VI.6.5 Marshland Agricultural Development Project

Table VI.6.5.1 Agreement between Farmers and Local Authorities concerning Usufruct of Cultivation at Muzi-Cyeru Marshland

Amasezerano y'itangwa ry'ubutaka nuburenganzira busanzwe bwoguhinga mugishanga cya Muzi-Cyeru

Hagati y'umurenge wa Ntarama, Akagali ka Kanzenze N'abahinzi

Mu rwego rwo gushyira mu bikorwa umushinga w' "inyigo ku iterambere ry'icyaro n'ubuhinzi mu karere ka Bugesera, intara y'iburasirazuba, Republika y'urwanda" (uzwi kwizina ry'inyigo). Umurenge wa Ntarama, Akagari ka Kanzenze N'abahinzi banyirimirima nabasanzwe bafite uburenganzira bwoguhinga (bazwi ku'izina ry'abahinzi) bahisemo ahazakorerwa umushinga mugishanga cya Muzi-Cyeru, mu rwego rwo gutunganya no guteza imbere ubuhinzi biterwa inkunga n'ikipe ya JICA ikora inyigo nk'umwe mu mushinga wicyitegererezo.

Kubera iyo mpanvu n'icyemezo cyogutunganya imirima izakorerwamo umushinga wavuzwe haruguru, ubuyobozi nabobireba ahazakorerwa umushinga, bemeye ibi bikurikira.

1) Nyirubutaka Bw'ahazakorerwa umushinga ni reta (Akarere ka Bugesera, umurenge wa Ntarama, n'Akagali ka Kanzenze).
2) Uburenganzira bwo guhinga aho umushinga uzakorerwa buzahabwa Akagali ka Kanzenze n'abahinzi ntakiguzi mugihe hazaba hakorerwa umushinga.
3) Mugihe inyigo izaba irangiye, nigihe umushinga woguhinga umucyeri uzaba utagifite akamaro, impande zombi zirebwa namasezerano, nyirubutaka ashobora kubusubirana.

Kanzenze

Kamena ____, 2007

Amazina y'abahinzi	Umukono
1. Rutagimire Leonard	
2. Gihana Wensislan	
3. Rusanganwa Viateur	
4. Kayiranga Elinarte	
5. Kalinamanya Trenfore	
6. Rusingiza Felicien	
7. Nshimyumurenyi Agustin	
8. Jean Pierre Rugambwa	
9. Uwimana [illegible]	
10. Nshimyimana J. Berchmas	
11. Ndabonziza JMV	
12. Hakizimana Gratien	
13. Uwihanganye Vedaste	
14. Mukamujenzi Jeanne	
15. Mukashamangaso [illegible]	
16. Nsengiyumva Daniel	
17.	
18.	
19.	
20.	

Uhagarariye Umurenge — Umukono

NIWENSHUTI Jean de [illegible]

Uhagarariye Akagali — Umukono

MUKESHIMANA Laurent

Figure VI.6.5.1 Implementation Organization for Paddy Field Construction

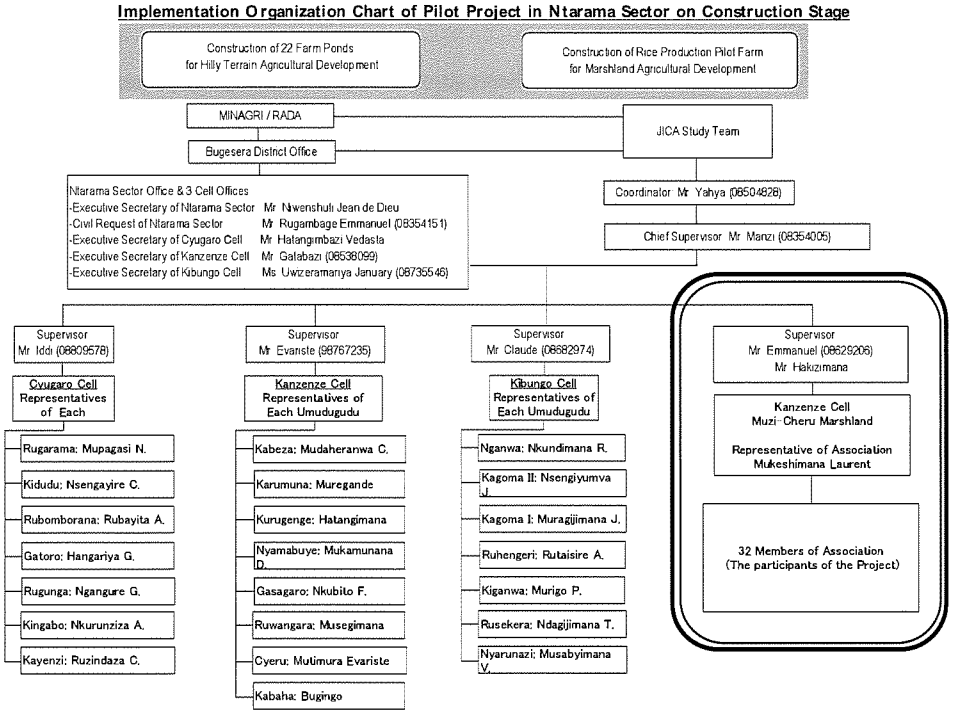


Figure VI.6.5.2 Plan of Operation for Rice Cultivation Practice

Pilot Project: Marshland Agricultural Development in Muzi-Cyeru

Plan of Operation **(Kanzenze Cell Version-1, As of 27/06/2007)**

Activity	Schedule										Inputs	Responsible Person (s), Group
	2007							2008			Personnel	
	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar		
Preparation Works:												
1 Topo Survey	■										Surveyor	JICA Study Team
2 Design	■										JICA Study Team	JICA Study Team
Construction Stage:												
3 Stripping												
4 Construction of main road with canal												
Main road : L=120m, Canal : L=320m		1 month									Beneficilaires	Beneficilaires
5 Construction of footpath : L=1,080m		■										
6 Construction of branch road with canal : L=175m												
Branch road : L=175m, Canal : L=215m												
Farming Practice Stage:												
7 Land leveling		▼	■									
8 Sowing on nursery			▲ Beginning of August									
9 Transplanting rice seed			▲ Middle of August								Beneficilaires	Beneficilaires
10 Farming practice			■	■	■	■	■	■	■	■		
11 Harvesting								▲ Middle of January				
12 Post harvesting operation								■	■	I		
Monitoring & Evaluation Stage:												
13 Interim Monitoring & Evaluation		■	■	■	■	■	■	■	■	■	Beneficiaries	Association
											JICA Study Team	JICA Study Team

Figure VI.6.5.3 Typical Design Plan of Paddy Field Reclamation in Muzi-Cyeru Marshland

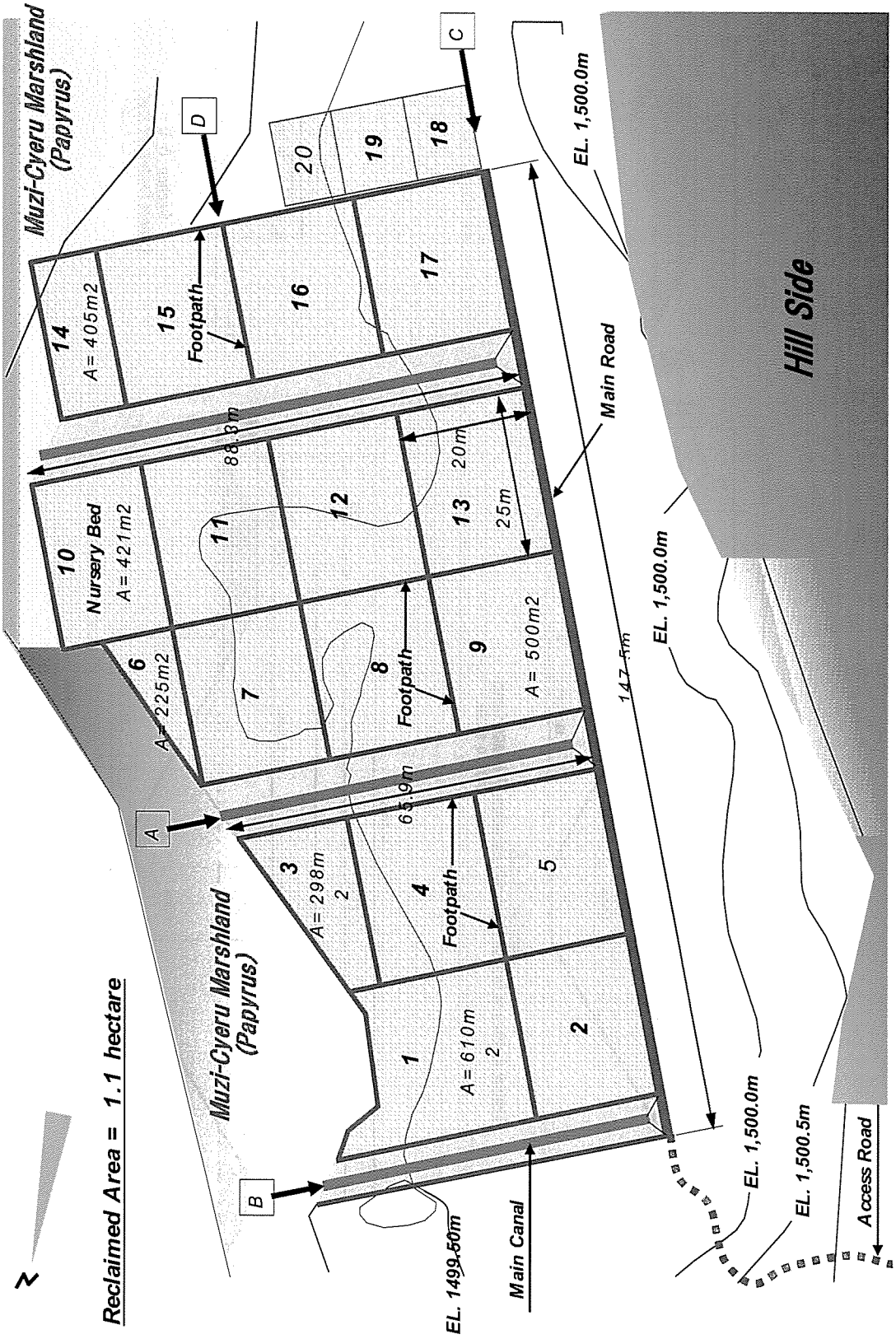
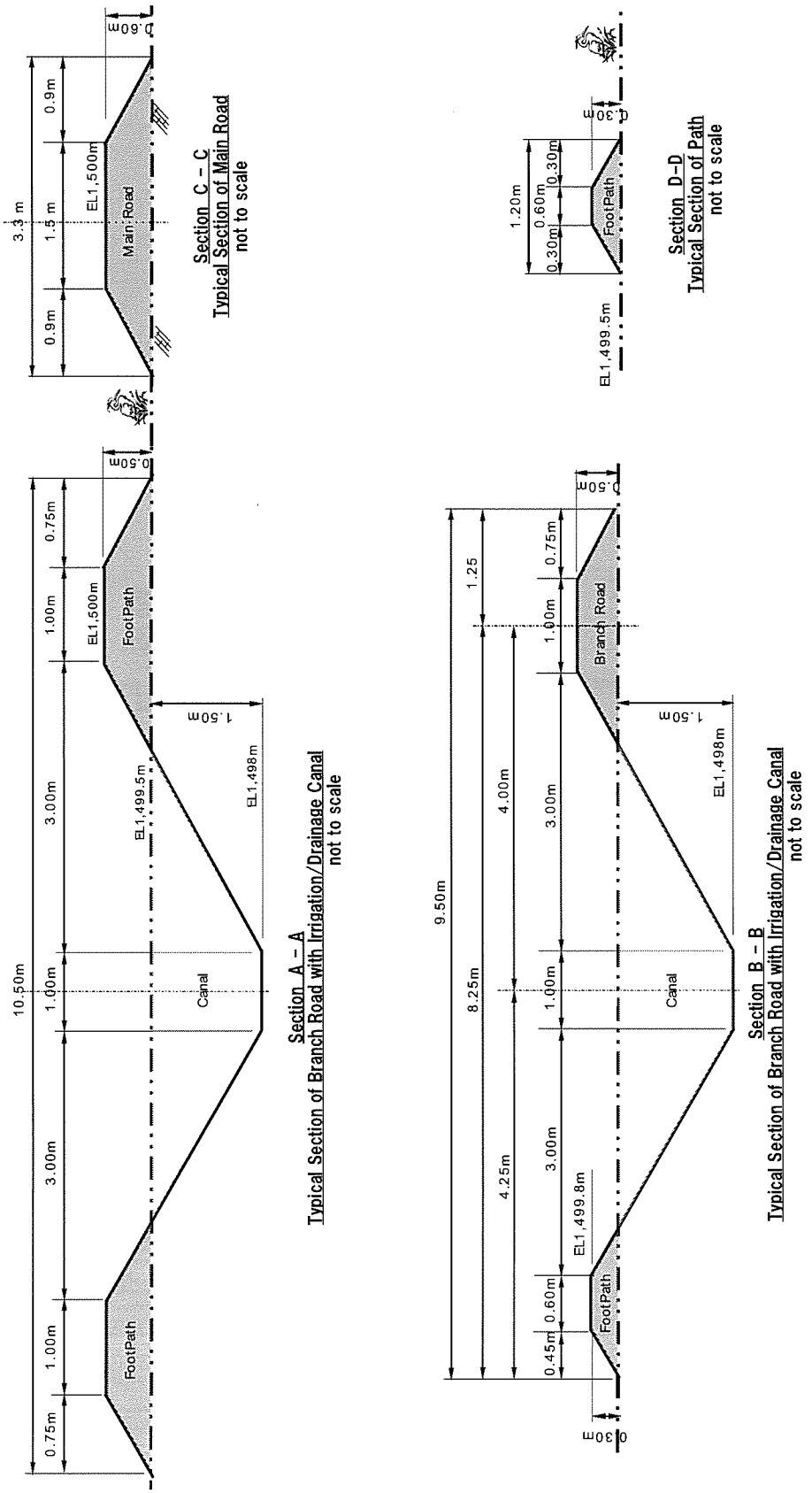
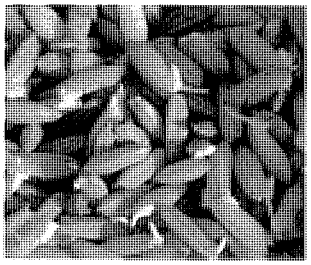
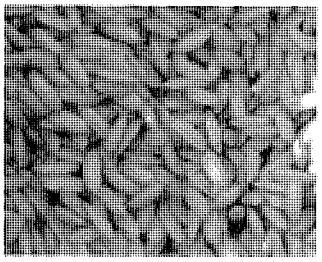


Figure VI.6.5.4 Typical Section of road and Canal for Paddy Field Reclamation Marshland

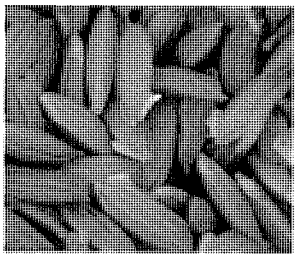




a. Gakire(a bit over growth of bud)



b. Intsinzi (Still not germinated yet)

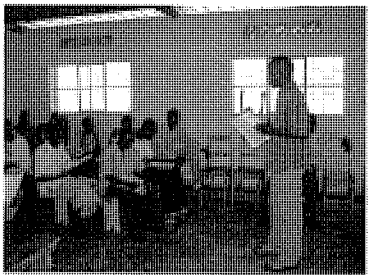


c. Insindagirabigega (suitable condition for sowing)

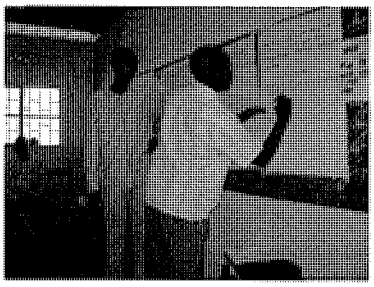
Figure VI.6.5.5 Variety Difference of Pre-germinated Conditions among Three

Table VI.6.5.2 WS Program

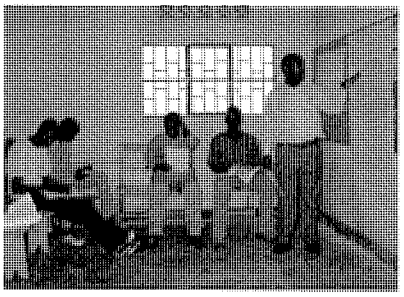
Program No		Outline of Discussion
3	Briefing of JICA PP and its components, implementing framework	- Objectives of marshland agricultural development - Project components and supporting activities by JICA - Division duties among the stakeholders concerned - Formation of Muzi Cyeru Rice Association
4	Formulation of Plan of Operation	Nomination of board members for the Muzi Cyeru Rice Association Operation and Maintenance framework for the farming implements and materials Operation and maintenance of the pilot farm Management system of NERICA plot Visiting place for study tour and tentative schedule
5	Guidance of Rice Cultivation	- Briefing of rice farming practice by each growth stage along to a handout of the technical guideline
6	Question and Answer	- Overall discussion about PP implementing framework



Representative of Bugesera District gave opning remarks



Selection of Board member in Muzi Cyeru Rice Association



Technical guidance of farming practice by RADA rice expert

The Program for the Workshop of the Marshland Agricultural Development in Muzi Cyeru Marshland

1. Date: October 3 (Wednesday), 2007

2. Place & Time: The Kanzenze Cell Office 9:00-14:00 PM

3. Participants

- Total number of the Participants: Around of 43 as below:

Stakeholders		No of the Participants
1	PP Beneficiary	32 members
2	Local Agronomist	1 member

3	Local Agronomist	1 member
4	Kanzenze Cell Office	2 member (ES and Cell Coordinator)
5	Ntarama Sector Office	1 member (Agronomist)
6	Bugesera District Office	1 member (C/P Agronomist assigned to the JICA Study Team)
7	RADA	1: Rice Expert
8	JOCV	1 member
9	JICA Study Team	3 members(Facilitator + Secretary +Expert)
Total		43 members

4. Objectives

The workshop is aimed at;

a. confirming an overall implementing framework of the Pilot Project for the Marshland Agricultural

Development for introduction of rice,

b. formulating a plan of operation with the beneficiary farmers and,

c. giving a technical guidance of rice cultivation in order to launch the said PP smoothly.

4-1. Overall Outline of the Pilot Project

The pilot project of Marshland Agricultural Development supported by JICA is aimed at enhancing food security through rice production by reclaiming paddy fields in marshland and using intensive labor force to develop marshland pursuit of possibility of marshland development by labor force.

4-2. Component of the Marshland Agricultural Development for Introduction of Rice

The components supported by ***JICA*** are confined to the items below:

	Components	Specification							
1	Reclamation of Paddy Fields	-Around 1.0 ha of paddy field with 500 m^2 plot as standard :							
2	Inputs	Improved rice seeds from ISAR	1	Insinzi:10 kg					
			2	Gakire:10 kg					
			3	Insindagirabbigega: 10 kg					
		Chemical fertilizers	-NPK (17-17-17): 5 bags=250 kg -Urea: 2 bags=100 kg						
		Agro-chemicals	-Necessary amount for control of pest/disease						
4	Farming implements	1	Rotary weeder	10		6	Plastic sheets	20	
		2	Pedal type -thresher	4		7	T- shape leveler	16	
		3	Manual type sprayer (15 Lt)	4		8	Balance (20 kg)	1	
		4	Mobile pump	2		9	Plastic ball	10	
		5	Fuel			10			
5	Supporting Activity	1	Technical guidance of rice cultivation						
		2	Operation and Maintenance of Consolidated Paddy Field in terms of technical advise						

5. WS Program Schedule

		Program	Time	Remark
October 3(Wednesday), 2007		**9:00 - 14:00**		
1	Ntarama Sector	Opening Remark	5 min	

2	All Participants	Self Introduction	15 min	Participant List
3	JICA Study Team/Facilitator	-Briefing of JICA PP Outline: Overall PP Components and implementing framework outline	60 min	-Flip chart
4	Facilitator/ Agronomists	Formulation of Plan of Operation for the PP(farming Practice)	60 min	-Flip chart/ assignment of plot for each participant
5	RADA/JICA Study Team	Technical Guidance	60 min	Cropping calendar for rice production
6	Agronomists/JICA-RADA Study Team	Overall Discussion on the PP	60 min	Q&A about overall PP
7	JICA Study Team	Closing Remark	5 min	

6. Remark for WS Facilitation:

Program 3: Briefing of JICA PP outline

(1) Scope of Work for JICA

- Time Schedule of PP Implementation: May, 2007 - October 2008 (about one and half year)
- Plan of Operation for Farming Activity in the PP shall be made in the 2nd Kick-off workshop held on October 2nd, 2007 under participatory approach.
- First planting could be intensively supported by JICA Team but from the 2nd planting phase, Muzi Cyeru Rice Association should take initiatives for rice production and JICA team is confined to mainly monitoring and evaluation activities.
- JICA-RADA-ISAR assist the beneficiary farmers in terms of the following items:
  1) Input (Certified seed, chemical fertilizer, pesticide, some farming tools/implements such as thresher, winnower, rotary weeder, T-shape leveler, etc)
  2) Technical Guidance on rice farming practice by supplying technical guideline and carrying out OJT in the field.

(2) Scope of Work for Muzi Cyeru Rice Association

- **Responsibility of Muzi Cyeru Rice Association**
  - To produce improved rice varieties under participatory way in collaboration with ISAR, RADA, JICA joint team and the Agronomists in order to lean rice farming practice.
  - Operation and Maintenance (OM) of the paddy field properly in collaboration with the Agronomists.
- **Responsibility of the Beneficiary farmers in Muzi Cyeru Rice Association**
  - The harvested rice in each plot belongs to the beneficiary farmer allotted to the plot concerned.
  - Each member assigned to the plot concerned should take responsibility for rice cultivation in cooperation with the Agronomists.
  - In order to apply a cost- sharing-system to the said PP, the beneficiary farmers are subject to the obligation of certain amount of the produce supplying to the Muzi Cyeru Association,

and the amount should be agreed upon among the relevant stakeholders.

(3) Scope of Work for the Agronomists

A. Mr. Muragwankulku Eric/Bugesera

- Liaison work among the stakeholders concerned such as Cell/Sector/District Offices according to Necessity
- Giving guidance to the beneficiary farmers based on the technical guideline through the PP implementation together with other agronomists.
- Giving guidance of farming including NERICA to the beneficiary farmers for the farm pond.

