ANNEX V THE QUICK PROJECT

Study on Sustainable Rural and Agricultural Development in Bugesera District in Republic of Rwanda

Rural Socioeconomic Survey for the Beneficiaries of the Quick Projects in Ntarama Sector in Bugesera District

(As of February, 2007)

JICA Study Team

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ANNEX

1. Introduction

The quick projects in rural and agricultural sectors financed by JICA have been commenced in Ntarama Sector in Bugesera District under the scope of work in the study on sustainable rural and agricultural development in Bugesera District since June, 2006. The quick projects consist of the four components, namely QP-1: Rainwater storage, QP-2: Shallow well irrigation, QP-3: Roadside irrigation and QP-4: Modern cow distribution, benefiting around of the 200 households in the 3 Cells of Ntarama Sector. Each QP has different objectives based on each component. In this survey carried out in August - September 2006, around of the 50 households over the 4 QPs were interviewed by QP in order to extract possible index for monitoring and evaluation of QPs and Pilot Projects on the baseline of August 2005 to July 2006.

2. Objectives

The rural socio-economic survey on the beneficiaries in the quick projects aims as follow;

1) Acquiring basic information for analyzing of agricultural and rural development potential and constraints together with index on evaluation of the 4 QPs and pilot study (PP) impacts based on the following project outline as per each QP.

Concerning the each QP profile, outline is shown in below Table.

Table 1: Numbers of Beneficiaries by QP and QP Outline

No	Component	No of Beneficiaries	Quick Project Outline	
QP1	Rainwater storage	90	Cyugaro Cell	30 households
			Kanzenze Cell	30 households
			Kibungo Cell	30 households
			Objectives: To secure safety domestic water during the rainy season by mitigating burden work for fetching water and contributing to generate spare time for their life and	
			To construct rainwater storage with 1 m3 cap in eachouseholdousehold under cost sharing system. Structure of rainwater storage consists of 3 type as follows: a. Traditional type with stone b. Brick type storage c. Wooden frame type	
QP2	Shallow well irrigation	60	Cyugaro Cell	20 households
			Kanzenze Cell	20 households
			Kibungo Cell	20 households
			Objectives: Improving farming activity (productivity, income generation) of marshland (Igishanga) during the dry season (Season C) by introducing shallow well.	
			To dig 2 types of shallow well in the border of marshland and hilly side as follow; a. Pit type of shallow well with 2 *2* 1.5 m size b. Canal type of shallow well to connect from water source in marshland to upland field around of 10- 15 m under	

			participatory work sharing approach.	
QP3	Roadside irrigation	30	Cyugaro Cell : 2 sites	10 households
			Kanzenze Cell: 2 sites	10 households
			Kanzenze Cell: 2 sites	10 households
			Objectives: Improving farming activity (productivity, income) by trapping runoff of rainwater into hilly side fields during the rainy season	
			To make ditches from roadside to upland fields so as to trap runoff into the upland field expanded in hilly terrain	
QP4	Modern cow distribution	18	Cyugaro Cell:	6 model farmers
			Kibungo Cell:	6 model farmers
			Kanzenze Cell:	6 model farmers
			Objectives: To improve farming activity (income generation by selling milk, applying cow dung manure to field, nutritious condition by consuming fresh milk)	
			To distribute crossbred cow in calf to the selected model farmers under cost sharing system regarding cowshed construction and animal health. This QP includes a revolving mechanism to redistribute new born calf to next generation in future.	
Total		About 200		

3. Method

(1) Component of Questionnaire

The rural socio-economic survey covers the following aspect consisting of the 6 categories as follow (See Annex II).

Table 2 Outline of Questionnaire

	Categories	Major survey items
1	General	Family aspect, decision making, meal, land tenure
2	Income	Income (August-05 to July-06) by crop and by season, i.e, annual crop, permanent crop, season A, season B and season C
3	Expenditure	Expenditure (August-05 to July-06) by agricultural input, hired labor, food items, non-food items, others
4	Association Activities	General, land tenure, income, expenditure
5	Traditional supporting system	Umuganda, Ubudehe, Ibibina, kugurizanya
6	Others	Fetching water, collecting firewood, spare time, soil fertility, health, drought cooping strategy

The questionnaires focusing on the rural community in Ntarama Sector was drafted by JICA Study Team based on preliminary information and briefed to the surveyors including objectives and target households involved in the quick projects on late August, 2006. The questionnaire consisting of structured and semi-structured questions was revised so as to fit to the current socio-economic situation via preliminary test carried out in Kibungo Cell late August, 2006. This preliminary test

includes training of the survey assistants as well.

(2) Sampling Method

Selection and arrangement of the households for interview was requested to the Cell office concerned or group head of the QP beneficiaries prior to interview under guidance of JICA Study Team. The numbers of the sampling households per each QP ranges from 20% to 50% as below.

Table 3 Number of Sampled Model Farm Households

QP components		Sampling Households	Ratio
1	Rainwater storage	18	20%
2	Shallow well irrigation	12	20%
3	Roadside irrigation		
4	Modern cow distribution	9	50%

(3) Analysis of Income and Expenditure

Total annual income and expenditure were estimated based on the following formula and information.

Income:

Total annual household income (TAI) = Agricultural Income + Off Farm Income
Agricultural Income = Farming Income + Livestock Income
Farming = Seasonal Crop Income + Permanent Crop Income
Annual Seasonal Crop Income = (Season A + Season B + Season C) Income
Seasonal Crop Income = Sum of quantities sold per each sale x Unit price How to approach : The collected data includes : inventory of seasonal crops exploited, planting and harvesting month, form of crop sold (green, dry, cobs, grain, flour, others), number of times sold, unit for sale (kg, bag, basket, plate, heap, piece, others), quantities sold per each sale
Permanent Crop Income = Sum of quantities sold per each sale x Unit price How to approach : The collected data includes: inventory of permanent crops exploited, number of pieces harvested, number of pieces sold, sale price /unit
Livestock Income = Sum of products sold per each sale x Unit price How to approach : The collected data includes: inventory of animals types exploited, rearing numbers, unit for sale (head, liter, piece, kg, others), quantities sold, unit price ...
Off Farm Income = Sum of casual work income, lending land income, banana wine income, sorghum beer income, donation income, pension income, others How to approach: The collected data includes: inventory of off farm income sources ; casual work : quantity (in terms of day/year), unit price ... lending land : area (Ha), unit price ... banana wine : quantity (jerry cans/year), unit price sorghum beer : quantity (jerry cans/year), unit price pension : amount/3 months

Expenditure:

Total annual household expenditure (TAE)=Expenditure of agricultural input + Cost of Hired labor + Food cost + Non Food cost

How to approach :

The collected data includes:

inventory of agricultural input, food, and non food purchase, sale unit, quantities, and unit price of each item,

The raw data collected have been entered, processed and analyzed by using Microsoft word and Excel.

4. ANALYTICAL RESULTS

4.1. Modern Cow Distribution Quick Project (QP4)

4.1.1 General

(1) Family aspects

Table 4 below shows the general characteristics of the households, model farmers for the modern cow distribution. These characteristics consist of household head age, sex, marital status, schooling years and family size, as well as family members engaged in farming and decision-makers of the house economy (farming practice and its expenditure and family food control).

Table 4: General Characteristics of the Households

No	Model Farmer code	Age (year)	Sex	Marital status	Schooling years	Family size	Family members engaged in farming	Decision-maker	
								Farming	Food
1	Cy-Kj	25	M	Single	12	3	1	Household head	Household head
2	Cy-Ms	47	M	Married	6	8	2	Husband	Husband
3	Cy-Mm	44	F	Widow	6	4	2	Household head	Household head
4	Kz-Km	36	M	Married	11	6	2	Husband	Wife
5	Kz-Me	47	F	Widow	9	2	1	Household head	Household head
6	Kz-Ko	49	M	Married	6	6	2	*	*
7	Kb-Mm	54	F	Widow	9	4	1	Household head	Household head
8	Kb-Gi	36	M	Married	3	7	2	*	*
9	Kb-Rj	25	M	Single	12	6	1	Household head	Household head
Average		40	33%F		8	5	1.6		

Source: Interview Results by JICA Study Team, 2006 / *No response given by the interviewee

Table 4 above shows HOUSEHOLD head ages, ranging from 25 to 54 years on average of 40 years. Their schooling years are respectively 12 in two households, 11 in one household, 9 in two Households, 6 in three Households and 3 in one household at average of 8 years schooling years. However, the results of filled registration form requested from the JICA Study Team inferred that most of them appeared not to comprehend well the questions based on the answers required in the said form because of often irrelevant. Typical household consists of 5 members on average, ranging from 2 to 8 per household. Whole households comprise two households of 2, 3, 5, 7 and 8 persons each, two households of 4 persons, and three households of 6 persons. The total number of the 9 Model Farmers' family members is 46 persons.

The number of persons engaged in farming activity per family resulted in one to two, on an average of 1.6 persons. Regarding marital status, 2 household heads are single, 4 are married and 3 are widows. Concerning decision making on house economy among the family members, from 7 HOUSEHOLD heads out of 9 responding to the question, it is noted that farming activity is entirely controlled by household-head (7 household heads). Household heads control personally this important rubric on which family survival basically depends. In fact, household food security is based on farming. Meanwhile, the 6 HOUSEHOLD heads control food procurement, the rest (or 1 HOUSEHOLD) being decided by other family member like a wife. It has been observed that only one wife out of two controls food procurement. Normally, according to Rwandese culture, wife controls food

procurement; however, it is noted that due to food insecurity situations, some husbands (who don't trust the capability of their spouse) take control of that household economic rubric to better economize food.

(2) Meals and Food

Frequency of taking meals per household per day varies from 1 to 3 times with an average of 2 times. 78% of the households take it at least 2 times per day, comprising of lunch and dinner. However, survey results could not assess how food was enough in nutritious balance.
According to the survey results shown in Tables 5 and 6 and Figure 1 below, the 3 main food crops for food diet are beans, sweet potatoes and maize among the farm households. Like elsewhere in low and middle altitude of Rwanda (1000 - 1700 m), bean and sweet potatoes are known to be the main food crops as the stable food. 100% of the households had beans, 62% sweet potatoes and 47% maize. Beans (commonly called Rwandese meat) are known to alleviate malnutrition by supplying its relatively high protein content.
The survey result has shown that beans, sweet potatoes, maize, sweet cassava, banana (brewing and cooking), Irish potatoes, cassava flour and sorghum are the 8 main different food crops of the staple food, and that the number of food crops in their food diet ranges from 1 to 6. 3 food crops for food diet were in 60% of the Households, 2 in 36%, and 1 in 4%. The staple food is almost the same over the seasons, because farmers seasonally cultivate the same crops, except for sorghum which is confined to only in the season B.

Table 5: Ratio of Households Taking Type of Food Crops for Diet

Food crop	Season C	Season A	Season B	Annually*
Beans	100%	100%	100%	100%
Maize	56%	44%	44%	47%
Sweet potatoes	67%	67%	56%	62%
Sweet cassava	33%	33%	33%	33%
Banana	22%	22%	44%	31%
Irish potatoes	11%	11%	11%	11%
Cassava flour	0%	11%	11%	8%
Sorghum	11%	0%	0%	3%

Source: Interview Results by JICA Study Team, 2006
*Annual % = ((%season C x 3 months/12 months) + (%season A x 4 months/12 months) + (%season B x 5 months/12 months))

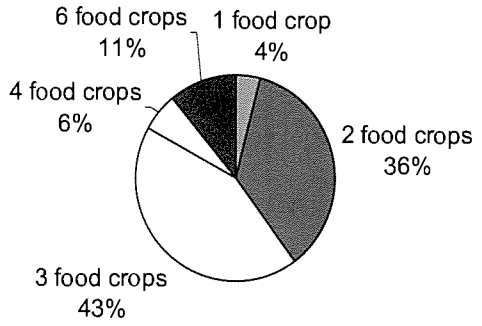
Table6: Ratio of Households taking the Number of Food Crops

No. of food crops	Season C	Season A	Season B	Annually*
1	0%	11%	0%	4%
2	44%	33%	33%	36%
3	33%	33%	56%	43%
4	11%	11%	0%	6%
5	0%	0%	0%	0%
6	11%	11%	11%	11%

Source: Interview Results by JICA Study Team, 2006
*Annual % = ((%season C x 3 months/12 months) + (%season A x 4 months/12 months) + (%season B x 5 months/12 months))

Figure 1 below highlights household ratio according to the number of food crops in their food diet.

Figure-1 % of HHs having the Number of Food Crops in their Food Diet



Source: Interview Survey Results by JICA Study Team, 2006

(2) Land tenure

Because of no metrology concept among the rural community, it was very difficult to grasp in accurate data; most of the interviewed household heads replied rough estimation about their land size. The interview results on land holding size ranged from 1 to 4 ha per household. Thus, obtained figures are not reliable. However, most of the farmers know exactly the numbers of parcels owned and which ranged from 1 to 4.

According to experience and other different reports related to land tenure in the region, farm size per household ranges from 1 to 2 ha. Like elsewhere in Rwanda, farm size has been continuously ramified over the years, either the children came into a land from their parents, or householdsold some parcels of the farmland.

Almost all lands used and/or leased are located in hillsides under rainfed regime. Only few farmers neighboring to wetlands have an advantage to access cultivation, especially in the season C.

Among the model farmers, no landless case has been noted; however, about 30% of the households borrows lands because of the small size of the farmlands, or to avoid high costs in plowing when the land is covered by dense bush after a long fallow, or when their land generate poor yield. Throughout Rwanda, there are no official rules to guide the land borrowing/lending arrangement between land owner and tenant and the dealing is based on an amicable agreement.

Farm plots on the hillsides belong to individual households under the control of the land owners. However, wetlands belong to the Government which decides on her utilization. The current Government policy on wetland utilization is to promote high value crops, especially cereals such as rice and maize through associative/cooperative organization. However, this strategy is not yet strictly implemented at the grass-root level, and individual farmers still continue to cultivate food crops in wetlands, because the customary rules and the newly established Land Organic Law are juxtaposed and most of the lands in Bugesera are used under the customary law.

4.1.2. Income (Rwf)

(1) Seasonal crops

1) Cultivated crops

Cultivated seasonal crops by the model farmers included maize, bean, sweet potatoes, sorghum, vegetables, sweet cassava, bitter cassava and groundnut. Beans, sweet potatoes, maize, sorghum and cassava are the major crops (See below Table 7). The produce of the seasonal crops is usually utilized for home consumption and for sale of surplus at local market.

Table 7: No. of Households planting and Selling Seasonal Crops

	Seasonal crop	Season A		Season B		Season C		Annually
		Household planting	Household selling	Household planting	Household selling	Household planting	Household selling	Household selling
1	Maize	7	**3**	8	**2**	2	**2**	**3**
2	Beans	8	**3**	8	**3**	1	**0**	**4**
3	Sweet potatoes	7	**3**	6	**0**	3	**1**	**3**
4	Sorghum	0	**0**	8	**6**	0	**0**	**6**
5	Vegetables	0	**0**	1	**1**	0	**0**	**1**
6	Sweet cassava	2	**0**	4	**0**	0	**0**	**0**
7	Bitter cassava	1	**0**	0	**0**	0	**0**	**0**
8	Groundnut	1	**0**	1	**0**	0	**0**	**0**
Any seasonal crops*			**5**		**8**		**2**	**8**

Source: Interview Survey Results by JICA Study Team, 2006 / *: Any of seasonal crops mentioned above

2) Seasonal Cropping Pattern in August 2005 - July 2006

A cropping pattern of the cultivated crops among the model farmers are shown below Figure-2.

Figure-2 Cropping Pattern for Modern Cow Distribution

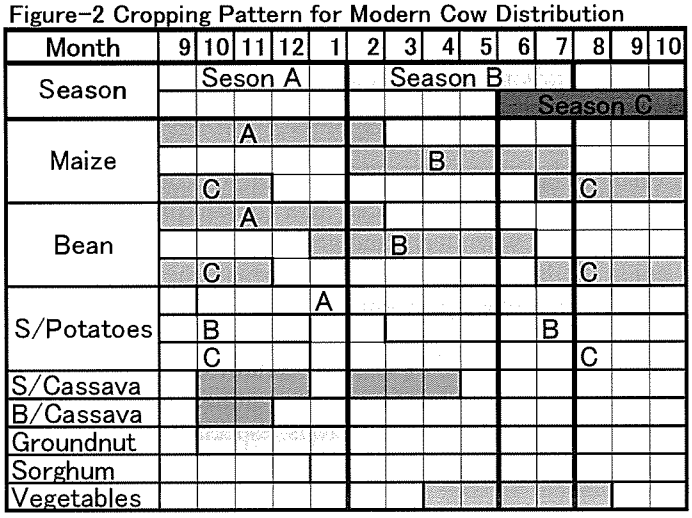
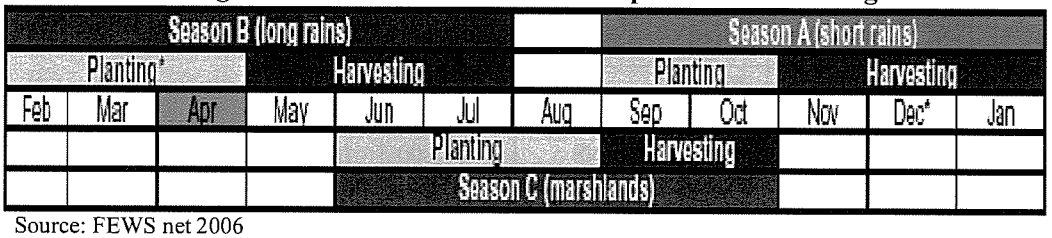


Figure-3 Seasonal Calendar for Crop Production in Bugesera



Source: FEWS net 2006

There are three cropping seasons in Bugesera District, namely Season A, B and C (See above Figure). They are corresponding to the bimodal rainy seasons (Season A and B) and the dry season (Season C). In Ntarama Sector, planting crops are based on the said cropping calendar. Generally speaking, short growing crops like sweet potato, beans and other crops are usually planted twice a year, meanwhile long growing crops like sorghum and cassava are just one time planted in B season and A season respectively. Vegetables are mainly cultivated in wetlands during the Season C.

3) Sale of Crop

i. Season A

Table 8 below shows the season A income.

Table 8: Season A income

No	Model Farmer code	Maize	Bean	Sweet potatoes	Total
1	Cy-Kj	NS*	NS	NS	NS
2	Cy-Ms	NS	NS	NS	NS
3	Cy-Mm	NS	30,000	NS	**30,000**
4	Kz-Km	60,000	NS	15,000	**75,000**
5	Kz-Me	NS	NS	NS	NS
6	Kz-Ko	NS	NS	8,000	**8,000**
7	Kb-Mm	NS	NS	NS	NS
8	Kb-Gi	2,400	10,000	40,000	**52,400**
9	Kb-Rj	2,500	2,200	NS	**4,700**
Average		21,633	14,067	21,000	**34,020**

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

It is noted that in the season A, 56% of the households got seasonal crop income. The range of sale amount was from 8,000 to 75,000 Rwf, on average of 34,020 Rwf per household. Major crops for sale were maize, beans and sweet potatoes. Considering sale amount by major crops, it is observed that 3 households out of 7 planting maize got 21,633 Rwf per household at average, ranging from 2,400 to 60,000 Rwf. An average of 14,067 Rwf per household planting bean is observed among the 3 households ranging from 2,200 to 30,000 Rwf. Finally, 3 households out of the seven which planted sweet potatoes got 21,000 Rwf per household at average, ranging from 8,000 to 40,000 Rwf.

ii. Season B

Table 9 below shows the season B income.

Table 9: Season B Income

No	Recipient code	Maize	Bean	Vegetable	Sorghum	Total
1	Cy-Kj	NS*	17,850	NS	NS	**17,850**
2	Cy-Ms	NS	NS	NS	12,000	**12,000**
3	Cy-Mm	NS	NS	NS	10,000	**10,000**
4	Kz-Km	30,000	NS	NS	30,000	**60,000**
5	Kz-Me	NS	NS	NS	46,000	**46,000**
6	Kz-Ko	NS	NS	NS	20,000	**20,000**
7	Kb-Mm	NS	NS	NS	NS	NS
8	Kb-Gi	NS	7,500	11,000	NS	**18,500**
9	Kb-Rj	1,500	3,000	NS	4,000	**8,500**
	Average	15,750	9,450	11,000	20,333	24,106

Source: Interview Survey Results by JICA Study Team, 2006 / NS*refers to No Sale

In the season B, 89% of the households got seasonal crop income. The range of sold amount was from 8,500 to 60,000 Rwf, on an average of 24,106 Rwf per household. Major crops sold were sorghum, maize, beans, sweet potatoes and vegetables (planted on the hillsides), and sorghum was leading. The sale amount per each sold crop was as follows: 6 households out of the eight planting sorghum got a sale amount from 4,000 to 46,000 Rwf, on an average of 20,333 Rwf per household. An average of 15,750 Rwf per household is noticed in 2 households by maize and an income ranged from 1,500 to 30,000 Rwf.

3 households out of 8 which planted bean got a sale amount from 3,000 to 17,850 Rwf and an average of 9,450 Rwf per household. On the other hand, only 1 household planted vegetables and got a sale amount of 11,000 Rwf.

iii. Season C

Table 10 below shows the season C income.

Table 10: Season C income

No.	Model Farmer code	Maize	Sweet potatoes	**Total**
1	Cy-Kj	NS*	NS	NS
2	Cy-Ms	NS	NS	NS
3	Cy-Mm	NS	NS	NS
4	Kz-Km	24,000	6,000	**30,000**
5	Kz-Me	NS	NS	NS
6	Kz-Ko	NS	NS	NS
7	Kb-Mm	NS	NS	NS
8	Kb-Gi	NS	NS	NS
9	Kb-Rj	2,000	NS	**2,000**
Average		13,000	6,000	16,000

Source: Interview Survey Results by JICA Study Team, 2006
NS*: No Sale

It observed that in the season C, 22% of the households got seasonal crop income. The range of sold amount was from 2,000 to 30,000 Rwf, on an average of 16,000 Rwf per household.

Major crops sold were maize and sweet potatoes. The sale amount per each sold crop was as follows:

2 Households which sowed maize got respectively a sale amount of 2,000 and 24,000 Rwf, on an average of 13,000 Rwf per household, while only 1 household out of 3 which planted sweet potatoes, got a sale amount of 6,000 Rwf.

iv. Total Income

Table 11 below presents the total annual seasonal crop income.

Table 11: Annual seasonal crop income

No	Recipient code	Season A	Season B	Season C	Annually
1	Cy-Kj	NS*	17,850	NS	**17,850**
2	Cy-Ms	NS	12,000	NS	**12,000**
3	Cy-Mm	30,000	10,000	NS	**40,000**
4	Kz-Km	75,000	60,000	30,000	**165,000**
5	Kz-Me	NS	46,000	NS	**46,000**
6	Kz-Ko	8,000	20,000	NS	**28,000**
7	Kb-Mm	NS	NS	NS	NS
8	Kb-Gi	52,400	18,500	NS	**70,900**
9	Kb-Rj	4,700	8,500	2,000	**15,200**
	Average	34,020	24,106	16,000	**49,369**

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

From Tables 11 above, it is noted that 89% of the households (out of the 100% of households which planted seasonal crops) got annual seasonal crop income. The range of sold amount was from 12,000 to 165,000 Rwf, on an average of 49,369 Rwf per household.

Season B followed by season A was significant for the most of the households for sale of surplus crops, because of long rainy season to accommodate various crops. Season C income was relatively small compared to other seasons. This appears to be less accessibility to wetland/marshland among the surveyed households.

(2) Permanent and perennial crops

1) Permanent and perennial crops grown

According to the field survey results, permanent or perennial crops grown including 3 types of banana (brewing, cooking and fresh fruit), some tropical fruit trees dominated by avocado, timber trees (dominated by Eucalyptus and Grevillea species) and fodder plants (including Pennicetum purpureum). Table 12 below shows income by permanent and perennial crops.

Table 12: Income by Permanent and Perennial Crops

No	Recipient code	Banana bunch	Timber	Pennicetum	Total
1	Cy-Kj	NS*	5,600	NS	5,600
2	Cy-Ms	1,500	NS	NS	1,500
3	Cy-Mm	NS	NS	NS	NS
4	Kz-Km	120,000	NS	110,000	230,000
5	Kz-Me	NS	NS	NS	NS
6	Kz-Ko	6,000	NS	NS	6,000
7	Kb-Mm	NS	NS	NS	NS
8	Kb-Gi	45,800	NS	NS	45,800
9	Kb-Rj	NS	NS	NS	NS
	Average	43,325	5,600	110,000	57,780
	% of households selling**	44%	11%	11%	56%

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale
**: % of households selling any of the crop permanent or perennial crops mentioned above

It is noted that 56% of the households got income by selling permanent and perennial crops; the range of sold amount was from 1,500 to 230,000 Rwf, on an average of 57,780 Rwf per household.

Among the 3 types of crops sold, banana bunch is leading. It was sold by 4 Households out of the 9, and gave a sale amount from 1,500 to 120,000 Rwf, on an average of 43,325 Rwf per household. Banana bunch plays an important role to generate cash income among the sampled households. One household sold fodder plant with an amount of 110,000 Rwf. Demand of fodder crop such as Pennicetum purpureum appears to come from the zero grazing system promoted by MINAGRI. However, a household corresponded to this income is one of the model farmers involved in the QP of Modern Cow Distribution and may loose cash income of fodder crops when modern cow is delivered. Meanwhile, one household got an amount of 5,600 Rwf by timber sale.

(3) Livestock

Major livestock reared and sold by the sampled households consists of goat, chicken and sheep, and goat is dominant. Livestock income is shown in Table 13 below.

Table 13: ivestock income by Household

No	Recipient code	Goat		Chicken		Sheep		Total
		Reared Heads	Sale amount	Reared Heads.	Sale amount	Reared Heads	Sale amount	
1	Cy-Kj	NA**	NS*	NA	NS	NA	NS	NS
2	Cy-Ms	4	8,000	4	8,000	NA	NS	16,000
3	Cy-Mm	1	15,000	3	NS	NA	NS	15,000
4	Kz-Km	4	18,000	NA	NS	NA	NS	18,000
5	Kz-Me	6	120,000	NA	NS	NA	NS	120,000
6	Kz-Ko	3	30,000	NA	NS	NA	NS	30,000
7	Kb-Mm	2	NS	NA	NS	NA	NS	NS
8	Kb-Gi	4	100,000	6	NS	2	6,000	106,000
9	Kb-Rj	NA	NS	NA	NS	NA	NS	NS
Average		3	48,500	4	8,000	2	6,000	50,833
Range		1 - 6	8,000 - 120,000	3 - 6	-	-	-	15,000-120,000
Households rearing & selling***		7	6	3	1	1	1	6

Source: Interview Survey Results by ICA Study Team, 2006 / NS*: No Sale / NA**: Non Applicable

It is noted that generally, 6 households got income by selling livestock ranging from 15,000 to 120,000 Rwf, at average of 50,833 Rwf per household. Specifically, 6 households out of the 7 rearing goat got an income by goat with an amount ranged from 8,000 to 120,000 Rwf, at an average of 48,500 Rwf per household. Meanwhile 1 household out the 3 rearing chicken got a 8,000 Rwf of income by selling chicken, and 1 household got an income of 6,000 Rwf by ship sale.

Thus, goat among the livestock occupies an important position, and the range of reared goat is from 1 to 6 per household, with an average number of 3 heads per household. Meanwhile a number of chickens per household ranges from 3 to 6 with an average of 4 chickens. Regarding sheep, one HOUSEHOLD reared 2 heads. In here no cattle reared among the household resulted from the reason that a precondition of the modern cow model farmer should not have any exotic or local cattle.
Generally, farmers sell animals in accordance with urgent need of cash, thus livestock income does not mean a regular annual income like crop farming and needs to pay attention to interpretation as long as responded household is not full time livestock farmer.

(4) Off Farm Activity

The off farm income among the surveyed Households consists of income from casual work, sale of banana wine, sale of sorghum beer, donations, allowance of training and other business. Table 14 shows the off farm income.

Table 14: Off farm income

No	Recipient code	Casual work	Banana wine	Sorghum beer	Donation	Perdiem training	Other business	Off farm
1	Cy-Kj	NA*	NA	24,000	NA	3,000	NA	**27,000**
2	Cy-Ms	NA	3,500	NA	NA	NA	NA	**3,500**
3	Cy-Mm	NA	NA	NA	NA	NA	NA	NA
4	Kz-Km	143,000	96,000	NA	100,000	40,000	240,000	**619,000**
5	Kz-Me	72,000	NA	NA	NA	8,000	NA	**80,000**
6	Kz-Ko	NA	NA	NA	NA	NA	NA	NA
7	Kb-Mm	NA	NA	NA	1,000	8,000	NA	**9,000**
8	Kb-Gi	NA	NA	NA	NA	NA	NA	NA
9	Kb-Rj	NA	NA	NA	NA	NA	NA	NA
	Average	107,500	49,750	24,000	50,500	14,750	240,000	147,700
No. Households concerned		**2**	**2**	**1**	**2**	**4**	**1**	**5**

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Non Applicable

The household off farm income consisted of 6 main sources including casual work, banana wine sale, sorghum beer sale, donations, training perdiem, and other business activities (non specified by the respondents). Casual work mainly consisted of working as day-laborers for STRABAG Enterprise in the construction of the Kigali-Bugesera road. Banana wine was brewed by farmers from their plantations; however, sorghum beer is mostly brewed from sorghum grains bought in the local market. Donations are generally received from relatives and friends. Finally, some money was earned as training allowance.

It is noted that 56% of the Households earned an off farm income ranging from 3,500 to 619,000 Rwf, at an average of 147,700 Rwf per household.

2 Households got respectively casual work income of 72,000 and 143,000 Rwf, or an average of 107,500 Rwf per household. 2 households got respectively banana wine sale amount of 3,500 and 96,000 Rwf, or an average of 49,750 Rwf per household. 1 household got sorghum beer income of 24,000 Rwf per household. 2 Households got respectively income from donation of 1,000 and 100,000 Rwf, or an average of 50,500 Rwf per household. 4 Households got income from training perdiems, ranged from 3,000 to 40,000 Rwf, on an average of 14,750 Rwf per household. And 1 household earned 240,000 Rwf from other business.

(5) Total Income

Total income by household is shown in Table 15 below.

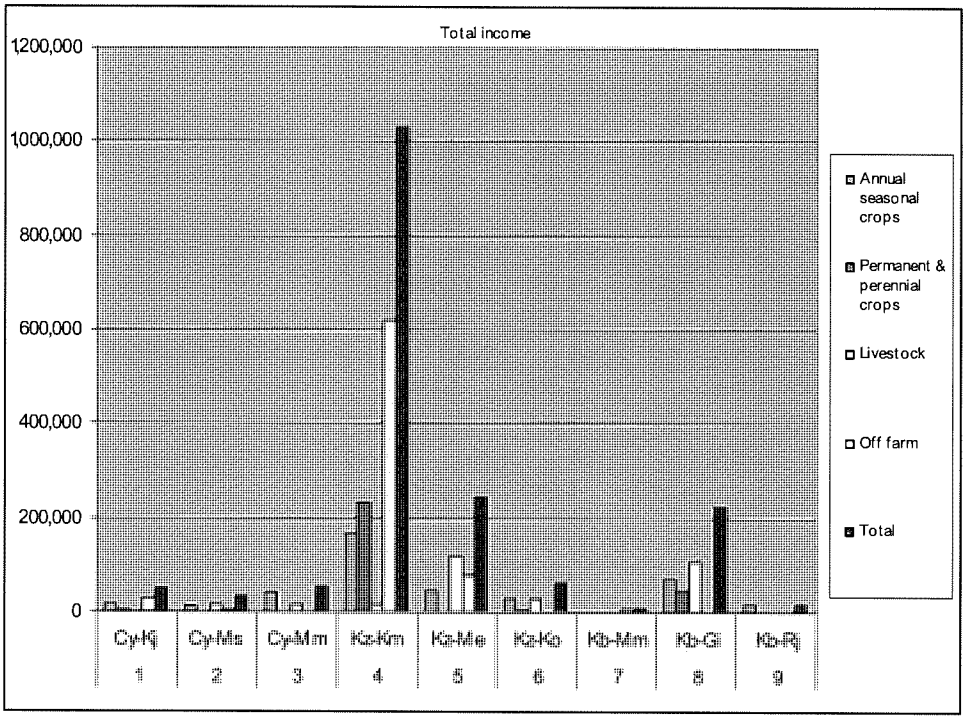
Table 15: Total Annual Income by Farm Household

No	Recipient code	Seasonal crop	Permanent & perennial crop	Farming	Livestock	AGRI CULTURE	OFF FARM	TOTAL
1	Cy-Kj	17,850	5,600	23,450	NA	23,450	**27,000**	**50,450**
2	Cy-Ms	12,000	1,500	13,500	**16,000**	29,500	**3,500**	**33,000**
3	Cy-Mm	40,000	NA	40,000	**15,000**	55,000	NA	**55,000**
4	Kz-Km	165,000	230,000	395,000	**18,000**	413,000	**619,000**	**1,032,000**
5	Kz-Me	46,000	NA	46,000	**120,000**	166,000	**80,000**	**246,000**
6	Kz-Ko	28,000	6,000	34,000	**30,000**	64,000	NA	**64,000**
7	Kb-Mm	NA*	NA	NA	NA	NA	**9,000**	**9,000**
8	Kb-Gi	70,900	45,800	116,700	**106,000**	222,700	NA	**222,700**
9	Kb-Rj	15,200	NA	15,200	NA	15,200	NA	**15,200**
Average		49,369	57,780	85,481	50,833	123,606	147,700	**191,928**

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Non Applicable

Figure below highlights the total income.

Figure 4: Total income by farm household



Source: Interview Survey Results by JICA Study Team, 2006

From Table 15 above, it is noted that 100% of the Households earned income, ranging from 9,000 to 1,032,000 Rwf, on an average of 191,928 Rwf per household.
Between agriculture income and off farm income in the total income earned, agriculture is dominant. In fact, agriculture income was received by 89% of Households in the range of 15,200 to 413,000

Rwf, on an average of 123,606 Rwf per household. Between farming income and livestock income in the agriculture income, farming income is leading. In fact, farming income of the 89% households is ranged from 13,500 to 395,000 Rwf, on an average of 85,481 Rwf per household.

When farming conditions are good (for instance, in good rainy seasons), people devote to farm land rather than doing off farm activities; agriculture yields a better sustainable profit.

Farming income, higher and more widely distributed among the households, is more important than livestock income. In fact, in Rwandese farm situation, breeding requires more than farming, especially, higher surface areas and higher investments. And due to poverty, peasants in Ntarama do not have means to rear important livestock generating high income.
However, stock breeders use to sell animal once 2 or 3 years for a major expenditure requiring a high amount, so livestock is seen as a live bank, while farming income, often seasonally got, is more spent for frequent ordinary expenditures.

Finally, seasonal crop income is higher and more widely distributed in households than permanent and perennial income. It is therefore more dominant since it requires less in terms of surface areas, and investment.

4.1.3. Expenditure

(1) Agriculture inputs

Agricultural input expenditure consists especially, of seeds, agrochemicals and tools; Table 16 below shows related figures.

Table 16: Expenditure of Agricultural Inputs and Tools

No	Recipient code	Seeds	Agro Chemicals	Tools	Inputs
1	Cy-Kj	5,040	NA	1,000	**6,040**
2	Cy-Ms	3,400	NA	2,000	**5,400**
3	Cy-Mm	NA*	NA	NA	NA
4	Kz-Km	1,600	6,000	4,400	**12,000**
5	Kz-Me	4,550	NA	3,800	**8,350**
6	Kz-Ko	NA	NA	NA	NA
7	Kb-Mm	1,950	NA	1,200	**3,150**
8	Kb-Gi	1,200	22,200	5,600	**29,000**
9	Kb-Rj	NA	NA	NA	NA
	Study Area	**2,957**	**14,100**	**3,000**	**10,657**
% Households spending		**67%**	**22%**	**67%**	**67%**

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Non Applicable

67% of the Households bought agricultural inputs. The range of money paid was between 3,150 to 29,000 Rwf, on an average of 10,657 Rwf per HOUSEHOLD.

Seeds procured annually were generally bean, maize, groundnut and vegetables, because most of the farmers consumes all produce including portion of the next seeds, and were obliged to procure seeds at the beginning of the cropping season. 67% of the households bought seeds in the range of 1,200 to 5,040 Rwf, on an average of 2,957 Rwf per household. 22% of the Households sprayed agrochemicals, especially on high input crops such as vegetables which require an intensive management with production cost. The cost spent for agrochemicals ranged from 6,000 to 22,200

Rwf, on an average of 14,100 Rwf per household. In fact, farming practice without agro-chemicals is very common on food crops.

And finally, main agricultural tools regularly purchased were hoes and machetes, accounting for 67 % of the Households. This implies that these tools were mainly used for their farming activities and easily worn out within one to two years. The range of tool expenditure among the model farmers was from 1,000 to 5,600 Rwf, on an average of 3.000 Rwf per household.

