasions, PMT would prepare the training materials and offer backstopping during the training	The selected facilitators are provided with their respective session objectives from which they are expected to come up with PowerPoint presentations. The presentations are evaluated during the pre-training meeting and recommendations made. Later they are reviewed to include the recommendations in the pre-training meeting
(5) Training methodology	The training methodology employed included plenary presentations, lectures, group discussions and role plays	The training methodology employed included lectures, group discussions and role plays
(6) Pre-training meeting	At the start of the project, there were no pre-training meetings held. However, after a technical exchange visit to Philippines, the project adopted the Philippines	Pre-training meetings were held for all Batch 1 trainings. However,

	<p>training model which included the pre-training meetings.</p> <p>This therefore means that the pre-training meetings were held for the remainder of the trainings after that visit</p>	<p>since the training content is the same for both batches, the PMT did not hold pre-training meetings for Batch 2</p>
(7) Training Delivery	<p>The trainings at the initial stages of the project were not as organized as to start with the Pre-training meetings, Climate settings and the knowledge evaluations. However, after the TOT training in Philippines, the PMT adopted the Philippines model of training.</p> <p>The SCIOs were very committed to the training as they had many incentives including the Japan training and the Technical exchange visits, the GOK finances which catered for their subsistence expenses and others obtained cars.</p> <p>At the end of every training day, the facilitators held a meeting to evaluate the performance during the training and areas to improve in future and next day training</p>	<p>The trainings have been very organized and following the adopted Philippines model. The trainings start with climate setting followed by knowledge evaluation. During the trainings, session evaluation is conducted and at the end of the training the course evaluation is administered.</p> <p>The SCIOs have demonstrated expertise in the trainings especially after the TOT training in Embu. More expertise has been demonstrated under Batch 2 trainings the most remarkable being the trainings by Tharaka, Mbeere North and Taveta SCIOs who had previously shown the greatest weakness in training delivery.</p>
(8) Training Evaluation	<p>3 types of evaluation for the trainings: (1) Knowledge evaluation (2) Session evaluation and (3) Course evaluation</p>	<p>3 types of evaluation is conducted for the trainings: (1) Knowledge evaluation (2) Session evaluation and (3) Course evaluation</p>
(9) Follow-up Program	<p>There was no follow-up on any program</p>	<p>There have been follow-up programs for Unit 1 in both Batches and Batch 1 Unit 2 training. Currently plans are underway for Batch 2 Unit 2 follow-up and Unit 3 follow-up for both Batch 1 and Batch 2</p>
(10) Report writing	<p>In all the trainings, there was assigned a secretariat</p>	<p>Unit 1 report writing</p>

	<p>who was involved in preparation of material handouts for the farmers.</p> <p>The secretariat had been provided with an automated excel analysis sheet developed by Dr. Doi (Team Leader) for filling in the evaluation and carrying out the evaluation analysis.</p> <p>The SCIOs were then expected to prepare the Training Reports. However, there were challenges in obtaining the reports on time and with expected quality</p>	<p>was done by the PMT. Unit 2 training under Batch 1 was the responsibility of the SCIOs after the TOT training. Only Taveta SCIO was unable to write the training report. Unit 3 training report under Batch 1 was also the responsibility of the SCIOs. However, only Marakwet East, Igembe South and Taveta SCIOs were able to write the Training reports. Most of the other SCIOs cited over-engagement in other project activities as the barrier towards writing the report. The task was therefore taken up by the PMT including all training reports under Batch 2</p>
Training manuals	The PMT was able to develop 7 training manuals to the level of publishing	Review of the first 3 manuals was conducted in Embu ready for publishing
Training Backstopping	The PMT team was assisted by 2 Philippine experts in IWUA capacity building. The first one offered back stopping for the trainings and ensured adoption of the Philippine model of farmers' trainings. The second expert was engaged to assist in the development of the 7 training manuals.	The PMT has been solely responsible for back-stopping in all the trainings
Achievements	<ol style="list-style-type: none"> 1) 12 training modules trained 2) 7 manuals developed 3) Conducted 10 in-country trainings 4) Conducted 10 IDD staff trainings 5) Held 5 technical exchange visits for IDD staff to Philippines, Thailand, Tanzania, Egypt and Malawi 6) Attended trainings for IDD staff in Japan one annually for 5 years 	<ol style="list-style-type: none"> 1) Successful conducting of the functionality Survey 2) 3 Units of training already finalized 3) 2 Farmers induction trainings finalized 4) 1 TOT training for SCIOs and SCIOs 5) 1 External Training on Contract Management 6) Review of Module 1, 2 and 3 ready for publishing
Challenges	<ol style="list-style-type: none"> 1) Material development by SCIOs and other facilitators being a challenge prompting the PMT to prepare training materials 2) Delay in report writing 3) Low literacy levels 	<ol style="list-style-type: none"> 1) Time limitation for all training activities making the farmers lethargic in attending the trainings. This is

	<p>4) Training fatigue among the farmers due to the long duration of training period</p> <p>5) Meal Subsidy – initially every participant used to be given Ksh.200 for attending the training until it was discovered that the farmers’ motivation to attend the training was the money and not the knowledge. After it was reduced to Ksh.70 in the mid of the project there were challenges in farmers attendance to the trainings. One scheme, in Loitoktok set a penalty of Ksh.1,000 per farmer who failed to attend the trainings after selection. This helped in ensuring the training attendance and commitment to the training remained high</p>	<p>because there are very many field activities demanding their attendance and so they feel withdrawn from their farm duties</p> <p>2) Low attendance especially in Laikipia West and Narok North Schemes</p> <p>3) Low literacy levels especially in Ganze, Igembe South and Narok North</p> <p>4) Delays in report writing and complaints by SCIOs of over-engagement</p>
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Source : JICA Team

Table 1.2.4 Training Program for Capacity Development for IWUA Members (SIDEMAN-SAL)

Category	Major Activities
Organizational Strengthening	<p>Unit 1: Community Mobilization (module1) and IWUA Formation (Module2)</p> <p>Unit 2: Basic Leadership (Module3), and Conflict Management (including Module3)</p> <p>Unit 3: Financial Management & Record Keeping (Module 5)</p>
Strengthening of capacity for water management and Maintenance	<p>Unit 4: On-farm Water Management and Practical Irrigated Agriculture (Module 9)</p> <p>Unit 5: Irrigation System Management (Module 4)</p>

Source : JICA Team

Each training course with accompanied preparatory activities is described hereinafter (Refer to Table 1.2.5).

Table 1.2.5 Summary of SIDEMAN-SAL Capacity Development Plan (proposed)

TRAINING	PURPOSE	CONTENT	FACILITATOR	PARTICIPANTS	LOCATION	DURATION	PERIOD
Induction Farmers Training	To induct farmers to the SIDEMAN-SAL project and train them on the basic skills required for irrigation	Briefing on the project; basic knowledge on irrigation & irrigation technologies; irrigation system management; market-oriented farming; environmental management	PMT	40 farmers (5 farmers from each scheme)	MIAD Centre (MWEA)	5days	18th - 22nd March 2013
IDD staff induction workshop	To discuss the roles of IDD staff in SIDEMAN-SAL project implementation; to prepare a financial budget ; Cost sharing agreement with the farmers; project management including supervision of construction; IWUA management; monitoring & evaluation	Roles of IDD staff in SIDEMAN-SAL, Budget planning, Management(supervision); Proposed detailed training programmed; Cost sharing agreement during construction and capacity building; Monitoring & evaluation (Reporting format and frequency);	PMT	32 IDD staff (SCIOs, SCAOs, WCDs, CDAs)	Naivasha	2days	18th-19th April 2013
Unit1 Community mobilization & IWUA formation	To come up with an Action plan for individual scheme and form an IWUA as per the IWUA guidelines	Roles of IWUAs in implementation; formulate IWUA vision, mission and Bylaws; IWUA action plan; IWUA registration	PMT,SCIOs, SCAOs	30-50 all farmer' s representative in individual schemes	Scheme	3days	Aug-Nov 2013
Training of Trainers Seminar (TOT)	To equip SCIOs and SCAOs with training knowledge to cover Unit2 to 5 on their own.	Under review (based on the training manuals for Unit 2-5)	PMT	SCIOs, SCAOs	Naivasha	Between 3 to 5days * 2times	Dec 2013 & April 2014

Source : JICA Team

TRAINING	PURPOSE	CONTENT	FACILITATOR	PARTICIPANTS	LOCATION	DURATION	PERIOD
Unit2 Leadership, and Conflict Management	To be able to explain the qualities of an ideal IWUA, qualities of a good leader, teamwork, conflict management and resolution	Qualities of a good leader; styles of leadership; Sources of conflict; Conflict resolution	SCIOs, SCAOs	Tentatively 30 farmers per scheme	Scheme	2days	Mar - Apr 2014
Unit3 Financial Management & Record Keeping	To be equipped to understand the importance of book keeping, the different financial records, budgeting as well as the auditing process	Importance of book keeping; different records; sources of income for IWUA; IWUA expenditure; Financial records; Budgeting; Auditing	SCIOs, SCAOs	Tentatively 30 farmers per scheme	Scheme	3days	Jun-2014
Unit4 On-farm water management and Practical Irrigated Agriculture	To be able to describe systems of water conveyance, distribution and application and prepare water application schedules for given crops.	Presentation of scheme reports; crop-water relationship; water application schedules; practical on farm water management	SCIOs, SCAOs	Tentatively 30 farmers per scheme	Scheme	4days	Mar-2015
Unit5 Irrigation System Management	To be able to prepare an operations and maintenance plan for their irrigation system	IWUA duties in scheme management; roles of IWUA leaders in scheme management; water distribution; water fee; cropping calendar	SCIOs, SCAOs	Tentatively 30 farmers per scheme	Scheme	4days	Jul-2015
Irrigation Engineering Seminar	To enhance SCIO's skill in irrigation management and supervision of construction.	Under review (based on SIDEMAN program)	PMT	SCIOs	Naivasha	5days * 4times	2013-2014 semi-annually

Source : JICA Team

1.2.3 Implementation Methods for the Training Program

While the Unit 1 will be conducted by the PMT members, the SCIOs are responsible for Unit 2-5's arrangements including estimation of the budgets, implementation and evaluation of the training programs, for the purpose of enhancing the ability of SCIO and project time limitation,

Before those Units are conducted, the PMT will conduct "Training of Trainer (TOT)" training to the SCIOs so as for them to ensure capacities for conducting the Training Units.

Overall training structure of IWUA Capacity Development is shown Figure 1.2.1.

TRAINING	FACILITATOR	TARGET GROUPS
Induction Farmers Training	PMT	SCIOs (SCAOs)
IDD staff induction workshop	PMT	IDD Staffs
Unit1 Community mobilization & IWUA formation	PMT, with SCIOs (SCAOs)	IWUA
Training of Trainers Seminar (TOT)	PMT	SCIOs (SCAOs)
TRAINING	FACILITATOR	TARGET GROUPS
Unit2* Leadership, Conflict & conflict resolution	SCIOs (SCAOs)	IWUA (30 members per scheme: Executive Committee members and key farmers)
Unit3 Record Keeping & Financial Management	SCIOs (SCAOs)	IWUA (same as above)
Unit4 On-farm water management and Practical Irrigated Agriculture	SCIOs (SCAOs)	IWUA (Same as above. Key farmers representing each irrigation block in scheme)
Unit5 Irrigation System Management	SCIOs (SCAOs)	IWUA (Same as above. Key farmers representing each irrigation block in scheme)

Note: *: Due to the size of members (450), Target numbers in Tumutumu scheme will be set as 50.

Source : JICA Team

Figure 1.2.1 Training Structure of IWUA Capacity Development

1.2.4 Work Flow of Implementation of Training

In each training Unit, work flow of the training is adopted as shown in Figure 1.2.2.

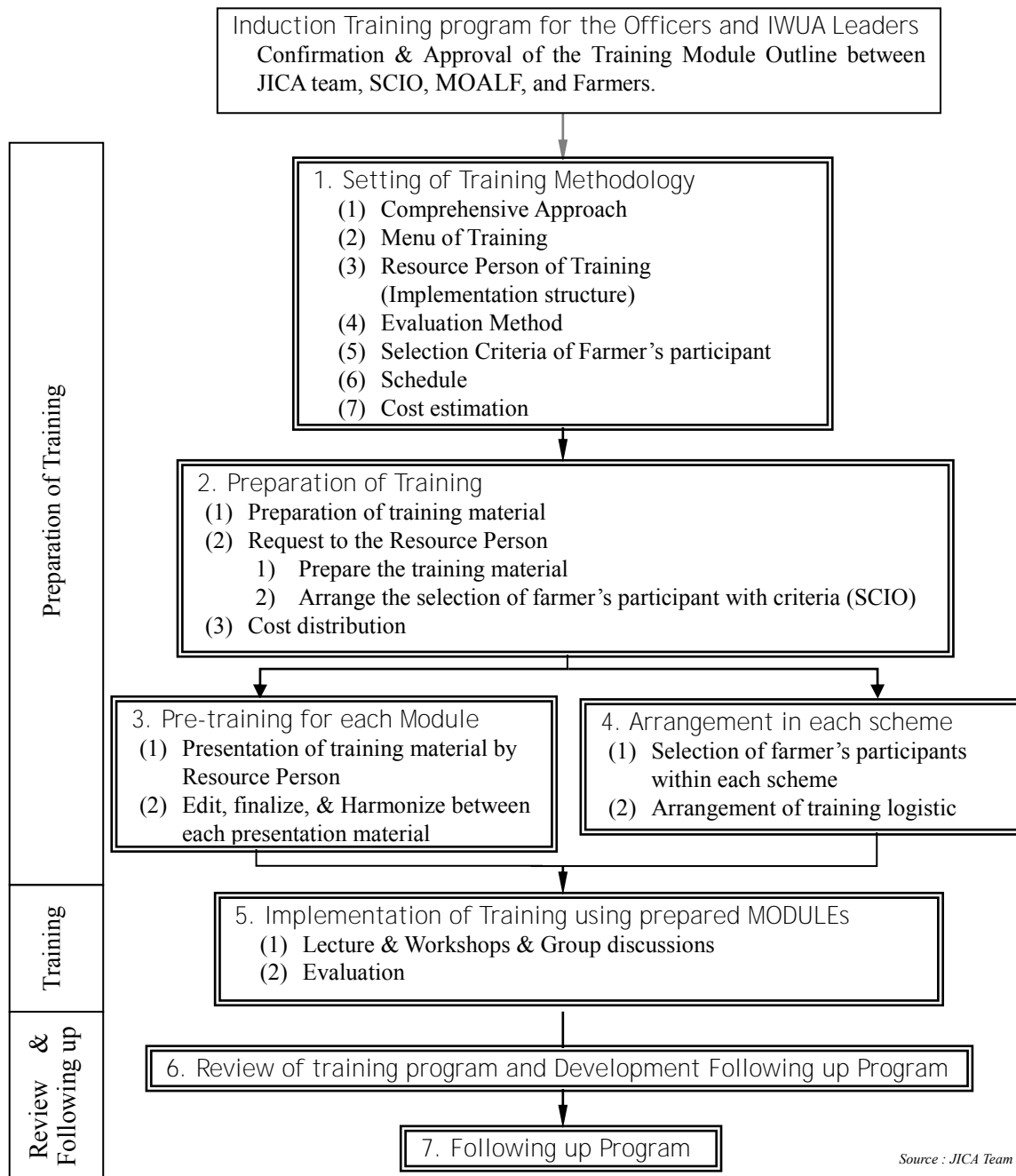


Figure 1.2.2 Work Flow of Training in Each Unit

As indicated above, so as to conduct the training program efficiently, aiming at the enhancement of capacities of the officers' concerned, special attention would be made the followings.

Based on prototype training materials, training materials to be used for each scheme will be

prepared by each SCIO, taking into consideration situation of the scheme as well as current capabilities of the participants, including type of media, literacy and experience in farming and irrigation management. It is expected that the process for the preparation is regarded as a process of the capacity building to the officers.

Similarly, it is to be stressed that the pre-training is very essential to keep quality of the training program. The session will give the field officers valuable opportunities to feed back the pre-arrangement from the PMT members.

Importance of evaluation of the trainings by the participant should be highlighted to review the training course and to prepare the follow-up program. At the end of the training course, a questionnaire will be distributed to the participants to evaluate the program.

1.3 Description of Activities in Capacity Development Plan

1.3.1 Induction Training Program for the Officers and IWUA Leaders

Before conducting the 5 strengthening training Units, Farmers Induction Training and Government staff induction workshop would be held.

(1) Induction Training for IWUA Leaders

It was held to induct the farmers to the Project so that these farmers can understand each stakeholder's role and their involvement in the project. It was an avenue to explain to them in details the process of the irrigation schemes development. The trained farmers would thereafter train the members in their specific schemes to ensure that there is absolute farmer participation in this project. During this training, the farmers were trained on IWUA formation and organization, irrigation and irrigated technologies, environmental management, market-oriented farming and record keeping.

(2) Induction workshop for Government staff

It was held for the government officers, such as CDWs, SCIOs, CDAs and SCAOs. The main issue is preparation of the budget for the Project to enhance their ownership. The information of 1) the outline of the Project, 2) the roles of them in the various phases of the project implementation 3) Capacity building program (that was identified and adopted as by the government officials) were also given.

1.3.2 Community Mobilization & IWUA Formation (Unit 1)

(1) Training Objective

The training objective for this Unit is to ensure that the farmers (participants) should be able to explain and familiar with the following

1) Scheme layout/design including:

- a) Detailed design
- b) Irrigation infrastructure proposed to be developed
- c) Estimated developmental cost
- d) Stakeholders in their scheme development
- e) Cost sharing and farmers contributions
- f) Implementation activities and farmers involvement
- g) Scheme operations and maintenance and farmers roles in O&M

2) Roles of IWUA & formation process including:

- a) Groups Dynamics
- b) Leadership in groups
- c) IWUA definition & IWUA formation and organizational structure
- d) IWUA objectives, roles and functions
- e) IWUA By-law formulation and operation
- f) IWUA registration
- g) IWUA action planning

3) Legal requirements for Irrigation Water Use

- a) Water Act 2002
- b) Water Resource Management Rules 2007
- c) Roles & functions of Water Resource Management Authority (WRMA)
- d) Roles & functions of Water Resource Users Association (WRUA)
- e) Roles & functions of Catchment Area Advisory Committees (CAAC)
- f) Water permitting and permitting process
- g) Water charges and penalties for non-compliance

The training should also enable farmers to change of attitude towards WRMA and water charges as well as devise an action plan for formulating cooperative group of IWUA.

(2) Detail Activities**1) Scheme Design**

The objective of the session is to introduce the concept of irrigation to the farmers, explain the scheme's layout and infrastructure as well as to discuss the estimated costs of the project based on the results of the detailed design report and the drawings. The various stages of a project are also explained as well as the various components of irrigation development infrastructure including intake, weir, conveyance channels and

main/distribution channels and conveyance channels. The farmers are also led through the estimated costs of all the infrastructures to be put in place. Finally, the farmers are exposed to their role in the Scheme's operation and maintenance.

2) Implementation Activities

The objective for this session is to enumerate the implementation activities that are meant to take place during scheme development and the roles of each stakeholder in this process. Emphasis is placed on the roles of the farmers during implementation and the Memorandum of Understanding to be signed by the farmers and the government which is the implementing agency.

3) Farmers' Participation in Construction Works

This is a workshop with which the farmers are expected to enumerate the activities that they will be involved during the construction phase of the project. The farmers are also expected to formulate and state their own action plan for the participation in the construction related activities.

4) Group Dynamics

The objective of this session is to engage the farmers to understand the dynamics of a group including group definition, group composition and formation, stages of group development, leadership in a group, qualities of an ideal leader, group conflicts and community mobilization. Based on the learned knowledge, the farmers are expected to evaluate their group dynamics and identify the stage of group development their IWUA is currently at and identify the issues that hinder them from progressing towards the final stage of group development.

The farmers are also trained on the various ways of registering a group including Self-help groups, SACCOs and Companies. The various processes of registration is enumerated and the advantages of registering in each of the ways. Emphasis is placed on legal registration of the group especially when the group reaches the fourth stage in group development i.e. performing stage.

5) Legal requirement for irrigation water use (Water Act 2002)

The main objective of this session is to train the farmers on the legal requirements under Water Act 2002, the Water Resources Management Rules of 2007, and the roles of Catchment Area Advisory Committee (CAAC) and Water Resource Users Association (WRUA) in water resource management. The roles and functions of Water Resource Management Authority (WRMA), the permitting process, the water use charges and their calculation, the penalties for non-compliance to WRMA Rules and the benefits of water payment are enumerated.

At the end of the session, the farmers carry out an exercise of calculating the amount of

money the scheme is expected to pay once the irrigation system becomes operational and then the bill is divided into the total households that will be served with the water. This makes the farmers psychologically aware of how much each of them will be expected to pay for the water, which is negligible considering the benefits that water would bring to them.

6) Training for making action plan

The objective of this session is to train the farmers on what action planning is, its importance and its composition. The farmers are also guided into preparing a sample action plan. At the end of training, the farmers are requested to prepare an annual action plan encompassing all the activities that are to be undertaken under this project.

(3) Detail of In-class Training Course - IWUA Formation (Upgrading group status)

1) IWUA Formation & Objectives

The objective of this session is to educate the participants on IWUA formation, objectives, roles and functions. The participants are also trained on how to formulate IWUA vision, mission and objectives. A workshop is conducted after the training where the farmers are expected to prepare a sample IWUA vision and mission, enumerate the various IWUA objectives, roles & functions.

2) IWUA by-laws & Registration as Legal Entity

The objective of this session is to assist the farmers to gain understanding of the importance of by-laws in the IWUA, the important inclusions of the by-laws and how to operate by-laws. A prototype by-law booklet is given to each participant to be used as a guide in the revision of the IWUA by-laws. At the end of the training, the farmers are expected to commit themselves to revision of their by-laws and a copy of the revised by-laws is expected to be sent to the project offices.

(4) Evaluation of the training

To analyze the participant's ability through training, we conducted the Evaluation Questionnaire for the participants who were done before and after training. Questionnaire was chosen from each section by the specific facilitator.

(5) Training Time Table

DAY/TIME	TOPIC/SESSION	PERSON RESPONSIBLE
DAY 1		
8.00 – 8.30am	Registration of participants	Participants
8.30 – 8.45am	Opening program	Project Manager/ SCIO
8.45 – 9.00am	Ice Breaking/Climate setting	Course coordinators
9.00 – 9.30am	PRE-TRAINING EVALUATION	Course coordinators
9.30 – 11.00am	SCHEME DESIGN	Project Manager /Project Engineer

11.00 – 11.30am	TEA BREAK	
11.30 – 1.00pm	IMPLEMENTATION ACTIVITIES	SCIO
1.00 – 2.00pm	LUNCH BREAK	
2.00 – 3.00pm	Workshop 1 – FARMERS PARTICIPATION	Project Manager /Project Engineer
3.00 – 4.00pm	Output presentation	
DAY 2		
8.00 – 8.30am	Recapitulation	Course Coordinators
8.30 – 10.30am	GROUP DYNAMICS	Min of Cooperatives Official
10.30 – 11.00AM	TEA BREAK	
11.00 – 1.00PM	IWUAs & IWUA Formation & Objectives	CB Expert – Alan Abwoga
1.00 – 2.00pm	LUNCH BREAK	
2.00 – 3.30pm	Workshop 2: Roles & functions, Vision & Mission	Course coordinators –Abwoga/Rahab
3.30 – 4.30pm	Output presentation	
DAY 3		
8.00 – 8.30am	Recapitulation	
8.30 – 10.30am	LEGAL REQUIREMENTS – WATER ACT 2002	Local WRMA official
10.30 – 11.00am	TEA BREAK	
11.00 – 12.00pm	BY-LAW FORMULATION	CB Expert - Alan Abwoga
12.00 – 1.00pm	Workshop 3: Review & Revision of By-laws	
1.00 – 2.00pm	LUNCH BREAK	
2.00 – 3.00pm	Workshop 4: IWUA ACTION PLAN	CB Expert - Alan Abwoga
3.00 – 4.00pm	INTRODUCTION TO CROP PRODUCTION	SCAO
4.00 – 4.30pm	POST-TRAINING EVALUATION	Course Coordinators
4.30 – 5.00pm	Closing program	SCIO & JICA Team Rep

(6) Facilitation to IWUA Members (Following up Program)

Periodical monitoring and guidance will be made to the IWUA members so as for them to keep their understanding on it for proper management of the organization. The process of the registration as legal entity will also be cared by the SCIO.

1.3.3 Training of Trainers Programme Unit 2&3 Feedback on Unit 1 Training

(1) Training Objective

The training objective for this Programme is to ensure that the SCIO&SCAO (participants) should be able to manage the following Unit2~5 by themselves. To accomplish it, the programme is designed for them to have the necessary knowledge, skills and attitudes in 1) Training Needs Assessment, 2) Training Design, 3) Training Delivery and 4) Training Evaluation which will empower them efficiently and effectively coordinate trainings under the SIDEMAN-SAL IWUA Capacity Building Program.

The following were the specific 13 session and objectives

1)Session 1: Capacity Building & Capacity Building Framework

At the end of the training, the participants should be able to:-

1. Discuss briefly the IWUA framework
2. Enumerate the importance of IWUA capacity building

3. Explain the Capacity Building programme under SIDEMAN-SAL project

2)Session 2: Introduction to Training & Training Cycle

At the end of the training, the participants should be able to:

1. Differentiate between training & capacity building
2. Discuss and define the gaps, knowledge, skills & analysis that trainings seeks to address
3. Outline and discuss in brief the training cycle (TNA, Training Design & Development, Training delivery, Training Evaluation & Training follow-up)

3)Session 3: Training Needs Assessment (hereinafter referred to TNA), Design & Development

At the end of the training, the participants should be able to:

1. Define & outline the process for conducting a TNA
2. Outline the 5 steps in TNA (Identification, Designing needs assessment, Data collection, Data analysis, Feedback)
3. Discuss how to prioritize training as per identified training needs
4. Outline the steps in general training design
5. Outline the various training methodologies & techniques

4)Session 4: Adult Learning Theories & Principles

At the end of the session, the participants should be able to:

1. Outline the Teaching & Learning process
2. Enumerate the factors influencing the learning process
3. Enumerate the factors that influence adult learning
4. Identify the techniques for teaching adult learners
5. Identify Behaviour & Attitudes expected in an adult learning environment
6. Describe the Adult learning environment

5)Session 5: Training Design & Programme Development

At the end of the session, the participants should be able to:-

1. Discuss Experiential Learning Concept
2. Explain the process of developing a training concept
3. Outline the procedure for developing training & session objectives
4. Discuss logical session sequencing techniques
5. Outline the procedure for selecting facilitators & participants
6. Define and discuss the importance of pre-training meetings

6)Session 6: Training Delivery

At the end of the session, the participants should be able to:-

1. Define training facilitation & enumerate the various facilitation skills including voice, body language, listening, answering questions, nerves, using paraphrases etc
2. Enumerate the skills necessary for feed-backing
3. Enumerate participation enhancing skills

7)Session 7: Experience Sharing Workshop

At the end of the session, the participants will have shared their:-

1. Previous training experience & challenges faced including:-
 - a. Training methodologies used
 - b. Participation
 - c. Training environment
 - d. Training logistics
 - e. Training content and relevancy of the content
 - f. Technology & knowledge adoption
2. Identified areas of improvement
3. Lessons learnt that can be borrowed under Sideman-Sal Capacity Building Programme

8)Session 8: Training Evaluation

At the end of the session, the participants should be able to:-

1. Define training evaluation & enumerate the benefits of evaluation
2. Outline and discuss the training evaluation methodologies
3. Enumerate the training evaluation tools
4. Discuss the process of identifying unmet training objectives

9)Session 9: Training Reporting & Follow-up-

At the end of the session, the participants should be able to:-

1. Enumerate the importance and uses of training reports
2. Outline the accepted reporting standards & content
3. Discuss the process of training follow-up & identifying unmet training objectives
4. Explain the importance and how to plan for Booster sessions
5. Outline the procedure of monitoring use/application of knowledge

10)Session 10: Feedback on Unit 1 training-

At the end of the session, the participants will be able to:-

1. Explain the training organization for Unit 1

2. Discuss the results of evaluations under Unit 1
3. Enumerate identified strengths, weaknesses and areas of improvement under Unit1
4. Identify the lessons learnt under Unit 1
5. Outline the recommendations to improve future trainings

11)Session 11: Sideman-Sal IWUA capacity building programme

At the end of the session, the participants should be able to:-

1. Outline the objectives of this programme
2. Outline the training Units to be covered under this programme
3. Outline the schedule of the trainings
4. Identify the resource persons for the trainings
5. Discuss in brief the training manuals developed under Sideman Project

12)Session 12: Review of Unit 2& 3

At the end of the session, the participants should be able to:-

1. Outline the objectives of each Unit
2. Explain the training content in each of the Units
3. Outline the schedule of the trainings
4. Identify the facilitators & participants selection for these Units

13)Session 13: Training Budgeting & Logistics

At the end of the session, the participants should be able to:-

1. Explain the importance of training budgeting
2. Outline the items included in the training budget
3. Cost a training programme
4. Explain training subsidies
5. Outline the procedure for training management including pre-training, supervision, facilitation etc

(2) Detail Activities

1) SESSION 1: Capacity Building & Capacity Building Framework

The facilitator started by giving a background of Irrigation Development in Kenya and the background of the IWUA Framework. He then gave the justification and the objective for the framework after which he outlined the contents of the Framework which include IWUAs, Community Mobilization & IWUA formation, Participation for Sustainability, IWUA Capacity Building, Scheme Operations & Maintenance, Conflict Management in IWUAs, Stakeholders, Gender Issues and Participatory Monitoring & Evaluation.

Participants inquired about the practicability of the Framework on all the IWUAs taking into consideration the capacities of IWUAs in different regions in Kenya especially the Maasai and communities in Northern Kenya. The facilitator affirmed that the IWUA Framework is a guideline and the methodologies that are employed are different depending on the strength and the maturity of the IWUA. Some communities may take more time in their approach to the Framework due to communication barriers.

Regarding IWUA registration, the participants sought to know the best recommended IWUA registration status. The facilitator informed that there is an Act prepared by the Directorate of Irrigation that is yet to be debated in parliament to become Law. In the meantime the IWUAs are registered by Social Services Department, or by the Attorney General or as Cooperatives. The weakness with the first registration as a Self-help group is that the group is not recognized as a legal entity and has no right to sue and be sued.

2) SESSION 2: Introduction to Training & Training Cycle

The facilitator started by defining training and differentiating between Training and Capacity Building. She gave a graphical representation of the Gap that Training seeks to fill and the importance of training which is to fill the existing Gap in Knowledge, Skills and Attitude. She discussed in detail the Training Cycle including Training Needs Assessment, Training Design, Training Delivery, Training Evaluation and Follow-up. She also highlighted on the importance of training follow-up and the various ways in which a training follow-up can be undertaken.

During the session, the participants sought to know how to fill the Gap between Theory and Practice. The facilitator informed that consistent presence by the Trainer as well as Social Marketing would help in changing the attitudes and the behaviour of the participants to put into practice the skills and knowledge gained through training.

3) SESSION 3: TNA, Design & Development-

The facilitator defined Evaluation and enumerated the importance of Training Evaluation. He discussed the various forms of evaluation including Summative, Diagnostic and Formative. He explained Kirkpatrick's 4 levels of evaluation including Reaction, Learning, Behaviour and Results. The facilitator also demonstrated how the various evaluation tools are used as well as how to carry out an analysis of the evaluation results.

4) SESSION 4: Adult Learning Theories & Principles

The facilitator started by defining an adult and enumerating the behaviour and attitudes of adults. He defined training and learning. He then discussed that factors influencing learning and explained the learning process including the centres of learning including Head, Heart and Hands.

The facilitator explained the psychology of an adult learner and the Experiential Learning Theory, the Andragogy and Pedagogy theory and the 7 Principles of adult learning, Techniques of adult learning. Finally he described the adult learning

environment and the factors influencing adult learning.

5) SESSION 5: Training Design & Programme Development

The facilitator started by outlining the 4 steps in a program design which include Training Objective, General Training Design, Session Design and arrangements for Training Implementation. He then went ahead and discussed these steps in detail focusing greatly on how to prepare training objectives and the contents of a training proposal.

The facilitator then described the 4 phases of Experiential Learning Cycle including Experience, Process, Generalization and Application. Finally he explained the 7 steps of Experiential Learning Cycle including Climate Setting, Goal Clarification, Experience, Process, Generalization, Application and Closure.

6) SESSION 6: Training Delivery

The facilitator defined training and training facilitation. He enumerated the importance of participatory training and the various roles of facilitation. He defined presentation skills and outlined the various skills required for facilitation.

He explained the process of planning a presentation and the skills required for the planning, the skills necessary in dealing with questions and answers, gaining training confidence and overcoming nervousness.

He described the different methods of facilitation as well how to choose the various training methods, the sitting arrangement methods, and importance of energizers, importance of graphics and the rules of effective participation.

He finally described the qualities of a good presentation.

7) SESSION 7: Experience Sharing Workshop

The facilitator divided the participants into 2 groups and tasked them to share information regarding their previous training experiences including SIDEMAN-SAL Unit 1 training experiences.

The discussions were structured to share experiences in the following areas:

- a. Training Methodologies
- b. Participation
- c. Training environment
- d. Training logistics
- e. Relevance of the training content
- f. Technology and knowledge adoption

After the group discussions the groups presented their findings and the following were some of the experiences.

1. Lectures are more suitable in the morning hours and Group works are the most preferred during the afternoon sessions
2. The criteria for participants used during Unit 1 locked out some participants

and therefore in future it needs to be checked

3. On-site training is more effective in imparting skills
4. The suggested venue for training should be inspected before the actual training to ensure it is conducive for the adult learners
5. The Handouts for the farmers should be prepared in Swahili for ease of comprehension. The PowerPoint presentations should remain in English but the training delivery would be in Swahili or a language that is suitable depending on the participants
6. There is need to have more time on Action Planning for Development

8) SESSION 8: Training Evaluation

The facilitator started by defining training evaluation. He then enumerated the reasons that justify training evaluation. He described the types of evaluation including Diagnostic, Formative and Summative. He then discussed Evaluation models placing emphasis on the Kirk Patrick's 4 levels of evaluation including Reaction of participants, Learning, Behaviour and Results.

He analyzed the various evaluation tools including happy charts, Feedback Forms, Verbal reactions which can be recorded and well as the Knowledge evaluation questionnaires.

Finally he trained the participants on how to analyze the results of the various evaluations and how to present the results. He demonstrated how the various results of evaluation are presented in the report including narratives/descriptions, Bar Charts, Pie Charts among others.

The participants sought to know when the pre-training knowledge inventory should be administered as well as when the corrective measures to the knowledge inventory should be undertaken.

The facilitator explained the importance of the pre-training knowledge inventory before the training sessions and that the corrective measures would be dependent on the post-knowledge evaluation after the training.

9) SESSION 9: Training Reporting & Follow-up

The facilitator started by defining a training report and explaining its benefits and users. She then outlined the various inclusions in a training report including cover page, table of contents, executive summary, introduction, evaluation results, conclusion and recommendations among others. She then gave the tips for preparing a training report and the exclusions in the report.

The facilitator then defined training follow-up and its objectives, the process of identifying unmet training needs as well as the tools of monitoring use of knowledge from the training. She discussed booster sessions and their importance.

The participants sought to know if training follow-up should be budgeted for during preparation of a training budget to be included in the training proposal. After

brainstorming, the participants all agreed that it would be necessary to budget for training follow-up.

10) SESSION 10: Feedback on Unit 1 Training

The facilitator started by giving a feedback on the training management for Unit 1 conducted in the eight schemes. He then reported on the results of the knowledge evaluation from the 8 schemes pointing out the weak areas that would require follow-up. He explained the possible causes of low performance as including:

1. Poor formulation of the questions (negative instead of positive)
2. Failure by facilitators to teach the farmer on the particular issue e.g. WRMA on the water permit charges
3. Lack of concentration by farmers when answering the questions

He then paired the participants into 8 groups as per their individual schemes and presented them with the evaluation results. He tasked them to analyze the results and suggest follow-up measures that would address the knowledge Gaps and draw up an Action plan for the follow-up exercises.

11) SESSION 11: Sideman-Sal IWUA capacity building programme

The facilitator started by giving a background of Capacity Building Program and a justification for the program. He explained the contents of the program including TNA statement, Curriculum Development entailing the 13 modules developed during SIDEMAN from the results of the TNA.

He then introduced the SIDEMAN-SAL capacity building program which is a compacted version of the program. He explained the objectives of the program and the 5 Units intended to be covered under this program including Community Mobilization & IWUA Formation, Leadership & Conflict Management, Record Keeping & Financial Management, Irrigation System Management and On-farm Water Management.

He then explained the objectives of each unit and the time duration, the logistics to be involved in the training as well as the proposed areas of guided practice.

12) SESSION 12: Review of Unit 2&3

The facilitator gave a brief review of the objectives for Unit 1 & 2 and explained in detail the different sessions that are to be covered under the 2 Units and the various session objectives.

Then facilitator divided the participants into 4 groups assigned them some sessions from which they were to prepare session objectives for Unit 2&3. These sessions are those that will be trained on during Unit 2 & 3 training.

After group discussions, each group made a presentation of their finding.

These would be compiled by the training coordinators and emailed to the participants as they embark on arrangements for Unit 2 training.

13) SESSION 13: Training Budgeting & Logistics

The facilitator started by defining a budget and outlining the importance of a training budget as well as the users of a training budget. She then discussed the code of ethics required when one is preparing a budget.

The facilitator discussed the various items included when preparing a training budget and demonstrated how a training budget should be prepared and the steps in preparing a training budget.

The participants were grouped into 3 and tasked to prepare a budget for Unit 2 training. After discussions the groups presented their findings and one of the presented budgets was adopted as the one whose template would be used universally by all the schemes when preparing their budgets.

14) SESSION 14: Way Forward

During this session, the facilitator guided the participants through the various activities and issues that emanated from the TOT. An action plan was prepared. This action plan would guide the participants through implementing the agreed activities within the timeline allocated.

1.3.4 Leadership and Conflict Management (Unit 2)

(1) Outline

To understand Leadership styles and policies for IWUA's members in scheme management. Members will also be trained on conflict management including introduction to conflict, sources of conflict and conflict resolution. The outcome of this training is revision of bylaws to include the new IWUA organizational structure which has the subcommittees including O&M, Conflict, Environment Health and Safety and Finance Subcommittees, leadership policies for every leadership post and conflict management policies for the scheme.

General Objective

By the end of the training, the participants should be able to explain their IWUA Organization Structure, come up with an ideal IWUA structure, and its functions. The training to also assist members in understanding leadership & leadership skills, qualities of a good Leader, essence of teamwork, conflict and conflict management & resolution as well as enumerate the roles of IWUAs and their contribution to scheme development. The training should also enable farmers to change the attitude towards IWUA leadership as well as devise an Action plan for their IWUA.

Specific Objectives

1. Explain a prototype IWUA organization structure
2. Explain & discuss leadership, a leader, different types of leadership styles, good leadership & leadership characteristics
3. Explain importance of planning, organizing, directing, problem solving, decision making, monitoring & controlling, team work and team building
4. Define conflict, enumerate causes of conflicts, importance of resolving conflicts and conflict resolution methods

<ol style="list-style-type: none"> 5. Possible conflicts in a scheme through dramatization and enumerate lessons learned from the drama 6. Explain leadership guidelines, identify weaknesses & strengths in the current IWUA 7. Formulate IWUA action plan
<p><u>Flow of Discussion</u></p> <ol style="list-style-type: none"> 1. Discuss IWUA Organization Structure, function & roles 2. Discuss Leadership 3. Discuss leadership Functions 4. Conflicts, sources, importance of conflict resolution & resolution mechanisms. 5. Example of possible conflicts through dramatization 6. Leadership policies 7. Coming up with Leadership policies for the IWUA 8. IWUA action plan
<p><u>Methodology</u></p> <ol style="list-style-type: none"> 1. Lecture 2. Workshops /Group Work
<p><u>Time Frame & Time of Conduct</u></p> <p>Two days; Before scheme implementation</p>
<p><u>Participants</u></p> <p>30 members of the IWUA (All IWUA leaders included)</p>
<p><u>Requirements</u></p> <ol style="list-style-type: none"> 1. Lecture materials 2. Flip Charts 3. Current IWUA bylaws

Source : JICA Team

(2) Training Objective

The main objective of the training was to equip farmers with knowledge and skills on IWUA leadership, leadership policies, characteristics of a good leader, sources of IWUA conflicts and the various conflict resolution methods. The action plan for this training was for that the farmers were expected to come up with leadership and conflict management guidelines for their IWUA that would be incorporated in the IWUA bylaws.

(3) Session Objective

The specific training objectives for Unit 2 were:

1. IWUA organizational structure

During this session the farmers were expected to gain knowledge and skills on:-

Objectives of an IWUA

Role and functions of an IWUA

The IWUA organizational structure

Formulation of a suitable organizational structure for their IWUA

2. Introduction to Leadership

During this session the farmers were expected to gain knowledge and skills on:-

Principles of Leadership

Different leadership styles;
Good leadership skills;
Leadership Characteristics.

3. Leadership functions

During this session the farmers were expected to gain knowledge and skills on:-

Planning
Organizing and directing
Problem solving and decision making
Facilitation and motivation
Monitoring and controlling,
Importance of team play
Team building skills

4. Conflicts and conflict resolution

During this session the farmers were expected to gain knowledge and skills on:-

Sources of conflict in an irrigation scheme
Importance of resolving conflicts
Conflict resolution methods
Demonstrated IWUA ability to resolve conflicts in the scheme

5. IWUA leadership policies including:-

Identification of the weakness in the current leadership and leadership guidelines
Formulation of leadership guidelines for the IWUA
Incorporate the developed leadership guidelines to the IWUA bylaws

(4) Detail Activities

1) Introduction to IWUA organisational structure

This session was a recapitulation on the IWUA organizational structure from previous trainings. It looked at the definition of an IWUA, its objectives, roles and functions at all the phases of scheme development. The composition of an IWUA and laws that govern it were dealt with. The qualities of an ideal IWUA were enumerated and discussed so that the group could develop theirs in that line.

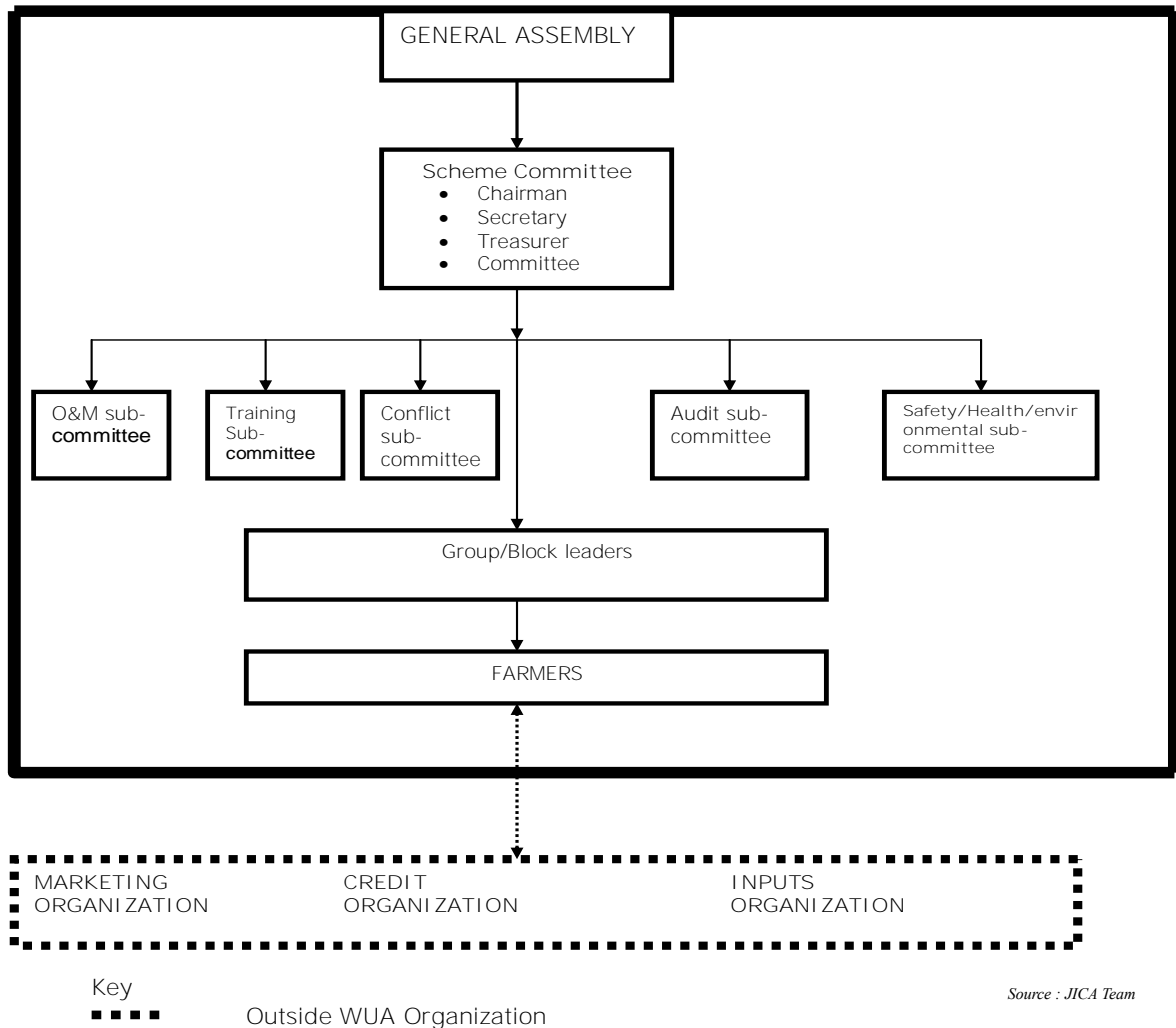


Figure 1.3.1 Structure of IWUA Committee

2) Introduction to Leadership

The objective for this session was to train farmers on leadership as applies to their scheme. It looked at the qualities of a good leader and the styles of leadership that have been used in governance. The advantages and disadvantages of these leadership styles were discussed and their application to scheme management discussed. The knowledge learnt during the session was to be applied in the leadership of the individual irrigation schemes.

3) Leadership functions

The participants were taken through the functions of leadership that ensures that an irrigation scheme realizes its objectives. These functions include planning for the scheme, facilitation in scheme activities and taking an active role in resolving conflicts

that arise in an irrigation scheme.

4) Conflict and conflict resolution

The session aimed at giving a general view on conflicts that arise in any organization and in particular irrigation schemes. The participants were introduced to conflict, causes of conflict, types of conflicts and common conflicts in irrigation projects. Emphasis was laid on the causes, importance of resolving conflicts and methods of resolving conflicts. The ability to resolve conflicts was agreed upon as a great pillar in IWUA management

5) Role play on conflict and conflict management

The farmers were tasked to prepare and present a role play depicting the following potential conflicts that are common in an IWUA as well as demonstrate the various ways of resolving them.

The following were the areas that the various groups were to demonstrate conflict management in the role play:

Poor financial management

Poor IWUA leadership

Water distribution

6) Leadership Politics

The farmers through group discussions were engaged to identify the weaknesses & strengths in the current IWUA leadership which was capped with the characteristics of a good leader and the various guidelines to be incorporated in the IWUA bylaws. From the results of the presentations by the farmers an action plan was prepared.

This involved suggestions on the various policies that would be entrenched in their constitution.

During this session, the farmers are introduced to the different personalities in a group with emphasis in an IWUA organization and how the different personalities affect the performance of the groups. The facilitator also describes how positive aspects of different personalities in a group can help the members of the group work together harmoniously.

(5) Time Table of the Training

DAY/TIME	TOPIC/SESSION	PERSON RESPONSIBLE
DAY ONE		
8.30 – 9.00 am	Registration of participants	Participants
9.00 – 9.15 am	Opening programme and climate setting	SCIO

9.15 – 9.30 am	Pre-training knowledge evaluation	SCIO/SCAO
9.30 – 10.40 am	IWUA organizational structure and Leadership <ul style="list-style-type: none"> • IWUA Objectives • IWUA roles and functions • IWUA organizational structure 	SCIO
10.40 – 11.00 am	Break	
11.00 – 1.00 pm	Leadership <ul style="list-style-type: none"> • Introduction to leadership • Qualities of a leader • Styles of leadership 	SCSDO
1.00 – 1.30 pm	Lunch break	
1.30 – 3.30 pm	Leadership functions <ul style="list-style-type: none"> • Planning • Facilitation • Conflict resolution 	SCAO
	DAY TWO	
8.30 – 9.00 am	Recapitulation	
9.00 – 10.40 am	Conflict and conflict resolution <ul style="list-style-type: none"> • Introduction to conflict • Sources of conflict and conflict resolution 	SCSDO
10.40 – 11.00 am	Break	All
11.00 – 01.00 pm	Pole play	Participants
01.00 – 01.30 pm	Lunch break	
01.30 – 03.30 pm	IWUA leadership policies (Group work)	SCIO Participants
03.30 – 04.00 pm	Post training knowledge evaluation	SCIO/SCAO

(6) Facilitation to IWUA Members (Following up Program)

Facilitation to follow-up on the action plan prepared during the training to backstop on the revision of the bylaws to include the leadership and conflict management policies. The facilitation team to also follow-up on the updating of the books provided by the project for IWUA organizational records including Membership register, Discipline book, Minutes and development fund book. Necessary observations and suggestion can be made in the case there are several conflicts during construction and operation period, including farmers' participation into the construction works and water distribution, and so on.

1.3.5 Financial Management & Record Keeping (Unit 3)

(1) Outline

The training will equip the participants with knowledge, attitudes, and skills on IWUA financial management system. The farmers will be trained on the 3 components of a financial management system including financial planning, financial recording and financial control. The farmers will also be assisted to open the various financial records that

an IWUA is expected to maintain.

<p><u>General Objective</u></p> <p>At the end of the 3 days training, the participants will be trained on financial management system, its components and its importance. They are expected to gain knowledge on budget preparation, basic book keeping as well as financial control. This 3day training is not enough to cover all that pertains to financial management and so there will be a follow up program during or after construction. Beyond training, the IWUAs will be assisted to open up the original books of entry.</p>
<p><u>Specific Objectives</u></p> <p>The participants will be able to:</p> <ol style="list-style-type: none"> 1. Define financial management and simple book keeping 2. Discuss the importance of book keeping 3. Enumerate various financial records necessary for basic book keeping 4. Discuss budgeting & budgetary control 5. Discuss financial reports (Annual & Management) 6. Discuss the auditing process 7. Develop and open the various accounting records
<p><u>Flow of Discussions</u></p> <ol style="list-style-type: none"> 1. Financial management and book keeping 2. Financial records and their importance 3. Budgeting & budgetary control 4. Financial reports 5. Financial audits 6. Facilitate opening of basic financial records
<p><u>Methodology</u></p> <ol style="list-style-type: none"> 1. Lecture 2. Small group task 3. Role play
<p><u>Time Frame & Time of Conduct</u></p> <p>2 days – Before construction works begin</p>
<p><u>Requirements</u></p> <ol style="list-style-type: none"> 1. Prototype financial records 2. Flip charts 3. Visuals

Source : JICA Team

(2) Training Objective

The main objective for this training is to equip farmers with knowledge and skills on record keeping and financial management. The farmers are expected to learn about financial planning, financial recording and financial reporting. They are also expected to be guided on to opening the various relevant financial records for their IWUA. Finally they are expected to come up with good financial management policies which will be incorporated in their bylaws.

(3) Session Objective

1) INTRODUCTION TO FINANCIAL MANAGEMENT

- Define financial management and book keeping
- Discuss IWUA activities
- Describe IWUA activities with financial implications
- Identify the need for financial planning and management

2) GROUP DISCUSSION - IWUA FINANCES

- Identify the sources of IWUA income
- Identify the expenditures of IWUA income

3) FINANCIAL RECORDS

- Define the various terminologies used in book keeping
- Discuss the basic accounting principles
- Enumerate the various financial records kept and books of original entry that should be maintained by an IWUA
- Identify the weaknesses in their current financial records
- Demonstrate the ability to open various IWUA financial records

4) ROLE PLAY – FINANCIAL MANAGEMENT

A Dramatization of Financial misappropriation of IWUA finances and the various effects of that on the IWUA performance and sustainability

5) BUDGETING & BUDGETING PROCESS

- Define a budget
- Explain the importance of budgeting
- Describe the budgeting process
- Demonstrate the ability to prepare an IWUA budget
- Explain the need for budgetary control
- Enumerate the various methods to control budgetary expenditure

6) FINANCIAL REPORTING & AUDITING PROCESS

- Define financial reporting
- Discuss the importance of financial reports
- Describe the various types of financial reporting
- Outline the contents of financial report

- Describe the best IWUA financial reporting practice
- Define and discuss the importance of Auditing
- Discuss the auditing process

7) GROUP EXERCISE – FINANCIAL POLICIES & GUIDANCE ON OPENING FINANCIAL RECORDS

The farmers during this workshop should be guided to develop policies for the financial management of the IWUA. The possible policy areas include:

1. Expenditure limits - Chairman & the Treasurer
2. Bank account operation
 - Signatories
 - Mandatory signatory
3. Collection of water fee
 - Method of calculating dues
 - How to receipt payments
4. Payment of irrigation dues (order of payment)
 - Penalties
 - Past dues
 - Current dues
5. Depositing of money procedures
6. How to handle tenants in collecting Irrigation dues
7. Penalties for failure or delay of payment dues
 - Principal amount due
 - Interest
 - Allowance – time periods
8. Capital build up (reserves) fund
9. Procurement policy

(4) Detail Activities

1) Introduction to Financial Management

The objective of this session is to recap on the IWUA organisational structure to demonstrate the importance of financial management in the IWUA. The facilitator is also expected to demonstrate the fact that the IWUA finances are required in all stages of irrigation development. Finally the facilitator is expected to define financial management and book keeping and the importance of financial management

2) IWUA income and Expenditure

During this session, the farmers are divided into 2 groups and tasked to discuss the

various sources of IWUA income and the various uses of IWUA income. The groups are expected to make a presentation of their findings and the facilitator assists them in identifying the key sources of IWUA income and expenditure. The main objective is to introduce the idea of water fee being a major source of IWUA income.

3) Financial Records

During this session, the farmers are trained on the various terminologies used in book keeping including assets, liabilities, income, expenditure, cash, bank, profit, loss, capital build up among others. They are then trained on the various book keeping principles. Finally the participants are trained on the various financial records that the IWUA is expected to maintain including cash book, petty cash book, income and expenditure book, asset register, stocks register, membership register and financial records file.

4) Role play financial management

The objective for this session is for the farmers to demonstrate the importance of proper financial management system through a short dramatization depicting:

Financial misappropriation
Lack of financial plans/budgets
Lack of proper record keeping

The participants are expected to portray the various conflicts that would arise from each of the areas.

5) Financial Reporting

The objective of this session is to train the farmers on the various financial reports that an IWUA should prepare annually in accordance with the law. These include Statement of Income & Expenditure, Statement of Financial Position (Balance Sheet), Cash flow Statement among others. The importance of the preparation of these reports to all members of the scheme is emphasized as they are the records that show how the IWUA is performing financially.

Due to the limited technical capacity of the farmers, they are not expected to know how to prepare these financial reports but to be aware of what they contain. They are advised to engage the services of a professional accountant to assist them in developing the books at the end of the year

6) Financial audits

The objective of this session is to enlighten farmers on the importance of financial audits for the financial records prepared under 9.4.2(5). Emphasis is placed on the fact that audits can disclose any malpractices among the leadership and also point out any

weaknesses in the IWUA financial management and give recommendations for improvement.

The current Law does not require that IWUAs be audited. However, due to the advantages of conducting the IWUA audit, the facilitators emphasize on the importance of the exercise.

7) Guidance on financial policies and opening of basic financial records

During this workshop, the farmers will be assisted in opening up samples of various records and they will be given a booklet containing samples of the various records that an IWUA is meant to maintain. They will also be provided with the various books that they will use to record the various financial transactions.

The books provided include:

Cash book

Petty cash book

Income and expenditure book

Asset register book

Development fund book and

A blank file for filing all the receipts, deposit slips, invoices, vouchers and other support documents

During this session, the participants are expected to develop financial policies which after endorsement by the general assembly would be incorporated in the IWUA bylaws.

(5) Facilitation to IWUA Members (Following up Program)

Accounting book kept by the IWUA will be checked regularly and a follow-up program will be organized to monitor if the IWUA keeps the accounting records as per the recommended formats. Additional refresher training course will be organized, if necessary.

(6) Training Time Table

Day/Time	Session	Facilitator
Day 1 8.30 am- 9.00 am	Registration of participants	
9.30 am – 10.00 am	Opening program and climate setting.	SCIO/SCAO
10.00 am – 11.00 am	Introduction to Financial Management	SCIO
11.00 am – 11.30 am	Tea break	
11.30 am – 1.00 pm	IWUA finances Sources of IWUA finances (Discussion – all)	SCSDO
1.00 pm -2.00 pm	Lunch break	
2.00 pm – 4.00pm	Financial Records I	SCSDO
Day 2	Recapitulation	

Day/Time	Session	Facilitator
8.30 am – 9.00 am		
9.00 am – 11.00 am	Financial Records II	SCAO
11.00 am – 11.30 am	Tea break	
11.30 am – 1.00 pm	Financial Records iii – Group task <ul style="list-style-type: none"> • Identify the weaknesses in their current financial records • Demonstrate the ability to open various IWUA financial records Output presentation.	SCAO
1.00 pm – 2.00 pm	Lunch break	
3.00 pm – 4.30 pm	Role-play A Dramatization of Financial misappropriation of IWUA finances and the various effects of that on the IWUA performance and sustainability	SCSDO
Day 3 8.30 am – 9.00 am	Recapitulation	
9.00 am – 11.00 am	Budgeting & Budgeting process	SCIO
11.00 am – 11.30 am	Tea break	
11.30 am – 1.00 pm	Financial Reporting & Auditing	SCSDO
1.00 pm – 2.00 pm	Lunch break	
2.00 pm – 3.00 pm	Financial Policies	SCAO
4.00 pm – 4.30 pm	Closing program	SCIO/SCAO

1.3.6 On Farm Water Management and Practical Irrigated Agriculture (Unit 4)

(1) Outline

The broad objective of this session is to equip the beneficiaries with the necessary skills to undertake on farm level water management and the knowledge for Practical Irrigated Agriculture to enhance sustainability of the schemes by ensuring efficient utilization of the water resources and maximize productivity. In the course of program, it is also focused to equip the farmers with understanding of i) proper water management (distributions and application), ii) the relationship between water, crops and soil with water application schedules for various crops. It is noted that there are basically three main irrigation methods of on-farm level water application, i.e. furrow sprinkler and drip. Therefore, both application methods and technologies will be guided to the farmers so as to adopt themselves based on not only their hydraulic conditions but also their economical/affordable investment conditions.

At the end of the training, the farmers will have identified the preferred cropping enterprises for their respective schemes and will have hands on experience on water application methodologies.

<p><u>Training Objective</u></p> <p>The participants are expected to acquire the knowledge and skills of how to manage the water to successfully grow a crop at farm level.</p>
<p><u>Specific Objectives</u></p> <p>At the end of the course, the participants should be able to:</p> <ol style="list-style-type: none"> 1. Describe the relationship between Plant, Soil and water and the need for irrigation 2. Explain crop Agronomy in relation to crop water requirement, irrigation scheduling, cropping calendar & pattern and crop rotation 3. Explain various water application technologies at farm level in relation to suitable cropping enterprises. 4. Describe challenges associated with irrigation such as water amount and quality, crop diseases, nutrient balance and soil properties 5. Describe crop Agronomy in relation to on-farm water management so as to maximize productivity.
<p><u>Expected Outcomes</u></p> <ol style="list-style-type: none"> 1. Water application schedules of given crops 2. The participants will identify the preferred cropping enterprises for their respective schemes and have practical hands on experience on water application methodologies and adherence to set schedules
<p><u>Training Flow</u></p> <ol style="list-style-type: none"> 1. Water management – conveyance, distribution, application. 2. Water requirements – plant water soil relationships 3. Irrigation technologies – furrow, sprinkler, drop and rotation in irrigation block 4. Practical water management
<p><u>Methodology</u></p> <ol style="list-style-type: none"> 1. Lecture 2. Plenary workshop 3. Field Practice (On the Job Training (OJT) in the field)
<p><u>Participants</u></p> <p>30 farmers from the scheme, representing each irrigation block</p>
<p><u>Time of Conducting this Training</u></p> <p>After Completion of Phase I Units, inclusion of partial completion with irrigation blocks in the upstream part of the scheme</p>
<p><u>Requirements</u></p> <ul style="list-style-type: none"> ▪ SCHEME DESIGNS - Scheme layout/topographic map ▪ SOILS DATA for respective schemes ▪ Materials for practical ▪ Visuals ▪ Flip chart ▪ On the Job Training in the demonstration field

(2) Detail Activities

1) SESSION 1: Introduction to On-farm water Management and irrigated agriculture

At the end of the session the Participants SHOULD be able to;

Discuss their current on-farm practices in respect to cropping enterprises, water systems and application methods, soil properties and cropping calendar with the aim of improving current practices.

Discuss Irrigated agriculture as opposed to rain-fed agriculture in terms of on-farm operations.

Explain on-farm water management in the context of Irrigated agriculture.

Enumerate and explain activities constituting on-farm water management.

Outline post-harvest activities in relation to Irrigated produce.

2)SESSION 2: Plant, Soil and Water relationships

At the end of the session the Participants SHOULD be able to;

Discuss plant, soil and water relationships in relation to the need for irrigation in crop growth

Describe Soil and its properties in relation to crop selection and Irrigation requirements

3)SESSION 3: Crop water requirements and Irrigation Agronomy

At the end of the session the Participants SHOULD be able to;

Define crop water requirements (CWR).

Outline factors of crop water requirements and determination of CWR.

Discuss CWR in relation to crop growth stages for specific crop enterprises

Discuss irrigation in relation to CWR

4)SESSION 4: Formulation of Cropping Calendar and Pattern

At the end of the session the Participants SHOULD be able to;

Discuss crop enterprise selection

Discuss elements of a cropping calendar

Demonstrate ability to formulate a cropping calendar and pattern in relation to crop water requirements and on-farm water management.

Explain crop rotation in optimization of a cropping calendar and pattern.

5)SESSION 5: Irrigation systems and water application technologies

At the end of the session the Participants SHOULD be able to;

Discuss different types of irrigation systems, conditions for their selection, advantages and disadvantages. i.e. pressurized and Gravity fed systems

Discuss various field water application technologies including their advantages and disadvantages i.e. furrow basin, sprinkler, drip etc.

Describe selection criteria for application methods in relation to cropping enterprise

6)SESSION 6: Crop management under irrigation

At the end of the session the Participants SHOULD be able to;

Discuss crop management challenges associated with water application i.e. over & under irrigation, water logging etc.