B. Mr. Kabera Jean Paul/JICA

- Giving guidance to the beneficiary farmers based on the technical guideline through the PP implementation.
- Grasp the information related to rice farming practice from the outside resource such as District/RADA concerned so as to guide the beneficiary farmers properly in accordance to necessity.
- Make a biweekly report in English and Kinyarwanda and Submit to Mr. Yahya, local staff of JICA Study Team.

C. Mr.Hakizimana Bpmavemtire/JICA

- Recording of water level at three sites where staff gauges for measuring water level are placed.
- Support the beneficiary farmers for rice farming in collaboration with other Agronomists.

(4) Scope of Work for Ntarama Sector Office/Kanzenze Cell Office

- Monitoring regularly progress of the PP scheme and guide the Association including target farmers if necessary.

(5) Plan of Operation

1) Formation of Muzi Cyeru Rice Association

a. Selection of Board members

Position			Name	Block	Sex
1	President				
2	Vice President				
3	Secretary				
4	Treasury				
5	Inspector				
6	Block Leader	A			
		B			
		C			

2) Operation and Maintenance of Input, the delivered farming implements and constructed facility

How to manage properly the farming implements, equipments and constructed facility delivered to Kanzenze Cell Office so far should be determined among Muzi Cyeru Rice Association members.

a. Tool & Input:

	Item	No	Place	Responsibility
1	T-shape leveler	16		
2	Rotary Weeder	10		
3	Balance	1		
4	Plastic ball	10		
5	NPK			
6	Urea (100 kg)			
7	Pump	2		
8	Jerry can			
9	Paddy Fields			

b. Constructed Paddy Fields

	Reclamation Area	Quantity	Responsibility	Outline
1	Plots	17 plots		
2	Main Road	156 m		
3	Branch Road	435 m		
4	Foot Path	381 m		
5	Ring Levee	172 m		
6	Main Canal A	46 m		
7	Main Canal B	60 m		
8	Main Canal C	78 m		
9				

c. NERICA Plot

NERICA (implying New Rice for Africa) is just introduced to the Plot No.18 as newly provided plot. Key person in charge of the NERICA cultivation in cooperation with Agronomists should be determined among the 32 beneficiary farmers.

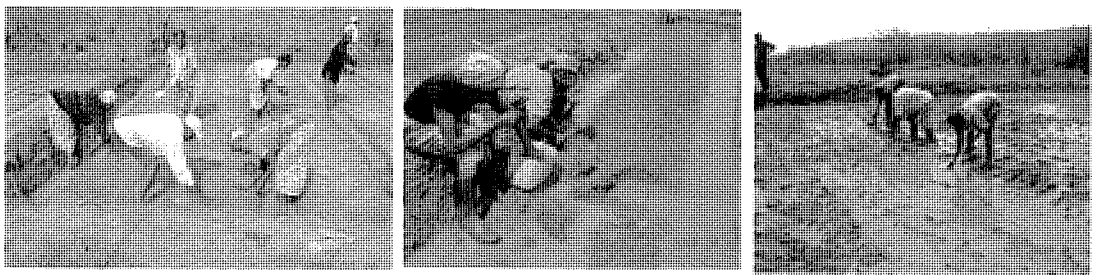


Figure VI.6.5.6 The 2nd Rice Cropping

Target Group: Results of the Project Impact Survey

In this project impact survey, the household profile was resurveyed to compare with the results of the socio-economic survey made by QP. Below Table shows family profile of the target group.

Table VI.6.5.3 List of the Beneficiary for the Pilot Project of Muzi Cyeru Marshland Agricultural Development

Plot No	Site	Name of the Household Head Year immigrated to			Family size	Family Labor	Decision maker (farming) 1.Husband, 2 Wife				Decision maker (Food) 1.husband, 2 wife, 3.Both, 4 Himself				Meals /day	Staple Food 1.Sorghum, 2 Maize, 3. H/Bean, 4. Banana, 5. Casava, 6. SW/Potato, 7 Rice, 8. other								
			Age	Year			1	2	3	4	1	2	3	4			1	2	3	4	5	6	7	8
1	Block A	Kaitankore Telosphore	52	Born	4	2			1			1			3	A	1	1	1	1	1	1	1	1
																B	1	1		1	1		1	1
																C	1	1	1	1	1	1	1	1
4		Mukandori Victore	68	1959	4	2		1				1			3	A	1	1	1	1	1	1	1	1
																B	1	1		1	1		1	1
																C	1	1	1	1	1	1	1	1
5		Rusanganwa Ciateur	53	1959	11	3			1			1			3	A	1	1	1	1	1	1		1
																B	1	1	1	1	1	1		1
																C	1	1	1	1	1	1	1	1
7	Block B	Kaneza Emestine(F)	47	Born	7	1		1				1			3	A	1	1	1	1	1	1	1	1
																B	1	1	1	1	1	1	1	1
																C	1	1	1	1	1	1	1	1
8		Karinamaryo Telesphore(M	42	Born	9	3			1			1			3	A	1	1	1	1	1	1	1	1
																B	1	1	1	1	1	1	1	1
																C	1	1	1	1	1	1	1	1
8		Ngabonziza J.M.V(M)	49	Born	6	2			1			1			3	A	1	1	1	1	1	1	1	1
																B	1	1	1	1	1	1	1	1
																C	1	1	1	1	1	1	1	1
10		Ndayisaba(M)	30	Born	3	2	1				1				2	A	1	1	1	1	1	1	1	1
																B	1	1	1	1	1	1	1	1
																C	1	1	1	1	1	1	1	1
13		Hakizumwami gratien(M)	46	Born	6	2			1				1		3	A	1	1	1	1	1	1		1
																B	1	1	1	1	1	1		1
																C	1	1	1	1	1	1	1	1
14	Block C	Rumanura Jean Bosco(M	42	Born	5	2			1			1			3	A	1	1	1	1	1	1	1	1
																B	1	1	1	1	1	1	1	1
																C	1	1	1	1	1	1	1	1
17		Kayitavu Onesphore(M)	51	1959	7	2			1			1			3	A	1	1	1	1	1	1	1	1
																B	1	1	1	1	1	1	1	1
																C	1	1	1	1	1	1	1	1
	Total				62	21	1	2	7	0	1	8	1	0	29		30	30	28	30	30	28	26	30
	Mean and percentage(%)		48.0		6.2	2.1	10	20	70	0	10	80	10	0	2.9		100	100	93	100	100	93	87	100

(a) Family

Age of the 10 sampled farm households ranged from 30 to 68 with 48 years old at average. Family size is around 6.2 persons, and 2.1 persons of them are engaged in farming activity. The seven household were indigenously grown up and the remainder were immigrated from outside in late 1950s.

(b) Decision making of Family's Economic Activity

70 % of decision making on farming activity is dominantly made by council system of couple, and 10 % was by husband or 20% by wife. 80 % of decision making of family food matter is dominantly

controlled by wife solely and 10 % by council system of couple or by husband, respectively.

(c) Intaking of meal per day

The socio-economic survey made for the QP on August, 2006 resulted in 1 to 2 times per day for intaking of meal per day. On the other hand, a frequency of intaking meal of the Muzi Cyeru target group is 2.9 times per day and only one household replied 2 times per day, which is great difference from the said survey result. A frequency of intaking meals appears to be increased when a farm household holds infant

Frequency of meal intake per day is 2.3 times and not different from the result of the baseline survey. Breakdown of this habitat consists of dominantly two times per day such as lunch and dinner without taking breakfast. Two interviewees replied three times per day by season. Change by season appears to be generally linked with harvesting season of cassava, maize and rice

(d) Staple food crop

The survey results of indigesting food diet is greatly different from the QP socio-economic survey results. The said result did not include rice as food diet and nothing among the 4 QPs. In this survey, sorghum is indigested as sorghum beer or sorghum porridge. As for rice, interviewees answered one or two time per month by purchasing it and not everyday ingestion.

The Program for the Final Evaluation Workshop on the Marshland Agricultural Development in Muzi Cyeru Marshland

1. Date: September 12 (Friday), 2008

2. Place & Time: The Kanzenze Cell Office 8:30-13:00 PM

3. Participants

- Total number of the Participants: Around of 43 as below:

Stakeholders		No of the Participants
1	PP Beneficiary	32 members
2	Local Agronomist	1 member
3	Kanzenze Cell Office	3 member (ES and Cell Coordinator, Secretary)
4	Ntarama Sector Office	1 member (or Dy ES or Agronomist)
5	Bugesera District Office	1 member (C/P Agronomist assigned to the JICA Study Team)
6	RADA	1: Rice Expert
7	JOCV	1 member
8	JICA Study Team	2 members(Secretary +Expert)
Total		42 members

4. Objectives

The workshop is aimed at reviewing of the 1st rice farming and discussing of management of Muzi Cyeru Paddy Field for the 2nd rice farming after JICA scheme completion.

5. WS Program Schedule

		Program	Time	Remark
September 12 (Friday), 2008 8:30 - 13:00				
1	Ntarama Sector	Opening Remark	5 min	
2	All Participants	Self Introduction	15 min	Participant List
3	JICA Study Team	-Briefing of Workshop Program	10 min	-
4	Facilitator/ Agronomists	-Review of overall farming activity and recommendation of paddy field utilization	60 min	-Hand out materials -Flip chart
5	Kanzenze Cell Secretary JOCV	-Vegetable production by shallow well irrigation	40 min	
6	Overall Discussion of Muzi Cyeru Marshland Management	-How to utilize	90 min	-Handout materials -Flip chart
7	JICA Study Team	Closing Remark	5 min	

6. Review of the 1st Rice Farming

(1) Outline of the 1st Rice Farming

Farming Practice on Rice Production in Muzi Cyeru guided by JICA

Key Practice		Date	Outline
1	Seed	June 2007	Basic Seeds from ISAR/Butare
2	Seed Rate/ha		20 - 30 kg/ha for nursery sowing
3	Seed Treatment and Sowing on nursery bed	Aug 8, 2007	Dipping 3 paddy CVs into water at Cell Office
		Aug 9, 2007	Incubation under wet condition
		Aug 10, 2007	Checking incubation progress & Keep it
		Aug 11, 2007	Stopping incubation & Sowing from 9:00 am
		Aug 11, 2007	-Application of NPK 125 kg/ha for the nursery bed -Sowing pre-germinated seeds on nursery at rate of 75 gm/m^2
4	Transplanting operation	Sept 3-Oct 2, 2007	-30 cm between rows x 15 cm between hills: 22.2 plants/m^2 -Using transplanting string and stick (15 cm) -Transplanting depth is not beyond 3 cm, otherwise tillering is suppressed.
5	No of seedlings/hill		Only one seedling /hill
6	Fertilizer	Early Oct-07 Early Dec-07	1) NPK 240 kg/ha is applied just before transplanting 2) Urea 82 kg/ha -1st 42 kg Top dressing: 30 days after Transplanting. -2nd 42 kg Top dressing: At Reduction Division (Meiosis : Kwigabanya k'uturemangingo bigeze hagati)stage 3)Total Nitrogen = 79 kg/ha
7	Pest & Disease	Late Oct/Late Nov-07, Early Dec-07	-Cypermetrine spray for pest control -Beam spray for fungi control
8	Harvesting	Jan-28-08 -Mid Feb-08	- By using sickles -Time to harvest is around 30 - 40 days after flowering date
9	Threshing	Jan-28-08 - Mid Feb-08	Using manual type thresher machine with plastic sheet
10	Winnowing		Using manual winnowing machine
11	Drying paddy		Drying paddy on the newly constructed concrete drying yard beside of Cyeru Umdugudu
12	Yield (t/ha)		0.56 t/ha - 2.2 t/ha in the season (Aug/07 - Jan/08)

(2) Paddy Rice Yield of the 1st Rice Farming

The Reusult of Paddy Yield by Plot in Muzi Cyeru Marshland

Block	Plot No	Variety	Assigned Beneficiary	Paddy Harvested (kg)	Polished Rice (kg)	Milling Rate(%)	Plot size (m^2)	Yield/ha (kg)
A	1	Intsinzi	Kayitankore Telesphore	90	53	59	609.5	1,476.6
	2		Gatabazi Alexis	62	35	56	500.0	1,240.0
	3		Karimganire Rapheal	39	22	56	297.5	1,310.9
	4	Gakire	Mukandori Victorice	50	29	58	500.0	1,000.0
	5		Rusanganwa viateur	80	48	60	500.0	1,600.0
B	6	Intsinzi	Nshimyuremyi Augustin	48	33	69	225.0	2,133.3
	7		Kaneza Ernestine	102	63	62	500.0	2,040.0
	8		Karinamaryo Telesphore	112	66	59	500.0	2,240.0
	9	Insindagirag	Gihana Wensceslas	58	38	66	500.0	1,160.0
	10	Intsinzi	Ndayambaje Donat	41	22	54	420.8	974.3
	11	Insindagirag	Mukeshimana Laurent	82	61	74	500.0	1,640.0
	12		Bunami Innocent	21	12	57	500.0	420.0
	13		Hakizumwami Gratien	46	28	61	500.0	920.0
C	14	Insindagirag	Rumanura Jean Bosco	32	19	59	405.0	790.1
	15		Rukara (Rutayisire Léonard	28	17	61	500.0	560.0
	16		Rutaganda Jean de Dieu	28	19	68	500.0	560.0
	17		Kayitavu Onesphore	70	46	66	500.0	1,400.0
Total				989	611	62	7,958	1,263

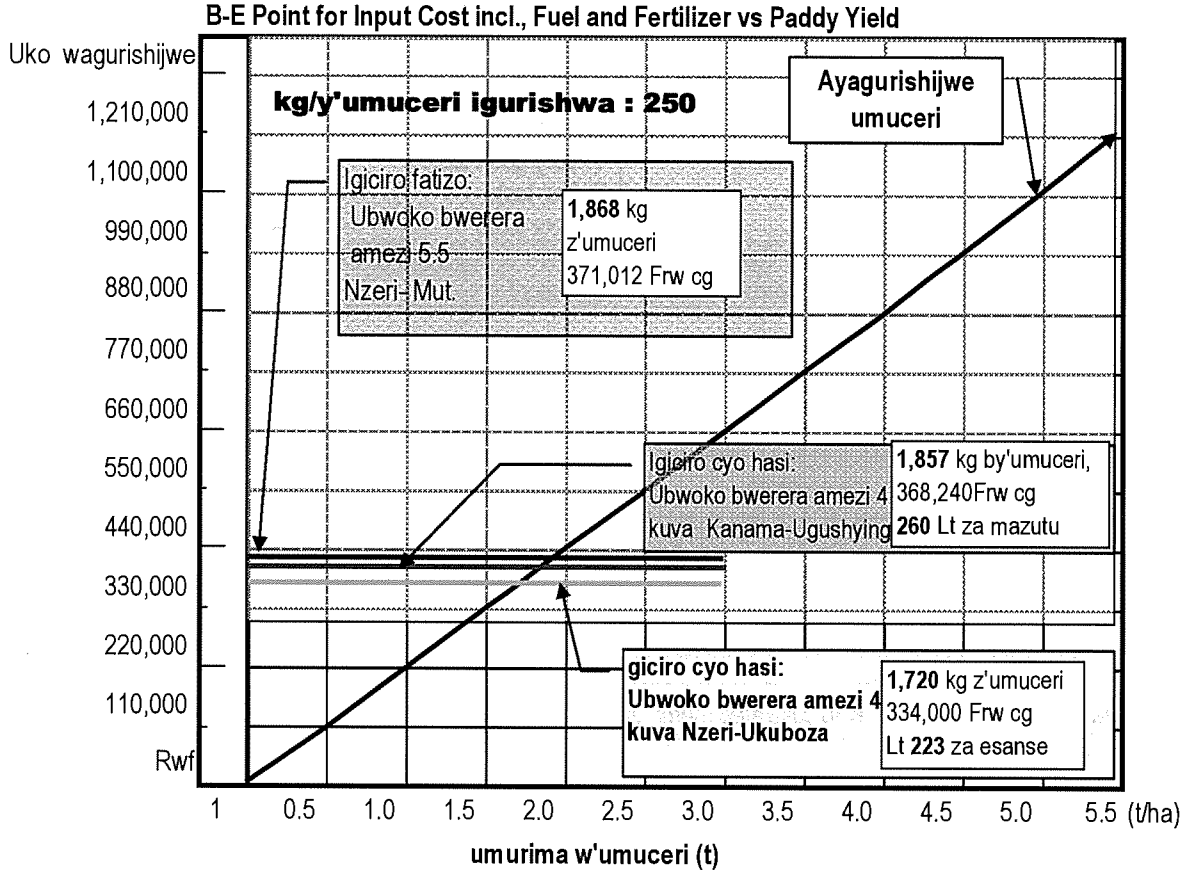
Source: Compiled by Ueta JOCV , March 2008

(3) Break-Even Point

Break- Even Point of Rice Production in Muzi Cyeru

Cost Items			Q'ity	Unit	Sub Total	4 months CV Sept - Dec	4 months CV Aug - Nov [A]	5.5 Month CV Sep - Jan [C]
Farming period								
a. 4 months CVs						◎	◎	
b. 5.5 months CVs								◎
Fuel Amt								
a. 4 months from Sept-Dec			223	Lt	206,052	206,052	240,240	243,012
b. 4 months from Aug-Nov			260	Lt	240,240			
c. 5.5 Months from Sept-Jan			263	Lt	243,012			
Fertilizer								
NPK	24,000	Rwf/50 kg	4	Bags	96,000	159,000	159,000	159,000
Urea	24,000	Rwf/50 kg	2	Bags	48,000			
Agro-chemicals								
a.Cypermetrine	5000	Rwf/1 lit	2	pc	10,000			
b. Kitazin	5000	Rwf/1 lit	1	pc	5,000			
Milling charge								
Transportation (round trip)					50,000	50,000	50,000	50,000
Milling charge (1500 kg pac 10 Rwf/kg					15,000	15,000	15,000	15,000
Total						430,052	464,240	467,012
Paddy Rice Price	250	rwf /kg	Equivalent to paddy wt.(k			1,720.2	1,857.0	1,868.0

Source: JICA Study Team, August, 2008



(4) Problem of Muzi Cyeru Paddy Filed

There are two issues so far arisen in the Muzi Cyeru paddy field soils as follow:

- Uneven soil fertility caused by land consolidated method.
- Soil physical-chemical aspect under submerged condition

Solution: Continuous application of cow dung manure in each cropping season and observe change of crop growth.

(5) Management of Muzi Cyeru Paddy Field

JICA Development Study will be phased out on the end of this coming November,2008. But the Muzi Cyeru paddy field constructed by JICA should be efficiently utilized by the Muzi Cyeru Rice Association

Members. In this regards, the following questions are asked to all Muzi Cyeru Group members to confirm

your intension.

1	What is your impression of rice farming via your field work?	
	1. Rice farming is easy----- [ ]. 2. Rice farming is difficult- [ ].	
2	Did you taste your rice harvested in Muzi Cyeru this year?	
	1. Yes [ ], 2. No [ ]	If yes, how did you find your rice ? 1. Very good taste [ ] 2. Fair taste [ ] 3. Poor taste [ ]
3	Are you willing to organize Muzi Cyeru Rice Cooperative or Agricultural Cooperatives including rice and vegetable crops together with other Muzi Cyeru association members?	
	1. Yes I want. [ ], 2. No I don't. [ ], 3. I don't know. [ ]	
4	Do you plant rice in Muzi Cyeru with your own expense (pump fuel, seed, fertilizer, agro-chemical) after JICA Study completion in this November 2008?	
	1. Yes, I will continue by my expense----------[ ] 2. No, I can not do without JICA or any external support.----------[ ] 3. I will follow a decision of the Muzi Cyeru Association meeting[ ] 4. It depends on a yield of the 2nd rice farming.----------[ ]	
5	Do you want to use Muzi Cyeru paddy field for cultivating vegetables after JICA study completion?	
	1. Yes, I want to use paddy field for vegetable production after completion of JICA Study--[ ]. 2. No, I will not use at all---------- [ ].	
6	Do you know that farmer who cultivates marshland has to pay tax to Bugesera District from this year?	
	1. Yes I heard it.-------[ ] 2. No I don't know it--[ ]	
7	Do you want to keep your cultivation right (usufruct) in Muzi Cyeru future?	
	1. Yes, I want to keep it always in the future **even if rice yield is poor**.----------[ ] 2. Yes I want to keep it always in the future by planting vegetables.----------[ ] 3. No, I don't want to keep it if profit is poor such as the 1st rice farming in Muzi Cyeru.---[ ]	
8	Do you know JICA's other supporting project like "Shallow well irrigation" for vegetable cultivation in Ntarama Sector?	
	1. Yes I know well ----------[ ] 2. Yes I heard it but I don't know about details-- [ ] 3. No I don't Know at all [ ]	
9	Are you interesting in shallow well irrigation project so as to apply for Muzi Cyeru Marshland future?	
	1. Yes [ ] 2. No [ ]	
10	Do you get positive impression or negative impression on Muzi Cyeru Marshland rice project?	
	1. I got positive impression ----------[ ] 2. I got negative impression----------[ ] 3. It is too early to conclude and verification study should be continued. [ ]	

(6) Management of Muzi Cyeru Property

How to manage properly the following farming implements, equipments and constructed facility handed out to Muzi Cyeru Rice Association should be discussed.

1) New Storage house beside the Cyeru Umdugudu, repaired by JICA is new storage house.

a. Key management:

Name:[1._____ 2._____,

3._____]

2). Properties of Muzi Cyeru Rice Association

Date of Transporting properties to new storage: [ ]

No	Properties of Muzi Cyeru Rice Rice Association	Quantity	Unit	Unit price (Rwf)	Sub total (Rwf)	Keeping Place
1	T-shape leveler	16	unit	15,000	240,000	
2	Rotary Weeder	10	unit	95,000	950,000	
3	Balance (20 kg)	1	unit	10,000	10,000	
4	Plastic ball	10	unit	300	3,000	
5	Pump(small)	1	unit	419,700	419,700	
	Accessories		lot		41,000	
6	Pomp(medium)	2	unit	540,000	1,080,000	
	Accessories	2	lot	50,000	100,000	
7	Jerry can	2	unit	1,000	2,000	
8	Plastic sheets	20	sheet	20,000	400,000	
9	Thresher	4	unit	250,000	1,000,000	
10	Winnower	4	unit	460,000	1,840,000	
11	Hand pomp sprayer	4	unit	28,000	112,000	
12	Wheelbarrow	5	unit	30,000	150,000	
13	Concrete drying yard (45 m^2)	45	m^2	8,000	360,000	
14	Storage					
15	Paddy Field (1 ha)	1ha	lot	3,400,000	3,400,000	
	Grand Total				10,107,700	

b. Constructed Paddy Fields

Just remind the following responsibility.