(2) Hired labor

It should have been very interesting to bring out the annual hired labor per household, but farmers couldn't give related retrospective data. They couldn't remember the data, and enumerators were unable to estimate them. However, taking into account the responses of some surveyed households, it is clear that hired labor is mostly paid in kind (food crop products, especially sweet potatoes) rather than in cash on the wage of 400 Rwf per man-day. Generally, people are unable to employ workers due to limited farming capital even insufficient of farming labor.

Annual hired labor cost per household roughly given ranged from 10,000 to 70,000 Rwf. This kind of expenditure seems to be mainly used for sorghum, from plowing up to milling activities.

(3) Food, non food items and total

Expenditure for food items consists of 16 main items shown below box:

1.sorghum grains, 2.sweet potatoes, 3.sweet cassava tuber, 4.bitter cassava flour, 5.maize flour, 6.beans, 7.soybeans, 8.groundnut, 9.cooking banana, 9.brewing banana, 10.Irish potatoes, 11.meat, 12.rice, 13.vegetables, 14.sugar, 15.coking oil and 16.salt

Expenditure for non-food items consists of 20 main items shown below box:

1.domestic water, 2.kerosene, 3.firewood, 4.clothes, 5.soap, 6.lotion, 7.tooth cream, 8.shoe cream, 9.bed sheets, 10.blankets, 11.belt, 12.radio, 13.radio batteries, 14.bicycle, 15.domestic animals, 16.construction materials, 17.school fees, 18.medical fees, 19.land rental, 20.ceremonial occasion and others

Table 17 below shows total expenditure. .

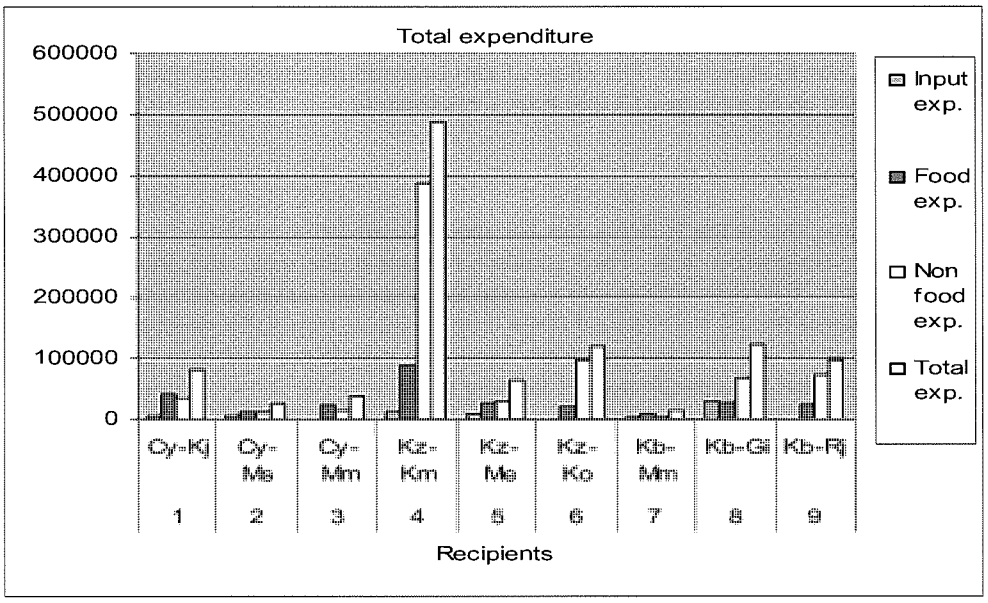
Table 17: Total expenditure

No	Recipient code	Input exp.	Food exp.	Non food exp.	Total Exp.
1	Cy-Kj	6,040	41,220	34,900	**82,160**
2	Cy-Ms	5,400	10,350	12,150	**27,900**
3	Cy-Mm	NA*	23,110	15,800	**38,910**
4	Kz-Km	12,000	88,480	389,200	**489,680**
5	Kz-Me	8,350	25,370	30,610	**64,330**
6	Kz-Ko	NA	21,300	98,050	**119,350**
7	Kb-Mm	3,150	8,850	3,500	**15,500**
8	Kb-Gi	29,000	26,950	67,860	**123,810**
9	Kb-Rj	NA	23,250	72,500	**95,750**
Average		10,657	29,876	80,508	**117,488**

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Non Applicable
(See details on food and non food items expenditure are shown in annex I)

Figure below highlights annual total expenditure.

Figure 5: Total expenditure



Source: Interview Survey Results by JICA Study Team, 2006

100% of the households expended money, in the range of 15,500 to 489,680 Rwf, on an average of 117,488 Rwf per household.

100% of the households bought food, in the range of 8,850 to 88,480 Rwf, on an average of 29,876 Rwf per household, and bought non food items, in the range of 3,500 to 389,200 Rwf, on an average of 80,508 Rwf per household. Among the expenditure items above, non food item is leading.
In Rwanda, especially, ceremonial occasions (such as marriage, funerals) are reported to be prestigiously expensive.

4.1.4. Balance income/expenditure

Table 18 and Figure 6 below show the annual balance between income and expenditure.

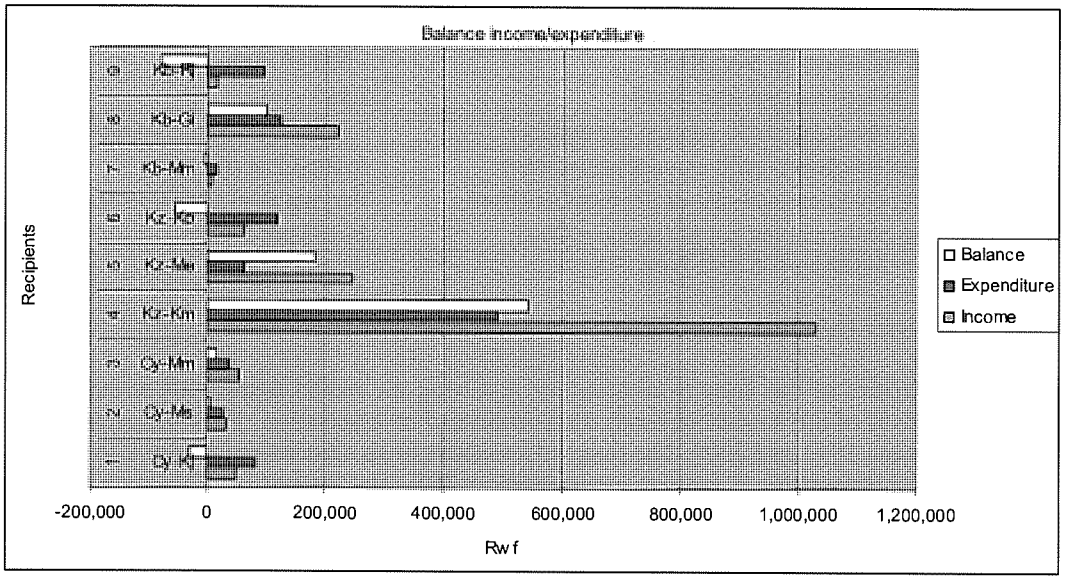
Table 18: Balance income/expenditure

No	Recipient code	Income	Expenditure	Balance
1	Cy-Kj	50,450	82,160	**-31,710**
2	Cy-Ms	33,000	27,900	**5,100**
3	Cy-Mm	55,000	38,910	**16,090**
4	Kz-Km	1,032,000	489,680	**542,320**
5	Kz-Me	246,000	64,330	**181,670**
6	Kz-Ko	64,000	119,350	**-55,350**
7	Kb-Mm	9,000	15,500	**-6,500**
8	Kb-Gi	222,700	123,810	**98,890**
9	Kb-Rj	15,200	95,750	**-80,550**
Average		191,928	117,488	**74,440**

Source: Interview Survey Results by JICA Study Team, 2006

The figure below highlights the annual balance of income and expenditure by HOUSEHOLD.

Figure 6: Balance income/expenditure



Source: Interview Survey Results by JICA Study Team, 2006

Table 18 and Figure 6 above show that the annual average balance income/expenditure is 74,440 Rwf per household. However, annual balance deficit is observed in 44% of the household, while annual surplus balance is noticed in the rest of the surveyed households (or 56%).

From these results, the following hypothesis could be made. Surveyed heads of Households had difficulty remembering the exact data of previous months, because they do not record household income and expenditures. Depending on some sensitive situations, some farmers do not deliberately declare some income from donations or other suspicious sources, thus at times the declared expenses can be more than the declared income showing a deficit.

4.1.5. Association activity

(1) Ibimina/tontine

According to Table 19 below, 33% of the household heads are in a tontine association. The number of members ranged from 12 to 40, on an average of 28 per tontine association.
The average monthly membership fees per member is ranging from 1,000 to 5,400 Rwf, on an average of 2,467 Rwf. Number of times to get the revolving credit amount varies from 1 to 3.3 years, on a rounded average of 2 years. The revolving credit amount got per member varying from 12,000 to 86,400 Rwf, on an average of 46,133 Rwf. Tontine, an informal form of saving and credit association is common and very helpful among farming communities. Many major expensive items are financed by the tontine amounts obtained, for instance buying domestic animal, land plots and etc. Tontine associations are created on proper initiative of the members who know each other. The members organized by written and/or verbal association rules have a strong social controlling system of the group. Each tontine association is led by an elected board committee, generally composed of a president, a vice-president, a treasure and a secretary.

Table 19: The Survey Results of Tontine Characteristics among the Respondents

Outline of Tontine	Result
% of Households belonging to tontine	33%
Average of Tontine members	28
Range of monthly membership fees (Rwf)	1,000 - 5,400
Average of monthly membership fees (Rwf)	2,467
A revolution to get revolving credit amount per member	varying from 1 to 3.3 years
Average time to get revolving credit amount per member	Around 2 years
Range of revolving credit amount gained per member (Rwf)	Varying from 12,000 to 86,400
Average revolving credit amount got per member (Rwf)	46,133 per 2 years

Source: Interview Survey Results by JICA Study Team, 2006

(2) Farming Activity Oriented Associations

General Characteristics of the farmers associations involving the model farmers are summarized as below Table 20. 44% of the household heads are members of an association. Those associations have been created between 1997 and 2006. The range of members in an association is from 8 to 54, on an average of 26. The percentage of farming associations is 75%, and the rest (or 25%) is a veterinary pharmacy. The membership fees per member are ranging from 1,000 to 200,000 Rwf, on an average of 66,500 Rwf.

Table 20: Association Characteristics

		Outline of Associations	Index
1	% Households in associations		44%
2	1	***DUFATANYE Association***	
		No. members	8
		Specific activities	Food crop production
		Membership entry fees (Rwf)	5,000
		Years of establishment	Feb. 2006
	2	***COOPEK Association***	
		No. members	54
		Specific activities	Sugarcane plantation
		Membership entry fees (Rwf)	60,000
		Years of establishment	July 2004
	3	***ABISHYIZEHAMWE Association***	
		No. members	21
		Specific activities	Veterinary pharmacy
		Membership entry fees (Rwf)	1,000
		Years of establishment	August 1997
	4	***AEDN Association***	
		No. members	20
		Specific activities	Crop production
		Membership entry fees (Rwf)	200,000
		Years of establishment	August 2000
3	Range of members in associations		8 – 56
4	Average members in an association		26
5	% of farming associations		75%
6	Range of membership entry fees (Rwf)		1,000 – 200,000
7	Average membership entry fees (Rwf)		66,500
8	Range of years of association establishment		1997 -2006

Source: Interview Survey Results by JICA Study Team, 2006

1) Land tenure

Farming associations borrow land on hillsides from various sources, and/or in wetlands from the Sector. One big farming association exploits 50 Ha of sugarcane in marshland along the Akagera Rive. It is noted that the farming associations don't have fixed plots, members often change lands. In these conditions, it is impossible to invest in medium and long terms, they must be content with seasonal food crop cultivation (bean, maize, sweet cassava, sorghum).

(3) Annual income

No annual cash income has been noted, crop sharing system is the common option among the association members. Regarding the sugarcane association mentioned above, the first production is expected for next year 2007.

(4) Annual expenditure

Generally, annual expenditure is composed of membership entry fees, which is spent for basic investment (tools, seed, pesticides, land renting).

4.1.6. Traditional Support System

(1) Umuganda

56% of the household heads do Umuganda once a month, especially, the last Saturday of each month from 7 to 12 morning. The rest does not fulfill it because of many different official reasons such as handicaps and so on. Umuganda is obligatory for every citizen. Planning and supervision is done by the Sector authorities. The main activities include repairing roads, water source maintenance, farming in the community lands, forestry, erosion protection activities.

Rwandese population is well sensitized to Umuganda practice sicne 1974 years; people know the social, political and economic benefit of it. In fact, Umuganda plays a role of social cohesion (ex. reconciliation), of popular mobilization and of infrastructure implementation. In principle, the population participates in Umuganda. If someone is absent, he must present a valid reason, otherwise he can be penalized financially by the Sector (usually between 2000 to 5000 Rwf per person).
The Sector may also temporarily refuse to grant him a certificate of good citizenship if requested.

(2) Ubudehe

Ubudehe is a traditional community supporting system as reciprocal help in farming activities, where a group in a village rotates in plowing, weeding, and harvesting operations of group member's farms in turn. Ubudehe in its real sense of the term is no longer practically existed; only some forms of informal and occasional arrangements of small group (generally 3 to 5 households) can be organized within neighbors for some agricultural activities such as plowing operation.

Ubudehe which was more or less official, regular and done by a whole village under traditional rule, has practically disappeared from the region; thus it does concretely no longer exist in rural community.

(3) Kugurizanya

Kugurizanya is a custom of labor loan, generally in farming activities between 2 neighboring and friend farmers. Working together, they rotate in each of their farm, working the same number of man-days according to their convenient agreement. In the sampled farm households, 33% of the households do sometimes Kugurizanya in agricultural activities (See below Table 21).

Table 21: Participation in Kugurizanya

Outline of Kugurizanya	Results
% of Households doing Kugurizanya	33%
Main activities	Plowing, weeding and harvesting
Frequency	Sometimes (one a month)

Source: Interview Survey Results by JICA Study Team, 2006

4.1.7. Others

(1) Fetching Water

The survey results on fetching water are shown below Table 22, Figures 7 and 8.

Table 22: General Characteristics of Domestic Water Security

	Index	Result
Fetching water		
1	Average water demand per HOUSEHOLD per day (Lt)	78
2	Range of water demand among the respondents (Lt)	40 - 140
3	% of Households fetching water from swamp (%)	78
4	% of Households fetching water from hand pomp (%)	22
5	% of Households having a rainwater harvesting system (%)	89
6	Quantity of rainwater usually harvested after a normal rain (Lt)	115
Season A		
1	Quantity of water fetched per day (Lt)	47
2	Times to fetch water per day	1.8
3	Time consumed for fetching water in a round –trip (min)	117
Season B		
1	Quantity of water fetched per day (Lt)	31
2	Times to fetch water per day	1.4
3	Time consumed for fetching water in a round-trip (min)	64
Season C		
1	Quantity of water fetched per day (Lt)	60
2	Times to fetch water per day	2
3	Time consumed for fetching water in a round-trip (min)	127

Source: Interview Survey Results by JICA Study Team, 2006

Daily domestic water demand per household resulted in around 80 liters and about 75 % (about 60 Lt) of the demand was covered by fetched water. Time consumed for fetching water ranged from 1 to 2 hours. In the rainy seasons, the gap of 25% is covered by rainwater harvested by 89% of the households which have a rainwater harvesting system. The average quantity of rainwater harvested after a normal rain was 115 liters.

Concerning the water sources, 78% of the households fetched water from swamps while the rest (or 22%) fetched from hand pumps installed along the border of the marsh land. Availability of water for domestic use is different among the cropping seasons. According to the interview results, the local ecosystem offers more water during the season B (February - end of June) commonly called the long rainy season than that in the season A, the short rainy season (September - January). On the other hand, the season C (end of June - mi-September), the long dry season is the last in terms of water availability (this sentence is not followed to the previous sentence smoothly because of its content, namely you should discuss available amount of season C compared to the Season A and B.) Therefore, availability of the domestic water and its accessibility is subject to seasonal water fluctuation. Thus, households fetch more domestic water during the dry season than that in the rainy season because the households could harvest rainwater during the rainy season. Moreover, quantity of domestic water fetched, frequency and time consumed for fetching water are negatively correlated with rainwater availability; thus, amount of fetching water, frequency per day and time consumed for fetching water are increased during the dry season compared to the rainy season. Figures below shows the general trend of domestic water use over the 3 cropping seasons.

Figure 7: Quantity and Time Consumed for Water Fetching

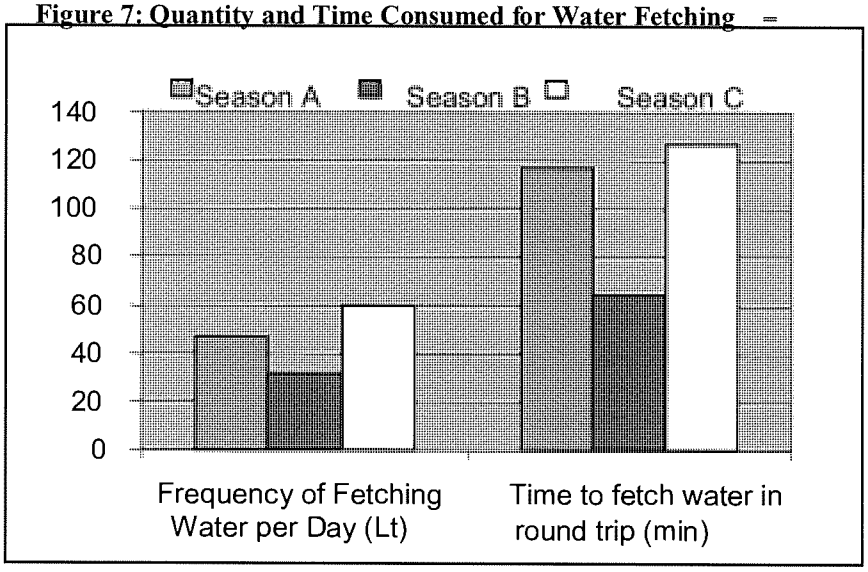
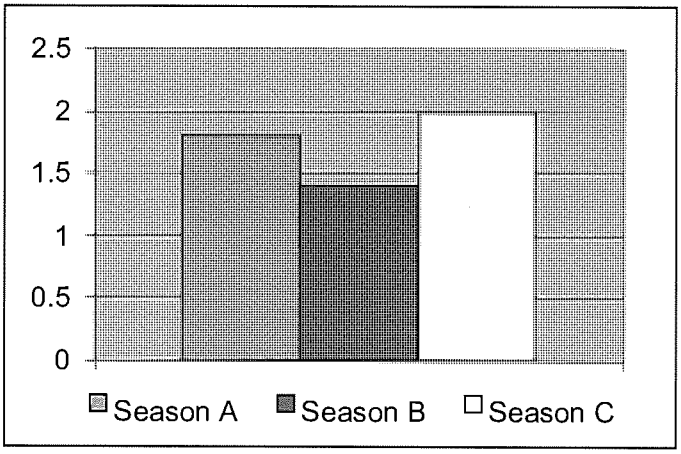


Figure 8: Frequency of Fetching Water per Day



Source: Interview Survey Results by JICA Study Team, 2006

(2) Collecting firewood

Time required to collect firewood is also correlated with rainy season. It is noted that in the rainy season, it takes more time to collect firewood than that in the dry season because of spending more time to collect dried firewood. Regarding frequency times to collect firewood per week, some slight differences are observed. There is a tendency to collect firewood less time required per week in the dry season than that in the rainy season. In fact, in the dry seasons people could collect big bundles of sticks than that in the rainy seasons because dried stick are more available (period of decrease of rain and increase of sunshine). Further in the dry seasons, farmers use plant residues for firewood which are more available in the farm.

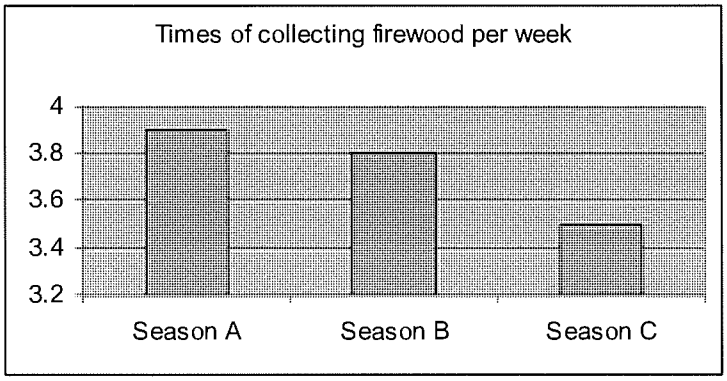
Table 23: General Characteristics on Collecting Firewood

Collecting firewood		Results
Season A		
1	Times per a week	3.9
2	Time consumed in a round-trip (min)	90
Season B		
1	Times per a week	3.8
2	Time consumed in a round-trip (min)	114
Season C		
1	Times per a week	3.5
2	Time consumed in a round-trip (min)	71

Source: Interview Survey Results by JICA Study Team, 2006

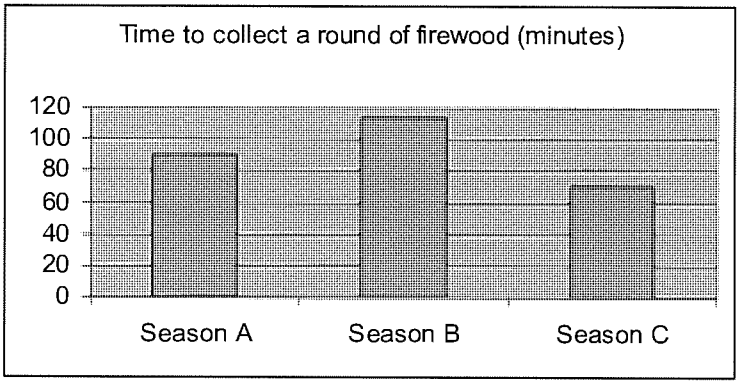
Figures below highlight the trend of collecting firewood over the 3 cropping seasons.

Figure 9: Frequency Times of Collecting Firewood per Week



Source: Interview Survey Results by JICA Study Team, 2006

Figure 10: Time to collect firewood



Source: Interview Survey Results by JICA Study Team, 2006

(3) Spare time

Table 24 below shows the characteristics of spare time.

Table 24: Survey Results on Spare Time among the Surveyed Households

	Spare time	Results
1	% of Households taking one day of rest per a week	100%
2	% of Households taking Sunday as a day of rest	89%
3	Average working hours per day	9.3
4	Breakdown of spare time use	Praying, taking rest, visiting friends

Source: Interview Survey Results by JICA Study Team, 2006

Like elsewhere in Rwanda, farmers in Ntarama Sector take one day rest per week, and 89 % of them take it (or 89% of Households) on Sunday with daily 9 hours work. Daily working hour length corresponds more or less with 8 working hours of Rwandese Public Administration Service.

(4) Soil fertility

1) General Trend

Table 23 shows how respondents perceive trend of crop yield fluctuation over the years. Most of the farmers perceive a decrease of crop yield year by year.

Table 25: Trend of crop yields over the years

	Trend of yield over the years	Results
1	% of Households perceiving decrease of legume yield over the years	83%
2	% of Households perceiving decrease of grain yield over the years	83%
3	% of Households perceiving decrease of tuber yield over the years	83%

Source: Interview Survey Results by JICA Study Team, 2006

2) Causes of Changing Crop Yields

According to the model farmers, decrease of crop yield is caused by decrease of soil fertility, while the

plant diseases have aggravated the situation, especially on the tuber crops such as cassava and sweet potatoes (see below Table 26). Meanwhile, 17% of Households didn't perceive any change in their farm.

Table 26: Factors Causing Crop Yield Decrease=

Causes of change on crop yield	Result
Ratio of Households perceiving decrease of soil fertility as a cause of decrease of legume yield	83%
Ratio of Households perceiving decrease of soil fertility as a cause of decrease of grain yield	83%
Ratio of Households perceiving decrease of soil fertility and increase of pest/plant disease as a cause of decrease of tuber crop yield	83%

Source: Interview Survey Results by JICA Study Team, 2006

3) Use of chemical fertilizers, manure and irrigation practice

Soil fertility and plant disease problems described above have led the farmers to apply some quick interventions as countermeasures for improving that situation. The points mentioned below give some adopted countermeasures. Table 27 below shows the percentage of surveyed farmers which applied fertilizer and irrigation practice.

Table 27: Percentage of Surveyed Farmers Using Fertilizers and Irrigation

Use of fertilizers & Chemicals		Results
1	Number of users	1 Household
2	Targeted crops	Vegetables
Manure		
1	Number of users	3 Households
2	Number of Households obtained from own livestock and neighbors	2 Households
3	% of Households obtained from own livestock	1 HOUSEHOLD
Irrigation practice		
	% of Households practicing	0

Source: Interview Survey Results by JICA Study Team, 2006

Only one husehold out of the nine used chemical fertilizer on vegetables. Meanwhile manure was more widely dressed by 3 Households out of the nine compared to the former. Like elsewhere in Rwanda, food crops were mainly cultivated without chemical fertilizers. No irrigation practice is observed among the sampled farmers. =

(5) Health

Table below shows health condition of the respondents. The prevailing main diseases consist of malaria and amoeba. No case of diarrhea, even if people do not use boiling water for drinking water. No specific alarming situation observed in terms of health; like elsewhere in Rwanda, malaria and amoeba declared by the respondents are known to be chronic diseases among the population.

Table 28: Health Condition

Major Health Problems	Result
1. Diarrhea	
% of HOUSEHOLD heads who were affected by diarrhea	0%
% of Households with a young child affected by diarrhea	0%
2. Malaria	
% of Household were affected by malaria	22%
% of Households with a young child affected by malaria	33%
3. Amoeba	
% of Households affected by amoeba	33%
% of Households with a young child affected by amoeba	33%
Nutrition center	
% of Households going to the nutrition center	0%

Source: Interview Survey Results by JICA Study Team, 2006

(6) Draught coping strategy

Table 29 below shows the draught coping measures among the model farmers.

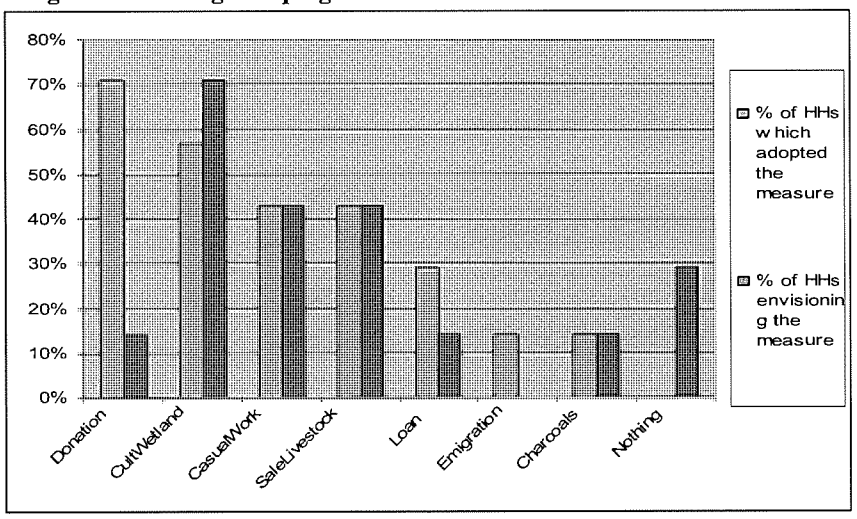
Table 29: Draught coping measures

Measures	% of Households during recent draughts	% of Households envisioning
Asking donation	71%	14%
Cultivating wetland	57%	71%
Casual work	43%	43%
Sale of livestock	43%	43%
Asking Loan	29%	14%
Emigration	14%	0%
Making charcoals	14%	14%
Nothing	0%	29%

Source: Interview Survey Results by JICA Study Team, 2006

Figure 9 below highlights the trend of draught coping measures.

Figure 11: Draught coping measures



Source: Interview Survey Results by JICA Study Team, 2006

In the past and future time, the model farmers have coped and will cope with draught by taking several countermeasures such as cultivating wetlands, doing casual work and selling livestock. In the past, most of the population (71% of the Households) has survived through receiving of donation, but actually, they do not envision by that measure like donation, except for few people (14% of Households) who still envision by donation. In fact, wetland cultivation seems to be a promising and sustainable draught coping measure in the region.

4.2. Rainwater Storage Quick Project (QP1)

4.2.1 General

(1) Family aspects

Table 30 below shows the general characteristics of the households, model farmers for the rainwater storage. These characteristics consist of household head age, sex, marital status, schooling years and family size, as well as family members engaged in farming and decision-makers of the house economy (farming practice and its expenditure, and family food control).

Table 30: General Characteristics of the Households

No	Recipient code	Age (year)	Sex	Marital status	Schooling years	Family size	Family members engaged in farming	Decision-maker	
								Farming	Food
1	Cy-Rj	47	M	Married	6	7	2	Husband	Wife
2	Cy-Ms	48	F	Widowed	5	10	2	Single parent	Single parent
3	Cy-Gam	47	F	Widowed	6	9	2	Single parent	Single parent
4	Cy-Mb	72	F	Widowed	0	4	1	Son	Son
5	Cy-Nf	23	F	Widowed	6	5	2	Single parent	Single parent
6	Cy-Gal	66	M	Married	6	9	2	Husband & wife	Husband & wife

7	Kz-Bj	34	M	Married	8	7	2	Husband	Wife
8	Kz-Nb	48	F	Widowed	6	3	1	Single parent	Single parent
9	Kz-Kj	54	M	Married	0	10	3	husband & wife	husband & wife
10	Kz-Mv	68	F	Widowed	8	1	1	Single parent	Single parent
11	Kz-Ke	52	M	Married	6	5	2	Husband & wife	husband & wife
12	Kz-M	56	F	Married	6	10	2	husband & wife	husband & wife
13	Kb-Kj	46	M	Married	4	8	3	husband & wife	husband & wife
14	Kb-Mfn	42	F	Widowed	4	9	3	Single parent	Single parent
15	Kb-Ms	43	F	Married	0	8	2	husband & wife	husband & wife
16	Kb-Ne	28	M	Single	12	4	1	Single parent	Single parent
17	Kb-Kl	54	F	Widowed	0	6	2	Single parent	Single parent
18	Kb-Mfs	49	F	Widowed	6	4	1	Single parent	Single parent
Average		49	61%F		5	7	1.9		

Source: Interview Results by JICA Study Team, 2006

Table 30 above shows HH head ages, ranging from 23 to 72 years on average of 49 years. Their schooling years are respectively 12 in one HH, 8 in two HHs, 6 in eight HHs, 5 in one HH, 4 in two HHs and 0 in four HHs, on an averaged academic background of 5 years.
Typical household consists of 7 members on average, ranging from 1 to 10 members per household. HH composition is as follows: one HH is composed of 1 person, another of 3, another one of 6, two HHs of 5, another two of 7, another one two HHs of 8, three HHs of 4, another three of 9, and another one three HHs of 10 persons. The total number of the 9 recipients' family members is 119 persons.

The number of persons engaged in farming activity per family resulted in the range 1 to 3, on an average of 1.9 persons. Regarding marital status, 1 HH head is single, 8 are married and 9 are widows. Concerning decision making on house economy among the family members, it is noted that farming activity is almost entirely controlled by household-head, except in one widowed HH where a son controls the rubric, because the HH head is too old (72 years). HH heads control personally this important rubric on which family survival basically depends. In fact, household food security is based up on farming. The single parents (in 10 HHs) control food procurement, except the case mentioned above, where a son controls the rubric because the HH head (his mother) is too old. Among the 8 married families, husbands both with their wife control food procurement, while in 2 HHs wife controls alone the rubric.
Normally, according to Rwandese culture, wife controls food procurement; however, it is noted that due to food insecurity situations, most of husbands are involved in food procurement assisting their wife to better economize food.

(2) Meals and food

The range of meals per household per day varies from 1 to 2 times with an average of 1.9 times. 94% of the households have 2 times per day, comprising of lunch and dinner. However, survey couldn't assess how food was enough, and how well-balanced were meals.

According to Tables 31 & 32 and Figure 10 below, the 3 main food crops of the staple food are beans, sweet potatoes and maize. Like elsewhere in low and middle altitude of Rwanda (1000 - 1700 m), bean and sweet potatoes are known to be the main food crops of the stable food. 100% of the households had beans, 62% sweet potatoes and 47% maize. Beans (commonly called Rwandese meat) are known to alleviate malnutrition due to their relative high protein content.

The survey has shown that beans, sweet potatoes, maize, banana (brewing and cooking), cassava flour, sweet cassava and groundnut were the 7 main different food crops of the staple food, and that the number of food crop in the staple food ranges from 1 to 4. Four food crops in the staple food were in 21% of the HHs, 3 food crops in 40%, 2 food crops in 37%, and 1 in 2%. The staple food is almost the same over the seasons, because farmers seasonally sow the same crops, except groundnut which only appeared in season B.

Table 31: Ratio of HHs Taking Type of Food Crops for Diet

Food crop	Season C	Season A	Season B	Annually*
Bean	100%	100%	100%	100%
Sweet potatoes	61%	72%	72%	69%
Maize	44%	44%	67%	54%
Banana	39%	20%	28%	31%
Cassava flour	17%	11%	11%	13%
Sweet cassava	17%	11%	6%	10%
Groundnut	0%	0%	6%	3%

Source: Interview Results by JICA Study Team, 2006
*Annual % = ((%season C x 3 months/12 months) + (%season A x 4 months/12 months) + (%season B x 5 months/12 months))

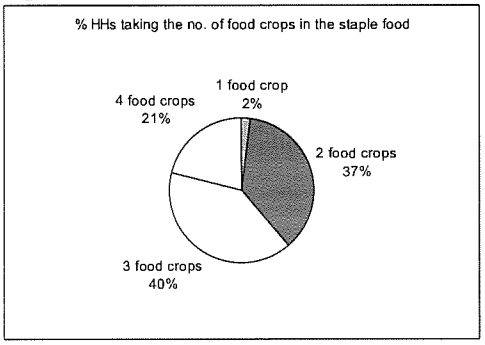
Table 32: Ratio of HHs taking the Number of Food Crops

No. of food crop	Season C	Season A	Season B	Annually*
1	6%	0%	0%	2%
2	28%	50%	33%	37%
3	50%	28%	44%	40%
4	17%	22%	22%	21%

Source: Interview Results by JICA Study Team, 2006
*Annual % = ((%season C x 3 months/12 months) + (%season A x 4 months/12 months) + (%season B x 5 months/12 months))

Figure below highlights HH ratio according to the number of food crops in the staple food.

Figure 12:



Source: Interview Results by JICA Study Team, 2006

(3) Land tenure

Because farmers don't have concept of metrology, it was very difficult to grasp in accurate data; Surveyed HH heads gave rough idea on land size had and/or owned in rounded figures. The results ranged from 1 to 4 Ha per family. These figures are therefore, not trustable. However, farmers know exactly the number of parcels had and/or owned which ranged from 1 to 3.

According to experience and other different reports related to land tenure in the region, farm size per family is ranging from 1 to 2 Ha. Like elsewhere in Rwanda, farm size has been continuously divided up over the years, either the parents came into a land inheritance to their children, or they have sold some parcels of the farmland.

Almost all lands owned and/or leased are on hillsides under rainfed regime. Only few farmers neighboring wetlands have advantage of access to, especially in season C.

Among the recipients, no landless case has been noted; however, about 33% of the HHs borrows lands, either in some cases, because of the small size of the farmlands, or to avoid high costs in plowing when the land is covered by dense bush after a long fallow, or when their own parcels yield poorly. Throughout Rwanda, there are no official rules to guide the land borrowing/lending arrangement between the 2 parties; the deal is based up on an amicable agreement.

Farm plots on the hillsides belong to individual households under the control of the owners. However, wetlands belong to the Government which decides on their utilization. The current Government policy on wetland utilization is to promote high value crops, especially cereals, through associative/cooperative farming. However, this strategy is not yet strictly implemented at the grass-root level, and individual farmers still continue to cultivate food crops in wetlands, because the customary rules and the newly established Land Organic Law are juxtaposed.

4.2.2 Income

(1) Seasonal crops

1)Cultivated crops

Cultivated seasonal crops by the recipients included maize, bean, sweet potatoes, sorghum, sweet cassava, bitter cassava, groundnut and soy bean. Beans, sweet potatoes, maize and sorghum were the major crops (See below Table 33). The produce of the seasonal crops is usually utilized for home consumption and for sale of surplus at local market.