Discuss cropping challenges arising from soil and water quality s i.e. Salinity their symptom identification and management

Discuss crop diseases prevalent in an irrigation environment and their remedy

Explain challenges of nutrient availability in an irrigation field

7)SESSION 7: Irrigation agronomy 1; Nursery and Field (Seed bed) preparation

At the end of the session the Participants SHOULD be able to;

Describe nursery preparation and management for irrigated crops, including sowing methods

Discuss suitable field (seedbed) preparation for various cropping enterprises including field leveling.

Demonstrate ability to prepare the Field (seedbed) for irrigated agriculture for various cropping enterprises and transplanting technology.

8)SESSION 8: Irrigation Agronomy 2; Irrigation and crop husbandry

At the end of the session the Participants SHOULD be able to;

Discuss various cropping enterprises in their locality

Discuss crop husbandry practices for selected cropping enterprises under irrigated agriculture i.e. seeding, transplanting, weeding, spacing, fertigation, disease management etc.

Disease management for selected crops

9)SESSION 9: Post -harvest Handling and processing

At the end of the session the Participants SHOULD be able to;

Discuss pest management on farm and at post-harvest

Outline integrated pest Management

Discuss post-harvest handling and to international guidelines for export produce. i.e. Euro Gap

Discuss post-harvest value addition for selected produce. I.e. drying, processing etc.

10)SESSION 10: Field practical's

At the end of the session the Participants SHOULD be able to;

Demonstrate ability to prepare fields for cropping under irrigation

Discuss the need for field leveling and demonstrate ability to prepare the same

Demonstrate ability to apply the correct amounts of water for irrigation

Demonstrate ability to undertake select water application methods

Demonstrate familiarity with value addition equipment

DAY/TIME	TOPIC/SESSION	PERSON
DAY 1		
8:00 – 8:30	Registration of participants	Participants
8:30 – 8:45	Opening program	
8:45 – 9:00	Ice breaking/Climate setting	
9:00 – 9:15	Pre training evaluation	Course coordinators
9:15-11:15	Session 1 : Introduction to On-farm water management	PMT
11:15 – 11:30	Break	
11:30 – 13:30	Session 2 : Plant, Soil and water Relationships	PMT/SCAO
12:30 – 13:30	Lunch Break	All
13:30 – 15:30	Session 3: Crop water requirements and Irrigation Agronomy	PMT/SCIO
15:30 – 15:45	Review of the sessions	
DAY 2		
8:00 – 8:30:	Recapitulation	
8:30 – 10:30	Session 4: Formulation of Cropping Calendar and Pattern	SCAO/PMT
10:30 – 10:45	Break	
10:45 – 12:45	Session 5: Irrigation systems and water application Technologies	SCIO/PMT
12:45 – 13:45	Lunch break	
13:45 – 15:45	Session 6 : Crop management under Irrigation	PMT/SCAO
15:45 – 16:00	Review of the sessions	
DAY 3		
8:00 – 8:30:	Recapitulation	
8:30 – 10:30	Session 7: Irrigation agronomy 1 ; Nursery and Field (Seed bed) preparation	SCAO/PMT
10:30 – 10:45	Break	
10:45 – 12:45	Session 8 : Irrigation Agronomy 2;Irrigation and crop husbandry	SCAO/PMT
12:45 – 13:45	Lunch break	
13:45 – 15:45	Session 9 : Post -harvest Handling and processing	PMT
15:45 – 16:00	Review of the sessions	
DAY 4		
8:30 – 9:00	Move to the farm	
9:00 – 15:00	Session 10 : FIELD PRACTICALS (1) Irrigation method (furrow, basin, drip, and sprinkler) (2) Watering, Soil condition ,applying the fertilizer, seed bed	SCAO/SCIO/PMT
15:00 – 15:30	Move to the lecture place	
15:30 – 16:00	Post training evaluation	Course coordinators
16:00 – 16:15	Closing program	Course coordinators

Source : JICA Team

1.3.7 Irrigation System Management (Unit 5)

(1) Outline

The objective of this session is to enhance farmers' skills on operation and maintenance of irrigation system to ensure scheme sustainability. They will be trained on the roles of IWUA (leaders and members) in scheme management, such as I) water distribution plan as well as its implementation, ii) water fee collection and management, iii) cropping calendar preparation and iv) system maintenance plan. They will also be trained on data information monitoring and evaluation. At the end of the training, the farmers will come up with a system management action plan.

<p><u>General Objective</u></p> <p>At the end of the 3 days training, the participants will be able to prepare an “Action Plan” for operation and maintenance of their irrigation system</p>
<p><u>Specific Objectives</u></p> <p>The participants will be able to:</p> <ol style="list-style-type: none"> 1. Identify the duties of IWUA in Irrigation scheme management (Operation and Maintenance (O&M)) 2. Explain and develop a water distribution plan for the system level 3. Understand components of water fee and how it may be charged 4. Formulate policies of irrigation system operation and maintenance
<p><u>Flow of Discussion</u></p> <ol style="list-style-type: none"> 1. Duties of IWUA in O& M of the scheme 2. Water distribution plan and its implementation 3. Water fee system 4. Policies of O&M of the irrigation scheme
<p><u>Methodology</u></p> <ol style="list-style-type: none"> 1. Lecture 2. Small group task 3. Workshop
<p><u>Time Frame & Time of Conduct</u></p> <p>3 DAYS; In prior to scheme completion</p>
<p><u>Participants</u></p> <p>Management committee and sub-committee and lateral leaders</p>
<p><u>Requirements</u></p> <ul style="list-style-type: none"> ▪ Scheme Layout ▪ Scheme O & M Manuals ▪ Flip Charts ▪ On the Job Training in the demonstration field

(2) Detail Activities

Source : JICA Team

1) Duties of IWUA in O& M of the scheme

The objective of this session is to introduce as well as enhance the IWUAs (leaders and

members) skills for irrigation system management (operation and maintenance) by identifying their roles & duties. The farmers are expected to take a pivotal role in generation of their roles and functions during this phase of scheme development.

2) Water distribution and water distribution plan

During this session, the facilitator will train the farmers on water distribution relevant to their irrigation system. The farmers will be trained on I) how water is abstracted (at intake), conveyed, diverted by using measuring devices then shared to each members to ensure equity; and ii) how to prepare a water distribution plan for their schemes based on the cropping calendar and seasonal water requirements through out a year. The farmers will be enlightened as to their roles in sharing and monitoring the water distribution to reduce water conflicts, in a proper manner.

3) Water fee

During this session, the farmers will be introduced to water fee and its system as well as the importance of paying for water. The farmers will also be trained on how to calculate water fee in their scheme, how to levy water fee and how to collect the water fee. They will also be trained on the uses of the water fee including payment for WRMA bills and the operation and maintenance cost in each scheme. They will also be trained on the water fee management records to be maintained for water fee levying and collection.

4) Policies of O&M of the irrigation scheme

Based on the roles and duties identified by the members of IWUA, basic skills on operation and maintenance of irrigation systems, basic knowledge on water fee collection and utilization, the policies of irrigation system management will be discussed and formulated along the workshop under facilitation of SCIOs and instructors.

5) Irrigation Planning and Water Distribution

Irrigation planning is based on i) cropping calendar over the irrigation scheme (crop types and planted area of each season), ii) seasonal water requirement of each crop, then iii) annual water requirement for each month over the irrigation scheme is estimated and planned as an “irrigation plan”. On the other hand, water distribution plan is based on “irrigation plan” and “irrigation block schematic diagram where the target plots are located in irrigation blocks under irrigation canal/ pipeline networks. The amount of water to be distributed seasonally for each canal/ pipeline network is determined in accordance with the service area of each canal/ pipeline. The JICA Team will prepare a proto-type irrigation scheduling and distribution plan so that the SCIOs can develop the plan for each irrigation scheme.

6) Water Measurement and Monitoring

Based on the WRMA’s specification, water measurement device and methods are

mainly categorized into following two types 1) and 2). In addition to this river discharge will be measured and monitored in the manner described in 3).

7) Water Measurement for Pipeline Irrigation System

For a pipeline irrigation system, it is required to install a water master meter to measure the current intake discharge as well as bulk amount of water abstracted from the datum date. Therefore, it is proposed to install a water master meter in the immediately downstream of sedimentation tank and discharge will be measured periodically by IWUA members and the WRMA officer in charge of each pipeline scheme. A training will be provided to IWUA members on measurement (how to read) and record keeping.

8) Water Measurement for Open Channel Irrigation System

For an open channel irrigation system, it is required to install staff gauges at the intake (on the retaining wall, upstream of intake gate, H1 (m)) and intake canal (in the downstream of the intake gate, H2 (m)). In prior to carrying out the discharge measurement at intake canal, an H-Q curve, a discharge (Q) characteristic curve related to the water levels, will be prepared based on the following parameters: I) head difference (H), i.e. water levels at the intake (H1) and at intake canal (H2); ii) intake gate width (B1); iii) intake gate opening (a), iv) discharge coefficient of the intake gate (C). Calculation, calibration and preparation of H-Q curve will be conducted by SCIOs with assistance of JICA Team, and then the training of water discharge measurement will be carried out to IWUA members by SCIOs with assistance of JICA Team. By using an H-Q curve, IWUA members will be able to measure, monitor and record the intake discharge, simply by reading two water levels at H1 and H2 and gate opening (a).

9) Water Measurement for River Discharge

It is also noted that training will be conducted for measurement, monitoring and recording of river discharge using the staff gauge provided on the retaining wall of intake weirs. In prior to the measurement, another H-Q curve for river discharge will be prepared based on I) the dimension of the weir as well as ii) characteristic formula and iii) water level measured at the intake weir. The preparation will be carried out by SCIOs with assistance of JICA. The training to IWUA on the river discharge measurement will be provided together with above trainings described in (1) and (2). Through river discharge measurement, IWUA will be able to detect the flood condition and close the intake gate so as to prevent from intrusion of excess sediment into irrigation system. IWUA also will be able to detect “drought condition” so as to adjust (reduce) water distribution amount to each block among the irrigation network to ensure equity.

10) Operation of Irrigation System

In order to distribute the water in timely and appropriate manner, operation of gate structures (such as intake gate, gate at diversion structure and off-takes at secondary/ tertiary levels) will be a key factor, especially for open channel irrigation system. Therefore, gate operation for regulating the discharge in canals/ pipelines will be focused in the training of IWUA members, using H-Q curves for each gate type and hydraulic condition. H-Q curves will be prepared by SCIOs with assistant of JICA Team. An overall operation manual for each scheme will be also prepared by the JICA Team, and used in the IWUA training.

11) Planning and Implementation of Maintenance Activities

In order to keep irrigation system to function as demanded, efficiently and smoothly, maintenance of irrigation system should be done by IWUA members of each scheme. Planning and budgeting of the maintenance works will be made annually or seasonally so as to conduct the works. Maintenance works of the irrigation system consists of I) routine maintenance, ii) periodical maintenance, iii) minor repair, IV) major repair and v) replacement/ rehabilitation. Through routine/ periodical maintenance works such as removal of sediment from sedimentation tank and/ or upstream of intake weir, open channels will be conducted by IWUA members so as to contribute for irrigation network to function appropriately. If some parts of irrigation system have been damaged, those parts should be repaired by IWUAs, with assistance of SCIOs, technicians so as to retrieve their original function. Those maintenance works/ sample of simple repair works that can be by IWUAs will be also included to the O&M manual prepared by the JICA Team, and used in the IWUA training.

12) Monitoring of Maintenance Works

Routine maintenance work such as monitoring of pressure gauge along pipelines will also contribute to detect the failures and/ or damages along pipeline networks and those failure/ damages should be repaired by IWUAs. Those maintenance works procedures will be included to the O&M manual that will be prepared by the JICA Team, and used in the IWUA training.

13) Simple Asset Management of Irrigation System

After completion of construction of irrigation system, a simple asset inventory form will be prepared and introduced for recording the irrigation system network. When damages/ failure of some sections of irrigation system have been detected and repair works have been done to those deteriorated sections, those repair records will be also recorded in the above asset inventory form so as to learn/ feedback to the future maintenance work as an asset management. A simple manual for asset management will also be included in the O&M manual, and used in the IWUA training.

14) Collection of O&M Fee

In the course of irrigation development, appropriate water fee will be required for implementation of several activities, such as payment to the WRMA, operation of the system, and maintenance of the system. Therefore, based on the workshop and meetings among IWUA members, “water fee system” is discussed and established under consensus of members. It may consists of the following major components: i) WRMA water fee (basic running cost), ii) Operation cost (technical and administrative running cost), iii) Routine maintenance cost (some percentage of construction cost), iv) Major repair cost (periodically collected and stored, or collected on an ad hoc basis).

The JICA Team will collect necessary data and information related to annual/monthly budget and expenditures with collection system of the fee from the SIDEMAN Project and existing irrigation scheme, namely, Kasokoni Irrigation Scheme so as to review and analyse the current situation and challenges encountered in the schemes, and subsequently to determine an appropriate amount of the fee with its collection methods in the irrigation schemes for proper maintenance works.

The fee is to be determined taking into consideration farmers’ gross margin under the irrigated farming.

DAY/TIME	TOPIC/SESSION	PERSON
DAY 1		
8:00 – 8:30	Registration of participants	Participants
8:30 – 8:45	Opening program	
8:45 – 9:00	Ice breaking/Climate setting	
9:00 – 9:30	Pre training evaluation	Course coordinators
9:30 – 10:30	Session 1: Introduction of Irrigation System Management (1) Feature of Irrigation system (2) Necessity of Irrigation system O&M (3) Management of an irrigation system (4) Cropping Pattern management with irrigation structure (Recapturing of Uni4 training)	
10:30 – 11:00	Break	All
11:00 – 12:30	Session 2-1: Formulation of Water Distribution Plan (1) Water Demand based on Crop calendar	
12:30 – 13:30	Lunch Break	
13:30 – 15:00	Session 2-2: Formulation of Water Distribution Plan (1) Water distribution plan and rotation with proper irrigation method and Cropping calendar	
15:00 – 15:15	Break	
15:15 – 16:45	Session 2-3: Formulation of Water Distribution Plan Group Work : Preparation of Water distribution plan	
16:45 – 17:00	Review of the sessions	
DAY 2		
8:00 – 8:30:	Recapitulation	

DAY/TIME	TOPIC/SESSION	PERSON
8:30 – 10:00	Session 2-4: Formulation of Water Distribution Plan Presentation and Discussion of Proposed Water distribution plan	
10:00 – 10:30	Break	
10:30 – 12:00	Session 3-1: Irrigation Water Measurement and Monitoring (1) Method of measuring and monitoring the intake discharge with devices (water master meter: pipe system / staff gauges.: open canal system)	
12:00 – 13:00	Lunch Break	
13:00 – 14:30	Session 3-2: Irrigation Water Measurement and Monitoring (1) Method for measuring the river discharge (with H-Q curve) and River Gauging Station	
14:30 – 14:45	Break	
14:45 – 16:15	Session 3-3: Irrigation Water Measurement and Monitoring (1) Record keeping of correct irrigation water amount	
DAY 3		
8:00 – 8:30	Recapitulation	
8:30 – 10:00	Session 4: Operation for Irrigation system (1) Understanding of system components (2) Handling of gate structures (3) Water distribution through the irrigation system (4) Human resource how many people is necessary such as water guard	
10:00 – 10:30	Break	
10:30 – 12:00	Session 5 : Maintenance for Irrigation System (1) Roles and functions of IWUA for the O&M of irrigation system (2) Maintenance plan for irrigation system	
12:00 – 13:00	Lunch Break	
13:00 – 14:30	Session 6-1 : Monitoring, Repair/Replacement and Evaluation for Irrigation System (1) Monitoring method (concept) for Irrigation System (2) Repair and replacement Technique and Cost for Irrigation infrastructure	
14:30 – 14:45	Break	
14:45 – 15:45	Session 6-2 : Monitoring, Repair/Replacement and Evaluation for Irrigation System (1) O&M budgeting for the Irrigation infrastructure	
16:15 – 16:30	Review of the sessions on the field	
DAY 4		
8:00 – 8:30	Recapitulation	

DAY/TIME	TOPIC/SESSION	PERSON
8:30 – 9:45	Session 7-1 : Actual water fee reflected to O&M of Irrigation System (1) Irrigation system O&M cost (2) Calculation for water fee	
9:45 – 10:00	Break	
10:00 – 11:00	Session 7-2: Actual water fee reflected to O&M of Irrigation System (1) Collection method for water fee	
11:00 – 13:00	Session 8: Group Work - Irrigation system management Action plan (1) Formulation of policies for irrigation system and O&M schedule (reflect to the by-law) (2) Formulate Draft O&M staff list with specific responsibility (3) Preparation of Draft irrigation system O & M Action plan	
13:00 – 14:00	Lunch Break and Move to the field	
14:00 – 16:30	Demonstration on the field for Session 3 to 6 (1) How to operate and maintain the Irrigation system (2) How to monitor, repair, and replace the irrigation system	
16:30 – 17:00	Post training evaluation	Course coordinators
17:00 – 17:30	Closing program	Course coordinators
DAY 5		
	Session 9: Field Visit	

Source : JICA Team

CHAPTER 2 Implementation of Capacity Development for IWUA Members for Batch 1 Pilot Schemes

2.1 Outline of IWUA Training

Actual achievement of IWUA Capacity training is shown below.

Table 2.1.1 Achievement of Capacity Development Plan (as of 2014/9/31)

Scheme	Induction Training	Unit 1	TOT	Unit 2	Unit 3	Unit 4	Unit 5
Kasokoni	18th - 22nd Mar. 13 (Farmers) 18th - 19th Apr. 13 (Officers)	5th - 7th Aug. 13	17th - 21st Feb 14	8th - 9th Apr. 14	5th - 7th Aug. 14		
Mdachi		29th 31st Oct. 13		25th - 26th Mar. 14	19th 21st Aug. 14		
Olopito		21st - 23rd Aug. 13		2nd - 3rd Apr. 14	12th - 14th Aug. 14		
Gatitu/Muthaiga		4th - 6th Sep. 13		25th - 26th Mar. 14	9th - 11th Sep. 14		
Kaben		3rd - 5th Dec. 13		23rd - 24th Apr 14	26th - 28th Aug. 14		
Murachaki		29th - 31st Nov. 13		23rd - 24th Apr 14	3rd - 5th Sep. 14		
Tumutumu		1st - 3rd Oct. 13		23rd - 24th Apr 14	9th - 11th Sep. 14		
Muongano		5th - 7th Nov. 13		28th - 29th Apr 14	26th - 28th Aug. 14		

Source : JICA Team

2.2 Achievements and Analysis

2.2.1 Induction Trainings

Farmers Induction Training and Government staff induction workshop were held during on 18th – 22nd March 2013, on 18th -19th April 2013, respectively.

2.2.2 Evaluation Method for Training

As a matter of course, the training improves the knowledge itself. At the same time it should be focus on not only the remarkable improvement but the weak point that farmers still didn't understand well (Performance gap). That point is recommended to improve future trainings / Following up program.

To ensure that, we set the criteria which highlight the feature of their understanding with the Questionnaire result appropriately.

The basic idea of criteria is “Evaluated as a Group rather than an Individual farmer”.

In concrete terms, more than 50% of the group members know the correct knowledge; they can support each other and share the knowledge. Then 50% of the score become the watershed to evaluate the result.



Figure 2.2.1 The Basic Idea of Criteria (50% is Watershed)

We also take particular note of “The Score moved down or even”. Because that results might be included the improvement issue for original program as follows. *Source : JICA Team*

Farmer is already known well, confused, not concentrate, people who answer was changed),

Facilitator or/and Questionnaire itself is too easy, difficult to understand, confused

Table 2.2.1 Criteria for Descriptive Analysis

Criteria	Remark
Score less than 50% (<u>Before</u> training)	Farmers didn't understand well → Farmer's weak point before training as compared to "After training" score, we can measure the achievement of this training. *Double score After training means "Farmers acquire significant improvement" → Good lesson learned._
Score less than 50% (<u>After</u> training)	Farmers still didn't understand well (Performance gap) → <u>Recommendations to improve future trainings / Following up program</u>
Score down or even	The Farmer (Already Know well, confused ,not concentrate, people who answer was changed), Facilitator, or/and Questionnaire itself (too easy, difficult to understand, confused) → <u>Improvement for original program might be included</u>

Source : JICA Team

A questionnaire comprising of questions from the various training sessions was administered to the participants before and after the training to gauge the knowledge gain or lost during the training.

2.2.3 Community Mobilization and IWUA Formation (Unit 1)

(1) Implementation Schedule and participant information

All of the schemes training were conducted as shown below.

Table 2.2.2 Records of Unit 1 Training Program

SCHEME	PRE-TRAINING	TRAINING	FOLLOW-UP
Kasokoni	8/01/2013	8/5-7/2013	4/10/2014
Mdachi	10/16/2013	10/29-31/2013	3/17/2014
Olopito	8/15/2013	8/21-23/2013	4/04/2014
Gatitu/Muthaiga	8/13/2013	9/4-6/2013	3/27/2014
Kaben	11/27/2013	12/3-5/2013	4/25/2014
Murachaki	11/13/2013	11/29-31/2013	4/25/2014
Tumutumu	9/26/2013	10/1-3/2013	4/25/2014
Muungano	10/24/2013	11/5-7/2013	4/30/2014

Source: JICA Team

Table 2.2.3 Description of Unit 1 Training Program

SCHEME	PARTICIPANTS		RESOURCE PERSONS	Training Venue
	Male	Female		
Kasokoni	10	11	SIDEMAN-SAL capacity building team, Mr. Musyimi, SCIO, Mr. Simba, WRMA Loitoktok and Mr. Alwala, Cooperative Officer, Taveta	Luthern Church, Kasokoni
Mdachi	22	7	SIDEMAN-SAL capacity building team, Mr. Chengo, SCIO and Mr. Kalama, SCSDO Ganze	Bibleway Restoration Church, Jeribuni
Olopito	16	15	SIDEMAN-SAL capacity building team, Mr. Omwenga, SCIO, Mr. Nyaga, WRMA Narok and Mr. Moywaywa, Cooperative Officer, Narok	FPFK Church, Olopito
Gatitu/Muthaiga	13	12	SIDEMAN-SAL capacity building team, Mr. Wameyo, WRMA Rumuruti and Mr. Githuku, Cooperative Officer Nyahururu	St. Caterina Cathoric Church, Kiamariga
Kaben	18	6	SIDEMAN-SAL capacity building team, Mr. Mwangi, SCIO, Mr. Okiro, WRMA Nakuru and Ms. Jeruto SCSDO Marakwet East	AIC Church, Liter
Murachaki	21	7	SIDEMAN-SAL capacity building team, Mr. Gitonga, SCIO, Mr. Maina, WRMA Meru and Mrs. Njoka, SCSDO Mbeere South	ST. Luke Church, Ciangera
Tumutumu	21	7	SIDEMAN-SAL capacity building team, Mr. Mathuko, SCIO, Mr. Maina, WRMA Meru and Ms.	New Apostolic Church. Ntherone

			Wambugu, SCSDO Igembe South	
Muongano	15	16	SIDEMAN-SAL capacity building team, Mr. Musya, SCIO, Mr. Maina, WRMA Meru and Mr.Njagi, SCSDO Tharaka South	Methodist Church of Kenya, Miompono

Source: JICA Team

(2) Evaluation Summary

The results of the knowledge evaluation per scheme depicting the percentages of the farmers in the various scoring levels as well as the average mark for each scheme are as follows.

Table 2.2.4 Before & After Training Score of the Evaluation Questionnaires (Unit1)

Scheme	Before Training	After Training	Difference
Kaben	73%	75%	3%
Olopito	60%	65%	6%
Gatitu-Mutahiga	74%	81%	7%
Tumutumu	67%	71%	4%
Muongano	76%	84%	8%
Murachaki	57%	74%	17%
Kasokoni	63%	72%	9%
Mdachi	67%	72%	5%
All scheme	67%	74%	7%

Source : JICA Team

*100% is full marks. There is a slight difference between the scheme questionnaires; however these are compared in the same row.

The average score was 67% and 74% before and after the training respectively, therefore, on average, the knowledge gained after the training is 7%. The score varies among the scheme.

For example Murachaki irrigation scheme acquired largest improvement of knowledge at 17%. In comparison Kaben is 3%. We covered the detail evaluation of each scheme in the next chapter.

The training was a success in all the schemes. The farmers remarked that they were happy with the trainings and that they would use the knowledge gained to manage their IWUA better as well as train the other members of the scheme who did not attend the training.

Here in below is the summary of Descriptive Analysis for each scheme. We described the detail evaluation the following chapter.

Table 2.2.5 Summary of Descriptive Analysis for Each Scheme

Item	Main Follow up program item
Kaben	1.WRMA Application fee for Permit
Olopito	1.Function of IWUA 2.Farmers activity in operation stage 3.Project stakeholders 4.Benefits of registering IWUA as a legal entity
Gatitu Muthaiga	1.Component of Action Plan
Tumutumu	1.The way of ensuring the by law
Muongano	1.Best leadership for the scheme
Murachaki	-
Kasokoni	1.Factors that affect by-law enforcement 2.Structure build in this Scheme 3.Component of Action Plan
Mdachi	1.Importance of registering a group legally 2.WRMA Application fee for Permit

Source: JICA Team

(3) Evaluation of Each Scheme

1) Kasokoni

Among the women who attended the training, 2 could not read and write. This explains the reason why the results of the evaluation are less than the number of participants registered for the training. The average score was 66% and 71% before and after the training respectively, therefore, on average, the knowledge gained after the training is 5%. 48% of the farmers scored 70% and above in the post-training knowledge evaluation, compared to 60% in pre-training knowledge evaluation. This performance shows that the training was a great success and that farmers understood the concepts that were taught.

Table 2.2.6 Results of Evaluation of Unit 1 Training Program in Kasokoni Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	2	9%
80-89%	2	10%	2	9%
70-79%	3	15%	12	55%
60-69%	8	40%	3	14%
Below 60%	7	35%	3	14%
Total Participants	20	100%	22	100%
Average Score	63%		72%	

Source : JICA Team

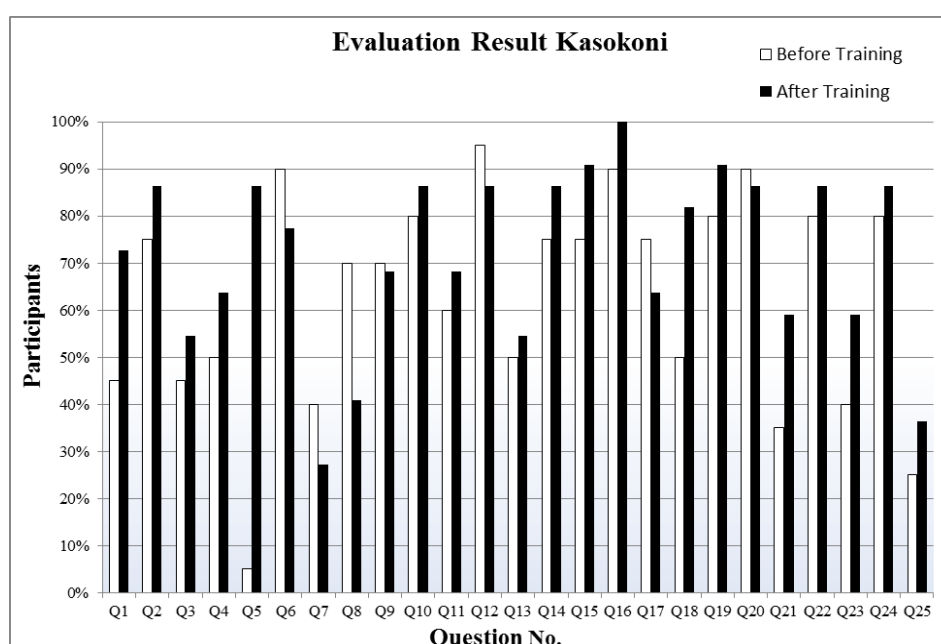


Figure 2.2.2 Result of Knowledge Evaluation in Kasokoni Scheme

Source: JICA Team

Table 2.2.7 Evaluation per Question for Unit 1 Program in Kasokoni Scheme

Qs No	Content	Performance	Remarks
Low Scoring Questions during Pre & Post knowledge Evaluations			
3	The Main function of an IWUA	PT – 45% AT – 55%	The main function is to supply water for irrigation. Most farmers responded that the main function is the enforce by-laws
7	Factors that affect by-law enforcement	PT – 40% AT – 27%	The farmers think that their education level affects enforcement of by-laws. In future they can be engaged in discussing the factors that would affect the operationalization of their by-laws during the session on by-laws so that the farmers generate the answers themselves thereby making the session very practical.
9	Who is responsible for the Schemes' Operations and Maintenance	PT – 70% AT – 68%	It seems that the farmers' responsibility in O&M was not so clearly defined during training about the farmers' roles in O & M.
13	Activities during scheme implementation	PT – 50% AT – 55%	The signing of MOU was the targeted answer. The farmers did not understand fully the activities in this phase of the project. A follow up on this is necessary.
17	Importance of joining a group	PT – 75% AT – 64%	The question should have been framed to read the importance of joining an IWUA and not joining any group in general as one can join any group for whichever reason.
21	The main document for water regulation	PT – 35% AT – 59%	The expected answer was a water permit. The question was not so clear and so the probability is that due the Swahili word used having different meanings the farmers got confused
23	Role of Catchment Area Advisory	PT – 40% AT – 59%	The role of CAAC was not so clear in training and the difference between WRMA, WRUA & CAAC hence the

Qs No	Content	Performance	Remarks
	Committee		low performance
25	Components of Action Planning	PT – 25% AT – 36%	The components of an Action Plan were not well understood. The reason would be because this session is better understood when farmers are engaged in a group discussion which did not take place due to the time constraint
High Scoring Questions in Pre & Post knowledge evaluations			
Qs No.	Content	Performance	Remarks
5	By-law enforcement & operationalization	PT – 5% AT – 86%	It shows that the farmers had very little understanding as to how the by-laws should be Operationalize. However, the training enhanced their skills in this.
6	Stages in By-law formulation	PT – 90% AT – 77%	It was not difficult to pick the odd choice among the multiple choices provided
10	IWUA roles during construction phase of the project	PT – 80% AT – 86%	It was not difficult to pick the odd choice among the multiple choices provided
12	Individual contribution to the success of the project	PT – 95% AT – 86%	It was not difficult to pick the odd choice among the multiple choices provided
19	Importance of IWUA legal registration	PT – 80% AT – 91%	The farmers had prior understanding on the importance of registering their scheme legally.
20	WRMA's main function	PT – 90% AT – 86%	The fact that this scheme is not new and so they have dealt with WRMA before, they had previous knowledge as to the role of WRMA
24	Importance of an Action Plan	PT – 80% AT – 86%	It was not difficult to pick the odd choice among the multiple choices provided

Source: JICA Team

2) Mdachi

The average score was 66% and 72% before and after the training respectively, therefore, on average, the knowledge gained after the training is 5%. 48% of the farmers scored 70% and above in the post-training knowledge evaluation, compared to 60% in pre-training knowledge evaluation. This performance shows that the training was a great success and that farmers understood the concepts that were taught.

A detailed analysis of the performance in the various sessions indicated that there was significant knowledge gain in all the sessions except the session on implementation activities that was covered by the SCIO.

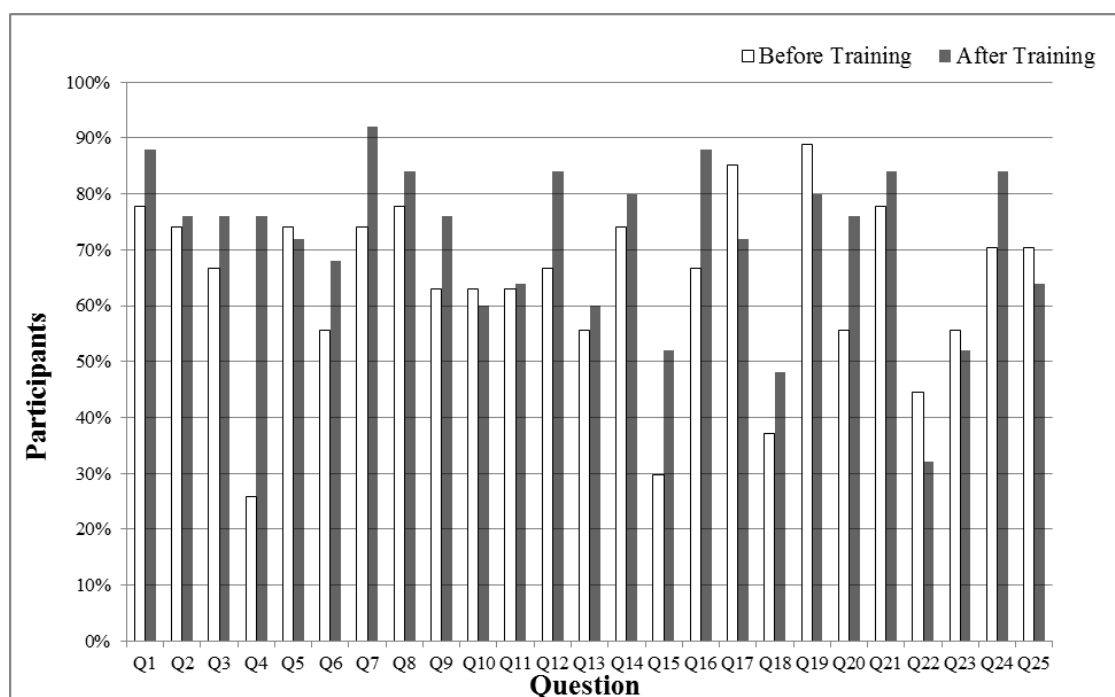
The reason for this is that the SCIOs lacked the capacity to train farmers as they had not been trained on adult learning

Table 2.2.8 Results of Evaluation of Unit 1 Training Program in Mdachi Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	1	4%	4	16%
80-89%	6	22%	7	28%
70-79%	6	22%	4	16%

60-69%	8	30%	5	20%
Below 60%	6	22%	5	20%
Total Participants	27	100%	25	100%
Average Score		66%		72%

Source: JICA Team



Source: JICA Team

Figure 2.2.3 Result of Knowledge Evaluation in Mdachi Scheme

Table 2.2.9 Evaluation per Question for Unit 1 Program in Mdachi Scheme

Qs No.	Content	Performance	Remarks
High Scoring Questions during Pre & Post knowledge Evaluations			
1	The Main function of an IWUA	PT – 78% AT – 88%	The main function is to supply water for irrigation. The farmers are aware that the reason they joined the group was to obtain water for irrigation.
2	IWUA organizational structure	PT – 74% AT – 76%	The multiple answers were such that it was easy for one to identify the odd one.
5	Formulation of IWUA by-laws	PT – 74% AT – 72%	The farmers seemed to have some knowledge on the process of formulating their by-laws
7	Irrigation infrastructure as per Scheme design	PT – 74% AT – 92%	The farmers understand the structures to be put in place in their scheme considering they have been involved during the FS & DD activities
8	Who is responsible for the Scheme's O&M	PT – 78% AT – 84%	Farmers are aware of the fact that the scheme being developed is theirs and so they are responsible for operating and managing it
14	WRMA's main mandate	PT – 74% AT – 80%	The answers to this question made it easy for the farmer to note the role of WRMA
17	Definition of a Stakeholder	PT – 85% AT – 72%	The farmers understand who a stakeholder is. The multi choices were confusing and farmers had to be keen to note the difference between the positive and

Qs No.	Content	Performance	Remarks
			negative choices given
21	Importance of paying for water	PT – 78% AT – 84%	The multi choices made it easy for the farmers to identify the best reason for paying for water
24	Importance of Action planning	PT – 70% AT – 84%	The multiple answers were such that it was easy for one to identify the odd one.
Questions with significant knowledge gain Pre & Post			
Qs No.	Content	Performance	Remarks
4	Ways of ensuring by-laws are followed	PT – 26% AT – 76%	Being that this is a new scheme and this is the time they are trying to storm, they did not understand how they can Operationalize their by-laws
7	By-law formulation process	PT – 74% AT – 92%	The farmers gained a lot of knowledge on how to formulate by-laws filling in the gaps for those who did not understand previously
12	Structures in scheme design	PT – 67% AT – 84%	The facilitator was used easy language and graphics that were easily understood by the farmers and this explains the gain in the knowledge
16	Farmers activities during scheme construction	PT – 67% AT – 88%	The workshop in which the farmers were required to enumerate their activities enhanced their understanding of their roles during scheme construction
15	Phases of an irrigation scheme development	PT – 30% AT – 52%	The farmers were engaged in a workshop on this concept and that explains the gain in knowledge
Questions with a significant drop in knowledge in Post from Pre-evaluation			
Qs No.	Content	Performance	Remarks
17	Factor that holds group members together	PT – 85% AT – 72%	Most farmers after the training on group dynamics stated that their geographical location holds them together.
19	WRMA's main mandate	PT – 89% AT – 80%	The question was straight forward and the drop in knowledge may be due to lack of concentration on the few farmers during the administration of the test
22	Permit application fee for the scheme's category	PT – 44% AT – 32%	The WRMA official, who is the knowledgeable person in this field did not show up for the training and therefore the farmers were not trained on the permit fees for their category as they differ depending on the catchment area in question

Source: JICA Team

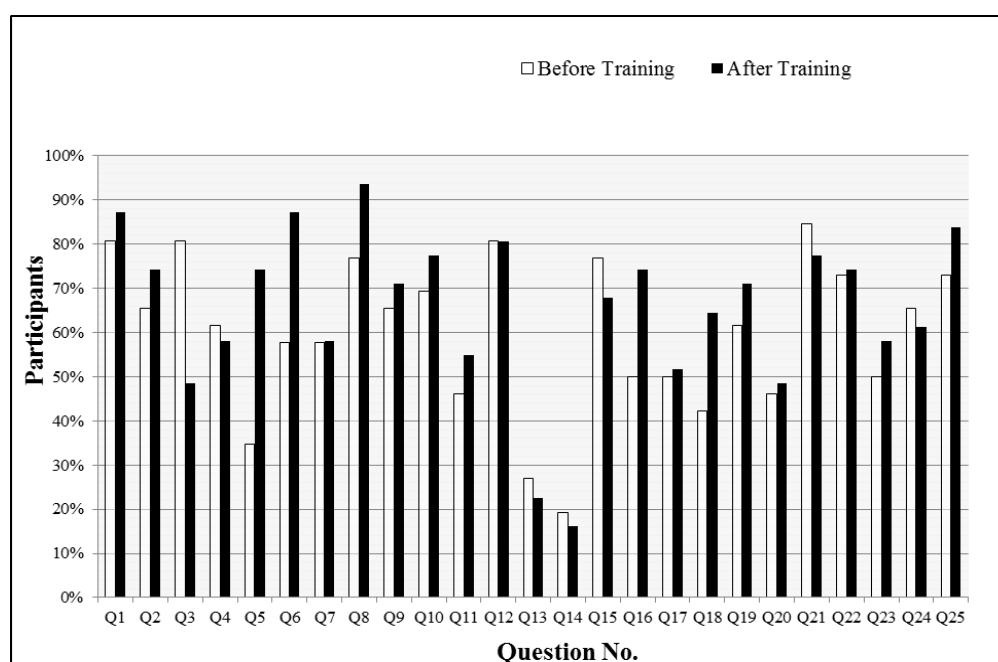
3) Olopito

The average score was 60% and 65% before and after the training respectively. This shows that the knowledge gained by the farmers is 8%. 47% of the farmers scored 70% and above in the post-training knowledge evaluation, compared to 41% in pre-training knowledge evaluation. This performance shows that the training was a great success. A detailed analysis of the participants' performance in the various sessions indicated that the farmers gained knowledge in all of the sessions that they were trained on.

Table 2.2.10 Results of Evaluation of Unit 1 Training Program in Olopito Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	1	4%	6	20%
80-89%	3	12%	6	20%
70-79%	7	27%	2	7%
60-69%	3	12%	6	20%
Below 60%	12	46%	10	33%
Total Participants	26	100%	30	100%
Average Score		60%		65%

Source: JICA Team



Source: JICA Team

Figure 2.2.4 Result of Knowledge Evaluation in Olopito Scheme

Table 2.2.11 Evaluation per Question for Unit 1 Program in Olopito Scheme

Qs No.	Content	Performance	Remarks
Low Scoring Questions during Pre & Post knowledge Evaluations			
4	Irrigation Phases in order of following	PT – 62% AT – 58%	The question required the farmers to identify the last stage in irrigation development well. After training it still was not so clear how the stages follow one another. During pre-training, it was noted that all the facilitators would use the same wordings and explanations when referring to the stages.
7	Factors affecting enforcement and	PT – 58% AT – 58%	The question was framed in a negative way and most farmers may have failed to see the negation

Qs No.	Content	Performance	Remarks
	acceptance of By-laws		thereby answering the question wrongly
11	Scheme sustainability	PT – 46% AT – 55%	The expected answer was that if the farmers wanted their scheme to be successful they needed to pay for water. Other farmers answered that for scheme sustainability they needed to ensure that all farmers in their neighborhood join the scheme, which is also one of the signs of scheme growth.
13	Farmers activity during operation stage	PT – 27% AT – 23%	The farmers did not understand what operation stage entailed.
14	Stakeholders in Olopito Irrigation Scheme Development	PT – 19% AT – 16%	The farmers were expected to point out who among the choices given was not part of the stakeholders involved in this project. The right answer was Narok Water company. However, it seems the farmers are unaware of the role of the Narok water company and that is the reason most did not answer this question. They seem to have associated it with WRMA.
17	Leadership styles	PT – 50% AT – 52%	The multiple choices had 2 possible answers. The facilitator mentioned that laissez faire is the best. However, another choice was that any leadership style is okay depending with the circumstances. The farmers might have gotten confused with both choices.
20	Benefits of registering as a legal entity	PT – 46% AT – 48%	The questions demanded that they pick out the MOST important benefit. However, most of them might have failed to note the word MOST.
23	Main function of WRUA	PT – 50% AT – 58%	The farmers do not seem to understand the difference between WRMA, CAAC and WRUA. This needs to be clarified
24	Importance of Action Planning	PT – 65% AT – 61%	This session is better understood if methodology used is group discussions or workshop. The time limitation did not allow us to hold the discussions.
High Scoring Questions in Pre & Post knowledge evaluations			
1	Objectives of IWUA	PT – 81% AT – 87%	The multiple choices given were too easy for one to single out the right answer
6	Stages in By-law formulation	PT – 58% AT – 87%	The multiple choices given were too easy for one to single out the right answer
8	Parts of Scheme Structure	PT – 58% AT – 87%	The multiple choices given were too easy for one to single out the right answer. Borehole was easy to pick out as it is the only odd one out
12	Individual contribution to the success of the project	PT – 81% AT – 81%	The multiple choices given were too easy for one to single out the right answer
25	Components of Action Planning	PT – 73% AT – 84%	The multiple choices given were too easy for one to single out the right answer.

Source: JICA Team

4) Gatitu/Muthaiga

The average score was 71% and 82% before and after the training respectively, therefore, on average, the knowledge gained after the training is 9%. 81% of the 46

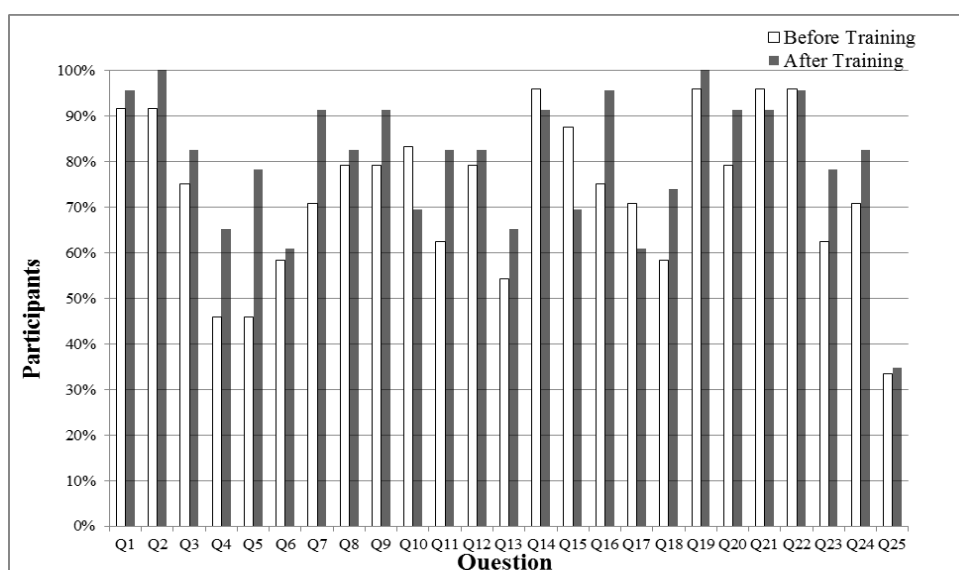
farmers scored 70% and above in the post-training knowledge evaluation, compared to 64% in pre-training knowledge evaluation. This performance shows that the training was a great success and that farmers understood the concepts that were taught.

The detailed analysis of the sessions trained indicate that the farmers gained knowledge in all of the sessions trained with the session on bylaws with the most knowledge gain.

Table 2.2.12 Results of Evaluation of Unit 1 Training Program in Gatitu/Muthaiga Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	3	12%	6	27%
80-89%	8	32%	10	45%
70-79%	5	20%	2	9%
60-69%	4	16%	2	9%
Below 60%	5	20%	2	9%
Total Participants	25	100%	22	100%
Average Score		74%		82%

Source: JICA Team



Source: JICA Team

Figure 2.2.5 Result of Knowledge Evaluation in Gatitu/Muthaiga Scheme

Table 2.2.13 Evaluation per Question for Unit 1 Program in Gatitu/Muthaiga Scheme

Qs No.	Content	Performance	Remarks
High Scoring Questions during Pre & Post knowledge Evaluations			
1	The Main function of an IWUA	PT – 92% AT – 96%	The main function is to supply water for irrigation. These farmers are informed that the reason they formed their IWUA was to supply members with water for irrigation considering

Qs No.	Content	Performance	Remarks
			the fact that even the intake is already constructed.
2	IWUA organizational structure	PT – 92% AT – 100%	The multiple choices were such that it was easy to pick the odd one out. They however know the composition of their group well. Those who did not know gained the knowledge such that during post knowledge they all got it right
7	Structures in the scheme design	PT – 71% AT – 91%	The farmers understand the structures based on the fact that some structures like the intake are already in place.
8	The responsible stakeholder for operations & maintenance	PT – 79% AT – 91%	The farmers understand that it is their ultimate role to operate and manage their scheme.
14	Definition of a stakeholder	PT – 96% AT – 91%	The farmers understand who a stakeholder is
16	Main reason for joining an IWUA	PT – 75% AT – 96%	These farmers understand that they joined the group with the purpose of obtaining water for irrigation
19	WRMA's main mandate	PT – 96% AT – 100%	The WRMA in that region is active in its duties and so most of the farmers already knew its role
20	Main function of a WRUA	PT – 79% AT – 91%	WRUA in the area has been also active and known to the members; in fact they have some members of their scheme being members of the WRUA.
21	Importance of paying for water	PT – 96% AT – 91%	The farmers had knowledge that payment of water is related to WRMA functions
22	Permit application fee for Category C as the scheme	PT – 96% AT – 96%	The multiple choices provided for this question did not have any right answer and so it was a free mark
Questions with significant knowledge gain Pre & Post			
Qs No.	Content	Performance	Remarks
4	Ways of ensuring by-laws are followed	PT – 46% AT – 65%	The farmers were not knowledgeable on how to Operationalize by-laws
5	By-law formulation process	PT – 46% AT – 78%	It was clear that all farmers were not involved in the preparation of their by-laws and they did not understand the process of formulating them
7	Structures in scheme design	PT – 71% AT – 91%	During the training on scheme design the farmers were engaged fully to understand their design
9	Farmers activities during scheme construction	PT – 79% AT – 91%	The workshop undertaken by the farmers on the implementation activities made them understand their roles more
11	Phases of an irrigation	PT – 63% AT – 83%	The workshop by the participants on the phases of scheme development explains the

Qs No.	Content	Performance	Remarks
	scheme development		gain in knowledge
13	Contents of an MOU	PT – 54% AT – 65%	Farmers are not so knowledgeable on the issue of MOU but this will be more clear when they get practically involved during the MOU discussions and signing before construction begins
16	Main reason for joining an IWUA	PT – 75% AT – 96%	The farmers understood the function of the IWUA, being to supply of irrigation water sustainably
23	Punishable offences under Water Act	PT – 63% AT – 78%	The farmers gained a lot of knowledge on the offences under water act as the session on the legal requirements was very interactive
24	Importance of Action Planning	PT – 71% AT – 83%	The farmers understood the concept of Action planning well as it was delivered as an interactive discussion
Questions with a significant drop in knowledge in Post from Pre-evaluation			
10	Action towards scheme sustainability	PT – 83% AT – 70%	The farmers were not so clearly told that the water fee payment is the key to sustaining their scheme as the funds will cater for O&M. In future trainings, the concept will need revisiting for attitude change.
15	Best leadership style	PT – 88% AT – 70%	The facilitator of group dynamics did not inform the participants on the best leadership style. During module 2 training, this will be revisited
17	What holds a group together	PT – 71% AT – 61%	The expected response was trust, obedience and teamwork towards goal achievement but most farmers responded that their problems held them together

Source: JICA Team

5) Kaben

The average score was 73% and 75% before and after the training respectively, therefore, on average, the knowledge gain is 2%. 68% of the farmers scored 70% and above in the post-training knowledge evaluation, compared to 74% in pre-training knowledge evaluation.

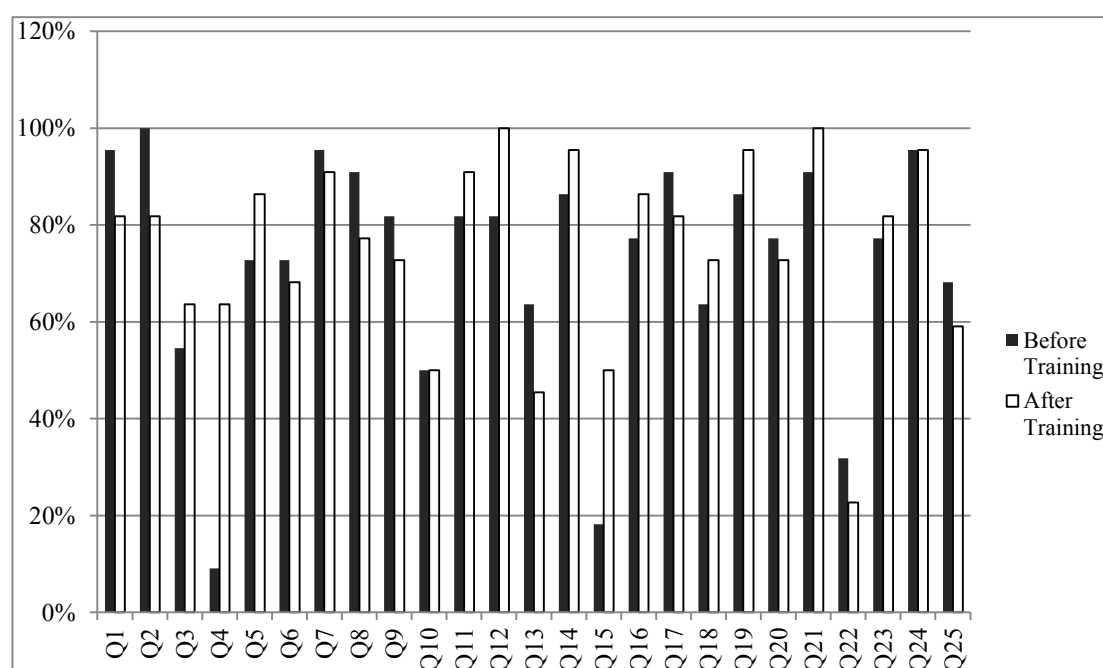
A detailed analysis of the various sessions shows that all the sessions recorded a gain in knowledge with the session on the bylaws and bylaw formulation reporting the most gain in knowledge.

Table 2.2.14 Results of Evaluation of Unit 1 Training Program in Kaben Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	6	27%

80-89%	10	53%	5	23%
70-79%	4	21%	4	18%
60-69%	5	26%	3	14%
Below 60%	0	0%	4	18%
Total Participants	19	100%	22	100%
Average Score		73%		75%

Source: JICA Team



Source: JICA Team

Figure 2.2.6 Result of Knowledge Evaluation in Kaben Scheme

Table 2.2.15 Evaluation per Question for Unit 1 Program in Kaben Scheme

Qs No.	Content	Performance	Remarks
High Scoring Questions during Pre & Post knowledge Evaluations			
1	Most important function of an IWUA	PT – 95% AT – 82%	The farmers lost 13% of knowledge on the most important function of an IWUA which is to provide water for irrigation
2	IWUA organizational structure	PT – 100% AT – 82%	The farmers lost 18% of knowledge. This could be attributed to lack of concentration as the choices were easy for one to pick the odd option
7	Scheme design components	PT – 95% AT – 91%	The knowledge gained is 4% and the farmers could easily identify the components in their design
11	Phases of Irrigation Scheme Development	PT – 82% AT – 91%	The knowledge gained is 9%.
12	Project implementation	PT – 82% AT – 100%	The farmers gained 18% of knowledge on the activities farmers are involved in during

Qs No.	Content	Performance	Remarks
	activities		implementation
14	Meaning of a Stakeholder	PT – 86% AT – 95%	The knowledge gained is 9%
17	What holds members of a group together	PT – 91% AT – 82%	The knowledge lost is 9%. Farmers after training answered that their same problems hold them together
19	Main mandate of WRMA	PT – 86% AT – 95%	The knowledge gained is 9%
21	Reason as to why we pay for water	PT – 91% AT – 100%	Knowledge gained is 9% and all farmers understood the reason why water is paid for
24	Importance of Action planning	PT – 95% AT – 95%	There is no change in knowledge
Questions with significant knowledge gain Pre & Post			
Qs No.	Content	Performance	Remarks
4	Ways of operationalizing by-laws	PT – 9% AT – 64%	The knowledge gained is 55%. The farmers gained knowledge on ways of operationalizing by-laws
5	Procedure of By-law formulation	PT – 73% AT – 86%	The knowledge gained is 13%. The farmers were able to identify the weaknesses in their current by-law formulation procedure
12	Project implementation activities	PT – 82% AT – 100%	The knowledge gained is 18%. The farmers understood their roles during the implementation stage of the project
15	Best leadership style	PT – 18% AT – 50%	The knowledge gained is 34%. The farmers understood the different areas where each leadership style is applicable
Questions with a significant drop in knowledge in Post from Pre-evaluation			
Qs No.	Content	Performance	Remarks
1	Most important function of an IWUA	PT – 95% AT – 82%	The knowledge lost is 13%. This can be attributed to lack of concentration to note that the question is asking which is NOT and not which is.
2	IWUA organizational structure	PT – 100% AT – 82%	The knowledge lost is 18%. The question was straightforward and it was easy for them to pick the right one out
8	Person responsible for scheme O&M	PT – 91% AT – 77%	The knowledge lost is 14%. Some farmers answered that the DIO was responsible for the O&M
13	Contents of MOU	PT – 64% AT – 45%	The knowledge lost is 19%. The multiple choices were a bit confusing and the farmer had to be keen to pick the best choice
22	Permit fee for Category C as per WRMA rules	PT – 32% AT – 23%	The knowledge lost is 9%. The facilitator did not train them on the charges levied for permits

Source: JICA Team

6) Murachaki

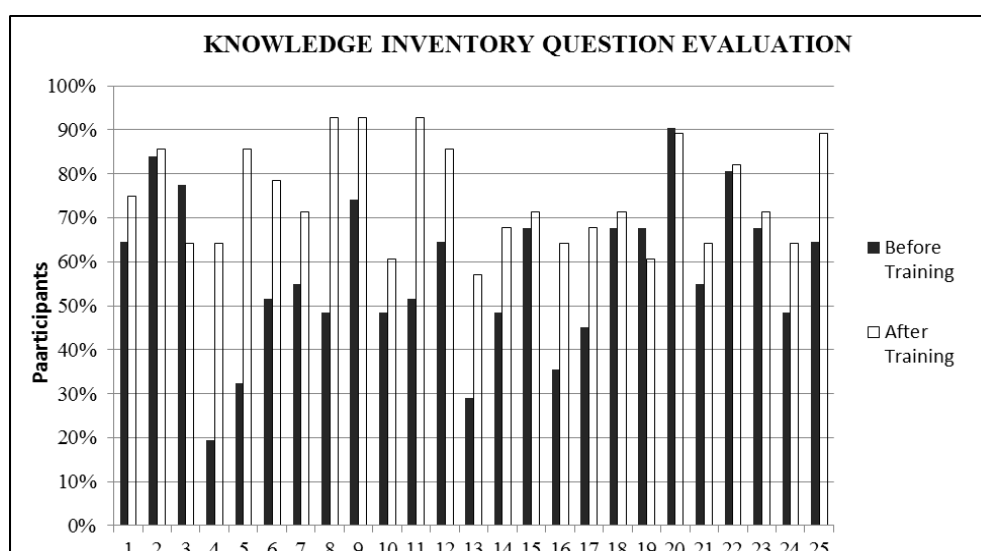
The average score was 57% and 74% before and after the training respectively, therefore, on average, the knowledge gained after the training is 16%. 87% of the farmers scored 70% and above in the post-training knowledge evaluation, compared to 62% in pre-training knowledge evaluation. This performance shows that the training

was a great success and that farmers gained a lot of new knowledge due to the training.

Table 2.2.16 Results of Evaluation of Unit 1 Training Program in Murachaki Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	2	6%	14	45%
80-89%	15	47%	9	29%
70-79%	3	9%	4	13%
60-69%	8	25%	1	3%
Below 60%	4	13%	3	10%
Total Participants	32	100%	31	100%
Average Score		57%		74%

Source: JICA Team



Source: JICA Team

Figure 2.2.7 Result of Knowledge Evaluation in Murachaki Scheme

Table 2.2.17 Evaluation per Question for Unit 1 Program in Murachaki Scheme

Qs No.	Content	Performance	Remarks
High Scoring Questions during Pre & Post knowledge Evaluations			
1	The Main function of an IWUA	PT – 84% AT – 86%	The farmers understand the main reason of joining an IWUA as the main aim is irrigation
20	IWUA organizational structure	PT – 90% AT – 89%	The multiple choices were such that it was easy to pick the off one out of the IWUA organization
22	Importance of paying for water	PT – 81% AT – 82%	The farmers understand the benefits of paying for water
Questions with significant knowledge gain Pre & Post			
4	Ways of ensuring by-laws are followed	PT – 19% AT – 64%	The farmers gained 45% knowledge on by-laws operationalization

Qs No.	Content	Performance	Remarks
5	By-law formulation process	PT – 32% AT – 86%	The farmers gained 54% knowledge of the process of by-law formulation.
6	Factors affecting acceptance of By-laws	PT – 52% AT – 69%	The knowledge gained is 27% on the factors that affect acceptance of by-laws by the members
7	Infrastructures in Scheme design	PT – 55% AT – 71%	There was 16% gain in knowledge as to the structures to be put in place for this scheme as per the scheme design
8	Who is responsible for O&M for the scheme	PT – 48% AT – 93%	The farmers gained 45% knowledge and embraced that the scheme O&M is their responsibility
9	Farmers Activities in Scheme construction	PT – 74% AT – 93%	The knowledge gained on the farmers activities during scheme construction is 19%
11	The stage in project development the scheme is in	PT – 52% AT – 93%	The farmers gained 41% knowledge on the various phases of irrigation development
12	Farmers activities during scheme implementation	PT – 65% AT – 86%	The farmers could identify their roles during scheme construction and the knowledge gained was 21%
13	Contents of MOU	PT – 29% AT – 57%	The farmers understood what an MOU is and what it contains and this is represented in 28% gain in knowledge
14	Stages in irrigation development	PT – 48% AT – 68%	The farmers gained 20% gain in knowledge on the phases in irrigation development
16	Best leadership style for the group	PT – 35% AT – 64%	The farmers gained 29% in knowledge and understood the various leadership styles and their applicability
17	Importance of a farmer joining the IWUA	PT – 45% AT – 68%	The farmers gained 23% in knowledge as to the reason why every farmer in the scheme should join their IWUA
24	Actions punishable under the water act 2002	PT – 48% AT – 64%	The farmers understood the various water acts that are punishable and which are not represented by 16% gain in knowledge
25	Importance of an Action Plan	PT – 65% AT – 89%	The farmers understood the importance of an Action plan and gained 24% in knowledge
Questions with a significant drop in knowledge in Post from Pre-evaluation			
Qs No.	Content	Performance	Remarks
3	Important function of an IWUA	PT – 77% AT – 64%	The farmers seemed confused as to whether the role of IWUA would be to provide water or to enforce by-laws
19	Importance of registering a group legally	PT – 68% AT – 61%	The farmers did not understand the reason for legal registration and most answered it is for obtaining donor funds

Source: JICA Team

7) Tumutumu

The average score was 67% and 71% before and after the training respectively, therefore, on average, the knowledge gained after the training is 4%. 81% of the farmers scored 70% and above in the post-training knowledge evaluation, compared to

64% in pre-training knowledge evaluation. This performance shows that the training was a great success and that farmers understood the concepts that were taught.