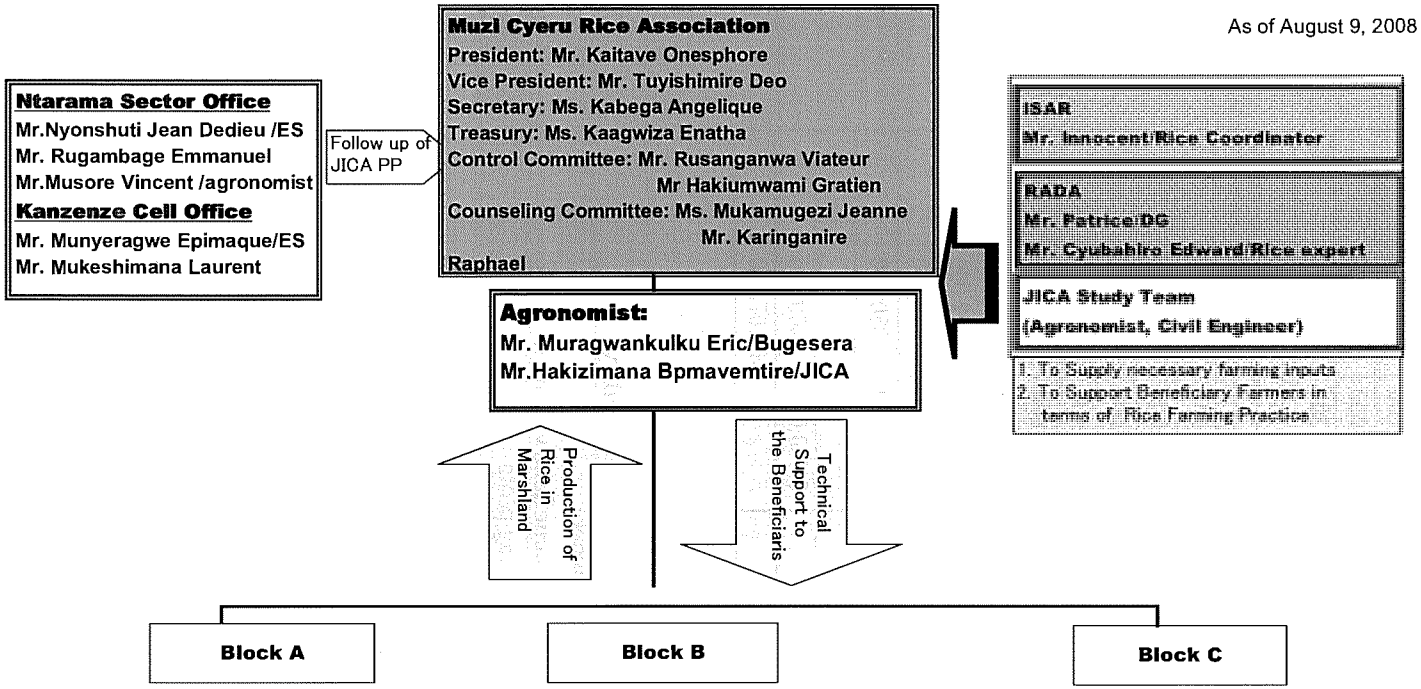
	Reclamation Area	Quantity	Responsibility
1	Plots	20 plots	Plot owners
2	Main Road	156 m	All 32 beneficiary farmers
3	Branch Road	435 m	Bordering plots
4	Foot Path	381 m	Bordering plots
5	Ring Levee	172 m	All 32 beneficiary farmers
6	Main Canal A	46 m	Block A Members
7	Main Canal B	60 m	Block B Members
8	Main Canal C	78 m	Block C Members

(7) Scope of Work for the Agronomists

A. Mr. Muragwankulku Eric financed by JICA Team (Up to the end of November/2008)

- Liaison work among the stakeholders concerned such as Cell/Sector/District Offices according to necessity
- Give guidance to the beneficiary farmers based on the technical guideline of rice farming through the PP implementation
- Giving guidance of overall farming including NERICA and vegetables to the beneficiary farmers.

As of August 9, 2008



Block Leader: [Mr. Uwihanganye Vedaste (M)]

No	Name	Plot	m^2	Sex
1	Uwihanganye Vedate			M
2	Kaitankore Telosphore	1	609.5	M
3	Tuisimire Deo			M
4	Gatabaxi Alexis	2	500.0	M
5	Gatete Augustin			M
6	Karinganire Raphael	3	297.5	M
7	Mukamugenzi Jeanne	4	500.0	F
8	Mukandori Victorie			F
9	Rusanganwa Viateur	5	500.0	M
10	Nyirabyiruka Beatrice			F
	Total		2407.0	

Block Leader: [Mr. Tuyishimire Deo(M)]

No	Name	Plot	m^2	Sex
1	Nshimyumuremyi Augustine	6	225.0	M
2	Mudahungwa J. Pierre	7	500.0	M
3	Kaneza Emestine			F
4	Karinamaryo Telesphore	8	500.0	M
5	Ngabonziza J.M.V			M
6	Gihana Wensceslas	9	500.0	M
7	Mukangoboka			F
8	Ndayisaba	10	420.8	M
9	Ndayambaje Donat			M
10	Mukeshimana Laurent	11	500.0	M
11	Kabagwiza Enatha			F
12	Mukasharangabo	12	500.0	F
13	Nunani Innocent			M
14	Kayiranga Ernest	13	500.0	M
15	Hakizumwami Gratien			M
	Total		3645.8	

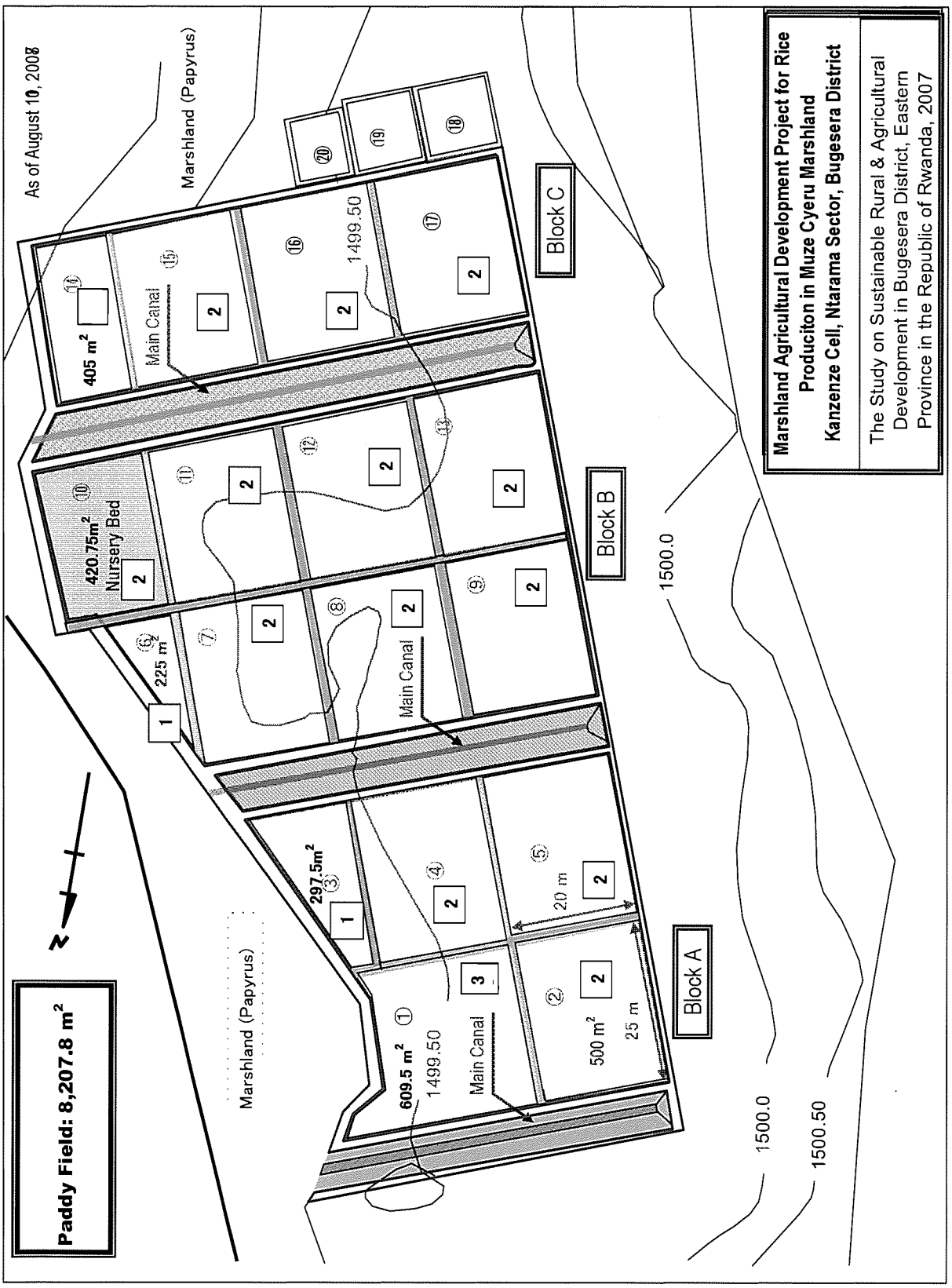
Block Leader: [Mr.Kabega Agelique(F)]

No	Name	Plot	m^2	Sex
1	Rumanura Jean Bosco	14	405.0	M
2	Rutayisire Leonard	15	500.0	M
3	Nshimiyimana J. Berchmas			M
4	Nsengiyumva Daniel	16	500.0	F
5	Rutaganda Jean de Dieu			M
6	Rusingiza Felicien	17	500.0	M
7	Kayitavu Onesphore			M
	Total		1905.0	

NERICA Plot

No	Name	Plot	m^2	Sex
8		18	100.0	
9		19	80.0	
10		20	72.0	
	Total		252.0	

Organization Chart on Rice Production for the Marshland Agricultural Development PP in Muzi Cyeru

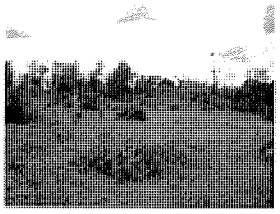
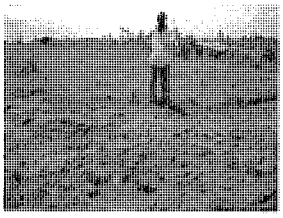
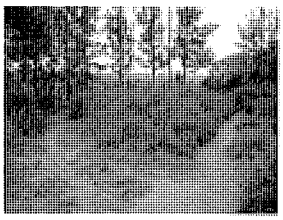
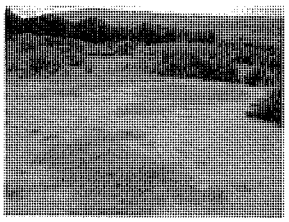
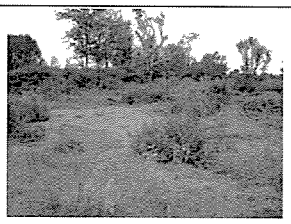

Paddy Field: 8,207.8 m²
As of August 10, 2008
Marshland (Papyrus)
Marshland (Papyrus)
Block A
Block B
Block C
Main Canal
Main Canal
Main Canal
609.5 m²
500 m²
297.5m²
225 m²
420.75m²
Nursery Bed
405 m²
1499.50
1499.50
20 m
25 m
1500.0
1500.0
1500.50
Marshland Agricultural Development Project for Rice Produciton in Muze Cyeru Marshland Kanzenze Cell, Ntarama Sector, Bugesera District
The Study on Sustainable Rural & Agricultural Development in Bugesera District, Eastern Province in the Republic of Rwanda, 2007

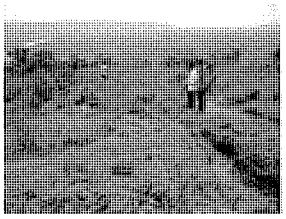
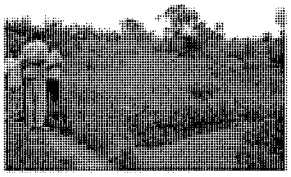
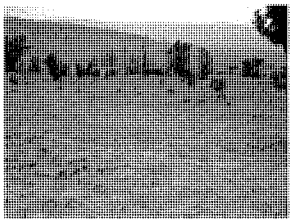
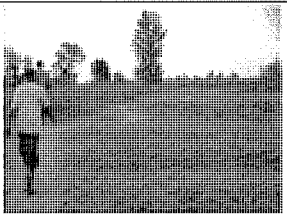
VI.6.6 Hilly Terrain Agricultural Development Project

Table VI.6.6.1 Project Sites of Hilly Terrain Agricultural Development

Cell	No	Umudugudu	Name of Site	Land Owner	Nos. of Model Farmers
Cyugaro	1	Rugunga	Rugunga-Ntashamaje	Ntashamaje EVARISTE	25 HHs
	2	Kidudu	Kinyana-Luberanziza	Luberanziza AUGUSTIN	25 HHs
	3	Rubomborana	Rubomborana-Ntavuko	Ntavuka EDOUADA	24 HHs
	4	Gatoro	Gatoro-Cyato	Judith	21 HHs
	5	Rugarama	Rugarama-Umudugudu	Ntarama Sector	30 HHs
	6	Kingabo	Kingabo-Bizimana	Bizimana LADISLAS	29 HHs
	7	Kayenzi	Kayenzi-Murekatete	Murekatete SPECIOSE	24 HHs
Kanzenze	1	Kabeza	Kabeza-Gasana	Gasana CASSIEN	25 HHs
	2	Karumuna	Karumuna-Venuste	Venuste BAKINAHE	25 HHs
	3	Kurugenge	Kurugenge-Hatangimana	Hatangimana LEODOMIR	25 HHs
	4	Nyamabuye	Nyamabuye-Fulgence	Fulgence SENDAGARI	30 HHs
	5	Gasagara	Gasagara-Josephine	Josephine YANKURIJE	20 HHs
	6	Ruwangara	Ruwangara-Merchiades	Merchiades MUGABO	30 HHs
	7	Cyeru	Cyeru-Ufitinka	UFITINKA	30 HHs
	8	Kabaha	Kabaha-Hitimana	Hitimana GASPARD	25 HHs
Kibungo	1	Nganwa	Nganwa-Denise	Denise MUKAKABERA	12 HHs
	2	Kagoma II	Kagoma II-Gregoria	GREGORIA	12 HHs
	3	Kagoma I	Kagoma I-Janvier	Janvier	12 HHs
	4	Ruhengeri	Ruhengeri-Uwanyirigira	Uwanyirigira GAUDENCE	12 HHs
	5	Kiganwa	Kiganwa-Muligo	Muligo PHILIPPE	12 HHs
	6	Rusekera	Rusekera-Kanuma	Kanuma RAPHAEL	12 HHs
	7	Nyarunazi	Nyarunazi-Rupfura	Rupfura EDWARD	12 HHs

Table VI.6.6.2 Present Condition of the Project Sites

Cell	Umudugudu	Site No.	Present Condition	
Cyugaro	Rugunga	CY1	▪ Private land ▪ Banana plantation ▪ Banana, Sorghum, Beans etc. are planted around the site ▪ Distant place comparing to the others	
	Kidudu	CY3	▪ Private land ▪ Left without any purpose ▪ Arable land and land abandoned are mixed around the site	
	Rubomborana	CY5	▪ Private land ▪ No cultivation at construction time ▪ Arable land downstream of FP, but abandoned	
	Gatoro	CY8	▪ Private land ▪ Some bananas were planted at construction time ▪ Banana, Maize are farmed around the FP	
Cyugaro	Rugarama	CY9	▪ The site belongs to Ntarama Sector ▪ Abandoned ▪ There are housings constructed newly upstream of the site	
	Kingabo	CY11	▪ Private land ▪ Abandoned ▪ Distant place comparing to the others	
	Kayenzi	CY13	▪ Private land ▪ Abandoned without any purpose ▪ Along the village road, accessible	

Cell	Umudugudu	Site No.	Present condition	
Kanzenze	Kabeza	KZ1	▪ Banana plantation of private land ▪ Close to Kigali-Nyamata tarmac road ▪ Gully is generated at the site ▪ Banana plantation around the site	
	Karumuna	KZ4	▪ Private land, ▪ Beans, maize are cultivated ▪ Close to Kigali-Nyamata tarmac road ▪ Gully is generated at the site ▪ Arable land and land abandoned are mixed around the site	
Kanzenze	Kurugenge	KZ6	▪ Private land ▪ Abandoned ▪ Cultivating land and abandoned land are mixed ▪ Steep hillside	
	Nyamabuye	KZ8	▪ Private land ▪ Abandoned ▪ Cultivating land (Maize, Sorghum) and abandoned land are mixed around the FP ▪ Distant place ▪ Steep hillside in the extreme	
	Gasagara	KZ9	▪ Private land ▪ Arable land, but no signs of having been cultivated ▪ Cultivating land (Maize, Sorghum) and abandoned land are mixed around the FP ▪ Distant place	
	Ruwangara	KZ11	▪ Private land, ▪ Abandoned with out purpose ▪ Along the road to Ntarama sector office ▪ Accessible	
	Cyeru	KZ13	▪ Private land ▪ Abandoned as well as around the FP ▪ Facing on Kigali-Nyamata tarmacroad ▪ A sample site good for display	

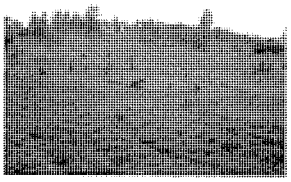
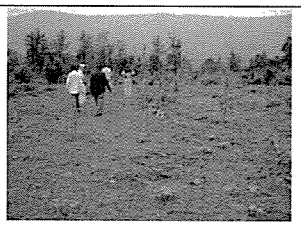
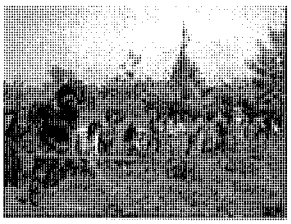
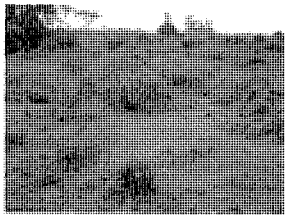
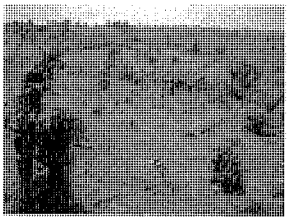
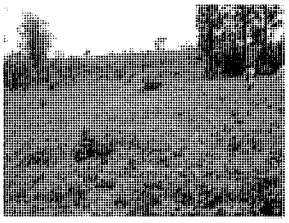
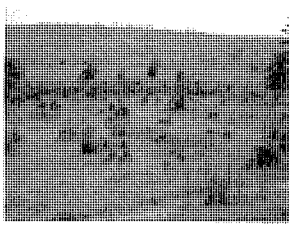
Cell	Umudugudu	Site No.	Present Condition	
Kibungo	Nganwa	KB1	▪ Private land cultivating beans, potatoes etc. ▪ Arable and abandoned land are mixed around the site ▪ Steep hillside	
	Kagoma II	KB3	▪ Private land ▪ Not used ▪ Distant place ▪ Steep hillside	
	Kagoma I	KB5	▪ Cultivation land of private ▪ Beans etc. are gown ▪ Mixed by arable and abandoned ▪ Along the village road, accessible	
	Rusekera	KB9	▪ Private land cultivating beans, sorghum, etc. ▪ Steep hillside	
Kibungo	Nyarunazi	KB12	▪ Private land ▪ Sorghum, etc. are cropped ▪ Banana plantation is located at downstream the FP ▪ Steep hillside in the extreme	
	Ruhengeri	KB13	▪ Private land cultivating beans, potatoes etc. ▪ Distant place ▪ Steep hillside	
	Kiganwa	KB14	▪ Private land abandoned ▪ Isolated place ▪ Poor accessibility, particularly in rainy season ▪ Steep hillside in the extreme	

Figure VI.6.6.1 Sites Location of Hilly Terrain and Marshland Agricultural Development Project

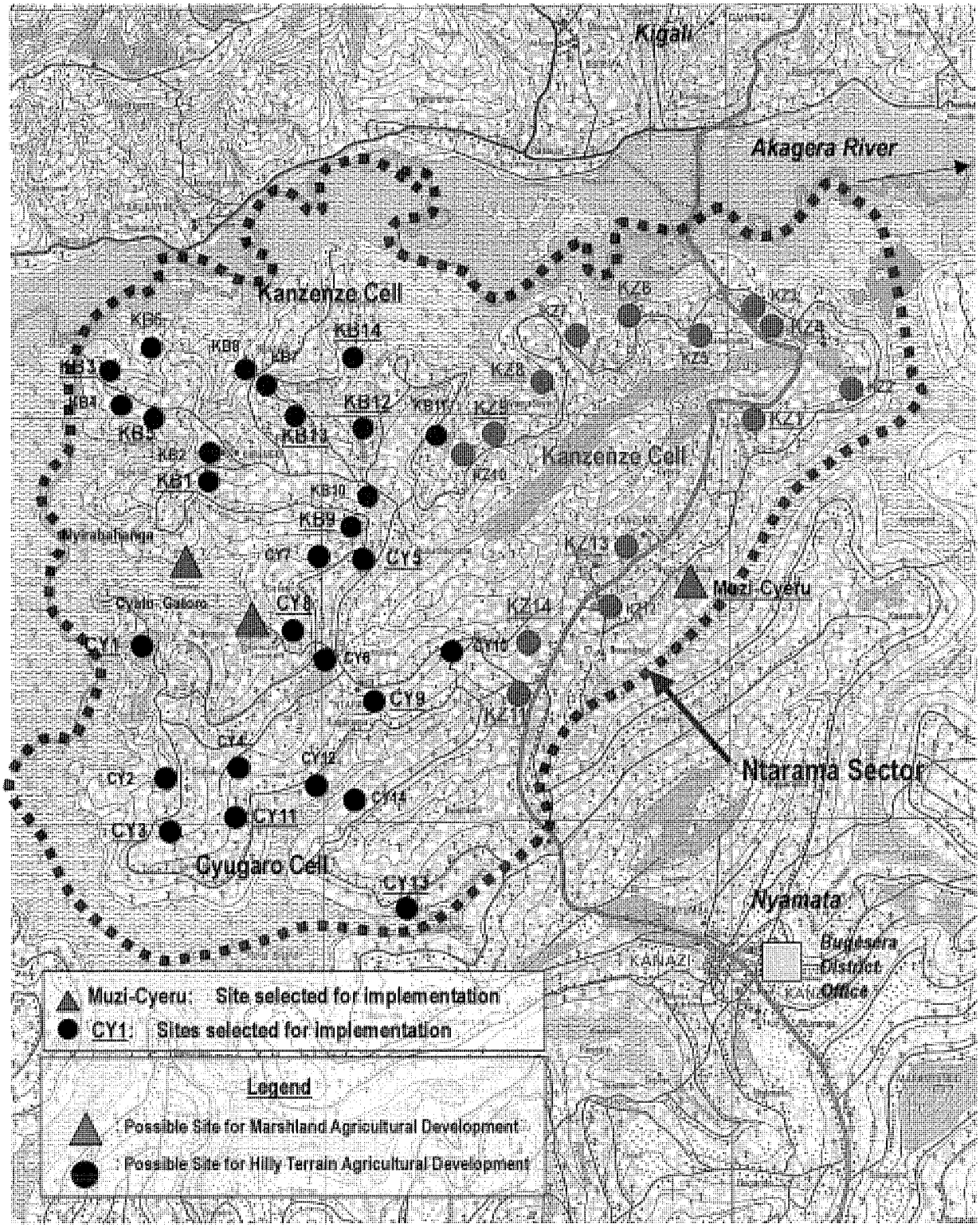


Table VI.6.6.3 Agreement between Land Owners of the Project Site and Local Authorities

Amasezerano y'itangwa ry'ubutaka buzubakwamo ibidamu byo kuvomera imyaka y'abaturage

Hagati y'Umurenge wa Ntarama na nyirubutaka bwubatswemo ibidamu mu Kagari ka Cyugaro

Mu rwego rwo gushyira mu bikorwa umushinga w' "Inyigo ku Iterambere ry'Icyaro n'Ubuhinzi mu Karere ka Bugesera , Intara y'Iburasirazuba, Repubulika y'U Rwanda" (uzwi ku izina ry' Inyigo), Umurenge wa Ntarama, Akagari ka ***Cyugaro*** n'Imidugudu *7* bahisemo ahazashyirwa ibidamu muri buri mudugudu mu rwego rwo gutunganya no guteza imbere ubuhinzi bw'imusozi biterwa inkunga n'ikipe ya JICA ikora Inyigo nk'umwe mu mushinga w'icyitegererezo.