Table 33: No. of HHs planting and selling seasonal crops

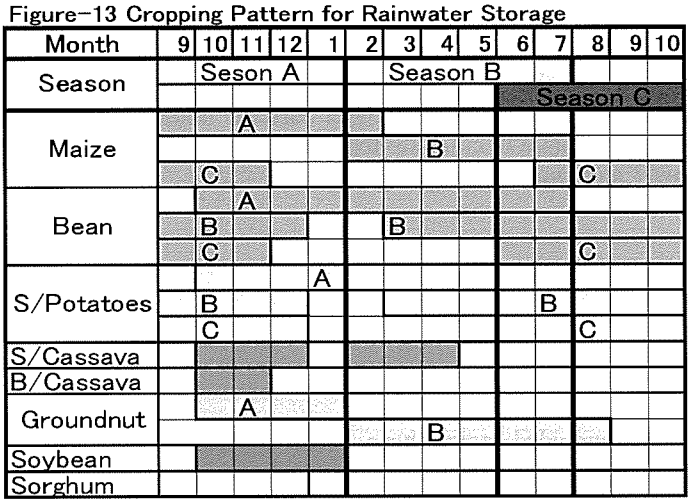
Seasonal crop	Season A		Season B		Season C	
	HH planting	**HH selling**	HH planting	**HH selling**	HH planting	**HH selling**
Maize	17	**2**	16	**2**	0	**0**
Beans	18	**8**	18	**4**	0	**0**
Sweet potatoes	16	**6**	12	**0**	2	**0**
Sorghum	0	**0**	18	**10**	0	**0**
Sweet cassava	7	**0**	2	**0**	0	**0**
Bitter cassava	4	**0**	0	**0**	0	**0**
Groundnut	3	**0**	2	**0**	0	**0**
Soy bean	1	**0**	0	**0**	0	**0**
Any seasonal crops*	**18**	**12**	**18**	**12**	**2**	**0**

Source: Interview Survey Results by JICA Study Team, 2006 / *: Any of seasonal crops mentioned above

2) Seasonal crop pattern, August 2005 - July 2006

A cropping pattern of the cultivated crops among the model farmers are shown below Figure-13.

Figure-13 Cropping Pattern for Rainwater Storage



It is noted that during the period of August 2005 to July 2006, the recipients' seasonal crop planting and harvesting periods over the seasons A, B and C, have more or less corresponded with the normal seasonal crop planting and harvesting periods of Bugesera (Figure-3).

3) Sale of Crops

i. Season A

Table 34 below shows the season A income.

Table 34: Season A income

No	Recipient code	Maize	Bean	Sweet potatoes	Total
1	Cy-Rj	NS*	NS	NS	NS
2	Cy-Ms	NS	5,000	NS	**5,000**
3	Cy-Gam	NS	10,000	NS	**10,000**
4	Cy-Mb	NS	NS	NS	NS
5	Cy-Nf	NS	2,000	2,400	**4,400**
6	Cy-Gal	20,000	45,000	7,200	**72,200**
7	Kz-Bj	NS	NS	NS	NS
8	Kz-Nb	450	NS	NS	**450**
9	Kz-Kj	NS	NS	NS	NS
10	Kz-Mv	NS	8,000	NS	**8,000**
11	Kz-Ke	NS	14,000	NS	**14,000**
12	Kz-M	NS	NS	7,500	**7,500**
13	Kb-Kj	NS	2,700	9,600	**12,300**
14	Kb-Mfn	NS	NS	NS	NS
15	Kb-Ms	NS	NS	9,000	**9,000**
16	Kb-Ne	NS	NS	3,000	**3,000**
17	Kb-Kl	NS	NS	NS	NS
18	Kb-Mfs	NS	5,000	NS	**5,000**
Average		**10,225**	**11,463**	**6,450**	**12,571**

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

It is noted that in season A, 67% of the HHs received seasonal crop income. The range of sale amount was from 450 to 75,200 Rwf, on average of 12,571 Rwf per HH. Major crops sold were maize, beans and sweet potatoes. Considering sale amount by major crops, it is observed that 2 HHs out of 17 which sowed maize got 10,225 Rwf per HH at average, 450 and 20,000. An average of 11,463 Rwf per HH which sowed bean is noted from the range of 2,000 to 45,000 Rwf in 8 HHs out of 18 which sowed bean. Finally, 6 HHs out of 16 which planted sweet potatoes received 6,450 Rwf per HH at average, ranging from 2,400 to 9,600 Rwf.

ii. Season B

Table 35 below shows the season B income.

Table 35: Season B income

No	Recipient code	Maize	Bean	Sorghum	Total
1	Cy-Rj	NS*	NS	5,000	**5,000**
2	Cy-Ms	NS	3,600	NS	**3,600**
3	Cy-Gam	NS	6,000	70,000	**76,000**
4	Cy-Mb	NS	NS	NS	NS
5	Cy-Nf	NS	1,200	NS	**1,200**
6	Cy-ed Gal	10,000	NS	50,000	**60,000**
7	Kz-Bj	NS	NS	NS	NS
8	Kz-Nb	NS	NS	30,000	**30,000**
9	Kz-Kj	NS	NS	NS	NS
10	Kz-Mv	NS	6,400	24,000	**30,400**
11	Kz-Ke	NS	NS	NS	NS
12	Kz-M	NS	NS	30,000	**30,000**
13	Kb-Kj	NS	NS	40,000	**40,000**
14	Kb-Mfn	NS	NS	30,000	**30,000**
15	Kb-Ms	2,000	NS	30,000	**32,000**
16	Kb-Ne	NS	NS	NS	NS
17	Kb-Kl	NS	NS	10,000	**10,000**
18	Kb-Mfs	NS	NS	NS	NS
	Average	**6,000**	**4,300**	**31,900**	**29,017**

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

In the season B, 67% of the HHs received seasonal crop income. The range of sold amount was from 1,200 to 76,000 Rwf, on an average of 29,017 Rwf per HH. Major crops sold were sorghum, maize and beans, and sorghum was leading. The sale amount per each sold crop was as follows: 10 HHs out of 18 which sowed sorghum, received a sale amount ranged from 5,000 to 70,000 Rwf, on an average of 31,900 Rwf per HH. An average of 6,000 Rwf per HH Rwf per HH is noticed in 2 HHs out of 16 which sowed maize, 2,000 and 10,000 Rwf. 4 HHs out of 18 which sowed bean, got a sale amount ranged from 1,200 to 6,400 Rwf, on an average of 4,300 Rwf per HH.

iii. Season C

Among the surveyed HHs, only 2 HHs had cultivated in season C. They had planted sweet potatoes of which all the production had been self consumed (thus, no sale had been noticed).

iv.Total Income

Table 36 below presents the total annual seasonal crop income.

Table 36: Annual seasonal crop income

No	Recipient code	Season A	Season B	Season C	Annually
1	Cy-Rj	NS*	5,000	NS	**5,000**
2	Cy-Ms	5,000	3,600	NS	**8,600**
3	Cy-Gam	10,000	76,000	NS	**86,000**
4	Cy-Mb	NS	NS	NS	NS
5	Cy-Nf	4,400	1,200	NS	**5,600**
6	Cy-Gal	72,200	60,000	NS	**132,200**
7	Kz-Bj	NS	NS	NS	NS
8	Kz-Nb	450	30,000	NS	**30,450**
9	Kz-Kj	NS	NS	NS	NS
10	Kz-Mv	8,000	30,400	NS	**38,400**
11	Kz-Ke	14,000	NS	NS	**14,000**
12	Kz-M	7,500	30,000	NS	**37,500**
13	Kb-Kj	12,300	40,000	NS	**52,300**
14	Kb-Mfn	NS	30,000	NS	**30,000**
15	Kb-Ms	9,000	32,000	NS	**41,000**
16	Kb-Ne	3,000	NS	NS	**3,000**
17	Kb-Kl	NS	10,000	NS	**10,000**
18	Kb-Mfs	5,000	NS	NS	**5,000**
Average		**12,571**	**29,017**	NS	**33,270**

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

From Tables 36 above, it is noted that 83% of the HHs (out of the 100% of HHs which planted seasonal crops) got annual seasonal crop income. The range of sold amount was from 3,000 to 132,200 Rwf, on an average of 33,270 Rwf per HH.

Season B, followed by season A, was significant for most of households for sale of surplus crops, because of long rainy season to accommodate various crops. No season C income, this appears to be less accessibility to wetland/marshland among the surveyed HHs.

(2) Permanent and perennial crops

1) Permanent and perennial crops grown

According to the field survey results, permanent or perennial crops grown included 3 types of banana (brewing, cooking and fresh fruit) and timber trees (dominated by the Eucalyptus species, Grevillea species).

Table 37 below shows income by permanent and perennial crops.

Table 37: Income by permanent and perennial crops

No	Recipient code	Banana	Timber	Total
1	Cy-Rj	NS*	NS	NS
2	Cy-Ms	NS	NS	NS
3	Cy-Gam	NS	3,500	**3,500**
4	Cy-Mb	NS	NS	NS
5	Cy-Nf	2,400	NS	**2,400**
6	Cy-Gal	NS	NS	NS
7	Kz-Bj	NS	NS	NS
8	Kz-Nb	32,000	NS	**32,000**
9	Kz-Kj	24,000	NS	**24,000**
10	Kz-Mv	NS	NS	NS
11	Kz-Ke	NS	NS	NS
12	Kz-M	NS	NS	NS
13	Kb-Kj	NS	NS	NS
14	Kb-Mfn	NS	NS	NS
15	Kb-Ms	52,000	NS	**52,000**
16	Kb-Ne	12,000	NS	**12,000**
17	Kb-Kl	22,000	NS	**22,000**
18	Kb-Mfs	NS	NS	NS
	Average	**24,067**	**3,500**	**21,129**

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

It is noted that 39% of the HHs received permanent and perennial crop income; the range of sold amount was from 2,400 to 52,000 Rwf, on an average of 21,129 Rwf per HH.

Among the 2 types of crops sold, banana bunch is leading. It was sold by 6 HHs out of the 18, and gave a sale amount ranged from 2,400 to 52,000 Rwf, on an average of 24,067 Rwf per HH. Banana bunch plays an important role to generate cash income among the sampled HHs. Meanwhile, 1 HH sold timber with a sale amount of 3,500 Rwf.

(3) Livestock

Major animals reared and sold by the surveyed HHs consist of goat, cow and chicken, and cow is dominant, and the range of reared cow is from 1 to 7 per HH, with an average number of 3 heads per HH. Table 38 below shows livestock income figures.

Table 38: Household livestock income

No	Recipient code	Goat		Ankole Cow		cow milk income	Chicken		Chicken egg	Total
		Reared No.	Sale amount	Reared No.	Sale amount	Sale amount	Reared No.	Sale amount	Sale amount	
1	Cy-Rj	NA*	NS*	2	NS	NS	4	NS	NS	NS
2	Cy-Ms	7	28,500	1	NS	NS	1	NS	NS	**28,500**
3	Cy-Gam	NA	NS	2	NS	NS	NA	NS	NS	NS
4	Cy-Mb	1	NS	NA	NS	NS	NA	NS	NS	NS
5	Cy-Nf	6	NS	NA	NS	NS	3	3,000	NS	**3,000**
6	Cy-Gal	NA	NS	3	NS	NS	NA	NS	NS	NS
7	Kz-Bj	3	NS	1	NS	NS	4	NS	NS	NS
8	Kz-Nb	1	11,000	NA	NS	NS	1	NS	NS	**11,000**
9	Kz-Kj	NA	NS	7	NS	180,000	NA	NS	NS	**180,000**
10	Kz-Mv	1	NS	NA	NS	NS	NA	NS	NS	NS
11	Kz-Ke	NA	NS	NA	NS	NS	NA	NS	NS	NS
12	Kz-M	NA	NS	5	NS	NS	NA	NS	NS	NS
13	Kb-Kj	2	21,000	NA	NS	NS	2	NS	NS	**21,000**
14	Kb-Mfn	3	7,000	2	NS	NS	2	3,000	1,500	**11,500**
15	Kb-Ms	NA	NS	NA	NS	NS	3	NS	NS	NS
16	Kb-Ne	1	NS	NA	NS	NS	1	NS	NS	NS
17	Kb-Kl	NA	NS	NA	NS	100,000	NA	NS	NS	**100,000**
18	Kb-Mfs	NA	NS	NA	NS	NS	2	NS	NS	NS
Average		**3**	**16,875**	**3**	NS	**140,000**	**2**	**3,000**	**1,500**	**50,714**
Range		**1 – 7**	**7,000 - 28,500**	**1 - 7**	NS	**100,000- 180,000**	**1 - 4**			**3,000 - 180,000**
HHs rearing & HHs selling***		**9**	**4**	**8**	NS	**2**	**10**	**2**	**1**	**7**

Source: Interview Survey Results by ICA Study Team, 2006 / NS*: No Sale / NA**: Non Applicable (doesn't rear)

It is noted that generally, 7 HHs received income by selling livestock ranged from 3,000 to 180,000 Rwf, at average of 50,714 Rwf per HH. Specifically, 4 HHs out of the 9 rearing sold goats in the range amount of 7,000 to 28,500 Rwf, at an average of 16,875 Rwf per HH. From 8 HHs rearing cow, no sale of cow, but only 2 HHs sold cow milk for 100,000 and 180,000, or an average of 140,000 Rfw per HH. Meanwhile 1 HH out the 10 rearing chicken received 3,000 Rwf of income by selling chicken, and another one HH rearing chicken received an income of 1,500 Rwf by chicken egg sale.

Thus, in terms of livestock income, goat among the livestock occupies an important position, and the range of reared goat is from 1 to 7 per HH, with an average number of 3 heads per HH. Meanwhile a number of chickens per HH range from 1 to 4 with an average of 2 chickens. Generally, farmers sell animals in accordance with urgent need of cash, thus livestock income does not mean a regular annual income like crop farming and needs to pay attention to interpretation as long as responded household is not full time livestock farmer.

(4) Off farm Activity

The off farm income among the surveyed HHs consists of income from casual work, lending land, sale of banana wine, donations, allowance of training and other business. Table 39 shows the off farm income.

Table 39: Off farm income

No	Recipient code	Casual work	Lending land	Banana wine	Donation	Allowance of training	Other business	Total
1	Cy-Rj	NA*	NA	10,500	NA	NA	NA	**10,500**
2	Cy-Ms	NA	NA	NA	NA	4,000	24,000	**28,000**
3	Cy-Gam	45,000	18,000	NA	5,000	NA		**68,000**
4	Cy-Mb	NA	NA	NA	NA	NA	NA	NA
5	Cy-Nf	NA	NA	NA	NA	NA	56,000	**56,000**
6	Cy-Gal	NA	NA	272,000	NA	2,000	NA	**274,000**
7	Kz-Bj	12,000	NA	NA	NA	NA	NA	**12,000**
8	Kz-Nb	NA	30,000	NA	10,000	NA	NA	**40,000**
9	Kz-Kj	NA	NA	NA	NA	NA	NA	NA
10	Kz-Mv	NA	NA	NA	NA	NA	NA	NA
11	Kz-Ke	NA	NA	NA	NA	NA	NA	NA
12	Kz-M	NA	NA	12,000	NA	NA	NA	**12,000**
13	Kb-Kj	NA	NA	NA	20,000	NA	24,000	**44,000**
14	Kb-Mfn	NA	NA	72,000	NA	NA	NA	**72,000**
15	Kb-Ms	NA	NA	36,000	NA	NA	NA	**36,000**
16	Kb-Ne	NA	NA	27,000	NA	NA	NA	**27,000**
17	Kb-Kl	NA	NA	57,000	NA	NA	NA	**57,000**
18	Kb-Mfs	NA	NA	NA	7,000	4,000	15,000	**26,000**
Average		**28,500**	**24,000**	**69,500**	**10,500**	**3,333**	**29,750**	**54,464**
No. HHs concerned		**2**	**2**	**7**	**4**	**3**	**4**	**14**

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Non Applicable

The HH off farm income consisted of 6 main sources including casual work, landing land, banana wine sale, donations, allowance of training, and other business activities (non specified by the respondents). Casual work mainly consisted of working as day-laborers. Banana wine was brewed by farmers from their plantations. Donations are generally received from relatives and friends. Finally, some money was earned as allowance of training and from other business.

It is noted that 78% of the HHs earned an off farm income ranging from 10,500 to 274,000 Rwf, at an average of 54,464 Rwf per HH.

2 HHs got respectively casual work income of 12,000 and 45,000 Rwf, or an average of 28,500 Rwf per HH. 2 HHs received respectively banana lending land amount of 18,000 and 30,000 Rwf, or an average of 24,000 Rwf per HH. 7 HHs received banana wine income ranged from 10,500 to 272,000 Rwf, on average of 69,500 Rwf per HH. 4 HHs received income from donation ranged from 5,000 to 20,000 Rwf, on average of 10,500 Rwf per HH. 3 HHs received allowance from training ranged from 2,000 to 4,000 Rwf, on an average of 3,333 Rwf per HH. And finally, 4 HHs earned money from other business, in the range of 15,000 and 56,000 Rwf, on average of 29,750 Rwf per HH.

(5) Total Income

Total income by HH is shown in Table 40 below.

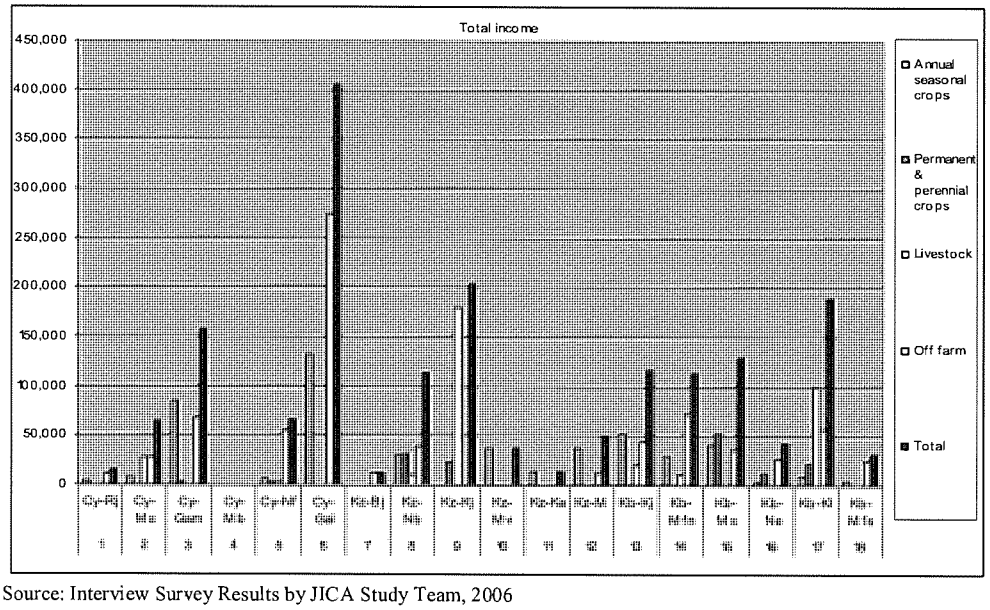
Table 40: Total Annual Income by Farm Household

No	Recipient code	Seasonal crop	Permanent & perennial crop	Farming	Livestock	Agriculture	Off farm	Total
1	Cy-Rj	5,000	NA	**5,000**	NA	**5,000**	10,500	**15,500**
2	Cy-Ms	8,600	NA	**8,600**	28,500	**37,100**	28,000	**65,100**
3	Cy-Gam	86,000	3,500	**89,500**	NA	**89,500**	68,000	**157,500**
4	Cy-Mb	NA*	NA	NA	NA	NA	NA	NA
5	Cy-Nf	5,600	2,400	**8,000**	3,000	**11,000**	56,000	**67,000**
6	Cy-Gal	132,200	NA	**132,200**	NA	**132,200**	274,000	**406,200**
7	Kz-Bj	NA	NA	NA	NA	NA	12,000	**12,000**
8	Kz-Nb	30,450	32,000	**62,450**	11,000	**73,450**	40,000	**113,450**
9	Kz-Kj	NA	24,000	**24,000**	180,000	**204,000**	NA	**204,000**
10	Kz-Mv	38,400	NA	**38,400**	NA	**38,400**	NA	**38,400**
11	Kz-Ke	14,000	NA	**14,000**	NA	**14,000**	NA	**14,000**
12	Kz-M	37,500	NA	**37,500**	NA	**37,500**	12,000	**49,500**
13	Kb-Kj	52,300	NA	**52,300**	21,000	**73,300**	44,000	**117,300**
14	Kb-Mfn	30,000	NA	**30,000**	11,500	**41,500**	72,000	**113,500**
15	Kb-Ms	41,000	52,000	**93,000**	NA	**93,000**	36,000	**129,000**
16	Kb-Ne	3,000	12,000	**15,000**	NA	**15,000**	27,000	**42,000**
17	Kb-Kl	10,000	22,000	**32,000**	100,000	**132,000**	57,000	**189,000**
18	Kb-Mfs	5,000	NA	**5,000**	NA	**5,000**	26,000	**31,000**
Average		**33,270**	**21,129**	**40,434**	**50,714**	**62,622**	**54,464**	**103,791**

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Non Applicable

Figure 14 below highlights the total income.

Figure 14: Total income by farm household



Source: Interview Survey Results by JICA Study Team, 2006

From Table 40 above, it is noted that 94% of the HHs earned income, ranging from 12,000 to 406,200 Rwf, on an average of 103,791 Rwf per HH.
Between agriculture income and off farm income in the total income earned, agriculture is dominant.

In fact, agriculture income was received by 89% of HHs in the range of 5,000 to 204,000 Rwf, on an average of 62,622 Rwf per HH. Between farming income and livestock income in the agriculture income, farming income is leading. In fact, farming income of the 89% HHs is ranged from 5,000 to 132,200 Rwf, on an average of 40,434 Rwf per HH.

When farming conditions are good (for instance, in good rainy seasons), people devote to farm land rather than doing off farm activities; agriculture yields a better sustainable profit.

Farming income, higher and more widely distributed among the households, is more important than livestock income. In fact, in Rwandese farm situation, breeding requires more than farming, especially, higher surface areas and higher investments. And due to poverty, peasants in Ntarama do not have means to rear important livestock generating high income. However, stock breeders use to sell animal once 2 or 3 years for a major expenditure requiring a high amount, so livestock is seen as a live bank, while farming income, often seasonally got, is more spent for frequent ordinary expenditures.

Finally, seasonal crop income is higher and more widely distributed in households than permanent and perennial income. It is therefore more dominant since it requires less in terms of surface areas, and investment.

4.2.3. Expenditure

(1) Agriculture inputs

Agricultural input expenditure consists especially, of seeds, agrochemicals and tools; Table 41 below shows related figures.

Table 41: Expenditure of Agricultural Inputs and Tools

No	Recipient code	Seeds	Agro chemicals	Tools		Total
				Hoes	Machetes	
1	Cy-Rj	7,500	NA	2,600	400	10,500
2	Cy-Ms	4,000	1,600	2,000	700	8,300
3	Cy-Gam	800	NA	4,500	800	6,100
4	Cy-Mb	NA*	NA	NA	NA	NA
5	Cy-Nf	1,500	NA	2,600	1,300	5,400
6	Cy-Gal	NA	NA	NA	NA	NA
7	Kz-Bj	3,000	NA	9,300	NA	12,300
8	Kz-Nb	1,500	NA	NA	NA	1,500
9	Kz-Kj	NA	20,400	NA	NA	20,400
10	Kz-Mv	18,300	NA	1,250	NA	19,550
11	Kz-Ke	NA	NA	NA	NA	NA
12	Kz-M	NA	NA	NA	NA	NA
13	Kb-Kj	NA	NA	4,000	700	4,700
14	Kb-Mfn	NA	NA	3,900	NA	3,900
15	Kb-Ms	NA	6,000	7,900	NA	13,900
16	Kb-Ne	NA	NA	2,600	1,000	3,600
17	Kb-Kl	NA	NA	4,350	NA	4,350
18	Kb-Mfs	1,200	NA	2,000	NA	3,200
Average		4,725	9,333	3,917	817	18,792
HHs spending		8	3	12	6	14

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Non Applicable

78% of the HHs bought agricultural inputs. The range of money paid was between 1,500 to 20,400 Rwf, on an average of 18,792 Rwf per HH. Seeds procured annually were generally bean, maize and groundnut, because most of the farmers consumes all produce including portion of the next seeds, and were obliged to procure seeds at the beginning of the cropping season. 44% of the HHs bought seeds in the range of 800 to 18,300 Rwf, on an average of 4,725 Rwf per HH.

17% of the HHs bought agrochemicals for crop storing. The cost spent for agrochemicals ranged from 1,600 to 20,400 Rwf, on an average of 9,333 Rwf per HH. And finally, main agricultural tools regularly purchased were hoes and machetes, accounting for 67 % of the HHs. This implies that these tools were mainly used for their farming activities and easily worn out within one to two years. The range of tool expenditure among the recipients was from 1,250 to 9,300 Rwf.

(2) Hired labor

It should have been very interesting to bring out the annual hired labor per household, but farmers couldn't give related retrospective data. They couldn't remember the data, and enumerators were unable to estimate them. However, taking into account the responses of some surveyed households, it is clear that hired labor is mostly paid in kind (food crop products, especially sweet potatoes) rather than in cash on the wage of 400 Rwf per man-day. Generally, people are unable to employ workers due to limited farming capital even insufficient of farming labor.
Average annual hired labor cost per HH roughly given by the recipient is 40,000 Rwf per HH. This kind of expenditure seems to be mainly used for sorghum, from plowing up to milling activities.

(3) Food, non food items and total

Expenditure for food items consists of 16 main items shown below box:

1.sorghum grains, 2.sweet potatoes, 3.sweet cassava tuber, 4.bitter cassava flour, 5.maize flour, 6.beans, 7.soybeans, 8.groundnut, 9.cooking banana, 9.brewing banana, 10.Irish potatoes, 11.meat, 12.rice, 13.vegetables, 14.sugar, 15.coking oil and 16.salt, 17.and others

Expenditure for non-food items consists of 20 main items shown below box:

1.domestic water, 2.kerosene, 3.firewood, 4.clothes, 5.soap, 6.lotion, 7.tooth cream, 8.shoe cream, 9.bed sheets, 10.blankets, 11.belt, 12.radio, 13.radio batteries, 14.bicycle, 15.domestic animals, 16.construction materials, 17.school fees, 18.medical fees, 19.land rental, 20.ceremonial occasion, 21.and others

Table 42 below shows total expenditure. .

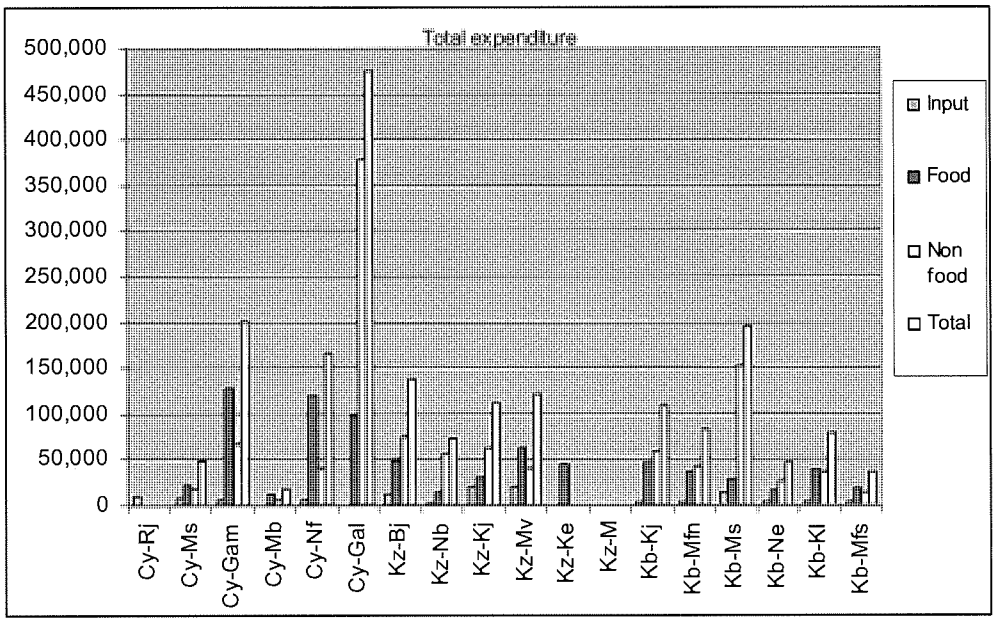
Table 42: Total expenditure

No	Recipient code	Input	Food	Non food	Total
1	Cy-Rj	10,500	**	**	**
2	Cy-Ms	8,300	**22,300**	**17,400**	**48,000**
3	Cy-Gam	6,100	**127,500**	**67,800**	**201,400**
4	Cy-Mb	NA*	**12,570**	**5,530**	**18,100**
5	Cy-Nf	5,400	**119,600**	**41,550**	**166,550**
6	Cy-Gal	NA	**97,750**	**377,200**	**474,950**
7	Kz-Bj	12,300	**48,900**	**76,200**	**137,400**
8	Kz-Nb	1,500	**14,810**	**57,400**	**73,710**
9	Kz-Kj	20,400	**29,700**	**62,100**	**112,200**
10	Kz-Mv	19,550	**62,250**	**40,150**	**121,950**
11	Kz-Ke	NA	**45,000**	**	**
12	Kz-M	NA	**	**	**
13	Kb-Kj	4,700	**46,600**	**58,800**	**110,100**
14	Kb-Mfn	3,900	**36,100**	**42,400**	**82,400**
15	Kb-Ms	13,900	**29,360**	**152,100**	**195,360**
16	Kb-Ne	3,600	**15,700**	**26,450**	**45,750**
17	Kb-Kl	4,350	**38,860**	**35,780**	**78,990**
18	Kb-Mfs	3,200	**18,100**	**14,300**	**35,600**
	Average	6,539	**47,819**	**71,677**	**126,831**

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Not Applicable / **: No response given by the interviewee

Figure 15 below highlights annual total expenditure.

Figure 15: Total expenditure



Among 15 HHs out of 18 which responded, 100% expended money, in the range of 18,100 to 474,950 Rwf, on an average of 126,831 Rwf per HH.

Among 16 HHs out of 18 which responded, 100% bought food, in the range of 12,570 to 127,500 Rwf, on an average of 47,819 Rwf per HH. Among 15 HHs out of 18 which responded, 100% bought non food items, in the range of 5,530 to 377,200 Rwf, on an average of 71,677 Rwf per HH. Among the expenditure items above, non food item is leading. In Rwanda, especially, ceremonial occasions (such as marriage, funerals) are reported to be prestigiously expensive.

4.2.4. Balance income/expenditure

Table 43 and Figure 16 below show the annual balance between income and expenditure.

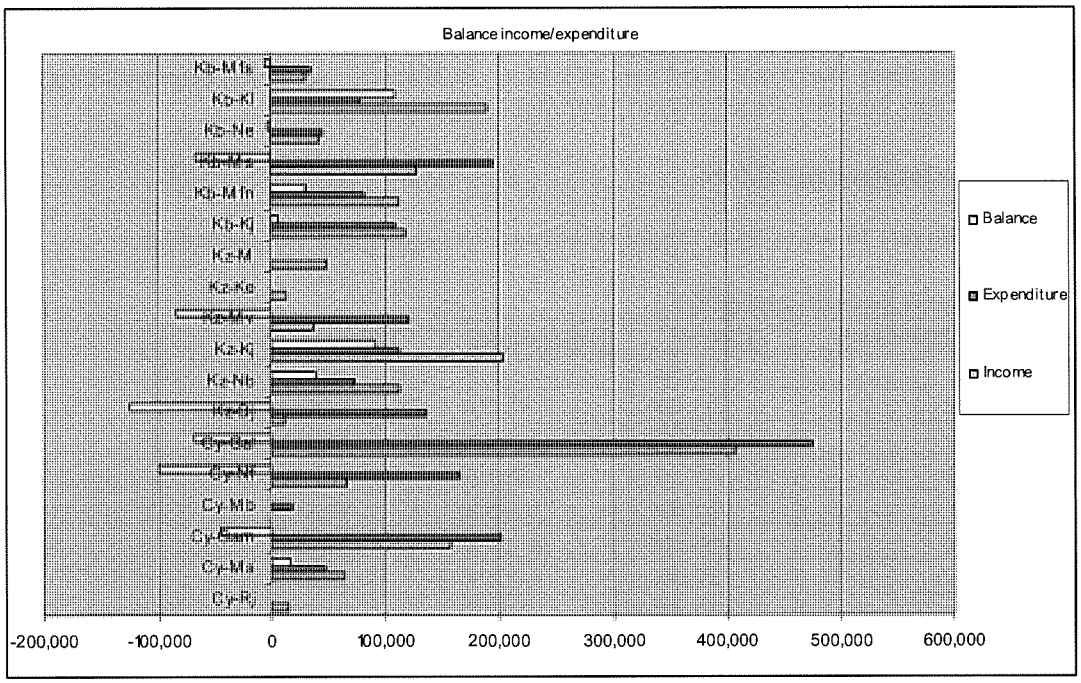
Table 43: Balance income/expenditure

No	Recipient code	Income	Expenditure	Balance
1	Cy-Rj	15,500	*	*
2	Cy-Ms	65,100	48,000	**17,100**
3	Cy-Gam	157,500	201,400	**-43,900**
4	Cy-Mb	*	18,100	*
5	Cy-Nf	67,000	166,550	**-99,550**
6	Cy-Gal	406,200	474,950	**-68,750**
7	Kz-Bj	12,000	137,400	**-125,400**
8	Kz-Nb	113,450	73,710	**39,740**
9	Kz-Kj	204,000	112,200	**91,800**
10	Kz-Mv	38,400	121,950	**-83,550**
11	Kz-Ke	14,000	*	*
12	Kz-M	49,500	*	*
13	Kb-Kj	117,300	110,100	**7,200**
14	Kb-Mfn	113,500	82,400	**31,100**
15	Kb-Ms	129,000	195,360	**-66,360**
16	Kb-Ne	42,000	45,750	**-3,750**
17	Kb-Kl	189,000	78,990	**110,010**
18	Kb-Mfs	31,000	35,600	**-4,600**
Average		103,791	126,831	**-14,208**

Source: Interview Survey Results by JICA Study Team, 2006 / *: No response given by the interviewee

The figure below highlights the annual balance of income and expenditure by HH.

Figure 16: Balance income/expenditure



Source: Interview Survey Results by JICA Study Team, 2006

Table 43 and Figure 16 above show that among 14 HHs out of 18 which responded, the annual average balance income/expenditure is -14,208 Rwf per HH. Annual balance deficit is observed in 57% of the HHs, while annual surplus balance is noticed in the rest of the surveyed households (or 43%).

From these results, the following hypothesis could be made. Surveyed heads of HHs had difficulty remembering the exact data of previous months, because they do not record household income and expenditures. Depending on some sensitive situations, some farmers do not deliberately declare some income from donations or other suspicious sources, thus at times the declared expenses can be more than the declared income showing a deficit.

4.2.5. Association activity

(1) Ibimina/tontine

According to Table 44 below, 28% of the household heads are in a tontine association. The number of members ranged from 18 to 70, on an average of 36 per tontine association.
The monthly membership fees per member is ranging from 400 to 2,200 Rwf, on an average of 1,480 Rwf. The revolving credit amount got per member varying from 9,200 to 154,000 Rwf, on an average of 47,600 Rwf. Tontine, an informal form of saving and credit association is common and very helpful among farming communities. Many major expensive items are financed by the tontine amounts obtained, for instance buying domestic animal, land plots and etc.
Tontine associations are created on proper initiative of the members who know each other. The members organized by written and/or verbal association rules have a strong social controlling system of the group. Each tontine association is led by an elected board committee, generally composed of a president, a vice-president, a treasure and a secretary.

Table 44: The Survey Results of Tontine Characteristics among the Respondents

Outline of Tontine	Result
% of HHs belonging to tontine	28%
Average of Tontine members	36
Range of Tontine members	18 – 70
Range of monthly membership fees (Rwf)	400 - 2,200
Average of monthly membership fees (Rwf)	1,480
Range of revolving credit amount gained per member (Rwf)	9,200 - 154,000
Average revolving credit amount got per member (Rwf)	47,600

Source: Interview Survey Results by JICA Study Team, 2006

(2) Farming Activity Oriented Associations

The general characteristics of association involving in the model farmers are summarized as below Table. 56% of the household heads are members of an association. The range of members in an association is from 8 to 200, on an average of 55. The percentage of farming associations is 70%, and the rest (or 30%) involved in the activities including veterinary pharmacy, agricultural commercialization and housing/construction. The membership fees per member are ranging from 1,000 to 70,000 Rwf, on an average of 11,772 Rwf.