Table 2.2.18 Results of Evaluation of Unit 1 Training Program in Tumutumu Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	3	12%	6	27%
80-89%	8	32%	10	45%
70-79%	5	20%	2	9%
60-69%	4	16%	2	9%
Below 60%	5	20%	2	9%
Total Participants	25	100%	22	100%
Average Score		67%		71%

Source: JICA Team

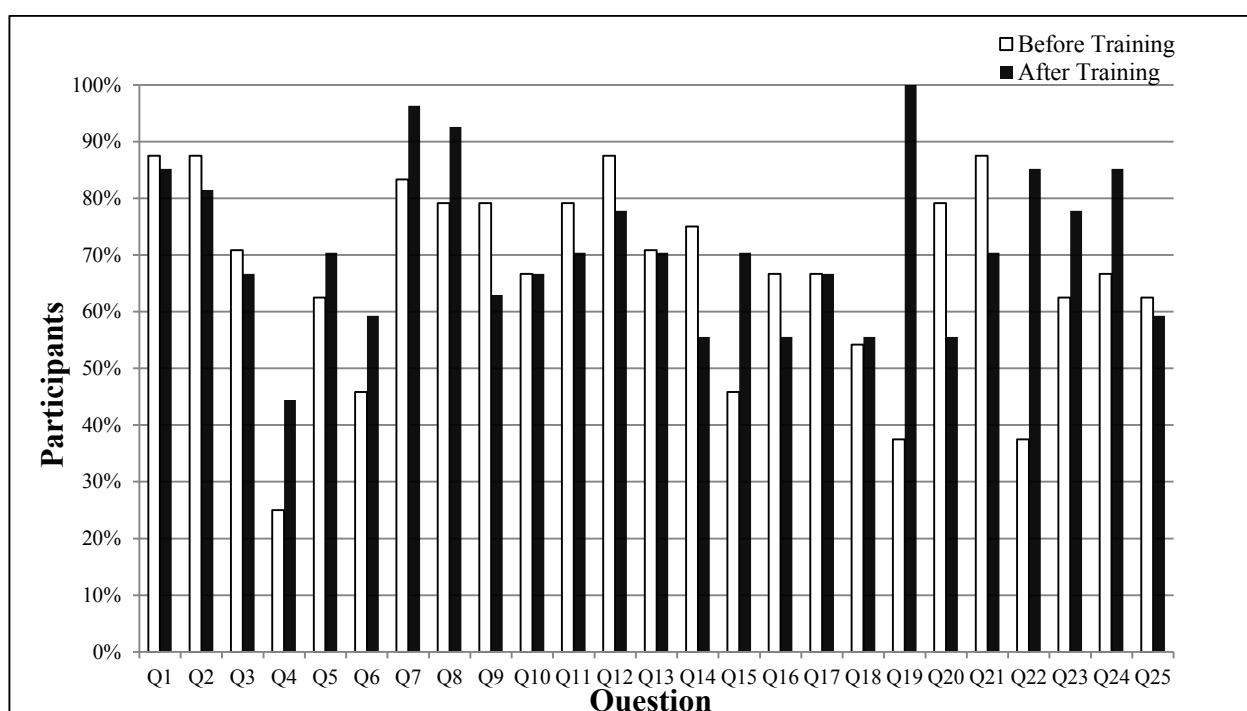


Figure 2.2.8 Result of Knowledge Evaluation in Tumutumu Scheme

Source: JICA Team

Table 2.2.19 Evaluation per Question for Unit 1 Program in Tumutumu Scheme

Qs No.	Content	Performance	Remarks
High Scoring Questions during Pre & Post knowledge Evaluations			
1	The Main function of an IWUA	PT – 85% AT – 88%	The main function is to supply water for irrigation. These farmers are informed that the reason they formed their IWUA was to supply members with water for irrigation considering the fact that the scheme intake is already constructed.

Qs No.	Content	Performance	Remarks
2	IWUA organizational structure	PT – 88% AT – 81%	The multiple choices were such that it was easy to pick the odd one out. They however know the composition of their group well. Those who did not know gained the knowledge as per the post knowledge results
7	Structures in the scheme design	PT – 83% AT – 96%	The farmers understand the structures based on the fact that some structures like the intake are already in place.
8	The responsible stakeholder for O & M	PT – 79% AT – 93%	The farmers understand that it is their ultimate role to operate and manage their scheme.
Questions with significant knowledge gain Pre & Post			
Qs No.	Content	Performance	Remarks
4	Ways of ensuring by-laws are followed	PT – 25% AT – 44%	The farmers were not knowledgeable on how to Operationalize by-laws. However as they practically revise their by-laws this will become clearer
5	By-law formulation process	PT – 63% AT – 70%	It seemed that all farmers were not involved in the preparation of their by-laws and they did not understand the process of formulating them but after training they now understood how they are formulated
7	Structures in scheme design	PT – 83% AT – 96%	During the training on scheme design the farmers were engaged fully to understand their design
9	Farmers activities during scheme construction	PT – 79% AT – 63%	The workshop undertaken by the farmers on the implementation activities made them understand their roles more
15	Best leadership style	PT – 46% AT – 70%	The facilitator of group dynamics was not clear on which leadership style is the best. During module 2 training, this will be revisited
19	WRMA's main mandate	PT – 38% AT – 100%	WRMA sub-region serving this area is active in its duties and so most of the farmers already knew its role
22	Permit application fee for Category C as the scheme	PT – 38% AT – 85%	The choices given for this question did not have any right answer and so it was a free mark for those who attempted
23	Punishable offences under Water Act	PT – 67% AT – 85%	The farmers gained significant knowledge on the offences under water act as the session on the legal requirements was very interactive
24	Importance of Action Planning	PT – 67% AT – 85%	The farmers understood the concept of Action planning well as it was delivered as an interactive discussion
Questions with a significant drop in knowledge in Post from Pre-evaluation			
Qs No.	Content	Performance	Remarks
14	Definition of a stakeholder	PT – 75% AT – 56%	This was a simple question. The drop during post evaluation may be due to lack of concentration on the participants when reading the multi choices as one answer negated the right one.
16	Main reason for joining an IWUA	PT – 67% AT – 56%	The farmers understood the concept of the IWUA, being supply of irrigation water sustainably
20	Main function of a WRUA	PT – 79% AT – 56%	WRUA in the area has also been active and known to the members; in fact they have some members of their scheme being members of the WRUA.

Qs No.	Content	Performance	Remarks
			Lack of concentration when answering the question may have been the cause of the drop in knowledge
21	Importance of paying for water	PT – 88% AT – 70%	The farmers had knowledge that payment of water is related to WRMA functions. Drop in knowledge is attributed to lack of concentration when answering the question after the training

Source: JICA Team

8) Muungano

The average score was 76% and 84% before and after the training respectively, therefore, on average, the knowledge gained after the training is 8%. 87% of the farmers scored 70% and above in the post-training knowledge evaluation, compared to 62% in pre-training knowledge evaluation. This performance shows that the training was a great success and that farmers gained a lot of new knowledge due to the training.

A detailed evaluation of the various sessions indicated that the farmers gained knowledge on IWUA roles and functions, bylaw and bylaw formulation, scheme design, group dynamics, legal requirements and action planning. However, farmers' knowledge declined in the area of implementation activities by the farmers in the various stages of irrigation development especially on the contents of the MOU.

It was observed that the farmers gained most knowledge (32%) on their scheme design and the bylaws and bylaw formulation. These sessions were trained by facilitators from SIDEMAN-SAL capacity building program while the sessions that the farmers showed some weakness and drop in knowledge are those that the SCIOs were involved in training. The reason for this may be the fact that the SCIOs had not been trained on adult learning.

Table 2.2.20 Results of Evaluation of Unit 1 Training Program in Muungano Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	2	6%	14	45%
80-89%	15	47%	9	29%
70-79%	3	9%	4	13%
60-69%	8	25%	1	3%
Below 60%	4	13%	3	10%
Total Participants	32	100%	31	100%
Average Score		76%		84%

Source: JICA Team

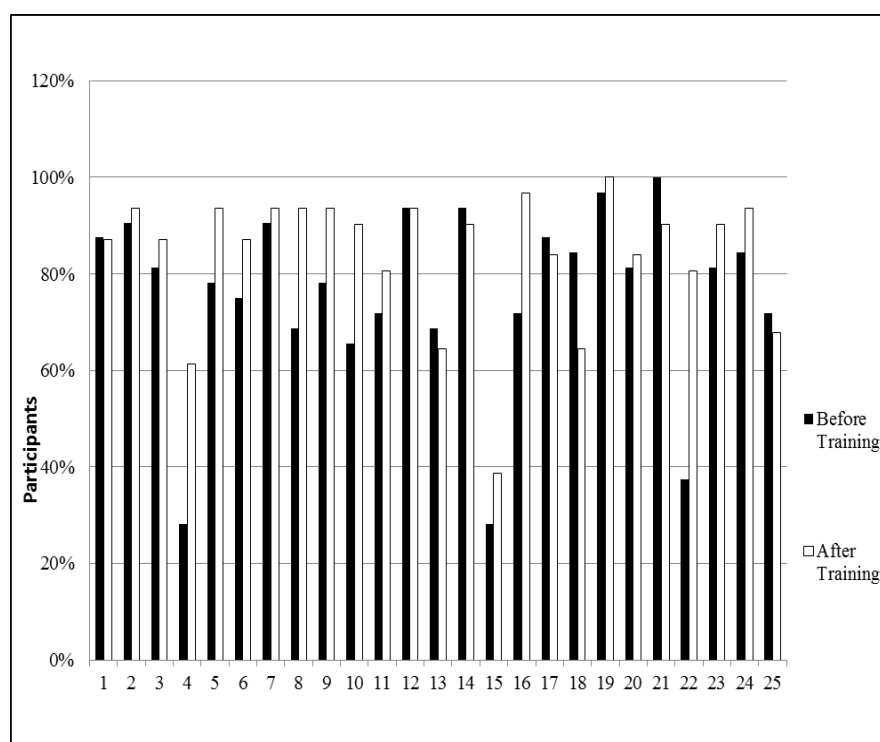


Figure 2.2.9 Result of Knowledge Evaluation in Muungano Scheme

Table 2.2.21 Evaluation per Question for Unit 1 Program in Muungano Scheme

Qs No.	Content	Performance	Remarks
High Scoring Questions during Pre & Post knowledge Evaluations			
1	The Main function of an IWUA	PT – 88% AT – 87%	The main function is to supply water for irrigation. This scheme was initiated in 2006 and so the farmers are aware as to the reason why they formed an IWUA
2	IWUA organizational structure	PT – 91% AT – 94%	The farmers understand their scheme organizational structure as comprising of blocks members and management committee.
3	Most important function of an IWUA	PT – 81% AT – 87%	The farmers understand that they came together as an IWUA to supply the members with water for irrigation development through implementation of the scheme
7	Irrigation infrastructure included in scheme design	PT – 91% AT – 94%	The multiple choices were such that it was easy for a participant to pick the odd one out.
12	Roles of farmers during construction phase	PT – 94% AT – 94%	The farmers understand what their roles are during construction.
14	A stakeholder	PT – 94% AT – 90%	The farmers are aware about who a stakeholder is in their project
19	WRMAs main mandate	PT – 97% AT – 100%	The farmers in this scheme have dealt with WRMA before and had actually obtained an authority to construct their intake from the authority in 2006. This shows that they understood what the main

Source: JICA Team

Qs No.	Content	Performance	Remarks
			mandate of WRMA is.
21	Importance of paying for water	PT – 100% AT – 90%	Having understood the roles of WRMA aided the participants in responding as expected to this question
Questions with significant knowledge gain Pre & Post			
Qs No.	Content	Performance	Remarks
4	Ways of ensuring by-laws are followed	PT – 28% AT – 61%	The farmers were not knowledgeable on how to Operationalize by-laws
5	By-law formulation process	PT – 78% AT – 94%	The farmers having not been involved in the formulation of their by-laws did not understand the process of formulating them before the training.
8	The responsible stakeholder for O&M	PT – 69% AT – 94%	The farmers understood that the sustainability of their scheme was totally dependent on them especially during O&M.
9	Farmers activities during scheme construction	PT – 78% AT – 94%	The workshop undertaken by the farmers on the implementation activities made them understand their roles more
10	Phases of an irrigation scheme development	PT – 66% AT – 90%	The repetition of the phases of irrigation development in the various sessions and also engaging the farmers in identifying at what stage their scheme development is in helped them to gain knowledge of these phases
16	Main reason for joining an IWUA	PT – 72% AT – 97%	The farmers did not understand the difference between an IWUA and other groups before training but during training it was explained the difference and the farmers understood the main reason for the existence of an IWUA
22	Water Permit application fee for the scheme	PT – 38% AT – 81%	The farmers had no idea how much money they would pay to WRMA for the processing of their water permit but after training they understood the value expected to be raised for this important function
Questions with a significant drop in knowledge in Post from Pre-evaluation			
Qs No.	Content	Performance	Remarks
18	Importance of group registration	PT – 84% AT – 65%	The training did not make it so clear as to the most important reason for registration and most farmers answered that it was so as to obtain donor funding.

Source: JICA Team

(4) Follow-up program

Between Farmers and Project team, the following “Important Way forward” was agreed. These are to be monitored during follow up program.

Extend the training on others who did not have a chance to attend the training.

Make an action plan needed to incorporate status of the IWUA

Revise the by-law taking into consideration for WRMA, O/M fee and corporate status of the IWUA.

A Follow-up program was conducted with the Unit 2 training program as described below.

Table 2.2.22 Follow-up Program for Unit 1 Training

S/No.	ACTIVITY	OBJECTIVE	REMARKS/OUTPUT
1	Feedback on Unit 1 Training	<ol style="list-style-type: none"> To give feedback to the farmers and relay the results of the training The recap the weak points as observed during the training and as identified by the training evaluation results 	<p>The facilitator, from SIDEMAN-SAL capacity building team gave a presentation of the evaluation results of the training, the training observation and recommendations.</p> <p>The facilitator also recapped on the questions from the knowledge evaluation that the farmers showed difficulty in answering correctly. This was so that the farmers can gain a better understanding of the particular area to avoid confusion.</p>
2	Farmers feedback on action plan	<p>During this session, the farmers were expected to provide the feedback on how far they were in implementing the action plan that they had prepared during Unit 1 training including:</p> <ol style="list-style-type: none"> Extending the training to those who had not attended the training Revision of the bylaws following the guide and procedure provided by SIDEMAN-SAL 	<p>The farmers reported on the progress in revision of Bylaws. Most of the schemes had reviewed their Bylaws except Gatitu/Muthaiga Scheme.</p> <p>Only one Scheme, Muungano Scheme that had held a training day where each of the blocks had met for training by those who had attended the training. The training was however not structured and the group resolved to conduct training.</p>
3	Action Planning	The farmers were guided through preparation of an action plan based on the farmers' responses. The action plan was to cover the preparation or revision of bylaws as well as extension of training to the farmers who had not been trained.	Each Scheme prepared an action plan. The deadline set by most of the groups for carrying out the activities was up to 30 th June 2014. The farmers in the extension training would also train on Leadership & Conflict Management (Unit 2); which had just been completed
4	Guided Practice in opening records	The objective was to provide the farmers with proper books that they would use to update their records including Membership Register, Minutes, Discipline and Development Fund Book.	The Books were handed over to the secretary of the IWUA with instructions on how to record. The recording of these books was to start immediately.

Source: JICA Team

2.2.4 Training of Trainers for Unit 2~3 to the Officers

After the training, training program and each session were evaluated by the participants. Here-below is the evaluation rate of training program and session.

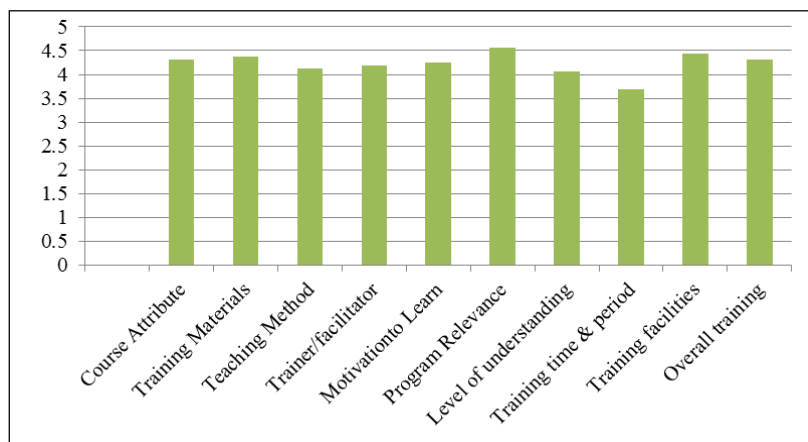
Table 2.2.23 The Evaluation Rate of Training Program

1	2	3	4	5
Bad	Poor	Fair	Good	Excellent
Not at all	To some extent	Moderate	Sufficient	Perfect

Source: JICA Team

(1) Evaluation of training program

The bar chart shows that 9 out of the 10 course attributes evaluated were rated as good or sufficient. The highest ranking attribute is the program relevance which was rated at 4.5. The training time and period attribute however was rated as fair. The participants remarked that the training time for the sessions was not enough and facilitators had to rush through the slides to complete the sessions on time. They also suggested that the trainings should not extend beyond 6PM.



Source: JICA Team

Figure 2.2.10 Evaluation of Training Program

(2) Evaluation of Session

Here-below is the Evaluation result of each session. Almost all session acquired more than “4” that means participant feel satisfied with the session program.

Table 2.2.24 Evaluation Result of Each Session

Session Name	Training Cycle	Training Needs Assessment	Training Evaluation	IWUA CB program	Adult Learning Principles	Training Delivery	Unit 2 & 3	Feedback from Unit 1	IWUA framework	Training Program preparation	Training Reporting & follow-up
Q1. Did you understand the content?	4.13	4.23	4.06	4.07	4.06	4.20	4.00	4.00	4.13	4.25	4.38
Q2. Was the content relevant to your work?	4.2	4.46	4.44	4.36	4.56	4.67	4.50	4.53	4.67	4.50	4.56
Q3. Did the content meet your expectations?	3.8	4.23	3.94	4.14	4.06	4.13	4.13	4.07	4.27	4.31	4.38
Q4. Rate the facilitator's delivery skills?	4.2	4.46	4.25	4.57	4.19	4.47	4.13	4.00	4.40	4.56	4.81
Q5. Was the facilitator well prepared for the course?	4.13	4.54	4.38	4.29	4.38	4.4	4.13	4.60	4.23	4.69	4.63
Q6. Did the facilitator demonstrate expertise of the content?	4.07	4.31	4.5	4.36	4.25	4.4	4.38	4.47	4.00	4.50	4.63

Source: JICA Team

2.2.5 Leadership and Conflict Management (Unit 2)

(1) Implementation Schedule and participant information

All of the schemes training were conducted as shown below.

Table 2.2.25 Records of Training Program in Unit 2

SCHEME	PRE-TRAINING	TRAINING	FOLLOW-UP
Kasokoni	4/01/2014	4/8,9/2014	7/18/2014
Mdachi	3/20/2014	3/25,26/2014	7/16/2014
Olopito	3/24/2014	4/2,3/2014	7/23/2014
Gatitu/Muthaiga	3/19/2014	3/25,26/2014	8/12/2014
Kaben	4/15/2014	4/23,24/2014	7/31/2014
Murachaki	4/10/2014	4/23,24/2014	8/8/2014
Tumutumumu	4/10/2014	4/23,24/2014	8/27/2014
Muongano	4/16/2014	4/28,29/2014	7/25/2014

Source: JICA Team

Table 2.2.26 Description of Unit 2 Training Program

SCHEME	PARTICIPANTS		RESOURCE PERSONS	VENUE FOR THE TRAINING
	Male	Female		
Kasokoni	13	10	SCIO, SCAO, SCSDO	Kasokoni Nursery School
Mdachi	19	9	SCIO, SCAO, SCSDO	Jaribuni Primary School
Olopito	16	16	SCIO, SCAO, 2 Officers from the Department of Cooperatives	Free Pentecostal Fellowship of Kenya Church, Olopito
Gatitu/Muthaiga	14	14	SCIO, SCAO, SCCPO (Cooperatives Officer)	Gospel Celebration Centre, Kiamariga
Kaben	14	9	SCIO, SCAO, SCSDO	AIC Church, Liter
Murachaki	11	10	SCIO, SCAO, SCSDO	St. Lukes Church, Ciangera
Tumutumu	24	6	SCIO, SCAO, SCSDO	New Apostolic Church, Ntherone
Muongano	20	12	SCIO, SCAO, Rahab, JICA Team	Miomponi Secondary School

Source: JICA Team

(2) Summary of Evaluation of Program

The results of the knowledge evaluation per scheme depicting the percentages of the farmers in the various scoring levels as well as the average mark for each scheme are as follows.

Table 2.2.27 Summary of Evaluation of Unit 2 Training Program

SCHEME	PRE-TRAINING AVERAGE SCORE	PORT-TRAINING AVERAGE SCORE	DIFFERENCE (KNOWLEDGE GAIN)
Kasokoni	55%	59%	4%
Mdachi	79%	85%	6%
Olopito	59%	44%	-15%
Gatitu/Muthaiga	52%	72%	20%
Kaben	57%	63%	6%
Murachaki	56%	51%	-5%
Tumutumu	34%	76%	42%
Muongano	68%	70%	2%

Source: JICA Team

It has been observed that different quality evaluation sheet at each schemes was applied in Unit 2 from the aspect of following point

(1) Different number of questions

Most questionnaires in Unit 2 were expected to have 20 questions but some schemes like Murachaki had 12 questions

(2) Quality of the questions

It has been noted that in some schemes the questions are so easy that the farmers are able to score very highly even before the training, Mdachi is one example

(3) The framing of the questions

It was very varied despite the instructions during the pre-training meeting. Furthermore some questionnaires had all negatively framed questions (e.g. 'which is not' instead of 'which is', which causes confusion to the farmers.

Under that condition, although it is difficult to simply compare, it was observed that the performance relied on mainly facilitator of quality, the motivation of participating farmers.

Here in below is the summary of Descriptive Analysis for each scheme. We described the detail evaluation the following chapter.

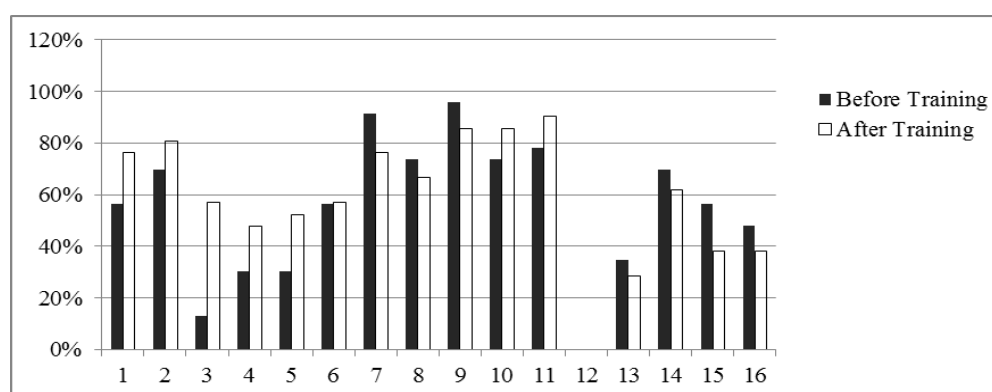
(3) Evaluation of Each Scheme**1) Kasokoni**

The average performance for the participants before and after the training was 55% and 59% respectively. This was a low score in comparison to Unit 1 training. However, it recorded a 4% gain in knowledge. The questionnaire comprised of 16 questions. Question 4 was ambiguous and that is why the score was nil both before and after the training. The table below highlights the areas that showed remarkable improvement and those that showed a low score even after the training.

Table 2.2.28 Results of Evaluation in Unit 2 Program in Kasokoni Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training (No of farmers)	% of farmers	Post-training (No of farmers)	% of farmers
90% and above	3	19%	4	19%
80-89%	5	31%	4	19%
70-79%	0	0%	0	0%
60-69%	4	25%	5	24%
Below 60%	4	25%	8	38%
Total Participants	16	100%	21	100%
Average Score	55%		59%	

Source: JICA Team



Source: JICA Team

Figure 2.2.11 Result of Knowledge Evaluation in Kasokoni Scheme

Table 2.2.29 Evaluation per Question for Unit 2 Program in Kasokoni Scheme

No.	Content	Result	Reason of low score or reduction even after training
Q9	Leadership composition	BT – 95% AT - 85%	The farmers understood the formation and composition of leadership. The difference in the number of participants before and after the training may have lowered the score.
Q3	IWUA structure	BT – 57% AT – 13%	The farmers gained knowledge on level of authority in the IWUA structures
Q7	Most important element of group	BT – 15% AT – 58%	The farmers did not understand that the most important element of leadership is followers.
Q8	Major step to establish a strong IWUA	BT – 72% AT – 65%	The farmers did not quite understand the core step to establish a strong IWUA. There might have been a little misunderstanding after the training.
Q12	Factors that deter good communication in an IWUA	BT – 0% AT – 0%	The question was not clear and so none of the participants was able to get it correct
Q15	Conflict Resolution	BT – 55% AT- 38%	The farmers may have been a little confused on conflict resolution especially after the role play The difference in farmer attendance before and after training might have also altered the results
Q16	Ways of resolving conflict	BT – 48% AT – 38%	The difference in farmer attendance before and after the training may have brought about the difference in results.

2)Mdachi

Source: JICA Team

The average performance for the participants before and after the training was 79% and 85% respectively. This represents a great improvement from Unit 1 training for the scheme depicting that the farmers understood the training content. It also shows that the attitudes are also positively changing.

Table 2.2.30 Results of Evaluation in Unit 2 Program in Mdachi Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training (No of farmers)	% of farmers	Post-training (No of farmers)	% of farmers
90% and above	8	36%	10	50%
80-89%	6	27%	5	25%
70-79%	4	18%	5	25%
60-69%	2	9%	0	0%
Below 60%	2	9%	0	0%
Total Participants	22	100%	20	100%
Average Score		79%		85%

Source: JICA Team

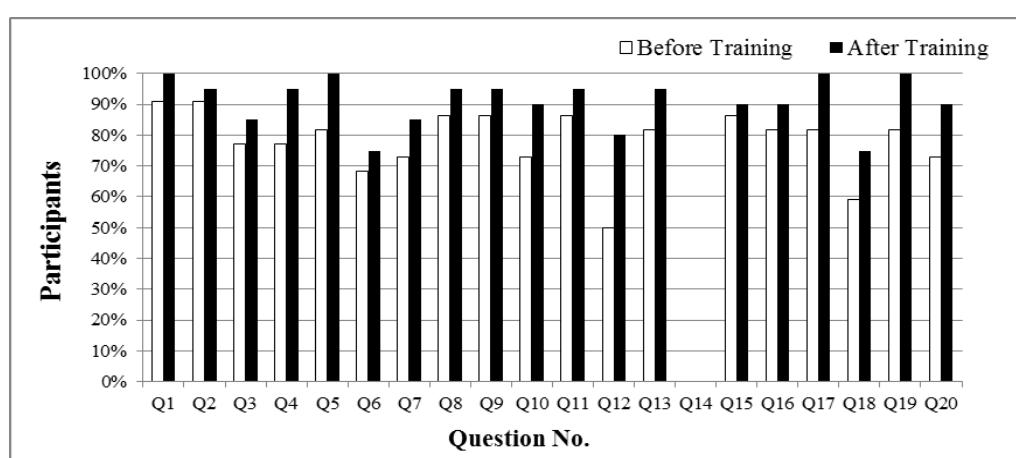


Figure 2.2.12 Result of Knowledge Evaluation in Mdachi Scheme Source: JICA Team

Table 2.2.31 Evaluation per Question for Unit 2 Program in Mdachi Scheme

No.	Content	Result	Reason of low score or reduction even after training
Q14	Interpersonal skills	BT – 0% AT - 0%	Question was not well understood by the participants and therefore none of the participants got the answer correct. The meaning got lost in the translation

Source: JICA Team

On the positive, all the other 19 questions showed a significance positive gain in knowledge depicting that the training was a success.

3) Olopito

The average performance by the participants before and after the training was 59% and 44% respectively representing a huge drop in knowledge. This could be attributed to the following:

1. The low literacy levels of the participants
2. The trainers may not have engaged the farmers fully to enhance their understanding

3. The questions may have confused the farmers
4. The farmers may not have been consistent in attending the training and so those who undertook the pre-training knowledge inventory are not the same ones who undertook the post-training knowledge inventory

The table below shows the performance of the questions which scored low after the training and the reason for the low score

Table 2.2.32 Results of Evaluation in Unit 2 Program in Olopito Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training (No of farmers)	% of farmers	Post-training (No of farmers)	% of farmers
90% and above	0	0	0	0
80-89%	2	8%	4	20%
70-79%	3	11%	1	5%
60-69%	9	33%	1	5%
Below 60%	13	48%	14	70%
Total Participants	27		20	
Average Score	59%		44%	

Source: JICA Team

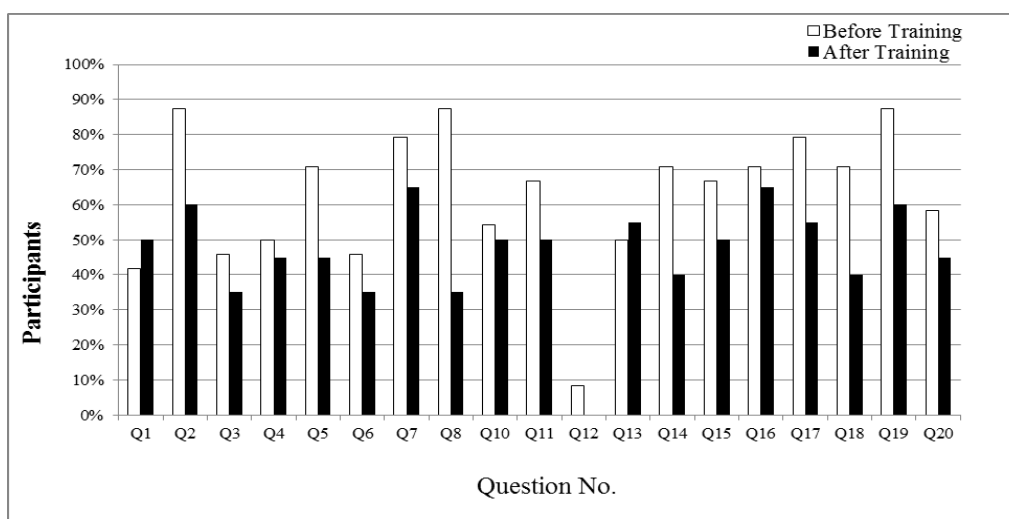


Figure 2.2.13 Result of Knowledge Evaluation in Olopito Scheme

Source: JICA Team

Table 2.2.33 Evaluation per Question for Unit 2 Program in Olopito Scheme

No	Content	Result	Reason of low score or reduction even after training
Q2	Contents of IWUA by-laws	BT – 88% AT – 60%	Question seems straight forward for farmers who understand their scheme Lack of concentration when answering the question as questionnaire was administered late in the evening
Q3	Qualities of a good IWUA	BT – 46% AT – 35%	Maybe the farmers did not understand the choices well during translation
Q4	Role of IWUA in irrigation development	BT – 50% AT – 45%	No clear understanding of the role of IWUA Believe in receiving handouts from government Lack of concentration when answering the question as questionnaire was administered late in the evening
Q5	Leader	BT – 71% AT – 45%	Confusion in the choices given Lack of concentration when answering the question as questionnaire was administered late in the evening
Q6	Leadership characteristics	BT – 46% AT – 35%	Complicated choices given for the farmers. Only those with a command of the English language could understand the choices given
Q7	Scheme leadership	BT – 79% AT – 65%	Confusion in the choices given Lack of concentration when answering the question as questionnaire was administered late in the evening
Q8	Leadership principles	BT – 88% AT – 35%	Complicated choices given for the farmers. Only those with a command of the English language could understand the choices given Maybe the farmers did not understand the choices well during translation
Q10	Leadership functions	BT – 54% AT – 50%	Maybe the farmers did not understand the question and choices well during translation Lack of concentration in answering the question.
Q11	Leadership functions	BT – 67% AT – 50%	All answers seem correct to the farmers and might have confused them.
Q12	Leadership functions	BT – 8% AT – 0%	All answers seem correct hence might have confused them Question was a bit too technical for the farmers
Q14	Definition of conflict	BT – 71% AT – 40%	Answered well in pre training assessment but poorly after training. Might have been due to lack of concentration when answering during post training evaluation
Q18	IWUA leadership qualities	BT – 71% AT – 40%	Participants might have gotten confused after the training and may have not been keen in answering the question during post training evaluation
Q20	IWUA leadership qualities	BT – 58% AT – 45%	Participants might have gotten confused after the training and may have not been keen in answering the question during post training evaluation

Source: JICA Team

4) Gatitu/Muthaiga

The average scores before and after the training was 52% and 72% respectively representing a 20% gain in knowledge. This was remarkable improvement depicting that the farmers understood the training content.

The table below shows the weak areas that were resolved after the training and those

areas that would require follow-up.

Table 2.2.34 Results of Evaluation in Unit 2 Program in Gatitu Muthaiga Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training (No of farmers)	% of farmers	Post-training (No of farmers)	% of farmers
90% and above	0	0	0	0
80-89%	3	12	10	50
70-79%	7	28	5	25
60-69%	2	8	3	15
Below 60%	13	52	2	10
Total Participants	25		20	
Average Score	52%		72%	

Source: JICA Team

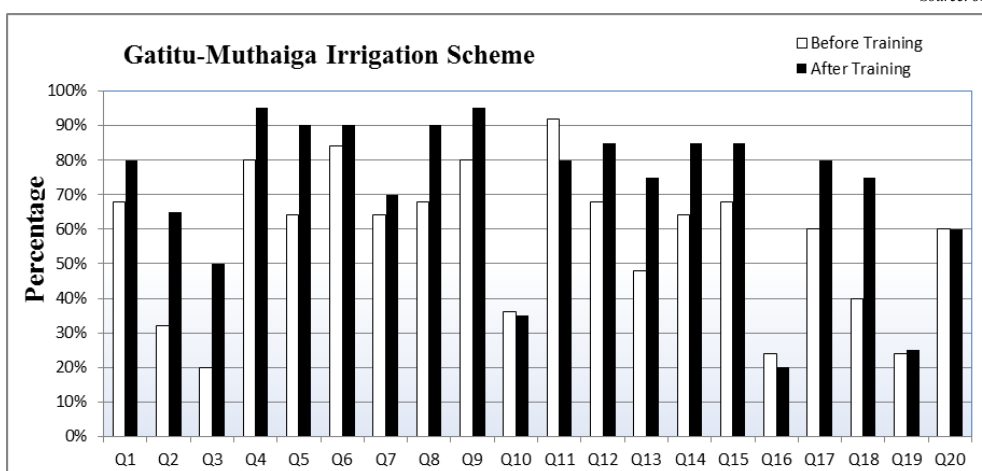


Figure 2.2.14 Result of Knowledge Evaluation in Gatitu/Muthaiga Scheme

Source: JICA Team

Table 2.2.35 Evaluation per Question for Unit 2 Program in Gatitu/Muthaiga Scheme

Item	Before training	After training
1. Solved Farmer's week point including "Good lesson learned" <i>Based on Score less than 50% (before training)</i>	1. Main body of design making of IWUA (Q2, 32%)	→ Solved (65%)
	2. Initiation phase of IWUA (Q3 20%)	→ Solved (50%)
	3. How to deal with the group's energy is going down in facilitating? (Q13 48%)	→ Solved (75%)
	4. The part of Conflict management (Q18, 40%)	→ Solved (75%)
2. Remaining issue after training Following up program	1. Democratic style of leadership (Q10, 36%)	→ Unsolved (35%)
	2. The Phase of Conflict management (Q16, 24%)	→ Unsolved (20%)
	3. 1 st step of Conflict Resolution (Q19, 24%)	→ Unsolved (25%) Facilitator and farmer : The farmers might not understand clearly (Facilitator might not clear up it).

Source : JICA Team

5)Kaben

The average performance for the participants before and after the training was 57% and

63% respectively. This represents a 6% knowledge gain. It is an indication that the training was a success and that the training achieved its overall objectives.

Table 2.2.36 Results of Evaluation in Unit 2 Program in Kaben Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training (No of farmers)	% of farmers	Post-training (No of farmers)	% of farmers
90% and above	1	4.8%	4	16%
80-89%	3	14.3%	3	12%
70-79%	3	14.3%	4	16%
60-69%	3	14.3%	5	20%
Below 60%	11	52.3%	4	36%
Total Participants	21	100%	25	100%
Mean scores	57%		63%	

Source: JICA Team

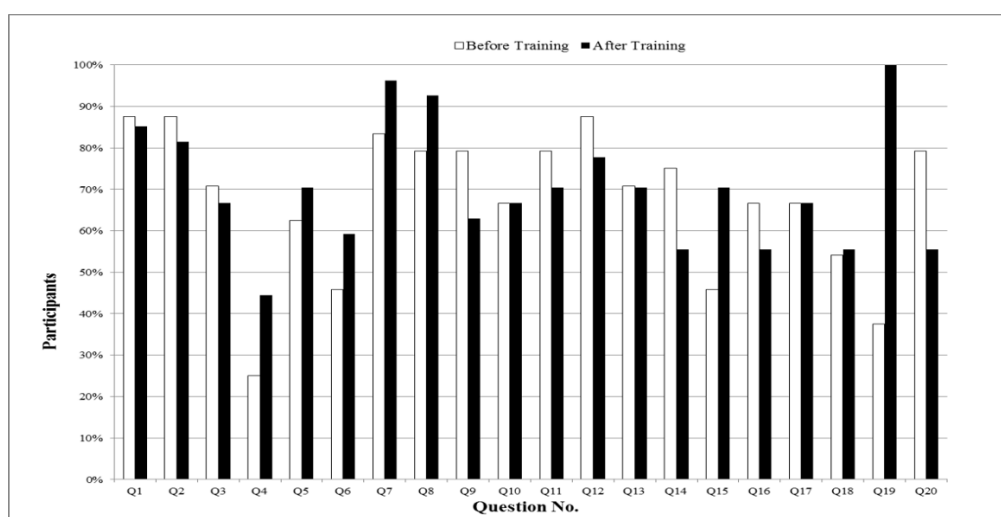


Figure 2.2.15 Result of Knowledge Evaluation in Kaben Scheme

Source: JICA Team

Table 2.2.37 Evaluation per Question for Unit 2 Program in Kaben Scheme

Item		Before training	After training
Solved Farmers' weak point including "Good lesson learned" based on score less than 50%		IWUA organizational structure (Q4 26%)	Unsolved (44%)
Remaining issue after training	Following up program		
	Follow-up program		Booster training on IWUA Structure

Source: JICA Team

Table 2.2.38 Evaluation per Question for Unit 2 Program in Kaben Scheme

No.	Content	Result	Reason of low score or reduction even after training
Q4	Role of Management	BT – 26% AT – 44%	Question was not well understood by the participants.

	committee		The question was hard.
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Source: JICA Team

6)Murachaki

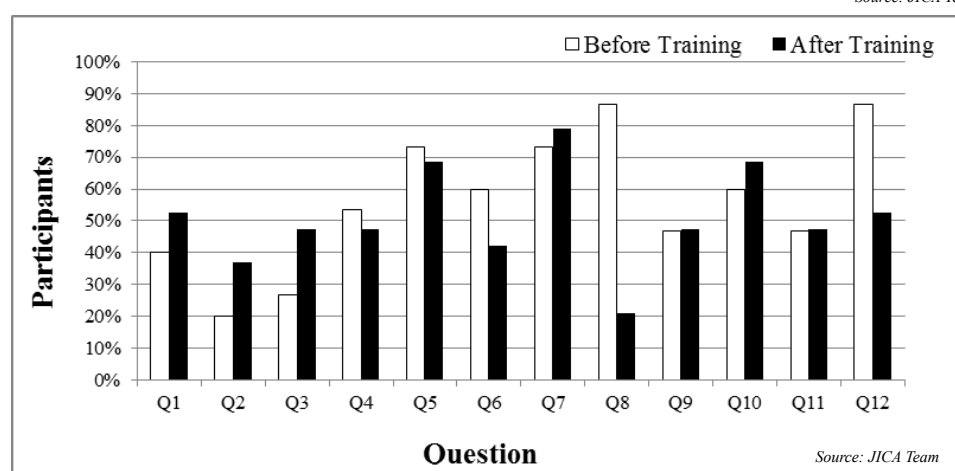
The average scores before and after the training was 56% and 51% respectively. This represented a 5% drop in knowledge. The questionnaire comprised of only 12 questions.

The poor performance may be attributed to ambiguous questions and questions with confusing answers, poor translation of the questions from English to Kiswahili during administration and lack of concentration by the participants when answering the questions.

Table 2.2.39 Results of Evaluation in Unit 2 Program in Murachaki Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training (No of farmers)	% of farmers	Post-training (No of farmers)	% of farmers
90% and above	0	0%	3	16%
80-89%	2	13%	0	0%
70-79%	2	13%	1	5%
60-69%	3	20%	1	5%
50-59%	2	13%	4	21%
Below 50%	6	40%	10	53%
Total Participants	15	100%	19	100%
Average Score	56%		51%	

Source: JICA Team



Source: JICA Team

Figure 2.2.16 Result of Knowledge Evaluation in Murachaki Scheme

Table 2.2.40 Evaluation per Question for Unit 2 Program in Murachaki Scheme

Item	Before training	After training
Solved Farmers' weak point including "Good lesson learned" based on score less than 50%	Activities of management committee (Q2, 20%)	Unsolved (37%)
	IWUA objectives (Q3, 27%)	Unsolved (47%)

		Conflicts in an IWUA (Q4, 53%)	Unsolved (47%)
		IWUA conflict resolution (Q6, 6%)	Unsolved (21%)
		Leadership styles (Q9, 47%)	Unsolved (47%)
		Functions of leadership (Q11, 47%)	Unsolved (47%)
Remaining issue after training	Improve the training program		
	Follow-up program		Booster training on IWUA leadership and conflict resolution

Source: JICA Team

7) Tumutumu

The average scores before and after the training was 34% and 76% respectively representing 42% gain in knowledge. This is a remarkable performance being a positive indicator that the training was a great success.

The graph shows the great gain in knowledge in almost all the areas of the training. The table below shows the weak areas of the training that require follow-up in future.

Table 2.2.41 Results of Evaluation in Unit 2 Program in Tumutumu Scheme

		ANALYSIS FOR KNOWLEDGE EVALUATION			
No	Score	Pre-training (No of farmers)	% of farmers	Post-training (No of farmers)	% of farmers
1	91-100%		0	0	0
2	81-90%		0	4	18%
3	71-80%		0	10	45%
4	61-70%		0	7	32%
5	51-60%	1	5%	1	5%
6	41-50%	4	18%	0	0
7	Below 40%	17	77%	0	0
TOTALS		22	100%	22	100%
Average score		34%		76%	

Source: JICA Team

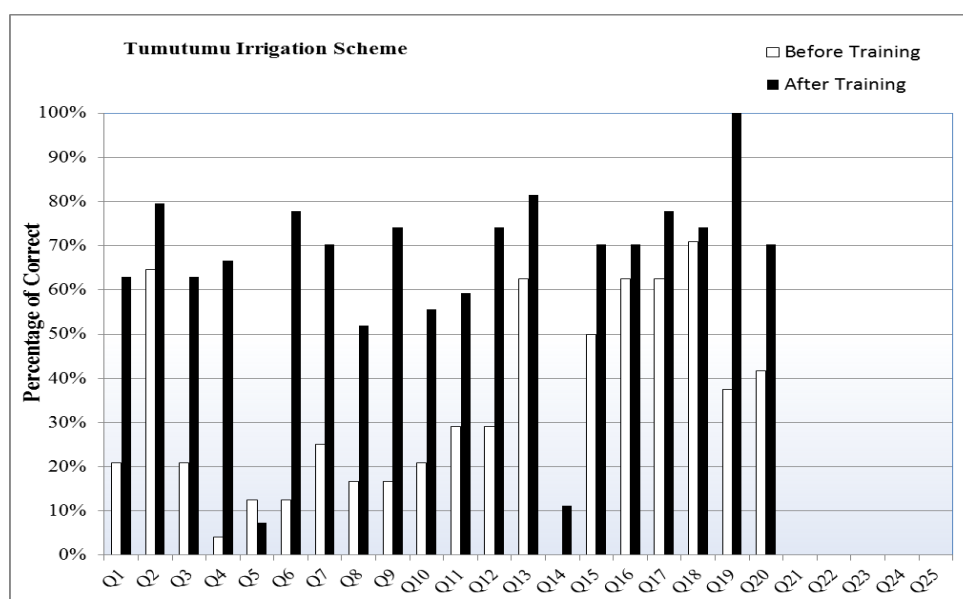


Figure 2.2.17 Result of Knowledge Evaluation in Tumutumu Scheme

Table 2.2.42 Evaluation per Question for Unit 2 Program in Tumutumu Scheme

No.	Content	Result	Reason of low score or reduction even after training
Q5	The IWUA members are directly answerable to who as per the organizational structure	BT – 13% AT – 7%	The farmers seemed to have gotten confused as to who they are answerable to. The members are directly answerable to the clock sub-committee but not to the chairman as many responded
Q14	Leadership influence	BT – 0% AT – 14%	The question demanded the farmers to identify one of the ways in which a leader can use to influence the IWUA on certain issues. The correct answer as use of rewards but the members answered it is through following the IWUA rules.

Source: JICA Team

8) Muungano

The average scores before and after the training was 68% and 70% respectively representing a 2% gain in knowledge.

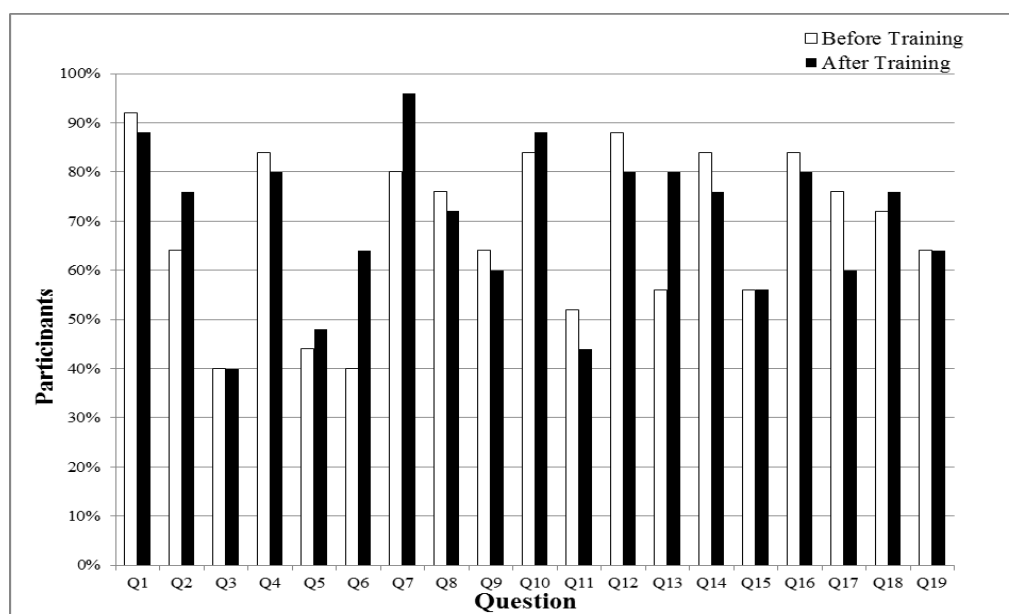
The table below indicates the weak areas identified during the evaluation which would be re-visited in future during follow-up.

Table 2.2.43 Results of Evaluation in Unit 2 Program in Muungano Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training (No of farmers)	% of farmers	Post-training (No of farmers)	% of farmers
90% and above	2	8%	3	12%
80-89%	4	16%	6	24%

70-79%	7	28%	4	16%
60-69%	3	12%	4	16%
Below 60%	9	36%	8	32%
Total Participants	25	100%	25	100%
Average Score	68%		70%	

Source: JICA Team



Source: JICA Team

Figure 2.2.18 Result of Knowledge Evaluation in Muungano Scheme

Table 2.2.44 Evaluation per Question for Unit 2 Program in Muungano Scheme

No.	Content	Result	Reason of low score or reduction even after training
Q3	Decision making body in an IWUA	BT – 40% AT – 40%	Most members responded that the Executive committee was the major decision making body instead of the general Assembly. Members did not understand their role in the IWUA organizational structure
Q5	Factors of leadership	BT – 44% AT – 48%	The farmers did not quite understand the meaning of factors of leadership so it was difficult to pick out the answer.
Q8	Leadership Styles	BT – 40% AT – 64%	The farmers understood the different styles of leadership after the training.
Q9	Guiding principles of leadership	BT – 64% AT – 60%	The meaning may have been lost in the translation causing the drop in knowledge
Q11	Motivation	BT – 52% AT – 44%	Lack of concentration when answering the question as the questionnaire was not read out to the farmers.
Q15	Interpersonal skills importance in team leadership	BT – 56% AT – 56%	Lack of concentration when answering the question as the questionnaire was not read out to the farmers therefore the misinterpretation by the farmers.
Q17	Causes of conflict in a group	BT – 76% AT – 60%	Lack of concentration when answering the question as the questionnaire was not read out to the farmers therefore the misinterpretation by the farmers.

Source: JICA Team

(4) Follow-up program

Table 2.2.45 Follow-up Program of Unit 2 Training Program

S/No	ACTIVITY	OBJECTIVE	REMARKS/OUTPUT
1	Feedback on Unit 2 Training	<ol style="list-style-type: none"> To give feedback to the farmers and relay the results of the training To recap on the main areas of the training as well as the weak areas identified during the evaluation 	<p>The SCIO recapped on the major content covered during the training and also aided the farmers in answering the questions that they had performed poorly in the knowledge evaluation to gain a better understanding.</p> <p>Generally, most of the schemes had recorded a gain in knowledge except Murachaki and Olopito. The Scheme that had the highest gain in knowledge was Tumutumu with 44%.</p>
2	Farmers feedback on action plan	<p>During this session, the farmers were expected to give a feedback on the action plan that had been prepared during Unit 2 training. The action plan covered:</p> <ol style="list-style-type: none"> Feedback on the progress of the action plan from the training Follow-up on record keeping on the books already opened after Unit 2 training and opening of other new books Follow-up on the revision of the IWUA bylaws to include Leadership and Conflict management policies 	<ol style="list-style-type: none"> <p>he schemes were in the process of reviewing their bylaws except Gatitu Muthaiga who were still preparing the initial copy of the bylaws. Other Schemes had completed preparation of their first draft copy of the bylaws and were in the process of incorporating the leadership and conflict policies</p> <ol style="list-style-type: none"> <p>he IWUA secretary informed members on the progress they had made in updating the IWUA records in the books that they had been provided with during Unit 1 follow-up. They included Membership Register, Black (Discipline) book, Minutes Book and Development Fund Book. Most of the books had been updated though with small errors which were corrected.</p> <ol style="list-style-type: none"> <p>on the extension of the training, Muungano had held trainings on block basis. All others were yet to conduct the trainings.</p>
3	Action Planning	<p>A new action plan was prepared in which the participants committed to:</p> <ol style="list-style-type: none"> Holding a training for the rest of the scheme members to cover Unit 2 as well as Unit 1 for those who were yet to extend the training Revision of the bylaws 	<p>Each Scheme prepared an action plan. Revision of the bylaws would include clauses on:</p> <ol style="list-style-type: none"> Dates of holding meetings including General Assembly Meetings, Committee meetings and block meetings Election policies Leadership policies Gender policies
4	Guided Practice in opening records	<p>The session objective was:</p> <ol style="list-style-type: none"> To backstop on the IWUA books update To present more books for financial recording 	<p>The SIDEMAN-SAL team gave a guided practice on filling of the IWUA records including:</p> <ol style="list-style-type: none"> Membership Register Minutes Book Discipline Book Development Fund Book Communal Records Register Cash Book A Box File for filing all letters, invoices, receipts etc.

Source: JICA Team

2.2.6 Record Keeping & Financial Management (Unit 3)

(1) Implementation Schedule and participant information

All of the schemes training were conducted except following up as shown below.

Table 2.2.46 Records of Unit 3 Training Program

SCHEME	PRE-TRAINING	TRAINING	FOLLOW-UP
Kasokoni	7/16/2014	8/5-7/2014	
Mdachi	7/16/2014	8/19-21/2014	
Olopito	7/24/2014	8/12-14/2014	
Gatitu/Muthaiga	8/11/2014	9/9-11/2014	
Kaben	7/30/2014	8/26-28/2014	
Murachaki	8/7/2014	9/3-5/2014	
Tumutumu	8/26/2014	9/9-11/2014	
Muongano	7/24/2014	8/26-28/2014	

Source: JICA Team

Table 2.2.47 Description of Unit 3 Training Program

SCHEME	PARTICIPANTS		RESOURCE PERSONS	VENUE FOR THE TRAINING
	Male	Female		
Kasokoni	12	10	SCIO, SCAO, SCCO	Nakuruto Nursery School
Mdachi	21	10	SCIO, SCAO, DSCAO	Jaribuni Primary School
Olopito	-	-	*SCIO lost the result and JICA team re-test for the farmers	-
Gatitu/Muthaiga	8	6	SCIO, SCAO, SCA&MO	Gospel Celebration Centre, Kiamariga
Kaben	15	9	SCIO, SCAO, SCSDO	AIC Church, Liter
Murachaki	15	6	SCIO, SCAO, SCSDO	St. Lukes Church, Ciangera
Tumutumu	23	7	SCIO, SCAO, SCSDO	New Apostolic Church, Ntherone
Muongano	-	-	Reviewing	-

Source: JICA Team

(2) Evaluation Summary

It has been observed that different quality evaluation sheet was applied in Unit 3. Therefore it is difficult to simply compare, however it was observed that the performance relied on mainly facilitator of quality, the motivation of participating farmers.

Table 2.2.48 Summary of Evaluation of Unit 2 Training Program

SCHEME	PRE-TRAINING AVERAGE SCORE	PORT-TRAINING AVERAGE SCORE	DIFFERENCE (KNOWLEDGE GAIN)
Kasokoni	64%	66%	2%
Mdachi	78%	82%	4%
Olopito	-	-	*SCIO lost the result and JICA team re-test for the farmers
Gatitu/Muthaiga	68%	70%	2%
Kaben	60%	63%	3%
Murachaki	57%	70%	13%
Tumutumu	55%	81%	26%
Muungano	-	-	Reviewing

Source: JICA Team

Here in below is the summary of Descriptive Analysis for each scheme. We described the detail evaluation the following chapter.

(3) Evaluation of Each Scheme

1)Kasokoni

The average performance for the participants before and after the training was 64% and 66% respectively. This depicts a 2% gain in knowledge. The questionnaire comprised of 15 questions drawn from the 9 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.49 Results of Evaluation in Unit 3 Training Program in Kasokoni Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	1	6%
80-89%	5	28%	4	27%
70-79%	3	16%	4	27%
60-69%	5	28%	2	13%
Below 60%	5	28%	4	27%
Average Score		64%	15	66%

Source: JICA Team

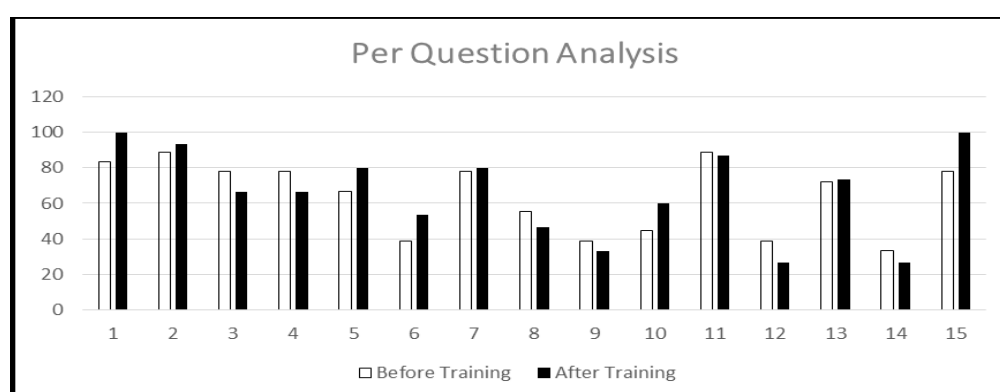


Figure 2.2.19 Result of Knowledge Evaluation in Kasokoni Scheme

Source: JICA Team

Table 2.2.50 Evaluation per question for Unit 3 Training Program in Kasokoni Scheme

No	Content	Result	Reason of low score or reduction even after training
Q3	IWUA activities with financial implication	BT – 78% AT – 67%	The farmers understood the activities that require IWUA finances.
Q4	The meaning of Book Keeping	BT – 78% AT – 67%	The farmers did not quite understand the layout of various financial records kept by IWUA owing to low literacy levels. There might have been a little confusion & difficult in assimilating terminologies used in book keeping after the training
Q8	Budget importance	BT – 56% AT – 47%	The farmers understood the importance of budgeting in their IWUA. The low literacy levels brought confusion on what farmers knew before the training and what they were taught after the training bringing about the difference in results.
Q9	Users of IWUA Funds	BT – 39% AT – 33%	Members did not quite understand the important roles of leadership of IWUA in managing IWUA finances, owing to previous attitudes that leaders must always embezzle funds.
Q11	Examples of Assets	BT – 89% AT – 87%	The farmers may have been a little confused on types of assets and liabilities.
Q12	The meaning of a Balance Sheet	BT – 39% AT – 27%	Book keeping proved a hard lesson for the IWUA because what they ‘knew’ differed with what is, hence confusion and low score
Q14	Management of organization funds	BT – 33% AT – 27%	The difference in farmer attendance before and after the training may have brought about the difference in results

Source: JICA Team

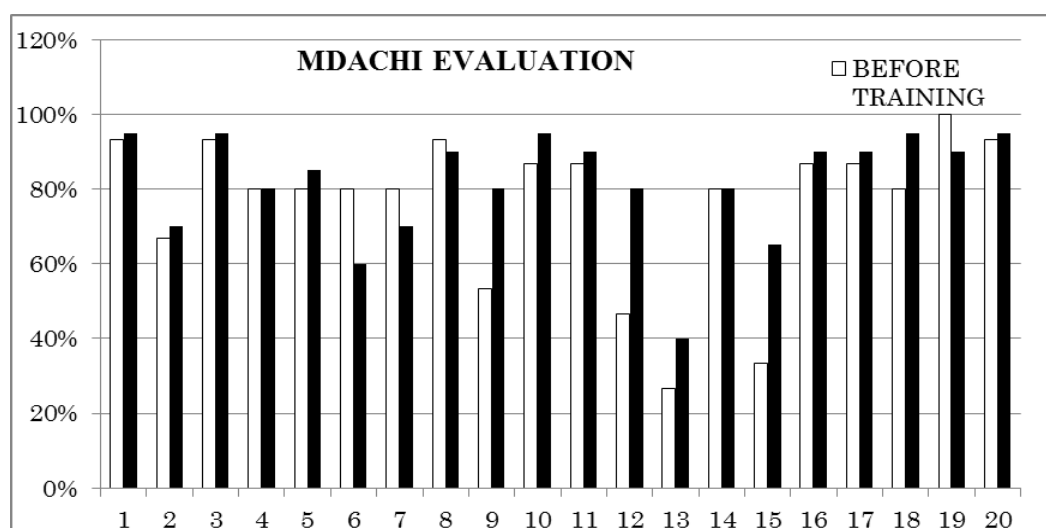
2)Mdachi

The average performance for the participants before and after the training was 78% and 82% respectively. This depicts a 4% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 9 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.51 Results of Evaluation in Unit 3 Training Program in Mdachi Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	2	13%	9	45%
80-89%	8	53%	4	20%
70-79%	3	20%	4	20%
60-69%	1	7%	2	10%
Below 60%	1	7%	1	5%
Total Participants	15		20	
Average Score		78%		82%

Source: JICA Team



Source: JICA Team

Figure 2.2.20 Result of Knowledge Evaluation in Mdachi Scheme

Table 2.2.52 Evaluation per question for Unit 3 Training Program in Mdachi Scheme

No	Content	Result	Reason for low score or reduction even after training
Q6	Financial planning definition	BT – 80% AT – 60%	The farmers may have gotten confused during the training Some of the participants who took part in the post knowledge were not available during the training on financial planning
Q7	Book keeping definition	BT – 80% AT – 70%	The inconsistency of participants in attending the training may have contributed to the reduction in the score
Q13	Things to be considered during the budgeting process	BT – 27% AT – 40%	Low literacy levels of the participants may have contributed to the low score The question was not so straight forward The meaning may have been lost in the translation

No	Content	Result	Reason for high score after training
Q9	Identifying an Asset	BT – 53% AT – 80%	This is attributed to the training, group work and recapitulations
Q12	Definition of financial planning	BT – 41% AT – 80%	The training on budgeting and financial planning was done at length and this score improvement may be attributed to that
Q15	Person responsible for the administration of budgetary control	BT – 33% AT – 65%	Before the training the farmers were not aware of what budgetary control is and most had indicated that the IWUA chairman was the one responsible for that. However after the training the farmer were able to understand and appreciate the role played by the audit sub-committee
Q18	Identifying the financial reports to be prepared annually for the IWUA	BT – 80% AT – 95%	The question was simple and there were only 2 multiple choices which made it easy for the participants to identify the right answer
No	Content	Result	Reason for high score even before the training
Q1	IWUA definition	BT – 93% AT – 95%	The farmers have been trained on this in all the Units under the program
Q3	Contents of a financial management	BT – 93% AT – 95%	The question was very simplistic
Q8	Contents of Income and Expenditure book	BT – 93% AT – 90%	The question was too simplistic.
Q10	Meaning of accrual principle of accounting	BT – 87% AT – 95%	The question was simple. However the training contributed to some addition in knowledge
Q11	Meaning of a budget	BT – 87% AT – 90%	Most farmers had basic understanding of what a budget is. The multiple choices also made it easy for one to identify the right answer
Q16	Meaning of financial reporting	BT – 87% AT – 90%	The multiple choices made it easy for one to identify the right answer.
Q17	Reasons for preparing financial statements	BT – 87% AT – 90%	The question was too simplistic
Q19	Common items appearing in an income statement	BT – 100% AT – 90%	The question was simple. The drop in score may be attributed to lack of concentration by the participants
Q20	Meaning of auditing	BT – 93% AT – 95%	The multiple choices made it easy for one to identify the right answer.

3)Olopito

Source: JICA Team

Documents for preparation of the training report misplaced. JICA team will tried to re-test the farmers and implement following up program.

4)Gatitu/Muthaiga

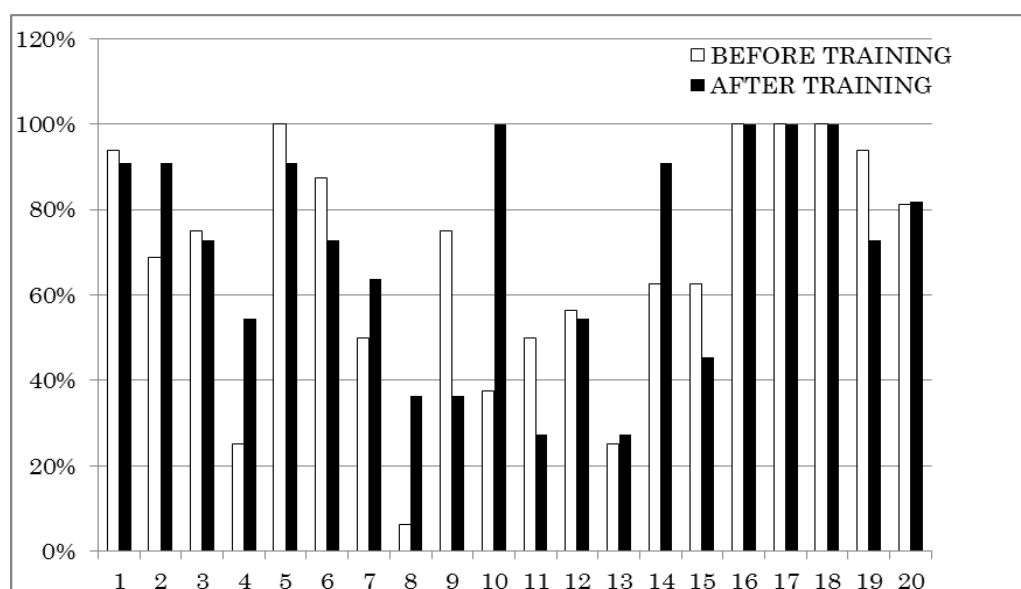
The average performance for the participants before and after the training was 68% and 70% respectively. This depicts a 2% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 9 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had

no knowledge gain after the training.