Kuri icyo cyemezo cy'ahazubakwa ibidamu, nyirubutaka buzubakwamo buri kidamu yemeye ibi bikurikira.

1) Nyirubutaka atanze umurima we ku buntu kugira ngo wubakwemo ikidamu.
2) Ikidamu nikimara kubakwa, aho cyubatswe hazaba hagengwa n'Umudugudu.
3) Mu gihe ikidamu kizaba kitagikoreshwa mu kuhira imyaka y'abaturage, impande zose zimaze kubyumvikanaho, nyirubutaka ashobora kubusubirana.

Cyugaro

Kamena ____, 2007

Izina rya Nyirubutaka	Umukono
1.	
2.	
3.	
4.	
5.	
6.	
7.	

Uhagarariye Umurenge	Umukono

Uhagarariye Akagari	Umukono

Uhagarariye Umudugudu	Umukono
1.	
2.	
3.	
4.	
5.	
6.	
7.	

Figure VI.6.6.2 Implementation Organization for Farm Pond Construction

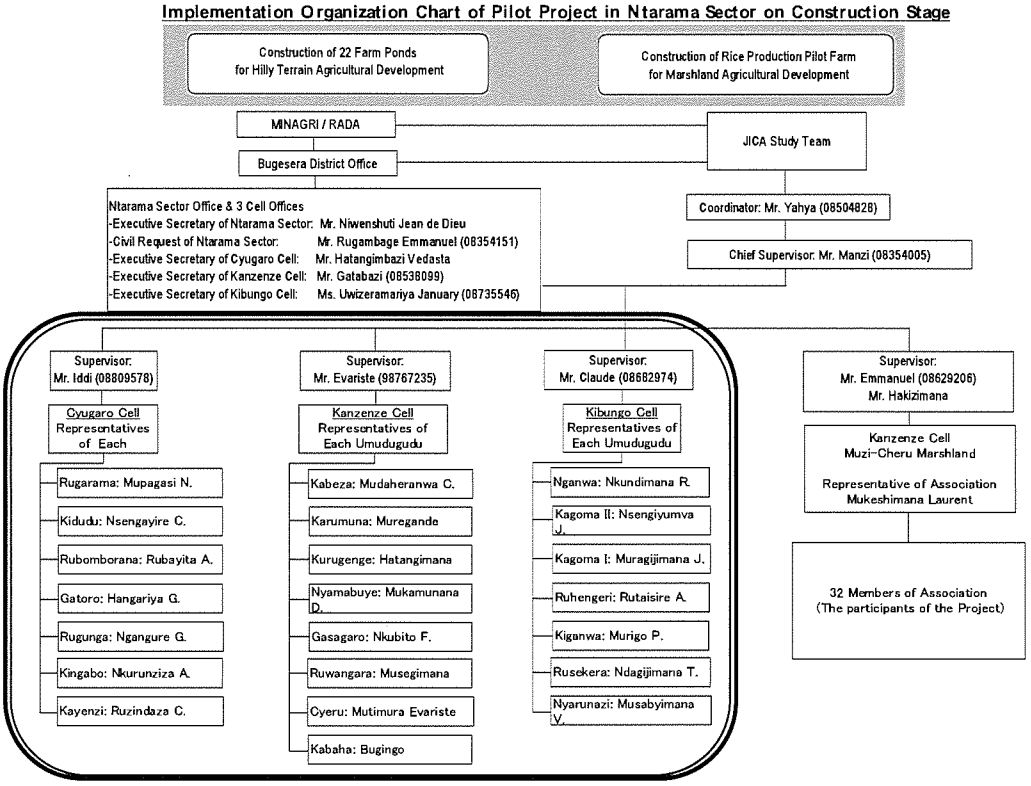


Figure VI.6.6.3 Plan of Operation for Farm Pond Construction

Pilot Project: Hilly Terrain Agricultural Development

Plan of Operation **(Kibungo Cell: Version-1, As of 20/06/2007)**

Activity		Schedule										Inputs	
		2007							2008			Personnel	Responsible Person (s), Group
		June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar		
Prepararion Works:													
1	Topo Survey	■											
2	Design	■											
Construction Stage:													
3	Stripping topsoil of construction site		■									Casual Labor (20)	Umudugudu leadrs who are appointed to Assistant Supervisor at each site in Umudugudu
4	Excavation of main body of pond		■									Casual Labor (20)	
5	Prevention of leakage at pond bottom			■								Casual Labor (20)	
6	Construction of Inlet (Masonry)			■								Masonry	
7	Construction of Outlet (Masonry)			■								Masonry	
8	Excavation of sedimentation pond			■								Casual Labor (20)	
9	Excavation of conduit canal			■								Casual Labor (20)	
10	Excavation of drainage canal				■							Casual Labor (20)	
11	Construction of safety fence				■							Casual Labor (20)	
12	Spoiled bank of excavated soil				■							Casual Labor (20)	
Farming Practice Stage:													
13	Reclamation of experimantal plots				■	■	■					Beneficiaries	Beneficiaries
14	Farming practice					■	■	■	■	■	■	Beneficiaries	Beneficiaries
Monitoring & Evaluation Stage:													
15	Interim Monitoring & Evaluation		■	■	■	■	■	■	■	■	■	Beneficiaries	Umudugudu, Cell
												JICA Study Team	JICA Study Team

Table VI.6.6.4 FP types based on the Conditions

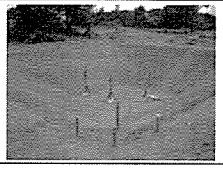
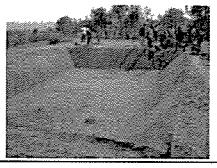
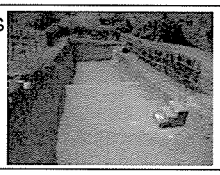
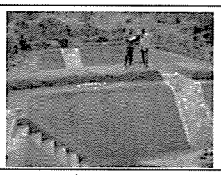
Type	T1 	T2, T3 	Others 	
Outline	▪ Suitable for applying to relatively flat topography with the topographic gradient gentler than 3° ▪ Applicable to the case with enough space to the topographically vertical section of the site for FP construction	▪ Suitable for applying relatively sloppy sites with the topographic gradient gentler than 3°~ 8° ▪ Applicable to any cases without regarding room for space of FP space to the topographically vertical section of the construction site	On the contour line ▪ Suitable for applying to steep slope with topo-gradient steeper than 8° & in the case of a limit FP space to the topographically vertical section of the construction site ▪ Shape of FP develops along the contour line and the FP shape is not necessarily limited to rectangular shape	Partition (into plural number of ponds) ▪ Suitable for applying to steep slope with topo-gradient steeper than 8° ▪ In case that site for FP construction has some room for spacing, plural number of ponds can be aligned, avoiding too much earth cutting, combining square/ rectangular ponds from downstream to upstream in conformity with relief
Sites	Adopted at 11 sites including Kagoma (Kibungo Cell)	Adopted at 9 sites including Rubomborana (Cyugaro Cell)	Employed at FP site of Nyamabuye (Kanzenze Cell)	Employed at FP site of Kurugenge (Kanzenze Cell)

Table VI.6.6.5 Soil Condition on the Sites

Soil	Cell	Site	Site situation
Ordinary soil	Each Cell	12 sites including Cyeru (Kanzenze Cell)	Possible to excavate up to 2.5m in depth
Hard soil	Cyugaro	Rubomborana	Hard soil layer from 1.6m in depth, difficult to dig deeper
		Kingabo	Hard soil layer from 1.2m in depth, difficult to dig deeper
	Kanzenze	Karumuna	Hard soil layer from 1.2m in depth
		Nyamabuye	Hard soil layer from 0.3m in depth, excavation work was suspended by 1.5min depth.
		Kabaha	Hard soil layer from 1.6m in depth, difficult to dig deeper
	Kibungo	Nganwa	Hard soil layer from 1.8m in depth
		Ruhengeri	Soil is intermixed with hard soil layer and ordinary soil from 0.8 m in depth, possible to dig up to 2.5m in depth
		Kiganwa	Hard soil layer from 1.4m in depth
		Rusekera	Hard soil layer from 1.8m in depth
		Nyarunazi	Hard soil layer from 0.6m in depth, difficult to dig deeper than 1.6min depth

Table VI.6.6.6 Progress of Farm Pond Construction

Hilly Terrain Agricultural Development Project

Summary of Quantity for Farm Pond Construction

Cell	Umudugudu	Major Qantity of Farm Pond Construction											Possibility of man-power		
		(1) Volume of Excavation Works				(2) Length of Canals			(3) Construction period (The total number of working days)			(6) The total number of man-days of Casual Labors	(7) Possible volume to be excavated per day	Ground slope on the site	Soil Condition on the Site
		FP	SP	CLs	Total	IC	OC	Total							
		M^3	M^3	M^3	M^3	M	M	M	July	Aug	Days	Man-days	M^3/Day/Man		
Cyugaro	Rugunga	226	10	8	244	12.0	3.5	15.5	9th	14th	26	531	0.46	Relati'y flat	Ordinal soil
	Kidudu	186	10	3	199	4.3	2.0	6.3	9th	17th	26	474	0.42	Relati'y flat	Ordinal soil
	Rubomborana	163	15	8	186	8.0	11.5	19.5	6th	17th	28	475	0.39	Flat	Hard soil
	Gatoro	194	8	8	210	5.0	10.0	15.0	6th	22th	31	483	0.43	Relati'y steep	Ordinal soil
	Rugarama	189	20	16	225	24.9	5.0	29.9	6th	22th	32	579	0.39	Relati'y steep	Ordinal soil
	Kingabo	191	9	6	206	14.9	2.0	16.9	9th	18th	27	811	0.25	Relati'y steep	Hard soil
	Kayenzi	192	8	10	210	17.0	7.0	24.0	9th	21th	27	435	0.48	Relati'y steep	Ordinal soil
Subtotal/Avarage		1,341	80	59	1,480	86.1	41.0	127.1			197	3,788	0.40		
Kanzenze	Kabeza	201	12	18	231	17.0	8.8	25.8	6th	18th	25	357	0.65	Relati'y steep	Ordinal soil
	Karumuna	204	18	11	233	18.9	12.5	31.4	9th	27th	28	414	0.56	Relati'y steep	Hard soil
	Kurugenge	196	14	7	217	13.0	5.0	18.0	9th	22th	25	380	0.57	Steep	Ordinal soil
	Nyamabuye	167	0	4	171	8.0	4.0	12.0	11th	22th	29	487	0.35	Steep	Hard soil
	Gasagaro	228	12	26	266	11.3	17.3	28.6	9th	24th	29	459	0.58	Relati'y flat	Ordinal soil
	Ruwangara	185	10	7	202	3.0	10.0	13.0	13th	20th	26	474	0.43	Flat	Ordinal soil
	Cyeru	205	20	20	245	29.0	7.0	36.0	3rd	22th	32	544	0.45	Relati'y steep	Ordinal soil
	Kabaha	173	12	6	191	29.0	2.5	31.5	6th	17th	23	362	0.53	Relati'y steep	Relat'y hard
Subtotal/Avarage		1,559	98	99	1,756	129.2	67.1	196.3			217	3,477	0.51		
Kibungo	Nganwa	220	11	10	241	45.0	10.0	55.0	6th	18th	29	447	0.54	Steep	Hard soil
	Kagoma II	224	10	9	243	17.2	6.8	24.0	6th	17th	28	449	0.54	Steep	Ordinal soil
	Kagoma I	182	0	14	196	27.0	10.0	37.0	6th	18th	29	457	0.43	Flat	Ordinal soil
	Ruhengeri	226	14	12	252	35.4	8.0	43.4	10th	18th	27	536	0.47	Steep	Relat'y hard
	Kiganwa	217	0	16	233	44.6	16.0	60.6	9th	17th	26	397	0.59	Steep	Relat'y hard
	Rusekera	207	7	14	228	16.3	14.0	30.3	11th	18th	26	541	0.42	Steep	Hard soil
	Nyarunazi	234	0	15	249	17.0	9.0	26.0	13th	27th	30	548	0.45	Steep	Relat'y hard
Subtotal/Avarage		1,510	42	90	1,642	202.5	73.8	276.3			195	3,375	0.49		
TOTAL		4,410	220	248	4,878	417.8	181.9	599.7			609.0	10,640			
Avarage(22 sites)		200	10	11	222	19	8	27			28	484	0.46		

Remarks: FP: Farm Pnod, SP: Sedimantation Pond, CLs: Inlet Canal + Outlet Canal IC: Inlet Canal, OC: Outlet Canal

The number of man-days of casual labor for preparation works is not included for the column No.(6)

Table VI.6.6.7 Construction Cost and Unit Cost for Water of $1m^3$

Hilly Terrain Agricultural Development Project
Summary of Initial Cost for Farm Pond Construction

Cell	Umudugudu	Capacity of FP	Quantity of Construction			Construction Cost of Farm Pond (Initial Cost of Hilly Trerrain Agricultural Development Project)				Unit Cost of FP Water	
			Volume of Earth Works	Total Workind Days	The total number of man-days of Casual Labors	Labor Fee	Tools	Material	Total Cost	Including the cost of tools	Excluding the cost of tools
		M^3	M^3	Days	Man-days	Rwf	Rwf	Rwf	Rwf	Rwf/M^3	Rwf/M^3
Cyugaro	Rugunga	116	244	26	546	546,000	191,000	87,000	824,000	7,100	5,400
	Kidudu	116	199	26	487	487,000	191,000	87,000	765,000	6,500	4,900
	Rubomborana	123	186	28	488	488,000	191,000	87,000	766,000	6,200	4,600
	Gatoro	116	210	31	497	497,000	191,000	87,000	775,000	6,600	5,000
	Rugarama	123	225	32	604	604,000	191,000	87,000	882,000	7,100	5,600
	Kingabo	123	206	27	826	826,000	207,000	87,000	1,120,000	9,100	7,400
	Kayenzi	116	210	27	447	447,000	191,000	87,000	725,000	6,200	4,600
Subtotal/Avarage		833	1,480	197	3,895	3,895,000	1,353,000	609,000	5,857,000	7,000	5,400
Kanzenze	Kabeza	116	231	25	420	420,000	191,000	87,000	698,000	6,000	4,300
	Karumuna	123	233	28	474	474,000	191,000	87,000	752,000	6,100	4,500
	Kurugenge	128	217	25	440	440,000	191,000	87,000	718,000	5,600	4,100
	Nyamabuye	134	171	29	547	547,000	205,500	87,000	839,500	6,200	4,700
	Gasagaro	116	266	29	539	539,000	191,000	87,000	817,000	7,000	5,300
	Ruwangara	116	202	26	474	474,000	191,000	87,000	752,000	6,400	4,800
	Cyeru	116	245	32	544	544,000	191,000	87,000	822,000	7,000	5,400
	Kabaha	116	191	23	382	382,000	191,000	87,000	660,000	5,600	4,000
Subtotal/Avarage		965	1,756	217	3,820	3,820,000	1,542,500	696,000	6,058,500	6,200	4,600
Kibungo	Nganwa	123	241	29	468	468,000	191,000	87,000	746,000	6,000	4,500
	Kagoma II	116	243	28	467	467,000	191,000	87,000	745,000	6,400	4,700
	Kagoma I	116	196	29	482	482,000	191,000	87,000	760,000	6,500	4,900
	Ruhengeri	120	252	27	536	536,000	191,000	87,000	814,000	6,700	5,100
	Kiganwa	120	233	26	397	397,000	191,000	87,000	675,000	5,600	4,000
	Rusekera	123	228	26	541	541,000	191,000	87,000	819,000	6,600	5,100
	Nyarunazi	123	249	30	568	568,000	191,000	87,000	846,000	6,800	5,300
Subtotal/Avarage		841	1,642	195	3,459	3,459,000	1,337,000	609,000	5,405,000	6,400	4,800
TOTAL		2,639	4,878	609	11,174	11,174,000	4,232,500	1,914,000	17,320,500		
Avarage(22 sites)		120	222	28	508	507,909	192,386	87,000	787,295	6,500	4,900

Remarks: Tools; - Tools provided to each site are as follows: 5 Wheelbarrows, 10 Shovels, 5 Picks, 1 Hummer, 3 kg Wire, 330m Strings
- Apart from tools above, 3 Chisels were added to Kingabo, Cyugaro Cell.
- Apart from tooels above, 5 Picks were added to Nyamabuye, Kanzenze Cell.
Material; Cement, Sand, Wooden pegs

Table VI.6.6.8 Result of <Treatment work-2> by site and state of implementing <Treatment work-3>

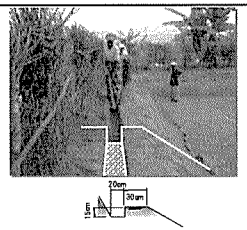
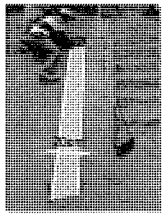
Cell Site	Soil／Type of <Treatment work -2>	State of rainy season 2008 (February ～ May)	<Treatment work-3>	
			Sheet	Leave as it is
Kibungo				
Kagoma II	SL-ML(Pebbly)／Type-1-	・ 4 times of high water level, retained for maximum 7 days ・ Clay smeared over the embankment slid by high intensity raindrop strike sedimenting at the bottom of FP.	○	
Kagoma I	SL／Type-3	・ Inlet part of conduct channel (contact point of roadside drain) was kept closed, thus rainwater flow into FP is failing.	○	
Nganwa	ML ／ not treated (by local opinion)	・ Because conduct channel has not been under management, rainwater drain has not adequately been conducted into FP.		○
Ruhengeri	ML(pebbly) ／not treated (by local opinion)	・ Water was stored 3 times in March and twice in April at the depth of 40cm ・ Because conduct channel has not been under management, rainwater drain has not adequately been conducted into FP.		○
Kiganwa	ML-SL／ Type-2	・ Water was stored 3 times in March at the depth of 1.5m ・ Since rainwater drain has flown into conduct channel, the channel is considered well capturing rainwater discharge from the catchment.	○	
Rusekera	SR ／ not treated (due to soft rock)	・ Water was stored 4 times in March and once in May at the depth of about 1.5m ・ Storage lasted for 3 days, and lost by percolation in around 4 days ・ Since rainwater drain has flown into conduct channel, the channel is considered well capturing rainwater discharge from the catchment.		○
Nyarunazi	SL／Type-3	・ Water was stored twice in March and twice in May at the depth of 0.3m. ・ Because very limited amount of rainwater drained down the conduct channels, most of stored water was considered to have flown directly into FP.	○	
Cyugaro				
Rubomborana	SL／Type-3	・ Water was stored twice in March and twice in April at the depth of 0.5m (up to around a half of the total depth). Retained for 3 days at maximum. ・ Since rainwater drain has flown into conduct channel, the channel is considered well capturing rainwater discharge from the catchment、however, the channel section has already been filled with sediment.	○	
Gatoro	SL／Type-3	・ Water was stored once in March and twice in May at the depth of 0.8m, retained the storage at longest 3 days. ・ Since rainwater drain has flown into conduct channel, the channel is considered well capturing rainwater discharge from the catchment. However, catchment area has to a large extent been narrowed after a road construction work done in the upstream of the catchment.	○	
Rugunga	ML／Type-1	・ During rainfall, only a bit of water flew down in conduct channel, so it is conceived that most of stored water flew directly into FP.		○
Kidudu	ML／Type-3	・ Water was stored twice in April and once in May at almost high water level, and the retention of storage lasted at longest 4 days. ・ Since rainwater drain has flown into conduct channel, the channel is considered well capturing rainwater discharge from the catchment、however, the channel section has been narrowed by sediment.	○	
Kingabo	SR ／ not treated (due to soft rock)	・ Water was stored 4 times in March reaching almost high water level then the storage was retained at maximum 8 days. ・ Since rainwater drain has flown into conduct channel, the channel is considered well capturing rainwater discharge from the catchment、however, the channel section has been narrowed by sediment. ・ In addition, catchment area has been reduced after a road construction work implemented in the upstream of the catchment.		○

Rugarama	SL／Type-3	・ Water was stored 3 times in March and twice in April and once in May, every time up to the depth of around 1.2m, retained the storage at longest 3 days. ・ Since rainwater drain has flown into conduct channel, the channel is considered well capturing rainwater discharge from the catchment、however, the channel section has been narrowed by sediment.	○	
Kayenzi	SL／Type-3	・ Water was stored 3 times in March and once in May at the depth of 0.4m, retained the storage at longest 2 days. ・ During rainfall, only a bit of water flew down in conduct channel, so it is conceived that most of stored water flew directly into FP.	○	
Kanzenze				
Kabaha	SR-ML／Type-3	・ Water was stored 3 times in March and twice in May, storage accompanied overflow from the spillway, storage was retained at longest 4 days. ・ Since rainwater drain has flown into conduct channel, the channel is considered well capturing rainwater discharge from the catchment, however, the channel section has been narrowed by sediment.	○	
Ruwangara	ML／Type-3	・ Water was stored 3 times in March and once in April and again once in May, storage accompanied overflow from the spillway, storage was retained at longest 6 days. ・ Since rainwater drain has flown into conduct channel, the channel is considered well capturing rainwater discharge from the catchment、however, the channel section has been narrowed by sediment.		○
Cyeru	ML／Type-3	・ Water was stored 3 times in March and once in May, at the depth of around 1.0m (up to around a half of the total dept), storage was retained at longest 4 days. ・ Flowing direction was split into two ways at the upstream side of the catchment, leading to a decrease of flow into FP to a half of hitherto flow.	○	
Kabeza	ML／Type-3	・ Water was stored twice in March and 3 times in April. Storage accompanied overflow from the spillway, but lasted only one day. ・ Since rainwater drain has flown into conduct channel, the channel is considered well capturing rainwater discharge from the catchment, however, catchment area has been altered through a road construction work implemented in the upstream of the catchment, leading to a reduction of discharge toward FP as compared to hitherto experienced volume	○	
Karumuna	ML／Type-2	・ Water was stored once in March and twice in April, accompanied overflow from the spillway, retaining at longest 3 weeks. ・ Since rainwater drain has flown into conduct channel, the channel is considered well capturing rainwater discharge from the catchment, however, catchment area has been altered through a road construction work implemented in the upstream of the catchment, leading to a reduction of discharge toward FP as compared to hitherto experienced volume	○	
Kurugenge	SR-SL(pebbly)／Type-1	・ Water was stored twice in March and once in April, with the storage depth of about 1m (at almost high water level), retained at longest 7 days. ・ Since rainwater drain has flown into conduct channel, the channel is considered well capturing rainwater discharge from the catchment, however, drainage system at upstream side underwent change, leading to reduced discharge into FP as compared with hitherto experienced discharge.	○	
Nyamabuye	SR／Type-3 (soft rock)	・ Water was stored twice in March and once in May, at the depth of about 0.5m, the storage lasted at maximum 5 days. ・ Because a part of the catchment has a channel that conveys water out of watershed, water flowing into FP has been reduced as compared with hitherto experienced discharge thereto.		○
Gasagara	SL(pebbly)／Type-1	・ Water was stored twice in March and again twice in May, storage reaching high water level, retained for the maximum 3days. ・ Rainwater discharge from the catchment was much less than hitherto anticipated rate. Hence, excavation of new conduct channel should be examined.	○	

Remarks : As to the indication of soil mechanical property, ML stands at silty loam, SL indicates sandy loam and SR means soft rock.