Table 45: Association characteristics

	Outline of Associations		Index
1	% HHs in associations		56%
2	1	***Association Abahuje***	
		No. members	19
		Specific activities	Farming
		Membership entry fees (Rwf)	-
		Years of membership	2000
	2	***Association Benishyaka***	
		No. members	25
		Specific activities	Farming
		Membership entry fees (Rwf)	-
		Years of membership	1995
	3	***Association Twisungane I***	
		No. members	8
		Specific activities	Farming
		Membership entry fees (Rwf)	1,200
		Years of membership	2005
	4	***Association Twisungane II***	
		No. members	83
		Specific activities	Sugar cane plantation
		Membership entry fees (Rwf)	2,000
		Years of membership	-
	5	***Association Twisungane III***	
		No. members	39
		Specific activities	Veterinary pharmacy
		Membership entry fees (Rwf)	1,000
		Years of membership	2003
	6	***Association Kopanya***	
		No. members	200
		Specific activities	Housing / construction
		Membership entry fees (Rwf)	-
		Years of membership	1975

	7	***Association Duteranimbaraga***	
		No. members	52
		Specific activities	Farming
		Membership entry fees (Rwf)	70,000
		Years of membership	1998
	8	***Association Jyambere***	
		No. members	-
		Specific activities	Agric. commercialization
		Membership entry fees (Rwf)	5,000
		Years of membership	2006
	9	***Association Dutabarane***	
		No. members	12
		Specific activities	Farming
		Membership entry fees (Rwf)	-
		Years of membership	1995
	10	***Association Abahujurukundo***	
		No. members	-
		Specific activities	-
		Membership entry fees (Rwf)	1,500
		Years of membership	2001
3	Range of members in associations		
4	Average members in an association		55
5	% of farming associations		67%
6	Range of membership entry fees (Rwf)		1,000 - 70,000
7	Average membership entry fees (Rwf)		11,772
8	Range of years of membership		1975 - 2006

Source: Interview Survey Results by JICA Study Team, 2006

1) Land tenure

Farming associations borrow land on hillsides from various sources, and/or in wetlands from the Sector. It is noted that the farming associations don't have fixed plots, members often change lands. In these conditions, it is impossible to invest in medium and long terms, they must be content with seasonal food crop cultivation (bean, maize, sweet cassava, sorghum).

(2) Annual income

No annual cash income has been noted, crop sharing system is the common option among the association members.

(3) Annual expenditure

Generally, annual expenditure is composed of membership entry fees, which is spent for basic investment (tools, seed, pesticides, land renting).

4.2.6. Traditional Support System

(1) Umuganda

81% of the household heads do Umuganda once a month, especially, the last Saturday of each month from 7 to 12 Morning. The rest does not fulfill it because of many different official reasons such as handicaps and so on. Umuganda is obligatory for every citizen. Planning and supervision is done by

the Sector authorities. The main activities include repairing roads, water source maintenance, farming in the community lands, forestry, repairing houses and construction of schools.
Rwandese population is well sensitized to Umuganda practice since 1974 years. People know the social, political and economic benefit of it. In fact, Umuganda plays a role of social cohesion (ex. reconciliation), of popular mobilization and of infrastructure implementation. In principle, the population participates in Umuganda. If someone is absent, he must present a valid reason, otherwise he can be penalized financially by the Sector (usually between 2000 to 5000 Rwf per person). The Sector may also temporarily refuse to grant him a certificate of good citizenship if requested.

i. Ubudehe

Ubudehe is a traditional community supporting system as reciprocal help in farming activities, where a group in a village rotates in plowing, weeding, and harvesting operations of group member's farms in turn. Ubudehe in its real sense of the term is no longer practically existed; only some forms of informal and occasional arrangements of small group (generally 3 to 5 households) can be organized within neighbors for some agricultural activities such as plowing operation.

Ubudehe which was more or less official, regular and done by a whole village under traditional rule, has practically disappeared from the region; thus it does concretely no longer exist in rural community.

ii. Kugurizanya

Kugurizanya is a custom of labor loan, generally in farming activities between 2 neighboring and friend farmers. Working together, they rotate in each of their farm, working the same number of man-days according to their convenient agreement. In the sampled farm households, 32% of the households do sometimes Kugurizanya in agricultural activities (See below Table 46).

Table 46: Participation in Kugurizanya

Outline of Kugurizanya	Results
% of HHs doing Kugurizanya	22%
Main activities	Plowing, weeding and harvesting
Frequency	Sometimes (once a month)

Source: Interview Survey Results by JICA Study Team, 2006

4.2.7. Others

(1) Fetching Water

i. Domestic water

Major index on domestic water security is summarized below Table 47 with Figure 17 and 18.

Table 47: General Characteristics of Domestic Water Security

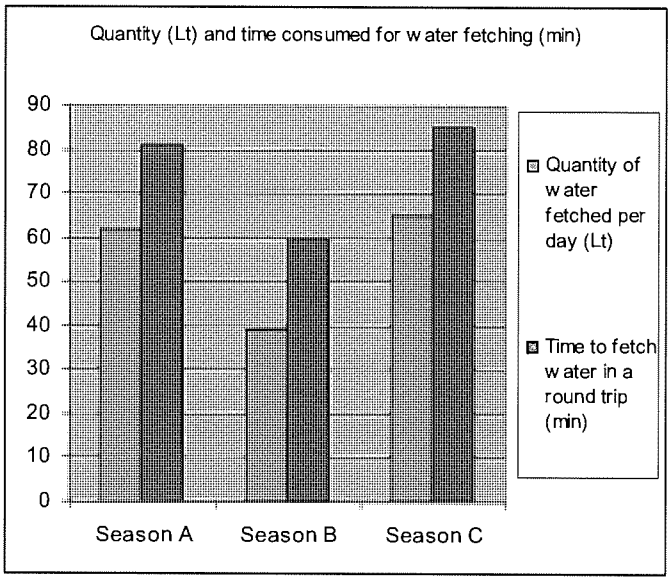
	Index	Result
Fetching water		
1	Average water demand per HH per day (Lt)	89
2	Range of water demand among the respondents (Lt)	40 - 160
3	% of HHs fetching water from swamp (%)	78
4	% of HHs fetching water from hand pomp (%)	22
5	% of HHs having a rainwater harvesting system (%)	94
6	Quantity of rainwater usually harvested after a normal rain (Lt)	69
Season A		
1	Quantity of water fetched per day (Lt)	62
2	Times to fetch water per day	2.4
3	Time consumed for fetching water in a round -trip (min)	81
Season B		
1	Quantity of water fetched per day (Lt)	39
2	Times to fetch water per day	1.6
3	Time consumed for fetching water in a round-trip (min)	60
Season C		
1	Quantity of water fetched per day (Lt)	65
2	Times to fetch water per day	2.6
3	Time consumed for fetching water in a round-trip (min)	85

Source: Interview Survey Results by JICA Study Team, 2006

Daily domestic water demand per HH resulted in around 90 liters. Time consumed for fetching water ranged from 1 to 1.5 hours. In the rainy seasons, 94% of the HHs harvested rainwater from their harvesting system. The average quantity of rainwater harvested after a normal rain was 69 liters. Concerning the water sources, 78% of the HHs fetched water from swamps while the rest (or 22%) fetched from hand pumps, tape water and rivers.

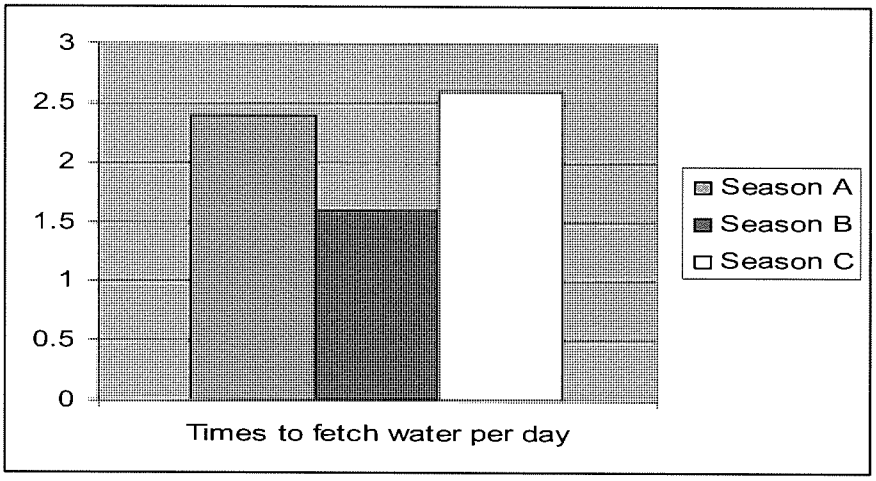
Availability of water for domestic use is different among the cropping seasons. According to the interview results, the local ecosystem offers more water during the season B (February - end of June) commonly called the long rainy season than that in the season A, the short rainy season (September - January). On the other hand, the season C (end of June - mid-September), the long dry season is the last in terms of water availability (this sentence is not followed to the previous sentence smoothly because of its content, namely you should discuss available amount of season C compared to the Season A and B.) Therefore, availability of the domestic water and its accessibility is subject to seasonal water fluctuation. Thus, households fetch more domestic water during the dry season than that in the rainy season because the households could harvest rainwater during the rainy season. Moreover, quantity of domestic water fetched, frequency and time consumed for fetching water are negatively correlated with rainwater availability; thus, amount of fetching water, frequency per day and time consumed for fetching water are increased during the dry season compared to the rainy season. Figures below shows the general trend of domestic water use over the 3 cropping seasons.

Figure 17: Quantity and Time Consumed for Water Fetching



Source: Interview Survey Results by JICA Study Team, 2006

Figure 18: Times to Fetch Water per Day



Source: Interview Survey Results by JICA Study Team, 2006

(2) Collecting firewood

Time required to collect firewood is also correlated with rainy season. It is noted that in the rainy season, it takes more time to collect firewood than that in the dry season because of spending more time to collect dried firewood. Regarding frequency times to collect firewood per week, some slight differences are observed. There is a tendency to collect firewood less time required per week in the dry season than that in the rainy season. In fact, in the dry seasons people could collect big bundles of sticks than that in the rainy seasons because dried stick are more available (period of decrease of rain and increase of sunshine). Further in the dry seasons, farmers use plant residues for firewood which are more available in the farm.

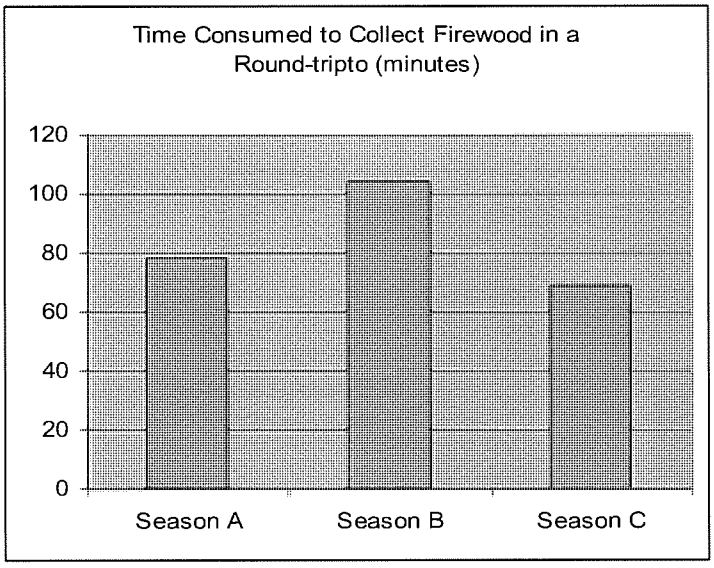
Table 48: General Characteristics on Collecting Firewood

Collecting firewood		Results
Season A		
1	Times per a week	3
2	Time consumed in a round-trip (min)	78
Season B		
1	Times per a week	3
2	Time consumed in a round-trip (min)	104
Season C		
1	Times per a week	3
2	Time consumed in a round-trip (min)	69

Source: Interview Survey Results by JICA Study Team, 2006

Figures 19 below highlight the trend of collecting firewood over the 3 cropping seasons.

Figure 19: Time to collect firewood



Source: Interview Survey Results by JICA Study Team, 2006

(3) Spare time

Table 49 below shows the characteristics of spare time.

Table 49: Survey Results on Spare Time among the Surveyed Households

Spare time		Results
1	% of HHs taking one day of rest per a week	100%
2	% of HHs taking Sunday as a day of rest	
3	Average working hours per day	
4	Breakdown of spare time use	Praying, taking rest, visiting friends

Source: Interview Survey Results by JICA Study Team, 2006

94% of recipients take one day rest per week every Sunday after an average of daily 8.7 hours work. Daily working hour length corresponds more or less with 8 working hours of Rwandese Public Administration Service.

(4) Soil fertility

1) General Trend

Table 50 shows how respondents perceive trend of crop yield fluctuation over the years. Most of the farmers perceive a decrease of crop yield year by year.

Table 50: Trend of crop yields over the years

	Trend of yield over the years	Results
1	% of HHs perceiving decrease of legume yield over the years	100%
2	% of HHs perceiving decrease of grain yield over the years	100%
3	% of HHs perceiving decrease of tuber yield over the years	100%

Source: Interview Survey Results by JICA Study Team, 2006

2) Causes of change of crop yields

According to the model farmers, decrease of crop yield is caused by decrease of soil fertility, while the plant diseases have aggravated the situation, especially on the tuber crops such as cassava and sweet potatoes (see below Table 51).

Table 51: Factors Causing Crop Yield Decrease=

Causes of change on crop yield	Result
Ratio of HHs perceiving decrease of soil fertility as a cause of decrease of legume yield	100%
Ratio of HHs perceiving decrease of soil fertility as a cause of decrease of grain yield	100%
Ratio of HHs perceiving decrease of soil fertility and increase of pest/plant disease as a cause of decrease of tuber crop yield	100%

Source: Interview Survey Results by JICA Study Team, 2006

3) Use of chemical fertilizers, manure and irrigation practice

Soil fertility and plant disease problems described above have led the farmers to apply some quick interventions as countermeasures for improving that situation. The points mentioned below give some adopted countermeasures. Table 52 below shows the percentage of surveyed farmers which applied fertilizer and irrigation practice.

Table 52: Percentage of Surveyed Farmers Using Fertilizers and Irrigation

	Use of fertilizers & Chemicals	Results
1	Number of users	0 HH
	Manure	
1	Number of users	8 HHs
2	Number of HHs obtained from own livestock and neighbors	7 HHs
3	% of HHs obtained from own livestock	1 HH
Irrigation practice		
	% of HHs practicing	0 HH

Source: Interview Survey Results by JICA Study Team, 2006

Manure was by 8 HHs. No use of fertilizers and chemical. No irrigation practice is observed among the surveyed.

(5) Health

Table 53 below shows health condition of the respondents. The prevailing main diseases consist of diarrhea, malaria and amoeba. 28% of HHs has had at least a young child affected by diarrhea.
33% of the HH heads has been affected by malaria, and 56% of HHs has had a child affected by that disease. 17% of HH Heads has been affected by amoeba, and the same percentage of HHs has had a young child affected by amoeba. Like elsewhere in Rwanda, malaria and amoeba especially declared by the respondents are known to be chronic diseases among the population.

Table 53: Health Condition

Major Health Problems	Result
1. Diarrhea	
% of HH heads who were affected by diarrhea	0%
% of HHs with a young child affected by diarrhea	28%
2. Malaria	
% of HH heads who were affected by malaria	33%
% of HHs with a young child affected by malaria	56%
3. Amoeba	
% of HH heads affected by amoeba	17%
% of HHs with a young child affected by amoeba	17%
Nutrition center	
% of HHs going to the nutrition center	0%

Source: Interview Survey Results by JICA Study Team, 2006

(6) Draught coping strategy

Table 54 below shows the draught coping measures among the recipients.

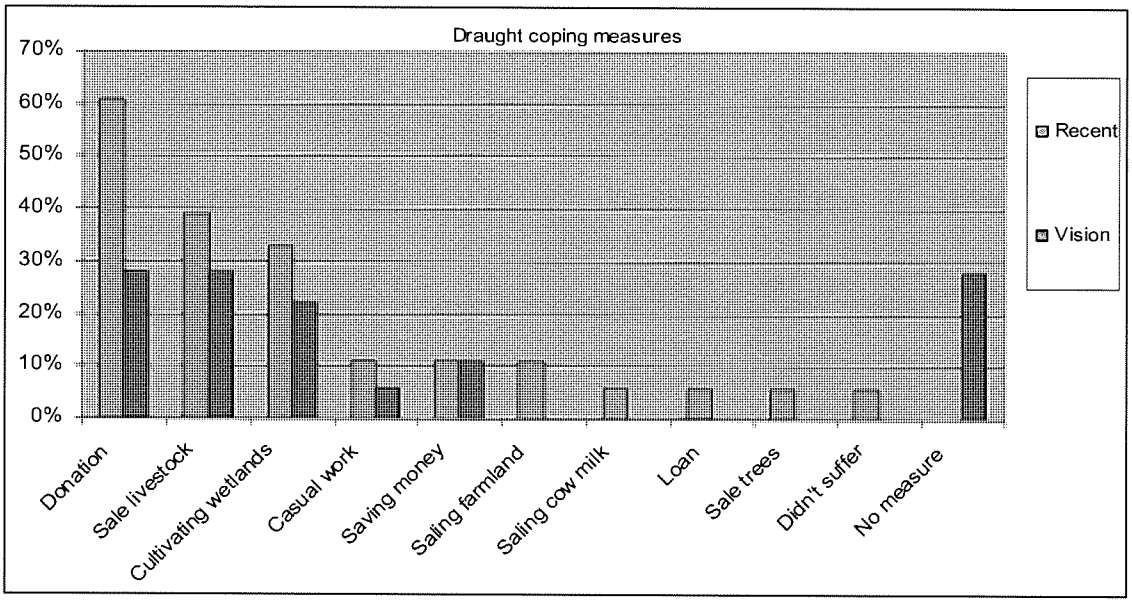
Table 54: Draught coping measures

Measures	% of HHs adopting the measure during recent draughts	% of HHs envisioning the measure
Donation	61%	28%
Sale of livestock	39%	28%
Cultivating wetlands	33%	22%
Casual work	11%	6%
Saving money (for buying food)	11%	11%
Sale of farmland	11%	0%
Sale of cow milk	6%	0%
Loan	6%	0%
Sale of trees	6%	0%
Didn't suffer (from draught)	6%	0%
No measure	0%	28%

Source: Interview Survey Results by JICA Study Team, 2006

Figure 20 below highlights the trend of draught coping measures.

Figure 20: Draught coping measures



Source: Interview Survey Results by JICA Study Team, 2006

In the past and future time, the model farmers have coped and will cope with draught by taking several countermeasures such as asking donation, selling livestock and cultivating wetlands. The same measures still remain to cope with draught in the future. In fact, wetland cultivation seems to be a promising and sustainable draught coping measure in the region.

4.3. Shallow Well Irrigation Quick Project (QP2)

4.3.1 General

(1) Family aspects

Table 55 below shows the general characteristics of the households, model farmers for the shallow well irrigation. These characteristics consist of household head age, sex, marital status, schooling years and family size, as well as family members engaged in farming and decision-makers of the house economy (farming practice and its expenditure, and family food control).

Table 55: General Characteristics of the Households

No	Recipient code	Age (year)	Sex	Marital status	Schooling years	Family size	Family members engaged in farming	Decision-maker	
								Farming	Food
1	Cy-Na	38	M	Married	8	3	2	Husband	Husband
2	Cy-Mj	41	F	Widow	6	6	1	Self	Self
3	Cy-Ng	54	M	Married	6	7	2	Husband	Wife
4	Cy-Gg	41	M	Married	0	3	2	Husband & wife	Husband & wife
5	Kz-Ut	36	M	Married	8	5	2	Husband	Wife
6	Kz-Na	28	M	Single	7	2	2	Self	Self
7	Kz-Mj	21	M	Single	4	3	2	Self	Self
8	Kz-Mv	51	M	Married	6	11	2	Husband & wife	Husband & wife
9	Kb-Mj	56	M	Widow	0	3	2	Self	Self
10	Kb-Mt	32	M	Single	6	1	1	Self	Self
11	Kb-Tt	26	M	Married	3	3	2	Husband & wife	Husband & wife
12	Kb-Kd	69	M	Married	0	6	2	Husband & wife	Husband & wife
Average		**41**			**4.5**	**4.4**	**1.8**		

Source: Interview Results by JICA Study Team, 2006

Table 55 above shows HH head ages, ranging from 21 to 69 years on average of 41 years. Their schooling years are respectively 8 in two HHs, 7 in one HH, 6 in four HHs, 4 in one HH, 3 in one HH and 0 in three HHs, on an averaged academic background of 4.5 years. Typical household consists of 4.4 members on average, ranging from 1 to 11 members per household.
HH composition is as follows: one HH is composed of 11 persons, another of 7, another one of 5, another one of 2 and the last one of 1; 5 HHs are composed of 3 persons each and 2 HHs of 6 each.
The number of persons engaged in farming activity per family resulted in the range 1 to 2, on an average of 1.8 persons. Regarding marital status, 3 HH heads are single, 7 are married and 2 are widows. Concerning decision making on house economy among the family members, it is noted that farming activity is controlled by household-head. Among the 7 married families, 4 husbands are assisted by their wife. HH heads control personally this important rubric on which family survival basically depends. In fact, household food security is based up on farming. Single parents control food procurement, while in the married families, that rubric is controlled by husband and wife, while it is controlled by wife alone in only 2 HHs. Normally, according to Rwandese culture, wife alone controls food procurement; however, it is noted that due to food insecurity situations, most of husbands are involved in food procurement assisting their wife to better economize food.

(2) Meals & food

Food diet characteristics are shown as below Table 56, 57 and 58 with Figure 21. The range of meals per household per day varies from 1.3 to 2 times with an average of 1.8 times. 75% of the households have 2 times per day, comprising of lunch and dinner. However, survey couldn't assess how food was

enough, and how well-balanced were meals.

According to Tables 55 & 56 and Figure 18 below, the 2 main food crops of the staple food were beans and sweet potatoes. Like elsewhere in low and middle altitude of Rwanda (1000 - 1700 m), bean and sweet potatoes are known to be the main food crops of the stable food. Almost 100% of the households had beans and 62% sweet potatoes. Beans (commonly called Rwandese meat) are known to alleviate malnutrition due to their relative high protein content.

The survey has shown that beans, sweet potatoes, cassava flour, maize, banana (brewing and cooking), sorghum, groundnut and taro were the 9 main different food crops of the staple food, and that the number of food crop in the staple food ranges from 2 to 5. Five food crops in the staple food were in 5% of the HHs, 4 in 40%, 3 in 34%, 2 in 53% and nothing in 3%. The staple food is almost the same over the seasons, because farmers seasonally sow the same crops.

Table 56: Average Daily Meal

No	Recipient code	Average daily meal
1	Cy-Na	2.0
2	Cy-Mj	1.5
3	Cy-Ng	2.0
4	Cy-Gg	2.0
5	Kz-Ut	2.0
6	Kz-Na	2.0
7	Kz-Mj	2.0
8	Kz-Mv	2.0
9	Kb-Mj	1.3
10	Kb-Mt	1.3
11	Kb-Tt	2.0
12	Kb-Kd	2.0
	Zone	**1.8**

Source: Interview Results by JICA Study Team, 2006

Table 57: Ratio of HHs Taking Type of Food Crops for Diet

Food crop	**Season C**	**Season A**	**Season B**	**Annually***
Beans	100%	92%	100%	97%
Sweet potatoes	75%	58%	58%	62%
Cassava flour	25%	25%	25%	25%
Maize	8%	33%	17%	20%
Sweet cassava	25%	17%	8%	15%
Banana	17%	8%	17%	14%
Sorghum	17%	8%	8%	10%
Groundnut	8%	8%	8%	8%
Taro	8%	8%	0%	5%
Nothing	0%	8%	0%	3%

Source: Interview Results by JICA Study Team, 2006

*Annual % = ((%season C x 3 months/12 months) + (%season A x 4 months/12 months) + (%season B x 5 months/12 months))

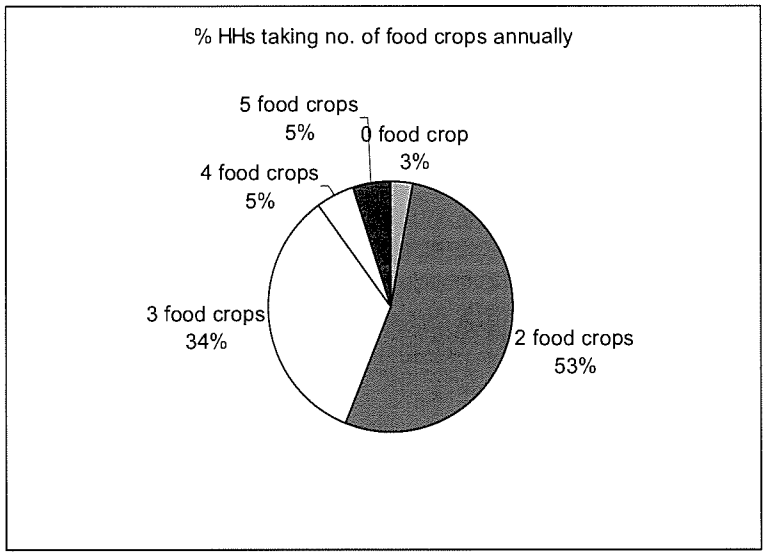
Table 58: Ratio of HHs taking the Number of Food Crops

No. of food crop	Season C	Season A	Season B	Annually*
0	0%	8%	0%	3%
2	42%	33%	75%	53%
3	42%	50%	17%	34%
4	8%	0%	8%	5%
5	8%	8%	0%	5%

Source: Interview Results by JICA Study Team, 2006
*Annual % = ((%season C x 3 months/12 months) + (%season A x 4 months/12 months) + (%season B x 5 months/12 months))

Figure 21 below highlights HH ratio according to the number of food crops in the staple food.

Figure 21:



Source: Interview Results by JICA Study Team, 2006

(3) Land tenure

Because farmers don't have concept of metrology, it was very difficult to grasp in accurate data; Surveyed HH heads gave rough idea on land size had and/or owned in rounded figures. The results ranged from 1 to 3 Ha per family. These figures are therefore, not trustable. However, farmers know exactly the number of parcels had and/or owned which ranged from 1 to 3.

According to experience and other different reports related to land tenure in the region, farm size per family is ranging from 1 to 2 Ha. Like elsewhere in Rwanda, farm size has been continuously divided up over the years, either the parents came into a land inheritance to their children, or they have sold some parcels of the farmland.

Almost all lands owned and/or leased are on hillsides under rainfed regime. Only few farmers neighboring wetlands have advantage of access to, especially in season C.

Among the recipients, no landless case has been noted; however, about 25% of the HHs borrows lands, either in some cases, because of the small size of the farmlands, or to avoid high costs in plowing when the land is covered by dense bush after a long fallow, or when their own parcels yield

poorly. Throughout Rwanda, there are no official rules to guide the land borrowing/lending arrangement between the 2 parties; the deal is based up on an amicable agreement.

Farm plots on the hillsides belong to individual households under the control of the owners. However, wetlands belong to the Government which decides on their utilization. The current Government policy on wetland utilization is to promote high value crops, especially cereals, through associative/cooperative farming. However, this strategy is not yet strictly implemented at the grass-root level, and individual farmers still continue to cultivate food crops in wetlands, because the customary rules and the newly established Land Organic Law are juxtaposed.

4.3.2. Income

(1) Seasonal crops

1) Cultivated

Cultivated seasonal crops by the recipients included maize, bean, sweet potatoes, sorghum, sweet cassava, bitter cassava, groundnut, soy beans, Irish potatoes and vegetables. Beans, sweet potatoes, maize and sorghum were the major crops (See below Table 59). The produce of the seasonal crops is usually utilized for home consumption and for sale of surplus at local market.

Table 59 No. of HHs sowing and selling seasonal crops

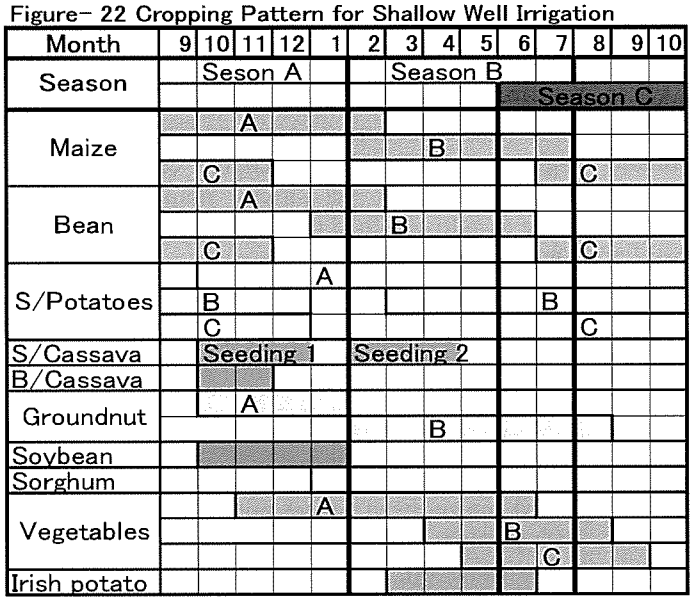
Seasonal crop	Season A		Season B		Season C	
	HH planting	HH selling	HH planting	HH selling	HH Planting	HH selling
Maize	10	0	10	0	0	0
Beans	12	3	11	3	0	0
Sweet potatoes	10	2	9	0	4	2
Sorghum	0	0	11	10	0	0
Sweet cassava	7	0	5	0	0	0
Bitter cassava	5	1	1	0	0	0
Groundnut	4	3	7	1	0	0
Soy bean	3	0	2	0	0	0
Irish potatoes	0	0	1	1	0	0
Vegetables	1	1	1	1	3	3
Any seasonal crops*	12	6	12	12	6	5

Source: Interview Survey Results by JICA Study Team, 2006 / *: Any of seasonal crops mentioned above

2) Seasonal crop pattern

A cropping pattern of the cultivated crops among the model farmers are shown below Figure-22.

Figure- 22 Cropping Pattern for Shallow Well Irrigation



It is noted that during the period of August 2005 to July 2006, the recipients' seasonal crop planting and harvesting periods over the seasons A, B and C, have more or less corresponded with the normal seasonal crop planting and harvesting periods of Bugesera (Figure-3).

3) Sale

i. Season A

Table 60 below shows the season A income.

Table 60: Season A income

No	Recipient code	Bean	Sweet potatoes	Bitter cassava	Groundnut	Vegetables	Total
1	Cy-Na	16,000	4,000	20,000	5,000	NS	**45,000**
2	Cy-Mj	NS*	NS	NS	1,500	NS	**1,500**
3	Cy-Ng	NS	NS	NS	5,000	NS	**5,000**
4	Cy-Gg	NS	NS	NS	NS	NS	NS
5	Kz-Ut	NS	NS	NS	NS	NS	NS
6	Kz-Na	NS	NS	NS	NS	NS	NS
7	Kz-Mj	10,050	NS	NS	NS	300,000	**310,050**
8	Kz-Mv	NS	NS	NS	NS	NS	NS
9	Kb-Mj	NS	NS	NS	NS	NS	NS
10	Kb-Mt	9,000	NS	NS	NS	NS	**9,000**
11	Kb-Tt	NS	NS	NS	NS	NS	NS
12	Kb-Kd	NS	20,000	NS	NS	NS	**20,000**
Average		11,683	12,000	20,000	3,833	300,000	**65,092**

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

It is noted that in season A, 50% of the HHs received seasonal crop income. The range of sale amount was from 1,500 to 310,050 Rwf, on average of 65,092 Rwf per HH. Major crop sold was vegetables. Considering sale amount by major crops, it is observed that 3 HHs out of 12 which sowed bean received 11,683 Rwf per HH at average, in the range of 9,000 and 16,000 Rwf. An average of 12,000

Rwf per HH which planted sweet potatoes is noted from 4,000 and 20,000 Rwf in 2 HHs out of 7 which planted sweet potatoes. An average of 3,833 Rwf per HH, from the range of 1,500 to 5,000 Rwf, is observed in 3 HHs out of 4 which sowed groundnut. One HH out 5 which planted bitter cassava, has received 20,000 Rwf. Finally, The one HH which planted vegetables received 300,000 Rwf.

ii. Season B

Table 61 below shows the season B income.

Table 61: Season B income

No	Recipient code	Bean	Groundnut	Irish potatoes	Vegetables	Sorghum	**Total**
1	Cy-Na	2,000	5,000	NS	NS	10,000	**17,000**
2	Cy-Mj	NS*	NS	NS	NS	5,000	**5,000**
3	Cy-Ng	NS	NS	NS	NS	32,000	**32,000**
4	Cy-Gg	NS	NS	NS	NS	10,000	**10,000**
5	Kz-Ut	NS	NS	NS	NS	60,000	**60,000**
6	Kz-Na	NS	NS	NS	NS	10,000	**10,000**
7	Kz-Mj	NS	NS	NS	240,000	NS	**240,000**
8	Kz-Mv	13,000	NS	NS	NS	30,000	**43,000**
9	Kb-Mj	NS	NS	NS	NS	15,000	**15,000**
10	Kb-Mt	9,000	NS	NS	NS	10,000	**19,000**
11	Kb-Tt	NS	NS	NS	NS	7,200	**7,200**
12	Kb-Kd	NS	NS	9,000	NS	NS	**9,000**
	Zone	8,000	5,000	9,000	240,000	18,920	**38,933**

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

In season B, all HHs received seasonal crop income. The range of sold amount was from 5,000 to 240,000 Rwf, on an average of 38,933 Rwf per HH. Major crops sold were beans, groundnut, Irish potatoes, vegetables and sorghum, and sorghum and vegetables were leading. The sale amount per each sold crop was as follows: 3 HHs out of 11 which sowed bean, received a sale amount ranged from 2,000 to 13,000 Rwf, on an average of 8,000 Rwf per HH. An average of 18,920 Rwf per HH Rwf per HH is noticed in 10 HHs out of 11 which sowed sorghum, from the range of 5,000 to 60,000 Rwf. 1 HH out of 7 which sowed groundnut, received a sale amount of 5,000, another which planted Irish Potatoes received 9,000 Rwf and another one which sowed vegetables received 240,000 Rwf.

iii. Season C

Table 62 below shows the season C income.

Table 62: Season C income

No	Recipient code	Sweet potatoes	Vegetables	Total
1	Cy-Na	NS*	NS	NS
2	Cy-Mj	NS	NS	NS
3	Cy-Ng	NS	NS	NS
4	Cy-Gg	NS	27,500	27,500
5	Kz-Ut	NS	400,000	400,000
6	Kz-Na	NS	25,000	25,000
7	Kz-Mj	NS	NS	NS
8	Kz-Mv	NS	NS	NS
9	Kb-Mj	NS	NS	NS
10	Kb-Mt	10,000	NS	10,000
11	Kb-Tt	5,500	NS	5,500
12	Kb-Kd	NS	NS	NS
Average		7,750	150,833	93,600

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

It observed that in season C, 42% of the HHs received seasonal crop income. The range of sold amount was from 5,500 to 400,000 Rwf, on an average of 93,600 Rwf per HH. Major crops sold were sweet potatoes and vegetables. The sale amount per each sold crop was as follows:
2 HHs out of four which planted sweet potatoes received respectively 5,500 and 10,000 Rwf (or an average of 7,750 Rwf per HH); and 3 HHs which sowed vegetables received an average of 150,833 Rwf per HH from the range of 25,000 to 400,000 Rwf).

iv. Total

Table 63 below presents the total annual seasonal crop income.

Table 63: Annual seasonal crop income

No	Recipient code	Season A	Season B	Season C	Annually
1	Cy-Na	45,000	17,000	NS	62,000
2	Cy-Mj	1,500	5,000	NS	6,500
3	Cy-Ng	5,000	32,000	NS	37,000
4	Cy-Gg	NS*	10,000	27,500	37,500
5	Kz-Ut	NS	60,000	400,000	460,000
6	Kz-Na	NS	10,000	25,000	35,000
7	Kz-Mj	310,050	240,000	NS	550,050
8	Kz-Mv	NS	43,000	NS	43,000
9	Kb-Mj	NS	15,000	NS	15,000
10	Kb-Mt	9,000	19,000	10,000	38,000
11	Kb-Tt	NS	7,200	5,500	12,700
12	Kb-Kd	20,000	9,000	NS	29,000
Average		65,092	38,933	93,600	110,479

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

From Table 63 above, it is noted that 100% of the HHs received seasonal crop income. The range of sold amount was from 6,500 to 550,000 Rwf, on an average of 110,479 Rwf per HH.
Season B was significant for most of households for sale of surplus crops, because of long rainy season to accommodate various crops.

(2) Permanent and perennial crops

1) Permanent crops grown

According to the field survey results, permanent crop grown which generated income is banana (cooking and fruit).

Table 64 below shows income by type of banana.

Table 64: Income by permanent crops

No	Recipient code	Cooking banana	Banana fruit	Total
1	Cy-Na	7,300	1,000	8,300
2	Cy-Mj	5,300	2,000	7,300
3	Cy-Ng	NS*	NS	NS
4	Cy-Gg	NS	NS	NS
5	Kz-Ut	NS	NS	NS
6	Kz-Na	NS	NS	NS
7	Kz-Mj	NS	NS	NS
8	Kz-Mv	NS	NS	NS
9	Kb-Mj	NS	NS	NS
10	Kb-Mt	7,700	NS	7,700
11	Kb-Tt	NS	NS	NS
12	Kb-Kd	2,300	16,200	18,500
Average		5,650	6,400	10,450

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

It is noted that 33% of the HHs received permanent crop income; the range of sold amount was from 7,300 to 18,500 Rwf, on an average of 10,450 Rwf per HH.
Cooking Banana was sold by 4 HHs out of the 18, and gave a sale amount ranged from 2,300 to 7,700 Rwf, on an average of 5,650 Rwf per HH. The same 4 HHs sold banana fruit at an average of 6,400 Rwf per HH, from the range of 1,000 to 16,200 Rwf.