Table 2.2.53 Results of Evaluation in Unit 3 Training Program in Gatitu/Muthaiga Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	1	13%	1	50%
80-89%	1	53%	2	18%
70-79%	6	20%	3	27%
60-69%	6	7%	3	27%
Below 60%	2	7%	2	18%
Total Participants	16	100%	11	100%
Average Score		68%		70%

Source: JICA Team



Source: JICA Team

Figure 2.2.21 Result of Knowledge Evaluation in Gatitu/Muthaiga Scheme

Table 2.2.54 Evaluation per question for Unit 3 Training Program in Gatitu/Muthaiga Scheme

No	Content	Result	Reason for low score or reduction even after training
Q6	Contents of the Income and Expenditure book	BT – 88% AT – 78%	The question was easy and multiple choices not confusing so the drop in the score may be due to the participants who did not attend the last day of the training who may have attended the first day of the training. It is noted that 16 and 11 participants undertook the pre and post knowledge inventory respectively
Q9	Definition of financial planning	BT – 75% AT – 36%	The participants may have gotten confused as to what financial planning is as the question was very simple
Q11	Definition of financial management	BT – 50% AT – 27%	The inconsistency of participants in attending the training may have contributed to the reduction in the score

Q15	Best way of resolving financial conflicts	BT – 63% AT – 45%	The multiple choices were confusing and during training there was no discussion on which is a better method of financial conflict resolution than the other
Q19	Person responsible for authorizing IWUA purchases	BT – 94% AT – 73%	Low literacy levels of the participants may have contributed to the low score Inconsistency of the participants may also be a cause
No	Content	Result	Reason for high score after training
Q2	What a budget enables	BT – 69% AT – 91%	The farmers gained knowledge on the uses of a budget and therefore many were able to respond correctly
Q4	Financial record book identification	BT – 25% AT – 55%	After the training many participants were able to identify the financial records
Q8	Definition of auditing	BT – 6% AT – 36%	Most of the participants did not understand what auditing was before the training but after the training those who were a bit literate were able to gain knowledge on the correct meaning of auditing
Q10	Person responsible for writing a qualified audit report	BT – 38% AT – 100%	After the training all the participants understood that the external auditor is the one who writes the audit report
Q14	Ways in which IWUA finances can be misused	BT – 63% AT – 91%	The group work on weaknesses in the financial system and the role play contributed to the increase in the score
No	Content	Result	Reason for high score even before the training
Q1	Benefits of budgeting	BT – 93% AT – 95%	The question was too simple
Q5	Contents of a cash book	BT – 93% AT – 95%	The question was too simple
Q16	IWUA bank signatories	BT – 93% AT – 90%	The question was too simple
Q17	Person responsible for keeping the cash book	BT – 87% AT – 95%	Most participants are aware that the treasurer is the one who should keep the financial records
Q18	IWUA bank account name	BT – 87% AT – 90%	The question was simple as it required the participants to identify in whose name the IWUA bank account should be in
Q20	Supporting document issued after making purchases	BT – 87% AT – 90%	Most members were aware that they are supposed to obtain a receipt for every purchase.

Source: JICA Team

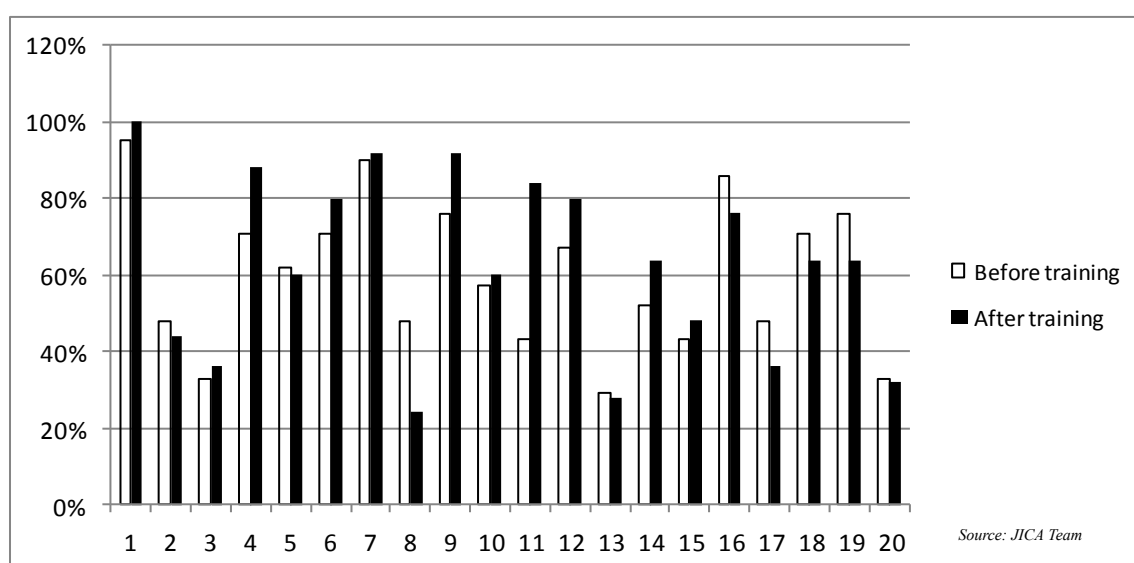
5)Kaben

The average performance for the participants before and after the training was 60% and 63% respectively. This depicts a 3% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 9 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.55 Results of Evaluation in Unit 3 Training Program in Kaben Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	0	0%
80-89%	1	4.8%	3	12%
70-79%	4	19%	7	28%
60-69%	7	33.3%	7	28%
Below 60%	9	42.9%	8	32%
Average Score		60%		63%

Source: JICA Team



Source: JICA Team

Figure 2.2.22 Result of Knowledge Evaluation in Kaben Scheme

Table 2.2.56 Evaluation per question for Unit 3 Training Program in Kaben Scheme

No	Content	Result	Reason of low score or reduction even after training
Q2	What is most important in order to sustain Kaben	BT – 48% AT – 44%	Most farmers indicated that they need to work harder in their farms. The correct response was they need to pay for water fee to have enough finances to run their operations and maintenance
Q3	The most important function of an IWUA	BT – 32% AT – 36%	Most of the farmers indicated that the most important function of an IWUA is to ensure members follow bylaws. Irrigation water supply is the most important function of an IWUA
Q8	Format for the membership register	BT – 48% AT – 24%	The low literacy levels of the participants may have contributed to the low score
Q13	Major input in the budgetary process	BT – 29% AT – 28%	The trainer may not have made it clear which is the most important input into the budgetary process The IWUA members' literacy level may also have contributed to the low score. The major input in budgeting is performance (past and present)
Q15	The benefit of	BT – 44%	Most of the participants did not understand the meaning of

	budgetary control	AT – 48%	budgetary control and confused it with auditing. The main reason for budgetary control is to prevent fraud, theft, wastage and misuse of IWUA funds
Q17	Definition of financial planning	BT – 48% AT – 36%	The farmers may have lost meaning in the translation and the answers were not confusing
Q20	Person responsible for budgetary control	BT – 33% AT – 32%	This was a very easy question as the answer was the budget sub-committee. The reason for low score may be the challenge in the translation or lack of concentration by the participants
No	Content	Result	Reason for improvement of training
Q4	Meaning of financial management	BT – 70% AT – 88%	The multiple choices made it easy for one to pick out the correct answer. The answers were also simple to understand
Q9	Source of IWUA income	BT – 76% AT – 92%	After the training almost all the participants were able to identify the sources of IWUA income
Q11	The importance of a budget	BT – 43% AT – 84%	After the training the participants were able to gain an understanding of a budget and things it assists one in doing
No	Content	Result	Reason for High score even before the training
Q1	The person in charge of Scheme O&M	BT – 95% AT – 100%	The farmers were already aware of their role in O&M given the fact that this had been covered during Unit 1 and 2 of the capacity building program
Q7	Distinction between a cash book and a petty cash book	BT – 90% AT – 92%	The translation may have enhanced the farmers to gain an understanding of the two books as the meaning is in the names
Q16	All phases of scheme implementation involves finances	BT – 86% AT – 76%	The multiple choices made it easy for many participants to identify the answer as they were to choose wither a (Yes and No)

Source: JICA Team

6)Murachaki

The average performance for the participants before and after the training was 57% and 70% respectively. This depicts a 13% gain in knowledge. The questionnaire comprised of 25 questions drawn from the 9 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training

Table 2.2.57 Results of Evaluation in Unit 3 Training Program in Murachaki Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	1	5%
80-89%	3	15%	5	26%
70-79%	2	10%	3	16%
60-69%	2	10%	5	26%
Below 60%	13	65%	5	26%
Total Participants	20	100%	19	100%
Average Score		57%		70%

Source: JICA Team

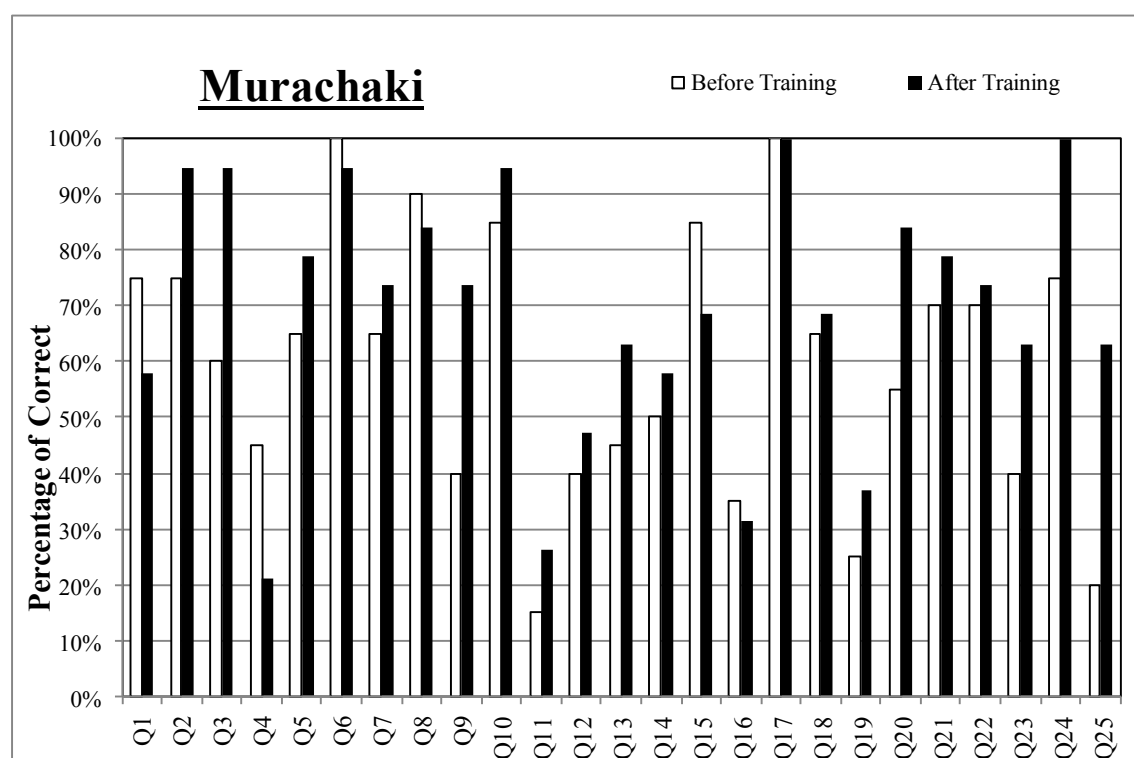


Figure 2.2.23 Result of Knowledge Evaluation in Murachaki Scheme

Table 2.2.58 Evaluation per question for Unit 3 Training Program in Murachaki Scheme

No	Content	Result	Reason for significant low score or reduction even after training
Q1	Definition of book keeping	BT – 75% AT – 58%	The meaning may have been lost in translation. The farmers may have confused with ‘arranging’ and ‘keeping’ of the records
Q4	Identifying an example liability	BT – 45% AT – 21%	The multiple choices were confusing and only if a participant understood well the meaning of a liability would they be able to identify the right answer
Q11	Identifying the IWUA activities with financial implications	BT – 15% AT – 26%	The translation of the multiple choices may have made the participants confused. Low literacy level may also be a factor
Q12	Components of IWUA financial management system	BT – 40% AT – 47%	The facilitator did not explain clearly the 3 major components of a financial management system
Q15	What is a financial budget	BT – 85% AT – 58%	Low literacy levels of the participants may have contributed to the low score Inconsistency of the participants in attending the training may also be a cause to the drop in score
Q16	Phases of irrigation system development	BT – 35% AT – 32%	These have been trained on in all the 3 units trained in the scheme. Lack of concentration when answering the question may have contributed to the low score
Q19	Where all receipts pertaining to IWUA income and expenditure should be kept	BT – 25% AT – 37%	The multiple choices were easy and therefore the low literacy levels of the participants may have contributed to the low score

Source: JICA Team

No	Content	Result	Reason for significant high score after training
Q2	Identifying an example of an IWUA financial record	BT – 75% AT – 95%	Training, group discussions is the contributing factor to the increase in score
Q3	Identifying an asset	BT – 60% AT – 95%	Training and group discussions enhanced the farmers' understanding of the assets
Q5	Person responsible for recording monthly payments	BT – 65% AT – 79%	Before the training, most respondents had indicated that it is the role of the secretary to record monthly payments. The training however made them appreciate the role of the treasurer in making these records
Q9	Person responsible for verifying that goods ordered are delivered and recorded properly	BT – 40% AT – 74%	Before the training most of the participants had indicated that the IWUA management committee or the operations and maintenance committee was responsible for this. However, the training enlightened them on the role of the IWUA audit subcommittee
Q13	Where all receipts pertaining to IWUA income and expenditure are filed	BT – 45% AT – 63%	Before the training the participants had indicated they should be kept in the income and expenses book. However, receipts are part of financial vouchers that should be kept in a financial record file
Q20	Types of auditing	BT – 55% AT – 84%	Before the training, the farmers were not aware of what auditing is and the types of auditing but the training enabled them to understand and identify correctly the 2 types of auditing
Q23	Person responsible for conducting an internal audit	BT – 40% AT – 63%	The gain in knowledge is attributed to the training
Q24	Person responsible for operations and maintenance of irrigation scheme	BT – 75% AT – 100%	This question has been recurrent in all the Units trained in the scheme. Inconsistency of the farmers in attending the training may have caused the low score before the training but after the training all the participants were able to understand their role in O&M
Q25	Most important aspect to ensure sustainability of the scheme	BT – 20% AT – 63%	This question has been recurrent in all the previous trainings. The farmers are expected to appreciate the major role played by finances towards scheme sustainability
No	Content	Result	Reason for significant high score even before the training
Q6	What should be done to the money collected by the IWUA	BT – 100% AT – 95%	The farmers were aware of the role of the treasurer as the custodian of the IWUA finances
Q8	Importance of keeping financial records	BT – 90% AT – 84%	The question was too simple
Q10	Advantages of keeping financial records	BT – 85% AT – 95%	The question was too simple

Source: JICA Team

7) Tumutumu

The average performance for the participants before and after the training was 55% and 81% respectively. This depicts a 26% gain in knowledge. The questionnaire comprised of 25 questions drawn from the 9 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training

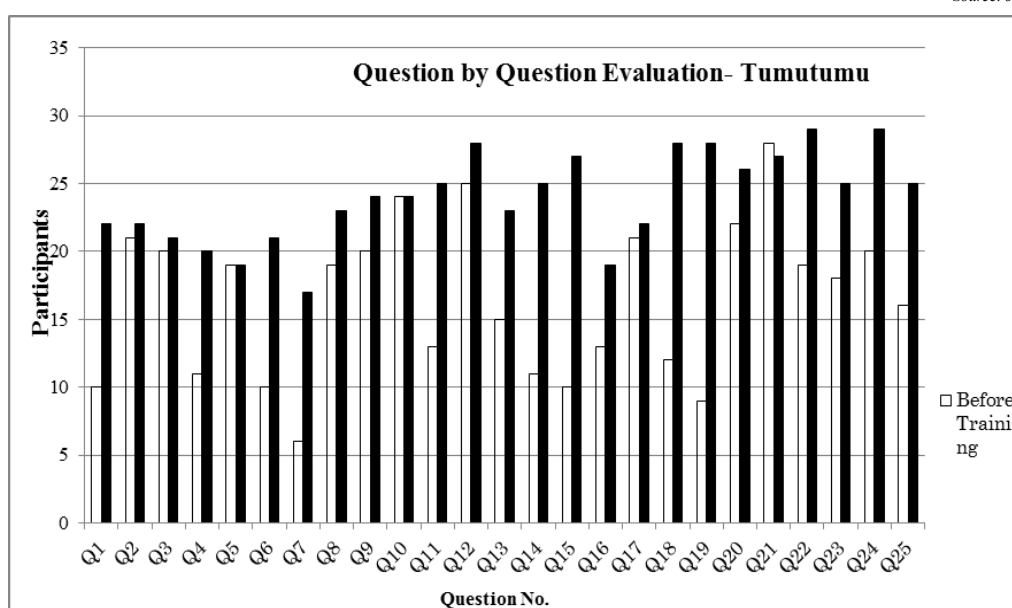
[Descriptive Analysis]

- A general increase in knowledge is seen
- Some questions had very small increase in knowledge
- Others had remarkable increase in knowledge
- Question 21 had no increase in knowledge. Participants scored less after training

Table 2.2.59 Results of Evaluation in Unit 3 Training Program in Tumutumu Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION					
No	Score	Pre-Training	% of farmers	Post training	% of farmers
1	91-100 %	0	0	11	36.7
2	81-90 %	0	0	7	23.3
3	71-80 %	6	20	6	20
4	61-70 %	3	10	2	6.7
5	Below 60%	9	70	4	13.4
	TOTALS	30	100	30	100
	Average score		55		81

Source: JICA Team



Source: JICA Team

Figure 2.2.24 Result of Knowledge Evaluation in Tumutumu Scheme

8)Muungano

Documents for preparation of training report yet to be sent by SCAO who is on leave

(4) Follow-up Program

The scores by the participants in all the schemes showed a gain in knowledge. However, in most of the schemes, the farmers remarked in the course evaluation that the training content was technical and required more days for them to gain good understanding. Specifically, farmers in Murachaki remarked that they had gained very little knowledge of book keeping

and hope that the initial training would be repeated in future.

The follow-up program for Unit 3 therefore is expected to take the form of guided practice where the farmers will be guided in the recording of the various financial transactions in the various financial books. This is expected to take a day. During this booster training, the executive committee and all the other scheme leaders are expected to attend, regardless of whether they had attended the training or not. The reason for this is because these are the implementers of the knowledge in book keeping. This program preparation is in progress.

2.2.7 On Farm Water Management and Practical Irrigated Agriculture

(1) Implementation Schedule and participant information

All of the schemes training were conducted except following up as shown below.

Table 2.2.60 Records of Unit 4 Training Program

SCHEME	PRE-TRAINING	TRAINING	FOLLOW-UP
Kasokoni	5/5-6/2015	5/18-21/2015	
Mdachi	3/31 – 4/01/ 2015	4/20-23/2015	
Olopito	4/13-14/2015	5/25-28/2015	
Gatitu/Muthaiga	4/16-17/2015	5/18-21/2015	
Kaben	4/28-29/2015	5/11-14/2015	
Murachaki	7/8-9/2015	7/20-23/2015	
Tumutumu	4/28-29/2015	5/11-14/2015	
Muongano	N/A	N/A	

Source: JICA Team

Table 2.2.61 Description of Unit 4 Training Program

SCHEME	PARTICIPANTS		RESOURCE PERSONS	VENUE FOR THE TRAINING
	Male	Female		
Kasokoni			SCAO, SCIO, Crops Officer, SCAEO, HEO, PMT	Home of a member - Kasokoni
Mdachi	16	11	PMT, SCAO, SCIO, SCCDO, HAE	IWUA office - Jaribuni
Olopito	19	7	SCIO, SCADO, SCAO, SCCDO, PMT	IWUA office - Olopito
Gatitu/Muthaiga	11	6	PMT, SCADO, SCIO, WAO	Gospel Celebration Centre, Kiamariga
Kaben	11	3	PMT, SCIO, WAO, SCAO, HEO	AIC Church, Liter
Murachaki	16	10	SCCDO, PMT, SCIO, SCAO, HAE	St. Lukes AIC Church, Ciangera
Tumutumu	20	4	SCIO, SCADO, SCAEO, SCCDO	New Apostolic Church, Ntherone
Muongano	N/A	N/A	N/A	N/A

(2)Evaluation Summary

An evaluation questionnaire was prepared by PMT and used in all the schemes to ensure quality and uniformity of the questions.

Table 2.2.62 Summary of Evaluation of Unit 4 Training Program

SCHEME	PRE-TRAINING AVERAGE SCORE	PORT-TRAINING AVERAGE SCORE	DIFFERENCE (KNOWLEDGE GAIN)
Kasokoni	60%	55%	(-5%)
Mdachi	68%	72%	(+4%)
Olopito	68%	68%	(0%)
Gatitu/Muthaiga	71%	78%	(+7%)
Kaben	61%	69%	(+8%)
Murachaki	56%	70%	(+14%)
Tumutumu	53%	59%	(+6%)
Muongano	N/A	N/A	N/A

Source: JICA Team

Here in below is the summary of Descriptive Analysis for each scheme. We described the detail evaluation the following chapter.

(3)Evaluation of Each Scheme

1)Kasokoni

The average performance for the participants before and after the training was 60% and 55% respectively. This depicts a 5% loss in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.63 Results of Evaluation in Unit 4 Training Program in Kasokoni Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	1	6%	0	0%
80-89%	1	6%	0	0%
70-79%	3	19%	2	15%
60-69%	5	31%	5	38%
Below 60%	6	38%	6	46%
Total Participants	10		14	
Average Score		60%		55%

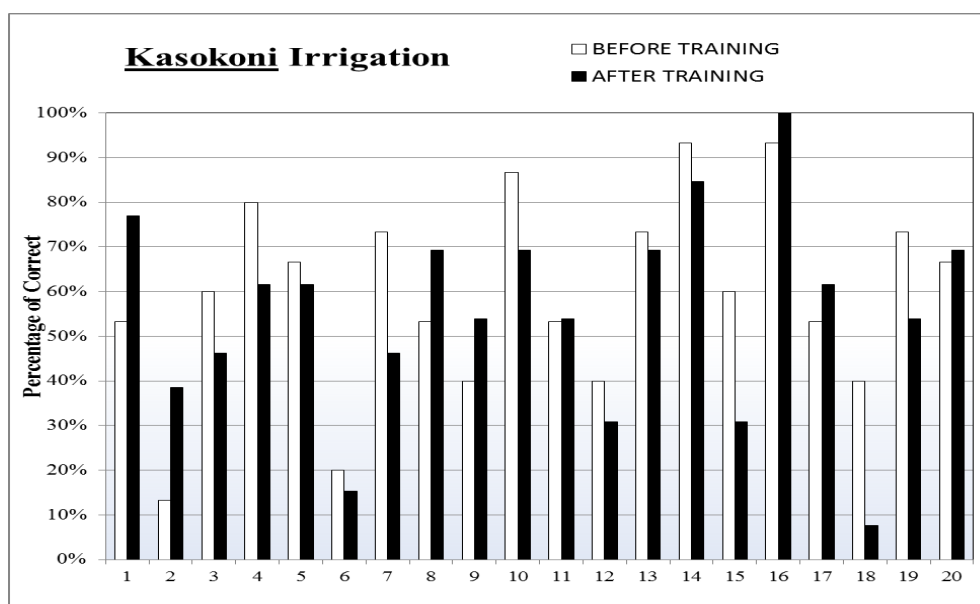


Figure 2.2.25 Result of Knowledge Evaluation in Kasokoni Scheme

Table 2.2.64 Evaluation per question for Unit 4 Training Program in Kasokoni Scheme

No	Content	Result	Reason for low score or reduction even after training
Q2	Best time to irrigate	BT – 13% AT – 38%	Majority of the participants got it wrong before training with slight improvement after the training. This signifies that majority did not fully grasp this part of training. This need to be re-emphasized on commencement of water delivery to the scheme and putting in place scheduling plans.
Q6	Conditions of plant growth when Irrigation is NOT required	BT – 20% AT – 30%	Majority got it wrong before training with a marginal improvement after training. This indicates that majority did not fully grasp this part of training or they got confused during training. This requires brushing up which could be undertaken at follow-up training on commencement of water delivery.
Q12	What is not correct about crop rotation/cropping pattern	BT – 40% AT – 31%	Participants may have gotten confused by the many terminologies during the training or by the translation of the question hence the reduction of the score. This would require brushing-up at follow-up training once water delivery commences.
Q15	When hardening off is done in Nursery management	BT – 60% AT – 31%	The significant drop in the score could be as a result of confusion in many terminologies and translation
Q18	Understanding of timing PHI and when to use produce after spraying	BT – 40% AT – 8%	Same as above. The big drop in score calls for brushing up during follow-up training.
Reason for high score even after training			
Q14	Wetting of Nursery always as a practice	BT – 85% AT – 85%	This indicates prior knowledge perhaps as imparted in primary biology class The zero improvement in the score here is rather surprising.

Q16	It is a good practice to always apply fertilizer for healthy plant growth	BT – 69% AT – 92%	There was a significant increase in the understanding of the GAP topic after the training indicating room for more improvement in crop production in future
Q18	Understanding of timing PHI and when to use produce after spraying	BT – 0% AT – 62%	There was total ignorance of the understanding of PHI before training but after the training there was a significant increase in the score attributed to understanding of the topic.

2)Mdachi

The average performance for the participants before and after the training was 68% and 72% respectively. This depicts a 4% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.65 Results of Evaluation in Unit 4 Training Program in Mdachi Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	1	8%
80-89%	3	30%	5	38%
70-79%	3	30%	3	23%
60-69%	1	10%	1	8%
Below 60%	3	30%	3	23%
Total Participants	10		13	
Average Score		68%		72%

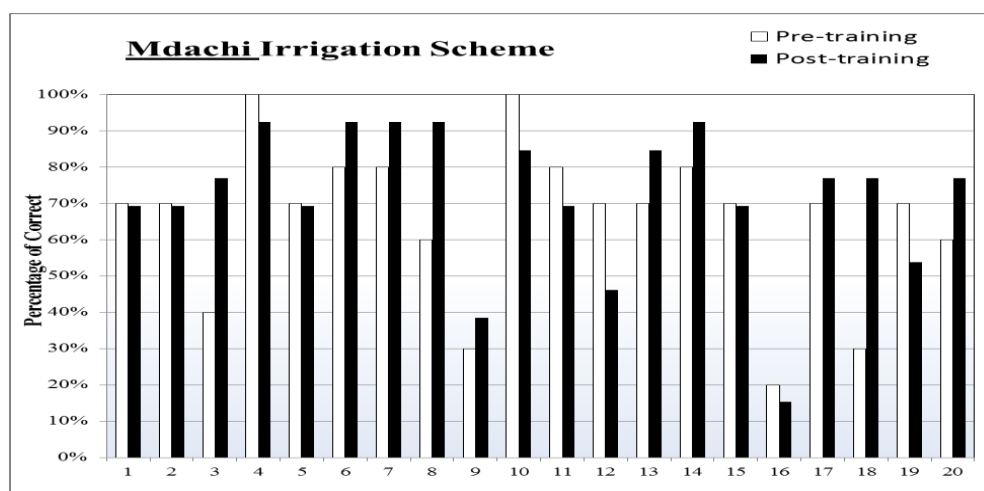


Figure 2.2.26 Result of Knowledge Evaluation in Mdachi Scheme

Table 2.2.66 Evaluation per question for Unit 4 Training Program in Mdachi Scheme

No	Content	Result	Reason for low score or reduction even after training
Q9	The slope of land that would be best for Basin Irrigation	BT – 30% AT – 38%	Low score even after training. The aspect of land slope in determining the type of irrigation or on-farm water application technique may not have been emphasized during training and even during the demonstration day.
Q16	It is Good practice to always apply fertilizer for healthy plant growth	BT – 20% AT – 15%	There was very low score before the training and a further reduction in score after the training. The main reason for this may be literacy levels as the word ‘always’ means ‘all the time’. However, the farmers are supposed to check for fertility levels and apply right fertilizers and amounts before planting
Q12	Which is NOT Correct about Crop rotation and cropping pattern?	BT – 70% AT – 46%	There was a significant reduction in score after training which could have resulted from the farmers’ inability to fully understand the question and the choices provided. However, a good number of participants were able to answer the question on crop rotation correctly.
Q19	How do we avoid post-harvest losses	BT – 70% AT – 54%	There was a significant reduction in score which again indicates confusion or lack of understanding during training; the best response was by adhering to GAP.
			Reason for high score after training
Q4	Requirements of a crop in order to grow in the field/farm	BT – 100% AT – 92%	This indicates prior general knowledge either from experience or general knowledge gained from elementary schooling Reduction in score is rather strange and may be attributed to confusion or misunderstanding after training
Q10	What is cropping calendar	BT – 100% AT – 85%	The significant high score is an indication that the participants understand the topic. This may be due to the fact that there are many programs including SHEP which have been promoting use of cropping calendars among farming groups. The slight decrease in the score may be attributed to misunderstanding of the question or lack of concentration by the participants
			Reason for significant increase in the score
Q18	Calculation of Post-Harvest Interval (PHI) in matters to do with safe use	BT – 30% AT – 77%	The significant increase in the score is attributed to full understanding of the topic during training and translation of the question

3)Olopito

The average performance for the participants before and after the training was 68% and 68% respectively. This depicts a 0% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.67 Results of Evaluation in Unit 4 Training Program in Olopito Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	1	9%	2	17%
80-89%	1	9%	4	33%
70-79%	2	18%	1	8%
60-69%	6	55%	1	8%
Below 60%	1	9%	4	33%
Total Participants	11		12	
Average Score		68%		68%

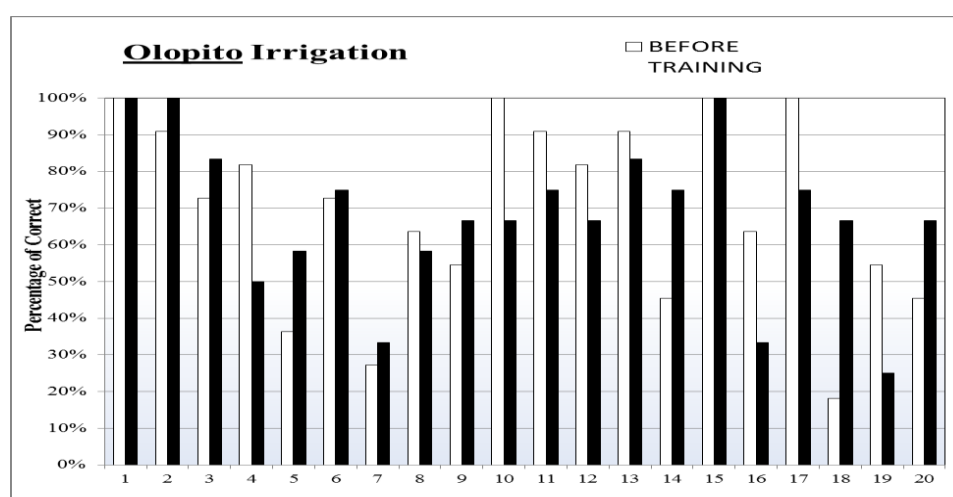


Figure 2.2.27 Result of Knowledge Evaluation in Olopito Scheme

Table 2.2.68 Evaluation per question for Unit 4 Training Program in Olopito Scheme

No	Content	Result	Reason for low score or reduction even after training
Q4	Stage of plant growth requiring least amount of water	BT – 82% AT – 50%	Participants appeared to understand the topic before training which dropped significantly after the training. May be the terminology late stage could have been confused not to mean mature stage or there may have been a misunderstanding during translation.
Q7	The best Water application method in a Gentle Slope	BT – 27% AT – 33%	As majority got it wrong before and after training hence the low scores, This call for a brush-up in future training
Q10	Meaning of crop rotation	BT – 100% AT – 67%	It appears that the participants had a prior knowledge of the topic There was however a significant reduction in the score after training indicating some confusion which need to be clarified in future training
Q12	One of the important factor in preparation of crop planting	BT – 82% AT – 67%	Participants appeared to understand the topic before training which dropped significantly after the training. The reduction in score calls for a brush-up in future training

	calendar		
Q16	How to use and store agrochemicals	BT – 64% AT – 33%	Same as above
Q17	Why is soil sampling and testing important before growing crops	BT – 100% AT – 75%	There was an excellent understanding of the topic before Training but a significant drop in the score after training calls for brush-up in future training.
Q19	Understanding of PHI	BT – 55% AT – 25%	There was a significant reduction in score after training which indicates the need for clarification/brush-up on the topic in future training.
			Reason for high score even after training
Q1	Best time to irrigate	BT – 100% AT – 100%	All the participants appear to be well informed on the topic before and after.
Q2	Best soil texture for growing major vegetables	BT – 91% AT – 100%	All the participants appear to be well informed on the topic
Q3	Definition of Crop Water Requirement	BT – 73% AT – 83%	Participants seem to have had some prior knowledge of the topic and this improved after the training for the score to remain high.
Q6	Reason for preference of furrow over basin irrigation	BT – 73 AT – 75%	Participants seem to have had some prior knowledge of the topic Score improved slightly and score remained high
Q11	Best time to carry out crop enterprise selection	BT – 91% AT – 75%	Participants seem to have had some prior knowledge of the topic Score reduced substantially after training although the score remained high This indicates some confusion which need to be clarified in future training
Q13	Wetness in Nursery Management	BT – 91% AT – 83%	Score remained high even after the slight drop. The participants need clarification as they may have gotten confused as they were taught during training that hardening-off require reduction of water
Q15	Siting of a good seedling Nursery	BT – 100% AT – 100%	There was an excellent understanding of the topic before and after the training
			Reasons for significant increase in Score after training
Q14	When hardening off is done in Nursery Management	BT – 45% AT – 75%	There was a significant increase in the score attributed to understanding of the topic after training.
Q18	What is involved in Integrated Pest Management (IPM)	BT – 18% AT – 67%	The level of the understanding of IPM before training was low but after the training there was a significant increase in the score attributed to understanding of the topic after training.
Q20	Reasons for value addition in agricultural produce	BT – 45% AT – 67%	A reasonable number of participants had gotten it right correct before training but they increased significantly after training indicating high level of understanding of the topic

4) Gatitu/Muthaiga

The average performance for the participants before and after the training was 71% and 78% respectively. This depicts a 7% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.69 Results of Evaluation in Unit 4 Training Program in Gatitu/Muthaiga Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	2	11%	1	10%
80-89%	5	28%	4	40%
70-79%	5	28%	4	40%
60-69%	3	17%	1	10%
Below 60%	3	17%	0	0%
Total Participants	18		10	
Average Score		71%		78%

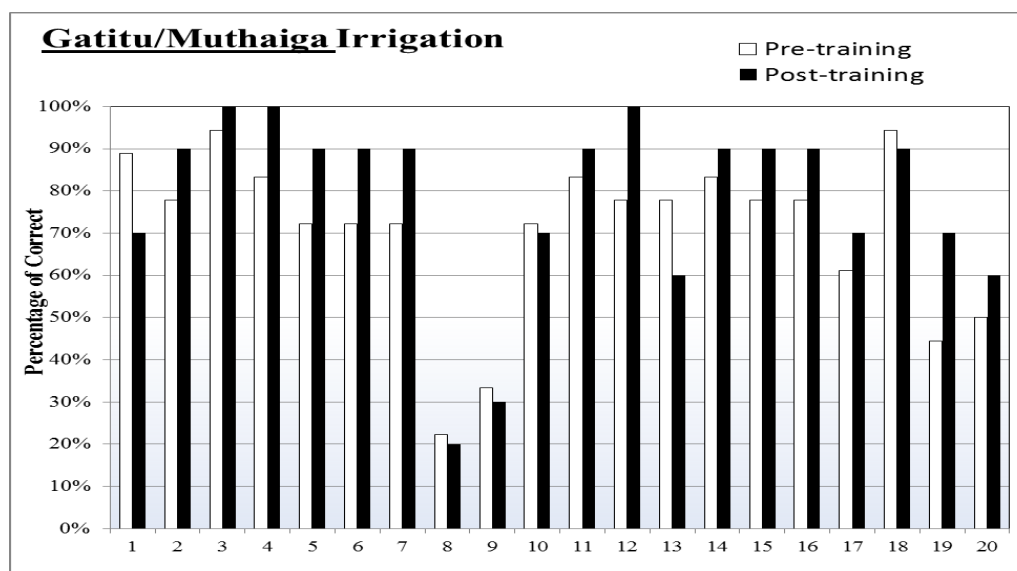


Figure 2.2.28 Result of Knowledge Evaluation in Gatitu/Muthaiga Scheme

Table 2.2.70 Evaluation per question for Unit 4 Training Program in Gatitu/Muthaiga Scheme

No	Content	Result	Reason for low score or reduction even after training
Q8	What is gravity fed system?	BT-22%	Low and reduction of score after training indicates serious misunderstanding of the topic This indicates that there is need for emphasis on the topic future
		AT-20%	
Q9	Where is Basin Irrigation preferred?	BT-33%	Same as Q8 above
		AT-30%	
			Reasons for high score even after training
Q1	What is not a major concern for sandy soils	BT-89%	There was a substantial decrease but the score remained high after training Although this indicates a high level of understanding of the topic but there is need remedial training of the topic in future
		AT-70%	
Q2	What is not a major concern for sandy soils	BT-78%	There was a substantial increase of the score which remained high after training This indicates a high level of understanding of the topic
		AT-90%	
Q3	Best soil texture to grow major vegetables	BT-94%	There was a total understanding of the topic after training
		AT-100%	
Q4	Factors/elements required for plant growth	BT-83%	Same as Q3 above
		AT-100%	
Q5	Effects on the roots as the plant grows	BT-72%	The score increased substantially and remained high after training. This indicates a high level understanding of the topic
		AT-90%	
Q6	condition when Irrigation is not required	BT-72%	Same as above
		AT-90%	
Q7	What is irrigation system?	BT-72%	Same as above
		AT-90%	
Q11	The meaning of crop rotation.	BT-83%	The score increased slightly and remained high after training This indicates a high level understanding of the topic
		AT-90%	
Q14	Is wetness required always during nursery management?	BT-83%	Same as above
		AT-90%	
Q15	When hardening off is required in nursery management	BT-78%	There was a fair increase and the score remained high after training. This indicates a high level understanding of the topic
		AT-90%	
Q16	Is Good Husbandry practice to always apply fertilizer for health plant growth	BT-78%	Same as above
		AT-90%	
Q18	Understanding of crop rotation and cropping pattern	BT-94%	Same as Q11 and Q14 above
		AT-90%	
			Reasons for significant increase in score after training
Q12	Understanding of	BT-78%	There was a total and significant improvement on the score after

	crop rotation and cropping pattern	AT-100%	training. This indicates a high level understanding of the topic
Q19	How to avoid post-harvest losses	BT-44%	There was a significant increase in the score after training. This indicates a high level understanding of the topic
		AT-70%	

5)Kaben

The average performance for the participants before and after the training was 61% and 69% respectively. This depicts a 4% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.71 Results of Evaluation in Unit 4 Training Program in Kaben Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	1	7%
80-89%	1	10%	4	29%
70-79%	2	20%	2	14%
60-69%	1	10%	4	29%
Below 60%	6	60%	3	21%
Total Participants	10		14	
Average Score		61%		69%

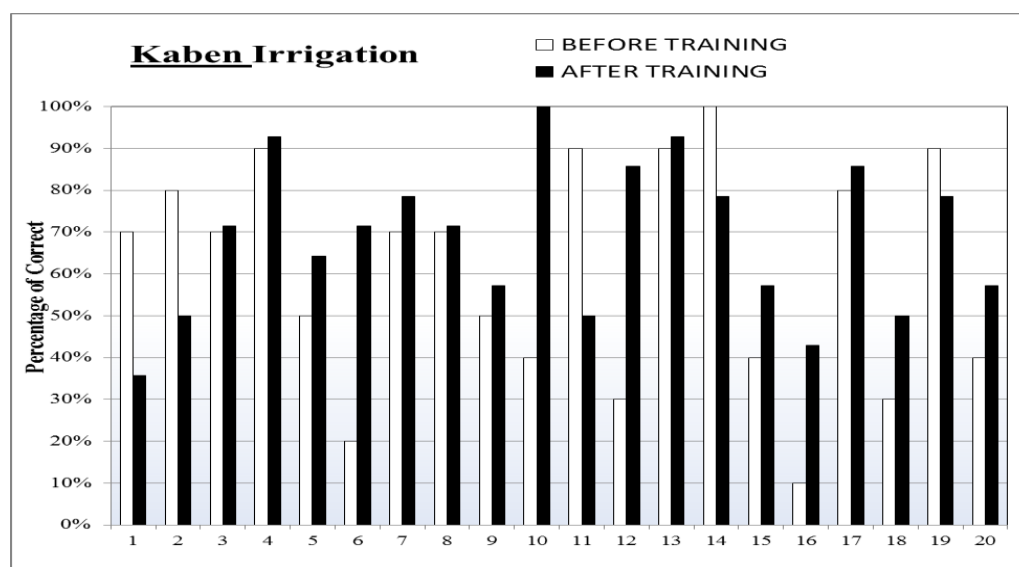


Figure 2.2.29 Result of Knowledge Evaluation in Kaben Scheme

Table 2.2.72 Evaluation per question for Unit 4 Training Program in Kaben Scheme

No	Content	Result	Reason for low score or reduction even after training
Q1	What is not a major concern for sandy soils	BT 70% AT 36%	Significant reduction of score indicates the need for further revisiting in future training
Q2	Best time to irrigate during plant growth	BT 80% AT 50%	Same as above
Q11	Meaning of Crop Rotation	BT 90% AT 50%	Same as above
Q16	Is Good Husbandry practice to always apply fertilizer for health plant growth	BT 10% AT 43%	There was a great improvement but the score remained low which indicates the need for further revisiting in future training Question is tricky as can find adequate plant nutrients after soil testing to warrant no immediate fertilizer requirement at planting time. This situation would certainly change during plant growth to necessitate some top dressing.
Q18	Understanding of Pre-Harvest Interval (PHI)	BT 30% AT 50%	There was a great improvement but the score remained low which indicates the need for further revisiting in future training
			High score even after training
Q4	Factors/elements required for plant growth	BT 90% AT 93%	The score remained high before and after training which indicates a high level understanding of the topic
Q13	What must be done before carrying out crop selection	BT 90% AT 93%	Same as Q4 above
Q14	Is wetness required always during nursery management?	BT 100% AT 79%	Although there was a reduction score remained high which indicates a high level understanding of the topic but may require some revisiting on the topic in future training
Q17	How to use and store agro-chemicals	BT 80% AT 86%	Same as Q4 and Q13 above
Q19	How to avoid post-harvest losses	BT 90% AT 79%	Same as Q14 above
			Significant increase in score
Q6	Exemption conditions when Irrigation is not required	BT 20% AT 71%	There was a significant increase in score indicates an overall high grasp and understanding of the topic after the training

Q10	What is cropping calendar	BT 40% AT 100%	Same as above
Q12	Understanding of crop rotation and cropping pattern	BT 30% AT 86%	Same as above

6)Murachaki

The average performance for the participants before and after the training was 56% and 70% respectively. This depicts a 4% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.73 Results of Evaluation in Unit 4 Training Program in Murachaki Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	2	8%
80-89%	1	5%	6	25%
70-79%	4	19%	7	29%
60-69%	5	24%	5	21%
Below 60%	11	52%	4	17%
Total Participants	21		24	
Average Score		56%		70%

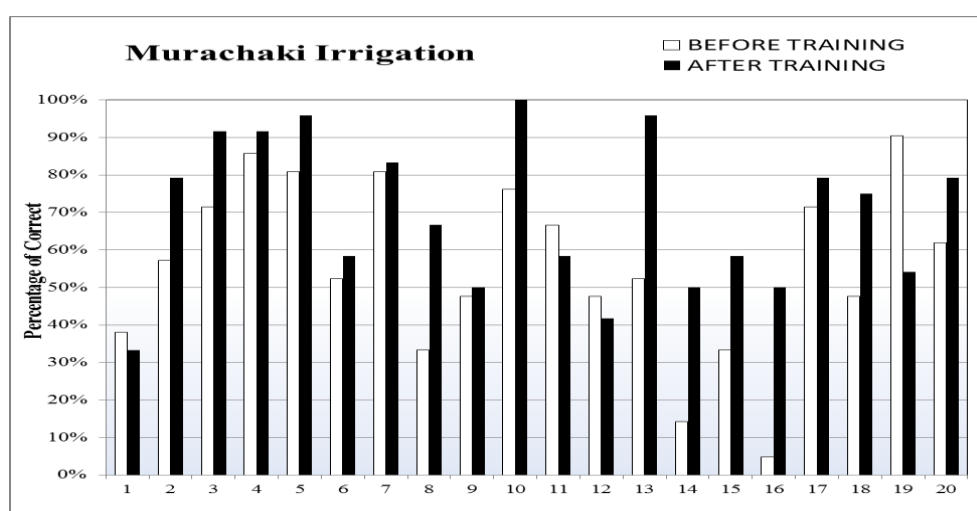


Figure 2.2.30 Result of Knowledge Evaluation in Murachaki Scheme

Table 2.2.74 Evaluation per question for Unit 4 Training Program in Murachaki Scheme

No	Content	Result	Reason for low score or reduction even after training
Q1	Which is not of major concern in sandy soils?	BT-38%	A slight decrease in score which remained low even after training This indicates the need for emphasis on the topic in remedial training in future.
		AT-33%	
Q11	Meaning of crop rotation	BT-67%	There was a slight decrease in the score This indicates the need for emphasis on the topic in remedial training in future.
		AT-58%	
Q12	Understanding of crop rotation and crop pattern	BT-48%	Same as Q1 above
		AT-42%	
Q19	How to avoid post-harvest losses	BT-90%	There was a significant reduction in the score This indicates that farmers may have gotten confused during training Thus there is need for emphasis on the topic in remedial training in future
		AT-54%	
			Reason for High score even after Training
Q3	Best soil texture to grow major vegetables	BT-71%	There was a high score before training which increased after the training. This indicates a good understanding of the topic which improved after training
		AT-92%	
Q4	Factors required for plant growth	BT-86%	Same as above
		AT-92%	
Q5	Effect on roots as plant grows bigger	BT-81%	Same as above
		AT-96%	
Q7	Description of an irrigation system	BT-81%	Same as above
		AT-83%	
Q17	How to use and store agrochemicals	BT-71%	Same as above
		AT-79%	
			Reason for significant score after Training
Q8	Description of a gravity fed irrigation system	BT-33%	There was a significant increase in the score This indicates a high level of understanding of the topic after training
		AT-67%	
Q10	Description of a cropping calendar	BT-76%	Same as above
		AT-100%	
Q13	What must be done before carrying out crop selection	BT-52%	Same as above
		AT-96%	
Q14	Wetness in nursery management	BT-14%	Same as above There is however need for more emphasis on this topic in future remedial training as the score remains just at average level.
		AT-50%	
Q15	When hardening-off	BT-33%	Same as above

	is done in nursery management	AT-58%	
Q16	Is it good nursery management practice to always apply fertilizer for healthy crop growth?	BT-5%	Same as above
		AT-50%	

7) Tumutumu

The average performance for the participants before and after the training was 53% and 59% respectively. This depicts a 6% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.75 Results of Evaluation in Unit 4 Training Program in Tumutumu Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	1	5%
80-89%	2	10%	2	10%
70-79%	2	10%	3	15%
60-69%	5	25%	7	35%
Below 60%	11	55%	7	35%
Total Participants	20		20	
Average Score		53%		59%

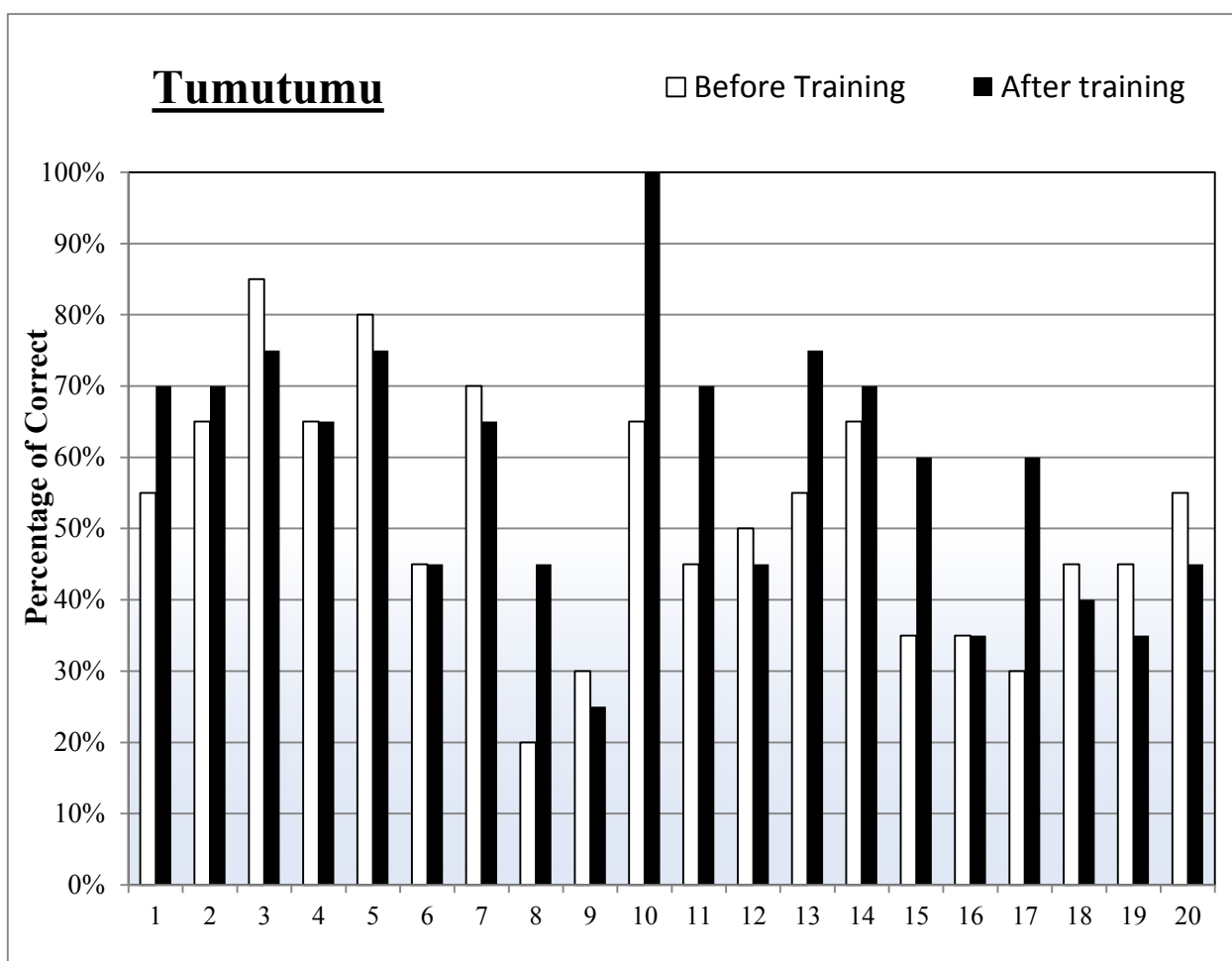


Figure 2.2.31 Result of Knowledge Evaluation in Tumutumu Scheme

Table 2.2.76 Evaluation per question for Unit 4 Training Program in Tumutumu Scheme

No	Content	Result	Reason for low score or reduction even after training
Q8	What is Gravity fed system of Irrigation	BT – 20% AT – 45%	There was an improvement on the score which still remained low. This calls for clarification of the topic in future training
Q9	Where basin irrigation is preferred.	BT – 30% AT – 25%	There was a reduction on the score which, calls for clarification of the topic in future training
Q12	Understanding of crop rotation and crop pattern	BT – 50% AT – 45%	About half the participants understood the topic before training, but was a slight reduction on the score after training which. This calls for clarification of the topic in future training
Q16	Is it Good husbandry practice to always apply fertilizers	BT – 35% AT – 35%	There was nil improvement on the score after training which indicates that there is need for clarification on the topic in future training
Q18	Understanding of PHI	BT – 45% AT – 40%	A good number of the participants (more than half) appeared not to understand the topic before training and there was a slight reduction in the score after training This calls for clarification of the topic in future

Q19	How to avoid post-harvest losses	BT – 45% AT – 35%	There was some reduction in score after training which indicates the need for clarification/brush-up on the topic in future training.
Q20	Best reasons carrying out value addition in agricultural produce	BT – 55% AT – 45%	About half of the participants had gotten it right correct before training but they reduced slightly after training
			Reason for high score even before training
Q3	Definition of Crop Water Requirement	BT – 85% AT – 75%	The score remained high although it reduced after training but still remained high. The drop in score indicates that there is need for clarification on the topic in future training
Q5	Effect on Root as plant grows bigger	BT – 80% AT – 75%	Score remained high although it reduced slightly after training indicating need for brushing –up in future training.

8)Muungano

The training was not held in the scheme as only the scheme intake was funded. Since the IWUA was not likely to get the infrastructure funded within the project period, the PMT resolved that training the farmers on on-farm water management would not be useful as they would not have a chance to apply on the skills and lessons learnt.

2.2.8 Irrigation System Management (Unit 5)

(1)Implementation Schedule and participant information

Table 2.2.77 Records of Unit 5 Training Program

SCHEME	TOT WORKSHOP	TRAINING	FOLLOW-UP
Kasokoni	8/19-20/2015	10/6-9/2015	
Mdachi	8/19-20/2015	9/29-10/2/2015	
Olopito	8/19-20/2015	9/29-10/2/2015	
Gatitu/Muthaiga	8/19-20/2015	10/6-9/2015	
Kaben	8/19-20/2015	9/22-25/2015	
Murachaki	8/19-20/2015	10/27-30/2015	
Tumutumu	8/19-20/2015	9/22-25/2015	
Muungano	N/A	N/A	

Source: JICA Team

Table 2.2.78 Description of Unit 5 Training Program

SCHEME	PARTICIPANTS		RESOURCE PERSONS	VENUE FOR THE TRAINING
	Male	Female		
Kasokoni	11	11	SCIO, SCAO, PMT	Kasokoni Nursery

Mdachi	11	11	SCIO, PMT, SCAO, HEO	IWUA office - Jaribuni
Olopito	13	12	SCIO, SCAO, PMT	IWUA office - Olopito
Gatitu/Muthaiga	12	10	SCIO, SCAO, PMT	RGC Kiamariga
Kaben	18	4	SCIO, SCAO, CDW, PMT	AIC Liter
Murachaki	14	1	SCIO, SCAO, PMT	AIC Ciangera Hall
Tumutumu	23	3	PMT, SCIO, SCAO, SCAEO	New Apostolic Church - Ntherone
Muongano	N/A	N/A		*No training for the scheme

(2)Evaluation Summary

An evaluation questionnaire was prepared by PMT and used in all the schemes to ensure quality and uniformity of the questions.

Table 2.2.79 Summary of Evaluation of Unit 5 Training Program

SCHEME	PRE-TRAINING AVERAGE SCORE	PORT-TRAINING AVERAGE SCORE	DIFFERENCE (KNOWLEDGE GAIN)
Kasokoni	83%	73%	(-10)
Mdachi	61%	73%	(+12)
Olopito	75%	76%	(+1)
Gatitu/Muthaiga	65%	76%	(+11)
Kaben	69%	73%	(+4)
Murachaki	74%	78%	(+4)
Tumutumu	59%	73%	(+14)
Muongano	N/A	N/A	N/A

Source: JICA Team

(3)Evaluation of Each Scheme

1)Kasokoni

The average performance for the participants before and after the training was 83% and 73% respectively. This depicts a 10% loss in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.80 Results of Evaluation in Unit 5 Training Program in Kasokoni Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	5	45%	2	13%
80-89%	1	9%	3	20%
70-79%	4	36%	5	33%
60-69%	0	0%	2	13%
Below 60%	1	9%	3	20%
Total Participants	11		15	
Average Score		83%		73%

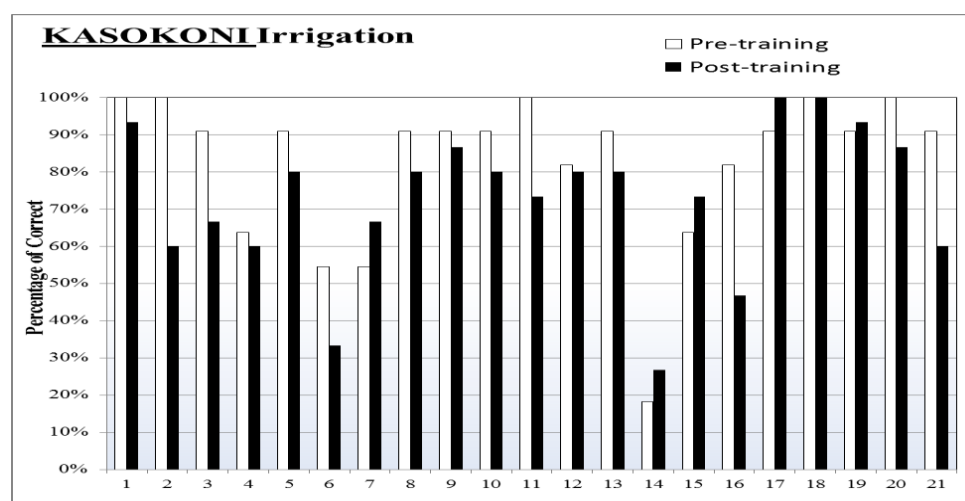


Figure 2.2.32 Result of Knowledge Evaluation in Kasokoni Scheme

Table 2.2.81 Evaluation per question for Unit 5 Training Program in Kasokoni Scheme

No	Content	Result	Reason for significant INCREASE in the score
Q7	Components of a system operation action plan	BT – 69% AT – 86%	– The increase in the score is attributed to the training and group work on action planning
Q14	Type of works to be undertaken on the irrigation system after lifespan	BT – 62% AT – 86%	– The increase in the score is attributed to the training on the system maintenance
Q15	Meaning of O&M fee	BT – 69% AT – 93%	– The increase in score is attributed to the training and farmers understanding that the fee is not only for WRMA bills
No	Content	Result	Reason for LOW score or REDUCTION even after training
Q2	Results of proper management of an irrigation system	BT – 100% AT – 60%	– The reduction in score may be attributed to: – Inconsistency in farmers attendance to the training – Lack of concentration from the farmers

Q3	What the IWUA needs to give special attention to for the optimal functioning of the irrigation system	BT – 91% AT – 67%	– The reduction in the score may be attributed to lack of concentration by the participants
Q6	What the IWUA requires to have during planning for water distribution for the following season	BT – 55% AT – 33%	– The low score is attributed to the fact that the concept was not covered during the training and the question was also complicated
Q11	What the IWUA needs to ensure for the system to function optimally	BT – 100% AT – 73%	– The low score is attributed to lack of concentration by the participants which could also be attributed to fatigue
Q14	Type of works undertaken by the IWUA after the lapse of the irrigation scheme lifespan	BT – 18% AT – 27%	– The low score is attributed to the fact that the concept was not covered during the training sessions
Q16	Who in the IWUA is responsible for handling and spending the O&M fee	BT – 82% AT – 47%	– The farmers may have gotten confused as to the role of O&M sub-committee during the training and this may be the reason why most of the participants responded that it is this sub-committee that should handle finances which is not the case. The IWUA treasurer has the mandate to handle all scheme finances
Q21	What would alleviate water distribution conflicts in a scheme	BT – 91% AT – 60%	– The farmers in this question were expected to appreciate the importance of proper scheme O&M. This would alleviate all conflicts including water distribution conflicts
No	Content	Result	Reason for high score BEFORE training
Q10	Results of poorly maintaining an irrigation system	BT – 91% AT – 80%	– The high score is attributed to the fact that the multiple choices made it easy for one to pick out the correct answer
Q17	What costs are taken into consideration to come up with an O&M fee	BT – 91% AT – 100%	– The high score is attributed to the question being simple
Q18	Meaning of gender	BT – 100% AT – 100%	– The high score is attributed to farmers' general knowledge of gender from other government agencies and NGOs
Q19	Importance of gender consideration in irrigation system management	BT – 91% AT – 93%	– The high score is attributed to farmers' general knowledge of gender from other government agencies and NGOs

2)Mdachi

The average performance for the participants before and after the training was 61% and 73% respectively. This depicts a 12% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.82 Results of Evaluation in Unit 5 Training Program in Mdachi Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	1	8%	2	13%
80-89%	0	0%	5	33%
70-79%	4	33%	1	7%
60-69%	3	25%	6	40%
Below 60%	4	33%	1	7%
Total Participants	12		15	
Average Score		61%		73%

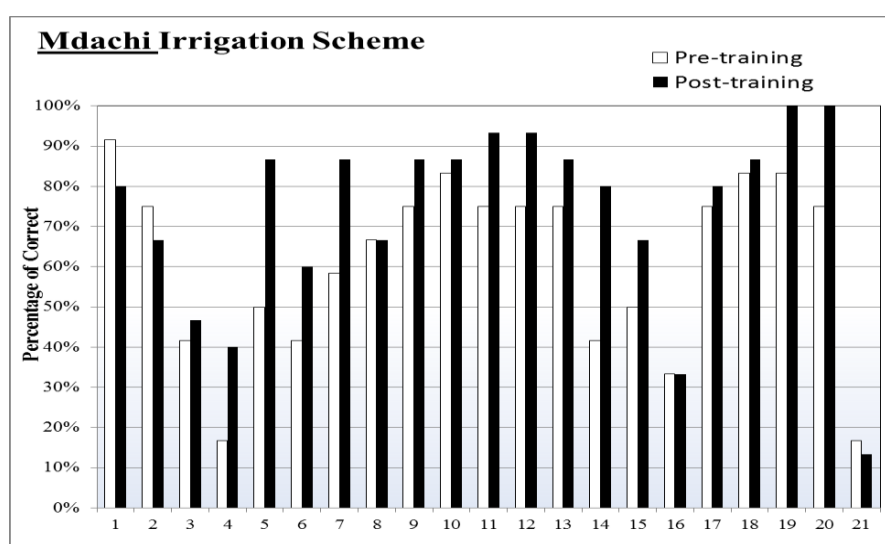


Figure 2.2.33 Result of Knowledge Evaluation in Mdachi Scheme

Table 2.2.83 Evaluation per question for Unit 5 Training Program in Mdachi Scheme

No	Content	Result	Reason for low score or reduction even after training
Q3	Importance of IWUA paying attention to O&M	BT – 42% AT – 47%	– Most of the farmers responded that for optimal operation of the system there was need for the IWUA to keep off brokers. The IWUA however should pay particular attention to scheme O&M if the system is to perform effectively. The reason for the low score could be misunderstanding of the question.
Q4	Who is responsible to handle O&M in a scheme	BT – 17% AT – 40%	– The low score, though, there is significant increase in knowledge could be attributed to the formulation of the question. The farmers may have gotten confused by the use of the word ‘ultimate responsibility’ with ‘ultimate authority’. Responsibility is with the O&M subcommittee but authority is with the IWUA general assembly.