[Plan of Operation/ Issues, Countermeasures, Status of Treatment & Others on the Implementation of FP Counter-Leakage Works]

(1/2)

No.	Operation	Construction work	Objective of construction (Remarks)	State of Construction/ others	Caution and issues	Countermeasures	State of treatment / others
1	Level cut	Level cut at the crest of enbankment slope in FP	In sheeting plastic sheets inside FP, preliminary earth work for fixing lined sheets at the crest of embankment is applied (refer to later describing "backfilling" and "sandbag laying")		If the width of the crest of embankment slope is not enough designed, the shape of its crest becomes too sharp, then after water is stored in FP, stress from stored water acts over the crest, threatening to give plastic sheets fissure damage.	Thorough consideration be made at construction works so that the width of the crest is enough spaced (applying such measures as reshaping banking and stabilizing fill etc.).	In the course of construction work, when level cutting is applied to the crest of embankment slope, work should be done with a greatest circumspection so that homogenous EL is maintained for all 4 sides of FP.
2	Ditch cut	Terracing inside FP & trenching of both-sides at concrete-lined inlet FP	In sheeting plastic sheets inside FP, trenches are excavated at terraces and both-sides of concrete-lined inlet FP (width and depth of trenching: 20cm and 15cm, respectively), in which the lined plastic sheets are sandwiched, over which sandbags are laid, thus sheets are fixed.		As there is a limitation in manual compaction work, fear of remaining some part of sharp crest after trenching in case of FP sites with gravelly soils.	Prior to operating "sheeting" that comes later, sand bags are packed over the surface of ditchesso that the edge of sheets do not directly contact with soil surface of the ditches.	In the course of applying the countermeasures mentioned in the left column, no other abnormal situation has been found on the implementation of the planned operation
3	Spoil Removal (Stockpile)	Spoil generated from the inside of FP through the above-cited two operations is carried away to outside borrowing pits and tentatively stocked	–	–	In the case of not deposit spoil in a pit, converted use of spoil is threatened in operating later following work like "back-filling"and"sandbag laying".	In operating "sandbag laying" and "backfilling" that follow later, it is desirable to pay attention for keeping relevant position of stockyard site so that spoil can readily be reused.	Therefound some sites where some difficulty arises from carriage due to lack of transport means for removing spoil (implement; wheel burrow)
4	Cleaning inside FP & compaction	Cleaning /removing scattered gravels etc inside FP, theground surface of embankment slope inside FP and of the bottom are compacted	By cleaning & compacting embankment slope and bottom ground, volume soil pores can be decreased and density of soil can be increased, thus water tighytness is improved and soil engineering property can be ameliorated.	–	As there is a limitation in manual compaction work, fear of remaining some part of sharp crest after trenching in case of FP sites with gravelly soils.	Before working the following operation "sheeting", sandbags are preliminarily laid over the bottom ground of FP so that sheets do not directly contact with ground surface.	In the course of applying the countermeasures mentioned in the left column, no other abnormal observation has been found on the implementation of the planned operation

To be continue

[Plan of Operation/ Issues, Countermeasures, Status of Treatment & Others on the Implementation of FP Counter-Leakage Works]

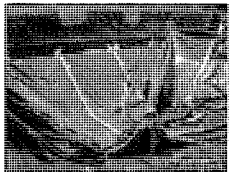
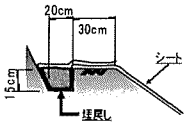
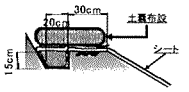
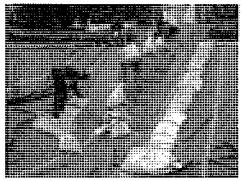
No.	Operation	Construction work	Objective of construction (Remarks)	State of Construction/ others	Caution and issues	Countermeasures	State of treatment / others
5	Sheeting	Plastic sheets are horizontally lined inside FP ※duplicated work	Measures against water leakage applied to water permeable soils in this area (sandy loam soils etc)	 Overlapped lining with two plastic sheets for securing water tightness	Coping with fear of exfoliation and/or fracture of plastic sheet by the action of stress by stored water appearing after water storage	In order to alleviate occurrence of biased tension stress over the lined sheets caused by stored water stress after water storage in FP, sheets are to be loosly lined with some room for stretching, and also, lining should cautiously worked so as not to cause any biased deflection to the direction of four corners of FP.	Now under the application of the countermeasures specified in the left column, no other abnormal situation has been found on the implementation of the planned operation
6	Back-filling	Back-filling using spoil over plastic sheets lined at the part of ditch on the crest of FP worked by the above-cited operation "sheeting"	In order to fix plastic sheets lined inside FP at the crest of FP		–	–	Now the work of tampering for aligning and fixing the laid sandbags is under way no other abnormal situation has been found on the implementation of the planned operation.
7	Sandbag laying	Sandbags are laid over plastic sheets lined at the part of ditch on the crest of FP worked by the above-cited operation "sheeting"	In order to fix plastic sheets lined inside FP at the crest of FP		–	–	No other abnormal osituation has been found on the implementation of the planned operation
8	Mortar lining	Boundary phase between concrete portion of inflow work and lined plastic sheets is joined with mortar.	In order to retain water tightness at the boundary face between concrete portion and plastic sheets		① Though adhessibity between mortar and concrete can be guaranteed when concrete portion and plastic sheets are bounded, there is fear of failing binding mortar with plastic sheets because these two materials have different material characteristics. ② Cracking developed by insufficient curing after applying mortar work	① Possibility should be sought whether adhessive agent should be applied at the binding part that can secure adhessivity between mortar and plastic sheets (now under examination using epoxy-resin derivatives etc). ②After work of mortar lining is compppleted	Now under implementation of the countermeasures mentioned in the left column ② (as regards the countermeasures① they are now under examination) No other abnormal situation has been found on the implementation of the planned operation.
9	Mortar lining (Terracing)	Boundary phase between concrete portion of terracing work and lined plastic sheets is joined with mortar.					
10	Mortar lining (Spillway)	Boundary phase between concrete portion of spillway and lined plastic sheets is joined with mortar.		State of junction between concrete portion of terracing work and plastic sheets, also state of sandbag laying to ditch cutting line			
	C o m p l e t i o n o f t h e w o r k s						

Table VI.6.6.9 An Example of By-Law of Water Users Association

Amategeko agenga ishyirahamwe ry' abakoresha amazi y'ikidamu

Izina ry'akagari	Kanzenze	
Izina ry'Umudugudu	Kurugenge	
Izina ry'ishyirahamwe ry'abakoresha amazi	TWIHAZE	
Itariki ryashingiweho	Umwaka: 2008 / Ukwezi: NZELI / Itariki: 03	
Izina ry'Umuyobozi w'ishyirahamwe ry'abakoresha amazi	HATANGIMANA Théodomir	Umukono: [signature]
Izina ry'umunyamuryango w'ishyirahamwe	Nakabonye Clémentine	Umukono: [signature]
Izina ry'umunyamuryango w'ishyirahamwe	Twahirwa Fulgence	Umukono: [signature]
Izina ry'umunyamuryango w'ishyirahamwe	Mukandayisenga Béatha	Umukono: [signature]
Izina ry'umunyamuryango w'ishyirahamwe		Umukono:
Izina ry'umunyamuryango w'ishyirahamwe		Umukono:
Izina ry'umunyamuryango w'ishyirahamwe		Umukono:
Izina ry'umunyamuryango w'ishyirahamwe		Umukono:

Ibintu bikeneye gusanwa byakorwa n'Ishyirahamwe ry'abakoresha amazi n'inshuro byakorwa	Ibigomba gusanwa	Inshuro	Ubishinzwe
	- Gutunganya urugo	rimwe mu kwezi	TWIHAZE
	Guhoma shitingi	igihe ya pfumutse	TWIHAZE

Amategeko agenga ishyirahamwe ry' abakoresha amazi y'ikidamu

Amabwiriza agenga ikoresha ry'amazi y'ikidamu	* Amazi agomba kuvomererwa imyaka. * Umuntu utari mu Ishyirahamwe ntiyemerewe gukoresha Amazi y'Ikidamu. * Ishyirahamwe rigomba gukoresha l 600 ku munsi z'Amazi y'Ikidamu.
Uko umusaruro ukoreshwa	* 1/3 cy'Umusaruro kizagabanywa abanyamuryango *. 1/3 cy'umusaruro kindi kizagurishwa hagurwemo Imiti y'Imyaka, Imashini no gusana Ibyangiritse (Ibikoresho) * 1/3 cy'umusaruro gisigaye kizajya kigurishwa amafaranga ashyirwe kuri Konte y'Ishyirahamwe.
Ingamba zo kwirinda ko abantu bagwa mu kidamc	* gukinga uruzi tugashyiraho Inzitiri. *. gushyiraho icyapa cyanditseho ko ntamuntu uwemerewe kuhinjira atabiherewe uburenganzira. *. gukomeza gukangurira abantu kobibujijwe kwegera ikidamu, mu manama ndetse n'Ahantu abantu bahurira ari benshi.

Table VI.6.6.10 Project evaluation by beneficiaries and Umudugudu leaders on Hilly Terrain Agricultural Development Project

Item of questions/ discussion	Aims of debates / transaction of evaluation	Evaluation / reply
Objectives of the Project	Understanding on the Project	・ Stable food security, poverty reduction, nutritional improvement by irrigation farming in dry season ・ Acquisition of methods of rainwater storage and its effective use ・ The Project leads to area development
What was easily fulfilled in FP construction?	On inhabitant's initiative	・ Ground (soil) was soft enough for excavation work ・ Construction of fence by using Euphorbia, installation of plastic sheets, implements supplied by the Study Team ・ Consent of landowners for constructing FP was obtained
What was felt difficult in FP construction?	On inhabitant's initiative	・ Excavation of rock, banking of embankment, lifting earth from the bottom of FP, carriage of clay from marshland, installation of earth sacks and their removal, also handling of implements, Umuganda was not practiced. Labor wage was cheap. ・ Explanation of construction works was difficult. Benefit of FP could not understand. ・ There was nothing difficult.
What was good throughout the Project implementation?	Positive impact, On inhabitant's initiative	・ Acquisition of FP construction techniques, subsequently capable of instructing what was learned to other areas. Effective use of rainwater is acquired. Measures coping with food shortage during dry season were obtained. High income was earned through participation to the Project. ・ Implements for construction works were supplied from the Study Team.
What was bad throughout the Project implementation?	Negative impact, On inhabitant's initiative	・ Rock excavation took much time and implements were broken. Laborers were injured. ・ Water leaked from FP without expected result of storage. Plastic sheets were damaged by drilled holes. Catchment area of FP was curtailed due to road construction works. Fences should be made of wire net. ・ There was nothing evil in the project implementation.
Why O.M has not been practiced?	On inhabitant's initiative	・ Because FP didn't store water, unnecessary O.M was not practiced. ・ Leaders didn't organize Umuganda. ・ Dredging work was practiced at some sites.
What is/are OM that can be self-practiced?	On inhabitant's initiative	・ Cleaning, weeding, dredging, channel excavation, repairing protective fences, safety securing for children
What is necessary for self-practicing O.M?	On inhabitant's initiative Administrative assistance	・ Implements for O.M ・ Training for O.M activities ・ Liaison and close contact with administration
Is it possible to manage O.M as Umudugudu?	On inhabitant's initiative Administrative assistance	・ It is necessary to form AS and close follow-up system by the administration. ・ It is possible to practice O.M by Umuganda.
Is it possible to construct new FP by self-help action of inhabitants?	On inhabitant's initiative	・ It can be implemented after identifying the effect of FP. ・ Usefulness of FP is understood and method of constructing FP was also learnt.
What are issues / tasks of constructing FP by self-help action of inhabitants?	On inhabitant's initiative	・ The issue is material procurement (cement, plastic sheets etc).
What can be done for sustaining the Project by self-help efforts?	On inhabitant's initiative, FtF	・ O.M activities for FP ・ Safety measures
What are issues / tasks of sustaining the Project by inhabitant's self-help effort?	On inhabitant's initiative FtF	・ Necessary to purchase input equipment/ material (Cost incurring) ・ Necessary to repair the facilities ・ Mutual cooperation within WUA is needed
Do inhabitants have	Identification of	・ They have intention to follow up the Project.

Item of questions/ discussion	Aims of debates / transaction of evaluation	Evaluation / reply
will of sustaining the Project>	participant's will to sustain the Project	
What is expected to the administration hereafter?	Administrative assistance	• RAD: expecting supply of farming inputs, assistance for training • District: expecting further construction of FP & assistance for training • Sector: expecting farming instruction by agricultural officers, public propaganda for usefulness of FP, repair of FP, advice on suitable construction sites of FP, exploitation of markets • Cell: expecting assistance on safety measures of FP • Umudugudu: Safety management and O.M of FP
Ideas for "from spot to plane" extension/ deployment of FP	Administrative assistance, FtF	• It is possible only if input material is available, particularly by Umganda because construction techniques / knowledge have already been learnt. • Engineers are required to expand the activities further. • Effect of FP must be identified.
How to strengthen Umudugudu?	On inhabitant's initiative Administrative assistance	• Extension is pursued through transferring techniques/ knowledge that have self-acquired to the neighborhood. • To make the inhabitants in Umudugudu aware of the importance of association activities. To lead development based on Vision 2020
What are the objectives of water storage in FP? What are expected to FP?	Degree of attaining Project objectives, feasibility	• Utilizing it for irrigating vegetables /fruit trees in dry season cropping • Expecting benefits by FP • To acquire technical knowledge for FP construction
Was the Project required?	Feasibility, identify to will of sustaining the Project	• Rainfall during rainy season can effectively stored for use of cultivation during dry season. FP innovated hitherto difficulty in dry season farming giving it greater possibility. • FP are not so far effectively utilized due to insufficient water storage, however, the Project is useful because precipitation in Bugesera District is little.
What have been learnt through the implementation of the Project?	Degree of attaining Project objectives / technical transfer	• Construction method of FP was acquired. Techniques of effectively utilizing rainwater by FP in farming on hilly terrain. Know-how of cultivating vegetables in dry season was learned. • Project management was learned. • What could be done by self-help without resorting to assistance from outside was identified.
Safety measures for FP	Safety mind	• Providing fences, doors, keys, ropes and upright bulletin boards are installed • Infant's trespassing into FP area is prevented through the meetings with their patrons.

(Remarks) Out of "aims of debates/ transaction of evaluation" in this table, contents of the brief indication mean as follows:

- On the inhabitant's initiative: means "possibility of sustainable project implementation on the initiative of the inhabitants"
- Administrative assistance: means "administrative means of assisting inhabitants".
- FtF: means "way of extension /deployment of the Project through Farmer to Farmer"

Table VI.6.6.11 Project evaluation by administration officers in charge of Hilly Terrain Agricultural Development Project

Item of questions/ discussion	Aims of debates / transaction of evaluation	Evaluation / reply
Objectives of the Project	Understanding on the Project	• Leading to increased yields of crop cultivation in dry season • Effect of preventing soil erosion can be expected. • Effective rainwater use is important for Bugesera District with little rainfall
What was good throughout the Project implementation?	Positive impact,	• Acquired means of effective rainwater use by FP • The Project brought local inhabitants labor opportunities (cash income)
What was wrong throughout the Project implementation?	Negative impact,	• Follow-up system of the Project was not well provided. • Storage of water in FP didn't last so long as initially expected. • Wage paid to the participants in the work was cheap. • There was nothing wrong about the Project.

Item of questions/ discussion	Aims of debates / transaction of evaluation	Evaluation / reply
What users should do for proper management and O.M of FP	On inhabitant's initiative	• Users of FP should jointly utilize water and practice O.M following their leader's instructions. • To establish WUA
What administration officers should do for proper management and O.M of FP	Administrative assistance	• To make users of FP the effectiveness (utility) of FP • To continue to provide such follow-up activities as monitoring • To urge establishment of WUA
What is necessary for administration officers to perform the above duty?	Administrative assistance	• A permanent supervisor is required for monitoring use and O.M of FP. • Means of patrol such as provision of a bicycle is indispensable. • Need of farming inputs
What should users do for sustaining the Project by their self-help efforts?	On inhabitant's initiative, FtF	• Proper management / O.M of FP and establishment of managerial system • Establishment of water user's group (Water Users Association) • Trained users give training for other users (inhabitants) through Umuganda
Users' issues /tasks in keeping the Project sustainable	On inhabitant's initiative, Administrative assistance	• It is difficult for users to buy plastic sheets again due to high price. Support by the government is too little. • Training for users is necessary. • Farming inputs are in short.
What should administrative authority do for keeping the Project sustainable	Administrative assistance	• To give advice on O.M of FP and cultivation techniques • To organize sufficiently frequent meetings with users of FP
Issues in keeping the Project sustainable	Administrative assistance	• Follow-up activities are difficult in lack of traffic means for monitoring • Farming inputs are in short.
Possibility of constructing new FP by the inhabitants	On inhabitant's initiative, FtF	• Possible: Manual construction is possible where plastic sheets are procurable by joint purchase of the participants. • Difficult: Farmers cannot afford to purchase plastic sheets.
What about means for strengthening Umudugudu?	Administrative assistance	• To activate it by forming an association in Umudugudu thereby introducing a project • To give advice on labor opportunities to inhabitants in Umudugudu, at the same time to sustain follow-up activities monitoring whether the advice is put into practice • To give advice on area development activities to inhabitants and leaders of Umudugudu
What are the objectives of utilizing water of FP? What are expected for FP?	Degree of objective fulfillment, feasibility	• Water storage in FP, farming activities in dry season • Acquisition of techniques of FP construction, thereby pursuing community development (CD)
Was the Project needed?	Feasibility, to identify will of sustaining Project	• Techniques of effectively utilizing rainwater through the construction of FP in semi-arid Bugesera District are not only useful but also effective against leaching soil loss. Hence, the implementation of the Project was beneficial.
What were learnt through the Project?	Degree of objective fulfillment, extent of progress of technical transfer	• Learned that tining for instructing inhabitants didn't require much expense • Acquainted with techniques for effectively utilizing rainwater through the construction of FP • Acquired techniques for constructing FP • Learned the method of instructing inhabitants not only by verbal instruction but also applying demonstrations and field practices as well as collaborating with them • Changes in inhabitant's consciousness was observed depending on how to instruct them • Contributed to self-capacity development
Safety measures of FP	Safety mind	• To install fence, door, key and bulletin board. Also to take measures for preventing infant's trespassing into FP area through their patrons

VI.6.7 Livelihood Improvement Projects

Table VI.6.7.1 Number and Density Data of Rabbit by Sector

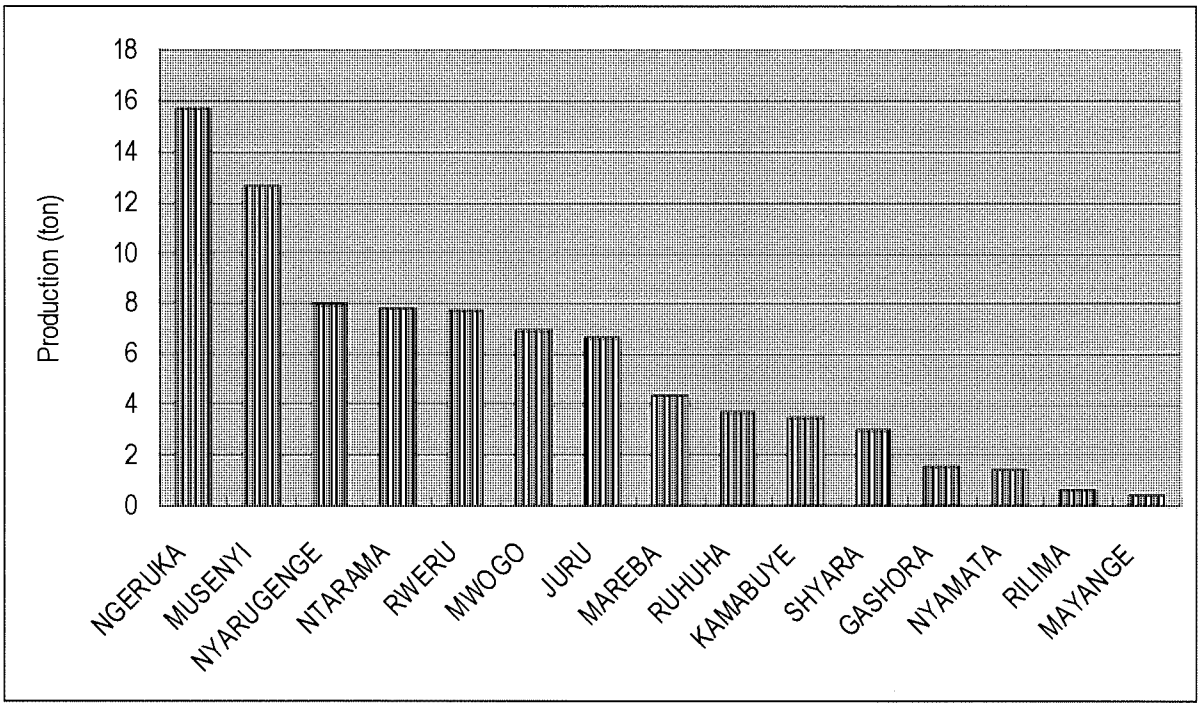
Sector	Actual Number	Distribution	Number/1,000 households	Indices to District Average
BUGESERA	1,627	100.0%	28.3	100%
GASHORA	118	7.3%	33.8	119%
JURU	198	12.2%	47.8	169%
KAMABUYE	30	1.8%	8.4	30%
MAREBA	143	8.8%	32.9	116%
MAYANGE	94	5.8%	21.8	77%
MUSENYI	140	8.6%	28.3	100%
MWOGO	24	1.5%	8.3	29%
NGERUKA	162	10.0%	30.2	107%
NTARAMA	91	5.6%	36.5	129%
NYAMATA	79	4.9%	17.8	63%
NYARUGENGE	93	5.7%	26.2	93%
RILIMA	153	9.4%	38.0	134%
RUHUHA	68	4.2%	18.3	65%
RWERU	107	6.6%	25.5	90%
SHYARA	127	7.8%	60.5	214%