(3) Livestock

Major animals reared and sold by the surveyed HHs consist of cow and chicken, and cow is dominant. Cow is reared by 4 HHs in the range of 1 to 5 heads per HH, on an average of 2.3 heads per HH. Goat is also reared by 4 HHs in the range of 1 to 7 heads per HH, on an average of 4.8 heads per HH. Chicken is reared by 5 HHs, in the range of 1 to 8 chickens per HH, on average of 4.2 per HH.

Table 65 below shows livestock income figures.

Table 65: Household livestock income

No	Recipient code	Goat	Ankole cow		Cow milk	Chicken		Chicken eggs	Total
		No. reared	No. reared	Amount	Amount	No. reared	Amount	Amount	
1	Cy-Na	NA*	NA	NS*	NS	6	5,000	NS	5,000
2	Cy-Mj	1	NA	NS	NS	2	2,400	NS	2,400
3	Cy-Ng	NA	1	NS	NS	NA	NS	NS	NS
4	Cy-Gg	NA	NA	NS	NS	NA	NS	NS	NS
5	Kz-Ut	NA	NA	NS	NS	1	NS	NS	NS
6	Kz-Na	7	NA	NS	NS	NA	NS	NS	NS
7	Kz-Mj	5	2	NS	NS	8	5,500	320	5,820
8	Kz-Mv	6	5	150,000	94,500	NA	NS	NS	244,500
9	Kb-Mj	NA	NA	NS	NS	4	NS	NS	NS
10	Kb-Mt	NA	NA	NS	NS	NA	NS	NS	NS
11	Kb-Tt	NA	NA	NS	NS	NA	NS	NS	NS
12	Kb-Kd	NA	1	50,000	NS	NA	NS	NS	50,000
Average		4.8	2.3	100,000	94,500	4.2	4,300	320	61,544

Source: Interview Survey Results by ICA Study Team, 2006 / NS*: No Sale / NA**: Non Applicable (doesn't rear)

It is noted that generally, 5 HHs received income by selling livestock ranged from 2,400 to 244,500 Rwf, at average of 61,544 Rwf per HH. Specifically, 2 HHs sold cows at 50,000 and 150,000 Rwf (or an average of 100,000 Rwf per HH). One HH sold cow milk at 94,500 Rwf. From 3 HHs, a chicken sale amount average of 4,300 Rwf per HH is noted, from the range of 2,400 to 5,500 Rwf. Only 1 HH out of HHs rearing chicken sold eggs at the sale amount of 320 Rwf. No sale of goat is noted. Generally, farmers sell animals in accordance with urgent need of cash, thus livestock income does not mean a regular annual income like crop farming and needs to pay attention to interpretation as long as responded household is not full time livestock farmer.

(4) Off farm Activity

The off farm income among the surveyed HHs consists of income from casual work, sale of banana wine, sale of sorghum beer, donations and pension. Table 66 shows the off farm income.

Table 66: Off farm Income

No	Recipient code	Casual work	Banana wine	Sorghum beer	Donation	Pension	Total
1	Cy-Na	5,000	NA	NA	NA	NA	5,000
2	Cy-Mj	NA*	NA	NA	21,000	NA	21,000
3	Cy-Ng	50,000	NA	NA	NA	NA	50,000
4	Cy-Gg	NA	19,000	NA	NA	NA	19,000
5	Kz-Ut	NA	NA	NA	NA	NA	NA
6	Kz-Na	NA	NA	NA	NA	NA	NA
7	Kz-Mj	NA	NA	NA	NA	20,000	20,000
8	Kz-Mv	NA	96,000	NA	NA	NA	96,000
9	Kb-Mj	NA	21,000	NA	NA	NA	21,000
10	Kb-Mt	2,000	9,000	NA	NA	NA	11,000
11	Kb-Tt	14,000	NA	NA	NA	NA	14,000
12	Kb-Kd	NA	1,000	24,000	NA	NA	25,000
Average		17,750	29,200	24,000	21,000	20,000	28,200

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Non Applicable

The HH off farm income consisted of 5 main sources including casual work, banana wine sale, sorghum beer sale, donations and pension. Casual work mainly consisted of working as day-laborers. Banana wine was brewed by farmers from their plantations. Sorghum beer is brewed from sorghum self produced and/or bought. Donations are generally received from relatives and friends.

It is noted that 83% of the HHs earned an off farm income ranging from 5,000 to 96,000 Rwf, at an average of 28,200 Rwf per HH.

4 HHs received respectively casual work income in the range of 2,000 to 50,000 Rwf, on an average of 17,750 Rwf per HH. 5 HHs received banana sale amount ranging from 1,000 to 96,000 Rwf, on an average of 29,200 Rwf per HH. One HH sold sorghum beer at 24,000 Rwf, another received 21,000 Rwf of donation and another one received 20,000 Rwf of pension.

(5) Total Income

Total income by HH is shown in Table 67 below.

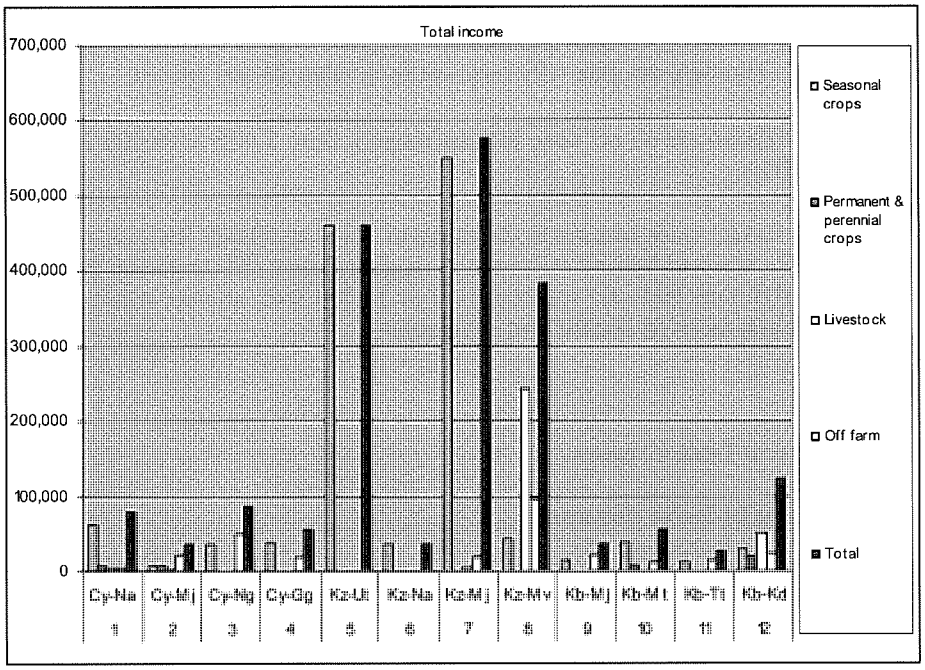
Table 67: Total Annual Income by Farm Household

No	Recipient code	Seasonal crops	Permanent & perennial crops	Farming	Livestock	Agriculture	Off-farm	Total
1	Cy-Na	62,000	8,300	70,300	5,000	75,300	5,000	80,300
2	Cy-Mj	6,500	7,300	13,800	2,400	16,200	21,000	37,200
3	Cy-Ng	37,000	NA*	37,000	NA	37,000	50,000	87,000
4	Cy-Gg	37,500	NA	37,500	NA	37,500	19,000	56,500
5	Kz-Ut	460,000	NA	460,000	NA	460,000	NA	460,000
6	Kz-Na	35,000	NA	35,000	NA	35,000	NA	35,000
7	Kz-Mj	550,050	NA	550,050	5,820	555,870	20,000	575,870
8	Kz-Mv	43,000	NA	43,000	244,500	287,500	96,000	383,500
9	Kb-Mj	15,000	NA	15,000	NA	15,000	21,000	36,000
10	Kb-Mt	38,000	7,700	45,700	NA	45,700	11,000	56,700
11	Kb-Tt	12,700	NA	12,700	NA	12,700	14,000	26,700
12	Kb-Kd	29,000	18,500	47,500	50,000	97,500	25,000	122,500
	Average	110,479	10,450	120,929	61,544	182,473	28,200	210,673

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Non Applicable

Figure 23 below highlights the total income.

Figure 23: Total income by farm household



Source: Interview Survey Results by JICA Study Team, 2006

From Table 67 above, it is noted that 100% of the HHs earned income, ranging from 26,700 to 575,870 Rwf, on an average of 210,673 Rwf per HH. Between agriculture income and off farm income in the total income earned, agriculture is dominant. In fact, agriculture income was received by 100% of HHs in the range of 12,700 to 555,870 Rwf, on an average of 182,473 Rwf per HH. Between farming income and livestock income in the agriculture income, farming income is leading. In fact, farming income of the 100% HHs is ranged from 12,700 to 550,050 Rwf, on an average of 120,929 Rwf per HH.

When farming conditions are good (for instance, in good rainy seasons), people devote to farm land rather than doing off farm activities; agriculture yields a better sustainable profit. Farming income, higher and more widely distributed among the households, is more important than livestock income. In fact, in Rwandese farm situation, breeding requires more than farming, especially, higher surface areas and higher investments. And due to poverty, peasants in Ntarama do not have means to rear important livestock generating high income. However, stock breeders use to sell animal once 2 or 3 years for a major expenditure requiring a high amount, so livestock is seen as a live bank, while farming income, often seasonally got, is more spent for frequent ordinary expenditures.
Finally, seasonal crop income is higher and more widely distributed in households than permanent and perennial income. It is therefore more dominant since it requires less in terms of surface areas, and investment.

4.3.3 Expenditure

(1) Agriculture inputs

Agricultural input expenditure consists especially, of seeds, agrochemicals and tools; Table 68 below shows related figures.

Table 68: Expenditure of Agricultural Inputs and Tools

No	Recipient code	Seeds	Fertilizer	Agro-chemical	Tools		Irrigation pomp borrowing	Total
					Hoes	Machete		
1	Cy-Na	1,300	NA	NA	2,400	900	NA	4,600
2	Cy-Mj	1,200	NA	NA	NA	NA	NA	1,200
3	Cy-Ng	3,600	NA	NA	5,600	1,000	NA	10,200
4	Cy-Gg	NA*	NA	1,500	2,400	800	NA	4,700
5	Kz-Ut	1,500	3,600	150,000	3,200	NA	50,000	208,300
6	Kz-Na	3,000	NA	9,500	5,900	NA	NA	18,400
7	Kz-Mj	NA	21,600	24,000	16,000	NA	NA	61,600
8	Kz-Mv	7,000	NA	16,000	NA	NA	NA	23,000
9	Kb-Mj	NA	NA	NA	NA	1,300	NA	1,300
10	Kb-Mt	NA	NA	NA	NA	NA	NA	NA
11	Kb-Tt	NA	NA	NA	3,000	700	NA	3,700
12	Kb-Kd	6,000	NA	NA	1,200	NA	NA	7,200
	Average	3,371	12,600	40,200	4,963	940	50,000	31,291

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Non Applicable

92% of the HHs bought agricultural inputs. The range of money paid was between 1,200 to 208,300 Rwf, on an average of 31,291 Rwf per HH.

Seeds procured annually were generally sweet potatoes cuttings, passion fruit, bean and groundnut. In terms of bean and groundnut, most of the farmers consumes all produce including portion of the next seeds, and were obliged to procure seeds at the beginning of the cropping season. 58% of the HHs bought seeds in the range of 1,200 to 7,000 Rwf, on an average of 3,371 Rwf per HH.
2 HHs bought fertilizers, especially for vegetables. The cost spent was 3,600 and 21,600 Rwf (or an average of 12,600 Rwf per HH). 5 HHs bought agrochemicals, especially for vegetables. The cost spent for agrochemicals was ranged from 1,500 to 150,000 Rwf, on an average of 40,200 Rwf per HH). Main agricultural tools regularly purchased were hoes and machetes, accounting for 9 HHs. This implies that these tools were mainly used for their farming activities and easily worn out within one to two years. The range of tool expenditure among the recipients was from 1,200 to 16,000 Rwf. And finally, 1 HH borrowed irrigation pomp for 50,000 Rwf.

(2) Hired labor

It should have been very interesting to bring out the annual hired labor per household, but farmers couldn't give related retrospective data. They couldn't remember the data, and enumerators were unable to estimate them. However, taking into account the responses of some surveyed households, it is clear that hired labor is mostly paid in kind (food crop products, especially sweet potatoes) rather than in cash on the wage of 400 Rwf per man-day. Generally, people are unable to employ workers due to limited farming capital even insufficient of farming labor.
Average annual hired labor cost per HH roughly given by the recipient is 40,000 Rwf per HH. This kind of expenditure seems to be mainly used for sorghum, from plowing up to milling activities.

(3) Food, non food items and total

Expenditure for food items consists of 16 main items shown below box:

1.sorghum grains, 2.sweet potatoes, 3.sweet cassava tuber, 4.bitter cassava flour, 5.maize flour, 6.beans, 7.soybeans, 8.groundnut, 9.cooking banana, 9.brewing banana, 10.Irish potatoes, 11.meat, 12.rice, 13.vegetables, 14.sugar, 15.coking oil and 16.salt

Expenditure for non-food items consists of 20 main items shown below box:

1.domestic water, 2.kerosene, 3.firewood, 4.clothes, 5.soap, 6.lotion, 7.tooth cream, 8.shoe cream, 9.bed sheets, 10.blankets, 11.belt, 12.radio, 13.radio batteries, 14.bicycle, 15.domestic animals, 16.construction materials, 17.school fees, 18.medical fees, 19.land rental, 20.ceremonial occasion and others

Table 69 below shows total expenditure.

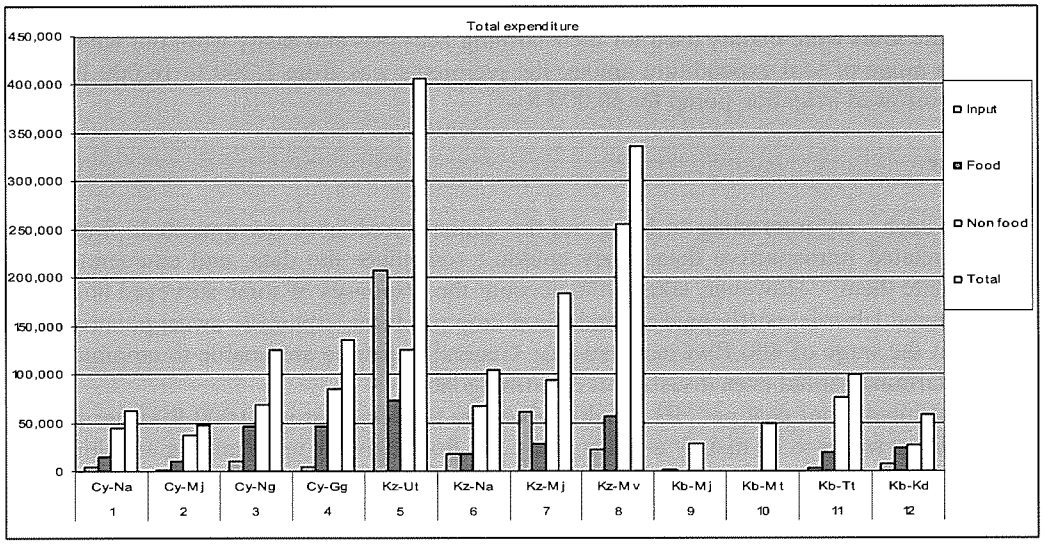
Table 69: Total expenditure

No	Recipient code	Input	Food	Non food	Total
1	Cy-Na	4,600	14,500	44,400	63,500
2	Cy-Mj	1,200	10,610	36,700	48,510
3	Cy-Ng	10,200	45,700	69,400	125,300
4	Cy-Gg	4,700	46,000	85,360	136,060
5	Kz-Ut	208,300	73,700	124,900	406,900
6	Kz-Na	18,400	18,400	67,200	104,000
7	Kz-Mj	61,600	29,000	93,700	184,300
8	Kz-Mv	23,000	57,400	255,700	336,100
9	Kb-Mj	1,300	**	28,800	**
10	Kb-Mt	NA*	**	49,650	**
11	Kb-Tt	3,700	19,700	76,900	100,300
12	Kb-Kd	7,200	24,300	26,400	57,900
Zone		31,291	33,931	79,926	156,287

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Not Applicable / **: No response given by the interviewee

Figure 24 below highlights annual total expenditure.

Figure 24: Total expenditure



Source: Interview Survey Results by JICA Study Team, 2006

Among 10 HHs out of 12 which responded, 100% expended money, in the range of 48,510 to 406,900 Rwf, on an average of 156,287 Rwf per HH. Among 10 HHs out of 12 which responded, 100% bought food, in the range of 10,610 to 73,700 Rwf, on an average of 33,931 Rwf per HH. 100% of the HHs bought non food items, in the range of 26,400 to 255,700 Rwf, on an average of 79,926 Rwf per

HH. Among the expenditure items above, non food item is leading. In Rwanda, especially, ceremonial occasions (such as marriage, funerals) are reported to be prestigiously expensive.

4.3.4 Balance income/expenditure

Table 70 shows below the situation of saving and credit is among the recipients.

Table 70: Saving, borrowing & credit situation among the recipients

No	Recipient code	loan	borrowing	depositing in bank	cash
1	Cy-Na	NA*	NA	NA	NA
2	Cy-Mj	NA	NA	NA	NA
3	Cy-Ng	NA	NA	NA	NA
4	Cy-Gg	NA	NA	NA	NA
5	Kz-Ut	145,000	60,000	NA	13,000
6	Kz-Na	32,000	NA	NA	15,000
7	Kz-Mj	12,000	2,000	400,000	10,000
8	Kz-Mv	NA	NA	NA	6,000
9	Kb-Mj	NA	NA	NA	NA
10	Kb-Mt	NA	NA	NA	NA
11	Kb-Tt	10,000	NA	NA	1,000
12	Kb-Kd	500	6,000	NA	NA
Average		39,900	22,667	400,000	9,000

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Not Applicable

Table 71 and Figure 25 below show the annual balance between income and expenditure.

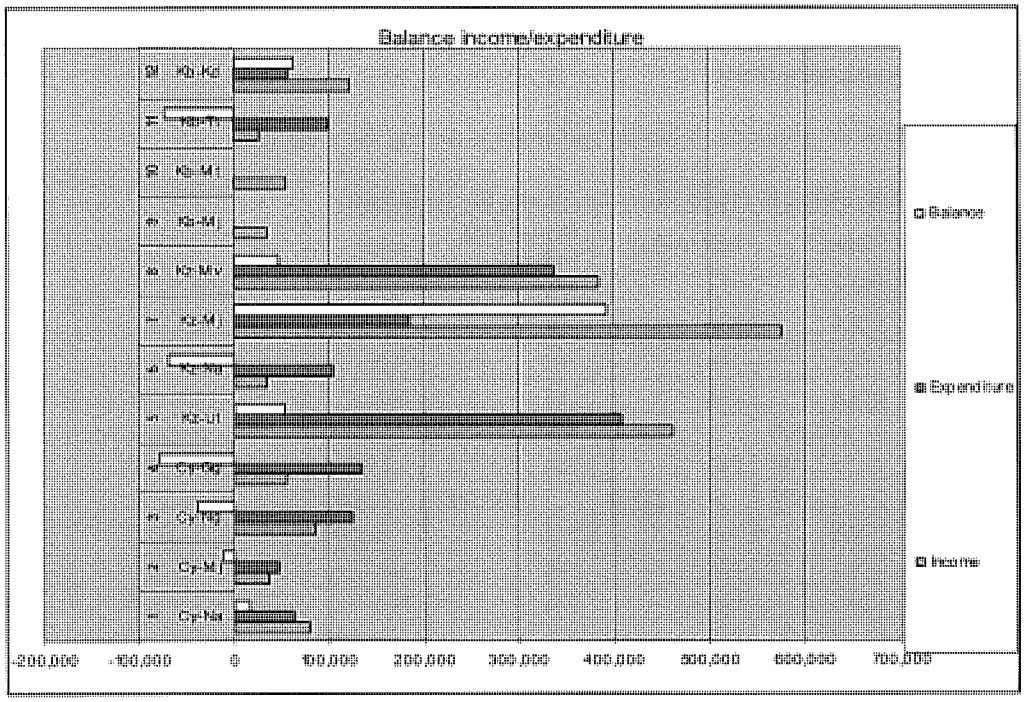
Table 71: Balance income/expenditure

No	Recipient code	Income	Expenditure	Balance
1	Cy-Na	80,300	63,500	**16,800**
2	Cy-Mj	37,200	48,510	**-11,310**
3	Cy-Ng	87,000	125,300	**-38,300**
4	Cy-Gg	56,500	136,060	**-79,560**
5	Kz-Ut	460,000	406,900	**53,100**
6	Kz-Na	35,000	104,000	**-69,000**
7	Kz-Mj	575,870	184,300	**391,570**
8	Kz-Mv	383,500	336,100	**47,400**
9	Kb-Mj	36,000	*	*
10	Kb-Mt	56,700	*	*
11	Kb-Tt	26,700	100,300	**-73,600**
12	Kb-Kd	122,500	57,900	**64,600**
Zone		163,106	156,287	30,170

Source: Interview Survey Results by JICA Study Team, 2006
/ *: No response given by the interviewee

Few recipients have cash money at home. No money deposed in bank, except one HH which has 400,000 Rwf. 5 HHs gave loan to their friends; and 2 HHs borrowed money.
The figure 25 below highlights the annual balance of income and expenditure by HH.

Figure 25: Balance income/expenditure



Source: Interview Survey Results by JICA Study Team, 2006

Table 71 and Figure 25 above show that among 10 HHs out of 12 which responded, the annual average balance income/expenditure is 30,170 Rwf per HH. Annual balance deficit is observed in 5 HHs, while annual surplus balance is noticed in the rest of the surveyed households (or 5 HHs).

From these results, the following hypothesis could be made on the cases of deficit. Surveyed heads of HHs had difficulty remembering the exact data of previous months, because they do not record household income and expenditures. Depending on some sensitive situations, some farmers do not deliberately declare some income from donations or other suspicious sources, thus at times the declared expenses can be more than the declared income showing a deficit.

4.3.5 Association activity

(1) Ibimina/tontine and other

According to Table 72 below, 25% of the household heads are in a tontine association. The number of members ranged from 12 to 20, on an average of 17 per tontine association. The monthly membership fee is ranging from 1,300 to 2,200 Rwf, on an average of 1,833 Rwf. The revolving credit amount gained per member varying from 22,000 to 26,000 Rwf, on an average of 24,000 Rwf.
Tontine, an informal form of saving and credit association is common and very helpful among farming communities. Many major expensive items are financed by the tontine amounts obtained, for instance buying domestic animal, land plots and etc. Tontine associations are created on proper initiative of the members who know each other. The members organized by written and/or verbal association rules have a strong social controlling system of the group. Each tontine association is led by an elected board committee, generally composed of a president, a vice-president, a treasure and a secretary.

Table 72: The Survey Results of Tontine Characteristics among the Respondents

Outline of Tontine	Result
% of HHs belonging to tontine	25%
Average of Tontine members	17
Range of no. of Tontine members	12 - 20
Range of monthly membership fees (Rwf)	1,300 - 2,200
Average of monthly membership fees (Rwf)	1833
Range of revolving credit amount gained per member (Rwf)	22,000 - 26,000
Average amount got per time, Rwf	24,000

Source: Interview Survey Results by JICA Study Team, 2006

(2) Farming Activity Oriented Associations

General index of the association involving the QP beneficiaries are summarized below Table 73. 42% of the household heads are members of an association. The range of members in an association is from 12 to 130, on an average of 44. The percentage of farming associations is 60%, and the rest (or 40%) involved in the activities including veterinary pharmacy and fishing. The membership fees per member are ranging from 400 to 2,000 Rwf, on an average of 1,367 Rwf.

Table 73: Association characteristics

		Outline of Associations	Index
1	% HHs in associations		42%
2	1	***Association Abubakanye***	
		No. members	20
		Specific activities	Farming
		Membership entry fees (Rwf)	-
		Years of membership	January, 2004
	2	***Association Duteraninkunga***	
		No. members	12
		Specific activities	Farming
		Membership entry fees (Rwf)	2,000
		Years of membership	February, 2005
	3	***Association Abishyizehamwe***	
		No. members	20
		Specific activities	Veterinary Pharmacy
		Membership entry fees (Rwf)	-
		Years of membership	June, 2000
	4	***Association Twitezimbere***	
		No. members	40
		Specific activities	Fishing
		Membership entry fees (Rwf)	1,700
		Years of membership	May, 2006
	5	***Association Tuzamurane***	
		No. members	130
		Specific activities	Farming
		Membership entry fees (Rwf)	400
		Years of membership	January, 2005
3	Range of members in associations		12 – 130
4	Average members in an association		44
5	% of farming associations		60%
6	Range of membership entry fees (Rwf)		400 - 2,000
7	Average membership entry fees (Rwf)		1,367

Source: Interview Survey Results by JICA Study Team, 2006

1) Land tenure

Farming associations borrow land on hillsides from various sources, and/or in wetlands from the Sector. It is noted that the farming associations don't have fixed plots, members often change lands. In these conditions, it is impossible to invest in medium and long terms, they must be content with seasonal food crop cultivation (bean, maize, sweet cassava, sorghum).

(3) Annual income

No annual cash income has been noted, crop sharing system is the common option among the association members. Only 1 HH head member of Abubakanye Association has received on July 2006, an association income of 5,000 Rfw.

(4) Annual expenditure

Generally, annual expenditure is composed of membership entry fees, which is spent for basic investment (tools, seed, pesticides, land renting).

4.3.5 Traditional Support System

(1) Umuganda

92% of the household heads do Umuganda once a month, especially, the last Saturday of each month from 7 to 12 Morning. The rest does not fulfill it because of many different official reasons such as handicaps and so on. Umuganda is obligatory for every citizen. Planning and supervision is done by the Sector authorities. The main activities include repairing roads, farming in the community lands and forestry.

Rwandese population is well sensitized to Umuganda practice since 1974 years. People know the social, political and economic benefit of it. In fact, Umuganda plays a role of social cohesion (ex. reconciliation), of popular mobilization and of infrastructure implementation. In principle, the population participates in Umuganda. If someone is absent, he must present a valid reason, otherwise he can be penalized financially by the Sector (usually between 2000 to 5000 Rwf per person).
The Sector may also temporarily refuse to grant him a certificate of good citizenship if requested.

(2) Ubudehe

Ubudehe is a traditional community supporting system as reciprocal help in farming activities, where a group in a village rotates in plowing, weeding, and harvesting operations of group member's farms in turn. Ubudehe in its real sense of the term is no longer practically existed; only some forms of informal and occasional arrangements of small group (generally 3 to 5 households) can be organized within neighbors for some agricultural activities such as plowing operation.

Ubudehe which was more or less official, regular and done by a whole village under traditional rule, has practically disappeared from the region; thus it does concretely no longer exist in rural community.

(3) Kugurizanya

Kugurizanya is a custom of labor loan, generally in farming activities between 2 neighboring and friend farmers. Working together, they rotate in each of their farm, working the same number of man-days according to their convenient agreement. In the sampled farm households, 25% of the

households do sometimes Kugurizanya in agricultural activities (See below Table 74).

Table 74: Participation in Kugurizanya

Outline of Kugurizanya	Results
% of HHs doing Kugurizanya	25%
Main activities	Plowing, weeding and harvesting
Frequency	Sometimes (once a month)

Source: Interview Survey Results by JICA Study Team, 2006

4.3.6 Others

(1) Fetching Water

1) Domestic water

General domestic water security is summarized as below Table 75 with Figure 26 and 27.

Table 75: General Characteristics of Domestic Water Security

Index		Result
Fetching water		
1	Average water demand per HH per day (Lt)	65
2	Range of water demand among the respondents (Lt)	40 - 100
3	% of HHs fetching water from swamp (%)	75
4	% of HHs fetching water from hand pomp (%)	25
5	% of HHs having a rainwater harvesting system (%)	58
6	Quantity of rainwater usually harvested after a normal rain (Lt)	62
Season A		
1	Quantity of water fetched per day (Lt)	46
2	Times to fetch water per day	1.6
3	Time consumed for fetching water in a round -trip (min)	66
Season B		
1	Quantity of water fetched per day (Lt)	29
2	Times to fetch water per day	1.2
3	Time consumed for fetching water in a round-trip (min)	67
Season C		
1	Quantity of water fetched per day (Lt)	48
2	Times to fetch water per day	1.7
3	Time consumed for fetching water in a round-trip (min)	75

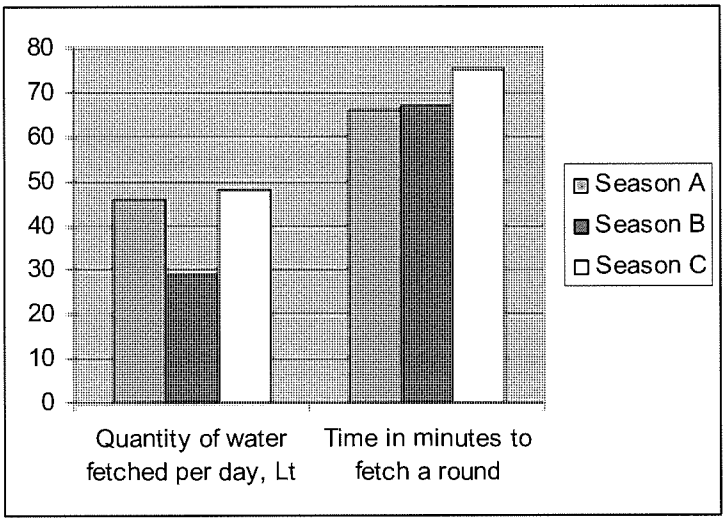
Source: Interview Survey Results by JICA Study Team, 2006

Daily domestic water demand per HH resulted in around 65 liters. Time consumed for fetching water ranged from 1 to 1.25 hours. In the rainy seasons, 58% of the HHs harvested rainwater from their harvesting system. The average quantity of rainwater harvested after a normal rain was 62 liters. Concerning the water sources, 75% of the HHs fetched water from swamps while the rest (or 25%) fetched from hand pumps and tape water.

Availability of water for domestic use is different among the cropping seasons. According to the interview results, the local ecosystem offers more water during the season B (February - end of June) commonly called the long rainy season than that in the season A, the short rainy season (September -

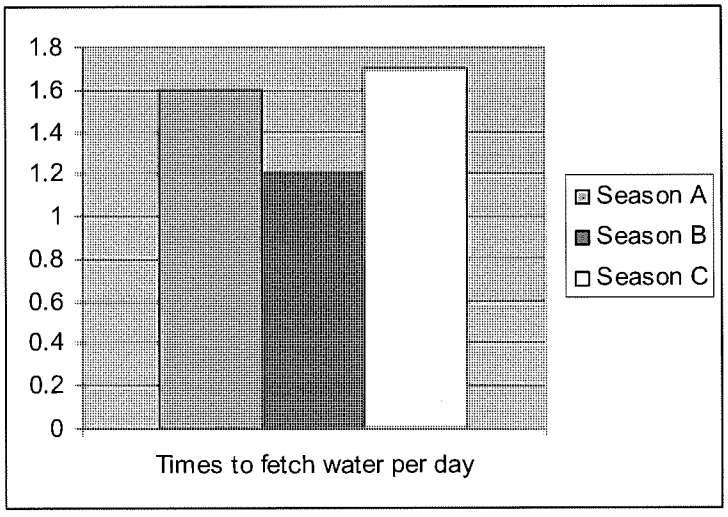
January). On the other hand, the season C (end of June - mi-September), the long dry season is the last in terms of water availability (this sentence is not followed to the previous sentence smoothly because of its content, namely you should discuss available amount of season C compared to the Season A and B.) Therefore, availability of the domestic water and its accessibility is subject to seasonal water fluctuation. Thus, households fetch more domestic water during the dry season than that in the rainy season because the households could harvest rainwater during the rainy season. Moreover, quantity of domestic water fetched, frequency and time consumed for fetching water are negatively correlated with rainwater availability; thus, amount of fetching water, frequency per day and time consumed for fetching water are increased during the dry season compared to the rainy season. Figures below shows the general trend of domestic water use over the 3 cropping seasons.

Figure 26: Quantity and Time Consumed for Water Fetching =



Source: Interview Survey Results by JICA Study Team, 2006

Figure 27: Frequency of Fetching Water per Day



Source: Interview Survey Results by JICA Study Team, 2006

(2) Collecting firewood

General situation of collecting firewood was summarized below Table 76. Time required to collect firewood is also correlated with rainy season. It is noted that in the rainy season, it takes more time to collect firewood than that in the dry season because of spending more time to collect dried firewood. Regarding frequency times to collect firewood per week, some slight differences are observed. There is a tendency to collect firewood less time required per week in the dry season than that in the rainy season. In fact, in the dry seasons people could collect big bundles of sticks than that in the rainy seasons because dried stick are more available (period of decrease of rain and increase of sunshine). Further in the dry seasons, farmers use plant residues for firewood which are more available in the farm.

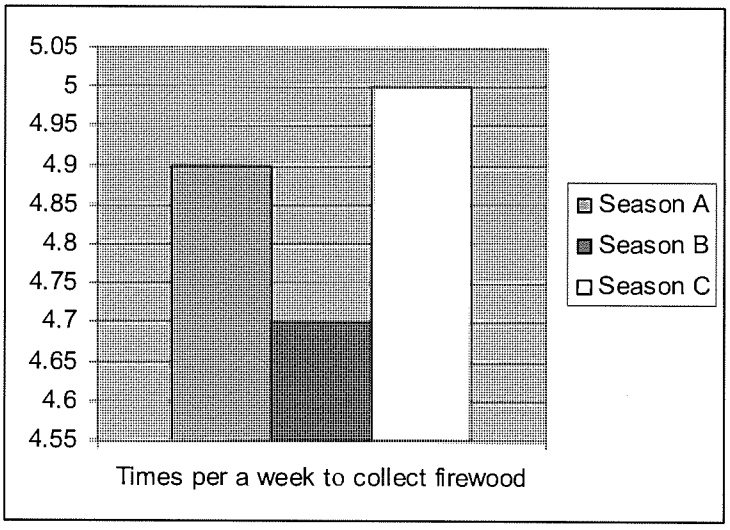
Table 76: General Characteristics on Collecting Firewood

Collecting firewood		Results
Season A		
1	Times per a week	4.9
2	Time consumed in a round-trip (min)	55
Season B		
1	Times per a week	4.7
2	Time consumed in a round-trip (min)	76
Season C		
1	Times per a week	5
2	Time consumed in a round-trip (min)	43

Source: Interview Survey Results by JICA Study Team, 2006

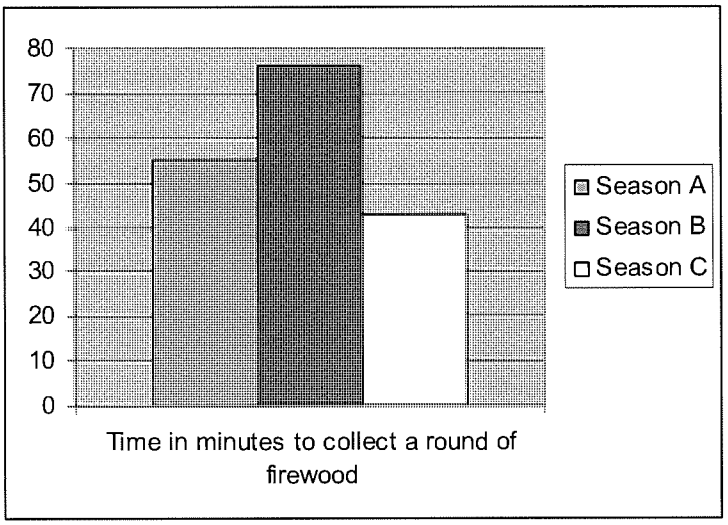
Figures 28 and 29 below highlight the trend of collecting firewood over the 3 cropping seasons.

Figure 28: Frequency Times of Collecting Firewood per Week



Source: Interview Survey Results by JICA Study Team, 2006

Figure 29: Time to collect firewood



Source: Interview Survey Results by JICA Study Team, 2006

(3) Spare time

Table 77 below shows the characteristics of spare time.

Table 77: Survey Results on Spare Time among the Surveyed Households

Spare time		Results
1	% of HHs taking one day of rest per a week	100%
2	% of HHs taking Sunday as a day of rest	75%
3	Average working hours per day	8.9
4	Breakdown of spare time use	Praying, taking rest, visiting friends

Source: Interview Survey Results by JICA Study Team, 2006

100% of recipients take one day rest per week, and 9 HH heads take it on Sunday, after an average of daily 8.9 hours work. Daily working hour length corresponds more or less with 8 working hours of Rwandese Public Administration Service.