Q16	Who should be responsible to handle and spend O&M fee	BT – 33% AT – 33%	– Most farmers responded that the O&M subcommittee has responsibility of having and spending the O&M fee. This is a misconception as only the IWUA treasurer is mandated with this function. There is need therefore to explain this to the farmers for clear role delineation among the two.
Q21	The best solution to water distribution conflicts	BT – 17% AT – 13%	– Most of the farmers responded that there was need for water to be shared equally. However, proper system operation demands water be shared equitably. There is need to follow-up on this matter so as to avoid conflicts during operation
			Reason for high score before training
Q10	Results of a poorly maintained irrigation system	BT – 83% AT – 87%	– The high score even before the training is attributed to the question as it was too easy and the answer was straightforward
Q18	Meaning of gender	BT – 83% AT – 87%	– Most NGOs have been involved in sensitizing farmers on gender and therefore most of the participants had knowledge on gender before training
Q19	Importance of gender consideration during scheme O&M	BT – 83% AT – 100%	– Gender sensitization has been carried out in most of the rural areas by NGOs and therefore most of the participants were aware of importance of gender consideration
			Reason for significant increase in the score
Q5	The most important function of O&M subcommittee	BT – 50% AT – 87%	– The high increase in score is attributed to the training on the roles of the OM subcommittee during scheme O&M
Q6	Important information required by the IWUA during water distribution planning for the next season	BT – 42% AT – 60%	– Since this is a new scheme, most of the farmers were not aware of irrigation planning and the training enhanced their knowledge. However, there is need for more emphasis on planning and the requirements during the planning
Q7	Components of irrigation operation action plan	BT – 58% AT – 87%	– After the training on the various components of an irrigation system most of the farmers were able to point out those components during the post-test
Q14	Major activity undertaken on the system after its lifespan	BT – 42% AT – 80%	– Before the training the farmers were not aware that every system has a lifespan but after the training they understood the need to carry out scheme rehabilitation
Q15	Meaning of O&M fee	BT – 50% AT – 67%	– Most of the farmers responded before training that O&M fee is meant for all IWUA affairs but after the training they understood that the fee is specific for all O&M operations

3)Olopito

The average performance for the participants before and after the training was 75% and 76% respectively. This depicts a 1% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.84 Results of Evaluation in Unit 5 Training Program in Olopito Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	4	36%	3	23%
80-89%	1	9%	4	31%
70-79%	3	27%	3	23%
60-69%	0	0%	1	8%
Below 60%	3	27%	2	15%
Total Participants	11		13	
Average Score		75%		76%

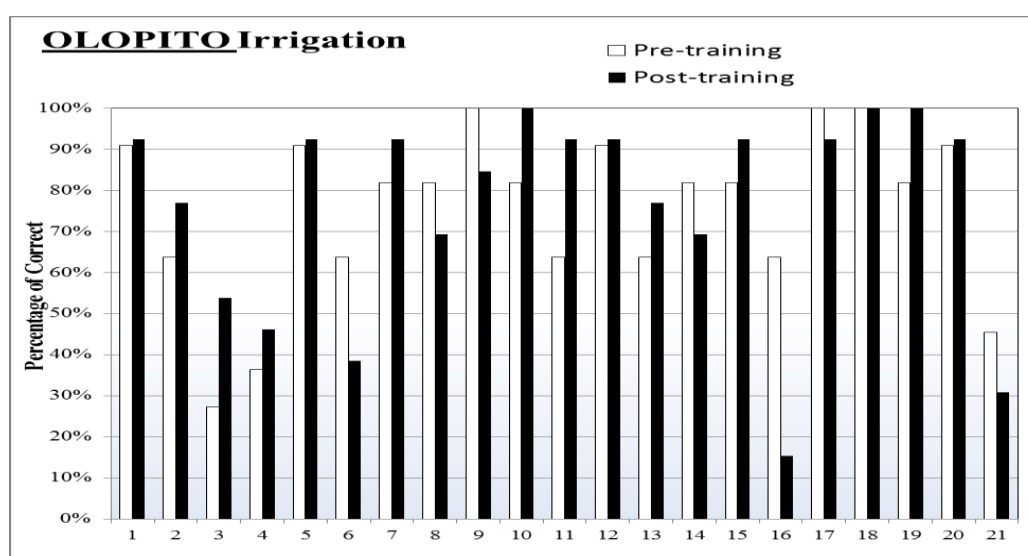


Figure 2.2.34 Result of Knowledge Evaluation in Olopito Scheme

Table 2.2.85 Evaluation per question for Unit 5 Training Program in Olopito Scheme

No	Content	Result	Reason for LOW score or REDUCTION even after training
Q6	What is required as the IWUA makes the water distribution plan for the following season	BT – 42% AT – 47%	– Most of the farmers indicated that the IWUA would require the list of the people in the scheme. It is however not necessary to have the population of the scheme and only the IWUA members. The expected response was the problems and challenges of the previous season and the suggested solutions
Q9	Components of an irrigation system	BT – 17% AT – 40%	– This being a new scheme and still incomplete, most of the farmers may not be familiar with all the irrigation system components. However, there was a

			great improvement in knowledge after training.
Q16	Who should be responsible to handle and spend O&M fee	BT – 33% AT – 33%	– Most farmers responded that the O&M subcommittee has responsibility of having and spending the O&M fee. This is a misconception as only the IWUA treasurer is mandated with this function. There is need therefore to explain this to the farmers for clear role delineation among the two.
Q21	The best solution to water distribution conflicts	BT – 17% AT – 13%	– Most of the farmers responded that there was need for water to be shared equally. However, proper system operation demands water be shared equitably. There is need to follow-up on this matter so as to avoid conflicts during operation
			Reason for significant increase in the score
Q3	What an IWUA needs to give particular attention towards optimal functioning of the scheme	BT – 27% AT – 54%	– The high increase in score is attributed to the training and farmers’ understanding on the roles of the O&M subcommittee during scheme O&M
Q11	Consequence of poorly maintaining a system	BT – 64% AT – 92%	– The farmers were able to understand the importance of handling their infrastructure with care for the proper functioning of the scheme
Q15	Meaning of O&M fee	BT – 64% AT – 77%	– After the training on the various components of an irrigation system most of the farmers were able to understand the composition of the O&M fee which is all costs related to operating and maintaining the irrigation system
Q19	Importance of gender consideration on system operations	BT – 82% AT – 100%	– Gender sensitization has been carried out in most of the rural areas in Kenya by the government and other NGOs and therefore the farmers had general idea to respond correctly to this question
			Reason for high score before training
Q1	Components of an irrigation system	BT – 91% AT – 92%	– The high score can be attributed to the question being too simple
Q5	The greatest function of an O&M sub-committee	BT – 91% AT – 92%	– The high score is attributed to the farmers general understanding on the role of the O&M sub-committee and the question being simple
Q16	Meaning if O&M fee	BT – 82% AT – 92%	– The question was simple
Q18	Meaning of gender	BT – 100% AT – 100%	– The farmers have general knowledge of what gender refers to

4)Gatitu/Muthaiga

The average performance for the participants before and after the training was 65% and 76% respectively. This depicts an 11% gain in knowledge. The questionnaire comprised

of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.86 Results of Evaluation in Unit 5 Training Program in Gatitu/Muthaiga Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	2	10%	4	20%
80-89%	2	10%	6	30%
70-79%	5	24%	6	30%
60-69%	3	14%	2	10%
Below 60%	9	43%	2	10%
Total Participants	21		21	
Average Score		65%		76%

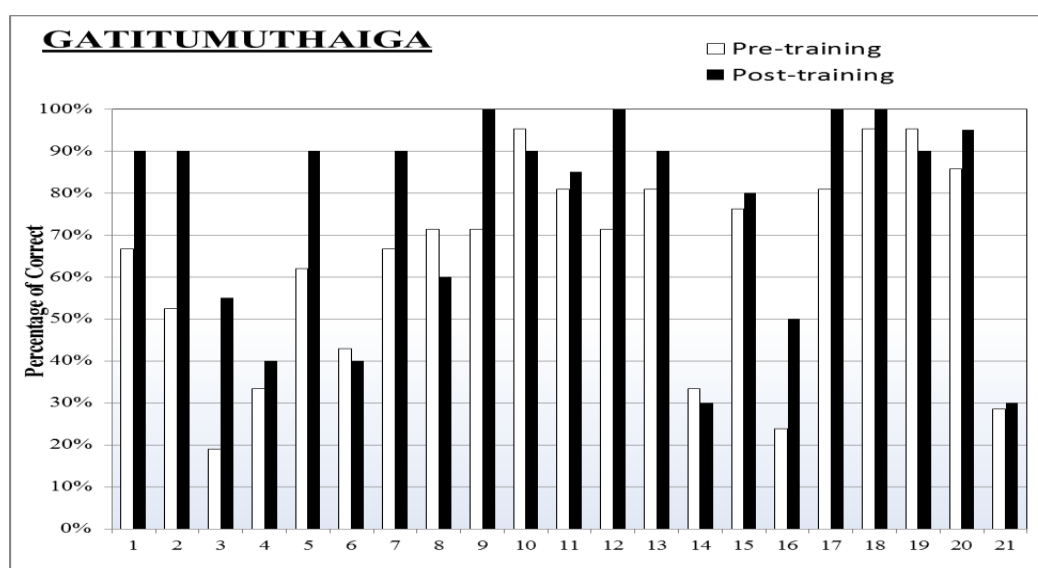


Figure 2.2.35 Result of Knowledge Evaluation in Gatitu/Muthaiga Scheme

Table 2.2.87 Evaluation per question for Unit 4 Training Program in Gatitu/Muthaiga Scheme

No	Content	Result	Reason for LOW score or REDUCTION even after training
Q4	Who has the ultimate responsibility of handling scheme O&M	BT – 33% AT – 40%	– The reason for the low score may be attributed to the formulation of the question. The farmers may have understood ‘ultimate responsibility’ to mean ‘ultimate authority’ and therefore responded that the general assembly is in charge. The correct answer was O&M

			sub-committee
Q6	Important requirement during planning for water distribution for the following season	BT – 43% AT – 40%	– The multiple choices were confusing to the participants as most responded that the list of people within the scheme area is what is required. However, for the following season what is most important are the problems and lessons learnt or solutions suggested for the coming season
Q14	Work to be undertaken after scheme lifespan	BT – 33% AT – 30%	– The low score may be attributed to the fact that the facilitator for system maintenance session did not mention the issue of system lifespan.
Q21	The best solution to water distribution conflicts	BT – 29% AT – 30%	– Most of the farmers responded that there was need for water to be shared equally. However, proper system operation demands water be shared equitably. There is need to follow-up on this matter so as to avoid conflicts during operation
			Reason for significant increase in the score
Q2	Consequence of poorly maintaining a system	BT – 52% AT – 90%	– The high increase in score is attributed to the training and farmers' understanding of the importance of scheme maintenance
Q3	What the IWUA needs to give particular attention to for optimal functioning of irrigation undertaking	BT – 19% AT – 55%	– The increase in score is attributed to the emphasis on proper scheme O&M during the training
Q5	Greatest function of the O&M sub-committee	BT – 62% AT – 90%	– The score is attributed to the training on the various functions, roles and responsibilities of the management committee and sub-committees
Q9	Irrigation system components	BT – 71% AT – 100%	– Most of the farmers had general knowledge of some of the scheme components even before the training but gained more knowledge of other components after the training
Q12	What should be done to improve and increase efficiency of the system	BT – 71% AT – 100%	– The increase in score is attributed to the training on importance of maintaining the scheme
Q16	Who is responsible to handle and spend O&M fee	BT – 24% AT – 50%	– The training on O&M fee contributed to the knowledge increase. However, even after the training half of the participants responded that the O&M sub-committee was responsible to handle and spend O&M fee. This needs follow up to avoid conflict of responsibilities.
			Reason for high score before training
Q18	Meaning of gender	BT – 95% AT – 100%	– The farmers have general knowledge of what gender refers to
Q19	Importance of gender consideration in	BT – 95% AT – 90%	– Gender sensitization has been carried out in most of the rural areas in Kenya by the government and other NGOs and therefore the farmers had general idea to respond

irrigation system management	correctly to this question
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5)Kaben

The average performance for the participants before and after the training was 69% and 73% respectively. This depicts an 4% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.88 Results of Evaluation in Unit 5 Training Program in Kaben Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	1	5%	1	5%
80-89%	6	27%	8	38%
70-79%	6	27%	4	19%
60-69%	5	23%	6	29%
Below 60%	4	18%	2	10%
Total Participants	22		21	
Average Score		69%		73%

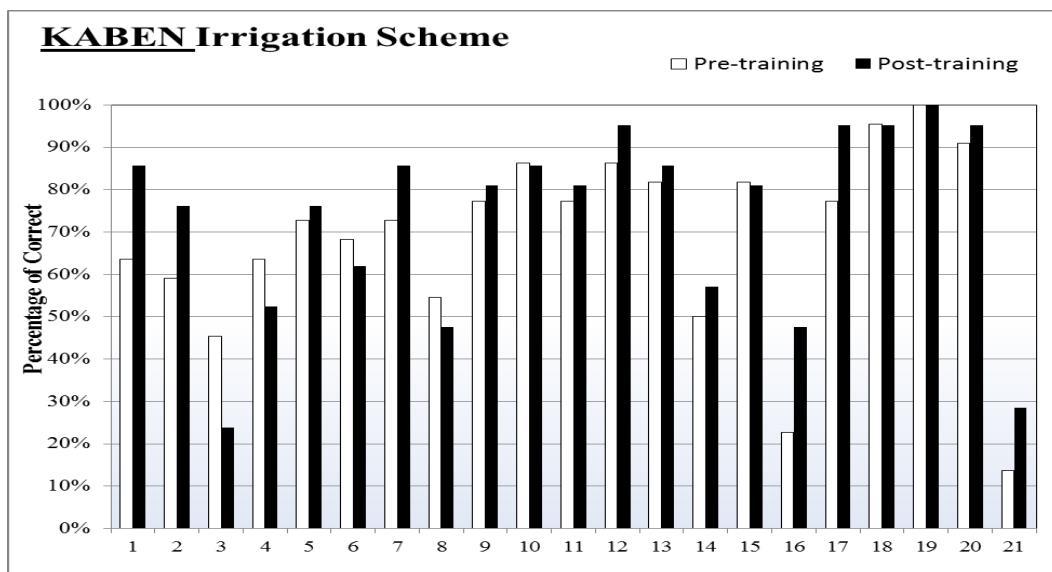


Figure 2.2.36 Result of Knowledge Evaluation in Kaben Scheme

Table 2.2.89 Evaluation per question for Unit 5 Training Program in Kaben Scheme

No	Content	Result	Reason for significant INCREASE in the score
Q1	Components of an irrigation system	BT – 64% AT – 86%	The increase in the score is attributed to the training on the various components of the irrigation system
Q2	Results of proper management of an irrigation system	BT – 59% AT – 76%	The high score is attributed to the training and emphasis on the importance of system maintenance
Q16	Who in the scheme should be in charge of handling and disbursing O&M fee	BT – 23% AT – 48%	The improvement in the score is as a result of the training on the role of the treasurer in O&M fee management distinct from the roles of the O&M sub-committee
Q17	What entails O&M fee	BT – 77% AT – 95%	The increase score is as a result of the training on the composition and calculation of O&M fee
No	Content	Result	Reason for LOW score or REDUCTION even after training
Q3	The most important element that should be given particular attention by the IWUA for optimal functioning of smallholder irrigation	BT – 45% AT – 24%	The low score is attributed to misunderstanding of the question and the framing of the question which may have brought confusion to the farmers
Q4	Who in the IWUA has the ultimate responsibility of handling O&M in the scheme	BT – 64% AT – 52%	The use of the word 'ultimate' may have confused the farmers as most responded that the IWUA general assembly is the one with the ultimate responsibility whereas the question demanded that they identify the O&M sub-committee
Q21	What is the most important thing that should be considered to alleviate water distribution conflicts	BT – 14% AT – 29%	The question demanded that the farmers identify proper O&M as the one that will alleviate any water conflicts. However most farmers responded that equal water distribution would be the solution to these conflicts.
No	Content	Result	Reason for high score before training
Q18	Meaning of gender	BT – 95% AT – 95%	The high score may be attributed to the general knowledge of what the term 'gender' refers to
Q19	Importance of gender consideration in irrigation system management	BT – 100% AT – 100%	The high score is attributed to gender sensitization programs supported by the government and other NGOs.
Q20	Importance of monitoring an irrigation system	BT – 91% AT – 95%	The high score is attributed to the question being simple

6)Murachaki

The average performance for the participants before and after the training was 74% and 78% respectively. This depicts a 4% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.90 Results of Evaluation in Unit 5 Training Program in Murachaki Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	1	13%	2	18%
80-89%	3	38%	4	36%
70-79%	1	13%	3	27%
60-69%	1	13%	1	9%
Below 60%	2	25%	1	9%
Total Participants	8		11	
Average Score		74%		78%

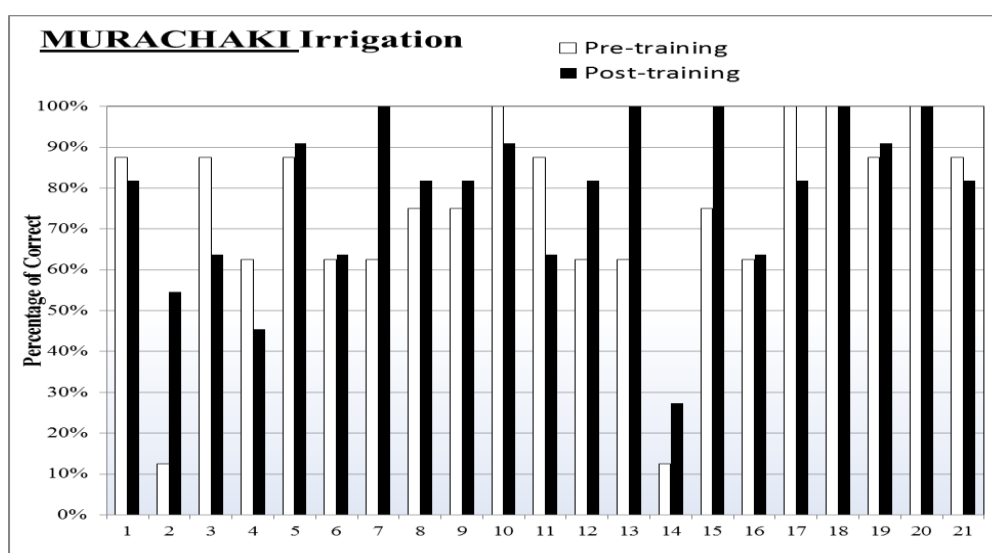


Figure 2.2.37 Result of Knowledge Evaluation in Murachaki Scheme

Table 2.2.91 Evaluation per question for Unit 5 Training Program in Murachaki Scheme

No	Content	Result	Reason for significant INCREASE in the score
Q2	Results of proper management of an irrigation system	BT – 47% AT – 75%	The increase in score is attributed to the training
Q7	Irrigation system action plan components	BT – 27% AT – 65%	The increase in score is attributed to the training and group work on action planning
Q12	What the IWUA needs to do to improve and increase efficiency in water movement through the pipeline	BT – 33% AT – 55%	The increase in score is attributed to the training on system maintenance
Q13	What the IWUA needs	BT – 63%	The increase in the score is attributed to the training on the

	to do to guarantee that the scheme will remain sustainable after the lifespan	AT – 100%	importance of a buildup up for system rehabilitation instead of relying on donor funding. Internal funding is the only guaranteed resources.
Q15	Meaning of O&M fee	BT – 75% AT – 100%	The increase in the score is attributed to the farmers' understanding of what O&M fee and what it comprises of
No	Content	Result	Reason for LOW score or REDUCTION even after training
Q3	What the IWUA should give special attention to for optimal functioning of the irrigation system	BT – 88% AT – 64%	The reduction in score may be attributed to the new farmers who joined the training after the first day and inconsistency by others.
Q4	Who in the scheme has the responsibility of handling scheme O&M	BT – 63% AT – 45%	The reduction in score may be attributed to the inconsistency by some of the farmers in attending the training. As well, there were about 5 farmers who joined the training on the second and third day and therefore skipped some lessons
Q11	What the IWUA needs to take seriously for proper functioning of the irrigation system	BT – 88% AT – 64%	The reduction in score may be attributed to the inconsistency by some of the farmers in attending the training. As well, there were about 5 farmers who joined the training on the second and third day and therefore skipped some lessons
Q14	Works carried out on a system after system lifespan	BT – 13% AT – 17%	The session on maintenance did not cover the issue of scheme rehabilitation and that is the reason the score was low before and even after the training
No	Content	Result	Reason for high score before training
Q10	Irrigation system components	BT – 100% AT – 91%	The high score is attributed to the farmers having already a general knowledge of irrigation system components
Q17	What constitutes O&M fee	BT – 100% AT – 82%	The high score is attributed to the question being too simple
Q20	Importance of scheme monitoring	BT – 100% AT – 100%	The high score is attributed to the multiple choices that made it too easy for one to identify the right answer even before training

7) Tumutumu

The average performance for the participants before and after the training was 59% and 73% respectively. This depicts a 14% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 2.2.92 Results of Evaluation in Unit 5 Training Program in Tumutumu Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	1	5%	3	20%
80-89%	3	14%	3	20%

70-79%	4	19%	7	47%
60-69%	4	19%	0	0%
Below 60%	9	43%	2	13%
Total Participants	21		15	
Average Score		59%		73%

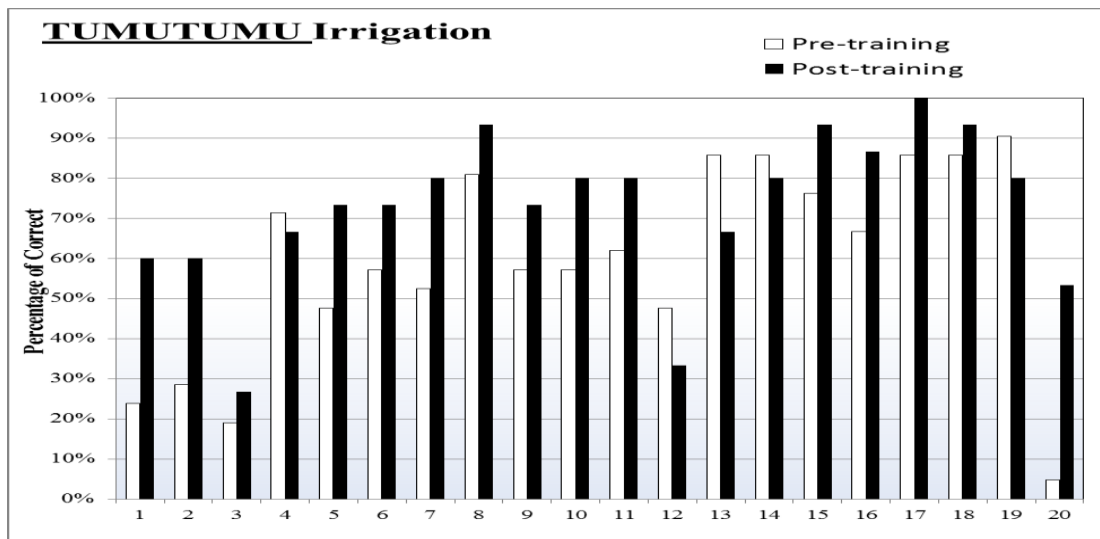


Figure 2.2.38 Result of Knowledge Evaluation in Tumutumu Scheme

Table 2.2.93 Evaluation per question for Unit 4 Training Program in Tumutumu Scheme

No	Content	Result	Reason for LOW score or REDUCTION even after training
Q3	Important requirement during planning for water distribution for the following season	BT – 33% AT – 40%	The reason for the low score may be attributed to confusion from the multiple choices provided. Most of the farmers answered that the IWUA needs a list of people within the scheme instead of the list of problems encountered during previous season distribution and suggested solutions.
Q12	Activity to be carried out after system lifespan	BT – 43% AT – 40%	The expected response was system rehabilitation but most of the participants responded that repair of pipes is what would be undertaken. However, this is routine. There is need to follow-up on this so that at least most of the farmers understand the importance of buildup fund towards scheme rehabilitation
			Reason for significant INCREASE in the score
Q1	Person mandated to handle O&M in a scheme	BT – 24% AT – 60%	The high increase in score is attributed to the training and farmers’ understanding of the role of the O&M sub-committee
Q2	Greatest function of O&M sub-committee	BT – 29% AT – 60%	The increase in score is attributed to the emphasis during training on the roles of the various subcommittees including the O&M one

Q5	Greatest goal of the IWUA while operating the scheme	BT – 48% AT – 73%	The farmers appreciated the paramount goal of operating a scheme being scheme efficiency and sustainability
Q7	Irrigation system components	BT – 52% AT – 80%	The high score is attributed to the training on the various components of the irrigation system
Q10	What should be done to improve and increase efficiency of the system	BT – 57% AT – 80%	The farmers through the training understood the importance of proper maintenance of the system as a way of enhancing its efficiency and effectiveness
Q20	The best solution to water distribution conflicts	BT – 5% AT – 53%	The farmers after the training appreciated the importance of proper O&M which in turn alleviates water distribution conflicts
			Reason for high score before training
Q17	Meaning of gender	BT – 86% AT – 100%	The farmers have general knowledge of what gender refers to
Q18	Importance of gender consideration in irrigation system management	BT – 86% AT – 93%	The high score is attributed to the campaigns on gender sensitization by the government and other NGOs
Q19	Importance of monitoring an irrigation system	BT – 90% AT – 80%	The high score before the training is attributed to the question being simple for farmers to get the correct answer

8) Muungano

This IWUA was not trained on this unit as the scheme does not have any infrastructure in place.

2.2.9 Observation and Findings

(1) Impacts on TOT: How were skills and attitudes for the SCIO/SCAO changed after the TOT Program

The effects of the TOT were evident during the pre-training meetings as well as observed during the trainings. The SCIO/SCAO seemed more at ease with the project's mode of conducting the training; they seemed aware of the training cycle. Training delivery also improved with the SCIO/SCAO being more confident and authoritative as they trained, being more participatory and utilising the adult learning techniques and theories.

The TOT held for Unit 5 training was also very positive as it standardized the quality of the trainings in all the schemes while at the same time ensuring that all the officers had similar expectations towards the training. The officers however remarked that since individual schemes have different dynamics, on-scheme pre-training meetings would be preferred.

(2) How the motivation of the trainers should be sustained

This motivation learnt can be maintained by PMT taking a back seat and observing the SCIO/SCAO coordinate the trainings and only backstopping where necessary. A lot of encouragement instead of criticism when they make mistakes is important as learning is an

on-going process.

The trainers, where possible, should be taken through a TOT before individual scheme trainings. This will ensure that they are aware of the expectations of the trainings and they understand the concepts they are to impact to the farmers better.

The trainers should be the ones to undertake training follow-up since they are local and can be able to track the progress of the IWUAs.

(3) Positive Impacts of Pre-Training

The pre-training meetings ensured that all the facilitators understand the basics of the project and especially the capacity building expected outputs. It ensured that the training objectives are met, the training materials are up to the expected quality, the facilitators got to know each other and therefore work together as a team. In general pre-training meetings enhanced harmony in training organization and delivery.

(4) Field Demonstrations

Unit 4 involved field demonstration on land preparation, nursery management, on-field irrigation application methods, safe use of pesticides and post-harvest handling and processing. This gave the farmers a chance to practice the skills that they had gained in the classroom which enhanced their understanding. The demonstrations were taken so positively and farmers promised to apply the same in their individual farms.

The team that took part in training Unit 5 comprised of Sub-county Subject Matter Specialists (SMS's) in Crops, Home Economics and Farm engineering. These worked in conjunction with a team of PMT comprising of Engineers, Capacity building experts and agronomists. It was notable, however that the SCIOs were a bit challenged on preparation of basins and furrows and require practical training on the same.

All the demonstrations were held successfully in most schemes. The SMS's showed a lot of expertise in the demonstrations and farmers showed great appreciation.

The challenges experienced during the demonstration day were lack of prior preparation of the demonstration materials which led to lateness in starting and ending the day. This was observed in Kasokoni and Kaben. In other areas the water pump for demonstrating water application and testing water depth failed to work. This was experienced in Kasokoni.

(5) Field Tour

Unit 5 comprised of a field tour to a neighbouring successful scheme with similar infrastructure. This was taken so positively by the farmers as they were able to identify with the schemes as well as the crops in the field and income from farming. They were able to identify the various challenges associated with irrigation farming and IWUA management. The farmers were able to identify with most of the concepts they had been trained in class.

The enthusiasm of the farmers cannot be emphasized. They were so motivated and challenged to work hard and ensure success and sustainability of their individual schemes. The Scheme that showed a lot of enthusiasm were Kasokoni, Olopito, Mdachi Kaben and Murachaki. For some of the schemes visited, however, the farmers' expectations were not totally met as it was not the peak season for irrigation farming. This was experienced by Gatitu/Muthaiga IWUA members in Boror Irrigation Scheme in Nakuru.

The challenge in the field tours were lack of sufficient due diligence to check on the suitability of the schemes. For example, some of the schemes visited were of lower standard than the scheme visiting and therefore they didn't offer enough motivation to the IWUA. Another challenge was that in other schemes, the farmers were only interested in learning about crop husbandry and enterprises and ignored the main aspect of the visit, which was learning on how the IWUA manages all aspects of the irrigation system.

(6) Attitude of the participants in the trainings

The participants on most of the trainings remarked that they were happy with the trainings. They gained a lot of knowledge on their IWUA organization and performance. Some of the changes observed in the various IWUAs include:-

1)Revision of Bylaws

All the schemes have written and revised bylaws using the prototype bylaws provided as well as putting into action the lessons learnt during all the trainings.

2)Membership list

The IWUAs have managed to update their membership register including the schemes that had difficulty identifying the real members. These included Olopito and Mdachi.

3)Monthly contributions

IWUAs have started collecting monthly fees for O&M with most schemes having set the fee at Ksh.100 per member per month.

4)Purchase of land

Most IWUAs were able to contribute towards purchasing of land for their office block construction. Gatitu/Muthaiga took too long to purchase the plot and therefore have not benefitted from the office block. Kaben scheme requested that all their financing be channelled to the infrastructure and not an office block as they already had a rented office.

5)Attendance to the trainings

The number of farmers attending the training improved greatly in Unit 4 and 5 which is attributed to the mobilisation that was undertaken by the IWUA leaders in cooperation with the FEOs 2 weeks before trainings. This ensured that the individual members were informed verbally of the training and the list of participants provided to the sub-county officers before the training time

6)Scheme Leadership

The trainings have had a lot of impacts on scheme leadership since most of the IWUAs have

acknowledged the need to change leadership after the stated term of office in the bylaws. Some IWUAs were able to identify the weaknesses in their scheme leadership and held elections to replace the leaders. The schemes that have held elections to change leadership include Murachaki, Gatitu/Muthaiga, Mdachi and Kaben.

Some IWUAs have revised their organisational structure to include the subcommittees. The latest scheme to adopt the structure is Mdachi. Women and youth involvement in the trainings has greatly improved. Participation during training is greatly improved and most participants, including women, are confident to make inquiries during trainings

7)Record keeping

Record keeping by the IWUAs has greatly improved after they received some Counter books from the project for their records. The schemes are almost finalizing on the updating the membership list, the minutes of meetings are being recorded as trained, the IWUA documents have been filed in the financial record file and the bylaws in the bylaw files.

Most of the IWUAs have already obtained an official post office box and stamp. The first group to do this was Murachaki. They are also in the process of printing their receipt books personalized to the IWUA. Murachaki Scheme has already developed the receipt books.

Muongano scheme treasurer has been able to update all the IWUA books and maintain them as per Unit 3 trainings.

Due to low literacy levels, most of the IWUA treasurers have not yet gained sufficient skills to enable them to update the records. This was evident in Olopito, Murachaki, Kasokoni and Tumutumu. In the rest of the schemes the Treasurers have made effort though some backstopping is necessary.

8)Attitude towards communal work

The attitude of the IWUA members towards communal work is very positive with good attendance reported in Kasokoni, Kaben, Mdachi and Gatitu/Muthaiga. The best contribution by the IWUA members towards scheme development was observed in Tumutumu with Olopito being the scheme experiencing a lot of challenges in communal work contribution. This is an indication that the trainings have mobilized farmers towards group cohesiveness and importance of each member's contribution towards scheme sustainability.

However, the PMT team conducted week long mobilisation activities to bring the members together towards completion of the excavation work as agreed in the MOU signed before the start of the construction. There was improvement but the pace is still slow. One of the reasons attributed to this slow pace is the fact that Maasais are generally pastoralists which means that they are not used to hard labour of excavation.

2.2.10 Lessons Learnt

(1) Review of session objective and time table for the improvement the training programs

For future trainings, it is important that the training objectives and session objectives be prepared well in advance and evaluated by the PMT and possibly Sub-county officers for relevance and quality check. Standardized resource materials for trainings are important as a guide to the facilitators while they prepare their PowerPoint presentations. This would ensure that the farmers obtain all the necessary information to meet the training objectives. A pre-training meeting should always be held and the facilitators encouraged to prepared fully for it and have ready presentations for evaluation. This ensures harmonisation of the training flow. There should be a break for the farmers in between 2 trainings to give them time to attend to other farming activities.

(2) How to keep motivation of the farmers during the training program

The farmers have been keen in attending the trainings and have made some recommendations for future training programs:

- Trainings should start at 9am and end at 4.00pm to allow the farmers to attend to other home duties
- Trainings should not extend beyond 3 days in a week
- Market days should be avoided
- Trainings should have a gap of at least 1 month to enable to farmers to rest and
- Local facilitators are preferred as they understand the needs of the farmers
- Training follow-up has recorded a big welcome by the farmers as it helps address the weaknesses as identified by the farmers after the training
- The training on financial management was a bit technical and required more and easily identifiable local examples. The local facilitators should therefore be involved in filling the gaps that remained unmet during the training and provide feedback to the farmers on the training in a follow-up activity and if possible a re-training.
- Unit 4 and 5 trainings would have been more successful if the IWUAs were already operating and maintaining the schemes. Since this was not the case in all the schemes, it would be important that the trainings be followed up in future when the infrastructure is in place.

(3) Non-uniformity of Questionnaires

It is therefore highly recommended that a standard questionnaire be developed for future trainings for uniformity and harmonization as well as creating grounds for comparison of different schemes performance which was possible for Unit 1 training as the questionnaire was similar for all the schemes.

Although, the questionnaires are uniform at unit-1 under JICA team mainly implemented, it has been observed that having a different knowledge evaluation sheet for different schemes as was done in Unit 2 and Unit 3 has elicited varied observations, (1) Different number of questions (for example, most questionnaires in Unit 2 were expected to have 20 questions

but some schemes like Murachaki had 12 questions, for Unit 3, the questionnaire for Mangudho Scheme under Batch 2 had only 10 questions; (2) Quality of the questions (it has been noted that in some schemes the questions are so easy that the farmers are able to score very highly even before the training, Unit 2 and 3 in Mdachi is one example; (3) The framing of the questions was very varied despite the instructions during the pre-training meeting. Some questionnaires had all negatively framed questions (e.g. ‘which is not’ instead of ‘which is’, which causes confusion to the farmers.

In Unit 4 and 5, the PMT developed a standard questionnaire that was used to gauge the farmers’ knowledge in all schemes. This ensured uniformity of the questions and the content areas that were evaluated.

(4) What item had low scoring of understanding for Units 1, 2 and 3. And what action will be needed to enhance knowledge and experiences.

During Unit 1, 2 and Unit 3 training, the following areas recorded a low performance and in future the areas require to be revisited to ease the farmers understanding:

Unit 1:

- IWUA organizational structure
- IWUA bylaws and bylaw formulation
- IWUA registration
- Water Act 2002

Unit 2:

- Development of leadership policies
- Development of conflict policies
- Process of review and operationalization of bylaws
- Review of IWUA organizational structure

Unit 3:

- Budgeting
- Recording in the books of original entry including ledger book, petty cash book, cash book, fixed asset register and income and expenses book
- Developing financial policies
- Internal Auditing procedure
- Importance of external auditing

Unit 4

- Preparation of basins and furrows
- Testing of water depth after irrigation
- Preparation of a cropping calendar
- Post-harvest processing

Unit 5

- Preparation of O&M plans
- Implementation of O&M plans
- Record keeping for O&M
- Action planning for O&M
- M&E of irrigation system

CHAPTER 3 Implementation of Capacity Development for IWUA Members for Batch 2 Pilot Schemes

3.1 General

Capacity Development Plan for Batch 2 is conducted by the mainly SCIOs and SCAO. Implementation and evaluation method is same as Batch 1.

Here, the training coordinator recapitulated on the IWUA capacity building programme. They also informed that since the SCIOs and SCAOs were now conversant with the trainings, the PMT would take a back seat in this training and offer backstopping. It was agreed that the PMT members attending the training be allocated at least 1 session for each member. The training objectives would not be changed but the facilitators were expected to prepare presentations that are specific to each of the scheme taking consideration of the lessons learnt during Batch 1. Under Unit 1 Batch 1 training, most of the facilitation was carried out by the PMT. During the pre-training meeting, the PMT provided the officers with Batch 1 Unit 1 presentations to assist them come up with their own presentation.

3.2 Achievements and Analysis

3.2.1 Outline of Achievement of IWUA Training

Actual achievement of IWUA Capacity training is shown below.

Table 3.2.1 Achievement of Capacity Development Plan (as of 2015/2/25)

Scheme	Induction Training	Functionality Survey	Unit 1	Follow-up	Unit 2	Unit 3	Unit 4	Unit 5
Mangudho	23rd - 27th June'14	09/09/2014	10-12/09/2014	02/12/2014	03-04/12/2014	27-29/01/2015		
Shulakino		03/11/2014	04-06/11/2014	13/01/2015	14-15/01/2015	10-12/02/2015		
Kiamariga/ Raya		07/10/2014	08-10/10/2014	01/12/2014	02-03/12/2014	27-29/01/2015		
Kaumbura		30/09/2014	01-03/10/2014	11/11/2014	12-13/11/2014	16-18/12/2014		
Challa/ Tuhire		16/09/2014	17-19/09/2014	08/12/2014	09-10/12/2014	20-22/01/2015		

Source: JICA Team

3.2.2 Induction Training for IWUA Leaders

The training was held for 5 days from 23rd to 27th June 2014. This time, JICA team developed questionnaires in order to clarify the place where the farmers' leader did not understand emulating the Capacity building training. The following is the result of that.

Table 3.2.2 Results of Evaluation in Induction Training

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	2	8%	8	32%
80-89%	8	32%	11	44%
70-79%	4	16%	4	16%
60-69%	5	20%	1	4%
Below 60%	6	24%	1	4%
Total Participants	25	100%	25	100%
Average Score		74%		81%

Source: JICA Team

Total 25 participants attended the training, each scheme represented by 5 farmers. The achievement is analysed based on the knowledge evaluation questionnaires which were administered to the participants before and after the training. The average scores before and after the training was 71% and 84% respectively. This depicts 13% gain in knowledge. The main areas of evaluation were IWUAs, Group Dynamics, IWUA by-laws, IWUA leadership and conflict management, Water Act 2002, Irrigation system management, IWUA record keeping and environmental management.

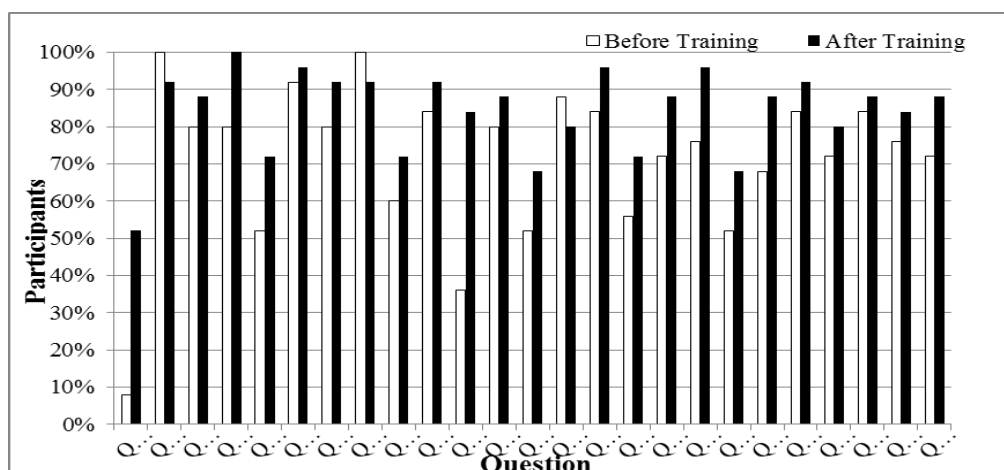


Figure 3.2.1 Result of Knowledge Evaluation in Induction Training

Source: JICA Team

The average scores before and after the training was 71% and 84% respectively. This depicts 13% gain in knowledge.

The worst performing questions were:

Q1 Which Ministry is implementing the project?

Since the change of regime in the Kenya government where many ministries were merged and other transferred, farmers are yet to understand the new arrangement and that explains why only 8% understood that the Ministry of Agriculture is the one implementing the project. Since irrigation was initially under the Ministry of Water and Irrigation, 92% of the farmers chose it as the implementing agency. After the training, 52% of the participants got it right but still there were those who did not understand. This will become clear as the project implementation continues.

Q11 Which is the best leadership style?

Most farmers answered that democratic leadership was the best before the training. Only 36% of the participants answered correctly that all leadership styles are good depending with the prevailing situation. After the training, 84% of the participants were able to answer correctly.

Q13 What is the important of group registration?

Most participants answered that obtaining legal registration would make the group receive donor funds while others answered that it would give them grounds to use irrigation water. 52% of the participants however were able to answer the question correctly.

After the training, 68% of the participants were able to answer correctly. The gain is not as significant as the facilitator for this session did not explain the importance of legal registration in detail. This will however be covered during Unit 1 training.

Q19 Which is not a direct result of irrigation?

The farmers were to selected more rainfall as the answer but most seemed confused and selected the increase of malaria incidences. This means that they do not understand the cause of malaria. 52% of participants got it right before the training and 68% after the training. This gap will be adequately filled during the upcoming environmental management trainings.

3.2.3 Community Mobilization & IWUA Formation (Unit 1)

(1) Implementation Schedule and participant information

All of the schemes training were conducted as shown below.

Table 3.2.3 Records of Training Program in Unit 1

SCHEME	PRE-TRAINING	TRAINING	FOLLOW-UP
Mangudho	22/8/2014	10-12/9/2014	2/12/2014
Shulakino	15/8/2014	4-6/11/2014	13/1/2015
Kiamariga/Raya	4/9/2014	8-10/10/2014	1/12/2014
Kaumbura	28/8/2014	1-3/10/2014	11/11/2014
Challa Tuhire	8/8/2014	17-19/9/2014	8/12/2014

Source: JICA Team

Table 3.2.4 Description of Unit 1 Training Program

SCHEME	PARTICIPANTS		RESOURCE PERSONS	VENUE FOR THE TRAINING
	Male	Female		
Mangudho	14	11	SCIO, SCA&MO, SCSDO, 2PMT members	Baptist Church, Mangudho
Shulakino	10	7	SCAO, SCA&MO, 2 WRMA officials and 3PMT members	AIC Church, Siyapei
Kiamariga/Raya	11	11	SCIO, SCAO, 2 PMT members	AIC Church, Raya
Kaumbura	19	11	SCIO, SCAO, SCSDO, 3 PMT members	EAPC Church, Muringa
Challa Tuhire	16	9	SCIO, SCAO, SCCO, 2 PMT members	St. Joseph Kivukoni Primary School Hall

Source: JICA Team

(2) Evaluation Summary

The results of the knowledge evaluation per scheme depicting the percentages of the farmers in the various scoring levels as well as the average mark for each scheme are as follows.

Overall, in all the schemes there is significant knowledge gain and on average the schemes gained 8% in knowledge. This demonstrates that the training was a success.

Table 3.2.5 Before& After Training Score of the Evaluation Questionnaires (Unit 1)

Scheme	Before Training	After Training	Difference
Mangudho	62%	71%	9%
Shulakino	63%	67%	4%
Kiamariga/Raya	70%	79%	9%
Kaumbura	60%	68%	8%
Challa Tuhire	71%	79%	8%
Average for all schemes	65%	73%	8%

Source: JICA Team

Here in below is the summary of Descriptive Analysis for each scheme. We described the detail evaluation the following chapter.

(3) Evaluation of Program for Each Scheme

1)Mangudho

The average scores before and after the training was 62% and 71% respectively. This depicts a 9% gain in knowledge which is an indication that the training was effective and achieved the training objectives.

Table 3.2.6 Results of Evaluation in Unit 1 Program in Mangudho Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	1	6%
80-89%	5	32%	5	32%
70-79%	0	0%	4	25%
60-69%	3	18%	2	12%
Below 60%	8	50%	4	25%
Total Participants	16	100%	16	100%
Average Score		62%		71%

Source: JICA Team

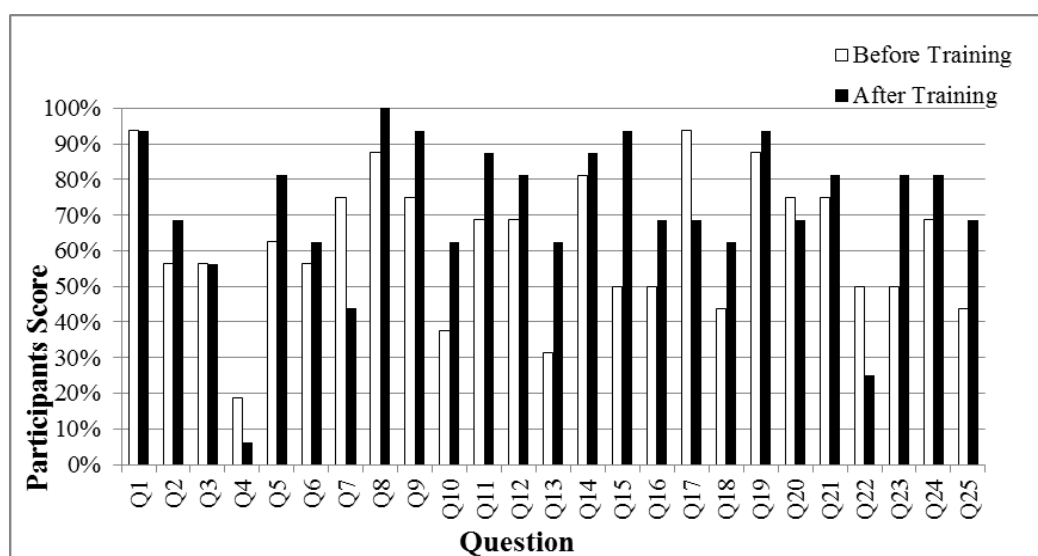
Figure 3.2.2 Result of Knowledge Evaluation in Mangudho Scheme *Source: JICA Team*

Table 3.2.7 Evaluation per Question for Unit 1 Program in Mangudho Scheme

Qs No.	Content	Performance	Remarks
High Scoring Questions during Pre & Post knowledge Evaluations			
1	Most important function of an IWUA	PT – 94% AT – 94%	The farmers having just formed their IWUA and held elections weeks before the training had been informed about the functions of an IWUA
8	In charge of O&M of the scheme	PT – 88% AT – 100%	The fact that the farmers formed their IWUA with the help of the field extension officers contributed to them having knowledge of IWUA roles and functions
14	The meaning of a stakeholder	PT – 81% AT – 88%	The multiple choices available made it easy for the farmers to pick the right answer
19	WRMA's main mandate	PT – 88% AT – 94%	The multiple choices provided made it easy for the farmers to identify the right answer
Questions with significant knowledge gain Pre & Post			
Qs No.	Content	Performance	Remarks
2	IWUA organizational structure	PT – 56% AT – 69%	The farmers gained knowledge of how an ideal IWUA organizational structure should be
5	Bylaw making procedure	PT – 63% AT – 81%	The farmers after training understood the procedure of formulating their bylaws
9	Farmers activities during scheme implementation	PT – 75% AT – 94%	The farmers gained knowledge on their participation during scheme construction
10	The important factor that ensures scheme sustainability	PT – 38% AT – 63%	The farmers understood the importance of water fee payment as the biggest factor in ensuring scheme sustainability
13	Contents of the MOU	PT – 31% AT – 63%	The farmers after training were able to identify what is contained in the MOU
15	Best IWUA leadership style	PT – 50% AT – 94%	The farmers understood the applications of the various leadership styles in the IWUA and the times when each is applicable

Qs No.	Content	Performance	Remarks
16	Importance of belonging to an IWUA	PT – 50% AT – 69%	The farmers understood the main reason why they join a group like the IWUA which is to obtain water for irrigation
23	Offences under Water Act	PT – 50% AT – 81%	The farmers after training on the water act were able to identify the various offences that are punishable under the act and those that are not
24	Importance of Action Planning	PT – 69% AT – 81%	The farmers after training were able to identify the importance of an action plan as planning for activities
25	Components of an action plan	PT – 44% AT – 69%	The farmers after the group work on action planning gained knowledge on the various components that are included in an action plan
Questions with a significant drop in knowledge and poor performing in pre and post evaluation			
Qs No.	Content	Performance	Remarks
7	Infrastructure to be included in the scheme design	PT – 75% AT – 44%	The fact that there was no design ready for the training may have contributed to the drop in knowledge as the farmers did not quite understand the major components or infrastructure that was to be put in place under the project
17	Factors that ensure group cohesion	PT – 94% AT – 69%	The question and the answers were straight forward and the reason for the loss in knowledge could have been lack of concentration when answering the questions
22	Permit application fee for Category	PT – 50% AT – 25%	The farmers confused the 2 permits required; authority to construct permit and abstraction permit

2)Shulakino

The average scores before and after the training was 63% and 67% respectively. This depicts a 4% gain in knowledge which is an indication that the training was effective and achieved the training objectives.

Table 3.2.8 Results of Evaluation in Unit 1 Program in Shulakino Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%		0%
80-89%	3	18%	1	7%
70-79%	3	18%	3	21%
60-69%	4	23%	4	29%
Below 60%	7	41%	6	43%
Total Participants	17	100%	14	100%
Average Score		63%		67%

Source: JICA Team

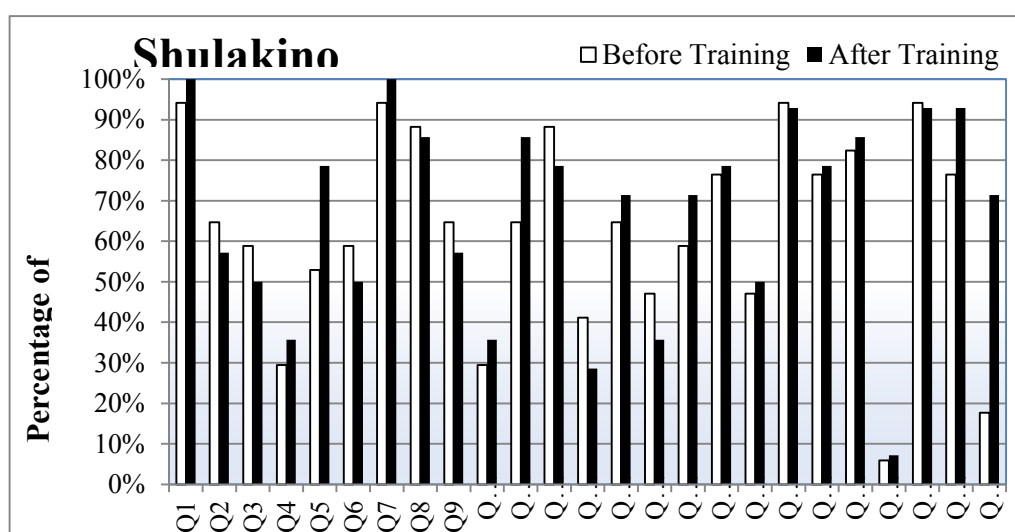


Figure 3.2.3 Result of Knowledge Evaluation in Shulakino Scheme

Source: JICA Team

Table 3.2.9 Evaluation per Question for Unit 1 Program in Shulakino Scheme

Qs No.	Content	Performance	Remarks
High Scoring Questions during Pre & Post knowledge Evaluations			
1	Functions of an IWUA	PT – 94% AT – 100%	This is an operational scheme and so the farmers know the functions of an IWUA
7	Components of Shulakino Scheme Design	PT – 94% AT – 100%	This is an operational scheme and so the farmers know the importance of an IWUA
8	Responsibility for Operations and Maintenance of the Scheme	PT – 88% AT – 86%	This is an operational scheme and therefore the participants were aware of their responsibility in operating and managing their irrigation scheme
19	WRMA's main mandate	PT – 94% AT – 93%	The farmers had a little knowledge about WRMA. The multiple choices also made it easy for one to pick the correct answer
23	Offences punishable under the Water Act 2002	PT – 94% AT – 93%	The participants had some knowledge about WRMA and the offences punishable under WRM rules
Questions with significant knowledge gain Pre & Post Evaluation			
5	Bylaw making procedure	PT – 53% AT – 79%	The farmers understood the procedure of formulating IWUA bylaws
11	Phases of Irrigation development	PT – 65% AT – 86%	The participants after the training were able to outline the 4 phases of irrigation development
24	Importance of Action Planning	PT – 76% AT – 93%	The facilitator engaged the farmers in formulating a sample action plan which enhanced the farmers understanding
25	Components of an Action Plan	PT – 18% AT – 71%	The facilitator during the training on the action plan engaged the farmers in formulating a sample action plan which enhanced their understanding
Questions with a significant drop in knowledge and poor performing in pre and post evaluation			
3	The Most important function of an IWUA	PT – 59% AT – 50%	The multiple choices were confusing and required one to pick out the MOST important function. Most of the farmers answered that it is to supply farmers with

Qs No.	Content	Performance	Remarks
			agricultural products and ensuring the members follow bylaws. The most important function of the IWUA is to supply irrigation water to members
4	Ways of operationalizing IWUA bylaws	PT – 29% AT – 36%	Almost all the participants indicated that giving a copy of the IWUA bylaws to the local judicial office would not assist in their operationalization which was wrong. The local judicial office needs to have a copy of the bylaws for reference when resolving conflicts.
6	Factors affecting operationalization of IWUA bylaws	PT – 59% AT – 50%	The reason for the drop in knowledge may be due to lack of concentration by the participants in answering the question
10	Important element towards sustaining an Irrigation scheme	PT – 29% AT – 36%	This question confused the farmers as it was not covered clearly during the training. In order to sustain an Irrigation Scheme, the members need to pay for water to cater for the operations and maintenance of the Scheme
13	Contents of an MOU	PT – 41% AT – 29%	The facilitator did not cover this subject clearly
15	Best leadership style for an IWUA	PT – 47% AT – 36%	The facilitator did not cover this subject clearly
18	Importance of legally registering an IWUA	PT – 47% AT – 50%	The subject was not covered during the training
22	WRMA abstraction permit charges for category C	PT – 6% AT – 7%	The facilitator did not cover this subject clearly

Source: JICA Team

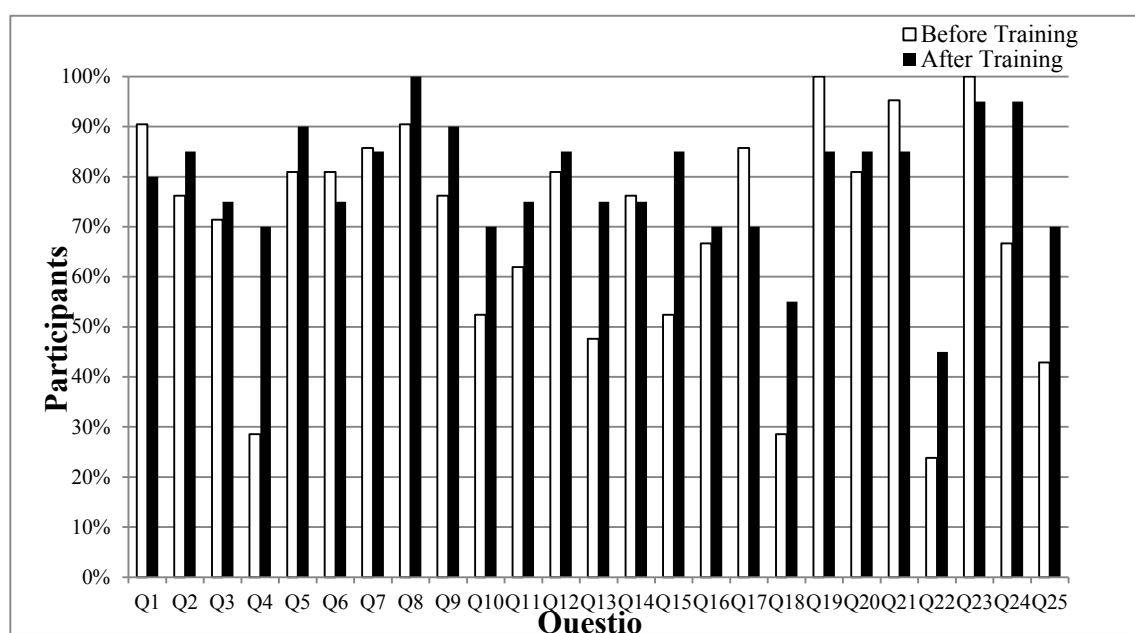
3)Kiamariga/Raya

The average score was 70% and 79% before and after the training respectively, therefore, on average, the knowledge gain after the training is 9%. This therefore depicts that the training was successful and that the training objectives were achieved.

Table 3.2.10 Results of Evaluation in Unit 1 Program in Kiamariga/Raya Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above			9	45%
80-89%	9	43%	4	20%
70-79%	1	5%	1	5%
60-69%	6	28%	4	20%
Below 60%	5	24%	2	10%
Total Participants	21	100%	20	100%
Average Score		70%		79%

Source: JICA Team



Source: JICA Team

Figure 3.2.4 Result of Knowledge Evaluation in Kiamariga/Raya Scheme

Table 3.2.11 Evaluation per Question for Unit 1 Program in Kiamariga/Raya Scheme

Qs No.	Content	Performance	Remarks
High Scoring Questions during Pre & Post knowledge Evaluations			
1	Functions of an IWUA	PT – 90% AT – 80%	This is an operational scheme and so the farmers know the functions of an IWUA
5	Bylaw formulation procedure	PT – 81% AT – 90%	The multiple choices given made it easy for the farmers to identify the right answer
7	Irrigation infrastructure in the scheme	PT – 86% AT – 85%	The multiple choices given made the answer easy to identify the right answer
8	In charge of irrigation infrastructure	PT – 90% AT – 100%	The scheme is already operational and so the farmers are aware of their roles in O&M
12	Project implementation activities	PT – 81% AT – 85%	This is an operational scheme and so the farmers know the project implementation activities
20	Main function of the WRUA	PT – 81% AT – 85%	There is already an existing IWUA in the region and so the farmers are aware of its roles
23	Actions punishable under the Water Act 2002	PT – 100% AT – 95%	The multiple choices given made the answer easy to identify the right answer
Questions with significant knowledge gain Pre & Post			
Qs No.	Content	Performance	Remarks
4	Bylaw operationalization	PT – 29% AT – 70%	The farmers understood the procedure of operationalizing the bylaws
9	Farmers activities during scheme construction	PT – 76% AT – 90%	The farmers gained knowledge of their roles during scheme implementation
10	What to do to sustain the project	PT – 52% AT – 70%	The farmers gained understanding as to the importance of paying for water to ensure scheme sustainability
11	Phases of irrigation Scheme development	PT – 62% AT – 75%	The farmers gained knowledge on the phases of irrigation development and their sequence
13	Contents of the MOU	PT – 48% AT – 75%	The farmers gained knowledge on the meaning and contents of the MOU

Qs No.	Content	Performance	Remarks
15	Best leadership style	PT – 52% AT – 85%	The farmers after training appreciated the importance of all leadership styles dependent on various situations
18	Importance of legal registration	PT – 29% AT – 55%	This topic was not covered clearly and so those farmers who got it right may have done so from general knowledge not from the training
22	Cost of abstraction Permit for category C	PT – 24% AT – 45%	The facilitator was very clear on the charges for permits for each category but the farmers may have confused the authority to construct with the abstraction permit
24	Importance of action planning	PT – 67% AT – 95%	The farmers after training understood the importance of action planning
25	Components of an Action Plan	PT – 43% AT – 70%	The training contributed to the farmers gaining knowledge of the components of an action plan
Qs No.	Content	Performance	Remarks
17	What holds members of a group together	PT – 86% AT – 70%	The session on group dynamics may have contributed to the drop in knowledge because all the options given were also trained as contributors in holding a group together. The farmers were expected to pick out the most important
19	Main mandate for WRMA	PT – 100% AT – 85%	The reason for the drop may be due to lack of concentration by the farmers in answering the questions as they were in a hurry to go home early
21	Importance of paying for water	PT – 95% AT – 85%	The reason for the drop in knowledge may be attributed to lack of concentration by the participants when answering the question

Source: JICA Team

4)Kaumbura

The average score was 60% and 68% before and after the training respectively, therefore, on average, the knowledge gain after the training is 8%. This therefore depicts that the training was successful and that the training objectives were achieved.