Source: Monograph of the District of Bugesera, published by District of Bugesera, January 2007

Table VI.6.7.2 Number and Density Data of Beehives by Type and Sector

Sector	Modern Beehives				Traditional Beehives			
	Actual Number	Distribution	Number/ 1,000 households	Indices to District Average	Actual Number	Distribution	Number/ 1,000 households	Indices to District Average
BUGESERA	325	100.0%	5.6	100%	2,483	100.0%	43.1	100%
GASHORA	5	1.5%	1.4	25%	166	6.7%	47.5	110%
JURU	28	8.6%	6.8	120%	280	11.3%	67.5	157%
KAMABUYE	5	1.5%	1.4	25%	88	3.5%	24.7	57%
MAREBA	21	6.5%	4.8	86%	187	7.5%	43.0	100%
MAYANGE	31	9.5%	7.2	127%	228	9.2%	52.8	122%
MUSENYI	13	4.0%	2.6	47%	235	9.5%	47.6	110%
MWOGO	9	2.8%	3.1	55%	137	5.5%	47.4	110%
NGERUKA	30	9.2%	5.6	99%	193	7.8%	36.0	84%
NTARAMA	26	8.0%	10.4	185%	59	2.4%	23.7	55%
NYAMATA	30	9.2%	6.8	120%	92	3.7%	20.8	48%
NYARUGENGE	7	2.2%	2.0	35%	204	8.2%	57.4	133%
RILIMA	67	20.6%	16.6	294%	287	11.6%	71.2	165%
RUHUHA	11	3.4%	3.0	52%	96	3.9%	25.8	60%
RWERU	29	8.9%	6.9	122%	173	7.0%	41.2	96%
SHYARA	13	4.0%	6.2	110%	58	2.3%	27.6	64%

Source: Monograph of the District of Bugesera, published by District of Bugesera, January 2007



Source: Monograph of the District of Bugesera, published by District of Bugesera, January 2007

Figure VI.6.7.1 Pineapple Production for the Last 12 Months by Sector

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Table VI.6.7.3 Evaluation WS Results: Rabbit Rearing

Evaluation of Livelihood Improvement Project (Rabbit Rearing) by Model Farmers

Participating Model Farmers: 10 (Female: 2, Male: 8) No. 1

Date: 11 September 2008, Venue: Kanzenze Cell Office

1 Have you ever joined this kind of projects in the past?

	Number	Percentage
Yes	7	70.0%
No	3	30.0%

2 Do you feel that it was good to participate in this project?

	Number	Percentage
Yes	10	100.0%
No	0	0.0%

2.1 If Yes, what were good things for you during participation in the project?

- Eating meat (6 persons)
- Getting income (4)
- Good relations with neighbors after giving rabbits (3)
- Quick benefit (2)
- Getting manure (2)
- Having importance in his life (1)
- Getting knowledge (1)

3 What kind of support/assistance have you gotten from the project?

- Rabbits
- Materials for cage construction
- Knowledge in seminar

3.1 Was the support/assistance enough for you?

	Number	Percentage
Yes	5	55.6%
No	4	44.4%

3.2 If Not enough, what kind of support/assistance did/do you want?

- Materials for another cage construction (4)

3.3 Do you think you can start rabbit rearing without support/assistance?

	Number	Percentage	
Yes	5	62.5%	
No	3	37.5%	Because some materials are expensive.

4 How do you think the future of your rabbit rearing?

	Number	Percentage	
Want to expand	9	90.0%	Expensive materials are problems.
Keep the present size	0	0.0%	
Want to reduce	1	10.0%	Will distribute rabbits to neighbors.
Want to stop	0	0.0%	

5 Do you think that rabbit rearing is a difficult activity to do by yourself?

	V.much	Somehow	Easy	V.easy	Total
Number	1	2	6	1	10
Percentage	10.0%	20.0%	60.0%	10.0%	100.0%

Evaluation of Livelihood Improvement Project (Rabbit Rearing) by Model Farmers

No. 2

6 For the sustainable project implementation, what the governmental organizations should do?

6.1 Cell Office

- To organize meetings to share the merits of rabbit rearing (2)
- To visit his rabbit rearing and help distribution of rabbits (2)
- To mobilize people and make them like rabbit rearing (2)
- To organize workshops
- To give technical assistance

6.2 Sector Office

- To give technical assistance (3)
- To visit his rabbit rearing and check whether his rabbit rearing is well or not
- To help organize rabbit rearing association
- To mobilize people and make them like rabbit rearing
- To visit his rabbit rearing
- To find a veterinary
- To help farmers to get credit
- To mobilize people in the sector
- To support material provision

6.3 District Office

- To find the market (3)
- To organize seminars
- To find support providers for farmers (2)
- To support material provision

6.4 Others, if any

- To give us more rabbits (2)
- To give technical assistance
- To assist more materials
- To organize workshops

7 Do you think the rabbit rearing will expand within the cell?

	Number	Percentage
Yes	8	80.0%
No	2	20.0%

7.1 If No, what is necessary for expansion of banana cultivation?

- Number of received rabbits were few.
- Need more support for another cage construction

7.2 If Yes, why do you think so?

- We can distribute rabbits to neighbors and the neighbor to others so on. (4)
- Already started distribution (2)
- Once people taste the rabbit meat, they like it.
- Rabbits increase very quickly.

8 When do you think to start distribution of suckers to neighbors?

	Number	Percentage
Already started	6	60.0%
Already promised to give	1	10.0%
After getting many rabbit babies	3	30.0%

Free Discussions:

- Many people in the district don't know the value of rabbits.
- It is better to make publicity of their rabbit rearing experiences to promote it.
- It is better to organize association for rabbit rearing with the model farmers.
- If JICA finishes its activity here, who helps new rabbit rearing farmers?

  => Because the model farmers have experiences, they can help them. Also you can ask cell office.

Table VI.6.7.4 Evaluation WS Results: Bee Keeping

Evaluation of Livelihood Improvement Project (Bee Keeping) by Model Farmers

Participating Model Farmers: 17 (KZZ: 1, KBG: 7, CGR1: 4, CGR2:5) No.1
Date: 12 September 2008, Venue: Mandela Village

1 Have you ever joined this kind of projects in the past?

	Number	Percentage
Yes	9	52.9%
No	8	47.1%

2 Do you feel that it was good to participate in this project?

	Number	Percentage
Yes	16	100.0%
No	0	0.0%

2.1 If Yes, what were good things for you during participation in the project?

- Can develop (4 persons)
- Will get honey (3)
- Association members (3)
- Can get income (2)
- Get knowledge (2)
- Bee keeping project is very important.
- Can become a bee keeping farmer

3 What kind of support/assistance have you gotten from the project?

- Iron sheets
- Beehives
- Other bee keeping materials

3.1 Was the support/assistance enough for you?

	Number	Percentage
Yes	5	29.4%
No	12	70.6%

3.2 If Not enough, what kind of support/assistance did/do you want?

- More beehives (2)
- Iron sheets
- More processed beeswax

4 How do you think the future of your bee keeping activity?

	Number	Percentage
Want to expand	10	90.9%
Keep the present size	1	9.1%
Want to reduce	0	0.0%
Want to stop	0	0.0%

5 Do you think that modern bee keeping is a difficult activity to do by yourself?

	V.much	Somehow	Easy	V.easy	Total
Number	3	1	0	7	11
Percentage	27.3%	9.1%	0.0%	63.6%	100.0%

Evaluation of Livelihood Improvement Project (Bee Keeping) by Model Farmers

No.2

6 For the sustainable project implementation, what the governmental organizations should do?

6.1 Cell Office
- To mobilize people for bee keeping activity
- To show the farmers how to construct beehive shed

6.2 Sector Office
- To help farmers to get support
- To help bring the modern knowledge

6.3 District Office
- To look for support providers
- To give technical support
- To find honey market

7 Do you think the modern bee keeping will expand within the cell?

	Number	Percentage
Yes	9	90.0%
No	1	10.0%

7.1 If No, what is necessary for expansion of banana cultivation?
- Governmental organization should mobilize people.

7.2 If Yes, why do you think so?
- Bee keeping is important. (3)
- When bee keeping farmers mobilize other people (2)
- When bee keeping farmers increase
- Honey is important.
- Depends on volunteers.
- People like bee keeping activity.

8 When do you think honey can be harvested from your beehive?

	Number	Percentage
October 2008	6	50.0%
December 2008	1	8.3%
Feb/Mar 2009	2	16.7%
2009	3	25.0%

9 When you have harvest in the future, how manay kilograms do you expect to be harvested from 2-story beehive?

	Number	Percentage
8kg	1	8.3%
9kg	2	16.7%
10kg	1	8.3%
12kg	1	8.3%
15kg	2	16.7%
16kg	2	16.7%
over 20kg	3	25.0%

Also how much is your expected selling price per kilogram?

	Number	Percentage
Rwf 1,000/kg	2	16.7%
Rwf 1,500/kg	5	41.7%
Rwf 2,000/kg	4	33.3%
Rwf 3,200/kg	1	8.3%

Evaluation of Livelihood Improvement Project (Bee Keeping) by Model Farmers

No.3

10 You have been selected as model farmers for modern bee keeping and got training and materials free of charge during the project period. How do you return what you have benefited so far to other people in your village?

- Will advise others. (7)
- Will share the knowledge. (2)
- Will mobilize others. (2)
- Will moivate to be a model farmer

Free Discussions:

- Want to put the 2nd beehive in November 2008 and need more processed beeswax.
- Want to change the color of beehive from white to blue.
- Only a few farmers joined works.
- Have a problem of tomato flowers with insecticides.

Table VI.6.7.5 Questionnaire Survey Results: Pineapple Cultivation

Evaluation of Livelihood Improvement Project (Pineapple Cultivation) by Model Farmers

Interviewed Model Farmers: 40 (KZZ: 20, KBG: 20) No. 1
Interviewed Period: From 18 to 25 September 2008

1 Have you ever joined this kind of projects in the past?

	Kanzenze	Kibungo		Total	Percentage
Yes	6	7		13	32.5%
No	14	13		27	67.5%

2 Do you feel that it was good to participate in this project?

	Kanzenze	Kibungo		Total	Percentage
Yes	20	20		40	100.0%
No	0	0		0	0.0%

2.1 If Yes, what were good things for you during participation in the project?

Kanzenze

- Received pineapple suckers (10)
- Got fruits (5)
- Got knowledge on pineapple cultivation (3)
- Can increase income

Kibungo

- Received pineapple suckers (17)
- Got knowledge on pineapple cultivation (5)

3 For the sustainable project implementation, what the governmental organizations should do?

3.1 Cell Office

Kanzenze

- To give technical advice (13)
- To create Coop or Association (4)
- To motivate people for pineapple cultivation (3)
- To organize meetings for pineapple cultivation

Kibungo

- To motivate people for pineapple cultivation (9)
- To organize meetings for pineapple cultivation (6)
- To give technical advice (4)

3.2 Sector Office

Kanzenze

- To give technical advice (6)
- To provide study tour or seminar (6)
- To provide manure and/or wheel barrow (3)
- To create Coop or Association (2)
- To motivate people for pineapple cultivation

Kibungo

- To give technical advice (15)
- To do monitoring (2)
- To provide manure and/or wheel barrow
- To create Coop or Association

3.3 District Office

Kanzenze

- To provide fertilizer/manure/cow for manure (7)
- To provide more suckers (3)
- To provide farmpond (3)
- To give technical advice/study tour (3)
- To provide machines for pineapple juice (2)
- To motivate people for pineapple cultivation (2)
- To provide manure wheel barrow
- To provide credit for pineapple
- To construct a fruit market

Evaluation of Livelihood Improvement Project (Pineapple Cultivation) by Model Farmers

No. 2

Kibungo

To provide wheel barrow (7)
To provide manure (5)
To provide material support (4)
To look for supporters (4)
To give technical advice (2)
To provide marketing support (2)
To provide machines for pineapple juice

3.4 Others, if any

Kanzenze

To provide more suckers (11)
To provide wheel barrow (6)
To provide cow to get manure (4)
To give technical advice (2)
To provide machines for pineapple juice

Kibungo

To look for supporters (11)
To give technical advice (2)
To provide more suckers (2)
To provide machines for pineapple juice

4 Do you think the pineapple cultivation will expand within the cell?

	Kanzenze	Kibungo		Total	Percentage
Yes	10	20		30	76.9%
No	9	0		9	23.1%

4.1 If No, what is necessary for expansion of pineapple cultivation?

Kanzenze

To distribute more suckers (8)
Pineapple cultivation is difficult.

5 After planting suckers, what kind of farming practices have you done for bananas?

Kanzenze

Weeding (15)
Mulching (12)
Giving manure (5)
Cultivation (3)
Irrigation

Kibungo

Giving manure (12)
Weeding (10)
Mulching (10)

6 Have you ever harvested fruits?

	Kanzenze	Kibungo		Total	Percentage
Yes	12	8		20	50.0%
No	8	12		20	50.0%

When do you think you get fruits?

	Kanzenze	Kibungo	Total	Percentage
October 2008	0	7	7	12.3%
November 2008	0	2	2	3.5%
December 2008	2	1	3	5.3%
April 2009	2	0	2	3.5%
November 2009	0	1	1	1.8%
Don't know	1	0	1	1.8%

Evaluation of Livelihood Improvement Project (Pineapple Cultivation) by Model Farmers

No. 3

Yes 6 Have you ever harvested fruits?

How many?

	Kanzenze	Kibungo		Total	Percentage
1	1	2		3	15.0%
2	2	4		6	30.0%
3	3	2		5	25.0%
4-5	2	0		2	10.0%
6-7	1	0		1	5.0%
8-9	1	0		1	5.0%
over 9	2	0		2	10.0%

Ate

	Kanzenze	Kibungo		Total	Percentage
1	1	2		3	15.0%
2	2	5		7	35.0%
3	3	1		4	20.0%
4-5	2	0		2	10.0%
6-7	1	0		1	5.0%
8-9	1	0		1	5.0%
over 9	2	0		2	10.0%

Sold

	Kanzenze	Kibungo		Total	Percentage	
1	0	1		1	100.0%	Rwf 200

7 When you have harvest in the future, how much is your expected selling price per piece?

Price per piece (Unit: Rwf)

	Kanzenze	Kibungo		Total	Percentage
150	1	0		1	2.6%
200	5	2		7	17.9%
250	4	8		12	30.8%
200-300	2	0		2	5.1%
300	5	9		14	35.9%
350	2	0		2	5.1%
400	1	0		1	2.6%

8 When do you think to start distribution of suckers to neighbors?

	Kanzenze	Kibungo	Total	Percentage
Year 2009	2	16	18	45.0%
Jan-Apr 2009	2	1	3	7.5%
Aug-Dec 2009	6	2	8	20.0%
Year 2010	2	1	3	7.5%
2 years later	3	0	3	7.5%
After getting full	5	0	5	12.5%

Table VI.6.7.6 Evaluation WS Results: Fruit Banana Cultivation

Evaluation of Livelihood Improvement Project (Fruit Banana Cultivation) by Model Farmers

Participating Model Farmers: 18 (KZZ: 2, KBG: 9, CGR: 7) No. 1
Date: 9 September 2008, Venue: Mandela Village

1 Have you ever joined this kind of projects in the past?

	Kanzenze	Kibungo	Cyugaro	Total	Percentage
Yes	2	7	6	15	83.3%
No	0	2	1	3	16.7%

2 Do you feel that it was good to participate in this project?

	Kanzenze	Kibungo	Cyugaro	Total	Percentage
Yes	2	8	7	17	94.4%
No	0	1	0	1	5.6%

2.1 If Yes, what were good things for you during participation in the project?

Kanzenze
- I can get out of poor condition.
- Got modern banana suckers free of charge and learned how to plant suckers.

Kibungo
- Got knowledge (3 persons)
- Bananas are very important. (2)
- Got modern banana suckers. (3)

Cyugaro
- Got banana suckers. (4)
- Have confidence for getting the best production.
- Not yet got benefit but waiting for that. (2)

2.2 If No, what were bad things for you during participation in the project?

Kibungo
- It rained very little during the project period.

3 What kind of support/assistance have you gotten from the project?

Kanzenze
- Support of suckers and knowledge (2)

Kibungo
- Banana suckers (8)

Cyugaro
- Banana suckers (6)

3.1 Was the support/assistance enough for you?

	Kanzenze	Kibungo	Cyugaro	Total	Percentage
Yes	2	1	6	9	56.3%
No	0	6	1	7	43.8%

3.2 If Not enough, what kind of support/assistance did/do you want?

Kibungo
- Wheel barrow (4)
- Shovel (2)
- More suckers
- Manure (2)

Cyugaro
- Manure

3.3 Do you think you can start banana cultivation without support/assistance?

	Kanzenze	Kibungo	Cyugaro	Total	Percentage
Yes	1	2	2	5	45.5%
No	1	5	0	6	54.5%

Evaluation of Livelihood Improvement Project (Fruit Banana Cultivation) by Model Farmers

No. 2

4 For the sustainable project implementation, what the governmental organizations should do?

4.1 Cell Office

Kanzenze

- To motivate the distribution of suckers to other who want the suckers
- To visit other fields with Agronomist

Kibungo

- To motivate the people to plant bananas
- To organize more meetings for banana cultivation (4)
- To give manure
- To mobilize people
- To visit farmers and advise them

Cyugaro

- To support livestock farming which helps to get manure (5)

4.2 Sector Office

Kanzenze

- To give farmers wheel barrows
- To find the market and provide study tour

Kibungo

- To advise people how to plant banana appropriately
- To prepare farmers training at banana fields
- To give farmers materials (wheel barrow, shovel, manure) (6)
- To visit farmers and give technical assistance

Cyugaro

- To extend banana cultivation, particularly fruit banana
- To motivate people to plant fruit banana

4.3 District Office

Kanzenze

- To find the market
- To motivate people to cultivate banana

Kibungo

- To make a research on banana cultivation
- To give materials (manure, wheel barrow and shovel) (4)
- To give farmers technical assistance (2)
- To advise farmers how to develop by themselves
- To find agronomist for farmers

Cyugaro

- To extend banana cultivation, particularly fruit banana
- To transform banana into more value-added product

4.4 Others, if any

Kibungo

- To support farmers how to promote banana cultivation
- To find banana market (2)
- To provide regular training and support
- To find agronomist for farmers

Cyugaro

- To help farmers to fight against diseases

Evaluation of Livelihood Improvement Project (Fruit Banana Cultivation) by Model Farmers

No. 3

5 Do you think the fruits banana cultivation will expand within the cell?

	Kanzenze	Kibungo	Cyugaro	Total	Percentage
Yes	0	5	2	7	43.8%
No	2	3	4	9	56.3%

5.1 If No, what is necessary for expansion of banana cultivation?

Kanzenze

To distribute suckers to other farmers (2)

Kibungo

To produce more banana suckers

It is too much sunshine here.

To distribute suckers to other farmers

Cyugaro

To distribute suckers to other farmers (4)

6 After planting suckers, what kind of farming practices have you done for bananas?

Kanzenze

Cultivation

Weeding and giving manure

Kibungo

Weeding and giving manure (3)

Mulching (2)

Weeding, mulching and giving manure

Weeding and mulching (2)

Cyugaro

Plowing and levelling the land (2)

Weeding and cultivation

Weeding, cultivation and giving manure (3)

Cultivation and giving manure

7 Are there any farming practices you should have done but haven't done?

	Kanzenze	Kibungo	Cyugaro	Total	Percentage
Yes	2	2	7	11	64.7%
No	0	6	0	6	35.3%

Kanzenze

Manure giving because of no straws (2)

Kibungo

Mulching (2)

Cyugaro

Manure giving (6)

Manure giving and irrigation

8 From now on, what kind of farming practices are you going to do?

Kanzenze

Put manure and mulching

Mulching and reclaiming erosion control ditch

Kibungo

Mulching and reducing the banana leaves (2)

Manure giving and planting beans between bananas

Manure giving and reducing the banana leaves (2)

Mulching

Road side irrigation

Weeding

Cyugaro

Cultivation and mulching (2)

Cultivation, giving manure, irrigation and mulching to keep moisture condition (3)

Cultivation

Giving manure and irrigation

Evaluation of Livelihood Improvement Project (Fruit Banana Cultivation) by Model Farmers

No. 4

9 How are the growth conditions of your bananas?

	Kanzenze	Kibungo	Cyugaro	Total	Percentage
V. good	1	2	4	7	41.2%
Good	1	5	0	6	35.3%
So-so	0	2	2	4	23.5%
Poor	0	0	0	0	0.0%
V. poor	0	0	0	0	0.0%

10 When do you think your banana start to bring harvest?

Kanzenze

March 2009 (2)

Kibungo

Next year (2)

June 2009 (4)

July 2009

October 2009

End of the next year

Cyugaro

Next year (3)

October 2009 (3)

11 When you have harvest in the future, how much is your expected selling price per bunch?

Kanzenze

Rwf 2,500

Rwf 2,000 - 2,500

Kibungo

Rwf 2,500

Rwf 3,000 (5)

Rwf 4,000

Depends on market situation

Depends on banana size

Cyugaro

Rwf 3,000

Rwf 3,000 - 5,000

Rwf 5,000

Depends on banana size (2)

12 When do you think to start distribution of suckers to neighbors?

Kanzenze

August 2009 (2)

Kibungo

Year 2010 (4)

October 2010 (2)

December 2010

Year 2011

Cyugaro

Year 2010

September 2010 (3)

After having three baby suckers

Free Discussions:

- There have been two problems during the project period, to get manure and little rainfall.
- Support of wheel barrow was necessary to carry manure to the field.
- They will start distribution of suckers to others after getting 3 offsprings.