(4) Soil fertility

1) General Trend

Table 78 shows how respondents perceive trend of crop yield fluctuation over the years. Most of the farmers perceive a decrease of crop yield year by year.

Table 78: Trend of crop yields over the years

Trend of yield over the years		Results
1	% of HHs perceiving decrease of legume yield over the years	100%
2	% of HHs perceiving decrease of grain yield over the years	100%
3	% of HHs perceiving decrease of tuber yield over the years	100%

Source: Interview Survey Results by JICA Study Team, 2006

2) Causes of change of crop yields

According to the model farmers, decrease of crop yield is caused by decrease of soil fertility, while the plant diseases have aggravated the situation, especially on the tuber crops such as cassava and sweet potatoes (see below Table 79).

Table 79: Factors Causing Crop Yield Decrease

Causes of change of yield	Data
Ratio of HHs perceiving decrease of soil fertility as a cause of decrease of legume yield	100%
Ratio of HHs perceiving decrease of soil fertility as a cause of decrease of cereal yield	100%
Ratio of HHs perceiving decrease of soil fertility and increase of pest/plant disease as a cause of decrease of tuber yield	100%

Source: Interview Survey Results by JICA Study Team, 2006

=

3) Use of chemical fertilizers, manure and irrigation practice

Soil fertility and plant disease problems described above have led the farmers to apply some quick interventions as countermeasures for improving that situation. The points mentioned below give some adopted countermeasures. Table 80 below shows the percentage of surveyed farmers which applied fertilizer and irrigation practice.

Table 80: Percentage of Surveyed Farmers Using Fertilizers and Irrigation

	Use of fertilizers & Chemicals	Results
1	Number of users	2 HHs
Manure		
1	Number of users	8 HHs
2	Number of HHs obtained from own livestock and neighbors	1 HH
3	Number of HHs obtained from own livestock	2 HHs
4	Number of HHs obtained from neighbors	4 HHs
5	Number of HHs baying	1 HH
Irrigation practice		
	% of HHs practicing	5 HH

Source: Interview Survey Results by JICA Study Team, 2006

2 HHs used fertilizers and chemicals, especially on vegetables. Manure was by 8 HHs. Irrigation practice is observed in 5 HHs (by bucket and/or motorized irrigation pomp). =

(4) Health

Table 81 below shows health condition of the respondents. The prevailing main diseases consist of diarrhea, malaria and amoeba. 8% of HH heads have been affected by diarrhea. 33% of HHs has had at least a young child affected by diarrhea. 58% of the HH heads has been affected by malaria, and 58% of HHs has had a child affected by that disease. 17% of HH Heads has been affected by amoeba, and 8% of HHs has had a young child affected by amoeba. Like elsewhere in Rwanda, malaria and amoeba especially declared by the respondents are known to be chronic diseases among the population.

Table 81: Health Condition

Major Health Problems	Result
1. Diarrhea	
% of HH heads who were affected by diarrhea	8%
% of HHs with a young child affected by diarrhea	33%
2. Malaria	
% of HH heads who were affected by malaria	58%
% of HHs with a young child affected by malaria	58%
3. Amoeba	
% of HH heads affected by amoeba	17%
% of HHs with a young child affected by amoeba	8%
Nutrition center	
% of HHs going to the nutrition center	0%

Source: Interview Survey Results by JICA Study Team, 2006

(5) Draught coping strategy

Table 82 below shows the draught coping measures among the recipients.

Table 82: Draught coping measures

Measures	% of HHs during recent draughts	% of HHs envisioning
Cultivating wetlands	50%	67%
Sale of livestock	25%	25%
Donation	17%	33%
Loan	8%	17%
No measure	8%	33%
Sale of charcoals	17%	0%
Casual work	0%	17%
HH head was imprisoned	25%	0%

Source: Interview Survey Results by JICA Study Team, 2006

Figure 30 below highlights the trend of draught coping measures.

Table 81: Health Condition

Major Health Problems	Result
1. Diarrhea	
% of HH heads who were affected by diarrhea	8%
% of HHs with a young child affected by diarrhea	33%
2. Malaria	
% of HH heads who were affected by malaria	58%
% of HHs with a young child affected by malaria	58%
3. Amoeba	
% of HH heads affected by amoeba	17%
% of HHs with a young child affected by amoeba	8%
Nutrition center	
% of HHs going to the nutrition center	0%

Source: Interview Survey Results by JICA Study Team, 2006

(5) Draught coping strategy

Table 82 below shows the draught coping measures among the recipients.

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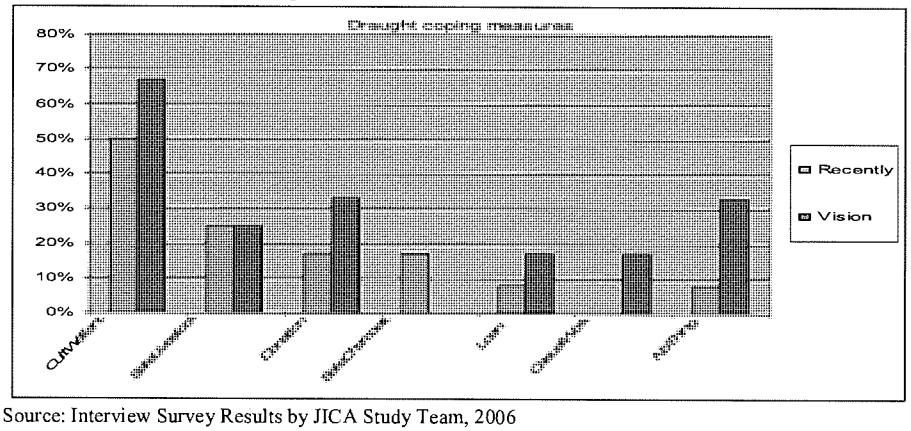
Measures	% of HHs during recent draughts	% of HHs envisioning
Cultivating wetlands	50%	67%
Sale of livestock	25%	25%
Donation	17%	33%
Loan	8%	17%
No measure	8%	33%
Sale of charcoals	17%	0%
Casual work	0%	17%
HH head was imprisoned	25%	0%

Source: Interview Survey Results by JICA Study Team, 2006

Figure 30 below highlights the trend of draught coping measures.

Figure 30: Draught coping measures



Source: Interview Survey Results by JICA Study Team, 2006

In the past and future time, the model farmers have coped and will cope with draught by taking several countermeasures such as asking donation, cultivating wetlands and selling livestock. The same measures still remain to cope with draught in the future. In fact, wetland cultivation seems to be a promising and sustainable draught coping measure in the region.

4.4 Roadside Irrigation Quick Project (QP3)

4.4.1 General

(1) Family aspects

Table 83 below shows the general characteristics of the households, model farmers for the roadside irrigation. These characteristics consist of household head age, sex, marital status, schooling years and family size, as well as family members engaged in farming and decision-makers of the house economy (farming practice and its expenditure, and family food control).

Table 83: General Characteristics of the Households

No	Recipient code	Age (year)	Sex	Marital status	Schooling years	Family size	Family members engaged in farming	Decision-maker	
								Farming	Food
1	Cy-Ka	42	M	Married	6	5	2	Husband & wife	Wife
2	Cy-Mp	50	F	Widow	7	3	1	Self	Self
3	Cy-Mn	34	M	Married	8	7	2	Husband & wife	Husband & wife
4	Kz-Kt	44	M	Married	6	10	2	Husband	Wife
5	Kz-Mm	47	M	Married	6	9	3	Husband & wife	Wife
6	Kz-Me	33	F	Married	8	5	1	Husband	Wife
7	Kb-Mj	35	M	Married	8	5	2	Husband & wife	Husband & wife
8	Kb-Mc	62	M	Married	0	8	5	Husband & wife	Husband & wife
9	Kb-Ma	54	F	Widow	2	6	3	Self	Self
Average		45			5.7	6.4	2.3		

Source: Interview Results by JICA Study Team, 2006

Table 83 above shows HH head ages, ranging from 33 to 62 years on average of 45 years. Their schooling years are respectively 8 in three HHs, 6 in other 3 HHs, 7 in one HH, 2 another HH and 0 in another one, on an averaged academic background of 5.7 years. Typical household consists of 6.4 members on average, ranging from 3 to 10 members per household. HH composition is as follows: 3 HHs are composed of 5 persons each, one HH is composed of 10 persons, another of 9, another one of 8, another one of 7, another one of 6, and the last one of 3. The number of persons engaged in farming activity per family resulted in the range 1 to 5, on an average of 2.3 persons. Regarding marital status, 7 HH heads are married and 2 are widows. Concerning decision making on house economy among the family members, it is noted that farming activity is controlled by household-head. Among the 7 married families, 5 husbands are assisted by their wife. HH heads control personally this important rubric on which family survival basically depends. In fact, household food security is based up on farming. Single parents control food procurement, while in the married families, that rubric is controlled by wife, while it is controlled by both (husband and wife) in only 3 HHs. Normally, according to Rwandese culture, wife alone controls food procurement; however, it is noted that due to food insecurity situations, some husbands are involved in food procurement assisting their wife to better economize food.

(2) Meals and Food

The range of meals per household per day varies from 1.8 to 2 times with an average of 1.98 times. 89% of the households have 2 times per day, comprising of lunch and dinner. However, survey couldn't assess how food was enough, and how well-balanced were meals.

According to Tables 84 & 85 and Figure 31 below, the 2 main food crops of the staple food were beans and sweet potatoes. Like elsewhere in low and middle altitude of Rwanda (1000 - 1700 m), bean and sweet potatoes are known to be the main food crops of the stable food. 100% of the households had beans and 80% sweet potatoes. Beans (commonly called Rwandese meat) are known to alleviate malnutrition due to their relative high protein content. The survey has shown that beans, sweet potatoes, banana (brewing and cooking), cassava flour, maize, groundnut, taro, cassava flour and sorghum were the 9 main different food crops of the staple food, and that the number of food crop in the staple food ranges from 2 to 6. Six food crops in the staple food in 11% of the HHs, 5 in 3%, 4 in 21%, 3 in 37% and 2 in 28%. The staple food is almost the same over the seasons, because farmers seasonally sow the same crops.

Table 84: Ratio of HHs Taking Type of Food Crops for Diet

Food crop	Season C	Season A	Season B	Annually*
Beans	100%	100%	100%	100%
Sweet potatoes	67%	78%	89%	80%
Banana	44%	44%	56%	49%
Sweet cassava	44%	44%	33%	39%
Maize	44%	33%	33%	36%
Groundnut	11%	11%	11%	11%
Taro	11%	0%	11%	7%
Cassava flour	11%	11%	0%	6%
Sorghum	11%	0%	0%	3%

Source: Interview Results by JICA Study Team, 2006

*Annual % = ((%season C x 3 months/12 months) + (%season A x 4 months/12 months) + (%season B x 5 months/12 months))

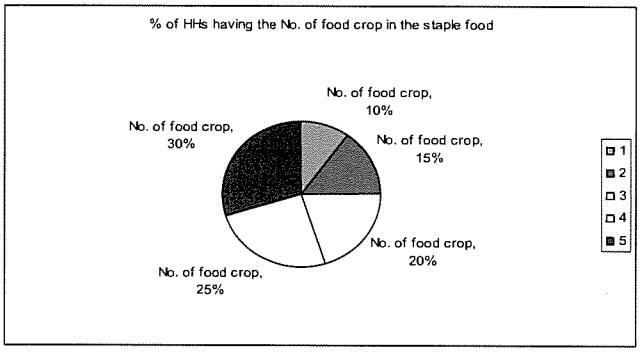
Table 85: Ratio of HHs taking the Number of Food Crops

No. of food crop	Season C	Season A	Season B	Annually*
2	11%	33%	33%	28%
3	67%	33%	22%	37%
4	0%	22%	33%	21%
5	11%	0%	0%	3%
6	11%	11%	11%	11%

Source: Interview Results by JICA Study Team, 2006
*Annual % = ((%season C x 3 months/12 months) + (%season A x 4 months/12 months) + (%season B x 5 months/12 months))

Figure 31 below highlights HH ratio according to the number of food crops in the staple food.

Figure 31



Source: Interview Results by JICA Study Team, 2006

(3) Land tenure

Because farmers don't have concept of metrology, it was very difficult to grasp in accurate data; Surveyed HH heads gave rough idea on land size had and/or owned in rounded figures. The results ranged from 1 to 3 Ha per family. These figures are therefore, not trustable. However, farmers know exactly the number of parcels had and/or owned which ranged from 1 to 4.
According to experience and other different reports related to land tenure in the region, farm size per family is ranging from 1 to 2 Ha. Like elsewhere in Rwanda, farm size has been continuously divided up over the years, either the parents came into a land inheritance to their children, or they have sold some parcels of the farmland.

Almost all lands owned and/or leased are on hillsides under rainfed regime. Only 11% of farmers neighboring wetlands have advantage of access to, especially in season C.

Among the recipients, no landless case has been noted; however, about 11% of the HHs borrows lands, either in some cases, because of the small size of the farmlands, or to avoid high costs in plowing when the land is covered by dense bush after a long fallow, or when their own parcels yield poorly. Throughout Rwanda, there are no official rules to guide the land borrowing/lending arrangement between the 2 parties; the deal is based up on an amicable agreement.

Farm plots on the hillsides belong to individual households under the control of the owners. However, wetlands belong to the Government which decides on their utilization. The current Government policy on wetland utilization is to promote high value crops, especially cereals, through associative/cooperative farming. However, this strategy is not yet strictly implemented at the

grass-root level, and individual farmers still continue to cultivate food crops in wetlands, because the customary rules and the newly established Land Organic Law are juxtaposed.

4.4.2 Income

(1) Seasonal crops

1) Cultivated

Cultivated seasonal crops by the recipients included maize, bean, sweet potatoes, sorghum, sweet cassava, bitter cassava, groundnut, taro and vegetables. Beans, sweet potatoes, maize and sorghum were the major crops (See below Table 86). The produce of the seasonal crops is usually utilized for home consumption and for sale of surplus at local market.

Table 86: No. of HHs sowing and selling seasonal crops

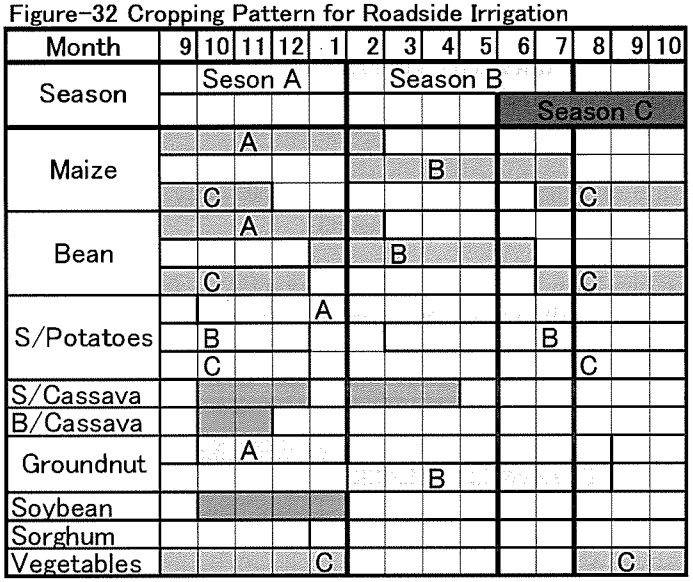
Seasonal crop	Season A		Season B		Season C	
	HH planting	**HH selling**	HH planting	**HH selling**	HH Planting	**HH selling**
Maize	7	**3**	9	**2**	0	**0**
Beans	8	**7**	8	**4**	0	**0**
Sweet potatoes	8	**4**	7	**1**	0	**0**
Sorghum	0	**0**	8	**8**	0	**0**
Vegetables	0	**0**	0	**0**	1	**1**
Sweet cassava	1	**0**	1	**0**	0	**0**
Bitter cassava	2	**0**	0	**0**	0	**0**
Groundnut	3	**0**	2	**0**	0	**0**
Any seasonal crops*		8		8	1	8

Source: Interview Survey Results by JICA Study Team, 2006 / *: Any of seasonal crops mentioned above

2) Seasonal crop pattern

A cropping pattern of the cultivated crops among the model farmers are shown below Figure-32.

Figure-32 Cropping Pattern for Roadside Irrigation



It is noted that during the period of August 2005 to July 2006, the recipients' seasonal crop planting and harvesting periods over the seasons A, B and C, have more or less corresponded with the normal seasonal crop planting and harvesting periods of Bugesera (Figure-3).

3) Sale of Crop

i. Season A

Table 87 below shows the season A income.

Table 87: Season A income

No	Recipient code	Maize	Beans	Sweet potatoes	Total
1	Cy-Ka	10,000	30,000	16,000	**56,000**
2	Cy-Mp	NS*	NS	NS	NS
3	Cy-Mn	NS	60,000	NS	**60,000**
4	Kz-Kt	60,000	75,000	25,000	**160,000**
5	Kz-Mm	54,000	NS	NS	**54,000**
6	Kz-Me	NS	16,000	NS	**16,000**
7	Kb-Mj	NS	6,000	4,500	**10,500**
8	Kb-Mc	NS	12,000	15,000	**27,000**
9	Kb-Ma	NS	18,000	NS	**18,000**
Average		41,333	31,000	15,125	50,188

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

It is noted that in season A, 89% of the HHs received seasonal crop income. The range of sale amount was from 10,500 to 160,000 Rwf, on average of 58,188 Rwf per HH. The major crop sold was beans. Considering sale amount by major crops, it is observed that 3 HHs out of 7 which sowed maize, received 41,333 Rwf in the range from 10,000 to 60,000 Rwf. 7 HHs out of 8 which sowed bean received 31,000 Rwf per HH at average, in the range of 6,000 and 75,000 Rwf. An average of 15,125 Rwf per HH which planted sweet potatoes is noted from 4,500 and 25,000 Rwf in 4 HHs out of 8 which planted sweet potatoes.

ii. Season B

Table 88 below shows the season B income.

Table 88: Season B income

No	Recipient code	Maize	Beans	Sweet potatoes	Sorghum	Total
1	Cy-Ka	NS*	50,000	NS	60,000	**110,000**
2	Cy-Mp	NS	NS	NS	NS	NS
3	Cy-Mn	NS	NS	NS	81,000	**81,000**
4	Kz-Kt	30,000	45,000	20,000	60,000	**155,000**
5	Kz-Mm	NS	NS	NS	150,000	**150,000**
6	Kz-Me	NS	NS	NS	66,000	**66,000**
7	Kb-Mj	NS	NS	NS	100,000	**100,000**
8	Kb-Mc	4,000	7,000	NS	10,000	**21,000**
9	Kb-Ma	NS	10,000	NS	40,000	**50,000**
Average		**17,000**	**28,000**	**20,000**	**70,875**	91,625

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

In season B, all 89% of HHs received seasonal crop income. The range of sold amount was from 21,000 to 155,000 Rwf, on an average of 91,625 Rwf per HH. Major crops sold were maize, beans, sweet potatoes and sorghum, and sorghum was leading. The sale amount per each sold crop was as follows: 2 HHs out of 9 which sowed maize, received respectively a sale amount ranged 4,000 and 30,000 Rwf, or an average of 17,000 Rwf per HH, 4 HHs out of 8 which sowed bean, received a sale amount ranged from 7,000 to 50,000 Rwf, on an average of 28,000 Rwf per HH. An average of 70,875 Rwf per HH Rwf per HH is noticed in 8 HHs out of 8 which sowed sorghum, from the range of 10,000 to 150,000 Rwf. 1 HH out of 7 which sowed sweet potatoes, received a sale amount of 20,000 Rwf.

iii. Season C

Table 89 below shows the season C income.

Table 89: Season C income

No	Recipient code	Vegetables	Total
1	Cy-Ka	NS*	NS
2	Cy-Mp	NS	NS
3	Cy-Mn	NS	NS
4	Kz-Kt	NS	NS
5	Kz-Mm	NS	NS
6	Kz-Me	30,000	**30,000**
7	Kb-Mj	NS	NS
8	Kb-Mc	NS	NS
9	Kb-Ma	NS	NS
Average		30,000	30,000

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

It observed that in season C, only 1 HH out of 9 had cultivated. It had planted and sold vegetables, the income received was 30,000 Rwf.

iv. Total Income

Table 90 below presents the total annual seasonal crop income.

Table 90: Annual seasonal crop income

No	Recipient code	Season A	Season B	Season C	Annually
1	Cy-Ka	56,000	110,000	NS	166,000
2	Cy-Mp	NS*	NS	NS	NS
3	Cy-Mn	60,000	81,000	NS	141,000
4	Kz-Kt	160,000	155,000	NS	315,000
5	Kz-Mm	54,000	150,000	NS	204,000
6	Kz-Me	16,000	66,000	30,000	112,000
7	Kb-Mj	10,500	100,000	NS	110,500
8	Kb-Mc	27,000	21,000	NS	48,000
9	Kb-Ma	18,000	50,000	NS	68,000
Average		50,188	91,625	30,000	145,563

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale

From Table 90 above, it is noted that 89% of the HHs received seasonal crop income. The range of sold amount was from 48,000 to 315,000 Rwf, on an average of 145,563 Rwf per HH. Season B was

significant for most of households for sale of surplus crops, because of long rainy season to accommodate various crops.

(2) Permanent and perennial crops

1) Permanent crops grown

According to the field survey results, permanent crops grown which generated income were banana (cooking and fruit) and trees. Table 91 below shows income by permanent crops.

Table 91: Income by permanent crops

No	Recipient code	Banana		Timber	Total
		Cooking	Fruit		
1	Cy-Ka	NS*	NS	4,500	4,500
2	Cy-Mp	NS	5,000	NS	5,000
3	Cy-Mn	NS	NS	NS	NS
4	Kz-Kt	52,500	NS	NS	52,500
5	Kz-Mm	66,000	NS	NS	66,000
6	Kz-Me	NS	NS	NS	NS
7	Kb-Mj	NS	NS	NS	NS
8	Kb-Mc	NS	NS	NS	NS
9	Kb-Ma	NS	NS	NS	NS
	Average	59,250	5,000	4,500	32,000
	% of HHs selling**	22%	11%	11%	44%

Source: Interview Survey Results by JICA Study Team, 2006 / NS*: No Sale / ** HHs selling permanent crop

It is noted that 44% of the HHs received permanent crop income; the range of sold amount was from 4,500 to 66,000 Rwf, on an average of 32,000 Rwf per HH. Cooking Banana was sold by 2 HHs, and gave respectively a sale amount of 52,500 and 66,000 Rwf, or an average of 59,250 Rwf per HH. Only 1 HH sold banana fruit at 5,000 Rwf, and another one sold timbers at 4,500 Rwf.

(3) Livestock

Major animals reared and sold by the surveyed HHs consist of cow, goat and chicken, and cow was dominant. Cow was reared by 6 HHs in the range of 2 to 4 heads per HH, on an average of 3 heads per HH. Goat was reared by 4 HHs in the range of 2 to 6 heads per HH, on an average of 4 heads per HH. Chicken was reared by 3 HHs, in the range of 6 to 8 chickens per HH, on average of 7 per HH.

Table 92 below shows livestock income figures.

Table 92: Household livestock income

No	Recipient Code	Goat		Ankole cow		Cow milk	Chicken		Total
		Reared No.	Sale amount	Reared No.	Sale amount		Reared no.	Sale amount	
1	Cy-Ka	NA**	NS*	2	NS	NS	NA	NS	NS
2	Cy-Mp	NA	NS	NA	NS	NS	8	2,000	2,000
3	Cy-Mn	NA	NS	4	NS	NS	NA	NS	NS
4	Kz-Kt	6	24,000	2	85,000	NS	NA	NS	109,000
5	Kz-Mm	NA	NS	3	NS	43,200	NA	NS	43,200
6	Kz-Me	3	NS	NA	NS	NS	6	4,500	4,500
7	Kb-Mj	2	14,000	2	60,000	21,600	NA	NS	95,600
8	Kb-Mc	3	NS	NA	NS	NS	NA	NS	NS
9	Kb-Ma	NA	NS	2	40,000	NS	6	NS	40,000
Average		4	19,000	3	61,667	32,400	7	3,250	49,050
Range		2 to 6		2 to 4	40,000 to 85,000		6 to 8		2,000 to 109,000
HHs rearing & HHs selling***		4	2	6	3	2	3	2	6

Source: Interview Survey Results by ICA Study Team, 2006 / NS*: No Sale / NA**: Non Applicable (doesn't rear)

It is noted that generally, 6 HHs received income by selling livestock ranged from 2,000 to 109,000 Rwf, at average of 49,050 Rwf per HH. Specifically, 2 HHs out of the 4 rearing goat, received respectively a goat sale income of 14,000 and 24,000 Rwf, or an average of 19,000 Rwf. 3 HHs out of the 6 rearing cow, received a cow sale amount ranging from 40,000 to 85,000 Rwf, on average of 61,667 Rwf per HH. 2 HHs out of the 3 rearing chicken, received respectively a chicken sale income of 2,000 and 4,500 Rwf, or an average of 3,250 Rwf. 2 HHs sold cow milk and received respectively income of 21,600 and 43,200 Rwf, or an average of 32,400 Rwf

Generally, farmers sell animals in accordance with urgent need of cash, thus livestock income does not mean a regular annual income like crop farming and needs to pay attention to interpretation as long as responded household is not full time livestock farmer.

(4) Off farm Activity

Table 93 shows the off-farm income.

Table 93: Off farm Income

No	Recipient code	Training allowance	Banana wine	Donation	Casual Work	Salary	Other business	TOTAL
1	Cy-Ka	12,000	48,000	NA	NA	NA	NA	60,000
2	Cy-Mp	NA*	12,000	40,000	NA	NA	NA	52,000
3	Cy-Mn	NA	NA	NA	NA	NA	NA	NA
4	Kz-Kt	NA	60,000	NA	NA	NA	NA	60,000
5	Kz-Mm	NA	NA	NA	NA	NA	NA	NA
6	Kz-Me	NA	NA	NA	NA	150,000	NA	150,000
7	Kb-Mj	NA	NA	NA	NA	NA	600,000	600,000
8	Kb-Mc	NA	NA	NA	12,000	NA	NA	12,000
9	Kb-Ma	NA	36,000	30,000	NA	NA	NA	66,000
Average		12,000	39,000	35,000	12,000	150,000	600,000	142,857
No. HHs concerned		1	4	2	1	1	1	7

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Non Applicable

The off farm income among the surveyed HHs consists of income from training allowance, sale of banana wine, donations, casual work, salary and other business. Casual work mainly consisted of working as day-laborers. Banana wine was brewed by farmers from their plantations. Donations are generally received from relatives and friends.

It is noted that 78% of the HHs earned an off farm income ranging from 12,000 to 600,000 Rwf, at an average of 142,857 Rwf per HH. 1 HH received training allowance of 12,000 Rwf, another 12,000 Rwf from casual work, another 150,000 Rwf of salary and another one 600,000 Rwf from other business. 2 HHs received respectively 30,000 and 40,000 Rwf from donation, or an average of 35,000 Rwf. 4 HHs received banana wine sale amount ranging from 12,000 to 60,000 Rwf, on an average of 39,000 Rwf per HH.

(5) Total Income

Total income by HH is shown in Table 94 below.

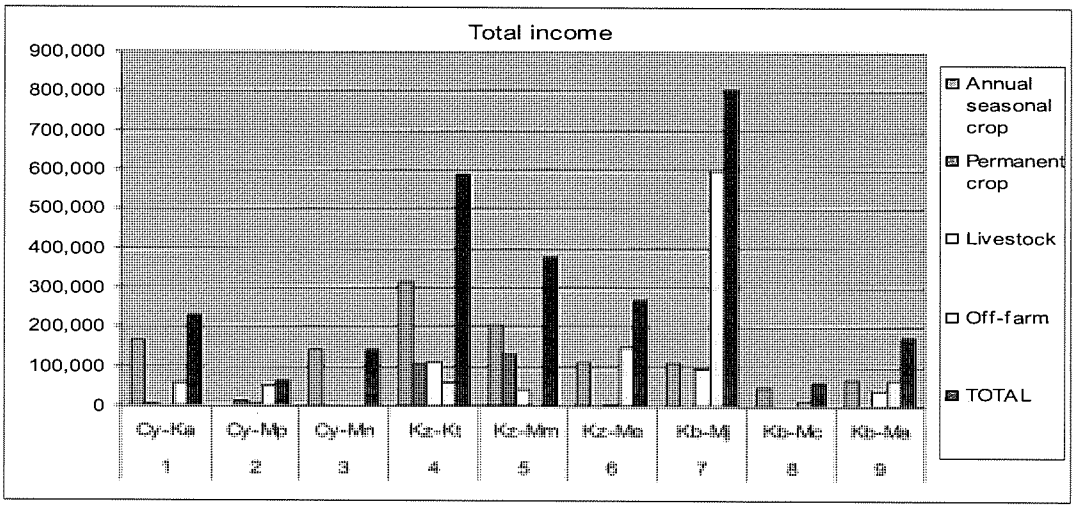
Table 94: Total Annual Income by Farm Household

No	Recipient code	Annual seasonal crop	Permanent crop	Farming	Livestock	Agriculture	Off-farm	TOTAL
1	Cy-Ka	166,000	4,500	170,500	NA	170,500	60,000	230,500
2	Cy-Mp	NA	10,000	10,000	2,000	12,000	52,000	64,000
3	Cy-Mn	141,000	NA	141,000	NA	141,000	NA	141,000
4	Kz-Kt	315,000	105,000	420,000	109,000	529,000	60,000	589,000
5	Kz-Mm	204,000	132,000	336,000	43,200	379,200	NA	379,200
6	Kz-Me	112,000	NA	112,000	4,500	116,500	150,000	266,500
7	Kb-Mj	110,500	NA	110,500	95,600	206,100	600,000	806,100
8	Kb-Mc	48,000	NA	48,000	NA	48,000	12,000	60,000
9	Kb-Ma	68,000	NA	68,000	40,000	108,000	66,000	174,000
Average		145,563	62,875	157,333	49,050	190,033	142,857	301,144

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Non Applicable

Figure 33 below highlights the total income.

Figure 33: Total income by farm household



Source: Interview Survey Results by JICA Study Team, 2006

From Table 94 above, it is noted that 100% of the HHs earned income, ranging from 60,000 to 806,100 Rwf, on an average of 301,144 Rwf per HH. Between agriculture income and off farm income in the total income earned, agriculture is dominant. In fact, agriculture income was received by 100% of HHs in the range of 12,000 to 529,000 Rwf, on an average of 190,033 Rwf per HH. Between farming income and livestock income in the agriculture income, farming income is leading. In fact, farming income of the 100% HHs is ranged from 10,000 to 420,000 Rwf, on an average of 157,333 Rwf per HH.

When farming conditions are good (for instance, in good rainy seasons), people devote to farm land rather than doing off farm activities; agriculture yields a better sustainable profit.

Farming income, higher and more widely distributed among the households, is more important than livestock income. In fact, in Rwandese farm situation, breeding requires more than farming, especially, higher surface areas and higher investments. And due to poverty, all recipients do not have means to rear important livestock generating high income. However, stock breeders use to sell animal once 2 or 3 years for a major expenditure requiring a high amount, so livestock is seen as a live bank, while farming income, often seasonally got, is more spent for frequent ordinary expenditures.

Finally, seasonal crop income is higher and more widely distributed in households than permanent and perennial income. It is therefore more dominant since it requires less in terms of surface areas, and investment.

4.4.3. Expenditure

(1) Agriculture inputs

Agricultural input expenditure consists especially, of seeds, agrochemicals and tools; Table 95 below shows related figures.

Table 95: Expenditure of Agricultural Inputs and Tools

No	Recipient code	Seeds	Fertilizers	Agro chemicals	Tools	Total
1	Cy-Ka	15,000	NA	4,000	5,000	24,000
2	Cy-Mp	7,000	NA	NA	1,000	8,000
3	Cy-Mn	NA*	NA	2,100	6,000	8,100
4	Kz-Kt	13,800	NA	NA	1,200	15,000
5	Kz-Mm	NA	NA	NA	28,400	28,400
6	Kz-Me	NA	1,600	6,000	NA	7,600
7	Kb-Mj	NA	NA	NA	2,800	2,800
8	Kb-Mc	11,000	NA	NA	NA	11,000
9	Kb-Ma	1,000	NA	1,000	2,000	4,000
Average		9,560	1,600	3,275	6,629	12,100
% HHs spending		56%	11%	44%	67%	100%

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Non Applicable

100% of the HHs bought agricultural inputs. The range of money paid was between 2,800 to 28,400 Rwf, on an average of 12,100 Rwf per HH. Seeds procured annually were generally sweet potatoes cuttings, passion fruit, bean and groundnut. In terms of bean and groundnut, most of the farmers consumes all produce including portion of the next seeds, and were obliged to procure seeds at the beginning of the cropping season. 56% of the HHs bought seeds in the range of 1,000 to 15,000 Rwf, on an average of 9,560 Rwf per HH.

1 HH (11% of HHs) bought fertilizers at 1,600 Rwf, especially for vegetables. 44% of HHs bought

agrochemicals, especially for vegetables. The cost spent for agrochemicals was ranged from 1,000 to 6,000 Rwf, on an average of 3,275 Rwf per HH). And finally, main agricultural tools regularly purchased were hoes and machetes, accounting 78% of HHs. This implies that these tools were mainly used for their farming activities and easily worn out within one to two years. The range of tool expenditure among the recipients was from 1,000 to 28,400 Rwf, on an average of 6,629 Rwf per HH.

(2) Hired labor

It should have been very interesting to bring out the annual hired labor per household, but farmers couldn't give related retrospective data. They couldn't remember the data, and enumerators were unable to estimate them. However, taking into account the responses of some surveyed households, it is clear that hired labor is mostly paid in kind (food crop products, especially sweet potatoes) rather than in cash on the wage of 400 Rwf per man-day. Generally, people are unable to employ workers due to limited farming capital even insufficient of farming labor.

Average annual hired labor cost per HH roughly given by the recipient is 50,000 Rwf per HH. This kind of expenditure seems to be mainly used for sorghum, from plowing up to milling activities.

(3) Food, non food items and total

Expenditure for food items consists of 16 main items shown below box:

1.sorghum grains, 2.sweet potatoes, 3.sweet cassava tuber, 4.bitter cassava flour, 5.maize flour, 6.beans, 7.soybeans, 8.groundnut, 9.cooking banana, 9.brewing banana, 10.Irish potatoes, 11.meat, 12.rice, 13.vegetables, 14.sugar, 15.coking oil and 16.salt

Expenditure for non-food items consists of 20 main items shown below box:

1.domestic water, 2.kerosene, 3.firewood, 4.clothes, 5.soap, 6.lotion, 7.tooth cream, 8.shoe cream, 9.bed sheets, 10.blankets, 11.belt, 12.radio, 13.radio batteries, 14.bicycle, 15.domestic animals, 16.construction materials, 17.school fees, 18.medical fees, 19.land rental, 20.ceremonial occasion and others

Table 96 below shows total expenditure.

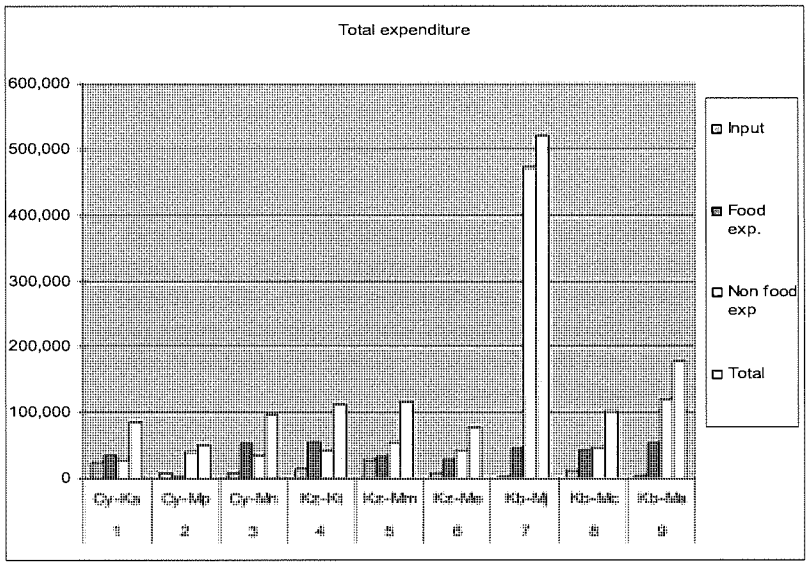
Table 96: Total expenditure

No	Recipient code	Input	Food exp.	Non food exp	Total
1	Cy-Ka	24,000	33,900	28,500	86,400
2	Cy-Mp	8,000	2,000	41,900	51,900
3	Cy-Mn	8,100	53,000	34,600	95,700
4	Kz-Kt	15,000	54,800	43,500	113,300
5	Kz-Mm	28,400	32,900	55,900	117,200
6	Kz-Me	7,600	28,800	42,000	78,400
7	Kb-Mj	2,800	45,400	472,650	520,850
8	Kb-Mc	11,800	43,400	46,700	101,900
9	Kb-Ma	4,000	52,500	121,200	177,700
Average		12,189	38,522	98,550	149,261

Source: Interview Survey Results by JICA Study Team, 2006

Figure 34 below highlights annual total expenditure.