Table 3.2.12 Results of Evaluation in Unit 1 Program in Kaumbura Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	1	3%	4	13%
80-89%	3	10%	6	20%
70-79%	5	16%	5	16%
60-69%	7	24%	8	27%
Below 60%	14	47%	7	24%
Total Participants	30	100%	30	100%
Average Score		60%		68%

Source: JICA Team

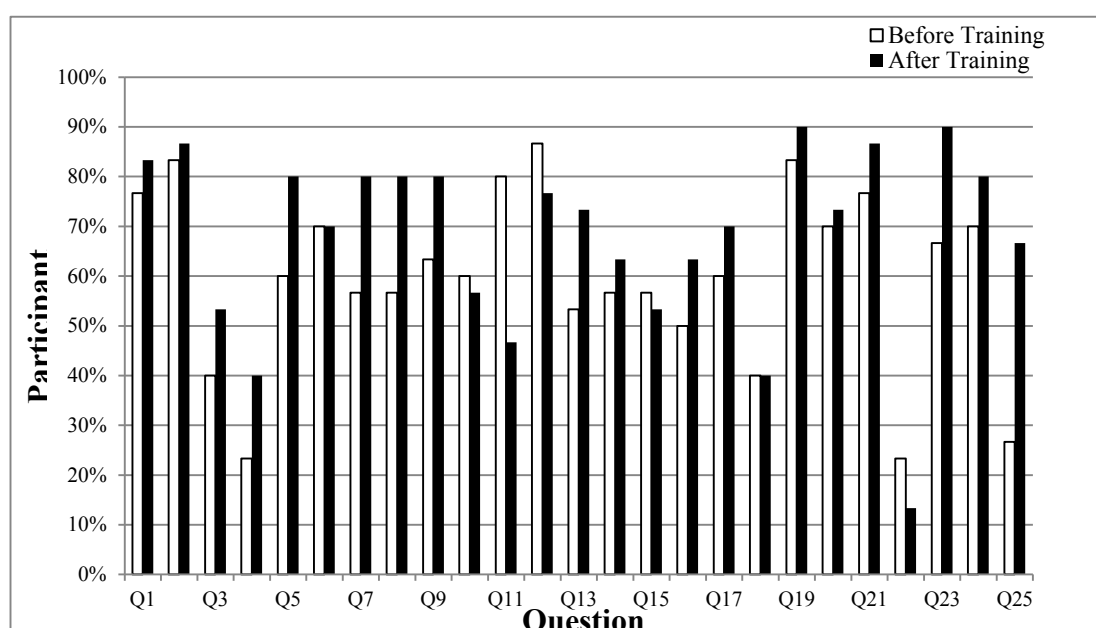


Figure 3.2.5 Result of Knowledge Evaluation in Kaumbura Scheme

Table 3.2.13 Evaluation per Question for Unit 1 Program in Kaumbura Scheme

Qs No.	Content	Performance	Remarks
High Scoring Questions during Pre & Post knowledge Evaluations			
1	Functions of an IWUA	PT – 77% AT – 83%	This is an operational scheme and so the farmers know the functions of an IWUA
2	IWUA organizational structure	PT – 83% AT – 87%	This is an operational scheme and so the farmers know the importance of an IWUA
12	Activities undertaken during scheme implementation	PT – 77% AT – 87%	The multiple choices given made the answer easy to pick out
19	WRMA's main mandate	PT – 83% AT – 90%	The farmers were already aware of WRMA functions and the IWUA was already collecting water fee
Questions with significant knowledge gain Pre & Post			
Qs No.	Content	Performance	Remarks
5	Bylaw making procedure	PT – 60% AT – 80%	The farmers understood the procedure of formulating IWUA bylaws
7	Components of Kaumbura Irrigation System	PT – 57% AT – 80%	The facilitator was very specific on the scheme components and therefore the farmers gained understanding of the same
8	The person in charge of scheme operations and maintenance	PT – 57% AT – 80%	The farmers after training understood their role in operations and maintenance of the scheme
9	Farmers activities during scheme construction	PT – 63% AT – 80%	The group work on farmers activities during implementation phase enhanced their understanding and so the knowledge gain

Source: IICA Team

Qs No.	Content	Performance	Remarks
13	Contents of the MOU	PT – 53% AT – 73%	The facilitator trained farmers on the MOU using a sample of the MOU used under Batch 1. This enhanced the farmers understanding
23	Offences under Water Act	PT – 67% AT – 90%	After the training on legal requirements, the farmers understood the offences under water act 2002
25	Components of an Action Plan	PT – 27% AT – 67%	This session was very participatory as the facilitator engaged the participants
Questions with a significant drop in knowledge and poor performing in pre and post evaluation			
Qs No.	Content	Performance	Remarks
3	The Most important function of an IWUA	PT – 40% AT – 53%	The farmers got confused as to the most important function of the IWUA and many answered that the most important function is not providing water for irrigation to members
4	Ways of operationalizing IWUA bylaws	PT – 40% AT – 23%	The farmers might have gotten confused by the multiple choices given or did not concentrate during the training
11	Phases of Irrigation Development	PT – 80% AT – 47%	The reason for the drop in knowledge may be attributed to lack of concentration by the participants when answering the question
18	Importance of group registration	PT – 40% AT – 40%	The facilitator on group dynamics did not cover the issue of group registration
22	Permit application fee for Category	PT – 23% AT – 13%	The facilitator did not cover this subject clearly

5)Challa Tuhire

The average score was 71% and 79% before and after the training respectively, therefore, on average, the knowledge gain after the training is 8%. This therefore depicts that the training was successful and that the training objectives were achieved.

Table 3.2.14 Results of Evaluation in Unit 1 Program in Challa Tuhire Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	4	17%	6	30%
80-89%	5	21%	4	20%
70-79%	5	21%	5	25%
60-69%	6	25%	4	20%
Below 60%	4	17%	1	5%
Total Participants	24	100%	20	100%
Average Score		71%		79%

Source: JICA Team

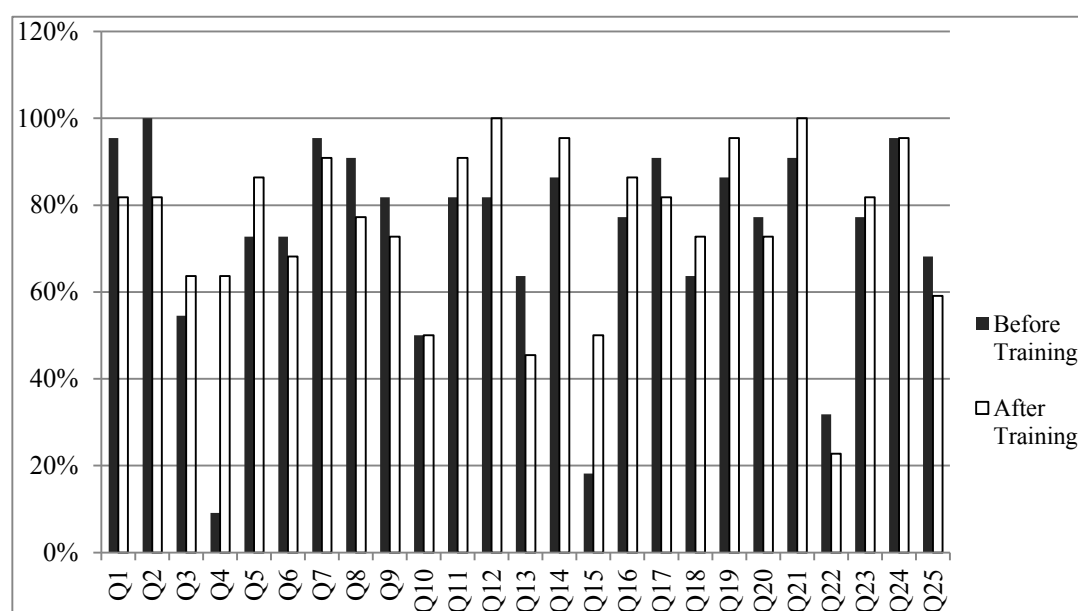


Figure 3.2.6 Result of Knowledge Evaluation in Challa Tuhire Scheme

Table 3.2.15 Evaluation per Question for Unit 1 Program in Tuhire/Challa Scheme

Source: JICA Team

Qs No.	Content	Performance	Remarks
High Scoring Questions during Pre & Post knowledge Evaluations			
1	Most important function of an IWUA	PT – 83% AT – 95%	This scheme is already operational and so they understand the importance of the IWUA.
2	IWUA organizational structure	PT – 88% AT – 100%	The question required the participants to pick the odd person out of the IWUA organizational structure. The choices given were too obvious for one to pick out the correct answer
7	Scheme design components	PT – 92% AT – 95%	The fact that this scheme is already operational made it easy for the participants to identify the infrastructure that is already existing in their scheme
8	Phases of Irrigation Scheme Development	PT – 96% AT – 80%	The participants having gone through the phases of irrigation development found it easy to pick out the last stage of scheme development
21	Reason as to why we pay for water	PT – 88% AT – 100%	The IWUA is already paying water charges to WRMA and so it could be the reason why most of them identified the correct answer as to the importance of paying for water
24	Importance of Action Planning	PT – 83% AT – 95%	The farmers had no knowledge of what an action plan is but the choices given made it too obvious to pick the right answer
Questions with significant knowledge gain Pre & Post			
Qs No.	Content	Performance	Remarks
4	Bylaws operationalization	PT – 38% AT – 60%	The farmers were not aware as to who should have a copy of the bylaws to ease their operationalization but after the training most of the farmers gained the knowledge
6	Factors that affect acceptance of Bylaws	PT – 42% AT – 90%	The farmers did not have knowledge about their bylaws, their importance as well as the factors that

Qs No.	Content	Performance	Remarks
			inhibit members to follow them
11	Phases of irrigation development	PT – 63% AT – 80%	The farmers who did not understand the phases of irrigation scheme development gained the knowledge
12	Activities during Scheme construction	PT – 79% AT – 95%	The farmers easily were able to point out the activities that are undertaken during the scheme construction after the training
17	Factors ensuring group cohesion	PT – 79% AT – 95%	The farmers gained knowledge on what holds them together as members
20	Functions of a WRUA	PT – 75% AT – 95%	The fact that this IWUA is already part of the WRUA in the region enhanced the farmers' interest to gain understanding on the roles of WRUAs
25	Components of an Action Plan	PT – 29% AT – 65%	Few farmers had information on what an action plan is and its components but after training there was a lot of knowledge gain.
Questions with a significant drop in knowledge and poor performing in pre and post evaluation			
3	Most important function of an IWUA	PT – 92% AT – 50%	After the training on Bylaws, the farmers got confused and most stated that the most important function of an IWUA is to ensure members follow bylaws.
8	Responsible person for Scheme O&M	PT – 96% AT – 80%	The reason for this may have been due to lack of concentration by some farmers when answering the question
10	How to ensure that the scheme is sustainable	PT – 75% AT – 60%	The farmers got confused as to how they can sustain their scheme with most choosing intensive farming instead of ensuring that water fee is paid
15	Best leadership style	PT – 42% AT – 50%	The facilitator on Group dynamics was not clear as to which style of leadership is the best
22	Permit Application fee for Category C	PT – 21% AT – 15%	The facilitator on legal requirements did not train the farmers on the amount of money is required for permits for each category.

Source: JICA Team

(4) Follow-up Program

The follow-up program is identified and expected to take the form of guided practice where the farmers will be guided.

This is expected to take a day. During this booster training, the executive committee and all the other scheme leaders are expected to attend, regardless of whether they had attended the training or not.

Table 3.2.16 Following up program developed for Unit 1

S/ No	ACTIVITY	OBJECTIVE	REMARKS/OUTPUT	RESPONSIBLE PERSON
1	Feedback on Unit 1 Training	1. To give feedback to the farmers and relay the results of the training 2. To recap on the main areas of the training as well as the weak areas identified during the evaluation	All schemes had reported an increase in knowledge The facilitator engaged the participants in recapping the training in general placing emphasis on the areas they had demonstrated the biggest weakness Including:	PMT

			Phases of irrigation development IWUA bylaws WRMA water charges IWUA leadership	
2	Farmers feedback on Action plan	The farmers were divided into 2 groups. The groups were supposed to discuss and present findings on: Updating of the members list Review or formulation of IWUA bylaws Preparation of IWUA action plan Extension of the training to other members of the IWUA	Mangudho and Kaumbura reported that they were in the progress of updating the membership list; the other 3 schemes were yet to start the process. In the issue of review or formulation of bylaws, Mangudho had prepared a draft, Challa Tuhire had finished reviewing the bylaws, and Kaumbura reported that they were in progress. Only Shulakino and Kiamariga/Raya had not attempted formulating and reviewing the bylaws, respectively Only Kaumbura had held a meeting to sensitize other members of the training.	Farmer s/ Particip ants
3	Action Planning	During this session, the facilitator is expected to engage the participants in coming up with an action plan on the way forward after farmers' feedback	The facilitator and the participants came up with a way forward which was setting dates for various unattained tasks including updating the membership list and bylaws review	PMT and Particip ants
4	Guided Practice on Record keeping	During this session, the participants are trained on the various records that they are expected to maintain at this level of group formation which include Membership register, minutes book, discipline book, bylaws file and developing a rubber stamp for the IWUA	During this session, the facilitator made a presentation of the various records that the IWUA is expected to maintain and demonstrated what each boo entails and how to record in the books. SIDEMAN-SAL project had purchased the books	PMT

Source: JICA Team

3.2.4 Leadership & Conflict Management (Unit 2)

(1)Implementation Schedule and participant information

All of the schemes training were conducted except follow up program as shown below.

Table 3.2.17 Records of Training Program in Unit 2

SCHEME	TRAINING	FOLLOW-UP
Mangudho	3-4/12/2014	
Shulakino	14-15/1/2015	
Kiamariga/Raya	2-3/12/2014	
Kaumbura	12-13/11/2014	
Challa Tuhire	9-10/12/2014	

Source: JICA Team

Table 3.2.18 Description of Unit 2 Training Program

SCHEME	Participants	RESOURCE PERSONS	VENUE FOR THE TRAINING
Mangudho	32	SCIO, SCA&MO, SCSDO, 2PMT members	Baptist Church, Mangudho
Shulakino	22	SCAO, SCA&MO, 2 WRMA officials and 3PMT members	Nursery School, Siyapei
Kiamariga/Raya	12	SCIO, SCAO, 2 PMT members	AIC Church, Raya
Kaumbura	24	SCIO, SCAO, SCSDO, 3 PMT members	EAPC Church, Muringa
Challa Tuhire	22	SCIO, SCAO, SCCO, 2 PMT members	St. Joseph Kivukoni Primary School Hall

Source: JICA Team

(2) Evaluation summary

Here-below are the results of the before and after evaluation result of Unit 2.

Overall, most of the schemes recorded a significant knowledge gain. However, in Kiamariga/Raya, there was a 4% drop in knowledge. This could be attributed to lack of commitment to the training by the farmers and inconsistency in attendance of the training.

Table 3.2.19 Before & After Training Score of the Evaluation Questionnaires (Unit 2)

Scheme	Before Training	After Training	Difference
Mangudho	75%	79%	4%
Shulakino	58%	67%	9%
Kiamariga/Raya	63%	59%	-4%
Kaumbura	58%	68%	10%
Challa Tuhire	60%	71%	11%
Average Score for all Schemes	63%	69%	6%

Source: JICA Team

(3) Evaluation of Each Scheme

1) Mangudho

The average scores before and after the training was 75% and 79% respectively. This depicts a 4% gain in knowledge which is an indication that the training was effective and achieved the training objectives.

Table 3.2.20 Results of Evaluation in Unit 2 Program in Mangudho Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	3	19%	6	35%
80-89%	5	31%	3	18%
70-79%	5	31%	7	41%

60-69%	2	13%	0	0%
Below 60%	1	6%	1	6%
Total Participants	16	100%	17	100%
Average Score		75%		79%

Source: JICA Team

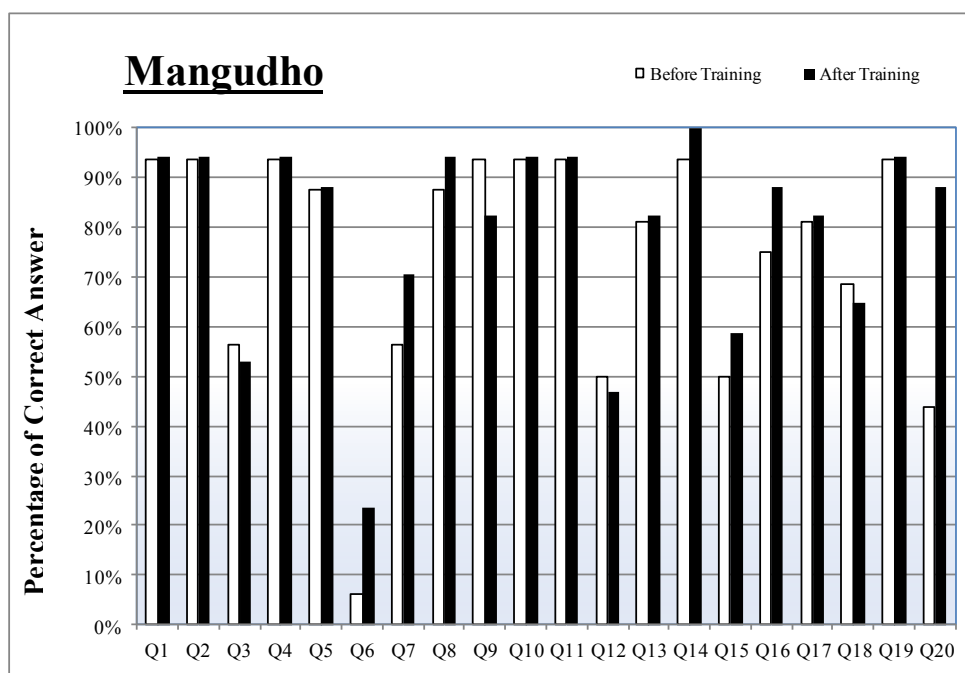


Figure 3.2.7 Result of Knowledge Evaluation in Mangudho Scheme

Source: JICA Team

Table 3.2.21 Evaluation per Question for Unit 2 Program in Mangudho Scheme

No	Content	Result	Reason of High Score even before the training
Q1	Objectives of an IWUA	BT – 94% AT – 94%	Having undertaken the previous units under the capacity building program the farmers were now clear on the IWUA objectives
Q2	IWUA organizational structure	BT – 94% AT – 94%	Having undertaken the previous units under the capacity building program the farmers were now clear on the IWUA organizational structure
Q4	Functions of management	BT – 94% AT – 94%	Having been trained on IWUA leadership under Unit 1 the farmers could easily identify the functions of the management
Q5	Features of planning	BT – 88% AT – 88%	The multiple choices made it easy for one to identify the right answer
Q10	Gender as a guiding principle for leadership	BT – 94% AT – 94%	The multiple choices were such that it was easy for one to identify the correct answer
Q11	Leadership functions	BT – 94% AT – 94%	Most participants having been trained on IWUA leadership could identify the functions of a leader
Q14	Interpersonal skills	BT – 94% AT – 100%	The framing of the question was very easy for all to answer correctly even without being trained

Q19	Characteristics of a successful group	BT – 94% AT – 94%	The multiple choices made it easy for one to identify the right answer
No	Content	Result	Reasons for high knowledge gain after the training
Q7	Leadership styles	BT – 56% AT – 71%	The farmers after the training understood the application of each mode of leadership based on different circumstances
Q16	Signs of conflicts	BT – 75% AT – 88%	The participants after the training understood the various signs of conflict
Q20	Features of an irrigation project	BT – 44% AT – 88%	The interpretation of the question may have contributed to the low score before the training. The question was very easy
No	Content	Result	Reason for drop in score or low score even after the training
Q3	Most important function of an IWUA	BT – 56% AT – 53%	Most farmers responded that the most important function of an IWUA is to ensure farmers follow bylaws. This may be due to the farmers getting confused with the 2 functions: irrigation water supply and operationalization of the bylaws
Q6	Factors of leadership	BT – 6% AT – 24%	The facilitator did not cover the factors of leadership and the participants were left to guess which answer was correct
Q12	Meaning of motivation	BT – 50% AT – 47%	The facilitator did not cover the area on motivation. The translation of the question during administration may have also contributed to the drop. Finally negative framing of the question bring confusion to the participants
Q15	Effects of team building	BT – 50% AT – 59%	Negative framing of the question may have contributed to the low score

Source: JICA Team

2)Shulakino

The average scores before and after the training was 58% and 67% respectively. This depicts a 9% gain in knowledge which is an indication that the training was effective and achieved the training objectives.

Table 3.2.22 Results of Evaluation in Unit 2 Program in Shulakino Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	1	7%
80-89%	2	11%	2	13%
70-79%	2	11%	5	33%
60-69%	7	37%	1	7%
Below 60%	8	42%	6	40%
Total Participants	19	100%	15	100%
Average Score		58%		67%

Source: JICA Team

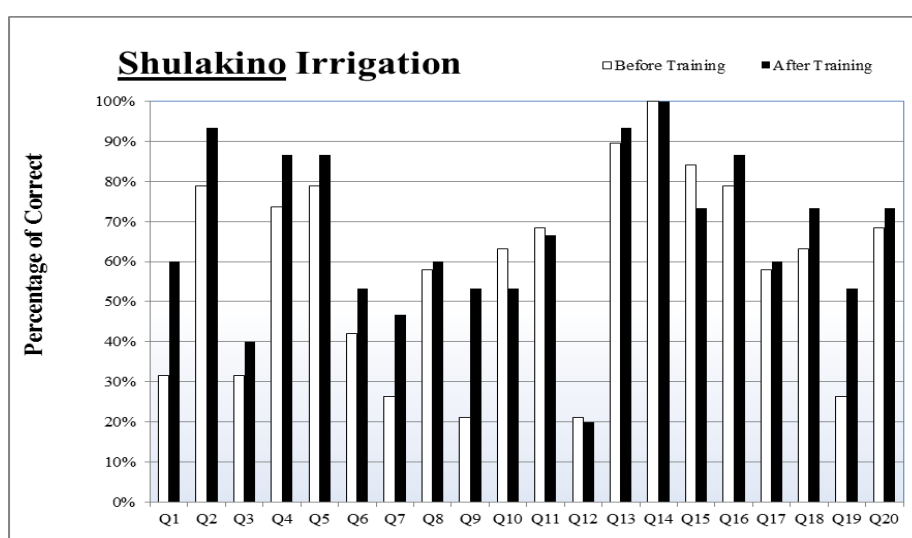


Figure 3.2.8 Result of Knowledge Evaluation in Shulakino Scheme

Source: JICA Team

Table 3.2.23 Evaluation per Question for Unit 2 Program in Shulakino Scheme

No	Content	Result	Reason of High Score even before the training
Q2	Objectives of an IWUA	BT – 79% AT – 93%	Having undertaken the previous unit under the capacity building program the farmers were now clear on the IWUA organizational structure
Q5	Best way to overcome leadership challenges	BT – 79% AT – 87%	Most of the participants were able to identify that the best way to overcome leadership challenges was through the organizational structure
Q14	Gender and leadership	BT – 100% AT – 100%	The participants were all aware that one does not have to be a man to qualify for leadership
No	Content	Result	Reasons for high knowledge gain after the training
Q1	Main decision making body in an IWUA	BT – 32% AT – 60%	Before the training, most of the farmers had indicated that the main decision making body in an IWUA is the executive committee but after the training they understood that the general assembly is the main decision making body
Q4	Leadership skills	BT – 74% AT – 87%	The participants were able to identify the leadership skills
Q6	Cause of leadership challenges in an IWUA	BT – 42% AT – 53%	The question was not easy and the multiple choices were confusing. This question required the participant to relate the challenges with IWUA organizational structure
Q9	The person in charge of handling conflict in an IWUA	BT – 21% AT – 53%	Before the training, most of the participants had indicated that the Management committee were responsible for handling the conflicts but after the training the participants were able to understand the role of the conflict sub-committee in handling the IWUA conflicts
Q19	Best mode of influence by IWUA leaders	BT – 26% AT – 53%	Most participants before the training indicated that punishments were the best mode of motivation and influence but after the training they understood the importance of using rewards as the best way to motivate members

No	Content	Result	Reason for drop in score or low score even after the training
Q3	Functions of management	BT – 32% AT – 40%	The question was easy and the interpretation of the question to Kiswahili or the lack of concentration by the participants when answering the question may have caused this low score
Q7	Features of planning	BT – 26% AT – 47%	Though there was a significant knowledge gain after the training, it is clear that the participants did not quite understand the features of planning
Q10	Best conflict management style	BT – 63% AT – 53%	The farmers were taught about conflict management styles but however during the role plays there was a bit of confusion in the selection of the best style of managing conflict and selected accommodating as the best instead of where all the needs of all aggrieved parties are met
Q12	Steps while resolving conflicts	BT – 21% AT – 20%	The facilitator did not cover the steps that are supposed to be followed while resolving conflicts
Q15	Effects of team building	BT – 84% AT – 73%	Low concentration by the participants may be the cause of this drop as the question was very easy with only 2 multiple choices

Source: JICA Team

3)Kiamariga/Raya

The average scores before and after the training was 63% and 59% respectively. This depicts a 4% loss in knowledge. The main reason for the low score before and after the training is: (1) Inconsistency in attendance on the side of the participants, (2) Low literacy levels of the participants, (3) Poor facilitation skills some of the trainers especially such that the farmers got more confused and (4) Poor translation of the questionnaire making the farmers confused and unable to respond to questions properly.

Table 3.2.24 Results of Evaluation in Unit 2 Program in Kiamariga/Raya Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	1	8%	2	17%
80-89%	0	0%	2	17%
70-79%	6	46%	1	8%
60-69%	3	23%	1	8%
Below 60%	3	23%	6	50%
Total Participants	13	100%	12	100%
Average Score		63%		59%

Source: JICA Team

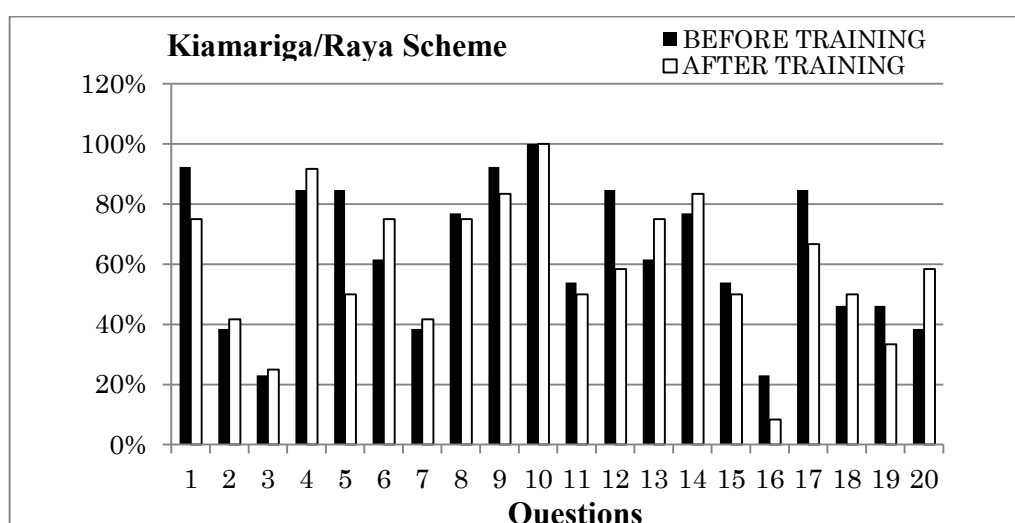


Figure 3.2.9 Result of Knowledge Evaluation in Kiamariga/Raya Scheme

Table 3.2.25 Evaluation per Question for Unit 2 Program in Kiamariga/Raya Scheme

No	Content	Result	Reason of Significant Knowledge Gain after the training
Q13	How to motivate a group whose energy has gone down	BT – 62% AT – 75%	Most of the respondents had indicated that the chairman and the executive committee have more powers but after the training they understood their role
Q20	Importance of resolving conflicts	BT – 38% AT – 58%	After the training on the organizational structure the farmers gained understanding and that is the reason all of the participants got it right
No	Content	Result	Reason for High Score even before the training
Q4	Functions of IWUA management	BT – 85% AT – 92%	The multiple choices and farmers general knowledge made it easy for one to identify the correct answer
Q9	Members of the executive committee	BT – 92% AT – 88%	This is an operational IWUA and therefore most members are aware of the composition of the executive committee
Q10	Definition of Democratic style of leadership	BT – 100% AT – 100%	The question was erroneous and therefore there was no one correct answer
No	Content	Result	Reason for significant drop in score or low score even after the training
Q2	Main decision making body of an IWUA	BT – 42% AT – 38%	Most of the respondents indicated that the executive committee was the main decision making body of an IWUA. This means that the members did not understand the IWUA organizational structure clearly
Q3	Activities carried out during the initiation phase of project implementation	BT – 23% AT – 25%	This question has been recurrent in the previous trainings. The farmers may have forgotten the activities carried out in the various phases of irrigation development
Q7	Most commonly used leadership style	BT – 38% AT – 42%	Most farmers may have gotten confused as in the previous trainings emphasis has been that it is alright to use all the different styles of leadership depending with the situation. This question
Q11	Functions of IWUA management	BT – 54% AT – 50%	The fact that the question was framed negative and was a ‘no’, ‘yes’ question may have contributed to the low score

Q15	Importance of team building	BT – 54% AT – 50%	It is noted that the members were not aware what team building is as they would have scored highly if they understood it. The question was easy
Q16	Phases of conflict management	BT – 46% AT – 38%	The participants may not have understood clearly the phases of conflict management and the training may have brought more confusion
Q18	Procedure of conflict management	BT – 23% AT – 8%	The participants may not have understood the procedure of resolving conflicts
Q19	1st step in conflict resolution	BT – 46% AT – 50%	The content on conflict management was not well understood by the participants as they scored poorly before and after the training

Source: JICA Team

4)Kaumbura

The average scores before and after the training was 58% and 68% respectively. This depicts a 10% gain in knowledge which is an indication that the training was effective and achieved the training objectives.

Table 3.2.26 Results of Evaluation in Unit 2 Program in Kaumbura Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	1	16%
80-89%	3	13%	5	0%
70-79%	10	13%	10	5%
60-69%	5	20%	4	5%
Below 60%	6	13%	4	21%
Total Participants	24	100%	19	100%
Average Score		58%		68%

Source: JICA Team

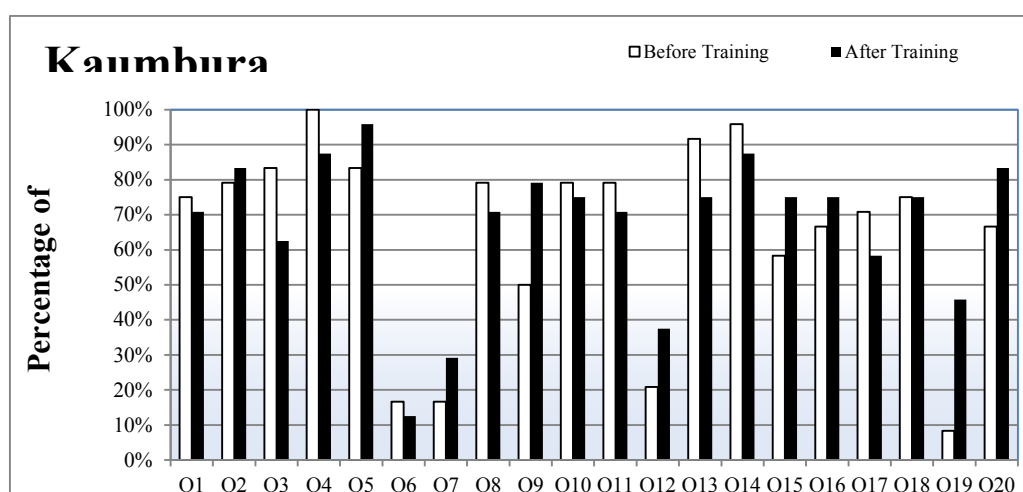


Figure 3.2.10 Result of Knowledge Evaluation in Kaumbura Scheme

Source: JICA Team

Table 3.2.27 Evaluation per Question for Unit 2 Program in Kiamariga/Raya Scheme

No	Content	Result	Reason of low score or reduction even after training
Q3	Functions of IWUA management	BT – 83% AT – 63%	Lack of concentration when answering the question
Q4	Leadership skills	BT – 100% AT – 88%	The multiple choices were such that it was easy for the participants to identify the right answer. The reduction in the percentage of the participants who got it right after the training may be attributed to lack of concentration when answering the questions
Q6	Causes of IWUA leadership challenges	BT – 17% AT – 13%	The question required the participants to be very keen to identify the right answer as the multiple choices were confusing This will be further explained during the follow-up program
Q7	Features of planning	BT – 17% AT – 29%	The participants may not have understood clearly the features of planning
Q12	Steps to follow when resolving conflicts	BT – 21% AT – 38%	The facilitator did not explain the steps that are followed during conflict resolution and therefore the participants were just guessing
Q13	Planning in an IWUA	BT – 92% AT – 75%	The reason may be lack of concentration by the participants when answering the question
Q17	Factors that hinder achievement of IWUA objectives	BT – 71% AT – 58%	The question might have confused the participants as most of the multiple choices were relevant
No	Content	Result	Reason for High Score even before the training
Q4	Leadership skills	BT – 100% AT – 88%	Question seems straight forward for farmers who understand scheme leadership Lack of concentration when answering the question
Q5	Ways of overcoming leadership challenges in an IWUA	BT – 83% AT – 96%	The multiple choices were straight forward and easy for a participant to identify the right answer

Q14	Principles of leadership	BT – 96% AT – 88%	The multiple choices were straight forward and easy for a participant to identify the right answer Lack of concentration when answering the question may be the cause of the drop in performance
No	Content	Result	Reason for high knowledge gain after the training
Q9	Who is responsible for resolving conflicts in an IWUA	BT – 50% AT – 79%	The participants before the training did not know about the role of the conflict sub-committee but after they were trained they understood their role in conflict resolution
Q19	Best source of influence for IWUA members	BT – 8% AT – 46%	Most farmers had indicated that punishment is the best source of IWUA motivation but after the training they understood that rewards are the best tool to influence members
Q20	Rewards as a source of motivating IWUA members	BT – 67% AT – 83%	The question was straight forward and linked to question number 19 and therefore the reason for the high knowledge gain for both questions after the training

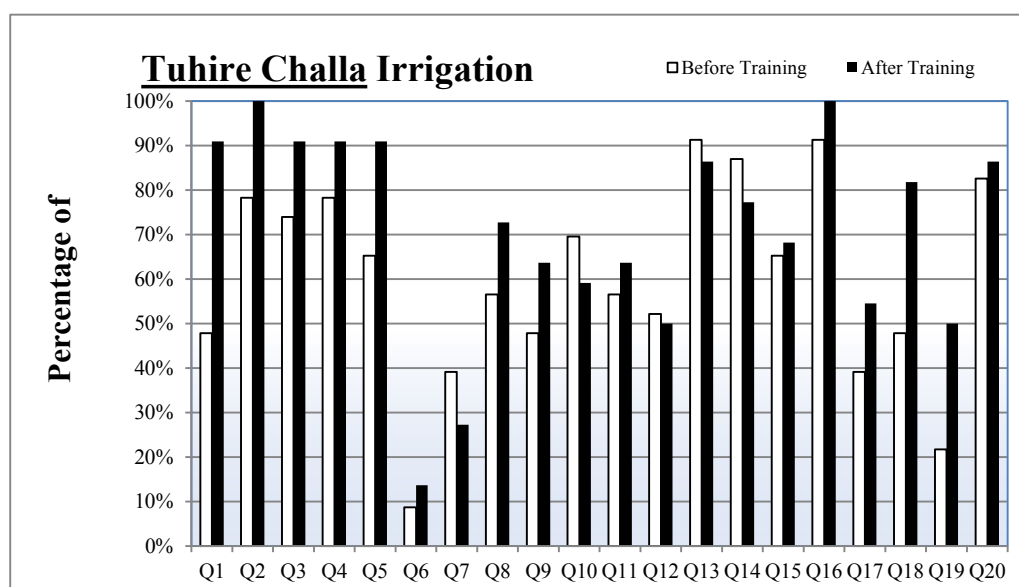
Source: JICA Team

5)Challa Tuhire

The average scores before and after the training was 60% and 71% respectively. This depicts 11% gain in knowledge which is an indication that the training was effective and achieved the training objectives.

Table 3.2.28 Results of Evaluation in Unit 2 Program in Challa Tuhire Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	2	9%
80-89%	3	13%	7	32%
70-79%	8	35%	6	27%
60-69%	3	13%	1	5%
Below 60%	9	39%	6	27%
Total Participants	23	100%	22	100%
Average Score		60%		71%



Source: JICA Team

Figure 3.2.11 Result of Knowledge Evaluation in Challa Tuhire Scheme

Table 3.2.29 Evaluation per Question for Unit 2 Program in Tuhire/Challa Scheme

No	Content	Result	Reason of High Knowledge Gain after the training
Q1	Main decision making body of an IWUA	BT – 48% AT – 91%	Most of the respondents had indicated that the chairman and the executive committee have more powers but after the training they understood their role
Q2	IWUA organizational structure	BT – 78% AT – 100%	After the training on the organizational structure the farmers gained understanding and that is the reason all of the participants got it right
Q3	Functions of IWUA management	BT – 74% AT – 91%	The farmers gained knowledge on the functions of each leader after the training
Q4	Leadership skills	BT – 78% AT – 91%	The participants understood the various skills required for leadership
Q5	Best way to overcome leadership challenges in an IWUA	BT – 65% AT – 91%	The farmers understood the need to have a proper organizational structure as the best way to overcome leadership challenges
Q8	Factors likely to undermine teamwork	BT – 57% AT – 73%	The multiple choices were such that it was easy for one to identify the correct answer
Q9	Who is responsible to handle IWUA conflict	BT – 48% AT – 64%	Most farmers had responded that the IWUA management was the one responsible to handle the IWUA conflicts but after the training they understood the role of the conflict sub-committee in IWUA conflict management

No	Content	Result	Reason for High Score even before the training
Q13	What is involved in planning	BT – 91% AT – 86%	The multiple choices made it easy for one to identify the correct answer
Q16	Characteristics of a successful group	BT – 91% AT – 100%	The multiple choices made it easy for one to identify the correct answer
Q20	Using rewards to motivate members	BT – 83% AT – 86%	The question was framed in an easy way and there were only to choices to pick from
No	Content	Result	Reason for drop in score or low score even after the training
Q6	Main cause of leadership challenges in a scheme	BT – 9% AT – 14%	The farmers got confused as the multiple choices were much related. However, the expected answer was the IWUA organizational structure. The use of the word challenge might also have contributed to the low score as different members interpreted it differently
Q7	Features of planning	BT – 39% AT – 27%	Most farmers responded that planning does not involve mid-term evaluation. The facilitator was not very clear in explaining the features of planning
Q10	Conflict management styles	BT – 70% AT – 59%	The question demanded them to state the conflict management style that made every party satisfied. The facilitator did not cover this during the training
Q14	Gender in leadership	BT – 87% AT – 77%	The participants were expected to affirm or deny that one of the leading principles of an IWUA was that one had to be a man. Lack of concentration by the participants may have caused the drop in the knowledge
Q17	Things that can hinder achievement of IWUA goals	BT – 39% AT – 55%	Most farmers indicated did not understand the big role played by the organizational structure in ensuring achievement of IWUA goals
Q19	Best mode of influencing IWUA members	BT – 22% AT – 50%	The best mode of influencing IWUA members is through rewards but the farmers responded that it was through punishing those who disregard the bylaws

Source: JICA Team

(4) Follow-up program

The follow up program for Unit 2 is yet to be undertaken.

3.2.5 Record Keeping & Financial Management (Unit 3)

(1) Implementation Schedule and participant information

Table 3.2.30 Records of Training Program in Unit 3

SCHEME	TRAINING	FOLLOW-UP
Mangudho	27-29/1/2015	
Shulakino	10-12/2/2015	
Kiamariga/Raya	27-29/1/2015	
Kaumbura	16-18/1/2015	
Challa Tuhire	20-22/1/2015	

Source: JICA Team

Table 3.2.31 Description of Unit 3 Training Program

SCHEME	Gender		RESOURCE PERSONS	VENUE FOR THE TRAINING
	Male	Female		
Mangudho	11	7	SCIO, SCA&MO, PMT Member Allan Abwoga	Baptist Church, Mangudho
Shulakino	8	9	SCIO, 2 Sub-county Agribusiness Officers, Narok North, Agribusiness Development Officer, Narok County	Nursery School, Siyapei
Kiamariga/Raya	16	7	SCIO, SCAO, SCA&MO	AIC Church, Raya
Kaumbura	17	7	SCIO, SCAO, SCSDO	EAPC Church, Muringa
Challa Tuhire	14	4	SCIO, SCAO, SCCO, PMT Member	Pentecostal Church, Kivukoni

Source: JICA Team

(2) Evaluation summary

Here-below are the results of the before and after evaluation result of Unit 3.

Overall, in all the schemes there is significant knowledge gain and on average the schemes gained 10% in knowledge. This demonstrates that the training was a success.

Table 3.2.32 Before& After Training Score of the Evaluation Questionnaires (Unit 3)

Scheme	Before Training	After Training	Difference
Mangudho	78%	79%	1%
Shulakino	58%	73%	15%
Kiamariga/Raya	50%	60%	10%
Kaumbura	57%	69%	12%
Challa Tuhire	56%	69%	13%
Average Score for all schemes	60%	70%	10%

Source: JICA Team

(3) Evaluation of Each Scheme

1) Mangudho

The average scores before and after the training was 78% and 79% respectively. This depicts a 1% slight gain in knowledge. The main reason for the slight gain in knowledge is attributed to the simplicity of the evaluation questionnaire which had many leading questions and easy multiple choices. This enabled the participants to answer most of the questions correctly even before the training. The questionnaire was also too short with just 10 questions. This evaluation cannot be therefore taken to reflect the true indication of the knowledge gain or loss.

Table 3.2.33 Results of Evaluation in Unit 3 Program in Mangudho Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	8	57%	8	62%
80-89%	2	14%	1	8%

70-79%	0	0%	2	15%
60-69%	1	7%	0	0%
Below 60%	3	21%	2	15%
Total Participants	14	100%	13	100%
Average Score		78%		79%

Source: JICA Team

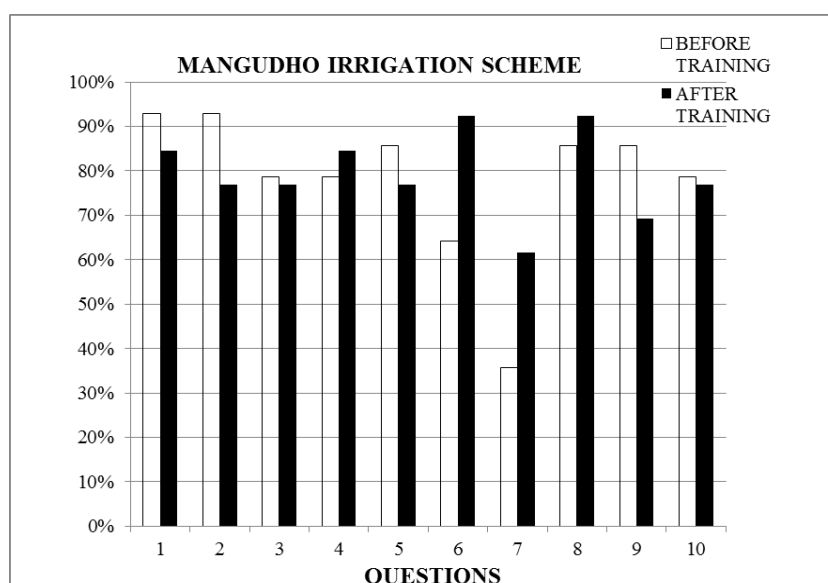


Figure 3.2.12 Result of Knowledge Evaluation in Mangudho Scheme

Source: JICA Team

Table 3.2.34 Evaluation per Question for Unit 3 Program in Mangudho Scheme

No	Content	Result	Reason for low score or reduction even after training
Q2	Do all phases of project implementation have a financial implication	BT – 93% AT – 77%	The low literacy levels of the participants may have contributed to the low score Lack of concentration by the trainees when answering the question may also be a contributor to the low score
Q5	Components of an IWUA financial management system	BT – 86% AT – 77%	The choices given demanded that one must have an understanding of all the components of a financial management system. It may not have been very clearly spelt out by the facilitator during the training
Q9	Common items that appear in an income statement	BT – 86% AT – 69%	The low literacy levels of the participants may have contributed to the low score after the training. However, the multiple choices also made it easy for one to identify the right answer
No	Content	Result	Reason for high score after training
Q6	What financial reporting entails	BT – 64% AT – 92%	The facilitator's training methodology may have contributed to the gain in knowledge
Q7	Why financial statements are prepared	BT – 36% AT – 62%	The facilitator's mode of training may have contributed to the gain in knowledge
No	Content	Result	Reason for high score even before the training

Q1	IWUA definition	BT – 93% AT – 85%	The multiple choices made it easy for one to identify the right answer even before the training
Q8	3 main financial reports that must be prepared by an IWUA	BT – 86% AT – 92%	The multiple choices made it easy for one to identify the right answer.

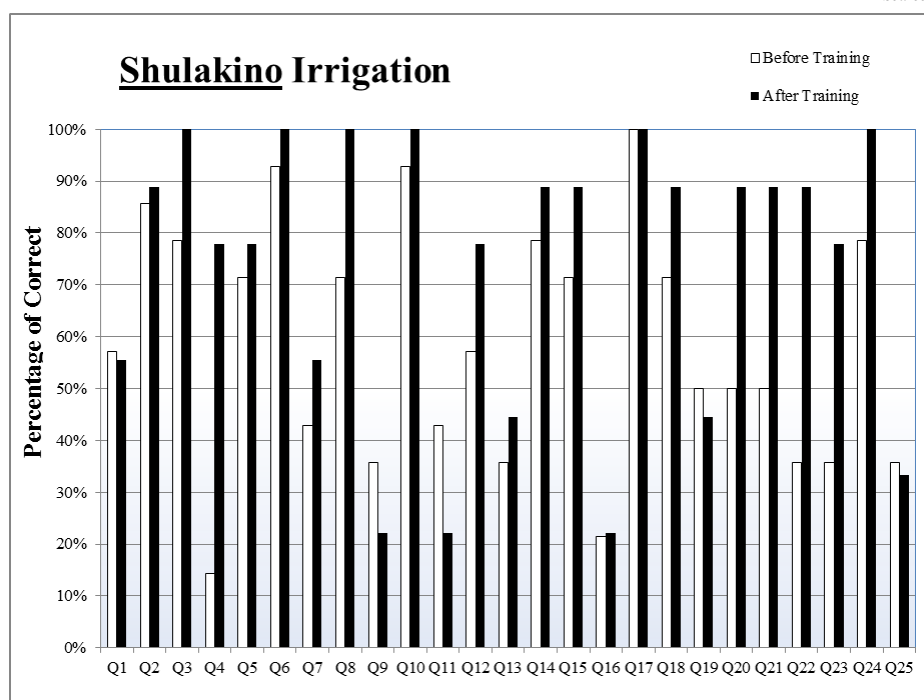
2)Shulakino

The average scores before and after the training was 58% and 73% respectively. This depicts a 15% gain in knowledge which is an indication that the training was effective and achieved the training objectives.

Table 3.2.35 Results of Evaluation in Unit 3 Program in Shulakino Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	0	0%
80-89%	1	75%	2	22%
70-79%	3	21%	5	56%
60-69%	4	29%	2	22%
Below 60%	6	43%	0	0%
Total Participants	14	100%	9	100%
Average Score		58%		73%

Source: JICA Team



Source: JICA Team

Figure 3.2.13 Result of Knowledge Evaluation in Shulakino Scheme

Table 3.2.36 Evaluation per Question for Unit 3 Program in Shulakino Scheme

No	Content	Result	Reason for low score or reduction even after training
Q1	Definition of book keeping	BT – 57% AT – 56%	The low literacy levels of the participants may have contributed to the low score. Meaning may also have been lost in the translation as most of the rest of the participants answered that it is arranging of IWUA records
Q9	Who is supposed to verify delivery of goods purchased and correct recording of the same	BT – 36% AT – 22%	Most participants indicated that the operations and maintenance subcommittee was mandated to inspect goods. However, the verification of delivery and proper recording is the work of the IWUA internal audit sub-committee. The main reason for the low score may be that the issue was not discussed during the training
Q13	Where all receipts involving income and expenses of the IWUA should be kept	BT – 36% AT – 44%	The meaning may have been lost in the translation. Most participants may have understood ‘kept’ to mean ‘recorded’
Q16	Phases of irrigation scheme development	BT – 21% AT – 22%	These phases have been trained on since Unit 1 and so it should not be hard for the participants to score low. The probability may be that this training had many trainees who had not attended the previous capacity building trainings at the scheme
Q19	Where all receipts pertaining to income and expenditure should be kept	BT – 50% AT – 44%	The meaning may have been lost in the translation. Most participants may have understood ‘kept’ to mean ‘recorded’
Q25	What IWUA members should do to sustain their project	BT – 36% AT – 33%	This question has been recurring in all the trainings with a hope that the farmers will understand the importance of paying for water towards scheme sustainability. Reason for low score may be due to the fact that most of the participants were may be those who had not attended previous trainings.
No	Content	Result	Reason for high score after training
Q3	Identifying an asset	BT – 79% AT – 100%	After the training and conducting exercises the farmers were able to identify assets from liabilities
Q4	Identifying a liability	BT – 14% AT – 78%	After the training the farmers gained knowledge of what a liability is. Group exercises may have contributed to this understanding
Q8	Importance of keeping financial records	BT – 71% AT – 100%	The farmers understood the importance of keeping financial records after the training. It was easy for one to identify the right answer if one understood that trained content
Q12	Components of IWUA financial management system	BT – 57% AT – 78%	Most participants were able to understand the 3 components of a financial management system after training thereby identifying the correct answer
Q20	Types of auditing	BT – 50% AT – 89%	The increase in score is attributed to the training
Q21	Person responsible for carrying out internal auditing	BT – 50% AT – 89%	The increase in score is attributed to the training
Q22	Period when	BT – 36%	The increase in score is attributed to the training

	financial auditing is done	AT – 89%	
Q23	Main financial reports that should be prepared by an IWUA	BT – 36% AT – 78%	The increase in score is attributed to the training
Q24	Person responsible to handle scheme O&M	BT – 79% AT – 100%	The farmers are aware that the scheme's operations and maintenance is their role. The training also contributed to the increase in the score
No	Content	Result	Reason for high score even before the training
Q2	Identifying financial records from others	BT – 86% AT – 89%	The multiple choices made it easy for one to identify the right answer. The translation of the question to their local language may have also contributed towards the high score
Q6	Who should have custody over the funds collected by the IWUA	BT – 93% AT – 100%	Most farmers were generally aware of the role of the treasurer as being the custodian of IWUA funds
Q10	Advantage of keeping financial records	BT – 93% AT – 100%	The multiple choices made it easy for one to identify the right answer.
Q17	Importance of maintaining financial records	BT – 100% AT – 100%	All the multiple choices were kept

3)Kiamariga/Raya

Source: JICA Team

The average scores before and after the training was 50% and 60% respectively. This depicts a 10% gain in knowledge which is an indication that the training was effective and achieved the training objectives.

Table 3.2.37 Results of Evaluation in Unit 3 Program in Kiamariga/Raya Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	1	4%
80-89%	0	0%	1	4%
70-79%	0	0%	5	22%
60-69%	2	12%	6	26%
Below 60%	12	88%	10	43%
Total Participants	16	100%	23	100%
Average Score		50%		60%

Source: JICA Team

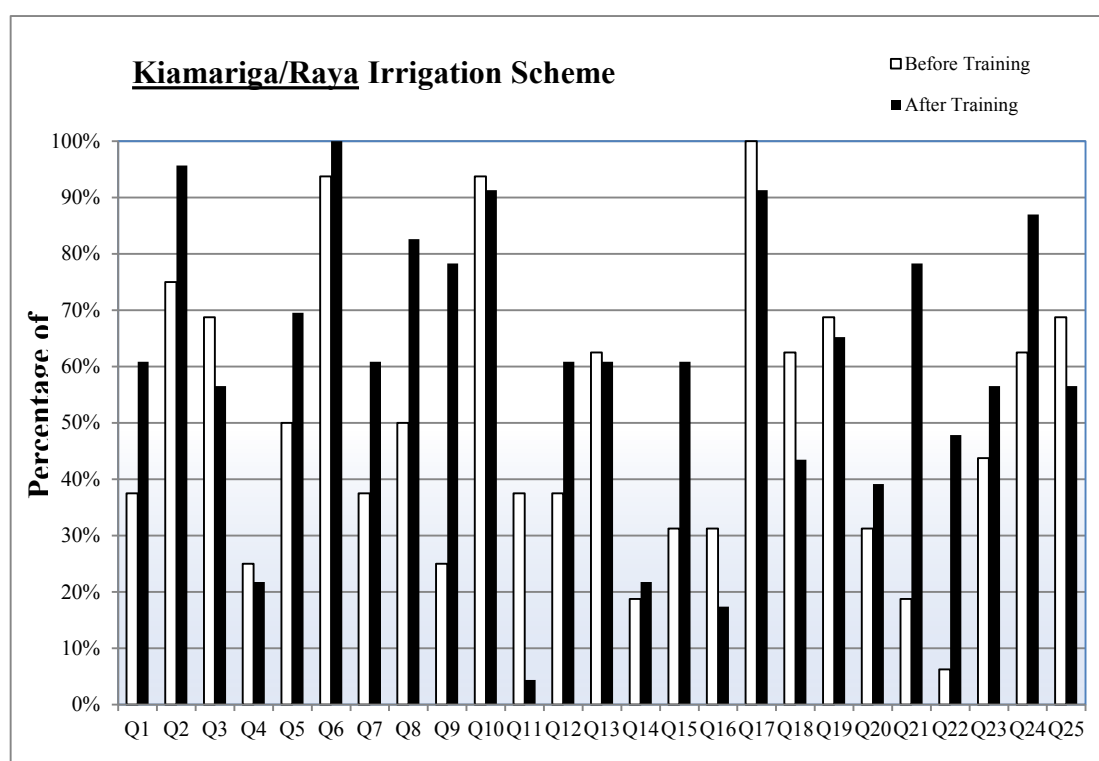
Figure 3.2.14 Result of Knowledge Evaluation in Kiमारिगा/राया Scheme Source: JICA Team

Table 3.2.38 Evaluation per Question for Unit 3 Program in Kiमारिगा/राया Scheme

No	Content	Result	Reason for low score or reduction even after training
Q4	Identifying liabilities from other assets	BT – 25% AT – 22%	The low literacy levels of the participants may have contributed The multiple choices were confusing
Q11	IWUA activities with financial implication	BT – 38% AT – 4%	The multiple choices were confusing and taking into consideration the low literacy levels of the participants it was not easy for them to identify the answer
Q14	The benefits of preparing a budget	BT – 19% AT – 22%	The multiple choices were very similar and it required one to understand the budget well to recognize the right answer
Q16	First phase of irrigation scheme development	BT – 31% AT – 17%	The farmers might have lost concentration when answering the question because this particular content area has been included in all the previous trainings in the scheme
Q18	Meaning of a cash book	BT – 63% AT – 43%	The meaning might have gotten lost in the question translation during post knowledge administration
Q20	Types of auditing	BT – 31% AT – 39%	The facilitator did not demonstrate much understanding on internal and external auditing and this translated in the poor score
Q22	When financial reporting is done	BT – 6% AT – 48%	After training farmers who understood the training content were able to understand that these are only prepared at the end of the accounting period
No	Content	Result	Reason for high score after training
Q1	Definition of book keeping	BT – 38% AT – 61%	After training the farmers were able to understand what book keeping is
Q2	IWUA financial	BT – 75%	The multiple choices made it easy for one to identify the correct

	record identification	AT – 96%	answer
Q5	Person responsible to record member monthly payments	BT – 50% AT – 70%	Most of the participants had indicated that the secretary was the one responsible to make these records but after the training it was clear that it was the role of the treasurer
Q7	How often financial recording should be done	BT – 38% AT – 61%	After the training the participants were able to understand the importance of updating financial records often
Q8	Importance of keeping financial records	BT – 50% AT – 83%	Before the training some farmers had indicated that the importance of keeping these records was to test the treasurer but after the training they understood that they are mainly kept as evidence of financial transactions
Q9	Person responsible to verify goods and records after purchase	BT – 25% AT – 78%	Most participants in pre-knowledge had indicated that the management committee was the one to verify delivery but after the training they understood the importance and role of audit sub-committee
Q12	Components of IWUA financial management system	BT – 38% AT – 61%	The participants after training gained knowledge on the 3 components of a financial management system
Q15	Definition of a financial budget	BT – 31% AT – 61%	After the training most farmers were able to understand the meaning and contents of a budget
Q21	Person responsible to conduct internal audit	BT – 19% AT – 78%	Before the training most farmers had indicated that the chairman was the one responsible to conduct internal auditing but after the training they appreciated the role of audit sub-committee in this
Q24	Person responsible to handle scheme O&M	BT – 63% AT – 87%	The farmers who had attended the previous trainings in the scheme were able to appreciate their role in handling scheme O&M. Those who did not know gained the knowledge during the training
No	Content	Result	Reason for high score even before the training
Q2	Identifying financial records from others	BT – 94% AT – 100%	The multiple choices made it easy for one to identify the right answer. The translation of the question to their local language may have also contributed towards the high score
Q10	Advantage of keeping financial records	BT – 94% AT – 91%	The multiple choices made it easy for one to identify the right answer.
Q17	Importance of financial records	BT – 100% AT – 91%	The multiple choices made it easy for one to identify the right answer

Source: JICA Team

4)Kaumbura

The average scores before and after the training was 57% and 69% respectively. This depicts a 12% gain in knowledge which is an indication that the training was effective and achieved the training objectives.

Table 3.2.39 Results of Evaluation in Unit 3 Program in Kaumbura Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	1	4%
80-89%	3	14%	6	24%

70-79%	1	5%	4	16%
60-69%	6	27%	8	32%
Below 60%	12	55%	6	24%
Total Participants	22	100%	25	100%
Average Score		57%		69%

Source: JICA Team

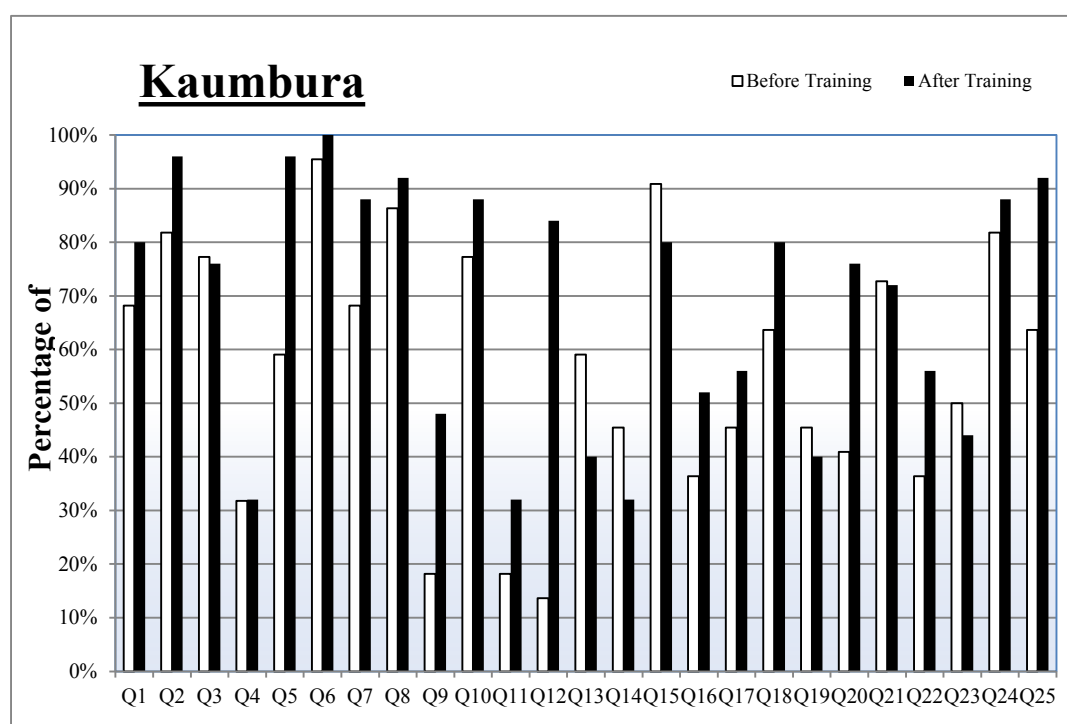


Figure 3.2.15 Result of Knowledge Evaluation in Kaumbura Scheme

Source: JICA Team

Table 3.2.40 Evaluation per Question for Unit 3 Program in Kaumbura Scheme

No	Content	Result	Reason for low score or reduction even after training
Q4	Identifying liabilities from other assets	BT – 32% AT – 32%	The low literacy levels of the participants may have contributor The multiple choices were confusing
Q9	The person in charge of verification of delivery of items and checking of records of those items	BT – 18% AT – 48%	Most of the farmers were confused as to who should verify stocks of purchase and documents and most answered it is the management committee. However after the training, there are those who understood that the Audit sub-committee was responsible for verification and vouching
Q11	IWUA activities with financial implication	BT – 18% AT – 32%	The multiple choices were confusing and taking into consideration the low literacy levels of the participants it was not easy for them to identify the answer
Q13	Where all receipts	BT – 59%	Most of the farmers might have gotten confused due to

	pertaining to income and expenses should be filed	AT – 40%	language used. They mostly answered that these are supposed to be recorded in the income and expense book instead of the financial records file
Q14	The benefits of preparing a budget	BT – 45% AT – 32%	The multiple choices were a bit difficult and this might have caused the drop in score.
Q19	Where all receipts pertaining to income and expenses should be kept	BT – 45% AT – 40%	The multiple choices were confusing and taking into consideration the low literacy levels of the participants it was not easy for them to identify the answer
Q23	Main financial reports that must be prepared by an IWUA	BT – 50% AT – 44%	Low literacy level is the reason why this score is low. Just a few farmers are able to understand there reports
No	Content	Result	Reason for high score after training
Q5	The person responsible to record all the monthly payments paid by IWUA members	BT – 59% AT – 96%	Most of the farmers before training had responded that the Secretary of the group was the one responsible for recording the collections but after the training they understood that the role of the treasurer
Q7	How often financial records should be recorded	BT – 68% AT – 88%	Most farmers before the training had not understood the need for the day to day recording of financial transactions. After the training it was made clear
Q9	Budget importance	BT – 18% AT – 48%	Most of the farmers did not understand the need for budgeting but after the training, for those who had the ability to understand, they were able to identify the correct answer
Q12	Components of an IWUA management system	BT – 14% AT – 84%	The farmers were not aware of the 3 components of a financial management system but after training most of them were able to identify them
Q18	Definition of a cash book	BT – 41% AT – 76%	Most of the farmers were able to understand what a cash book is after the training, differentiating it from the other books
Q20	Types of auditing	BT – 36% AT – 56%	The farmers who had the capacity to understand were able to identify the 2 types of auditing after the training. Low literacy level is the cause for the low percentage of farmers who got it right
Q22	When financial reporting should be done	BT – 64% AT – 92%	Most of the participants were not aware as to what financial reporting is and when it should be done but after the training the score improved greatly
Q25	The necessary input required in order to sustain the scheme	BT – 64% AT – 92%	Most farmers had responded that if they worked harder in their farms it would the scheme sustainable but after the training on the importance of money towards scheme sustainability the farmers were able to note the role of water fee in scheme sustainability
No	Content	Result	Reason for high score even before the training
Q2	Examples of Assets	BT – 82% AT – 96%	The multiple choices made it easy for one to identify the right answer. The translation of the question to their local language may have also contributed towards the high score
Q6	Who should have custody of the money collected by the IWUA	BT – 95% AT – 100%	Most farmers were generally aware of the role of the treasurer as being the custodian of IWUA funds
Q24	The person in charge of Operations and maintenance of the scheme	BT – 82% AT – 88%	Following the previous 2 trainings, Unit 1 & 2, most of the participants were now aware of their role towards scheme operations and maintenance

Source: JICA Team

5)Tuhire Challa

The average scores before and after the training was 56% and 69% respectively. This depicts a 13% gain in knowledge which is an indication that the training was effective and achieved the training objectives.