VI.6.8 Cost Benefit Analysis

Cost Benfit Sheet PP1

Name of Project: **Improved Rice Seed Multiplication and Diseemination Project**

Benefit period: **1. Dec/07-Jan/08, 2. Jul/08/harvesting season, one year**

B/C Ratio / Initial Cost Recovery Period; 1.4 / after 2nd rice harvesting of 1 year

				unit Rwf/ha/year
A. Direct cost	**unit cost**	**Quantity**	**Sub total cost**	**Depreciation cost or ha**
1. equipmet and tools: Life Span (LS) 10 years				
Manual Winnower	460,000	4	1,840,000	368,000
Thresher	260,000	5	1,300,000	260,000
Rotary Weeder	95,000	20	1,900,000	380,000
T-shape leveler	15,000	10	150,000	30,000
Hand pump sprayer	28,000	4	112,000	22,400
Tool, etc.				0
Maintenamce Fee 5% in total of above items			265,100	265,100
2. materials				
Plastic Sheet	20,000	20	400,000	80,000
Fertilizer (NPK)	14,000	10	140,000	140,000
Fertilizer (Urea)	18,750	4	75,000	75,000
Kitazine	8,000	2	16,000	16,000
Cypermetrine	5,000	4	20,000	20,000
3. labor fee	500	860	430,000	430,000
4. tranportation fee				8,928
5. Facility :				
Concrete drying yard: LS=30 year	8,000	810	6,480,000	216,000
Sub-total				2,311,428
B. Indirect cost	unit cost	Quantity	cost	
Supporting staff				
1 Extension worker	80,000	12	960,000	320,000
2 Study Tour	95,000	5	475,000	158,333
3. Study Tour	250,000	1	250,000	83,333
Sub-total				561,667
Total				2,873,095

C. Benfit	unit cost	Quantity	cost	
1 Paddy rice (7823 kg/ha)	250	15,646	3,911,500	3,911,500
Total				3,911,500
Benefit				1,038,405
B/C ratio				1.4

Initial Cost Recovery Period After 2nd harvesting

Cost Benfit Sheet PP2

Name of Project: Marshland Agricultural Development Project

Benefit period: 1.Jan-Feb/08 for harvesting season

B/C Ratio / Initial Cost Recovery Period; 0.2 / 6 years

				unit Rwf/ha/year
A. Direct cost	**unit cost**	**Quantity**	**Sub total cost**	**Depreciation cost or ha**
1. equipmet and tools: Life Span (LS)=10 years				
Manual Winnower	460,000	4	1,840,000	184,000
Thresher	260,000	4	1,040,000	104,000
Rotary Weeder	95,000	10	950,000	95,000
T-shape leveler	15,000	16	240,000	24,000
Hand pump sprayer	28,000	4	112,000	11,200
Moble pump with accessories		3	1,545,000	309,000
2. materials				
Plastic Sheet: LS=5 years	20,000	20	400,000	80,000
Fertilizer (NPK)	14,000	5	70,000	70,000
Fertilizer (Urea)	18,750	2	37,500	37,500
Kitazine	8,000	1	8,000	8,000
Cypermetrine	5,000	2	10,000	10,000
3. labor fee	500	430	215,000	215,000
4. tranportation fee				
5. Facility				
Concrete drying yard: LS=50 years	8,000	45	360,000	7,200
Sub-total				1,154,900
B. Indirect cost	unit cost	Quantity	cost	
Supporting staff				
1 Extension worker by Sector			0	0
2 Study Tour	40,000	2	80,000	80,000
Sub-total				80,000
Total				1,234,900

C. Benfit	unit cost	Quantity	cost	
1 Paddy rice (926 kg/0.78 ha)	250	926	231,500	231,500
Total				231,500
Benefit				-1,003,400
B/C ratio				0.2

Initial Cost Recovery Period 6 years

Cost Benefit Sheet No.PP3

Name of Project: Hilly Terrain Agricultural Development Project

Benefit Period:

【Condition: Life span=10years, Size of cultivation area=1,000m2 vegetable:600m2, fruit tress:400m2】

【Condition: Each vegetable:150m2, Each fruit tree:200m2, Spacing of fruit tree:3m*3m=99m2, 23trees/200m2, Survival ratio:70%】

B/C Ratio / Initial Cost Recovery Period; 1.57 / 6 years

A. Cost (per 1 site)

Kind		Item	Q'ty	Unit	Unit Price (Rwf)	Amount (Rwf)	Remark
Construction Cost	Tools	Wheel Barrow	5	nos.	29,500	147,500	
		Shovel	10	nos.	1,650	16,500	
		Pick	5	nos.	2,900	14,500	
		Hummer	1	nos.	6,700	6,700	
		Wire	3	Kg	1,000	3,000	
		Strings	330	m	8	2,700	
		S.Total				190,900	
	Material	Cement (Main construction)	4	Bag	11,500	46,000	
		Sand (Main construction)	1	nos.	35,500	35,500	
		Lumber	22	nos.	250	5,500	
		Plastic sheet	450	m2	219	98,500	U.P=35,000/160m2, 225m2/sheet
		Cement (Sheeting)	2	Bag	9,800	19,600	
		Sand (Sheeting)	1	nos.	2,000	2,000	
		Glue	4	nos.	2,300	9,200	
		Tape	8	nos.	500	4,000	
		Sack	200	nos.	100	20,000	
		S.Total				240,300	
	Labor	Casual (Main construction)	508	man-day	1,000	508,000	Actual avarage on 22 sites
		Casual (Mason work of Main C)	20	man-day	800	16,000	ditto
		Casual (Sheeting)	32	man-day	700	22,400	ditto
		Casual (Mason work of sheeting)	4	man-day	700	2,800	ditto
		Mason (Main construction)	10	man-day	2,500	25,000	ditto
		Mason (Sheeting)	2	man-day	1,500	3,000	ditto
		S.Total				577,200	
		Total				1,008,400	1 m^3 of water=8,400Rwf $1,863
Maintenance Cost	Material	Plastic sheet	450	m2	219	98,500	Done once per 3 years
		Cement (Sheeting)	2	Bag	9,800	19,600	Ditto
		Sand (Sheeting)	1	nos.	2,000	2,000	Ditto
		Glue	4	nos.	2,300	9,200	Ditto
		Tape	8	nos.	500	4,000	Ditto
		Sack	200	nos.	100	20,000	Ditto
		Total				153,300	$283
						51,100	Per 1 year $94
Farming Cost	Seed	Vegetable				1,750	per Season-C (A=600m2, each kind 150m2)
		Fruit tree (survival ratio:70%)				480	per Season-C (A=400m2, each kind 200m2)
	Chemical fertilizer	For vegetable				25,500	Ditto
		For fruit tree				6,800	Ditto
		Total				34,530	$64
	Tool	Sprayor				28,000	
		Total				56,000	Life span=5years $103
Total cost for 10 years						1,920,700	$3,549

B. Benefit

Kind		Item	Q'ty	Unit	Unit Price (Rwf)	Amount (Rwf)	Remark
Production	Vegetable	Onion				300	5,000Rwf/2,500m2/season-C
		Carrote				300	5,000Rwf/2,500m2/season-C
		Cabbage				600	10,000Rwf/2,500m2/season-C
		Tomatoes				2,100	35,000Rwf/2,500m2/Season-C
		S.Total				3,300	
	Fruit	Papaya				69,000	10fruits/tree*23trees/200m2*300Rwf
		Mango				230,000	100fruits/tree*23trees/200m2*100Rwf
		S.Total				299,000	
		Total				302,300	$559
Total benefit for 10 years						3,023,000	$5,585

C. Ratio of Cost and Benefit

Benefit/Cost=	1.57	
Initial Cost Recovery Period	**6 years**	

Cost Benefit Sheet No.PP4
Name of Project: **Rabbit Rearing Project**
Benefit Period:
B/C Ratio / Initial Cost Recovery Period: 1.00 / 1 year

(Unit: Rwf)

Cost	Unit price	Quantity	Cost	Remarks
1. Equipment and tools				
2. Materials				
Lumber	2,400	27	64,800	
Iron Sheets	4,900	22	107,800	
Plywood	5,000	16	80,000	
Nails for Roofing	1,200	16	19,200	
Nails	900	16	14,400	
Wire Net	15,000	3	45,000	
7 Female Rabbits	1,500	11	16,500	Unit price: per kg
9 Male Rabbits	1,000	35	35,000	Unit price: per kg
4 Male and 6 Female Rabbits	1,500	10	15,000	Unit price: per head
2 Male and 10 Female Rabbits	1,500	12	18,000	Unit price: per head
10 Male Rabbits	1,500	10	15,000	Unit price: per head
3. Labor fee				
Hiring carpenters	4,000	16	64,000	
4. Miscellaneous				
Expenses for Workshop			3,750	
Stationery			22,950	Notes, Pens, Papers, etc.
Carton boxes for rabbit transportation			2,000	
TOTAL PROJECT COST for 16 model farmers with 48 rabbits			523,400	
Unit cost per rabbit			10,904	48 rabbits
Unit cost per model farmer			32,713	16 model farmers

Benefit	Unit price	Quantity	Cost	Remarks
1. Sales of rabbit				
Rabbit		36	51,900	for 8-month with 48 rabbits
Unit selling price per rabbit	1,442			average price in 2007
2. Assumption of benefit				
Based on the following assumptions, benefits are estimated.				
- One female rabbit gives 2.3 births per year.				
- 3.9 live baby rabbits are born per birth.				

Item	Unit price	Quantity	Amount	Benefit / Cost Ratio
Cost				
Unit cost per model farmer			32,713	with 1 male and 2 female rabbits
Benefit				B/C Ratio
After 6-month rabbit rearing, benefit will be	1,800	9.05	16,290	0.50
After 1-year rabbit rearing, benefit will be	1,800	18.10	32,580	1.00
After 1.5-year rabbit rearing, benefit will be	1,800	27.15	48,870	1.49

Note: In Nyamata, a rabbit was sold at Rwf 1,800 in 2008.

Cost Benefit Sheet No.PP5
Name of Project: Bee Keeping Project
Benefit Period:
B/C Ratio / Initial Cost Recovery Period: 1.40 / 3 years

(Unit: Rwf)

Cost	Unit price	Quantity	Amount	Remarks
1. Equipment and tools				
2. Materials				
Various materials for bee keeping			209,200	protection hats, smokers, etc.
Beehives	13,000	31	403,000	Carpenter in Nyamata made.
Processed bees wax	3,000	5	15,000	
Processed bees wax	3,500	15	52,500	Price increase
Processed bees wax	5,000	10	50,000	Price increase
Iron sheets	5,000	45	225,000	
Iron sheets	5,300	10	53,000	Price increase
Iron sheets	5,500	10	55,000	Price increase
Cages for queen bee	1,500	30	45,000	
Extractor	130,000	1	130,000	
Plastic grate	6,000	10	60,000	
3. Labor fee				
4. Miscellaneous				
Textbook	600	34	20,400	
Expenses for Workshop			47,200	
Transportation of materials	15,000	2	30,000	
Repair of tools etc.			8,700	
TOTAL PROJECT COST for 33 model farmers			1,404,000	
Unit cost per group			351,000	4 groups
Unit cost per model farmer			42,545	33 model farmers

Benefit	Unit price	Quantity	Amount	Remarks
1. Assumptions of benefit				
Based on the following assumptions, benefits are estimated.				
- One 2-story beehive can be harvested 3 times in 2 years.				
- 12 kg of honey (8.8 liters) are harvested per time.				
2. Gross income				
Honey production per year		13.2		liter
Unit selling price per liter	1,500			per liter

Item	Unit price	Quantity	Amount	Benefit / Cost Ratio
Cost				
Unit cost per model farmer			42,545	
Benefit				
After 1-year	1,500	13.2	19,800	0.47
After 2-year	1,500	26.4	39,600	0.93
After 3-year	1,500	39.6	59,400	1.40

Cost Benefit Sheet No.PP6
Name of Project: Fruit Banana Cultivation Project
Benefit Period: After 2 years
B/C Ratio / Initial Cost Recovery Period: 4.41 / 2 years

(Unit: Rwf)

Cost	Unit price	Quantity	Amount	Remarks
1. Equipment and tools				
2. Materials				
Suckers of Kamaramasenge	1,800	350	630,000	for 1.5 ha (0.5 ha x 3 cells)
Suckers of Gros Michel	1,800	350	630,000	for 1.5 ha (0.5 ha x 3 cells)
3. Labor fee				
Unloading labor fee	9,000	1	9,000	
4. Miscellaneous				
Transportation fee	200,000	1	200,000	
Bags for sucker transportation	200	100	20,000	
TOTAL PROJECT COST for 11 model farmers wit 3,600 suckers			1,489,000	
Unit cost per sucker			414	3,600 suckers
Unit cost per hectare			496,333	3 hectares

Benefit	Unit price	Quantity	Amount	Remarks
1. Assumptions of benefit				
Benefits are estimated that one sucker brings 1 bunch of bananas 2 years after planting.				
	2,500	1.0	2,500	
Survival rate of suckers				73%
2. Gross income				
Banana		1		1 bunch per 2 years
Unit selling price	2,500			per bunch

Item	Unit price	Quantity	Amount	Benefit / Cost Ratio
Cost				
Unit cost per hectare (1,200 suckers/hectare)			496,333	73% survival rate
Benefit				
After 2 years	2,500	876	2,190,000	4.41

Cost Benefit Sheet No.PP7
Name of Project: Pineapple Cultivation Project
Benefit Period : 1.5 year
B/C Ratio / Initial Cost Recovery Period: 2.48 / 1.5 years

(Unit: Rwf)

Cost	Unit price	Quantity	Amount	Remarks
1. Equipment and tools				
2. Materials				
Suckers of pineapple	20	33,291	665,820	for 1.5 ha (0.5 ha x 3 cells)
3. Labor fee				
Loading and unloading labor fee	2,000	5	10,000	
4. Miscellaneous				
Transportation fee	137,500	5	687,500	
Bus for study tour	70,000	2	140,000	
Study tour expenses			8,900	
TOTAL PROJECT COST for 11 model farmers wit 3,600 suckers			1,512,220	
Unit cost per sucker			47	32,000 suckers
Unit cost per hectare			756,110	2 hectares

Benefit	Unit price	Quantity	Amount	Remarks
1. Assumptions of benefit				
Benefits are estimated that one sucker brings fruit 1.5 years after planting.				
	150	1.0	150	
Survival rate of suckers				78%
2. Gross income				
Pineapple		1		1 fruit per 1.5 years
Unit selling price	150			per piece

Item	Unit price	Quantity	Amount	Benefit / Cost Ratio
Cost				
Unit cost per hectare (16,000 suckers/hectare)			756,110	78% survival rate
Benefit				
After 1.5 years	150	12,480	1,872,000	2.48

Cost Benfit Sheet QP1

Name of Project: Modern Cow Distribution

Benefit period: About 240 days after delibery of calf, (lactation period)

Break-even Point **Option 1=9liter, Option 2=5liter**

			unit Rwf/MF/year	
A. Direct cost	unit cost	Quantity/MF	cost	Depreciation Cost
1. equipmet and tools			0	0
hand pump sprayor (LS=5years)	20,000	0.16	3,200	640
2. materials			0	0
Cement (50 kg)	8,500	4.00	34,000	34,000
Sand (coarse sand)	1,500	6.00	9,000	9,000
Sand (fine sand)	1,333	3.00	3,999	3,999
Roofing sheets	4,800	6.00	28,800	28,800
Nail(6kg)	1,000	6.00	6,000	6,000
Nail for roofing	1,200	1.00	1,200	1,200
Acaricide	5,500	1.00	5,500	5,500
Subtotal (LS=30years life)				2,950
3. labor fee	500	320.00	160,000	160,000
			0	0
4. tranportation fee (cow)	140,000	1.00	140,000	7,778
Material/MF	2,222	1.00	2,223	2,223
5. Crossbred(Option 1) Grant by JICA	400,000	1.00	400,000	400,000
Crossbred(Option 2) Grant by Market	120,000	1.00	120,000	120,000
Sub-total			913,922	262,090
B. Indirect cost	unit cost	Quantity	cost	cost
Supporting staff				0
1. 3 Vet technicians (1/18)	50,000	12.00	600,000	33,333
2. RARDA Staff allowance(1/18)	5,000	17.00	85,000	4,722
3. Monitoring cost(1/18)			68,000	3,778
4. Minibus for Study Tour (1/18)	35,000	2.00	70,000	3,889
5. Minibus for Study Tour (1/18)	50,000	1.00	50,000	2,778
			0	0
Sub-total			873,000	48,501
Total				310,590
C. Benfit	unit cost	Quantity	cost	cost
1 Milk (lactation 240 days/year)/Ntarama	150	720.00	108,000	108,000
2. Milk (-ditto-)/Kigali	250	720.00	180,000	180,000
Total (Option-1)				108,000
Total (Option-2)				180,000
Benefit (Option-1)				-202,590
Benefit (Option-1)				-130,590
B/C ratio(Option-1)				0.348
B/C ratio(Option-2)				0.580

Break -Even Point= Option-1/Ntarama 9 Lit/day * 240 days/year

Break -Even Point= Option-2/Kigali 5 Lit/day * 240 days/year

Cost Benfit Sheet QP2

JICA Quick Project : Cost and Benefit of Installation of Rainwater Storage

【Condition: Life span=10years】

B/C Ratio / Initial Cost Recovery Period: 1.92 / 5 years

A. Cost (per 1 site)

Kind	Item		Q'ty	Unit	Unit Price (Rwf)	Amount (Rwf)	Remark
Construction Cost	Material	Brick	730	nos.	50	36,500	
		Cement	6	nos.	8,500	51,000	
		Fine sand	8	nos.	1,200	9,600	
		Course sand	5	nos.	1,400	7,000	
		Water proof	1	Bag	1,000	1,000	
		Iron sheet	1	nos.	5,500	5,500	
		Timber	6	m	500	3,000	
		S.Total				113,600	
	Labor	Casual	6	man-day	800	4,800	Actual avarage on 22 sites
		Mason	6	man-day	2,500	15,000	ditto
		S.Total				19,800	
		Total				133,400	$246
Maintenance Cost	Material	Cement	1	nos.	9,800	9,800	Once per 5 years
		Fine sand	2	nos.	1,200	2,400	Ditto
	Labor	Mason	2	man-day	2,500	5,000	
		Total				17,200	$32
						3,440	per 1 year $6
Total cost for 10 years						167,800	$310

B. Benefit

Kind	Item	Amount	Unit	Remark
	Data is provided by monitoring survey:			
	Period of use expected per year (from Mid of Nov. to Mid May)	76	days/year	42% of rainy season (180 days)
	Amount of expenditure expected to be reducted per day	425	Rwf/day	6
	Amount of expenditure expected to be reducted per year	32,300	Rwf/day	
Total benefit for 10 years		323,000	Rwf/day	$597

C. Ratio of Cost and Benefit

Benefit/Cost=	1.92	
Initial Cost Recovery Period	**5 years**	

Cost and Benefit Sheet QP3

Name of Project: **Shallow Well Irrigation**

【Condition: Life span=10years, Aultivation size per 1 site=300m2 on avarage of the project sites】

B/C Ratio / Initial Cost Recovery Period: 4.40 / 2 years

A. Cost (per 1 site)

Kind	Item		Q'ty	Unit	Unit Price (Rwf)	Amount (Rwf)	Remark
Construction Cost	Labor	Casual		man-day	800	0	Actual data on project sites (on avarage)
		Total				0	$0
Maintenance Cost	Labor	Casual		man-day	800	0	Once per before season
		Total				0	$0
Farming Cost							
	Seed	Vegetable				1,065	Cultivation area:300m2
	Pesticide					4,800	Ditto
		Total				5,865	$11
	Tool	Sprayor		1	28,000	28,000	
		Total				56,000	Life span:5years $103
Total cost for 10 years						**114,650**	$212

B. Benefit

Kind	Item	Amount	Remark	
Production	**Data is provided by monitoring survey:**			
	Number of farmers on avarage who are using shallow well in 1site	8	Farmer per 1 site	
	Income from shallow well irrigation farming per 1 farmer	6,300	Rwf/farmer/season-C	
	Total income at 1 site	50,400	Rwf/site/season-C	
Total benefit for 10 years		**504,000**	Rwf	$931

C. Ratio of Cost and Benefit

Benefit/Cost=	**4.40**	
Initial Cost Recovery Period	**2**	

Annex VIII TECHNOLOGY TRANSFER

8.1 Progress during 1st to 2nd field survey

(1) Progress of Technology Transfer

Tables below show the contents, transfer method, schedule and its implemented date during the Phase 1 field survey period from middle of April 2006 to the February 2007. Almost all of the technology transfers are going on as according to the each schedule.