Figure 34: Total expenditure



Source: Interview Survey Results by JICA Study Team, 2006

100% of HHs expended money, in the range of 51,900 to 520,850 Rwf, on an average of 149,261 Rwf per HH. 100% of HHs bought food, in the range of 2,000 to 54,800 Rwf, on an average of 38,522 Rwf per HH, and bought non food items, in the range of 28,500 to 472,650 Rwf, on an average of 98,550 Rwf per HH. Among the expenditure items above, non food item is leading. In Rwanda, especially, ceremonial occasions (such as marriage, funerals) are reported to be prestigiously expensive.

4.4.4. Balance income/expenditure

Table 97 and Figure 30 below show the annual balance between income and expenditure.

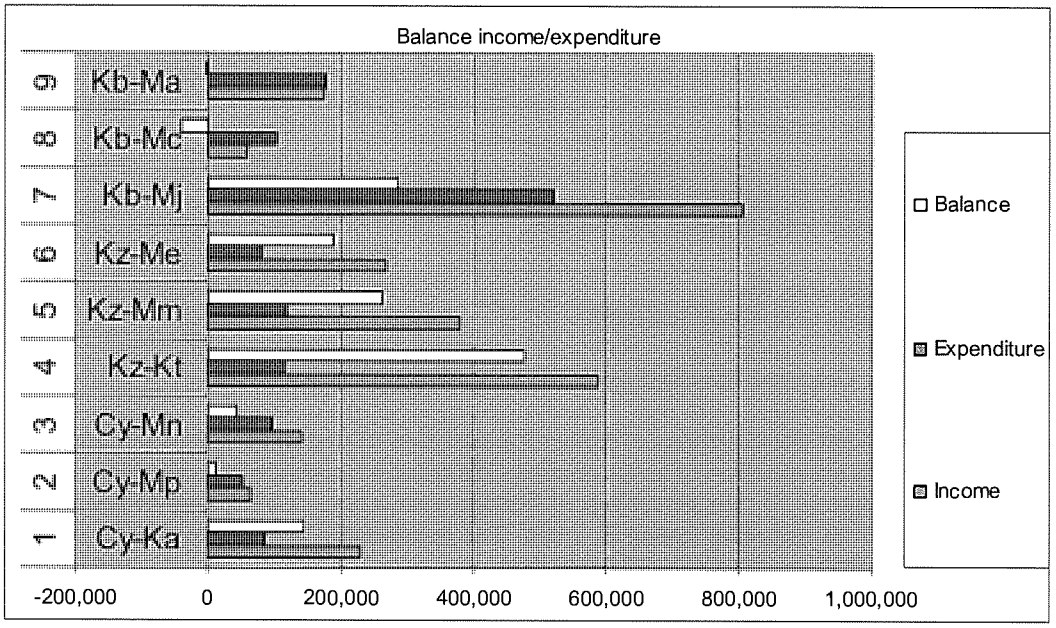
Table 97: Balance income/expenditure

No	Recipient code	Income	Expenditure	Balance
1	Cy-Ka	230,500	86,400	**144,100**
2	Cy-Mp	64,000	51,900	**12,100**
3	Cy-Mn	141,000	95,700	**45,300**
4	Kz-Kt	589,000	113,300	**475,700**
5	Kz-Mm	379,200	117,200	**262,000**
6	Kz-Me	266,500	78,400	**188,100**
7	Kb-Mj	806,100	520,850	**285,250**
8	Kb-Mc	60,000	101,900	**-41,900**
9	Kb-Ma	174,000	177,700	**-3,700**
Average		301,144	149,261	151,883

Source: Interview Survey Results by JICA Study Team, 2006

The figure 34 below highlights the annual balance of income and expenditure by HH.

Figure 35: Balance income/expenditure



Source: Interview Survey Results by JICA Study Team, 2006

Table 97 and Figure 35 above show that the annual average balance income/expenditure is 151,883 Rwf per HH. Annual balance deficit is observed in 22% of HHs, while annual surplus balance is noticed in the rest of the surveyed households (78% of HHs). From these results, the following hypothesis could be made on the cases of deficit. Surveyed heads of HHs had difficulty remembering the exact data of previous months, because they do not record household income and expenditures. Depending on some sensitive situations, some farmers do not deliberately declare some income from donations or other suspicious sources, thus at times the declared expenses can be more than the declared income showing a deficit.

4.4.5. Association activity

(1) Ibimina/tontine and other

According to Table 98 below, 44% of the household heads are in a tontine association. The number of members ranged from 15 to 32, on an average of 25 per tontine association. The monthly membership fee is ranging from 1,000 to 5,400 Rwf, on an average of 2,450 Rwf. The revolving credit amount gained per member varying from 18,000 to 80,000 Rwf, on an average of 42,250 Rwf. Tontine, an informal form of saving and credit association is common and very helpful among farming communities. Many major expensive items are financed by the tontine amounts obtained, for instance buying domestic animal, land plots and etc. Tontine associations are created on proper initiative of the members who know each other. The members organized by written and/or verbal association rules have a strong social controlling system of the group. Each tontine association is led by an elected board committee, generally composed of a president, a vice-president, a treasure and a secretary.

Table 98: The Survey Results of Tontine Characteristics among the Respondents

Outline of Tontine	Result
% of HHs belonging to tontine	44%
Average of Tontine members	25
Range of no. of Tontine members	15 – 32
Range of monthly membership fees (Rwf)	1,000 - 5,400
Average of monthly membership fees (Rwf)	2,450
Range of revolving credit amount gained per member (Rwf)	18,000 - 80,000
Average amount got per time, Rwf	42,250

Source: Interview Survey Results by JICA Study Team, 2006

(2) Farming Activity Oriented Associations

Table 99 shows a general characteristics of farmer's association related to the QP beneficiaries. 67% of the household heads are members of an association. The range of members in an association is from 14 to 114, on an average of 70. The percentage of farming associations is 83%, and the rest (or 17%) involved in the activities including saving & credit. The membership fees per member are ranging from 2,400 to 20,000 Rwf, on an average of 6,040 Rwf.

Table 99: Association characteristics

		Outline of Associations	Index
1	% HHs in associations		67%
2	1	***COGEK Association***	
		No. members	14
		Specific activities	Farming
		Membership entry fees (Rwf)	2,400
		Years of membership	July, 2002
	2	***Dushyigikirane Association***	
		No. members	33
		Specific activities	Saving & credit
		Membership entry fees (Rwf)	50
		Years of membership	2002
	3	***COOPEC Association***	
		No. members	55
		Specific activities	Sugar cane plantation
		Membership entry fees (Rwf)	10,000
		Years of membership	July, 2001
	4	***Duterimbere Association***	
		No. members	90
		Specific activities	Sugar cane plantation
		Membership entry fees (Rwf)	2,400
		Years of membership	2006
	5	***Twisungane Association***	
		No. members	114
		Specific activities	Farming
		Membership entry fees (Rwf)	2,400
		Years of membership	May, 2006
	6	***Tuzamurane Association***	
		No. members	114
		Specific activities	Sugar cane plantation
		Membership entry fees (Rwf)	6,000
		Years of membership	2005

3	Range of members in associations	14 – 114
4	Average members in an association	70
5	% of farming associations	83%
6	Range of membership entry fees (Rwf)	2,400 - 20,000
7	Average membership entry fees (Rwf)	6,040

Source: Interview Survey Results by JICA Study Team, 2006

1) Land tenure

Farming associations borrow land on hillsides from various sources, and/or in wetlands from the Sector. It is noted that the farming associations don't have fixed plots, members often change lands. In these conditions, it is impossible to invest in medium and long terms, they must be content with seasonal food crop cultivation (bean, maize, sweet cassava, sorghum). However with new sugarcane implementation along Kagera wetlands, farming association will stay more time on the same parcels due to perennial plant exploitation.

(3) Annual income

No annual cash income has been noted, crop sharing system is the common option among the association members. But, sugarcane association members expect much money from their first harvest.

(4) Annual expenditure

Generally, annual expenditure is composed of membership entry fees, which is spent for basic investment (tools, seed, pesticides, land renting).

4.4.6 Traditional Support System

(1) Umuganda

89% of the household heads do Umuganda once a month, especially, the last Saturday of each month from 7 to 12 Morning. The rest does not fulfill it because of many different official reasons such as handicaps and so on. Umuganda is obligatory for every citizen. Planning and supervision is done by the Sector authorities. The main activities include repairing roads, farming in the community lands and forestry.
Rwandese population is well sensitized to Umuganda practice since 1974 years. People know the social, political and economic benefit of it. In fact, Umuganda plays a role of social cohesion (ex. reconciliation), of popular mobilization and of infrastructure implementation. In principle, the population participates in Umuganda. If someone is absent, he must present a valid reason, otherwise he can be penalized financially by the Sector (usually between 2000 to 5000 Rwf per person). The Sector may also temporarily refuse to grant him a certificate of good citizenship if requested.

(2) Ubudehe

Ubudehe is a traditional community supporting system as reciprocal help in farming activities, where a group in a village rotates in plowing, weeding, and harvesting operations of group member's farms in turn. Ubudehe in its real sense of the term is no longer practically existed; only some forms of informal and occasional arrangements of small group (generally 3 to 5 households) can be organized within neighbors for some agricultural activities such as plowing operation.

Ubudehe which was more or less official, regular and done by a whole village under traditional rule,

has practically disappeared from the region; thus it does concretely no longer exist in rural community.

(3) Kugurizanya

Kugurizanya is a custom of labor loan, generally in farming activities between 2 neighboring and friend farmers. Working together, they rotate in each of their farm, working the same number of man-days according to their convenient agreement. In the sampled farm households, no HH head does Kugurizanya.

4.4.6 Others

(1) Fetching Water

1) Domestic water

General Situation of domestic water security among the respondents are summarized below Table 100 with Figure 36 and 37.

Table 100: General Characteristics of Domestic Water Security

Index		Result
Fetching water		
1	Average water demand per HH per day (Lt)	82
2	Range of water demand among the respondents (Lt)	40 - 200
3	% of HHs fetching water from swamp & rivers (%)	78
4	% of HHs fetching water from hand pomp & tap water (%)	22
5	% of HHs having a rainwater harvesting system (%)	100%
6	Quantity of rainwater usually harvested after a normal rain (Lt)	87
Season A		
1	Quantity of water fetched per day (Lt)	57
2	Times to fetch water per day	1.8
3	Time consumed for fetching water in a round -trip (min)	88
Season B		
1	Quantity of water fetched per day (Lt)	32
2	Times to fetch water per day	1.1
3	Time consumed for fetching water in a round-trip (min)	88
Season C		
1	Quantity of water fetched per day (Lt)	64
2	Times to fetch water per day	1.9
3	Time consumed for fetching water in a round-trip (min)	90

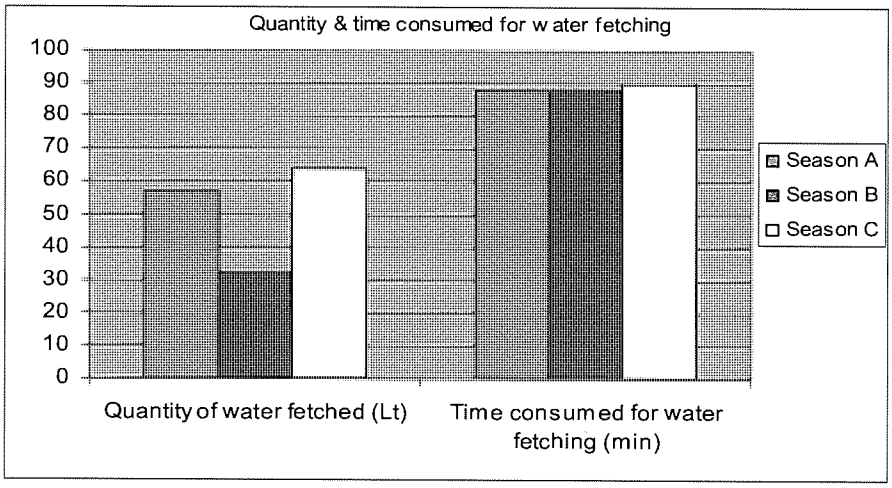
Source: Interview Survey Results by JICA Study Team, 2006

Daily domestic water demand per HH resulted in around 82 liters. Time consumed for fetching water ranged is about 1.5 hours. In the rainy seasons, 100% of the HHs harvested rainwater from their harvesting system. The average quantity of rainwater harvested after a normal rain was 87 liters. Concerning the water sources, 78% of the HHs fetched water from swamps and rivers, while the rest (or 25%) fetched from hand pumps and tape water.

Availability of water for domestic use is different among the cropping seasons. According to the interview results, the local ecosystem offers more water during the season B (February - end of June) commonly called the long rainy season than that in the season A, the short rainy season (September -

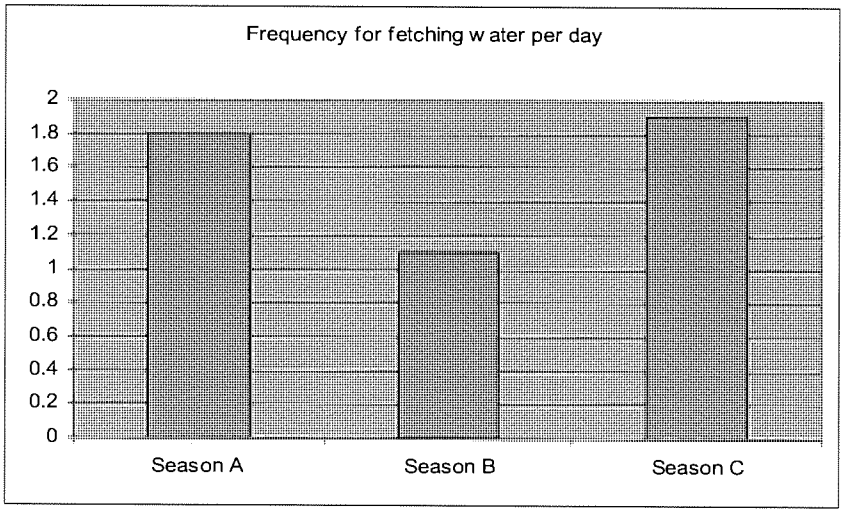
January). On the other hand, the season C (end of June - mi-September), the long dry season is the last in terms of water availability (this sentence is not followed to the previous sentence smoothly because of its content, namely you should discuss available amount of season C compared to the Season A and B.) Therefore, availability of the domestic water and its accessibility is subject to seasonal water fluctuation. Thus, households fetch more domestic water during the dry season than that in the rainy season because the households could harvest rainwater during the rainy season. Moreover, quantity of domestic water fetched, frequency and time consumed for fetching water are negatively correlated with rainwater availability; thus, amount of fetching water, frequency per day and time consumed for fetching water are increased during the dry season compared to the rainy season. Figures below shows the general trend of domestic water use over the 3 cropping seasons.

Figure 36: Quantity and Time Consumed for Water Fetching =



Source: Interview Survey Results by JICA Study Team, 2006

Figure 37: Frequency of Fetching Water per Day



Source: Interview Survey Results by JICA Study Team, 2006

(2) Collecting firewood

The interview results of this issue are shown in Table 101, Figure 38 and 39 below. Time required to collect firewood is also correlated with rainy season. It is noted that in the rainy season, it takes more time to collect firewood than that in the dry season because of spending more time to collect dried

firewood. Regarding frequency times to collect firewood per week, some slight differences are observed. There is a tendency to collect firewood less time required per week in the dry season than that in the rainy season. In fact, in the dry seasons people could collect big bundles of sticks than that in the rainy seasons because dried stick are more available (period of decrease of rain and increase of sunshine). Further in the dry seasons, farmers use plant residues for firewood which are more available in the farm.

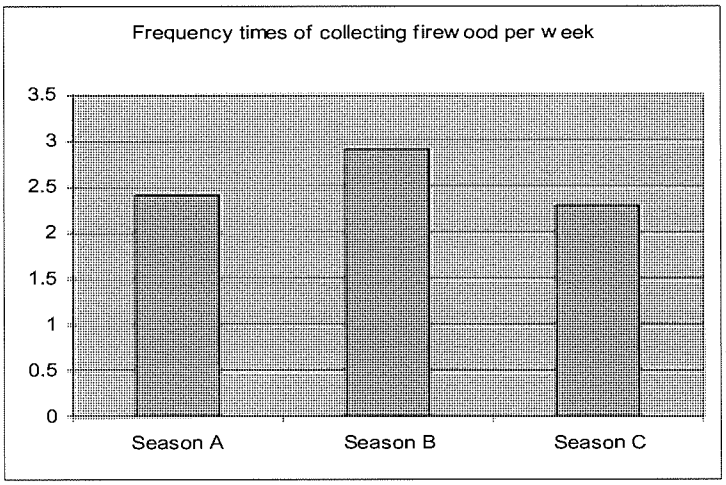
Table 101: General Characteristics on Collecting Firewood

	Collecting firewood	Results
Season A		
1	Times per a week	2.4
2	Time consumed in a round-trip (min)	89
Season B		
1	Times per a week	2.9
2	Time consumed in a round-trip (min)	106
Season C		
1	Times per a week	2.3
2	Time consumed in a round-trip (min)	81

Source: Interview Survey Results by JICA Study Team, 2006

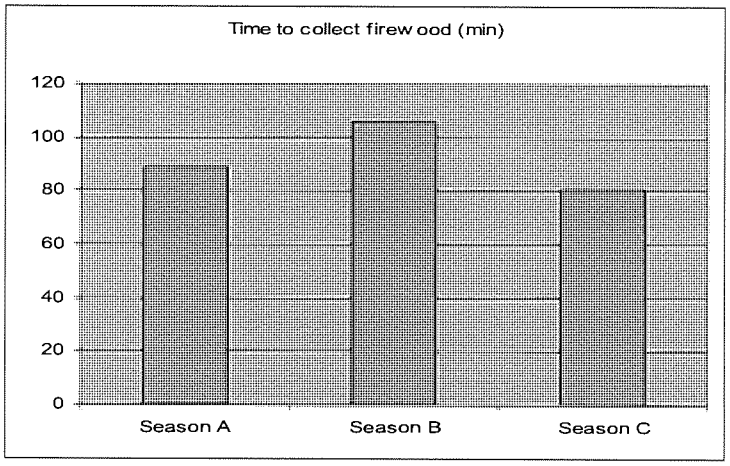
Figures 38 and 39 below highlight the trend of collecting firewood over the 3 cropping seasons.

Figure 38: Frequency Times of Collecting Firewood per Week



Source: Interview Survey Results by JICA Study Team, 2006

Figure 39: Time to collect firewood



Source: Interview Survey Results by JICA Study Team, 2006

(3) Spare time

Table 102 below shows the characteristics of spare time enjoyed by the respondents.

Table 102: Survey Results on Spare Time among the Surveyed Households

	Spare time	Results
1	% of HHs taking one day of rest per a week	89%
2	% of HHs taking Sunday as a day of rest	89%
3	Average working hours per day	8.4
4	Breakdown of spare time use	Praying, taking rest, visiting friends

Source: Interview Survey Results by JICA Study Team, 2006

89% of recipients take on Sunday, one day rest per week. One HH head doesn't take any day rest per week. The average daily hours work is 8.4. Daily working hour length corresponds more or less with 8 working hours of Rwandese Public Administration Service.

(4) Soil fertility

1) General Trend

Table 103 shows how respondents perceive trend of crop yield fluctuation over the years. Most of the farmers perceive a decrease of crop yield year by year. One HH head out of 8 (who responded) considered stable crop yield over the years. One HH head who inhabits recently Bugesera (from 2002) didn't of course, respond to the question.

Table 103: Trend of crop yields over the years

	Trend of yield over the years	Results
1	% of HHs perceiving decrease of legume yield over the years	88%
2	% of HHs perceiving decrease of grain yield over the years	88%
3	% of HHs perceiving decrease of tuber yield over the years	88%

Source: Interview Survey Results by JICA Study Team, 2006

2) Causes of change of crop yields

According to the model farmers, decrease of crop yield is caused by decrease of soil fertility, while the plant diseases have aggravated the situation, especially on the tuber crops such as cassava and sweet potatoes (see below Table 104). 1 HH head is perceiving decrease of soil fertility and increase of pest/plant disease as a cause of decrease of legume.

Table 104: Factors Causing Crop Yield Decrease

Causes of change of yield	Data
Ratio of HHs perceiving decrease of soil fertility as a cause of decrease of legume yield	71%
Ratio of HHs perceiving decrease of soil fertility as a cause of decrease of cereal yield	100%
Ratio of HHs perceiving decrease of soil fertility and increase of pest/plant disease as a cause of decrease of tuber yield	100%

Source: Interview Survey Results by JICA Study Team, 2006

=

3) Use of chemical fertilizers, manure and irrigation practice

Soil fertility and plant disease problems described above have led the farmers to apply some quick interventions as countermeasures for improving that situation. The points mentioned below give some adopted countermeasures. Table 105 below shows the percentage of surveyed farmers which applied fertilizer and irrigation practice.

Table 105: Percentage of Surveyed Farmers Using Fertilizers and Irrigation

	Use of fertilizers & Chemicals	Results
1	Number of users	1 HHs
2	Targeted crops	Vegetables
Manure		
1	Number of users	6 HHs
2	Number of HHs obtained from own livestock	6 HHs
Irrigation practice		
	% of HHs practicing	0 HH

Source: Interview Survey Results by JICA Study Team, 2006

1 HH used fertilizers and chemicals, especially on vegetables. Manure was dressed by 6 HHs. They obtained it from their own livestock. No irrigation practice has been noted. =

(4) Health

Table 106 below shows health condition of the respondents. The prevailing main diseases consist of diarrhea, malaria and amoeba. 22 of HH heads have been affected by diarrhea. 22% of HHs has had at least a young child affected by diarrhea. 56% of the HH heads has been affected by malaria, and 67% of HHs has had a child affected by that disease. 22% of HH Heads has been affected by amoeba, and 22% of HHs has had a young child affected by amoeba. Like elsewhere in Rwanda, malaria and amoeba especially declared by the respondents are known to be chronic diseases among the population.

Table 106: Health Condition

Major Health Problems	Result
1. Diarrhea	
% of HH heads who were affected by diarrhea	22%
% of HHs with a young child affected by diarrhea	22%
2. Malaria	
% of HH heads who were affected by malaria	56%
% of HHs with a young child affected by malaria	67%
3. Amoeba	
% of HH heads affected by amoeba	22%
% of HHs with a young child affected by amoeba	22%
Nutrition center	
% of HHs going to the nutrition center	0%

Source: Interview Survey Results by JICA Study Team, 2006

(5) Draught coping strategy

Table 107 below shows the draught coping measures among the recipients.

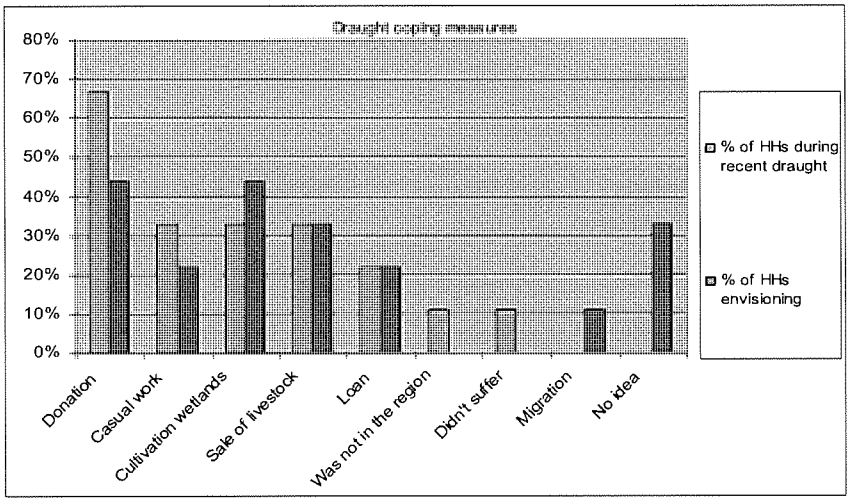
Table 107: Draught coping measures

Measures	% of HHs during recent draughts	% of HHs envisioning
Donation	67%	44%
Casual work	33%	22%
Cultivation wetlands	33%	44%
Sale of livestock	33%	33%
Loan	22%	22%
Was not in the Bugesera region	11%	-
Didn't suffer	11%	-
No idea	-	33%
Migration	-	11%

Source: Interview Survey Results by JICA Study Team, 2006

Figure 40 below highlights the trend of draught coping measures.

Figure 40: Draught coping measures



Source: Interview Survey Results by JICA Study Team, 2006

In the past and future time, the model farmers have coped and will cope with draught by taking several countermeasures such as asking donation, casual work, cultivating wetlands and selling livestock. The same measures still remain to cope with draught in the future. In fact, wetland cultivation seems to be a promising and sustainable draught coping measure in the region.

4.5 Comparison among the Four Quick Projects

4.5.1 General

(1) Family Aspect

Table 108 shows the average general characteristics of the household per each QP.

Table 108: General Characteristics of the household

QP	Average HH head Age (year)		% of widows*	Average HH head schooling years		Family size		Family members engaged in farming	
	Range	Average		Range	Average	Range	Average	Range	Average
QP1 (Rainwater storage)	23-72	49	50%	0-12	5	1-10	7	1-3	1.9
QP2 (Shallow well irrigation)	21-69	41	17%	0-8	4.5	1-11	4.5	1-2	1.8
QP3 (Roadside irrigation)	33-62	45	22%	0-8	5.7	3-10	6.4	1-5	2.3
QP4 (Modern cow)	25-54	40	33%	3-12	8	2-8	5	1-2	1.6

Source: Interview Results by JICA Study Team, 2006 / *% of widows among the interviewed sampled recipients

Figures above show that family general characteristics are more or less the same among the QPs. Average HH head age is around 44, schooling years is ranging from 4.5 and 8, family size is ranged from 4.5 and 7, and family members engaged in farming is around 2 persons per HH. However, some significant differences are noticed. The average HH head, percentage of widows and family size in the QP1 are higher. The main reason is that the QP1 (Rainwater storage) targets vulnerable persons as

beneficiaries, especially old people, with objective of securing safety domestic water during the rainy season. Schooling years of 8 in the QP4 is higher, because its recipients are younger and have had more chance to be sent to school.

(2) Meal and Food

No significant difference was observed on daily meal and food. The daily meal among the QPs' recipients is around 2 times comprising of lunch and dinner. Food crop types included beans, sweet potatoes, maize, banana, cassava flour, sweet cassava, groundnut, taro, sorghum, and Irish potatoes. Beans, sweet potatoes, maize, banana and sweet cassava were dominant. More than 65% of HHs had annually at least between 2 and 3 types of food crop in the staple food.

(3) Land Tenure system

Land tenure system is same among the QPs' recipients. Farm size is ranged from 1 to 3 Ha per family. Almost all lands owned and/or leased are on hillsides under rain-fed regime. Only few families had access to wetlands. However, the QP2 (Shallow well irrigation) recipients had relatively more access to wetlands, reason why they have been targeted for shallow well irrigation activities.

Among the recipients, no landless case has been noted. However, about 25% of the HHs borrows lands, either in some cases, because of the small size of the farmlands, or to avoid high costs in plowing when the land is covered by dense bush after a long fallow, or when their own parcels yield poorly. They didn't have official rules to guide the land borrowing/lending arrangement between the 2 parties; the deal was based up on an amicable agreement.

Farm plots on the hillsides belonged to individual households under the control of the owners. However, wetlands belong to the Government which decides on their utilization. The current Government policy on wetland utilization is to promote high value crops, especially cereals, through associative/cooperative farming. However, this strategy is not yet strictly implemented at the grass-root level, and individual farmers still continue to cultivate food crops in wetlands, because the customary rules and the newly established Land Organic Law are juxtaposed.

4.5.2. Income

Figure 40 and 41, and Table 2 below shows the average household income per each QP. It contains the main points to be compared and discussed.

Figure 41: Income from seasonal crop

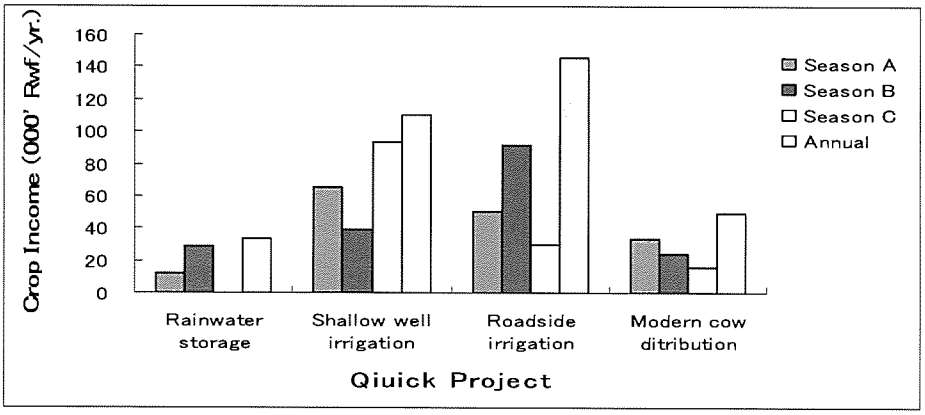


Figure 41: Total annual income

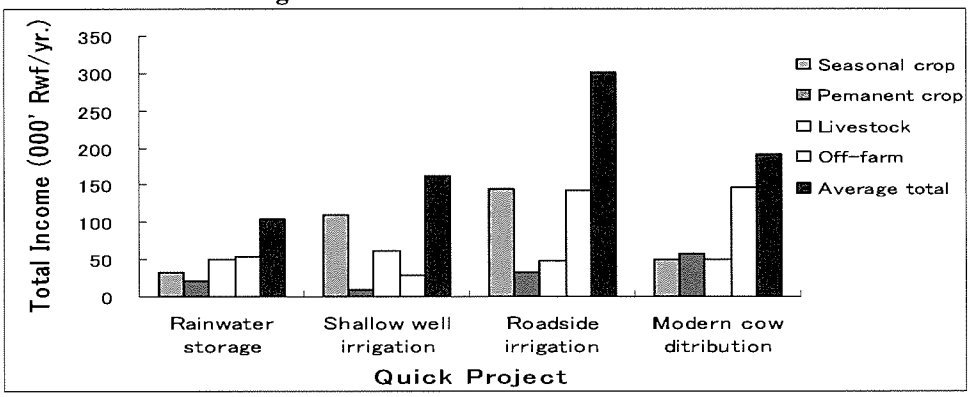


Table 109: QPs' Income (Part I)

QP	Season A			Season B		
	%HHs selling	*Sale amount*		%HHs selling	*Sale amount*	
		Range	***Average***		Range	***Average***
QP1 (Rainwater storage)	67%	450 - 75200	**12,571**	67%	1200 - 76000	**29,017**
QP2 (Shallow well irrigation)	50%	1,500 - 310,050	**65,092**	100%	5,000 - 240,000	**38,933**
QP3 (Roadside irrigation)	89%	10,500 - 160,000	**50,188**	89%	21,000 - 155,000	**91,625**
QP4 (Modern cow distribution)	56%	8,000 - 75,000	**34,020**	89%	8,000 - 75,000	**24,106**

Source: Interview Results by JICA Study Team, 2006

QPs' Income (Part II)

QP	Season C			Annual seasonal crops		
	%HHs selling	*Sale amount*		%HHs Selling	*Sale amount*	
		Range	***Average***		Range	***Average***
QP1 (Rainwater storage)	0%	-	**0**	83%	3,000 - 132,200	**33,270**
QP2 (Shallow well irrigation)	42%	5,500 - 400,000	**93,600**	100%	6,500 - 550,000	**110,479**
QP3 (Roadside irrigation)	11%	-	**30,000**	89%	48,000 - 315,000	**145,563**
QP4 (Modern cow distribution)	22%	-	**16,000**	89%	12,000 - 165,000	**49,369**

Source: Interview Results by JICA Study Team, 2006

QPs' Income (Part III)

QP	Permanent crops			**Agriculture**		
	%HHs selling	*Sale amount*		%HHs selling	*Sale amount*	
		Range	Average		Range	Average
QP1 (Rainwater storage)	39%	2,400 - 52,000	**21,129**	39%	5,000 - 204,000	**40,434**
QP2 (Shallow well irrigation)	33%	7,300 - 18,500	**10,450**	42%	12,700 - 550,050	**120,929**
QP3 (Roadside irrigation)	44%	4,500 - 66,000	**32,000**	67%	10,000 - 420,000	**157,333**
QP4 (Modern cow distribution)	56%	1,500 - 230,000	**57,780**	67%	13,500 - 395,000	**85,481**

Source: Interview Results by JICA Study Team, 2006

QPs' Income (Part IV)

QP	Livestock			Off-farm		
	%HHs selling	*Sale amount*		%HHs earning	*Money received*	
		Range	*Average*		Range	*Average*
QP1 (Rainwater storage)	39%	3,000 - 180,000	39%	78%	10,500 - 274,000	**54,464**
QP2 (Shallow well irrigation)	42%	2,400 - 244,500	42%	83%	5,000 - 96,000	**28,200**
QP3 (Roadside irrigation)	67%	2,000 - 109,000	67%	78%	12,000 - 600,000	**142,857**
QP4 (Modern cow distribution)	67%	15,000 - 120,000	67%	56%	3,500 - 619,000	**147,700**

Source: Interview Results by JICA Study Team, 2006

QPs' Income (Final)

QP	TOTAL		
	%HHs selling	*Money received*	
		Range	*Average*
QP1 (Rainwater storage)	94%	12,000 - 406,200	**103,791**
QP2 (Shallow well irrigation)	100%	26,700 - 575,870	**163,106**
QP3 (Roadside irrigation)	100%	60,000 - 806,100	**301,144**
QP4 (Modern cow distribution)	100%	9,000 - 1,032,000	**191,928**

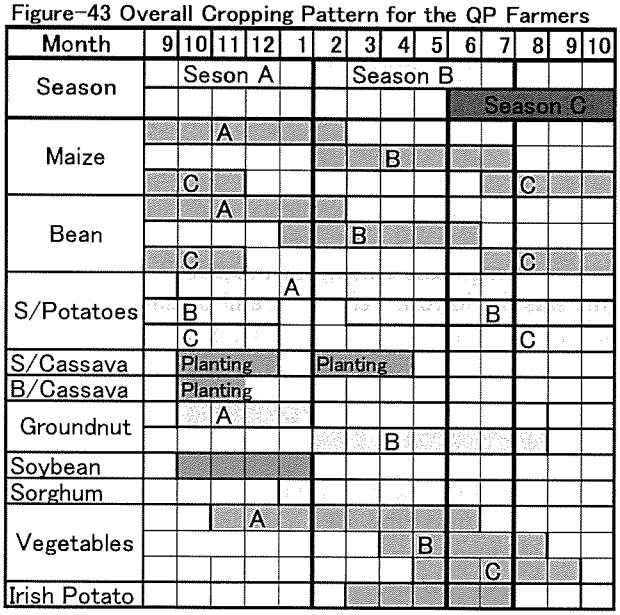
Source: Interview Results by JICA Study Team, 2006

(1) Agriculture

Crops cultivated:

Cultivated seasonal crops by QP were the same. It included maize, bean, sweet potatoes, sorghum, sweet cassava, bitter cassava, groundnut, soy beans, and vegetables. Beans, sweet potatoes, maize and sorghum were the major crops. The produce of the seasonal crops was usually utilized for home consumption, and for sale of surplus at local market. It is noted that exceptionally, Irish potatoes was planted by only 1 recipient of the QP2 (Shallow well irrigation). Vegetables were not cultivated by the QP1 (Rainwater storage) recipients. Seasonal crop pattern was the same and corresponded with the normal seasonal crop pattern of Bugesera region. Its trend is presented below.

Figure-43 Overall Cropping Pattern for the QP Farmers



Permanent crops cultivated among the interviewees were same. It included banana and tree plants. However, 1 recipient of the QP4 (Modern cow distribution) planted a fodder perennial plant (*Pennicetum purpureum*).

Season A:

Season A income was relatively higher in the QP2 (Shallow well irrigation) and QP3 (Roadside irrigation), while it was very low in the QP1 (see Table 2 above). Major crop sold were the same and included maize, beans and sweet potatoes. However, in the QP2 (Shallow well irrigation), 1 HH planted and sold vegetables at a sale amount of 300,000 Rwf. Another planted and sold bitter cassava at a sale amount of 20,000 Rwf. That sale of vegetables had significantly contributed to increase the average season A income of the QP2 (Shallow well irrigation).

Season B:

QP3 (Roadside irrigation) season B income is far higher than others (see Table 2 above). It was more or less the same in the other three QPs. Major crop sold were the same and included maize, beans, sweet potatoes and sorghum. Sorghum was leading. However, in the QP2 (Shallow well irrigation) 1 HH planted and sold vegetables at a sale amount of 240,000 Rwf, another planted and sold Irish potatoes, and another one planted and sold groundnut, both at a modest sale amount. Vegetables were planted upland and sold by some QP2 (Shallow well irrigation) and QP4 (Modern cow distribution) recipients.