Table 3.2.41 Results of Evaluation in Unit 3 Program in Challa Tuhire Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	0	0%
80-89%	1	5%	6	29%
70-79%	4	19%	7	33%
60-69%	5	24%	3	14%
Below 60%	4	19%	5	24%
Total Participants	14	100%	25	100%
Average Score		56%		69%

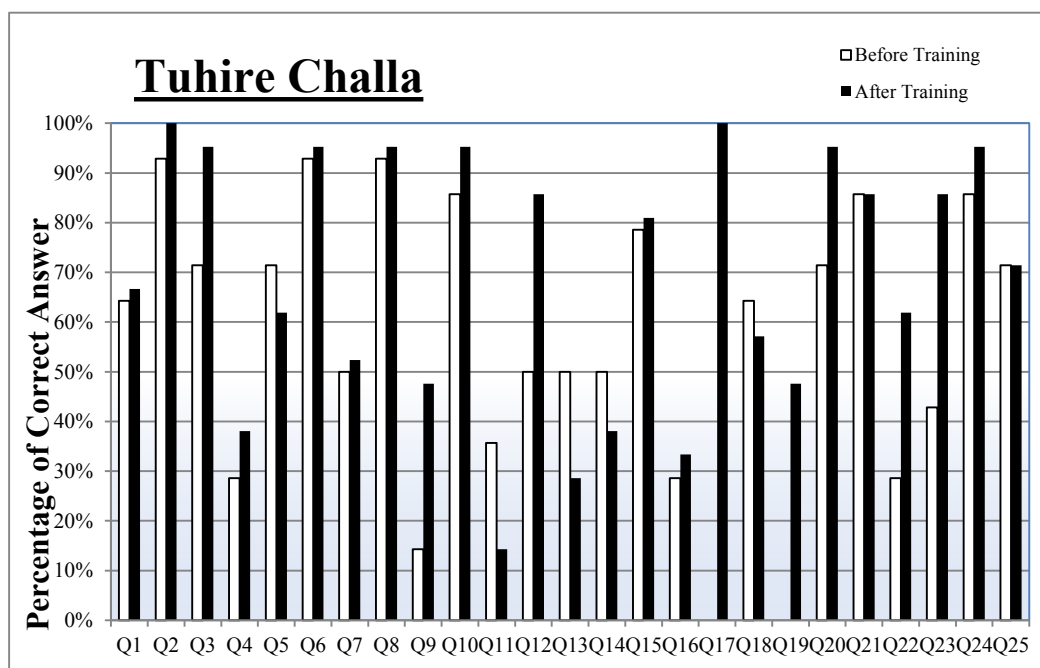


Figure 3.2.16 Result of Knowledge Evaluation in Challa Tuhire Scheme

Source: JICA Team

Table 3.2.42 Evaluation per Question for Unit 3 Program in Tuhire Challa Scheme

No	Content	Result	Reason for low score or reduction even after training
Q4	Identifying liabilities from other assets	BT – 29% AT – 38%	The low literacy levels of the participants may have contributed The multiple choices were confusing
Q7	How often financial transactions should be recorded	BT – 50% AT – 52%	Most participants thought that they should be recorded monthly. The multiple choices were confusing
Q9	The person in charge of verification of delivery of items and checking of records of those items	BT – 14% AT – 48%	Most of the farmers were confused as to who should verify stocks of purchase and documents and most answered it is the management committee. However after the training, there are those who understood that the Audit sub-committee was responsible for verification and vouching
Q11	IWUA activities with financial implication	BT – 36% AT – 14%	The multiple choices were confusing and taking into consideration the low literacy levels of the participants it was not easy for them to identify the answer
Q13	Where all receipts pertaining to income and expenses should be filed	BT – 50% AT – 29%	Language translation may have contributed to the low score. The question was asking about the receipts or supporting documents of expenditure but most confused that with income
Q14	The benefits of preparing a budget	BT – 50% AT – 38%	The multiple choices were a bit confusing and this might have caused the drop in score.
Q16	First phase of irrigation scheme development	BT – 29% AT – 33%	The farmers might have lost concentration when answering the question because this particular content area has been included in all the previous trainings in the scheme
No	Content	Result	Reason for high score after training
Q3	Identifying an asset	BT – 71% AT – 95%	After the training and conducting exercises the farmers were able to identify assets from liabilities
Q9	The person in charge of verification of delivery of items and checking of records of those items	BT – 14% AT – 48%	The few farmers who were a bit literate were able to understand the role of the audit sub-committee after the training and that is the reason for the great increase in the average score
Q12	Components of an IWUA management system	BT – 50% AT – 86%	The farmers were not aware of the 3 components of a financial management system but after training most of them were able to identify them
Q19	Where receipts that pertain to income and expenses should be kept	BT – 0% AT – 48%	All the participants answered the question wrongly in pre-training evaluation but after the training those who could read and write were able to know they should be kept in the IWUA office
Q20	Types of auditing	BT – 71% AT – 95%	The farmers who had the capacity to understand were able to identify the 2 types of auditing after the training. Low literacy level is the cause for the low percentage of farmers who got it right
Q22	When financial reporting should be done	BT – 29% AT – 62%	Most of the participants were not aware as to what financial reporting is and when it should be done but after the training the score improved greatly
Q25	The necessary input required in order to sustain the scheme	BT – 43% AT – 86%	Most farmers had responded that if they worked harder in their farms it would the scheme sustainable but after the training on the importance of money towards scheme sustainability the farmers were able to note the role of water fee in scheme sustainability

No	Content	Result	Reason for high score even before the training
Q2	Identifying financial records from others	BT – 93% AT – 100%	The multiple choices made it easy for one to identify the right answer. The translation of the question to their local language may have also contributed towards the high score
Q6	What is supposed to be done to the money collected at the end of the month	BT – 93% AT – 95%	Most farmers were generally aware of the role of the treasurer as being the custodian of IWUA funds
Q8	Importance of keeping financial records	BT – 93% AT – 95%	Most of the respondents were aware that we keep records as evidence of financial transactions
Q10	Advantage of keeping financial records	BT – 86% AT – 95%	The multiple choices made it easy for one to identify the right answer.
Q21	Who is responsible for conducting internal audit in a scheme	BT – 86% AT – 86%	The multiple choices were leading as the farmers connected audit with audit sub-committee
Q24	The person in charge of operations and maintenance of the scheme	BT – 86% AT – 95%	Following the previous 2 trainings, Unit 1 & 2, most of the participants were now aware of their role towards scheme operations and maintenance

Source: JICA Team

(4) Follow-up program

The follow-up program for Unit 3 training is yet to be undertaken

3.2.6 On farm Water Management and Practical Irrigated Agriculture

(1) Implementation Schedule and participant information

Table 3.2.43 Records of Training Program in Unit 4

SCHEME	PRE-TRAINING	TRAINING	FOLLOW-UP
Mangudho	3/31 – 4/01/ 2015	5/25-28/2015	
Shulakino	4/13-14/2015	6/15-18/2015	
Kiamariga/Raya	4/16-17/2015	6/8-11/2015	
Kaumbura	4/28-29/2015	6/15-18/2015	
Challa Tuhire	5/5-6/2015	6/8-11/2015	

Source: JICA Team

Table 3.2.44 Description of Unit 4 Training Program

SCHEME	PARTICIPANTS		RESOURCE PERSONS	VENUE FOR THE TRAINING
	Male	Female		
Mangudho			PMT, SCAO, SCIO, SCCDO, HAE	Mangudho Church
Shulakino			SCIO, SCADO, SCAO, SCCDO, PMT	Nursery school in Siyiapei
Kiamariga/Raya			PMT, SCADO, SCIO, WAO	AIC church in Raya
Kaumbura			SCIO, SCADO, SCAEO, SCCDO	AIC church in Lakathi

Challa Tuhire		SCAO, SCIO, Crops Officer, SCAEO, HEO, PMT	Kivukoni Pentecostal Church
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(2) Evaluation summary

Here-below are the results of the before and after evaluation result of Unit 4.

Overall, in all the schemes there is significant knowledge gain and on average the schemes gained 4.4% in knowledge. This demonstrates that the training was a success.

Table 3.2.45 Before & After Training Score of the Evaluation Questionnaires (Unit 4)

Scheme	Before Training	After Training	Difference
Mangudho	73%	65%	(-8%)
Shulakino	56%	65%	(+9%)
Kiamariga/Raya	64%	60%	(-4%)
Kaumbura	53%	64%	(11%)
Challa Tuhire	64%	78%	(14%)
Average Score for all schemes	62%	66.4%	(+4.4%)

Source: JICA Team

(3) Evaluation of Each Scheme

1) Mangudho

The average scores before and after the training was 73% and 65% respectively. This depicts an 8% loss in knowledge. This loss is attributed to lack of consistency among members who attended the training. It may also be attributed to the fact that the post-knowledge questionnaire was administered in a field set up which lowers the concentration of the farmers.

Table 3.2.46 Results of Evaluation in Unit 4 Program in Mangudho Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	1	8%
80-89%	6	46%	2	15%
70-79%	4	31%	4	31%
60-69%	1	8%	1	8%
Below 60%	2	15%	5	38%
Total Participants	13		13	
Average Score		73%		65%

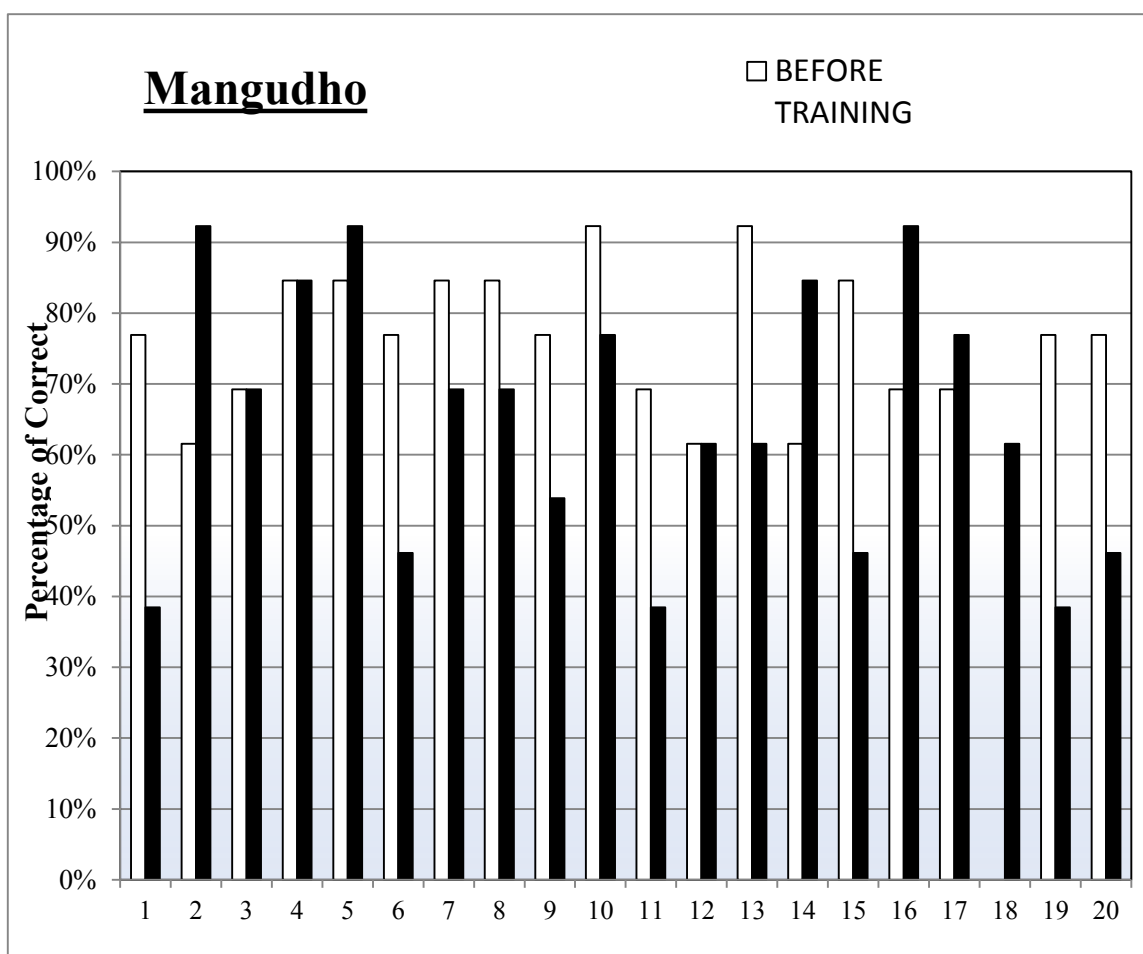


Figure 3.2.17 Result of Knowledge Evaluation in Mangudho Scheme

Table 3.2.47 Evaluation per Question for Unit 3 Program in Mangudho Scheme

No	Content	Result	Reason for low score or reduction even after training
Q1	Major point of concern for sandy soil	BT – 77% AT – 38%	<ul style="list-style-type: none"> – Majority of the participants got it right before training that there is no major concern as regards to drainage for sandy soils. – This is a bit tricky as others could rightly have thought that it is a major concern as you will require to add more water to compensate for water loss due to drainage.
Q6	Irrigation is required when following conditions exist EXCEPT	BT – 77% AT – 46%	<ul style="list-style-type: none"> – As majority got it right before training, participants must have gotten confused that there is no need for irrigation when crop is mature.
Q11	Meaning of crop rotation	BT – 69% AT – 38%	<ul style="list-style-type: none"> – Participants may have gotten confused by the many terminologies during the training or by the translation of the question.
Q13	When to undertake crop selection to be a successful commercial farmer	BT – 92% AT – 62%	<ul style="list-style-type: none"> – Same as above.

Q15	When is Hardening off done in nursery Management	BT – 85% AT – 46%	– Same as above.
Q19	How do we avoid post-harvest losses	BT – 77% AT – 38%	– There was a significant reduction in score which again indicates confusion or lack of understanding during training; – Participants appear not to have grasped that there is need to always adhere to Good Agricultural Practices to avoid post-harvest losses.
Q20	Reasons for value addition in agricultural produce	BT – 77% AT – 46%	– Participants may have gotten confused during the training or by the translation of the question. – There could have been some substitution of participants during the pre and post knowledge evaluation.
			Reason for high score even after training
Q4	In-order to grow in field, crops need the following except.	BT – 85% AT – 85%	– This indicates prior knowledge perhaps as imparted in primary biology class – The zero improvement in the score here is rather surprising.
Q5	What happens to roots as irrigated crop grows bigger	BT – 85% AT – 92%	– Rather a common sense question signifying and a bit of prior biology knowledge and an expected consequent improvement after training
			Reason for significant increase in the score
Q16	It is a good practice to always apply fertilizer for healthy plant growth	BT – 69% AT – 92%	– There was a significant increase in the understanding of the GAP topic after the training indicating room for more improvement in crop production in future
Q18	Understanding of timing PHI and when to use produce after spraying	BT – 0% AT – 62%	– There was total ignorance of the understanding of PHI before training but after the training there was a significant increase in the score attributed to understanding of the topic.

2)Shulakino

The average scores before and after the training was 56% and 65% respectively. This depicts a 9% gain in knowledge which is an indication that the training was effective and achieved the training objectives.

Table 3.2.48 Results of Evaluation in Unit 4 Program in Shulakino Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	0	0%
80-89%	1	7%	3	27%
70-79%	1	7%	2	18%
60-69%	4	29%	0	0%
Below 60%	8	57%	6	55%
Total Participants	14		11	
Average Score		56%		65%

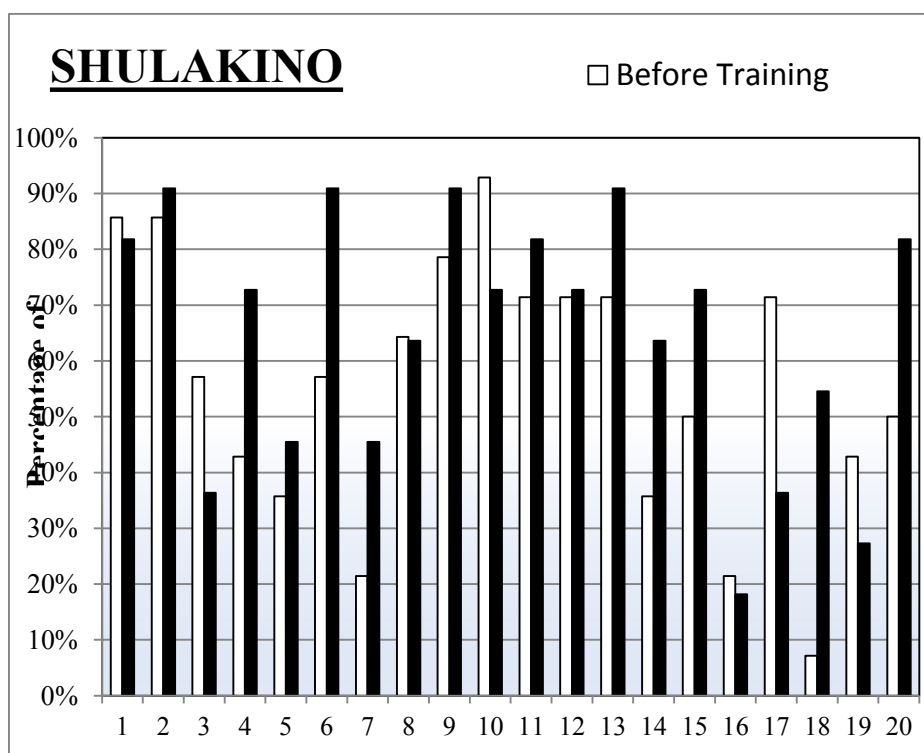


Figure 3.2.18 Result of Knowledge Evaluation in Shulakino Scheme

Table 3.2.49 Evaluation per Question for Unit 4 Program in Shulakino Scheme

No	Content	Result		Reason for low score or reduction even after training
		BT	AT	
Q5	Factor which does not influence Crop Water Requirement	BT	36%	<ul style="list-style-type: none"> Majority got it wrong before and although there was an increase the score still remained low after training. This call for a total recap of the topic in future training
		AT	45%	
Q7	Water application method best suited for a farm with very gentle slope	BT	21%	Same as above
		AT	45%	
Q16	How to use and store agrochemicals	BT	21%	Same as above
		AT	18%	
		AT	55%	
Q19	Understanding of Pre-harvest Interval	BT	43%	<ul style="list-style-type: none"> Majority got it wrong before and there was a decrease the score even after training. This calls for a total recap of the topic in future training to ensure that the topic is properly understood
		AT	27%	
Q10	Meaning of crop rotation	BT	93%	<ul style="list-style-type: none"> There was a reduction of score after training indicating a slight misunderstanding on what is crop rotation. This calls for re-emphasis on the topic in future training to ensure that the topic is understood properly.
		AT	73%	
Q17	Why is soil sampling	BT	71%	There was a reduction of score after training

	important	AT	36%	indicating a slight misunderstanding on what is crop rotation. – This calls for a total recap of the topic in future training to ensure that the topic is properly understood
Q3	Definition of Crop Water Requirement	BT	57%	– Same as above
		AT	36%	
				Reason for High Score Before and After training
Q1	Best time to irrigation during plant growth	BT	86%	– Participants seem to have had some prior knowledge of the topic and although this the score reduced slightly after the training it still remain high.
		AT	82%	
Q2	Best soil texture for growing major vegetables	BT	86%	– Participants seem to have had some prior knowledge of the topic and the score increased slightly after the training. – This indicates good understanding of the topic before and after the training
		AT	91%	
Q9	Main disadvantage of basin irrigation	BT	79%	– Same as above
		AT	91%	
				–
Q4	Crop growth stage when least amount of water is required	BT	43%	– There was a significant increase in the score after training – This show high degree of understanding
		AT	73%	
Q6	Reason for preference of furrow irrigation over basin irrigation	BT	57%	– Same as above
		AT	91%	
				Reason for High Score after the Training
Q13	Wetness in nursery management	BT	71%	– Same as above
		AT	91%	
Q14	When is hardening-off done in nursery management	BT	36%	– Same as above
		AT	64%	
Q15	Siting of a good seedling nursery	BT	50%	– Same as above
		AT	73%	
Q18	What is involved in Integrated Pest Management	BT	7%	– There was a significant increase but the score still remained low after training. – This call for a total recap of the topic in future training
		AT	55%	
Q20	Which one is a good reason for agro-processing	BT	50%	– There was a significant increase in the score after training – This show high degree of understanding
		AT	82%	

3)Kiamariga/Raya

The average scores before and after the training was 64% and 60% respectively. This depicts a 4% loss in knowledge which is an indication that the training was effective and achieved the training objectives.

Table 3.2.50 Results of Evaluation in Unit 4 Program in Kiamariga/Raya Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	2	11%	0	0%
80-89%	0	0%	2	13%
70-79%	6	33%	4	25%
60-69%	4	22%	4	25%
Below 60%	6	33%	6	38%
Total Participants	18		16	
Average Score		64%		60%

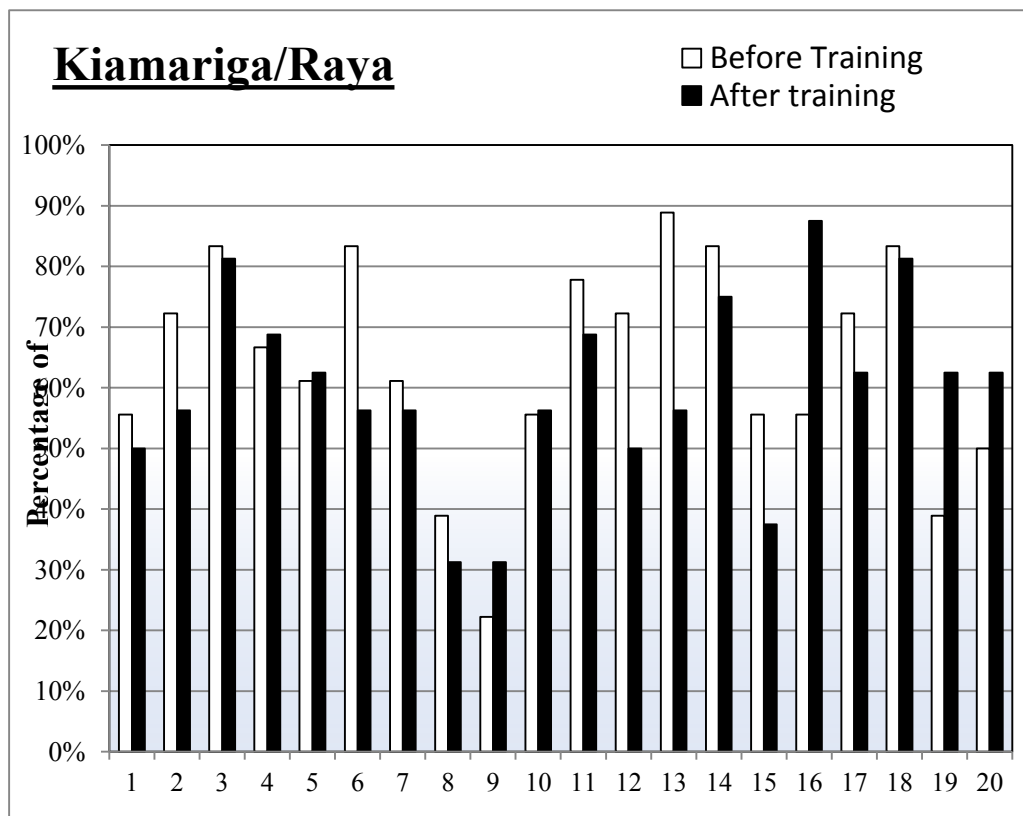


Figure 3.2.19 Result of Knowledge Evaluation in Kiamariga/Raya Scheme

Table 3.2.51 Evaluation per Question for Unit 4 Program in Kiamariga/Raya Scheme

No	Content	Result	Reason for low score or reduction even after training
Q8	Where is basin irrigation required?	BT39%	<ul style="list-style-type: none"> Low and reduction of score after training indicates serious misunderstanding of the topic This indicates that there is need for emphasis on the topic future
		AT31%	
Q9	Where is cropping calendar?	BT22%	<ul style="list-style-type: none"> A slight increase in score remains low even after training. Thus there is need for emphasis on the topic in future training
		AT31%	
Q2	Best soil texture to grow major vegetables	BT72%	<ul style="list-style-type: none"> There was a substantial reduction in the score after training. This indicates that there is need for emphasis on the topic in future training
		AT56%	
Q6	Description of an	BT83%	<ul style="list-style-type: none"> There was a significant reduction in the score after training.

	irrigation system	AT56%	– This indicates that there is need for a recap and extra emphasis on the topic in future training
Q11	When is crop selection	BT78%	– Same as Q2 above
		AT69%	
Q12	Important factor in preparing crop planting calendar	BT72%	– Same as Q2 and Q11 above
		AT50%	
Q13	Wetness during nursery management?	BT89%	– Same as Q6 above
		AT56%	
Q15	Hardening off in Nursery Management	BT56%	– Same as Q2, Q11 and Q12above
		AT38%	
Q17	How to use and store agrochemicals	BT72%	– Same as Q1
		AT63%	
			Reason for high score even after training
Q3	Element /factor NOT required for plant growth in the field	BT83%	– The was a reduction but the score still remained high – This indicates that there is high level of understanding but the drop in score need to be rectified through a recap of the topic in future training
		AT81%	
Q14	Advantage of raising seedlings in a nursery	BT83%	– Same as above
		AT75%	
Q18	Importance of sampling and testing before growing crops	BT83%	– Same as above
		AT81%	
			Reason for Significant increase in score after training
Q16	Siting of a good seedling nursery	BT56%	– There was a significant increase in the score after training – This indicates a high level of understanding of the topic after training. There is however room for improvement to maintain the high score
		AT88%	
Q19	Understanding of PHI	BT39%	– The significant increase of the score – This indicates a high level of understanding of the topic after training. – There is however room for improvement on the score since it is just above the halfway mark.
		AT63%	

4)Kaumbura

The average performance for the participants before and after the training was 53% and 64% respectively. This depicts an 11% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 3.2.52 Results of Evaluation in Unit 4 Program in Kaumbura Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	3	13%
80-89%	1	4%	4	17%
70-79%	7	29%	6	25%
60-69%	4	17%	1	4%
Below 60%	12	50%	10	42%
Total Participants	24		24	
Average Score		53%		64%

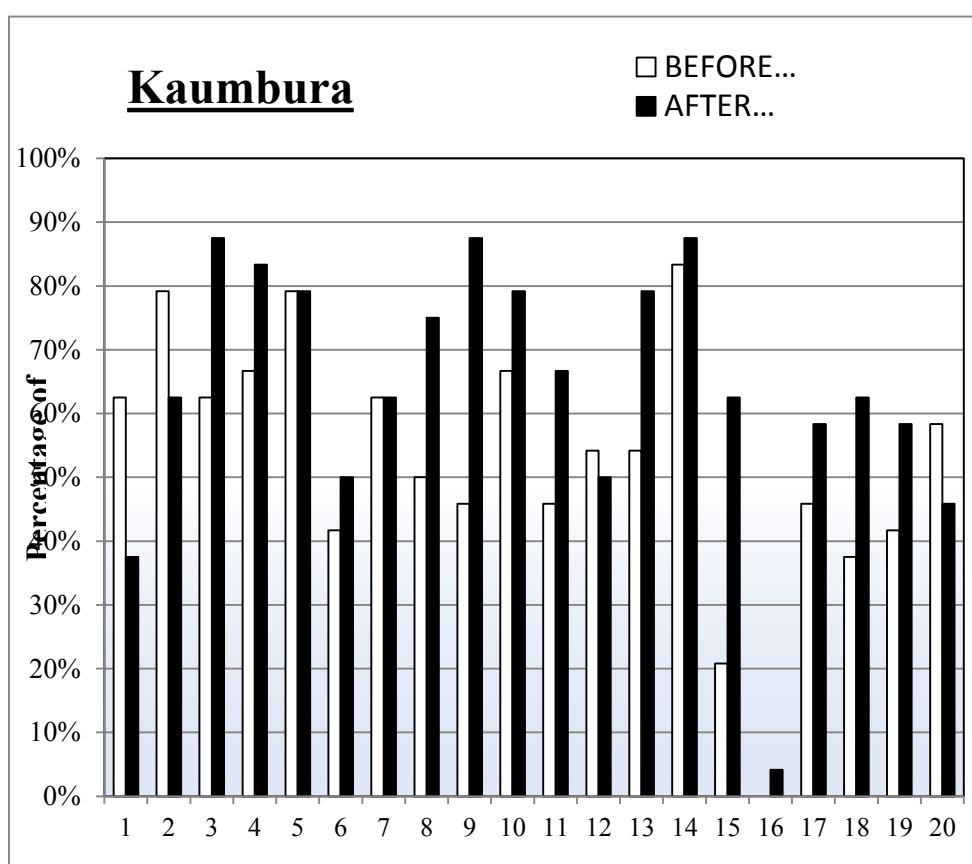


Figure 3.2.20 Result of Knowledge Evaluation in Kaumbura Scheme

Table 3.2.53 Evaluation per Question for Unit 4 Program in Kaumbura Scheme

No	Content	Result	Reason for low score or reduction even after training
Q1	Which factor is not of major concern for sandy soil?	BT-63%	<ul style="list-style-type: none"> - There was a significant reduction in score after training - This indicates that there is need for a recap and extra emphasis on the topic in future training
		AT-38%	
Q2	Best soil texture to grow major vegetables	BT-79%	<ul style="list-style-type: none"> - There was a slight reduction in score after training - This indicates that there is need for a recap on the topic in future training
		AT-63%	

Q6	Condition when irrigation is not required	BT- 42%	<ul style="list-style-type: none"> - There was a slight increase in score which still remains low even after training - This indicates that there is need for a recap on the topic in future training
		AT- 50%	
Q16	Is it good husbandry practice to always apply fertilizer	BT- 0%	<ul style="list-style-type: none"> - There was nil understanding of the topic before training, with a negligible increase in score after training. - This calls for a serious review and emphasis of this topic in future training.
		AT- 4%	
Q20	Best reason for carrying out value addition to agricultural produce	BT-58%	<ul style="list-style-type: none"> - Same as Q2 above
		AT-46%	
			Reason for high score even after training
Q5	Effect on the roots as the plant grows bigger	BT- 79%	<ul style="list-style-type: none"> - The score remained high even after the training - This indicates a high level of understanding of the topic after training but there is room for improvement
		AT - 79%	
Q14	Wetness in nursery management	BT- 83%	<ul style="list-style-type: none"> - Good knowledge of the topic before and after training - This indicates a high level of understanding of the topic after training
		AT-8 8%	
			Reason for Significant increase in score after training
Q3	Best soil texture to grow major vegetables	BT- 63%	<ul style="list-style-type: none"> - There was a significant increase in the score after training - This indicates a high level of understanding of the topic after training.
		AT- 88%	
Q8	What is gravity fed system?	BT- 50%	<ul style="list-style-type: none"> - There was a significant increase in the score after training - This indicates a high level of understanding of the topic after training but there is room for improvement
		AT-75%	
Q9	Where is Basin irrigation preferred?	BT-46%	<ul style="list-style-type: none"> - Same as above
		AT-88%	
Q13	What must be done before carrying out a crop selection	BT-54%	<ul style="list-style-type: none"> - Same as above
		AT-79%	
Q15	When is hardening off done in nursery management?	BT-21%	<ul style="list-style-type: none"> - Same as above
		AT-63%	
Q18	Understanding of PHI	BT-38%	<ul style="list-style-type: none"> - Same as above
		AT-63%	
Q19	What should be done to avoid post-harvest losses	BT-42%	<ul style="list-style-type: none"> - Same as above
		AT-58%	

5)Tuhire Challa

The average performance for the participants before and after the training was 64% and 78% respectively. This depicts an 14% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 3.2.54 Results of Evaluation in Unit 4 Program in Tuhire Challa Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	3	20%
80-89%	2	22%	6	40%
70-79%	3	33%	3	20%
60-69%	1	11%	1	7%
Below 60%	3	33%	2	13%
Total Participants	9		15	
Average Score		64%		78%

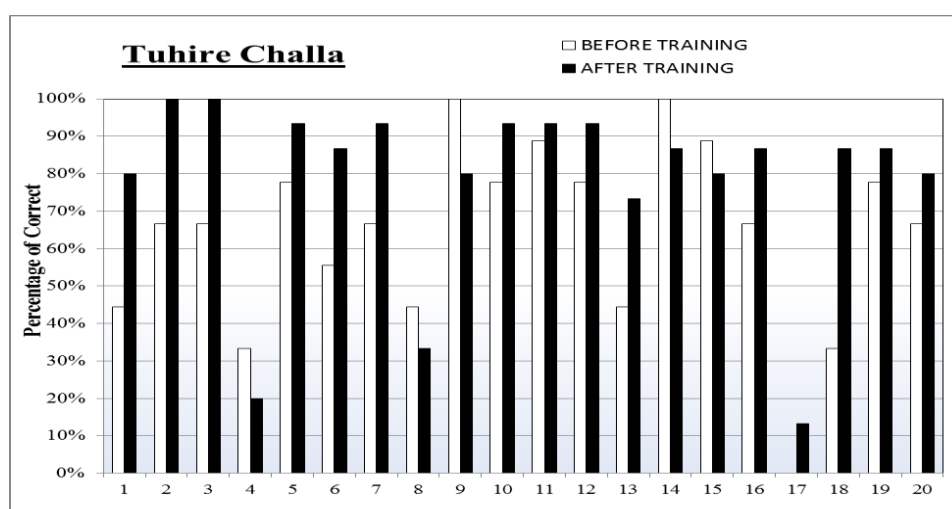


Figure 3.2.21 Result of Knowledge Evaluation in Challa Tuhire Scheme

Table 3.2.55 Evaluation per Question for Unit 4 Program in Tuhire Challa Scheme

No	Content	Result	Reason for low score or reduction even after training
Q4	Soil type with the smallest soil particles	BT – 33% AT – 20%	– Low score. A big number wrongly thought that silt has smallest soil particles than clay soil. This should be clarified further in future training engagement.
Q8	Effects of Over and under irrigation	BT – 44% AT – 33%	– The fact that over irrigation enhances soil salinity was not very clear and need to be re-emphasized in future training.
Q17	Methods of Value addition	BT – 0% AT – 13%	– There was nil understanding before training and a very low score was attained after training – This signifies that there is need for session clarification and emphasis of the topic in future training engagements.
No	Content	Result	Reason for significant increase in the score after training
Q1	Soil level (Top, subsoil, parent aggregate) has higher fertility level for plant growth	BT – 44% AT – 80%	– There was a significant increase in the score. This indicates a high level of understanding by the participants

Q2	Soil level (Top, subsoil, parent aggregate) with highest water holding capacity	BT – 67% AT – 100%	– Total improvement all understood the topic fully which indicates possible prior knowledge in irrigation and a high level of understanding by the participants
Q3	Soil texture identification	BT – 67% AT – 100%	– Total improvement all understood the topic fully which indicates a high level of understanding by the participants
Q6	Exemption important criteria/factors for consideration during crop selection	BT – 56% AT – 87%	– There was a significant increase in the score. This indicates a prior knowledge and high level of understanding by the participants
Q7	Conditions which are Not important in crop rotation	BT – 67% AT – 93%	– Same as above
Q13	What to consider when choosing a site for Nursery establishment	BT – 44% AT – 73%	– Same as above
Q18	What is not required in preparation of Tomato jam	BT – 33% AT – 87%	– Same as above
No	Content	Result	Reason for high score even after training
Q5	Cropping calendar	BT – 78% AT – 93%	– There was a high score before and after training. This indicates a prior knowledge of the topic and a level of understanding by amongst scheme members
Q9	Cause of fungal disease	BT – 100% AT – 80%	– Score remained high after the training but there was a drop in score which may be due to an intense exposure to the number of crop diseases covered during the training.
Q10	What can reduce soil salinity	BT – 78% AT – 93%	– Same as Q5 above
Q11	Plant nutrients	BT – 89% AT – 93%	– Same as Q5 above
Q12	What is a Nursery?	BT – 78% AT – 93%	– Score remained high after the training but there was a substantial improvement indicating the high level of understanding and prior knowledge of the topic.
Q14	What is Not important in land preparation	BT – 100% AT – 87%	– Score remained high after the training. This indicates prior knowledge and high level of understanding. – The drop in score signifies the need clarification in future
Q15	When hardening off is done in Nursery management	BT – 89% AT – 80%	– Same as above
Q16	Solution to reduce post-harvest loses	BT – 67% AT – 87%	– Score remained high after the training but there was a slight improvement.
Q19	Root growth in relation to vegetative plant	BT – 78% AT – 87%	– Score remained high after the training but there was some improvement.
Q20	What is Gravity fed Irrigation fed Scheme	BT – 67% AT – 80%	– Same as above

3.2.7 Irrigation System Management (Unit 5)

(1) Implementation Schedule and participant information

Table 3.2.56 Records of Training Program in Unit 5

SCHEME	PRE-TRAINING	TRAINING	FOLLOW-UP
Mangudho	3/31 – 4/01/ 2015	11/10-13/2015	
Shulakino	4/13-14/2015	11/3-6/2015	
Kiamariga/Raya	4/16-17/2015	10/6-9/2015	
Kaumbura	4/28-29/2015	10/13-16/2015	
Challa Tuhire	5/5-6/2015	9/15-18/2015	

Source: JICA Team

Table 3.2.57 Description of Unit 5 Training Program

SCHEME	PARTICIPANTS		RESOURCE PERSONS	VENUE FOR THE TRAINING
	Male	Female		
Mangudho	5	25	PMT, SCIO, SCAO	Mangudho Church
Shulakino	5	12	PMT, SCIO, SCAO, HAE	Nursery school in Siyiapei
Kiamariga/Raya	13	5	PMT, SCIO, SCAO	AIC church in Raya
Kaumbura	18	7	PMT, SCIO, SCAO	RGC church in Lakathi
Challa Tuhire	20	8	PMT, SCIO, SCAO	Kivukoni Primary School

(2) Evaluation summary

Here-below are the results of the before and after evaluation result of Unit 5.

Overall, in all the schemes there is significant knowledge gain and on average the schemes gained 5% in knowledge. This demonstrates that the training was a success.

Table 3.2.58 Before & After Training Score of the Evaluation Questionnaires (Unit 5)

Scheme	Before Training	After Training	Difference
Mangudho	77%	73%	(-4%)
Shulakino	61%	73%	(+12%)
Kiamariga/Raya	64%	66%	(+2%)
Kaumbura	62%	70%	(+8%)
Challa Tuhire	72%	79%	(+7%)
Average Score for all schemes	67.2%	72.2%	(+5%)

Source: JICA Team

(3) Evaluation of Each Scheme

1) Mangudho

The average scores before and after the training was 77% and 73% respectively. This depicts a 4% loss in knowledge. This loss is attributed to lack of consistency among members who attended the training. It may also be attributed to the fact that the post-knowledge questionnaire was administered in a field set up which lowers the concentration of the farmers.

Table 3.2.59 Results of Evaluation in Unit 5 Program in Mangudho Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	2	15%	3	21%
80-89%	3	23%	4	29%
70-79%	6	46%	2	14%
60-69%	2	15%	2	14%
Below 60%	0	0%	3	21%
Total Participants	13		14	
Average Score		77%		73%

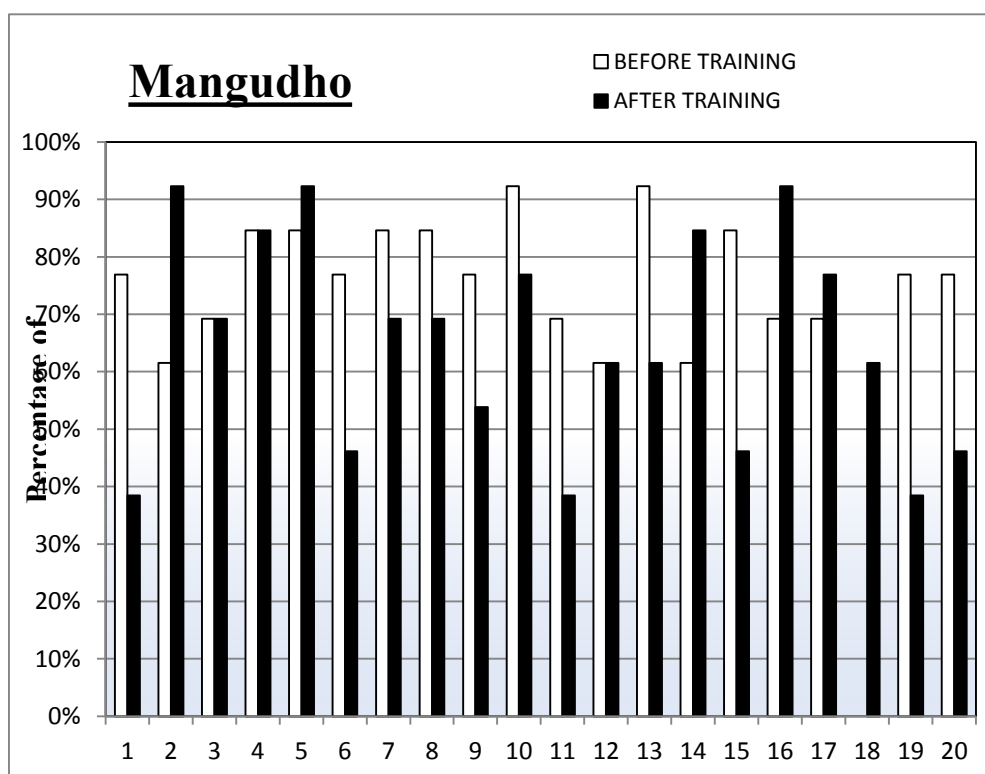


Figure 3.2.22 Result of Knowledge Evaluation in Mangudho Scheme

Table 3.2.60 Evaluation per Question for Unit 5 Program in Mangudho Scheme

No	Content	Result	Reason for low score or reduction even after training
Q1	Major point of concern for sandy soil	BT – 77% AT – 38%	<ul style="list-style-type: none"> Majority of the participants got it right before training that there is no major concern as regards to drainage for sandy soils. This is a bit tricky as others could rightly have thought that it is a major concern as you will require add more water to compensate for water loss due to drainage.
Q6	Irrigation is required when following conditions exist EXCEPT	BT – 77% AT – 46%	<ul style="list-style-type: none"> As majority got it right before training, participants must have gotten confused that there is no need for irrigation when crop is mature.
Q11	Meaning of crop rotation	BT – 69% AT – 38%	<ul style="list-style-type: none"> Participants may have gotten confused by the many terminologies during the training or by the translation of the question.
Q13	When to undertake crop selection to be a successful commercial farmer	BT – 92% AT – 62%	<ul style="list-style-type: none"> Same as above.
Q15	When is Hardening off done in nursery Management	BT – 85% AT – 46%	<ul style="list-style-type: none"> Same as above.
Q19	How do we avoid post-harvest losses	BT – 77% AT – 38%	<ul style="list-style-type: none"> There was a significant reduction in score which again indicates confusion or lack of understanding during training; Participants appear not to have grasped that there is need to always adhere to Good Agricultural Practices to avoid post-harvest losses.
Q20	Reasons for value addition in agricultural produce	BT – 77% AT – 46%	<ul style="list-style-type: none"> Participants may have gotten confused during the training or by the translation of the question. There could have been some substitution of participants during the pre and post knowledge evaluation.
			Reason for high score even after training
Q4	In-order to grow in field, crops need the following except.	BT – 85% AT – 85%	<ul style="list-style-type: none"> This indicates prior knowledge perhaps as imparted in primary biology class The zero improvement in the score here is rather surprising.
Q5	What happens to roots as irrigated crop grows bigger	BT – 85% AT – 92%	<ul style="list-style-type: none"> Rather a common sense question signifying and a bit of prior biology knowledge and an expected consequent improvement after training
			Reason for significant increase in the score
Q16	It is a good practice to always apply fertilizer for healthy plant growth	BT – 69% AT – 92%	<ul style="list-style-type: none"> There was a significant increase in the understanding of the GAP topic after the training indicating room for more improvement in crop production in future
Q18	Understanding of timing PHI and when to use produce after spraying	BT – 0% AT – 62%	<ul style="list-style-type: none"> There was total ignorance of the understanding of PHI before training but after the training there was a significant increase in the score attributed to understanding of the topic.

2)Shulakino

The average scores before and after the training was 61% and 73% respectively. This depicts a 12% gain in knowledge which is an indication that the training was effective and achieved the training objectives.

Table 3.2.61 Results of Evaluation in Unit 5 Program in Shulakino Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	2	11%	2	11%
80-89%	4	21%	9	50%
70-79%	4	21%	3	17%
60-69%	1	5%	1	6%
Below 60%	8	42%	3	17%
Total Participants	19		18	
Average Score		61%		73%

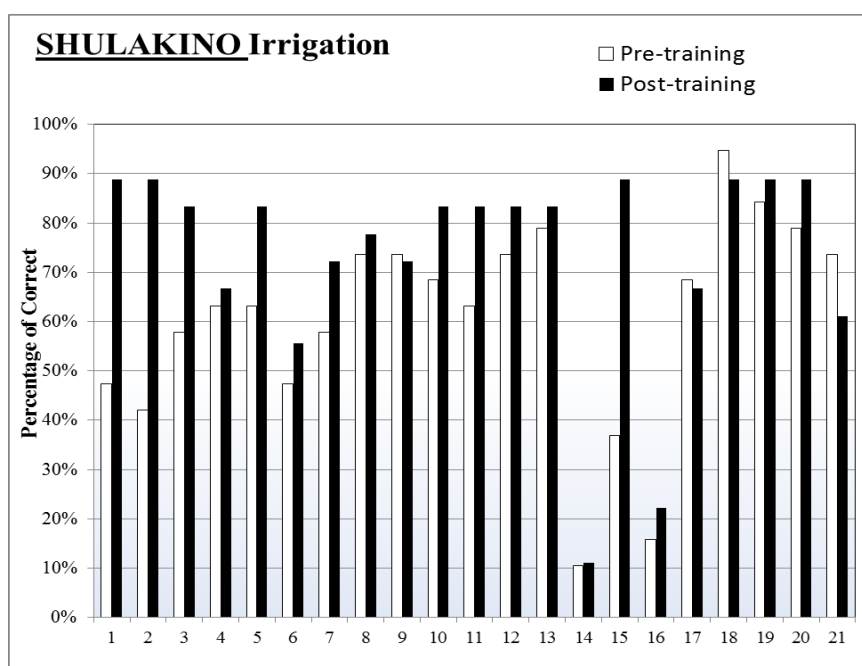


Figure 3.2.23 Result of Knowledge Evaluation in Shulakino Scheme

Table 3.2.62 Evaluation per Question for Unit 5 Program in Shulakino Scheme

No	Content	Result	Reason for significant INCREASE in the score
Q1	Components of an irrigation system	BT – 47% AT – 89%	– The increase in the score is attributed to the training on the various components that are included in the scheme design
Q2	Results of proper maintenance of an irrigation system	BT – 42% AT – 89%	– The increase in score is attributed to the training on the importance of proper maintenance of an irrigation scheme
Q3	What the IWUA should give particular attention	BT – 53% AT – 83%	– The increase in score is attributed to the farmers appreciating the importance of O&M

	for proper functioning of an irrigation system		
Q5	The greatest function of the O&M sub-committee	BT – 63% AT – 83%	– The high score is attributed to the training on the proper organizational structure for O&M
Q15	Meaning of O&M fee	BT – 37% AT – 89%	– The high score is attributed to the question being too simple or leading
No	Content	Result	Reason for LOW score or REDUCTION even after training
Q6	What is required by an IWUA when preparing a water distribution plan for the following season	BT – 47% AT – 56%	– The participants were expected to understand the importance of monitoring and dealing with problems experienced in the previous season as a solution to the coming season. The concept may not have been clear during the training thereby resulting to the low score after training
Q14	Type of works to be undertaken after lapse of an irrigation system lifespan	BT – 11% AT – 11%	– The concept may not have been covered clearly during the training. The question expected the farmers to understand that they will be undertaking rehabilitation of the scheme after about 30years. Most farmers could not differentiate between minor pipe leakage repairs and rehabilitation works
Q16	Who in the IWUA should be responsible for handling and disbursing money	BT – 16% AT – 22%	– The question expected the farmers to distinguish the role of the O&M sub-committee and the treasurer. Due to the low score, the issue would require revisiting. Most of the farmers indicated the money should be handled by the O&M sub-committee
Q21	What is the most important thing that should be considered to alleviate water distribution conflicts	BT – 74% AT – 61%	– The question demanded that the farmers identify proper O&M as the one that will alleviate any water conflicts. The reduction in the score is attributed to inconsistency in farmers attending the training
No	Content	Result	Reason for high score BEFORE training
Q18	What gender refers to	BT – 95% AT – 89%	– The high score is attributed to farmers' general knowledge of gender from other government agencies and NGOs
Q19	Importance of gender consideration in irrigation scheme management	BT – 84% AT – 89%	– The high score is attributed to farmers' general knowledge of gender from other government agencies and NGOs
Q20	Importance of monitoring an irrigation system	BT – 79% AT – 89%	– The high score is attributed to the question being easy

3)Kiamariga/Raya

The average scores before and after the training was 64% and 66% respectively. This depicts a 2% loss in knowledge which is an indication that the training was effective and achieved the training objectives.

Table 3.2.63 Results of Evaluation in Unit 5 Program in Kiamariga/Raya Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	1	7%	0	0%
80-89%	2	13%	7	35%
70-79%	4	27%	5	25%
60-69%	2	13%	2	10%

Below 60%	6	40%	6	30%
Total Participants	15		20	
Average Score		64%		66%

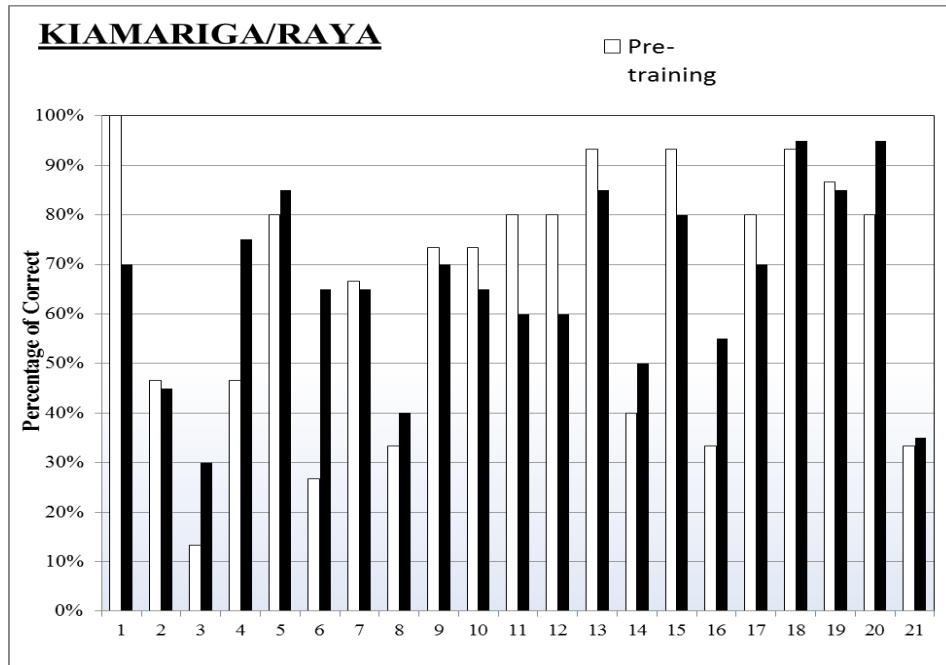


Figure 3.2.24 Result of Knowledge Evaluation in Kiamariga/Raya Scheme

Table 3.2.64 Evaluation per Question for Unit 5 Program in Kiamariga/Raya Scheme

No	Content	Result	Reason for significant INCREASE in the score
Q4	Who in the IWUA has the ultimate responsibility of handling O&M in the scheme	BT – 47% AT – 75%	– The increase in the score is attributed to the training on the IWUA organizational structure
Q6	What the IWUA requires when preparing an irrigation water distribution plan for the following season	BT – 27% AT – 65%	– The increase in the score is attributed to the training on irrigation planning
Q16	Components of the O&M fee	BT – 33% AT – 55%	– The increase in the score is as a result of the training on system operation and planning where the components of the irrigation system was covered
Q20	Importance of monitoring scheme O&M	BT – 80% AT – 95%	– The high score is attributed to the question being too simple
No	Content	Result	Reason for LOW score or REDUCTION even after training
Q1	Components of an irrigation system	BT – 100% AT – 70%	– The decline in the score may be attributed to the translation of the question and multiple choices as the question was straight forward
Q2	Results of proper management of an irrigation system	BT – 47% AT – 45%	– The low score is attributed to the framing of the question as it was negatively framed.
Q3	Important aspect that should be given particular attention to ensure sustainability of smallholder irrigation	BT – 13% AT – 30%	– The low score may be attributed to the facilitator not being too specific to the requirements by the IWUA during planning for future water distribution

	undertaking		
Q8	The ultimate goal of the IWUA while operating an irrigation system	BT – 33% AT – 40%	– The low score may be attributed to farmers lack of understanding of the multiple choices
Q14	Which activity or work is undertaken after the system lifespan to ensure it continues to perform effectively	BT – 40% AT – 50%	– There is an increase in the score. However, this being a new scheme, they may not have had knowledge of system lifespan and scheme rehabilitation.
Q21	What is the most important thing that should be considered to alleviate water distribution conflicts	BT – 33% AT – 35%	– The question demanded that the farmers identify proper O&M as the one that will alleviate any water conflicts. However most farmers responded that equal water distribution would be the solution to these conflicts.
No	Content	Result	Reason for high score before training
Q13	How an IWUA can ensure scheme sustainability after the system lifespan	BT – 93% AT – 85%	– The high score may be attributed to the farmers' general knowledge that you cannot rely on external funds for scheme operations and maintenance.
Q15	Meaning of O&M fee	BT – 93% AT – 80%	– The high score is attributed to the question being simple
Q18	Meaning of gender	BT – 93% AT – 95%	– The high score is attributed to farmers' general knowledge of gender from other government agencies and NGOs
Q19	Importance of gender consideration in irrigation scheme management	BT – 87% AT – 85%	– The high score is attributed to farmers' general knowledge of gender from other government agencies and NGOs

4)Kaumbura

The average performance for the participants before and after the training was 62% and 70% respectively. This depicts an 8% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 3.2.65 Results of Evaluation in Unit 5 Program in Kaumbura Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	2	12%	4	14%
80-89%	3	18%	5	18%
70-79%	2	12%	7	25%
60-69%	1	6%	6	21%
Below 60%	9	53%	6	21%
Total Participants	17		28	
Average Score		62%		70%

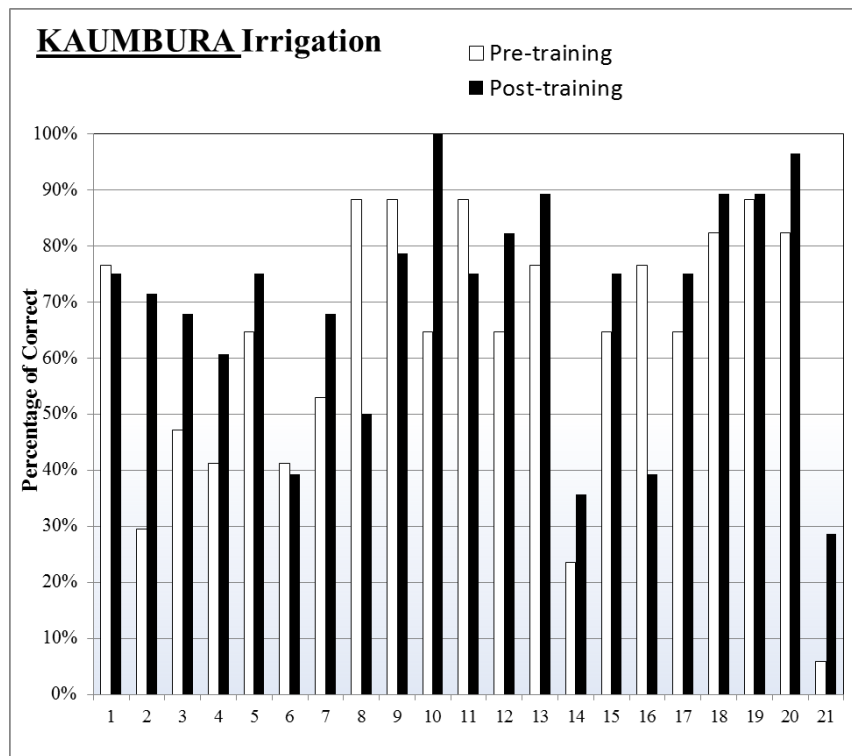


Figure 3.2.25 Result of Knowledge Evaluation in Kaumbura Scheme

Table 3.2.66 Evaluation per Question for Unit 5 Program in Kaumbura Scheme

No	Content	Result	Reason for significant INCREASE in the score
Q2	Consequences of proper management of an irrigation system	BT – 29% AT – 71%	– The high score is attributed to the training and the fact that the participants appreciated the importance of proper scheme O&M
Q3	Important factor that should be given particular attention by the IWUA for optimal functioning of the scheme	BT – 47% AT – 68%	– The high score is attributed to the training and emphasis on the importance of system maintenance
Q10	Effects of poorly maintaining a system	BT – 65% AT – 100%	– The high score is attributed to knowledge gained in the training on the consequences of poor O&M
Q21	The best solution towards alleviating water distribution conflicts	BT – 6% AT – 29%	– The increase score is as a result of the training on proper O&M. However, still a large number of participants responded that the conflicts will only be alleviated if the water is distributed equally. This needs follow-up.
No	Content	Result	Reason for LOW score or REDUCTION even after training
Q6	Important requirement during planning for water distribution for the	BT – 41% AT – 39%	– The farmers did not quite understand the question and so most answered that the requirement is the list of people within the scheme. They may have confused ‘people’ to mean ‘members’ of the scheme

	following season		
Q8	The goal of an IWUA in operating their scheme efficiently	BT – 88% AT – 50%	– The question was straight forward and this could be the reason 88% of the farmers were able to answer it correctly before the training. The reduction in score may be attributed to the way the question was translated such that it was not well understood after the training
Q14	Activity to be carried out after system lifespan	BT – 24% AT – 36%	– The major activity here is scheme rehabilitation. Most farmers however responded that the major activity would be repair of leaking pipes. This is wrong as this is routine. The concept needs to be cleared to the farmers so that they can see and adapt the cash buildup mechanism for finances to cater for scheme rehabilitation after those years
Q16	Person responsible to handle O&M fee	BT – 76% AT – 39%	– The farmers may have gotten confused during the training on O&M fee as they mostly answered that it is the O&M sub-committee that should handle this cash. This is however a misconception as only the treasurer is allowed to hold the money in trust by the IWUA
No	Content	Result	Reason for high score before training
Q18	Meaning of gender	BT – 82% AT – 89%	– The high score may be attributed to the general knowledge of what the term ‘gender’ refers to
Q19	Importance of gender consideration in irrigation system management	BT – 88% AT – 89%	– The high score is attributed to gender sensitization programs supported by the government and other NGOs.
Q20	Importance of monitoring an irrigation system	BT – 82% AT – 96%	– The high score is attributed to the question being simple

5)Tuhire Challa

The average performance for the participants before and after the training was 72% and 79% respectively. This depicts an 8% gain in knowledge. The questionnaire comprised of 20 questions drawn from the 10 sessions. The table below highlights the areas that showed remarkable improvement and those that recorded a decline in knowledge or had no knowledge gain after the training.

Table 3.2.67 Results of Evaluation in Unit 5 Program in Tuhire Challa Scheme

ANALYSIS FOR KNOWLEDGE EVALUATION				
Score	Pre-training	% of farmers	Post-training	% of farmers
90% and above	0	0%	3	12%
80-89%	7	29%	13	52%
70-79%	12	50%	4	16%
60-69%	2	8%	4	16%
Below 60%	3	13%	1	4%
Total Participants	24		25	
Average Score		72%		79%

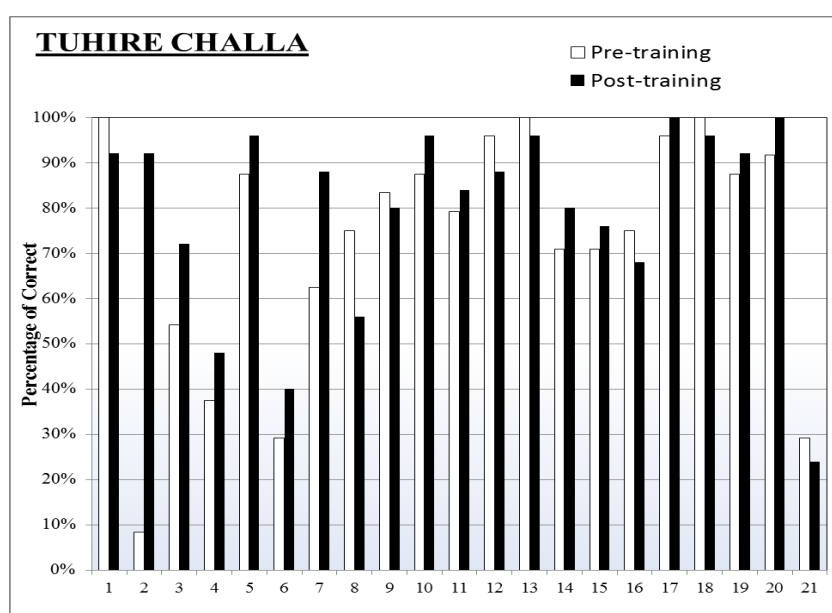


Figure 3.2.26 Result of Knowledge Evaluation in Tuhire Challa Scheme

Table 3.2.68 Evaluation per Question for Unit 5 Program in Tuhire Challa Scheme

No	Content	Result	Reason for significant INCREASE in the score
Q2	Results of proper management of an irrigation system	BT – 8% AT – 92%	– The increase in the score is attributed to editing of the question to remove ambiguity
Q3	Factor that should be given particular attention by the IWUA for irrigation system to be sustainable	BT – 54% AT – 72%	– The increase in the score is attributed to the training and farmers appreciating the importance role O&M plays towards scheme sustainability
Q7	Components of an irrigation operation action plan	BT – 63% AT – 88%	– The increase in the score is as a result of the training and group work on the same
Q20	Importance of monitoring scheme O&M	BT – 92% AT – 100%	– The high score is attributed to the question being too simple
No	Content	Result	Reason for LOW score or REDUCTION even after training
Q4	Who in the IWUA has the ultimate responsibility of handling O&M in the scheme	BT – 38% AT – 48%	– The use of the word ‘ultimate’ may have confused the farmers as most responded that the IWUA general assembly is the one with the ultimate responsibility whereas the question demanded that they identify the O&M sub-committee
Q6	What the IWUA requires when preparing an irrigation water distribution plan for the following season	BT – 29% AT – 40%	– The training on irrigation planning was not clear as to the requirements during the activity. This issue should be followed up
Q8	The ultimate goal of the IWUA while operating an irrigation system	BT – 75% AT – 56%	– The low score is attributed to the fact that the facilitator during the training was not so clear as to the goal of the IWUA during scheme operation which is to supply water to the greatest possible area for cultivation
Q21	What is the most important	BT – 29%	– The question demanded that the farmers identify proper

No	Content	Result	Reason for high score before training
	thing that should be considered to alleviate water distribution conflicts	AT – 24%	O&M as the one that will alleviate any water conflicts. However most farmers responded that equal water distribution would be the solution to these conflicts.
Q1	Components of an irrigation system	BT – 100% AT – 92%	– The high score even before the training is attributed to the fact that this is not a new scheme and therefore the farmers had prior knowledge of the scheme components
Q12	What to be done to improve efficiency and movement of water within the canals	BT – 96% AT – 88%	– The high score is attributed to the fact that the scheme is not new and therefore the farmers understood the importance of canal cleaning and desilting at the intake as improving the efficiency of the scheme
Q13	What the IWUA needs to do to ensure that after the system lifespan the scheme remains sustainable	BT – 100% AT – 96%	– The scheme, having being financed in part for a couple of times understood that sustainability can only be guaranteed using the IWUA resources
Q17	Components of the O&M fee	BT – 96% AT – 100%	– The scheme, being operational, was already undertaking O&M and paying WRMA fees and therefore this was not a new concept
Q18	Meaning of gender	BT – 100% AT – 96%	– The high score is attributed to general knowledge by the farmers

3.2.8 Lessons Learnt for Unit 1, 2, 3, 4 and 5

(1) Pre-training meetings

There is need to hold pre-training meetings for all the trainings to confirm the preparedness of the facilitators for the training and also check on the quality of the training materials before the training time. It was mainly noted that most of the facilitators replicated the training materials they had used under Batch 1 with some forgetting to edit the name of the scheme. This happened mainly in Kiamariga/Raya, Shulakino and Mangudho Schemes.