Table 8.1.1Schedule and progress on the Technology Transfer to local government officers

Item	Contents	Transfer Method	Schedule	Progress	Place
Rural Development Plan	Selection of the QP components	Discussion	May 2006	17th May	Ntarama Sector office
	To prioritize the QP components at each Cell	Discussion	June 2006	8th June	
	Kick off workshop for modern cow	Workshop	June 2006	Jun 20, 22, 23	
	Formulation of Modern Cow rearing implementation	Workshop	July 2006	July11	
	To organize capacity development of model farmers	Workshop & OJT	Aug, 2006 Dec. 2006-	Aug 1-3, 8	
	M & E of the QP	Workshop & OJT		Dec,5, 7,	
Farming technique	Shallow well irrigation	OJT	July 2006-	19th Dec	Each site
	Road side irrigation	OJT Study tour Workshop	July 2006-	27th Dec 12nd Dec 3rd Nov	Each site
Water use technique	Rainwater storage facility	OJT	July 2006-	8th Nov, etc.	Each site

Table 8.1.2 Schedule and progress on the Technology Transfer to Environmental Specialist

Item	Contents	Transfer Method	Schedule	Progress	Place
EIA technique	Legal basis of EIA in Rwanda	Lecture of Environmental Law	June 2006	1st June	District office
	Executing of Project Brief (PB) (1)	Lecture of Project Brief	June 2006	20th June	District office
Planning technique	Method of data collection and its analysis on resource management on forest	Site survey and lecture of existing forestry	June 2006	23rd June	Forest in Shyara Sector
EIA technique	Executing of Project Brief (PB) (2)	Lecture of PB for QP proposed by JICA Study Team	July 2006	15th July	District office
Planning technique	Method of data collection and its analysis on resource management on wetland and soil erosion site	Site survey and lecture of existing wetland and soil erosion site	July 2006	24th July	District office
Planning technique	Planning of agricultural development on slope and riparian zone protection	OJT, Field visit	January-February 2007	January-February 2007	Ngenda, Ntarama, Bugesera
EIA technique	Procedure of EIA for marshland development	OJT, Field visit	January 2007	February 2007	Ntarama, Bugesera
EIA technique	Preparation of Project Brief (PB)	OJT	January 2007	February 2007	District office

Table 8.1.3 Schedule and progress on the Technology Transfer to RARDA Staff

Item	Contents	Transfer Method	Schedule	Progress	Place
Rural Developme nt Plan	Selection of the QP participants To formulate Plan of Operation To Organize Capacity Development of Model Farmers including training module Design &Construction of Cowshed M & Ev of the QP	Workshop Workshop Discussion, Workshop & Study Tour Discussion & Workshop OJT Discussion & OJT	June 2006 June 2006 Aug 2006 Aug-Sept, 2006 Dec-06-Feb-07	20,2,23th June July 11, 2006 Aug., 1-3, 8 Nov 8-9, 2006 Dec 11, 15, 29, Feb 12	Ntarama Sector

(2) Quick Project Follow-up

Regarding the follow-up for the three water related QP, namely i) introduction of rainwater storage, ii) introduction of shallow well irrigation system, and iii) introduction of road side irrigation system, a series of activities for formulation of the follow-up plans and its implementation have been progressed in collaboration with three (3) Cell Secretaries from Cyugaro, Kanzenze and Kibungo Cell Office, respectively. As of the middle of September, monitoring survey to grasp current situation of the existing sites were started. Based on the results of monitoring, the follow-up plan of each component, technology transfer has been done. The activities for QP follow up are summarized as table below (See Table 8.1.4).

Table 8.1.4 Progress of Technology Transfer on QP Follow-up

Project	Quick Project Follow-up		
Project Stage	Item of Technology Transfer	Persons targeted	Contents, Method, Period, Place, etc. of Technology Transfer
Surveying	▪ Method of monitoring	▪ 3 Cell Officers concerned (3) ▪ C/P of Bugesera District Office(1)	▪ Hearing to the model farmers by using unified questionnaire which was formulated prior to monitoring ▪ Contents of technology transfer listed above carried out as a form of discussion at Ntarama Sector Office as well as the existing site where were implemented the QP so far.
Planning	▪ Formulation of follow-up plan	▪ 3 Cell Officers concerned(3) ▪ C/P of Bugesera District Office(1)	▪ Formulation of follow-up plan based on the result of monitoring with its analysis ▪ Plan for reinforcement of the rainwater storage ▪ Plan for conduct mutual study tour of shallow well irrigation system ▪ Plan for construction of shallow well irrigation system with farming practice ▪ Contents of technology transfer listed above carried out as a form of discussion at Ntarama Sector Office.
Implementing	▪ Project implementation ▪ Project monitoring	▪ 3 Cell Officers concerned(3) ▪ C/P of Bugesera District Office (1)	▪ Arrangement to implement the follow-up plans formulated by 3 Cell officers together with C/P sent by Bugesera district ▪ Contents of technology transfer listed above carried out through OJT.

8.2 Progress during 3rd to 4th field survey

(1) Improved Rice Seed Multiplication and Dissemination Project

As of September 15, 2007, technology transfer to the stakeholders concerned was summarized in Table below. During the implementation stage, transmission of instruction from JICA study team to the 60 beneficiary farmers was mainly managed through Agronomists who mobilized the beneficiaries from time to time through holding meeting and/or OJT in the field work. Furthermore, the biweekly activity report made by the Agronomists was computerized in English and Kinyarwanda versions and delivered to the stakeholders concerned (See table 8.2.1) so as to give the beneficiaries feedback about PP activity as well as sharing information among the stakeholders concerned.

Table 8.2.1 Summary of Technology Transfer to the Target Stakeholders

Stage	Activity/Technolgy		Target Stakeholders	Key technology/information
Planning State	Jun 7	Discussion of PP	ISAR/RADA	Briefing of PP framework, Contribution of ISAR to PP
	June 13	Discussion of PP	RADA Rice Expert RADA Seed Unit	Briefing of PP Framework
	Jun 25	WS: Plan formulation	RADA staff, District officer, Ruhuha Sector/Cell officers, Corinyaburiba Cooperative beneficiaries, Local Agronomists	Formation of PP in the WS via participatory approach
	Jun 26	WS: Technical Training	RADA staff, Corinyaburiba coop beneficiaries, local Agronomists	Management of WS, Lecture of Key Farming Practices based on the technical guideline
Implementing stage	Jun 29	Soil survey	District officer, local Agronomists, Corinyaburiba coop beneficiaries	Making soil pit, soil sampling method,
	Jul 4-6	Seed Treatment, Fertilizer(NPK) application, sowing on nursery bed	Agronomists, beneficiaries, RADA	Seed dressing with chemical, and incubation, application of NPK on nursery bed, sowing seed rate of 75 gm/m^2 in nursery bed
	Jul 25, 31	1st Roguing operation	Agronomists, beneficiary	Elimination of Off-type in nursery stage
	Jul 15-31	Soil Conservation	Agronomists	Identification of target area for soil conservation measure in the scope of work/JICA PP
	Aug 1-10	Uprooting of seedlings, leveling plot & Transplanting	Agronomists, beneficiaries, non-participants of coop members, NGO,	One seedling/hill, 30 *15 cm spacing, uprooting seedlings without root damage, leveling of main plots by T-shape, transplanting depth of seedling
	Aug 15-25	Weeding Operation	Agronomists, beneficiaries	Weeding by rotary weeder in ponding condition
	Aug 15-31	Make round guidance for the Nyaburiba rice farmers	Agronomists, non-seed multiplication rice farmers in Nyaburiba marshland	Every Monday and Wednesday to round guidance about JICA rice farming practices
	Aug 30 - Sept 4	Spraying pesticide	Agronomist, Beneficiaries	To control Diophsis(Stalk-eyed borer) by spraying Cypermetrine
	Sept 5-14	1st Top dressing,	Agronomist, Beneficiaries	1st top dressing with urea

	Sept 6	Study Tour	Agronomists, Muzi Cyeru agronomists, Ruhuha/Nyarugenge Sector staff, District officer, President of 11 associations/Corinyaburiba coop and Coop board members, 60 beneficiary farmers	Structure and activity of CODERVAM coop, modern rice milling machine, irrigated paddy field with irrigation facility

Table 8.2.2 Stakeholders concerned for Distribution of Activity Reports

	Stakeholders		Nyaburiba PP		Muzi Cyeru PP	
			Eng	Kinya	Eng	Kinya
1	Bugesera District	Mayor, E/S, P/U, Eric	4	4	4	4
2	Ntarama Sector	E/S, Emmanuel, Paul	1	2	1	2
3	Kanzenze Cell	Cell Coordinator, E/S				2
4	Ruhuha Sector	Agronomist		1		
5	Nyarugenge Sector	Agronomist		1		
6	Corinyaburiba Cooperative	President and three Associations		4		
		2 Agronomists	2	2		
7	RADA	Edward/Rice Expert	1	1	1	1
Total			8	15	6	9

Note: Eng: English, Kinya: Kinyarwanda, E/S: Executive Secretary, P/U: Planning Unit

There are several issues in implementation of technology transfer as below.

1) Most of District, Sector and Cell Offices are busy for their routine work and have very limited time to regularly join the implementation of the pilot project. In addition, they do not have means to visit their command area and communication means at their disposal are extremely limited.

2) Consequently, target group for technology transfer is confined to end user such as coop, participant of the project.

3) In a view of sustainability, participation to the project on regular basis by the officer concerned (RADA, District, Sector and Cell) would be desirable, but actually their participation is impossible, thus information activities like newsletter, media and so on were important strategy to compensate such problem.

(2) Marshland Agricultural Development Project

1) Pilot Farm (PF) construction stage

Technology transfer to the persons concerned on the stage of PF construction is summarized in table below.

Table 8.2.3 Progress of Technology Transfer on PF Construction Stage

Project	Marshland Agricultural Development Project Construction of Pilot Farm for Rice Cultivation		
Project Stage	Item of Technology Transfer	Persons targeted	Contents, Method, Period, Place, etc. of Technology Transfer
Surveying	▪ Selection of project site	▪ 3 Cell Officers concerned (6) ▪ Representatives of Umudugudu	▪ Carrying out field investigation together with the persons targeted ▪ Project site selection based on soil, water quality, frequency of water level in

Project	Marshland Agricultural Development Project Construction of Pilot Farm for Rice Cultivation		
Project Stage	Item of Technology Transfer	Persons targeted	Contents, Method, Period, Place, etc. of Technology Transfer
			marshland, etc. ▪ Contents of technology transfer listed above carried out through OJT on each candidate site.
Planning	▪ Formulation of project plan ▪ Formulation of implementation plan	▪ Ntarama Sector Officers concerned (2) ▪ Kanzenze Cell Officers concerned(2) ▪ Representatives of umudugudu ▪ Existing cultivators of the project siteCandidates for the project, (3) ▪ C/P of Bugesera District Office (1) ▪ Supervisors on the project site (2)	▪ Indication of the issues which should be solved prior to commencement of the project. ▪ In particular, existing right for cultivation on the project site should be carefully made consensus with present cultivators. ▪ Formulation of Plan of Operation ▪ Pointing out other issues to be confirmed and resolved ▪ Contents of technology transfer listed above have been carried out during the Kick-off Workshop at the time for commencement of the project through OJT with participatory approach. ▪ At Kanzenze Cell Office
Implementing	▪ Construction method ▪ Progress control	▪ Candidates for the project ▪ C/P of Bugesera District Office ▪ Participants for the construction work (2,500 man-days) ▪ Supervisors on the project site	▪ Explanation of plan ▪ Fixing rulers, setting up elevation of facilities, method of canalizing, embanking with compaction, leveling of plots, plan of earth works, etc. ▪ Introduction and fabrication of tools on the site ▪ Plan of arrangement of casual labors, progress control ▪ Formulation of construction record ▪ Contents of technology transfer listed above have been carried out during the construction period through OJT on the project site, Muzi-cyeru marshland.

2) Farming Practice

As of September 15, 2007, technology transfer to the stakeholders concerned was summarized in below (See Table 8.2.4). As rice-farming operation has commenced prior to the 2nd workshop under limited cropping pattern and progress of land reclamation work for paddy field, technology transfer was mainly done via OJT by mobilizing the participants involved in land reclamation work.

Table 8.2.4 Summary of Technology Transfer to the Target Stakeholders

Stage	Activity/Technology		Target Stakeholders	key technology/information
Planning State	Concerning the farming activity followed by the reclamation work of paddy fields, the workshop is not convened yet as of September 15 because of ongoing of the reclamation work. Further, due to limited rice cropping pattern, rice farming activity was initiated prior to the plan formation step.			
Implementation	Aug. 1	Briefing of Muzi Cyeru reclamation work	RADA rice expert	Briefing of Muzi Cyeru Marshland agricultural development PP

	Aug. 8	Weighing seeds and soaking	JICA agronomist, District officer, Cell staff, participants	Weighing seeds of 3 varieties and soaking each seed bags into water
	Aug. 9-10	Initiation of incubation	JICA agronomist, District officer, Cell staff, participants	Incubation method to make seed bags keep wet condition
	Aug. 11	Stop to incubation and sowing operation with fertilizer application	JICA agronomist, District officer, Cell staff, participants	Timing of ceasing incubation based on shape of pre-germinated seed, method of sowing seeds on nursery bed and application of NPK on nursery bed
	Aug 12-25	Water management of nursery bed	JICA agronomist, District officer, Cell staff, participants	Watering nursery bed not so as to dry bed for making seeds emergence evenly under consideration of heavy clay soil characteristics.
	Aug 25 - Sept 7	Puddling /Leveling of main plots	JICA agronomist, District officer, Cell staff, participants	Puddling/leveling by hoe and T-shape tool under ponding condition
	Sept 3	Uprooting of seedlings, application of basal dressing of NPK and transplanting	JICA agronomist, District officer, Cell staff, participants	Uprooting of seedlings without damage of root by shovel, method of fertilizer application, method of transplanting
	Sept 4-15	Water management, filling missing plants	JICA agronomist, District officer, Cell staff, participants	Based on water requirement of new paddy field, irrigate the transplanted plots two times/day for keeping water just after transplanting, filling gap caused by water fowl.
	Late Aug to mid Sept	Identification of factor causing yellowing/browning symptom of seedlings	JICA agronomist, District officer	Briefing of the results of soil analysis by ISAR and measuring of pH/EC for the irrigation water so as to narrow causes down

There are similar issues in implementation of technology transfer as mentioned in the improved rice seed multiplication and dissemination project.

3) Hilly Terrain Agricultural Development Project

The technology transfer of the project is divided into two stages, namely FP construction stage and farming practice stage with activity for facility maintenance. As of the middle of September 2007, almost all construction works of FP has been completed with technology transfer, which mainly relates to civil engineering works. Technology transfer to the persons concerned is summarized in below (See Table 8.2.5).

Table 8.2.5 Progress of Technology Transfer on FP Construction Stage

Project	Hilly Terrain Agricultural Development Project -Construction of Farm Pond-		
Project Stage	Item	Persons targeted	Purpose
Surveying	▪ Selection of project site	▪ 3 Cell Officers concerned (6) ▪ Representatives of Umudugudu (2) ▪ Landowner of the candidate site of the FP construction	▪ Determination of the project site depend on the condition candidate site like ground slope, soil, catchment area ▪ Contents of technology transfer listed above carried out through OJT on each candidate site as field investigation.
Planning	▪ Formulation of project plan ▪ Formulation of implementation	▪ Ntarama Sector Officers concerned (2) ▪ 3 Cell Officers concerned(6)	▪ Indication of the issues which should be solved prior to commencement of the project. ▪ In particular, landownership with its

Project	Hilly Terrain Agricultural Development Project -Construction of Farm Pond-		
Project Stage	Item	Persons targeted	Purpose
	plan	▪ Representatives of Umudugudu (22) ▪ Landowner of the project sites (21) ▪ C/P of Bugesera District Office (1) ▪ Supervisors on the project site (3)	exploitation on the each project site should be carefully made consensus with landowners. ▪ Formulation of Plan of Operation ▪ Pointing out other issues to be confirmed and resolved ▪ Contents of technology transfer listed above were carried out during the Kick-off Workshop at the time for commencement of the project through OJT with participatory approach.
Implementing	▪ Construction method ▪ Progress control	▪ Representatives of Umudugudu(22) ▪ C/P of Bugesera District Office ▪ Participants for the construction work(10,000 man-days) ▪ Supervisors on the project site	▪ Selection of appropriate type of FP to the site ▪ Arrangement of FP system ▪ Fixing rulers, method of excavation, embanking with compaction, arrangement of ancillaries, etc. ▪ Introduction and fabrication of tools on the site ▪ Grass fence, the other devices against soil erosion ▪ Slope protection method ▪ Permeability test ▪ Daubing clay soil on the bottom of FP as measures for prevention of infiltration of FP water stored ▪ Safety measures ▪ Arrangement of casual labors, progress control ▪ Formulation of construction record ▪ Contents of technology transfer listed above have been carried out during the construction period through OJT on the each project site.

During the 4th field survey from November 2007 to February 2008, the project carried out reinforcement works of the farm ponds to secure the storage capacity of the FP. Apart from the works, the Study Team appealed to participants to maintain the FP facilities to keep them in good condition as well as establishment of rules for proper water use of the FP. The activities concerning these points are summarized as follows:

Table 8.2.6 Progress of Technology Transfer on FP Construction Stage

Project	Hilly Terrain Agricultural Development Project (Reinforcement & Maintenance of Farm Pond)		
Stage	Item	Targeted persons	Purpose
Implementing	▪ Measures for reinforcement of the FP	▪ Representatives of Umudugudu, Users ▪ C/P of Bugesera	▪ Reinforcement of the FP, was carried out with a concept of low cost and simple technique approach using local available material like clay soil.

Project	Hilly Terrain Agricultural Development Project (Reinforcement & Maintenance of Farm Pond)		
Stage	Item	Targeted persons	Purpose
		District Office	▪ 3 different kinds of measures have been introduced and an appropriate one was selected among them depending on site condition respectively. ▪ Technical transfer was carried out through OJT.
Planning	▪ Establishment of Rules for water use	▪ Representatives of Umudugudu, Users ▪ C/P of Bugesera District Office	▪ Particularly in the dry spell, water of the FP should be casually used. ▪ It is essential to make a rule for proper water use, which strongly appealed to the participants by the Study team. ▪ The rules were formulated by each site taking account of their own condition of Umudugudu.
Planning	▪ Formulation of maintenance schedule	▪ Representatives of Umudugudu, Users ▪ C/P of Bugesera District Office	▪ The items for proper maintenance of farm pond facilities were indicated by the Study Team. ▪ Based on the items, each site formulated their own schedule of maintenance for upcoming 6 months. ▪ Presentation to report on activities concerning maintenance works was done to share information among participants.
Planning	▪ Planning safety measures	▪ Representatives of Umudugudu, Users ▪ C/P of Bugesera District Office	▪ In order to avoid occurrence of unexpected accidents around the FP, the safety devices should be fixed in case of accident, particularly for children. ▪ Plans for fixing material such as rope were made by each Umudugudu.

8.3 Progress during 5th field survey

Progress of the Technology Transfer during 5th field Survey was summarized as below

(1) Improved Rice Seed Multiplication and Dissemination Project

Progress of technology transfer so far is summarized as follow. Making information known to the all beneficiaries was managed by holding the beneficiary meeting when it was necessary, and farming guidance to the beneficiary was carried out through OJT. Moreover, biweekly activity report prepared by the agronomist financed by JICA Study Team was fed back to the beneficiary in order to share information among the stakeholders concerned.

Table 8.3.1 Summary of Technology Transfer to the Target Stakeholders

Activity/Technology		Target Stakeholders	Major technology transfer/information
Late May to early Junly	-Roguing -Criteria of harvesting	- Agronomist employed by JICA Study Team, 60 beneficiaries	Roguing in ripening stage and judgment of harvesting time by color of rice canopy

Activity/Technology		Target Stakeholders	Major technology transfer/information
Early July to late August	-Quadrant sampling survey -Seed treatment and sowing on nursery -Transplanting	-Agronomist employed by JICA Study Team, Muzi Cyeru Agronomist, JOCV -Agronomist employed by JICA Study Team, 60 beneficiaries, JOCV -60 beneficiaries,	-Yield survey, yield component analysis -Seed treatment by chemicals, seed incubation, sowing on nursery bed - Planting density

The problems on technology transfer are summarized as below.

- Officers in District, Sector and Cell office are always filed with routine work, and unable to participate in PP activity. Meanwhile, most of them do not have travel mean to visit their command area with extremely limited communication means.
- Consequently, the target stakeholders are inevitably confined to agronomist employed by JICA Study Team, Cooperative members, Beneficiary farmers.
- In a view of sustainability, regular participation of governmental officers (RADA, District, Sector and Cell) to the PP is desired but is difficult, thus feasible way is obliged to cope with it via public relation like issuing biweekly newsletter.

(2) Marshland Agricultural Development Project in Muzi Cyeru Marshland

The progress of technology transfer to the stakeholders concerned so far was summarized table below. Technology transfer was mainly carried out by targeting the beneficiary farmers engaged in the land consolidation work via OJT. The main technology transfer about farming and land consolidation work is as follow.

Table 8.3.2 Progress of technology transfer to target stakeholders about farming

Early to late June	Formulation of Cropping Plan	Muzi Cyeru Rice Association (32 members), JICA employed agronomist, JOCV	Working schedule toward the 2nd rice cropping, effect of compost/manure application
Early to late July	Preparation of nursery plot, seed treatment, sowing on nursery, nursery management	Muzi Cyeru Rice Association (32 members), JICA employed agronomist, JOCV	Seed treatment, seed incubation, preparation of nursery bed, sowing on nursery, covering seeds with soils, water management on nursery plot
Early to late August	Nursery management, paddling of main plot, uprooting of seedlings, transplanting	Muzi Cyeru Rice Association (32 members), JICA employed agronomist, JOCV	Nursery management, uprooting of seedlings, transplanting method

As for the technology transfer issues, similar problems mentioned in the previous project is existed.

(3) Hilly Terrain Agricultural Development Project

During 5th field survey, the activities of technology transfer have been carried out through OJT as table below. The items transferred to Umudugudu people were strengthening of water storage function, operation and maintenance works, and so on. In parallel, to Sector/Cell officers the Study Team

recommended and emphasized the necessity of establishing Water Users Association (WUA) at each Umudugudu. Furthermore, evaluation method to the project was transferred to Sector/Cell officers through a series of workshop.

Table 8.3.3 Progress of Technology Transfer on FP Construction Stage

Project	Hilly Terrain Agricultural Development Project		
Project stage	Item	Target persons	Purpose
Implementation	▪ Treatment work on strengthening of water storage function	▪ Representatives of Umudugudu and participants in construction works. ▪ Stakeholders in related Sector and Cells	▪ Techniques were transferred through OJT on the method of implementing measures for strengthening water storage function using plastic sheets and remarks
Supporting of water users group	▪ Establishment of water user's group	▪ Representatives of Umudugudu and participants in construction works ▪ Stakeholders in related Sector and Cells	▪ Necessity of establishing water user's group orienting toward relevant management of farm ponds and items for concrete examination were instructed through WS. ▪ Advice and support are provided on formulation of O.M plan, provision of rule of water use and safety measures planning.
Project evaluation	▪ Project evaluation	▪ Stakeholders in Sector office and Cell offices	▪ Technical transfer of project evaluation method was made through OJT, instructing management of project evaluation WS in which the target group for technical transfer including model farmers and Umudugudu leaders participated.

(4) Modern Cow Distribution Project in QP

The progress of technology transfer to the stakeholders concerned so far was summarized table below. Technology transfer was mainly carried out to RARDA staff through OJT. The main technology transfer about monitoring and follow up activity is as follow.

Table 8.3.4 Progress of technology transfer to RARDA Staff

Item	Contents	Transfer Method	Progress	Place
One cow, one family	Monitoring & Evaluation of the QP	Monitoring	May 29, Jun2, 2008	Ntarama Sector
	Follow-up activity	Study Tour	Aug 29, 2008	Gahanga Sector
	Final Evaluation of QP	Workshop	Sept 5-08, 2008	Ntarama Sector