In other schemes, the facilitators selected were not informed well in advance and so they could not manage to come and train. This was experienced in Kaumbura (SCSDO and WRMA officials), Shulakino (SCIO), and Mangudho (SCAO) among others.

It is suggested that especially for those sessions where an external facilitator is invited, the SCIO and SCAO should have the PowerPoint presentations beforehand to enable them to step in and train on behalf of those external facilitators whenever they fail to turn up for the training. A pre-training meeting cannot therefore be over-emphasized.

(2) Farmers Mobilization

The farmers' turn-up for the training has been low for the 5 schemes with Kiamariga Raya recording the worst turn-up. The reasons provided by these farmers is that they are not given enough notice to prepare to attend the training while others said that they are not informed at all. The PMT therefore decided that the FEO is facilitated for one day to convey the news of a particular training one or two weeks before the training. After obtaining the list of the attendees, he is expected to email the same to the PMT. This has demonstrated a remarkable improvement in attendance in Mangudho, Kaumbura, Shulakino and Challa Tuhire. In Kiamariga/Raya Scheme, it is noted that there is miscommunication between the

Chairman and the members. In fact, the chairman depicts himself as one who has no passion for the trainings.

(3)Field Demonstrations

Unit 4 involved field demonstration on land preparation, nursery management, on-field irrigation application methods, safe use of pesticides and post-harvest handling and processing. This gave the farmers a chance to practice the skills that they had gained in the classroom which enhanced their understanding. The demonstrations were taken so positively and farmers promised to apply the same in their individual farms.

The team that took part in training Unit 5 comprised of Sub-county Subject Matter Specialists (SMS's) in Crops, Home Economics and Farm engineering. These worked in conjunction with a team of PMT comprising of Engineers, Capacity building experts and agronomists. It was notable, however that the SCIOs were a bit challenged on preparation of basins and furrows and require practical training on the same.

All the demonstrations were held successfully in most schemes. The SMS's showed a lot of expertise in the demonstrations and farmers showed great appreciation.

The challenges experienced during the demonstration day were lack of prior preparation of the demonstration materials which led to lateness in starting and ending the day. This was observed in Kasokoni and Kaben. In other areas the water pump for demonstrating water application and testing water depth failed to work. This was experienced in Kasokoni.

(4)Field Tour

Unit 5 comprised of a field tour to a neighbouring successful scheme with similar infrastructure. This was taken so positively by the farmers as they were able to identify with the schemes as well as the crops in the field and income from farming. They were able to identify the various challenges associated with irrigation farming and IWUA management. The farmers were able to identify with most of the concepts they had been trained in class.

The enthusiasm of the farmers cannot be emphasized. They were so motivated and challenged to work hard and ensure success and sustainability of their individual schemes. The Scheme that showed a lot of enthusiasm were Kaumbura, Shulakino, Kiamariga/Raya and Mangudho. For some of the schemes visited, however, the farmers' expectations were not totally met as the scheme was of a lower status than the visiting scheme in terms of IWUA organisation, O&M and irrigation farming. This was experienced in Entarara Irrigation Scheme visited by Tuhire Challa Irrigation Scheme.

The challenge in the field tours were lack of sufficient due diligence to check on the suitability of the schemes. For example, some of the schemes visited were of lower standard than the scheme visiting and therefore they didn't offer enough motivation to the IWUA. Another challenge was that in other schemes, the farmers were only interested in learning about crop husbandry and enterprises and ignored the main aspect of the visit, which was

learning on how the IWUA manages all aspects of the irrigation system.

(5) Follow-up Program

Unit 1 follow-up program was very positively received. The farmers were able to recapitulate what they had learnt in the training and asked many questions regarding the areas where they did not understand. Among the areas farmers sought clarification included process of bylaw formulation, IWUA organizational structure, WRMA water charges calculation and legal registration. The farmers were also asked to give reasons for low performance and the notable reasons were (1) Absenteeism or inconsistency by participants in attending the training, (2) Low literacy level of participants, (3) Some trainers were too low on volume and did not engage the participants and (4) Inadequate time allocation for sessions

There was no follow-up for Units 3,4 and 5 due to project time constraints.

(6) How to motivate farmers for the trainings

The farmers made the following recommendations which would motivate them to attend trainings

- Trainings should start at 9am and end at 4.00pm to allow the farmers to attend to other home duties
- Trainings should not extend beyond 3 days in a week
- Market days should be avoided
- Trainings should have a gap of at least 1 month to enable to farmers to rest and
- Training follow-up highly welcome
- Hand-outs should be printed in good time and should be available every day after training to enable the farmers revise on the training while it is still fresh in their minds.
- Participants' selection criterion was noted to be limiting especially in the schemes where the literacy level is very low. Some of the schemes have committee members who are unable to read and write but would wish to attend the trainings. The PMT informed that it was okay for those to attend the training to ensure a class of 30 provided priority is given to the farmers who can read and write. This was evident in Mangudho and Kiamariga/Raya
- Involving the FEO to mobilize the farmers for the training had great impact in Unit 4 and 5

(7) Facilitators

During the trainings, it is noted that the facilitation skills of the SCIOs, SCAOs and the field officers involved in Batch 1 training had greatly improved. Among the best improved as noted by the farmers were SCIO Taveta and SCIO Ganze. For example, Unit 3 training under Batch was 1 was a challenge to the field officers but they demonstrated a lot of ease and expertise during Batch 2 training. It is also noted that the mode of preparing PowerPoint presentations has greatly improved. The slides are now clear and the facilitators give a lot of relevant examples during trainings. It was noted that in Taveta, the SCIO had mobilized all

the facilitators to prepare 2 presentations, one in English and the other was presented to the participants in Kiswahili. This was greatly appreciated by the participants.

The training on financial management was a bit technical and required more and easily identifiable local examples. The local facilitators should therefore be involved in filling the gaps that had remained unmet during the training and provide feedback to the farmers on the training in a follow-up activity and if possible a re-training.

Unit 4 training facilitators included SMS's in their respective areas. These facilitators showed great expertise and understanding in the areas they trained on which enhanced farmers understanding as they were able to train using the local language.

The training on on-farm water management was a bit challenging for most of the SCIOs and the PMT noted that there should have been a TOT for this Unit before the training. They required practical examples on preparation of land for the various on-farm water application technologies.

(8) Notable Weak Areas requiring follow up in Unit 2, 3, 4 & 5

During Unit 2, 3, 4 and 5 training, the following areas recorded a low performance and in future the areas require to be revisited through a follow-up program to ease the farmers understanding:

Unit 2:

- Conflict management process and methods
- Development of leadership policies
- Development of conflict policies
- Process of formulation, review and operationalization of bylaws
- Review of IWUA organizational structure

Unit 3

- Budgeting
- Posting entries of recording in the books of original entry including ledger book, petty cash book, cash book, fixed asset register and income and expenses book
- Developing financial policies
- Internal Auditing procedure
- Importance of external auditing
- Farmers' mobilization towards fund contributions and penalties payments

Unit 4

- Preparation of basins and furrows
- Testing of water depth after irrigation
- Preparation of a cropping calendar
- Post-harvest processing

Unit 5

- Preparation of O&M plans
- Implementation of O&M plans
- Record keeping for O&M

- Action planning for O&M
- M&E of irrigation system

CHAPTER 4 Monitoring and Evaluation of IWUA Performance

4.1 Objective

The general objective of this research is to obtain information on the IWUAs in terms of O&M, organization, management of finances and its involvement in other activities that add value to its success.

4.2 Monitoring and Evaluation of IWUA Performance under Batch 1 Sites

4.2.1 Baseline Survey Objective

The objective was to obtain baseline information on the functionality and performance of the IWUAs in their operational, organizational, financial management as well as in the additional factors that are considered to add value to a successful IWUA. The information obtained from the baseline survey questionnaires would also aid in identification of the specific areas/aspects of weakness for which the Capacity Building program will place emphasis on as well as act as a basis for determining further assistance and intervention programs for the IWUA. Finally, the study will act as a tool to assess the impact of the project's IWUA capacity building program.

By the end of project the same questionnaire will be administered to the same IWUAs to measure the impact of the capacity building component of the project.

4.2.2 Evaluation Method

The methodology applied was a questionnaire comprising of 2 sections; the first section on Irrigation and IWUA organization and the second section on additional factors that are deemed to add value to the performance of an IWUA. The questionnaires are administered to a sample of farmers aided by a team of enumerators comprising of the PMT, SCIO and SCAO. The data collected is then analysed and mean scores obtained based on the functionality criteria already developed. The scores are then tallied to obtain the final score which is indicative of the degree of IWUA performance against the adjective rating.

Table 4.2.1 Adjective Rating for Functionality Survey

Item			Full Score
SECTION A	O & M	Planning	15
		Implementation	15
		Performance	10
SECTION B	IWUA organization		30
SECTION C	Financial Management		20
SECTION D	Other Indicators		10
Total Points			100

Source: JICA Team

Table 4.2.2 Rating for Functionality Survey

Total Functionality Score	Adjective Rating
95 points and above	Outstanding
85-94 points	Very satisfactory
75 to 84 points	Satisfactory
65 to 74 points	Fair
Below 65points	Poor

Source: JICA Team

4.2.3 Results of Baseline Evaluation

The Baseline survey was conducted from August to December 2013 in all the eight schemes under Batch 1. The participants were the committee members in these schemes and ordinary members totalling to a maximum of 40farmers. The enumerators were SIDEMAN-SAL capacity building team assisted by the SCIOs.

The results survey showed that on all IWUAs under Batch 1 are poorly rated. The main areas where the IWUAs showed very low scores were on IWUA O&M planning and implementation, IWUA organization and IWUA financial management. Here-below is the summary of the results of the evaluation for each scheme and the rating.

Table 4.2.3 Summary of Functionality Score per Scheme and Rating

Name of Irrigation Scheme	MEAN SCORE	RATING
Kasokoni	63.5	Poor
Mdachi	34	Poor
Olopito	35.5	Poor
Gatitu/Muthaiga	36	Poor
Kaben	38	Poor
Murachaki	39	Poor
Tumutumu	35	Poor
Muongano	40.5	Poor

Source: JICA Team

(1) Kasokoni Irrigation Scheme

Table 4.2.4 Average Ratings – Kasokoni Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	13	This is an operational scheme and has O&M plans, water fee collection plans and water distribution plans
2	O & M implementation	15	9	The Scheme is fair on implementation of those plans
3	O & M operations	10	6	The scheme is poor on operationalizing the plans especially the water collection and O&M plans.
4	Organizational performance	30	24	The IWUA is organized except that the farmers participation in IWUA meetings is not so good
5	Financial performance	20	9.5	The IWUA lacks financial plans but most of the IWUA income is spent in O&M.
6	Additional indicators	10	3	The IWUA does not provide services to the farmers except those that are irrigation based. However, the group adheres to the 30% gender rule and the IWUA leaders render their services for free to the IWUA and the IWUA has some network connections with local farmers groups.
Total Score		100	63.5	The IWUA is rated as performing Poorly

Source: JICA Team

(2) Mdachi Irrigation Scheme

Table 4.2.5 Average Ratings – Mdachi Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	7.5	This is a new scheme and therefore has no O & M plans
2	O & M implementation	15	0	The scheme is new
3	O & M operations	10	0.5	The scheme is new
4	Organizational performance	30	19.5	The IWUA is poorly organized as indicated by the low percentage of members of the farmers within the scheme area; it is poor in record keeping and weak in members' attendance to the IWUA activities.
5	Financial performance	20	4.5	The IWUA lacks financial plans
6	Additional indicators	10	2	The IWUA does not provide services to the farmers except those that are irrigation based. However, the IWUA leaders render their services for free to the IWUA and the group has some networks with other farmers' groups
Total Score		100	34	The IWUA is rated as performing Poorly

Source: JICA Team

(3) Olopito Irrigation Scheme

Table 4.2.6 Average Ratings – Olopito Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	7.5	This is a new scheme therefore the IWUA does not have any O&M plans
2	O & M implementation	15	0	The scheme is new
3	O & M operations	10	0	The scheme is new
4	Organizational performance	30	21	The IWUA is fairly organized but lacks proper meetings organization
5	Financial performance	20	5	The scheme operates without a budget, its income is less than the expenditure and has no money to carry out normal operations
6	Additional indicators	10	2	The IWUA leaders render their services for free and the group adheres to the 30% gender rule

Total Score	100	35.5	The IWUA is rated as performing poorly
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Source: JICA Team

(4) Gatitu/Muthaiga Irrigation Scheme

Table 4.2.7 Average Ratings – Gatitu/Muthaiga Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	7.5	The IWUA does not have any O&M plans
2	O & M implementation	15	0	The scheme does not have any plans for implementation
3	O & M operations	10	1.5	The scheme is operational but there is very little organized activity in farming and there is no water fee collection
4	Organizational performance	30	20.5	The IWUA is fairly organized but lacks proper bylaws and the 2 groups in the scheme operate independently
5	Financial performance	20	4.5	The IWUA has no financial plans, the 2 blocks operate independently and have separate bank accounts, the income is also less than expenses
6	Additional indicators	10	2	The IWUA does not provide services to the farmers except those that are irrigation based. However, the group adheres to the 30% gender rule and the IWUA leaders render their services for free to the IWUA
Total Score		100	36	The IWUA is rated as performing poorly

Source: JICA Team

(5) Kaben Irrigation Scheme

Table 4.2.8 Average Ratings – Kaben Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	7.5	This is a new scheme therefore the IWUA does not have any O&M plans
2	O & M implementation	15	0	The scheme is new
3	O & M operations	10	0	The scheme is new

4	Organizational performance	30	22	The IWUA is fairly organized but is weak on frequency and meetings and has low attendance in those meetings.
5	Financial performance	20	3	The IWUA does not have any financial plans and does not operate a bank account
6	Additional indicators	10	3.5	The officials offer their services for free and the IWUA has an office. However it does not provide any additional services to members
Total Score		100	38	The IWUA is rated as performing poorly

Source: JICA Team

(6)Murachaki Irrigation Scheme

Table 4.2.9 Average Ratings – Murachaki Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	7.5	This is a new scheme therefore the IWUA does not have any O&M plans
2	O & M implementation	15	0	The scheme does not have any plans for implementation
3	O & M operations	10	0	The scheme is new and so there are no irrigation related activities being conducted
4	Organizational performance	30	23	The IWUA is fairly organized.
5	Financial performance	20	4.5	The IWUA has no financial plans, its income is less than expenses and has no money in the bank for its operations
6	Additional indicators	10	4	The IWUA does not provide services to the farmers except those that are irrigation based. However, the group adheres to the 30% gender rule and the IWUA leaders render their services for free to the IWUA, the IWUA has an office and the IWUA has a few networks with the neighbouring farmers' groups.
Total Score		100	39	The IWUA is rated as performing poorly

Source: JICA Team

(7) Tumutumu Irrigation Scheme

Table 4.2.10 Average Ratings – Tumutumu Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	7.5	This is a new scheme therefore the IWUA does not have any O&M plans
2	O & M implementation	15	0	The scheme does not have any plans for implementation
3	O & M operations	10	0	The scheme is new and so there are no irrigation related activities being conducted
4	Organizational performance	30	18.75	The IWUA is poorly organized. Attendance to meetings and communal works are poor. Many farmers in the scheme area have not joined the IWUA and the IWUA is not divided into blocks for ease of management
5	Financial performance	20	5.5	The IWUA has no financial plans; its income is less than expenses. However the IWUA has over Ksh.100,000 in the bank.
6	Additional indicators	10	3	The IWUA does not provide services to the farmers except those that are irrigation based. However, the group adheres to the 30% gender rule and the IWUA leaders render their services for free to the IWUA and the IWUA has a few networks with the neighbouring farmers' groups.
Total Score		100	34.75	The IWUA is rated as performing poorly

Source: JICA Team

(8) Muungano Irrigation Scheme

Table 4.2.11 Average Ratings – Muungano Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	7.5	This is a new scheme therefore the IWUA does not have any O&M plans
2	O & M implementation	15	0	The scheme does not have any plans for implementation
3	O & M operations	10	0	The scheme is new and so there are no irrigation related activities being conducted

4	Organizational performance	30	25	The IWUA is well organized and members are committed in meeting and communal work attendance and following the by-laws
5	Financial performance	20	5	The IWUA has financial plans and operates a bank account. However, the income is less than the IWUA expenses
6	Additional indicators	10	3	The IWUA does not provide services to the farmers except those that are irrigation based. However, the group adheres to the 30% gender rule and the IWUA leaders render their services for free to the IWUA and the IWUA has an office
Total Score		100	39	The IWUA is rated as performing poorly

Source: JICA Team

4.2.4 Final Survey Objective

4.2.5 Results of Final Evaluation

The final survey was conducted from November to December 2015 in all the eight schemes under Batch 1. The participants were the committee members in these schemes and ordinary members totalling to a maximum of 40 farmers. The enumerators were SIDEMAN-SAL capacity building team assisted by the SCIOs and SCAOs.

The results survey showed that on all IWUAs under Batch 1 are poorly rated. The main reason why the IWUAs score remained poor even after the trainings was because the schemes are still under construction and therefore there is no O&M on-going as at the time the survey was taking place. There was however improvement in the IWUA organization and great improvement in financial management. This shows that the capacity building program had a lot of impact and the score would be much higher had the schemes reached the operations stage of irrigation scheme development. Here-below is the summary of the results of the final evaluation for each scheme and the rating.

Table 4.2.12 Summary of Functionality Score per Scheme and Rating

Name of Irrigation Scheme	MEAN SCORE	RATING
Kasokoni	58	Poor
Mdachi	35.5	Poor
Olopito	36.25	Poor
Gatitu/Muthaiga	49	Poor

Kaben	42.5	Poor
Murachaki	46.5	Poor
Tumutumu	45	Poor
Muongano	58	Poor

Source: JICA Team

(1) Kasokoni Irrigation Scheme

Table 4.2.13 Average Ratings – Kasokoni Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	13	This is an operational scheme and has O&M plans, water fee collection plans and water distribution plans
2	O & M implementation	15	8	The Scheme is rated fair on implementation of those plans
3	O & M operations	10	7.5	The scheme is poor on operationalizing the plans especially the water collection and O&M plans.
4	Organizational performance	30	17.5	The IWUA is organized, maintains important records and is registered. However, attendance by members to various IWUA activities is low and the IWUA does not hold elections due to lack of quorum
5	Financial performance	20	9.5	The IWUA lacks financial plans, has very little bank balance and the viability index is very low. However, efficiency in collection of water fee is excellent and at least most of the IWUA funds are used in O&M
6	Additional indicators	10	2.5	The IWUA does not provide most of the additional services except that it has an office block and the leaders render their services to the IWUA for free.
Total Score		100	58	Poor

Source: JICA Team

(2) Mdachi Irrigation Scheme

Table 4.2.14 Average Ratings – Mdachi Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	7.5	The scheme is not operational and has no O&M plans
2	O & M implementation	15	0	The scheme is not operational and therefore this was not applicable

3	O & M operations	10	0	This was not applicable as the scheme is not yet operational
4	Organizational performance	30	18.5	The scheme is registered, has good membership, has good frequency of meetings, maintains the important records, holds elections and is able to resolve conflicts internally. Members attendance to IWUA activities is however not so good.
5	Financial performance	20	6.5	The group has no budget, has very little money in the account, has no external source of income, does not conduct an audit and the viability index is very low. However, the IWUA operates a bank account
6	Additional indicators	10	3	This is attributed to the fact that the IWUA has an office, involvement of women and youth in leadership is beyond the threshold of 30% and leaders render their services to the group for free
Total Score		100	35.5	Poor

Source: JICA Team

(3)Olopito Irrigation Scheme

Table 4.2.15 Average Ratings – Olopito Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	9	The scheme is not yet operational and there are no O&M plans except the monthly member contributions towards scheme activities
2	O & M implementation	15	0	This is not applicable as the scheme is not operational
3	O & M operations	10	2	The O&M plans would not have been implemented and evaluated since the scheme is not operational. However, the farmers scored in the percentage of production, efficiency in members contributions and cropping intensity which is at one season in a year
4	Organizational performance	30	13.75	The IWUA is registered, has good percentage of membership within the scheme, maintains important records and has a good attendance by members while resolving most conflicts internally.
5	Financial performance	20	8.5	IWUA has no financial plans, does not conduct audit, viability index is low, but the IWUA spends all its income on O&M and

				has a bank account
6	Additional indicators	10	3	The IWUA has an office, leaders do not charge for their services and Women and youth involvement is more than 30%
Total Score		100	36.25	Poor

Source: JICA Team

(4)Gatitu/Muthaiga Irrigation Scheme

Table 4.2.16 Average Ratings –Gatitu/Muthaiga Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	9	The scheme is not yet operational and there are no O&M plans except the monthly member contributions towards scheme activities
2	O & M implementation	15	1	This is not applicable as the scheme is not operational. Efficiency in collection of monthly contributions is poor as less than 50% of members pay.
3	O & M operations	10	4.5	The O&M plans would not have been implemented However, the farmers scored on the level of production, efficiency in members contributions and cropping intensity which is twice a year
4	Organizational performance	30	22.5	The IWUA is registered, has good percentage of membership within the scheme, frequency in holding important meetings is good, maintains important records and has a good attendance by members while resolving most conflicts internally and holds elections as per scheme bylaws. Attendance to meetings need to improve
5	Financial performance	20	10.5	IWUA has financial plans, spends all income on O&M, has a bank account but has a very small bank balance, does not conduct audit and the viability index shows IWUA income is less than expenses
6	Additional indicators	10	1.5	The IWUA leaders do not charge for their services and Women and youth involvement is at least 30%
Total Score		100	49	Poor

Source: JICA Team

(5) Kaben Irrigation Scheme

Table 4.2.17 Average Ratings – Kaben Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	7.5	The scheme has no O&M plans. The scheme is still under construction.
2	O & M implementation	15	0	This is not applicable as the scheme is not operational and has no plans
3	O & M operations	10	0	This is not applicable
4	Organizational performance	30	23.5	The group is registered, percentage of membership within the scheme is good, holds important meetings frequently, maintains important records, holds elections as per bylaws, resolves conflicts internally and members attendance and commitment to IWUA work is good rated about 75%.
5	Financial performance	20	10	The IWUA keeps money in the bank account and utilizes all income in O&M. However, it does not have a budget, it does not have any outside sources of income, has little money in the account, does not conduct audit and viability index is less than 1 meaning IWUA cannot meet some of its expenditure.
6	Additional indicators	10	1.5	The score is attributed to leaders offering their services for free and at least 30% of women and youth take part in the IWUA management
Total Score		100	42.5	Poor

Source: JICA Team

(6) Murachaki Irrigation Scheme

Table 4.2.18 Average Ratings – Murachaki Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	9	The scheme has no O&M plans. The scheme is still under construction. The IWUA however has plans of monthly member contributions.
2	O & M implementation	15	2	The score is attributed to the fact that about 50-89% of IWUA members paid the monthly contribution as per the plan
3	O & M operations	10	1	The score is on cropping intensity rated at 2 times each year
4	Organizational	30	22	The group is registered, percentage of membership within the scheme is good, holds

	performance			important meetings frequently, maintains important records, holds elections as per bylaws, resolves conflicts internally and committee members' attendance to meetings is good. However, the attendance of the IWUA members to the communal work and the general assembly is less than 50%
5	Financial performance	20	11.5	The IWUA has a financial plan, a bank account, collects more than 50% of intended income from members and utilizes all income on O&M. The IWUA however does not receive any funds from outside sources as intended, does not conduct audit and cannot meet all expenses as income is less.
6	Additional indicators	10	3	The IWUA has an office constructed by the project, leaders render their services at no pay and the group has been able to improve their system using their own funds (excavation of 13km of pipeline)
Total Score		100	46.5	Poor

Source: JICA Team

(7) Tumutumu Irrigation Scheme

Table 4.2.19 Average Ratings – Tumutumu Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	9	The scheme has no O&M plans. The scheme is still under construction. The IWUA however has plans of monthly member contributions.
2	O & M implementation	15	2	The score is attributed to the fact that about 50-89% of IWUA members paid the monthly contribution as per the plan
3	O & M operations	10	2.5	The score is on the level of production, efficiency in collecting the monthly contributions and cropping intensity rated at 2 times each year
4	Organizational performance	30	18	The group is registered, percentage of membership within the scheme is good, holds important meetings frequently, maintains important records, holds elections as per bylaws, resolves conflicts internally and committee members' attendance to meetings is good. However, the attendance of the IWUA members to the communal work and the general assembly is less than 50% . It is also noted that the IWUA rarely holds general assembly meetings

5	Financial performance	20	11.5	The IWUA has no financial plan but has a bank account with more than Ksh.500,000 depicting that the income in the IWUA is more than expenses. All IWUA income is spent on O&M. However, the IWUA only manages to collect less than 50% of the intended income from member contributions and does not conduct audit. This would need to be addressed
6	Additional indicators	10	3	The IWUA has an office constructed by the project, leaders render their services at no pay and also the women and youth involvement in the IWUA is more than 30%
Total Score		100	45	Poor

(8)Muungano Irrigation Scheme

Source: JICA Team

Table 4.2.20 Average Ratings – Muungano Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	9	The scheme is not operational and has no O&M plans. The group however has a plan for members monthly contributions
2	O & M implementation	15	2	The scheme is not operational and therefore this was not applicable. However, the rate of implementation of the monthly contributions plan is 50-89%.
3	O & M operations	10	4.5	This was not applicable as the scheme is not yet operational. However the rate of efficiency in collecting the monthly contributions is 100% , the level of production is 60-79% of target and the cropping intensity is two season in a year
4	Organizational performance	30	26	The scheme is registered, has good membership, has good frequency of meetings, maintains the important records, holds elections and is able to resolve conflicts internally. Members' attendance to IWUA activities is also so good.
5	Financial performance	20	13	The group has a budget, a bank account, collects near 100% of budgeted income from monthly contributions and utilises all income on O&M. The group however does not carry out a financial audit and its income is less than expenses.
6	Additional indicators	10	3.5	This is attributed to the fact that the IWUA has an office build by the project, involvement of women and youth in leadership is at least 30%, leaders render their services to the group for free and the group has undertaken some improvement of

				the scheme (purchase of some intake materials and pipes).
Total Score		100	58	Poor

Source: JICA Team

4.3 Monitoring and Evaluation of IWUA Performance under Batch 2 Sites

4.3.1 Baseline Survey Objective

Under Batch 2, the functionality questionnaire developed under Batch 1 was still used as the survey instrument for collecting information on the performance of the IWUAs before capacity building program. However, from the experience under Batch 1, the questionnaire was slightly improved to gather as much information as necessary to allow the project to derive concise conclusions on the various categories of research. Among the improvements were inclusion of the question regarding the cropping intensity, details of the financial institutions found within the scheme locality, information on how the IWUA markets, information on why women and men involvement is as is and the reason for paying IWUA officials. The survey was conducted one day before Unit 1 training on Community mobilization and IWUA formation. After data collection, analysis was done and the IWUAs rated.

4.3.2 Evaluation Method

The methodology applied was a questionnaire comprising of 2 sections; the first section sought information on Irrigation and IWUA organization while the second section dealt with additional factors that are considered to add value to IWUA performance. The questionnaires were administered to a sample of farmers aided by a team of enumerators comprising of the PMT, SCIO, SCAO and an officer from the SCAO's office. The data collected was then analysed and mean scores obtained based on a functionality criteria already developed. The scores are then tallied to obtain the final score which is indicative of the degree of IWUA performance against the adjective rating.

4.3.3 Results of Evaluation

The Baseline survey was conducted from September to December 2014 in all the five schemes under Batch 2. It employed a questionnaire method of gathering the data. The participants were the committee members in these schemes and ordinary members totaling to a maximum of 40 farmers. The enumerators were SIDEMAN-SAL capacity building team assisted by the SCIO and SCAOs.

The results survey showed that on average all IWUAs performance was poor. The main areas where the IWUAs showed very low scores were on IWUA O&M planning and implementation and evaluation, IWUA financial management and on the additional factors that make the IWUA performance better including gender involvement, marketing together, networking with other organizations among others. Here-below is the summary of the results of the evaluation for each scheme and the rating

Table 4.3.1 Summary of Functionality Score per Scheme and Rating

Name of Irrigation Scheme	MEAN SCORE	RATING
Shulakino	41.5	Poor
Mangudho	23.5	Poor
Kaumbura	64.5	Poor
Kiमारiga/Raya	57.5	Poor
Challa Tuhire	57.5	Poor

Source: JICA Team

(1)Shulakino Irrigation Scheme

Table 4.3.2 Average Ratings – Shulakino Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	11.5	This is an operational scheme and therefore there are plans on O&M and water distribution
2	O & M implementation	15	1	Even though the scheme is operational, the IWUA members operate independently and they do not follow the plans on operations and maintenance
3	Evaluation O & M operations	10	3	The scheme members operate individually with little cohesion and so the implementation of the O&M plans is poor
4	Organizational performance	30	17.5	The IWUA despite maintaining some important records and having a big percentage of farmers in the scheme join the IWUA is not cohesive and there is little member involvement in IWUA activities
5	Financial performance	20	5.5	The IWUA's financial management system is weak. There is no water fee collection and the income cannot meet the IWUA expenses
6	Additional indicators	10	3	The IWUA only obtained a score by the fact that the leaders render their services to the IWUA for free, gender representation meets the 30% threshold and extension of the water canal using the IWUAs funds
Total Score		100	41.5	The IWUA is rated as performing poorly

(2)Mangudho Irrigation Scheme

Table 4.3.3 Average Ratings – Mangudho Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	7.5	This is fairly a new scheme and therefore there are no plans in place for operations and maintenance
2	O & M Plans implementation	15	0	This is not applicable as there are no plans
3	Evaluation O & M operations	10	4	The scheme is fairly new without O&M plans
4	Organizational performance	30	5.5	The IWUA is currently in the group formation phase of members registration and formulation of scheme bylaws
5	Financial performance	20	3.5	The IWUA is in its formative stage and in the process of setting up a financial management system. However, the members are making contribution towards payment of WRMA charges but the cash is never banked as there is no bank account
6	Additional indicators	10	3	The IWUA is not involved in most of the additional activities beyond irrigation. The scores here were mainly from gender representation, leadership and networking with other farmers' groups
Total Score		100	23.5	The IWUA is rated as performing poorly

(3)Kaumbura Irrigation Scheme

Table 4.3.4 Average Ratings – Kaumbura Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	13	This is an operational scheme with most of the plans for operations and maintenance except cropping calendar
2	O & M Plans implementation	15	8	At least 50% of the O&M plans are implemented
3	Evaluation O & M operations	10	5.5	Only about 50% of the O&M plans are effectively followed
4	Organizational performance	30	24	This is a very organized IWUA having been in operation for long. There is member commitment in attending meetings and communal

				work
5	Financial performance	20	11	The IWUA financial management system lacks plans and even there is effective water fee charge and collection, the IWUA income is less than the IWUA expenses
6	Additional indicators	10	3	The IWUA is not involved in most of the additional activities beyond irrigation. The scores here were mainly from gender representation, leadership and networking with other farmers' groups
Total Score		100	64.5	The IWUA is rated as performing poorly but almost at the level of being termed as a fairly performing IWUA

(4)Kiamariga/Raya Irrigation Scheme

Table 4.3.5 Average Ratings – Kiamariga/Raya Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	13	This is an operational scheme with most of the plans for operations and maintenance except cropping calendar
2	O & M Plans implementation	15	6	There is little implementation of the O&M plans
3	Evaluation O & M operations	10	5.5	Only about 50% of the O&M plans are effectively followed
4	Organizational performance	30	19.5	This is a fairly organized IWUA having been in operation for long. There is member commitment in attending meetings and communal work
5	Financial performance	20	11.5	The IWUA financial management system is weak and the IWUA income is less than the IWUA expenses
6	Additional indicators	10	2	The IWUA is not involved in most of the additional activities beyond irrigation. The scores here were mainly from gender representation and leadership rendering their services for free to the IWUA
Total Score		100	57.5	The IWUA is rated as performing poorly

(5)Challa Tuhire Irrigation Scheme

Table 4.3.6 Average Ratings – Challa Tuhire Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	11	This is an operational scheme with 2 plans for water distribution and water collection
2	O & M Plans implementation	15	7	The 2 existing plans are well implemented
3	Evaluation O & M operations	10	5.5	The 2 O&M plans are effectively implemented
4	Organizational performance	30	21.5	This is a well-organized IWUA with a strong leadership and group members' cohesion. The group is able to resolve most conflicts internally
5	Financial performance	20	11.5	The IWUA financial performance is fair due to efficiency in water fee collection and having financial plans. However, the IWUA income is less than the IWUA expenses
6	Additional indicators	10	1	The IWUA is not involved in most of the additional activities beyond irrigation except that it has an IWUA office
Total Score		100	57.5	The IWUA is rated as performing poorly

4.3.4 Final Survey Objective

The final survey was conducted from November to December 2015 in all the five schemes under Batch 2. The participants were the committee members in these schemes and ordinary members totalling to a maximum of 40farmers. The enumerators were SIDEMAN-SAL capacity building team assisted by the SCIOs and SCAOs.

The results survey showed that three of the IWUAs (Mangudho, Shulakino and Tuhire Challa) are poorly rated while Kiamariga/Raya is fair and Kaumbura satisfactory. The schemes demonstrated great improvement in making of O&M plans, IWUA organization and financial management. However, some could not implement the plans as the construction was on-going. This shows that the capacity building program had a lot of impact and the score would be much higher had the schemes reached the operations stage of irrigation scheme development. Here-below is the summary of the results of the final evaluation for each scheme and the rating.

4.3.5 Results of Final Evaluation

(1) Shulakino Irrigation Scheme

Table 4.3.7 Average Ratings – Shulakino Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	13	The group has all the O&M plans except the maintenance and repairs plan
2	O & M Plans implementation	15	5	The group is implementing the cropping calendar and the number of farmers paying according to the monthly contributions plan is almost 90%
3	Evaluation O & M operations	10	4.5	The efficiency in implementing O&M plans is poor, the level of scheme production is about 50%, cropping intensity is one season per year and the IWUA is not efficient in collecting the monthly contributions
4	Organizational performance	30	18	The group is registered, holds committee meetings regularly, maintains important records, and holds elections as per bylaws and resolves conflicts internally. The members commitment to IWUA activities including attending general assembly meetings and communal work need improvement
5	Financial performance	20	10	The IWUA has a bank account, is able to collect almost 100% of targeted income from members and utilises all income on O&M. However, there is no financial plan, no audit conducted, little balance in the account and income is less than expenses
6	Additional indicators	10	3.5	The IWUA owns some agricultural equipment like jembes and panga, leaders render their services for free and the IWUA has undertaken some physical improvement of the scheme using own funds (Canal extension)
Total Score		100	54	The IWUA is rated as performing poorly

(2)Mangudho Irrigation Scheme

Table 4.3.8 Average Ratings – Mangudho Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	11	IWUA has a cropping calendar and member's contribution plan. However, there is no water distribution plan and maintenance and repairs plan
2	O & M Plans implementation	15	5	The farmers stated that the cropping calendar is being implemented and at least 50-89% of members are adhering to the monthly contributions plan.
3	Evaluation O & M operations	10	6.5	The members rated the status of the irrigation facilities as good, level of production as 60-79% of expected and cropping intensity at 3 season per annum
4	Organizational performance	30	21	The group is registered as a SHG, holds important meetings regularly, holds elections as per bylaws, resolves conflicts internally, and has high attendance of members to those meetings. However, the IWUA membership is low and attendance to communal work is also very low.
5	Financial performance	20	11.5	The IWUA has a financial plan, is able to attain at least 60% of targeted income and utilises at least 60% of income on O&M. The group however does not collect any income from external sources, does not conduct audits and income is less than expenses
6	Additional indicators	10	3	IWUA owns some agricultural equipment, woman and youth involvement is more than 30% and leaders offer their services for free
Total Score		100	58	The IWUA is rated as performing poorly

(3)Kaumbura Irrigation Scheme

Table 4.3.9 Average Ratings – Kaumbura Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	15	IWUA has all the O&M plans. This scheme is under rehabilitation and is operational
2	O & M Plans	15	11	At least 50-89% of all the plans were

	implementation			implemented
3	Evaluation O & M operations	10	7	The area of scheme under irrigation is over 50%, the level of production over 60%, irrigation facilities are in good status, efficiency in collection of water fee is almost 80% and the cropping intensity is 2 seasons per annum
4	Organizational performance	30	28.5	The group is excellent in all IWUA organisation areas except that it is still registered as a SHG and the attendance of members to communal work is at 75-94%.
5	Financial performance	20	12	The IWUA has a financial plan, operates a bank account, is able to collect almost 80% of targeted income and utilises all income on O&M. However, the group does not conduct audit, has a small bank balance and its income is less than expenses
6	Additional indicators	10	3	Women and youth involvement is more than 30%, leaders render their services for free and the group has undertaken some physical improvement of their scheme using own funds (canal extension)
Total Score		100	76.5	The IWUA is rated as performing Satisfactorily

(4)Kiamariga/Raya Irrigation Scheme

Table 4.3.10 Average Ratings – Kiamariga/Raya Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	13	The IWUA has all plans except the maintenance and repairs one. This scheme is operational undergoing extension of the pipeline
2	O & M Plans implementation	15	11	At least 50-89% of all the plans were implemented
3	Evaluation O & M operations	10	7	The area of scheme under irrigation is over 50%, the level of production over 60%, irrigation facilities are in good status, efficiency in collection of water fee is almost 80% and the cropping intensity is 2 seasons per annum
4	Organizational performance	30	20	IWUA is registered as a SHG, its membership is between 60-79%, important meetings are held frequent, elections are held as per bylaws, conflicts

				are resolved internally and attendance of members to group meetings is good. The group however holds general assembly meetings rarely and attendance of members is low.
5	Financial performance	20	13.5	IWUA has a budget, operates a bank account, is able to collect all targeted income from members, utilises all income on O&M and IWUA income is slightly more than expenses. However, the group bank balance is small, does not conduct audit
6	Additional indicators	10	1.5	Women and youth involvement in IWUA activities is at least 30% and leaders offer their services to the IWUA for free
Total Score		100	66	The IWUA is rated as performing fairly

(5)Tuhire Challa Irrigation Scheme

Table 4.3.11 Average Ratings – Tuhire Challa Irrigation Scheme

S/No	Category	Full Score	Actual Score	Remarks
1	O & M planning	15	11	The group has a water distribution plan and water fee collection plan but no cropping calendar and maintenance and repairs plan
2	O & M Plans implementation	15	3	Less than 50% of members followed the water distribution plan while 50-89% of members paid the water fee as per plan
3	Evaluation O & M operations	10	5.5	The area under irrigation is below 50%, production below 50% of target, irrigation facilities in good working condition, cropping intensity two seasons per annum and efficiency in water fee collection at 60-79%
4	Organizational performance	30	22.5	IWUA is registered as a SHG, its membership is between 60-79%, important meetings are held frequent, maintains important group records, elections are held as per bylaws, conflicts are resolved internally and attendance of members to group meetings is good. The group filing system is fair and general assembly meetings are rarely held and lowly attended. Communal work is also lowly attended
5	Financial performance	20	13	IWUA has a budget, operates a bank account, is able to collect all targeted income from members, utilises and all

				income on O&M a. However, the group bank balance is small, does not conduct audit and income is less than expenses
6	Additional indicators	10	6	IWUA owns some agricultural equipment, has an office, women and youth involvement is more than 30%, has some network ties with other institutions (CDF), leaders offer services for free and has undertaken physical improvement of scheme using own funds
Total Score		100	61	The IWUA is rated as performing poorly

4.4 Performance evaluation of schemes after capacity building program (Comparison of Baseline and Final FS Results)

4.4.1 Performance Evaluation – Batch 1

Table 4.4.1 Summary of Comparisons – Batch 1 Schemes

SCHEME (BATCH 1)		Kasokoni		Mdachi		Olopito		Gatitu/ Muthaiga		Kaben		Murachaki		Tumutumu		Muungano	
Category	Max Score	FS1	FS2	FS1	FS2	FS1	FS2	FS1	FS2	FS1	FS2	FS1	FS2	FS1	FS2	FS1	FS2
Part I: O&M and IWUA organization	90																
Operations and Maintenance																	
1) O&M planning	15	13	13	7.5	7.5	7.5	9	7.5	9	7.5	7.5	7.5	9	7.5	9	7.5	9
2) O&M implementation	15	9	8	0	0	0	0	0	1	0	0	0	2	0	2	0	2
3) O&M evaluation	10	6	7.5	0.5	0	0	2	1.5	4.5	2	0	0	1	0	2.5	0	4.5
IWUA organization	30	23.5	17.5	19.5	18.5	23	13.75	21.5	22.5	22.5	23.5	24	22	19.25	18	26	26
Financial Management	20	9.5	9.5	4.5	6.5	5	8.5	4.5	10.5	3	10	4.5	11.5	5.5	11.5	5	13
Part II: Additional indicators	10	3	2.5	2	3	2	3	2	1.5	3.5	1.5	4	3	3	3	3	3.5
Aggregate Score	100	64	58	34	35.5	37.5	36.25	37	49	38.5	42.5	40	46.5	35.25	45	41.5	58
IWUA ranking		Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor

4.4.2 Individual Scheme Comparison – Batch 1

(1)Kasokoni Irrigation Scheme

Table 4.4.2 Individual Scheme Comparison – Kasokoni

KASOKONI IRRIGATION SCHEME				
Category	Max Score	FS1	FS2	REMARKS
Part I: O&M and IWUA organization	90			
Operations and Maintenance				
1) O&M planning	15	13	13	
2) O&M implementation	15	9	8	The was due to the reduction in the level of implementation of the maintenance and repairs plan attributed to the scheme being under construction
3) O&M evaluation	10	6	7.5	The increase in score is on cropping intensity which is rated at 2 seasons per annum and the level of production in the scheme which improved from below 50% to 50-59% of expected yields
IWUA organization	30	23.5	17.5	The decrease in scores is attributed to the inactiveness of many members to scheme affairs. The general assembly meetings reduced; the attendance to both general assembly and the committee meetings reduced; the group is not holding elections as per the bylaws due to lack of quorum and lack of willingness by members to hold elections.
Financial Management	20	9.5	9.5	
Part II: Additional indicators	10	3	2.5	The level of involvement by the women and youth reduced from over 30% to at least 30%
Aggregate Score	100	64	58	The reduction in score is attributed to weaknesses in IWUA organization as well as lack of cohesion among group members
IWUA ranking		Poor	Poor	

(2)Mdachi Irrigation Scheme

Table 4.4.3 Individual Scheme Comparison – Mdachi

MDACHI IRRIGATION SCHEME				
Category	Max Score	FS1	FS2	REMARKS
Part I: O&M and IWUA organization	90			
Operations and Maintenance				

1) O&M planning	15	7.5	7.5	
2) O&M implementation	15	0	0	
3) O&M evaluation	10	0.5	0	
IWUA organization	30	19.5	18.5	Reduction in score is attributed to reduction in the number of farmers attending communal work activities.
Financial Management	20	4.5	6.5	The increase in the score is attributed to increase in the rate of collections of income and fund utilization towards IWUA affairs
Part II: Additional indicators	10	2	3	
Aggregate Score	100	34	35.5	This is attributed to better collection of farmers contributions and accountability on the utilization of IWUA income
IWUA ranking		Poor	Poor	

(3)Olopito Irrigation Scheme

Table 4.4.4 Individual Scheme Comparison – Olopito

OLOPITO IRRIGATION SCHEME				
Category	Max Score	FS1	FS2	REMARKS
Part I: O&M and IWUA organization	90			
Operations and Maintenance				
1) O&M planning	15	7.5	9	Increase is attributed to the IWUA having a written contributions plan
2) O&M implementation	15	0	0	
3) O&M evaluation	10	0	2	Increase is attributed to the improvement in collection of members contributions
IWUA organization	30	23	13.75	This reduction is attributed to: Decrease in scheme membership, reduction in frequency of holding general assembly meetings, elections not being held as per the scheme bylaws and reduction in the rate of attendance to members to committee and general assembly meetings
Financial Management	20	5	8.5	Increase is attributed to the improved utilization of funds towards O&M
Part II: Additional indicators	10	2	3	Increase is attributed to the IWUA having an office
Aggregate Score	100	37.5	36.25	The reduction is generally attributed to lack of commitment by IWUA members to group meetings and reduction in scheme membership
IWUA ranking		Poor	Poor	

(4)Gatitu/Muthaiga Irrigation Scheme

Table 4.4.5 Individual Scheme Comparison – Gatitu/Muthaiga

GATITU/MUTHAIGA IRRIGATION SCHEME				
Category	Max Score	FS1	FS2	REMARKS
Part I: O&M and IWUA organization	90			
Operations and Maintenance				
1) O&M planning	15	7.5	9	The increase is attributed to the written down contribution plans
2) O&M implementation	15	0	1	The score is attributed to the implementation of the member contributions plan in which at least 50% of members paid
3) O&M evaluation	10	1.5	4.5	The increase is attributed to the improvement in the level of production from below 50% to over 50% as well as the improvement in the condition of irrigation structures and facilities
IWUA organization	30	21.5	22.5	Improvement in quality of the filing system and record keeping from poor to good
Financial Management	20	4.5	10.5	The increment is attributed to the IWUA having a written financial plan, improvement in collection of member contributions and utilization of IWUA funds towards scheme affairs only
Part II: Additional indicators	10	2	1.5	
Aggregate Score	100	37	49	The increment in score is attributed to improved record keeping and financial management
IWUA ranking		Poor	Poor	

(5)Kaben Irrigation Scheme

Table 4.4.6 Individual Scheme Comparison – Kaben

KABEN IRRIGATION SCHEME				
Category	Max Score	FS1	FS2	REMARKS
Part I: O&M and IWUA organization	90			
Operations and Maintenance				
1) O&M planning	15	7.5	7.5	
2) O&M implementation	15	0	0	
3) O&M evaluation	10	2	0	
IWUA organization	30	22.5	23.5	The improvement is on conflict resolution which improved to being internal from conflict resolution being aided by local administration
Financial Management	20	3	10	The IWUA was able to open a bank account and bank some money even though the balance is still below

				Ksh.100,000. The IWUA fund collection and utilization greatly improved.
Part II: Additional indicators	10	3.5	1.5	IWUA initially had rented an office but they closed it down. The IWUA also reported that there were no longer any networks with NGOs within the area
Aggregate Score	100	38.5	42.5	Increase is attributed to improved financial management
IWUA ranking		Poor	Poor	

(6)Murachaki Irrigation Scheme

Table 4.4.7 Individual Scheme Comparison –Murachaki

MURACHAKI IRRIGATION SCHEME				
Category	Max Score	FS1	FS2	REMARKS
Part I: O&M and IWUA organization	90			
Operations and Maintenance				
1) O&M planning	15	7.5	9	Improvement attributed to the IWUA having a written monthly contribution plan for members
2) O&M implementation	15	0	2	Increment attributed to the implementation of the contribution plan where 50-89% of members paid
3) O&M evaluation	10	0	1	Score in cropping intensity being 2 seasons per annum
IWUA organization	30	24	22	Reduction in score attributed in reduction in the number of farmers attending meetings (both committee meetings and general assembly meetings where less than 50% of members attend)
Financial Management	20	4.5	11.5	The increase in score is attributed to the fact that the IWUA has a written financial plan, was able to improve collections from members and utilize all the funds obtained in scheme affairs
Part II: Additional indicators	10	4	3	Gender issues reduced the score as there were reduced number of women and youth involvement in IWUA management
Aggregate Score	100	40	46.5	Score is attributed to improved financial management
IWUA ranking		Poor	Poor	

(7)Tumutumu Irrigation Scheme

Table 4.4.8 Individual Scheme Comparison – Tumutumu

TUMUTUMU IRRIGATION SCHEME				
Category	Max Score	FS1	FS2	REMARKS
Part I: O&M and IWUA organization	90			

Operations and Maintenance				
1) O&M planning	15	7.5	9	Improvement attributed to the IWUA having a written monthly contribution plan for members
2) O&M implementation	15	0	2	Increment attributed to the implementation of the contribution plan where 50-89% of members paid
3) O&M evaluation	10	0	2.5	Increase is attributed to improved efficiency in collection of contributions and the cropping intensity being 2 seasons per year
IWUA organization	30	19.25	18	The reduction is attributed to the reduction in frequency of holding general meetings and also reduction in the number of members attending meetings
Financial Management	20	5.5	11.5	Increase in score is attributed to improved bank balance as the IWUA has over Ksh.500,000 in the account, improved fund utilization and improved viability index
Part II: Additional indicators	10	3	3	
Aggregate Score	100	35.25	45	Increase in score is attributed to improved financial management
IWUA ranking		Poor	Poor	

(8)Muungano Irrigation Scheme

Table 4.4.9 Individual Scheme Comparison – Muungano

MUUNGANO IRRIGATION SCHEME				
Category	Max Score	FS1	FS2	REMARKS
Part I: O&M and IWUA organization	90			
Operations and Maintenance				
1) O&M planning	15	7.5	9	Increase is attributed to availability of a written contributions plan
2) O&M implementation	15	0	2	Increment attributed to the implementation of the contribution plan where 50-89% of members paid
3) O&M evaluation	10	0	4.5	The increase is attributed to the improved level of production, improved collection of contributions and improved cropping intensity to 2 seasons per year
IWUA organization	30	26	26	No change in IWUA organization
Financial Management	20	5	13	The increase is attributed to the availability of a financial plan, improved collection of member contributions to 100% and improved fund utilization on IWUA affairs to 80-100%
Part II: Additional indicators	10	3	3.5	Increase is due to improvement in youth and women involvement in IWUA management
Aggregate Score	100	41.5	58	Generally, increase is attributed to improved IWUA organization and financial management
IWUA ranking		Poor	Poor	

4.4.3 Performance Evaluation – Batch 2

Table 4.4.10 Summary of Comparisons – Batch 2 Schemes

SCHEME (BATCH 2)		Mangudho		Shulakino		Kiamariga/ Raya		Kaumbura		Tuhire Challa	
Category	Max Score	FS1	FS2	FS1	FS2	FS1	FS2	FS1	FS2	FS1	FS2
Part I: O&M and IWUA organization	90										
Operations and Maintenance											
1) O&M planning	15	7.5	11	9.5	13	13	13	13	15	11	11
2) O&M implementation	15	0	5	1	5	3	11	8	11	7	3
3) O&M evaluation	10	3	6.5	3	4.5	5	7	5.5	7	5.5	5.5
IWUA organization	30	5.5	21	17.5	18	20	20	24	28.5	20.5	22.5
Financial Management	20	3.5	11.5	5.5	10	11.5	13.5	11	12	9.5	13
Part II: Additional indicators	10	3	3	3	3.5	2	1.5	3	3	1	6
Aggregate Score	100	23.5	58	39.5	54	54.5	66	64.5	76.5	54.5	61
IWUA ranking		Poor	Poor	Poor	Poor	Poor	Fair	Poor	Satisfactory	Poor	Poor

4.4.4 Individual Scheme Comparison – Batch 2

(1) Shulakino Irrigation Scheme

Table 4.4.11 Individual Scheme Comparison – Shulakino

SHULAKINO IRRIGATION SCHEME				
Category	Max Score	FS1	FS2	REMARKS
Part I: O&M and IWUA organization	90			
Operations and Maintenance				
1) O&M planning	15	9.5	13	Increase is attributed to availability of cropping calendar and a members contribution plan
2) O&M implementation	15	1	5	Increase is on implementation of the cropping calendar and collections plan
3) O&M evaluation	10	3	4.5	Increase attributed to improved level of production and improved efficiency in collections
IWUA organization	30	17.5	18	Increase in score is on improved attendance of members to communal work
Financial Management	20	5.5	10	Increase attributed to improved collection of IWUA income from members and increase utilization of IWUA funds on O&M
Part II: Additional indicators	10	3	3.5	The group now owns some agricultural tools like pangas and jembes
Aggregate Score	100	39.5	54	Increase attributed to availability of written O&M plans and improved financial management
IWUA ranking		Poor	Poor	

(2) Mangudho Irrigation Scheme

Table 4.4.12 Individual Scheme Comparison – Mangudho

MANGUDHO IRRIGATION SCHEME				
Category	Max Score	FS1	FS2	REMARKS
Part I: O&M and IWUA organization	90			
Operations and Maintenance				
1) O&M planning	15	7.5	11	Increase is attributed to availability of cropping calendar and a members contribution plan
2) O&M implementation	15	0	5	Increase is on implementation of the cropping calendar and collections plan
3) O&M evaluation	10	3	6.5	Increase is due to improved status of the irrigation facilities as well as improved level of production
IWUA organization	30	5.5	21	The increase in score is attributed to the following: <ul style="list-style-type: none"> - IWUA registering as a SHG - Availability of the members' list - Availability of IWUA bylaws - Group holding elections as per bylaws

				<ul style="list-style-type: none"> - Improved regularity in holding general assembly and committee meetings - Increase number of members attending the general assembly and committee meetings
Financial Management	20	3.5	11.5	Increase in score attributed to: <ul style="list-style-type: none"> - IWUA having a written financial plan - Availability of a bank account - Improved collection of IWUA income - Utilization of all of IWUA income on group operations
Part II: Additional indicators	10	3	3	
Aggregate Score	100	23.5	53	Generally, improved performance attributed to improved group organization and financial management
IWUA ranking		Poor	Poor	

(3)Kaumbura Irrigation Scheme

Table 4.4.13 Individual Scheme Comparison – Kaumbura

KAUMBURA IRRIGATION SCHEME				
Category	Max Score	FS1	FS2	REMARKS
Part I: O&M and IWUA organization	90			
Operations and Maintenance				
1) O&M planning	15	13	15	Increase due to availability of a written cropping calendar
2) O&M implementation	15	8	11	Score increase is due to implementation of the cropping calendar
3) O&M evaluation	10	5.5	7	Attributed to improved level of production and efficiency in collecting members contributions
IWUA organization	30	24	28.5	Attributed to increase IWUA membership to 100% and internal conflict resolution
Financial Management	20	11	12	Attributed to increase in collection of members funds
Part II: Additional indicators	10	3	3	
Aggregate Score	100	64.5	76.5	Increase in score attributed to improvement in handling scheme O&M and financial management
IWUA ranking		Poor	Satisfactory	

(4)Kiamariga/Raya Irrigation Scheme

Table 4.4.14 Individual Scheme Comparison – Kiamariga/Raya

KIAMARIGA/RAYA IRRIGATION SCHEME				
Category	Max Score	FS1	FS2	REMARKS
Part I: O&M and IWUA organization	90			

Operations and Maintenance				
1) O&M planning	15	13	13	
2) O&M implementation	15	3	11	Score increase attributed to implementation of O&M plans including cropping calendar, water distribution and maintenance and repairs plans
3) O&M evaluation	10	5	7	Increase is from improved status of the irrigation facilities and increase area of scheme under irrigation
IWUA organization	30	20	20	
Financial Management	20	11.5	13.5	Increase is due to increase utilization of IWUA funds on IWUA operations
Part II: Additional indicators	10	2	1.5	Decrease is due to reduction in women and youth involvement in IWUA management
Aggregate Score	100	54.5	66	Generally, increase in score is attributed to development and implementation of O&M plans
IWUA ranking		Poor	Fair	

(5)Tuhire Challa Irrigation Scheme

Table 4.4.15 Individual Scheme Comparison – Tuhire Challa

TUHIRE CHALLA IRRIGATION SCHEME				
Category	Max Score	FS1	FS2	REMARKS
Part I: O&M and IWUA organization	90			
Operations and Maintenance				
1) O&M planning	15	11	11	
2) O&M implementation	15	7	3	Reduction in score is attributed to inefficiency in implementing the O&M plans.
3) O&M evaluation	10	5.5	5.5	
IWUA organization	30	20.5	22.5	Increase in score is attributed to improved regularity of holding meetings and increase in number of members attending the meetings
Financial Management	20	9.5	13	Increase attributed to improved collection of member contributions and utilization of IWUA funds
Part II: Additional indicators	10	1	6	Increase attributed to : <ul style="list-style-type: none"> - IWUA owns some agricultural equipment (jembes and pangas) - IWUA networking with other development institutions like CDF (Community Development Fund) - Improved women and youth involvement in IWUA management - Physical improvement of scheme using own funds
Aggregate Score	100	54.5	61	Increase attributed to better O&M planning and additional factors beyond irrigation
IWUA ranking		Poor	Poor	

4.5 Impacts of the Capacity Building Program

4.5.1 Batch 1 Schemes

Following the trainings, there has been a big impact mainly on IWUA organization and financial management in all the schemes. The scores of the functionality survey, however, remained low and all the schemes under Batch 1 were ranked as poor.

In IWUA organisation, the groups have been able to identify and update their list of members with details of land ownership. They have also been able to formulate and update their bylaws as per the recommendations during the trainings. For those IWUAs who had not registered, they have managed to register as self-help groups. The IWUAs have managed to improve on the frequency in holding block, committee and general assembly meetings with the attendance also improving. Commitment to communal work within the IWUA has greatly improved with most of the schemes being able to contribute towards the excavation of canals and pipelines during scheme construction, even though this was a challenge to Olopito Irrigation Scheme.

After the training on leadership and conflict management, most of the scheme evaluated their leadership vis a vis the leadership standards and principles and some called for elections. These include Mdachi, Gatitu/Muthaiga and Kaben. In the rest of the schemes, the leaders improved on their style of leadership and commitment to service. On financial management, the project after Unit 3 training provided each IWUA with a set of books to assist them in opening the necessary records. These included a membership register, minutes book, cash book, petty cash book, income and expenditure book, discipline book, fund development book and a file where all receipts and other documents would be filed. The capacity building team in collaboration with the Sub-county officers assisted the group leaders in opening the books and assisting them to fill them. Most of the schemes were able to update the membership register, minutes book, petty cash receipt book, records of communal work and filing of documents. The cash book and income and expenditure book were still a challenge at the time of conducting the final functionality survey.

4.5.2 Batch 2 Schemes

Most of the schemes under Batch 2 were either being rehabilitated or were extending the water distribution network. This means that most of the schemes were operational.

The schemes ranking improved greatly as shown in the summary of final results. Kaumbura irrigation scheme was ranked as satisfactory with 76.5points. Kiamariga/Raya also improved from being poorly rated at 54.5points to fairly rated at 66points. The rest of the schemes were still ranked as poor even though their score had improved greatly. Mangudho scheme was the most improved having risen from 23points to 58points.

The impact of the capacity building program was that most of these IWUAs were able to come up with O&M plans and in some schemes those have already started being implemented. Following the training and assistance by the agriculture team in the project, the IWUAs were able to come up with a cropping calendar. The training on Irrigation System Management enabled the groups to come up with water distribution plans and O&M fee contribution plans.

Most of the groups however remarked that they were yet to come up with a written maintenance and repairs plan.

On the IWUA organisational structure, the groups were able to come up with an updated list of members, register as self-help groups (Shulakino, Mangudho), formulate proper IWUA bylaws, come up with the recommended IWUA organisational structure, hold elections (Shulakino and Mangudho), maintain important records, improve frequency in holding committee and general assembly meetings, increase membership, improve attendance of members to scheme activities and communal work. The schemes hold elections as per bylaws and they are able to resolve conflicts without aid from an external person.

On financial management, the groups have been able to open bank accounts, set and collect monthly collections from members, some have financial budgets and all utilise most if not all of the IWUA income on O&M.

On additional factors beyond irrigation, most have their leaders offering their services for free and the women and youth involvement is more than the 30% threshold.

4.6 Areas of follow up

4.6.1 Batch 1 Schemes

Since these schemes are not yet in the operational phase, they will require to be assisted in coming up with O&M plans and implementing the plans. A follow-up of Unit 5 training is therefore necessary.

The groups also need to be encouraged to improve members contributions towards O&M since the bank balances they have are very small except in Tumutumu who have over Ksh.500,000 in their bank account.

The groups require beyond training on financial management and especially making entries in to the various finance books provided by the project. The local government staff is in a better position to assist the IWUAs in setting up and maintains their books as per expectation.

4.6.2 Batch 2 Schemes

The sites currently have O&M plans. The groups were assisted to come up with the plans by the PMT. The farmers themselves need to learn how to formulate these plans without any external aid for scheme sustainability.

The schemes have serious challenges in book keeping and require hands-on training on how to record the various transactions in these books. The IWUAs also need to be encouraged and challenged to improve on member contributions.

4.7 Lessons Learnt

4.7.1 Questionnaire

The questionnaire was written in English. The low literacy level of the respondents therefore required an enumerator to translate the questions in order to obtain the responses from the farmer participants. This involvement by the enumerator may have resulted in biasness as the farmers may have withheld some facts which would have otherwise been disclosed if the questionnaire was administered in a language that they understood.

4.7.2 Selection of Respondents

The respondents were not randomly selected. The Chairman of the Scheme was requested to invite a maximum of 30 IWUA members inclusive of the committee members for this exercise. The sample was therefore not representative of the total population. Future surveys should consider random selection of respondents to ensure the representation and accuracy of the results. The sample size was sometimes too small, for example, in Shulakino, only 6 farmers took part in the final FS. In other instances, there was only one IWUA official. In such instances it is difficult to obtain some information that is only possible from officials.

4.7.3 Respondent knowledge, recall, perceptions and bias

The data collected was influenced, as in all question-based surveys, on respondent knowledge of the IWUA, the accuracy of their recall, and on various biases that influence responses for example the farmers exaggerations, among other factors. Interviewer skills and approach were also important; particularly the extent of probing in questions demanding sensitive information for example conflicts and finances.

4.7.4 Availability of IWUA documents

The officials of the IWUA did not avail some of the documents that were required for confirmation of some of the responses. Some responses are therefore subject to confirmation once the documents are availed. The farmers' perception may have been the reason they withheld some of the documents like financial plans, receipt books and bank statements.