Season C:

QP2 (Shallow well irrigation) season C income is far higher than others (see Table 2 above). QP3 (Roadside irrigation) and QP4 (Modern cow distribution) season income were modest, while no season C income in the QP1 (Rainwater storage) was noted. Major crop planted and sold in marshlands were vegetables, sweet potatoes and maize; and vegetables were leading. More access to wetlands by the QP2 (Shallow well irrigation) recipients, was an opportunity to plant and sell, especially vegetables which relatively procure high income.

Total seasons:

The QP3 (Roadside irrigation) and QP2 (Shallow well irrigation) annual seasonal crop income were far higher than others, due to of course, relative high income of the three cropping seasons (see Table 2 above).

Permanent and perennial crop income:

The QP4 (Modern cow distribution) income from permanent and perennial crops was higher than others (see Table 2 above). This was also due to especially, one HH which planted and sold *Pennicetum purpureum* (a perennial fodder plant) at a high sale amount of 110,000 Rwf. Meanwhile in the QP2 (Shallow well irrigation), the income was the lowest. Permanent and perennial crops sold were banana (cooking and fruit), tree plants and fodder plants (only planted by 1 HH of the QP4, as mentioned above).

(2) Livestock

There is no significant difference between the QPs' livestock income. Livestock income consisted of sale of goat, cow, cow milk, chicken and sheep. However, the QP4 (Modern cow distribution) recipients didn't sale cow milk; and in the QP4 (Modern cow distribution) and QP1 (Rainwater storage) no sale of cow were noticed.

(3) Off-farm activities

QP3 (Roadside irrigation) off-farm income, followed by that of QP4 (Modern cow distribution), was far the highest (see Table 2 above). One recipient in the QP4 and another in the QP3 had an off-farm income of around 600,000 Rwf each, very far higher than others. That big amount was especially received from the other business rubric. The off-farm income consisted of money received from casual work, from lending lands, sale of banana wine, sale of sorghum beer, donations, training allowances and other business (not specified by the respondents). However, one QP2 (Shallow well irrigation) recipient received money from pension, and another recipient received a salary in the QP3.

(4) Total

Regarding total income among the QPs income, there was significant difference. The QP3 (Roadside irrigation) income is the highest (see Table 2 above). It was followed by the QP2 (Shallow well irrigation) income and QP4 (Modern cow distribution) income which were almost equal. The QP1 (Rainwater storage) income was far the lowest.

4.5.3 Expenditure

Below are presented Figure 44 and Table 110 of the average household expenditure per each QP. It contains the main points to be compared and discussed.

Figure 44: Expenditure

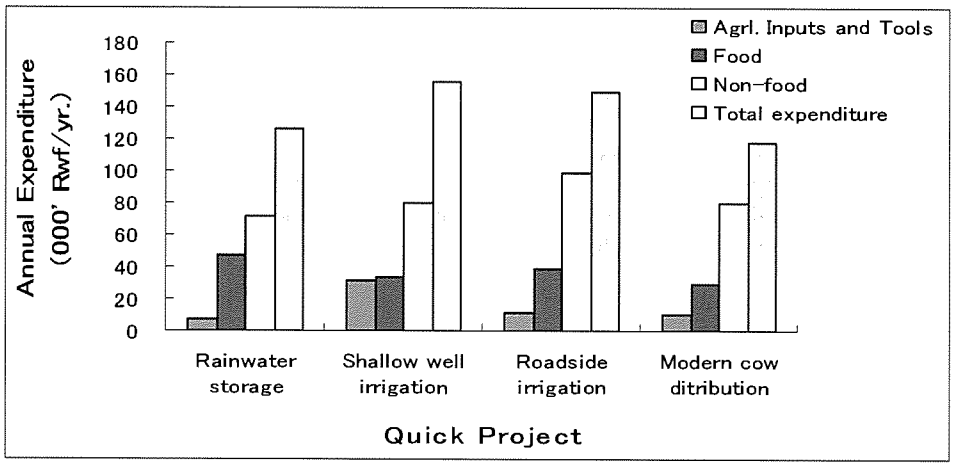


Table 110: Expenditure (Part I)

QPs	*Agricultural Inputs and Tools*							
	Seeds		Fertilizers		Agrochemicals		Tools	
	% HHs buying	Expenditure	% HHs buying	Expenditure	% HHs buying	Expenditure	% HHs buying	Expenditure
QP1 (Rainwater storage)	44%	4,725	0%	0	17%	9,333	67%	4,325
QP2 (Shallow well irrigation)	58%	3,371	17%	12,600	42%	40,200	75%	10,489
QP3 (Roadside irrigation)	56%	9,560	11%	1,600	44%	3,275	67%	6,629
QP4 (Modern cow)	67%	2,957	0%	0	22%	14,100	67%	3,000

Source: Interview Results by JICA Study Team, 2006

Expenditure (Part II)

QPs	*Subtotal inputs*			*Food*		
	% HHs buying	Expenditure		% HHs buying	Expenditure	
		Range	Average		Range	Average
QP1 (Rainwater storage)	78%	1,500 – 20,400	**7,847**	100%	12,570 – 127,500	**47,819**
QP2 (Shallow well irrigation)	92%	1,200 – 208,300	**31,291**	100%	10,610 – 73,700	**33,931**
QP3 (Roadside irrigation)	100%	2,800 – 28,400	**12,100**	100%	2,000 – 54,800	**38,522**
QP4 (Modern cow)	67%	3,150 – 29,000	**10,657**	100%	8,850 – 88,480	**29,876**

Source: Interview Results by JICA Study Team, 2006

Expenditure (Final Part)

QPs	Non food items			Total	
	% HHs buying	Expenditure		Expenditure	
		Range	Average	Range	Average
QP1 (Rainwater storage)	100%	5,530 – 377,200	**71,677**	18,100 - 474,950	**126,831**
QP2 (Shallow well irrigation)	100%	26,400 – 255,700	**79,926**	48,510 - 406,900	**156,287**
QP3 (Roadside irrigation)	100%	28,500 – 472,650	**98,550**	51,900 - 520,850	**149,261**
QP4 (Modern cow)	100%	3,500 – 389,200	**80,508**	15,500 - 489,680	**117,488**

Source: Interview Results by JICA Study Team, 2006

(1) Agricultural Inputs

Regarding agricultural input expenditure, there was significant difference. The QP2 (Shallow well irrigation) presented higher input expenditure on fertilizers, agrochemical and tools than others (see Table 3 above). Its recipients used to cultivate vegetables in marshlands; and vegetables consume more input than traditional food crop. Meanwhile, the QP3 recipients expended more in buying food crop seeds sowed in hillsides. The inputs consisted of vegetables and food crop seeds including bean, groundnut, sweet potatoes cuttings and maize. Fertilizers were bought and used by only some QP2 (Shallow well irrigation) and QP3 (Roadside irrigation) recipients. Agrochemicals were used on planted vegetables and on stored food crop products. Tools mainly consisted of hoes and machetes.

(2) Food

Regarding food expenditure, no significant difference was noted. Meanwhile, food expenditure in the QP4 (modern cow distribution) seemed to be lightly lower than others (see Table 3 above).

Expenditure for food items consisted of 16 main items shown below box:

1.sorghum grains, 2.sweet potatoes, 3.sweet cassava tuber, 4.bitter cassava flour, 5.maize flour, 6.beans, 7.soybeans, 8.groundnut, 9.cooking banana, 9.brewing banana, 10.Irish potatoes, 11.meat, 12.rice, 13.vegetables, 14.sugar, 15.coking oil and 16.salt

(3) Non food items

Regarding non food expenditure, no significant difference was noted. Meanwhile, non food expenditure in the QP3 (Roadside irrigation) seemed to be lightly higher than others (see Table 3 above). That is justified by the highest income observed in that Quick Project. The QP1 (Rainwater storage), QP3 (Roadside irrigation) and QP4 (Modern cow distribution) presented each, one HH spending very big amount of between around 400,000 and 500,000 Rwf, on non food items.

Expenditure for non-food items consisted of 20 main items shown below box:

1.domestic water, 2.kerosene, 3.firewood, 4.clothes, 5.soap, 6.lotion, 7.tooth cream, 8.shoe cream, 9.bed sheets, 10.blankets, 11.belt, 12.radio, 13.radio batteries, 14.bicycle, 15.domestic animals, 16.construction materials, 17.school fees, 18.medical fees, 19.land rental, 20.ceremonial occasion and others

(4) Total

Total expenditure among the QPs was lightly significant. The QP2 (Shallow well irrigation) and QP3 (Roadside irrigation) total expenditure, more or less same, were higher than the two others. The QP1 (Rainwater storage) and the QP4 (Modern cow distribution) had almost the same expenditure. (see Table 3 above).

4.5.4 Balance

Figure 45 and Table 111 below show balance (income/expenditure) figures per each QP. It contains the main points to be compared and discussed.

Figure 45: Balance income/expenditure

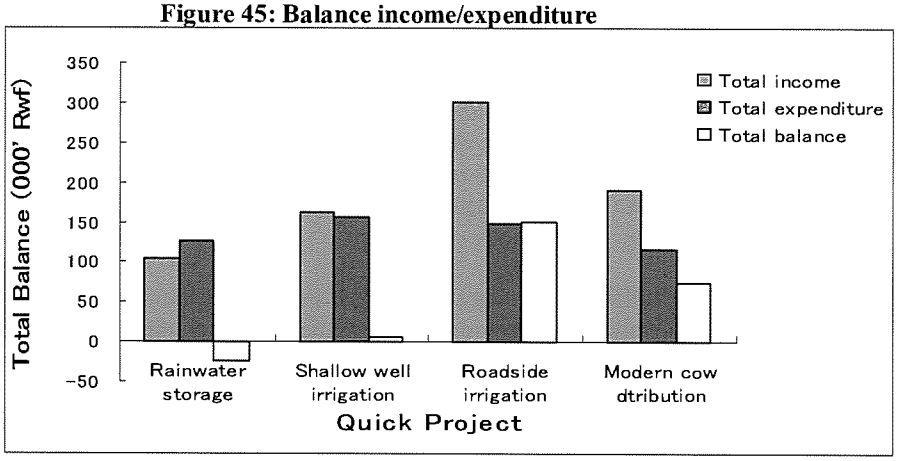


Table 111: Balance income/expenditure

QPs	Income	Ex penditure	Balance	Range
QP1 (Rainwater storage)	103,791	126,831	**-23,040**	-125,400 ... +110,010
QP2 (Shallow well irrigation)	163,106	156,287	**68,19**	-79,560 ... +391,570
QP3 (Roadside irrigation)	301,144	149,261	**151,883**	-41,900 ... +475,700
QP4 (Modern cow)	191,928	117,488	**74,440**	-80,550 ... +542,320

Source: Interview Results by JICA Study Team, 2006

Regarding to balance, there was significant difference. The QP3 (Roadside irrigation) balance was far higher than others. It was followed by the QP4 balance, itself followed by the QP2 balance, while the QP1 balance was in the last position.

QP1 presented an annual balance deficit, while annual surplus balance was noticed in other QPs. From these results, the following hypothesis could be made on the cases of deficit. Some surveyed HH heads of the QP1 (especially, old people), had difficulty remembering the exact data of previous months, because they do not record household income and expenditures. Again, depending on some sensitive situations, some farmers do not deliberately declare some income from donations or other

suspicious sources, thus at times the declared expenses can be more than the declared income showing a deficit.

4.5.5 Others

(1) Fetching Water

Regarding to general characteristics of domestic water security, no significant difference was noticed among the QPs. Average water demand per HH per day was around 80 liters from the range of 40 to 150 liters among the respondents. 77.3% of HHs fetched water from swamps and rivers, while the rest, only 22.3%, fetched water from hand pomp and tap water. Quantity of water fetched per day, times to fetch that water per day and time consumed for fetching it in a round-trip depended on seasons (rainy and dry) (Figure 46, 47, and 48). This is because availability of water for domestic use was different among the cropping seasons. Considering the average household members of 5.7 and the standard requirement of water per day in African countries (20 Lt/person), the result above indicates absolute insufficiency of daily water amount per capita in the project sites.

According to the interview results, the local ecosystem offers more water during the season B (February - end of June, commonly called *long rainy season)*, than that in the season A (called the *short rainy season,* September - January). On the other hand, the season C (end of June - mi-September, the *long dry season*) is placed last in terms of water availability. Therefore, availability of the domestic water and its accessibility is subject to seasonal water fluctuation. Thus, households fetched more quantity of domestic water, fetched that water more times per day, and consumed more time for fetching it in a round-trip, during the dry season than that in the rainy season. In fact, during the rainy season, 85% of HHs used rainwater harvesting systems, and collected around 80 liters after a normal rain.

In season C, average quantity of water fetched per day per HH was about 60 liters. That water was fetched around 2 times per day on average and average time consumed for fetching it in a round-trip was around 1.5 hours. In season A, quantity of water fetched per day per HH was 50 liters. That water was fetched around 2 times per day and time consumed for fetching it in a round-trip was lightly less than 1.5 hours. In season B, average quantity of water fetched per day per HH was about 33 liters. That water was fetched around 1.3 times per day and average time consumed for fetching it in a round-trip was around 1 hour.

Figure 46: Amount of water fetched per day by season (Lt)

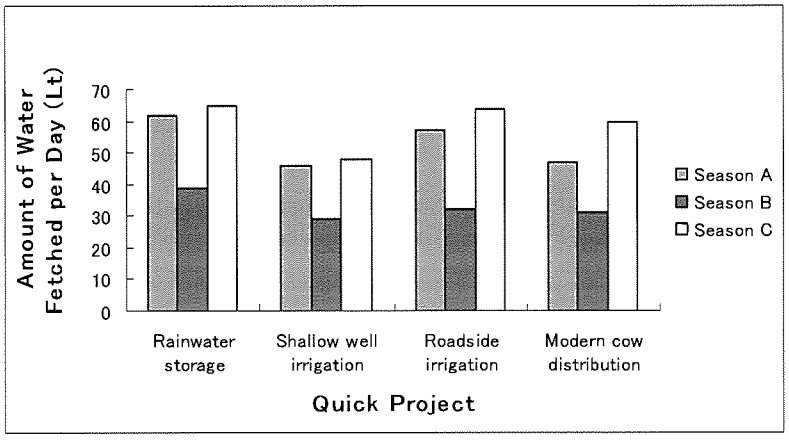


Figure 47: Frequency of water fetching per day by season

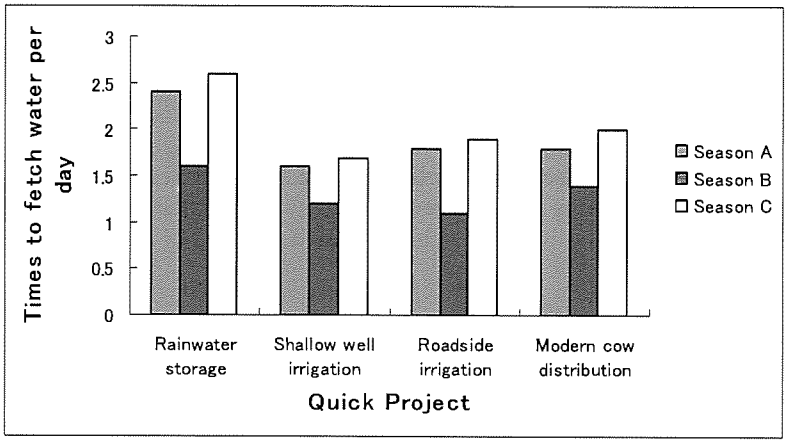
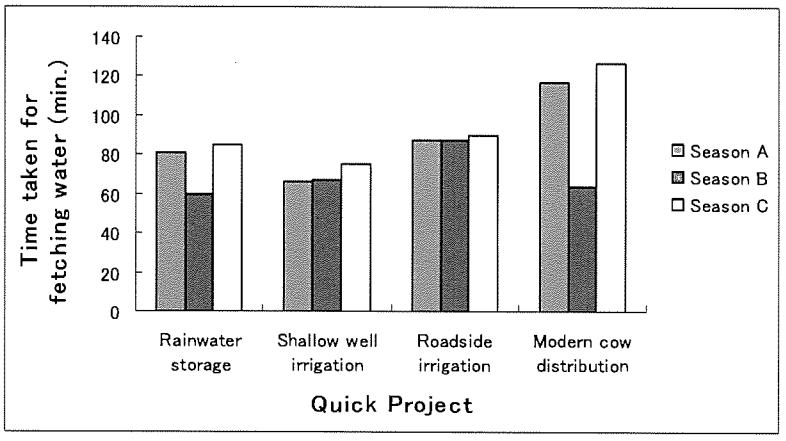


Figure 48: Time taken for a round-trip of water fetching by season



(2) Collecting Firewood

Regarding to general characteristics on collecting firewood, no significant difference was noted among the QPs. Time required to collect firewood was correlated with rainy season. It is noted that in the rainy season, it takes more time to collect firewood than that in the dry season because of spending more time to collect dried firewood. Regarding to frequency of firewood collection per week, some slight differences are observed. There is a tendency to collect firewood required less time per week in the dry season than that in the rainy season. In fact, in the dry seasons people could collect big bundles of sticks than that in the rainy seasons, because dried stick are more available (period of decrease of rain and increase of sunshine). Further in the dry seasons, farmers used plant residues for firewood which are more available in the farm. In season C, times per a week to collect firewood were 3.5 and time consumed in a round-trip was around 1 hour. In season A, times per a week to collect firewood were 4 and time consumed in a round-trip was around 1.25 hours. In season B, times per a week to collect firewood were 3.6 and time consumed in a round-trip was more than 1.5 hours.

(3) Soil Fertility

No significant difference was noted among the QPs on how the recipients perceived trend of crop yield fluctuation over the years. Almost all farmers perceived a decrease of crop yield year by year. However, one QP3 (Roadside irrigation) recipient and another one of the QP4 (Modern cow distribution) considered that crop yield was stable over the years. According to the model farmers, decrease of crop yield is caused by decrease of soil fertility, while the plant diseases have aggravated the situation, especially on the tuber crops such as cassava and sweet potatoes. Infertility of soil or disease incidence could be caused by crop rotation without fallowing period or continuous cultivation of same crops.

(4) Draught coping strategy

Regarding draught coping strategy, no significant difference was noticed among the QPs. In the past and future time, the model farmers have coped and will cope with draught by taking several countermeasures including *asking donation, sale of livestock, cultivating wetlands, casual work, sale of farmlands, requesting loan, sale of trees, making and sale of charcoals and migration*. Cultivating wetlands, sale of livestock and asking donation were dominant countermeasures. In fact, wetland cultivation seems to be a promising and sustainable draught coping measure in the region.

Annex I: Summary Tables for Food Expenditure (Unit: Rwf)

(1) QP1:Rainwater Storage

Part I

No	Recipient code	Sorghum	Sweet potatoes	Sweet cassava	Cassava flour	Maize flour	Bean	Groundnut
1	Cy-Rj	3,256	2,187	675	6,941	9,615	1,236	888
2	Cy-Ms	NP*	NP	NP	1,600	18,000	NP	NP
3	Cy-Gam	NP	NP	NP	37,500	25,000	15,000	NP
4	Cy-Mb	NP	1,500	NP	220	2,150	NP	650
5	Cy-Nf	NP	8,000	3,000	14,000	45,000	NP	NP
6	Cy-Gal	50,000	NP	NP	13,000	NP	NP	1,750
7	Kz-Bj	NP	10,500	900	4,500	12,000	2,400	600
8	Kz-Nb	NP	NP	NP	440	2,000	NP	NP
9	Kz-Kj	NP	NP	300	NP	17,000	NP	NP
10	Kz-Mv	NP	15,000	NP	4,000	NP	2,400	4,600
11	Kz-Ke	NP	NP	NP	NP	13,500	NP	5,400
12	Kz-M	**	**	**	**	**	**	**
13	Kb-Kj	NP	NP	1,600	2,400	8,000	NP	NP
14	Kb-Mfn	NP	NP	5,000	6,000	5,500	NP	1,200
15	Kb-Ms	NP	NP	NP	NP	NP	NP	NP
16	Kb-Ne	NP	NP	NP	NP	3,000	NP	NP
17	Kb-Kl	NP	NP	NP	24,700	NP	NP	NP
18	Kb-Mfs	2,100	NP	NP	2,700	2,700	NP	NP
Average		18,452	7,437	1,913	9,077	12,574	5,259	2,155

Source: Interview Survey Results by JICA Study Team, 2006 / NP*: No Purchasing / **: No response given by the interviewee

Part II

No	Recipient code	Banana	Irish potatoes	Meat	Rice	Vegetables	Sugar	Cooking oil
1	Cy-Rj	3,050	5,756	2,750	1,919	1,001	4,513	2,525
2	Cy-Ms	NP	700	NP	NP	NP	NP	NP
3	Cy-Gam	NP	NP	NP	6,000	NP	44,000	NP
4	Cy-Mb	NP	4,600	NP	1,250	700	NP	1,000
5	Cy-Nf	8,500	6,500	3,500	6,200	4,500	10,500	6,000
6	Cy-Gal	NP	20,000	NP	2,000	NP	3,000	6,000
7	Kz-Bj	1,500	2,300	2,400	2,400	1,500	3,500	2,000
8	Kz-Nb	NP	500	2,400	NP	820	3,200	3,200
9	Kz-Kj	NP	3,400	2,000	NP	700	NP	5,700
10	Kz-Mv	17,000	5,500	3,100	4,800	600	NP	2,800
11	Kz-Ke	12,000	6,000	8,100	NP	NP	NP	NP
12	Kz-M	**	**	**	**	**	**	**
13	Kb-Kj	3,000	20,000	8,000	NP	NP	2,400	NP
14	Kb-Mfn	NP	6,600	1,800	NP	2,000	600	5,000
15	Kb-Ms	4,600	4,000	8,800	5,400	900	1,400	2,700
16	Kb-Ne	NP	3,500	2,500	200	2,300	NP	3,000
17	Kb-Kl	NP	2,500	NP	2,460	2,000	3,600	3,000
18	Kb-Mfs	2,200	6,000	1,400	NP	NP	NP	NP
Average		6,481	6,116	3,896	3,263	1,547	7,671	3,577

Source: Interview Survey Results by JICA Study Team, 2006 / NP*: No Purchasing / **: No response given by the interviewee

Final part

No	Recipient code	Salt	Milk	Total
1	Cy-Rj	1,186	316	47,814
2	Cy-Ms	2,000	NP	22,300
3	Cy-Gam	NP	NP	127,500
4	Cy-Mb	500	NP	12,570
5	Cy-Nf	900	3,000	119,600
6	Cy-Gal	2,000	NP	97,750
7	Kz-Bj	2,400	NP	48,900
8	Kz-Nb	1,800	450	14,810
9	Kz-Kj	600	NP	29,700
10	Kz-Mv	2,000	450	62,250
11	Kz-Ke	NP	NP	45,000
12	Kz-M	**	**	**
13	Kb-Kj	1,200	NP	46,600
14	Kb-Mfn	2,400	NP	36,100
15	Kb-Ms	600	960	29,360
16	Kb-Ne	1,200	NP	15,700
17	Kb-Kl	600	NP	38,860
18	Kb-Mfs	800	200	18,100
Average		1,346	896	47,818

Source: Interview Survey Results by JICA Study Team, 2006 / NP*: No Purchasing / **: No response given by the interviewee

QP2 :Shallow Well Irrigation

Part I

No	Recipient code	Fish	Sweet potatoes	Sweet cassava	Cassava flour	Maize flour	Soy beans	Groundnut
1	Cy-Na	NP*	1,000	NP	NP	4,800	1,000	NP
2	Cy-Mj	NP	NP	NP	750	1,200	NP	NP
3	Cy-Ng	NP	NP	1,500	6,000	10,000	NP	NP
4	Cy-Gg	NP	1,400	NP	2,500	18,000	NP	NP
5	Kz-Ut	NP	NP	NP	NP	4,700	1,000	NP
6	Kz-Na	NP	NP	NP	NP	3,600	NP	NP
7	Kz-Mj	NP	NP	NP	5,000	2,000	NP	NP
8	Kz-Mv	NP	NP	NP	NP	36,000	NP	NP
9	Kb-Mj	**	**	**	**	**	**	**
10	Kb-Mt	**	**	**	**	**	**	**
11	Kb-Tt	NP	NP	NP	2,000	1,000	NP	1,000
12	Kb-Kd	4,500	6,000	NP	NP	NP	NP	NP
Average		4,500	2,800	1,500	3,250	9,033	1,000	1,000

Source: Interview Survey Results by JICA Study Team, 2006 / NP*: No Purchasing / **: No response given by the interviewee

Part II

No	Recipient code	Cooking banana	Irish potatoes	Meat	Rice	Vegetables	Sugar	Cooking oil
1	Cy-Na	NP*	1,000	1,000	2,000	NP	NP	2,500
2	Cy-Mj	NP	4,000	1,000	860	NP	NP	2,000
3	Cy-Ng	NP	8,000	3,600	NP	NP	NP	5,000
4	Cy-Gg	NP	8,000	2,000	1,250	3,000	4,000	5,250
5	Kz-Ut	NP	20,000	36,000	4,000	NP	NP	6,000
6	Kz-Na	2,000	1,500	1,600	1,100	NP	NP	7,000
7	Kz-Mj	NP	NP	6,000	3,000	NP	2,000	4,000
8	Kz-Mv	NP	NP	7,000	8,400	NP	NP	6,000
9	Kb-Mj	**	**	**	**	**	**	**
10	Kb-Mt	**	**	**	**	**	**	**
11	Kb-Tt	NP	5,000	2,000	NP	3,500	NP	3,000
12	Kb-Kd	NP	NP	2,400	3,000	1,600	NP	4,800
Average		2,000	6,786	6,260	2,951	2,700	3,000	4,555

Source: Interview Survey Results by JICA Study Team, 2006 / NP*: No Purchasing / **: No response given by the interviewee

Final part

No	Recipient code	Salt	Beans	Honey	Tea	Total
1	Cy-Na	1,200	NP	NP	NP	14,500
2	Cy-Mj	800	NP	NP	NP	10,610
3	Cy-Ng	1,600	10,000	NP	NP	45,700
4	Cy-Gg	600	NP	NP	NP	46,000
5	Kz-Ut	2,000	NP	NP	NP	73,700
6	Kz-Na	1,600	NP	NP	NP	18,400
7	Kz-Mj	1,000	NP	6,000	NP	29,000
8	Kz-Mv	NP	NP	NP	NP	57,400
9	Kb-Mj	**	**	**	**	**
10	Kb-Mt	**	**	**	**	**
11	Kb-Tt	1,200	NP	NP	1,000	19,700
12	Kb-Kd	2,000	NP	NP	NP	24,300
Average		1,333	10,000	6,000	1,000	33,931

Source: Interview Survey Results by JICA Study Team, 2006 / NP*: No Purchasing
/ **: No response given by the interviewee

(3) QP3: Roadside Irrigation

Part I

No	Recipient code	Fish	Sweet potatoes	Sweet cassava	Cassava flour	Maize flour	Groundnut	Cooking banana
1	Cy-Ka	NA*	NA	NA	NA	NA	NA	NA
2	Cy-Mp	NA	NA	NA	NA	NA	1,000	NA
3	Cy-Mn	3,000	NA	NA	6,000	12,000	3,000	NA
4	Kz-Kt	NA	NA	NA	30,000	NA	NA	NA
5	Kz-Mm	NA	NA	NA	NA	NA	NA	NA
6	Kz-Me	NA	NA	1,600	8,000	3,000	NA	3,000
7	Kb-Mj	4,000	NA	NA	NA	6,000	NA	NA
8	Kb-Mc	NA	NA	NA	3,700	NA	NA	9,000
9	Kb-Ma	NA	6,000	2,000	18,000	10,000	NA	
Average		3500	6,000	1,800	13,140	7,750	2,000	6,000

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Not Applicable

Final part

No	Recipient code	Irish potato	Meat	Rice	Vegetables	Sugar	Cooking oil	Salt	Total
1	Cy-Ka	NA	7,500	8,000	5,000	4,700	7,500	1,200	**33,900**
2	Cy-Mp	NA	NA	NA	NA	NA	NA	1,000	**2,000**
3	Cy-Mn	9,000	6,000	3,000	3,000	3,000	3,000	2,000	**53,000**
4	Kz-Kt	20,000	2,800	NA	NA	NA	NA	2,000	**54,800**
5	Kz-Mm	13,000	8,400	2,400	5,000	NA	3,600	500	**32,900**
6	Kz-Me	2,000	4,800	2,000	2,400	NA	1,000	1,000	**28,800**
7	Kb-Mj	5,000	4,500	6,000	5,500	8,000	4,000	2,400	**45,400**
8	Kb-Mc	17,000	NA	3,300	2,200	NA	6,000	2,200	**43,400**
9	Kb-Ma	2,000	3,600	1,500	2,400	NA	5,000	2,000	**52,500**
Average		9,714	5,371	3,743	3,643	5,233	4,300	1,589	**38,522**

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Not Applicable

(4) QP4: Modern Cow Distribution

Part I

No	Recipient code	Sweet cassava	Cassava flour	Maize flour	Groundnut	Banana	Irish potatoes	Meat
1	Cy-Kj	**NP***	12,500	920	800	**NP**	2,000	9,000
2	Cy-Ms	**NP**	**NP**	2,400	1,200	**NP**	**NP**	**NP**
3	Cy-Mm	**NP**	10,800	560	**NP**	2,500	800	3,000
4	Kz-Km	**NP**	**NP**	**NP**	**NP**	**NP**	24,000	18,000
5	Kz-Me	**NP**	5,270	6,250	**NP**	**NP**	2,300	**NP**
6	Kz-Ko	**NP**	**NP**	**NP**	**NP**	**NP**	4,800	5,400
7	Kb-Mm	**NP**	**NP**	**NP**	**NP**	**NP**	300	**NP**
8	Kb-Gi	4000	7,500	2,550	1,500	**NP**	3,400	**NP**
9	Kb-Rj	**NP**	**NP**	12,000	**NP**	**NP**	4,000	**NP**
Average		4,000	9,017	4,113	1,166	2,500	5,200	8,850

Source: Interview Survey Results by JICA Study Team, 2006 / **NP: No Purchasing**

Final part

No	Recipient Code	Rice	Vegetables	Sugar	Cooking oil	Salt	Total
1	Cy-Kj	**NP**	6,000	**NP**	7,000	3,000	41,220
2	Cy-Ms	**NP**	2,300	2,200	1,500	750	10,350
3	Cy-Mm	**NP**	1,600	2,200	1,050	600	23,110
4	Kz-Km	5,500	25,000	3,500	9,600	2,880	88,480
5	Kz-Me	5,000	3,500	**NP**	2,400	650	25,370
6	Kz-Ko	1,500	3,600	2,400	3,000	600	21,300
7	Kb-Mm	**NP**	2,400	3,200	700	2,250	8,850
8	Kb-Gi	1,600	2,050	2,200	1,500	650	26,950
9	Kb-Rj	3,250	**NP**	2,100	1,000	900	23,250
Average		3,370	5,806	2,225	3,083	1,364	29,876

Source: Interview Survey Results by JICA Study Team, 2006 / **NP: No Purchasing**

Annex II: Summary Table for Non Food Expenditure (Unit: Rwf)

(1) QP1: Rainwater Storage

Part I

No	Recipient code	Domestic water	Kerosene	Firewood	Clothes	Soap	Lotion	Tooth cream
1	Cy-Rj	**	**	**	**	**	**	**
2	Cy-Ms	NP	NP	NP	NP	4,000	NP	NP
3	Cy-Gam	NP	800	NP	60,000	5,000	NP	NP
4	Cy-Mb	NP	1,200	NP	NP	1,000	1,080	450
5	Cy-Nf	NP	3,000	NP	11,000	4,700	8,000	750
6	Cy-Gal	NP	NP	NP	10,000	1,650	3,000	6,000
7	Kz-Bj	1,200	7,200	NP	30,000	7,000	6,000	NP
8	Kz-Nb	500	6,000	NP	30,000	6,000	7,200	NP
9	Kz-Kj	NP	1,300	NP	7,000	1,200	1,200	NP
10	Kz-Mv	NP	4,200	6,500	8,000	4,800	1,200	450
11	Kz-Ke	**	**	**	**	**	**	**
12	Kz-M	**	**	**	**	**	**	**
13	Kb-Kj	NP	5,000	NP	10,000	7,000	5,000	NP
14	Kb-Mfn	NP	5,000	NP	20,000	3,000	NP	NP
15	Kb-Ms	NP	3,000	14,000	82,000	3,600	3,000	600
16	Kb-Ne	NP	1,500	NP	9,000	2,400	1,500	1,200
17	Kb-Kl	NP	2,100	NP	3,000	2,300	780	NP
18	Kb-Mfs	NP	500	NP	5,000	2,000	1,000	NP
Average		850	3,138	10,250	21,923	3,710	3,247	1,575

Source: Interview Survey Results by JICA Study Team, 2006 / NP*: No Purchasing / **: No response given by the interviewee

Part II

No	Recipient code	Shoe cream	Shoes	Notebook	Radio	Watch	Blanket	Match
1	Cy-Rj	**	**	**	**	**	**	**
2	Cy-Ms	NP	NP	NP	NP	NP	NP	NP
3	Cy-Gam	NP	NP	NP	NP	NP	NP	NP
4	Cy-Mb	NP	NP	NP	NP	NP	NP	NP
5	Cy-Nf	NP	9,000	NP	NP	NP	NP	NP
6	Cy-Gal	1,050	NP	NP	2,500	1,500	NP	NP
7	Kz-Bj	NP	NP	12,000	NP	NP	NP	NP
8	Kz-Nb	NP	NP	NP	NP	NP	NP	2,000
9	Kz-Kj	NP	NP	NP	NP	NP	NP	NP
10	Kz-Mv	NP	NP	NP	NP	NP	NP	NP
11	Kz-Ke	**	**	**	**	**	**	**
12	Kz-M	**	**	**	**	**	**	**
13	Kb-Kj	400	3,600	1,500	NP	NP	NP	NP
14	Kb-Mfn	0	2,500	NP	NP	NP	3,600	NP
15	Kb-Ms	600	NP	NP	NP	NP	NP	NP
16	Kb-Ne	1,500	NP	NP	NP	NP	NP	NP
17	Kb-Kl	300	NP	NP	NP	NP	NP	NP
18	Kb-Mfs	NP	1,200	NP	NP	NP	3,500	NP
Average		770	4,075	6,750	2,500	1,500	3,550	2,000

Source: Interview Survey Results by JICA Study Team, 2006 / NP*: No Purchasing / **: No response given by the interviewee

Part III

No	Recipient code	Cutting hair	HH pots	House Keeper	Radio battery	Imisanzu	Ceremonial occasion	Shool fees
1	Cy-Rj	**	**	**	**	**	**	**
2	Cy-Ms	NP	1,500	NP	NP	NP	NP	400
3	Cy-Gam	NP	1,000	NP	NP	NP	NP	1,000
4	Cy-Mb	NP	NP	NP	NP	300	1,500	NP
5	Cy-Nf	NP	NP	NP	NP	600	1,500	NP
6	Cy-Gal	NP	NP	NP	NP	1,000	500	150,000
7	Kz-Bj	NP	9,800	NP	NP	NP	NP	1,200
8	Kz-Nb	3,600	NP	NP	NP	900	NP	1,200
9	Kz-Kj	2,700	NP	NP	NP	2,700	12,000	NP
10	Kz-Mv	NP	NP	NP	NP	900	2,000	NP
11	Kz-Ke	**	**	**	**	**	**	**
12	Kz-M	**	**	**	**	**	**	**
13	Kb-Kj	NP	NP	2,000	2,000	NP	12,000	300
14	Kb-Mfn	NP	NP	NP	2,000	NP	NP	300
15	Kb-Ms	NP	NP	NP	NP	300	20,000	NP
16	Kb-Ne	NP	NP	NP	NP	300	7,000	1,050
17	Kb-Kl	NP	1,200	NP	NP	800	10,300	NP
18	Kb-Mfs	NP	NP	NP	1,000	NP	NP	100
Average		3,150	3,375	2,000	1,667	867	7,422	17,283

Source: Interview Survey Results by JICA Study Team, 2006 / NP*: No Purchasing / **: No response given by the interviewee

Final part

No	Recipient code	Medical fees	Rental lands	Total
1	Cy-Rj	**	**	**
2	Cy-Ms	11,500	NP	17,400
3	Cy-Gam	NP	NP	67,800
4	Cy-Mb	NP	NP	5,530
5	Cy-Nf	3,000	NP	41,550
6	Cy-Gal	200,000	NP	377,200
7	Kz-Bj	1,800	NP	76,200
8	Kz-Nb	NP	NP	57,400
9	Kz-Kj	34,000	NP	62,100
10	Kz-Mv	12,100	NP	40,150
11	Kz-Ke	**	**	**
12	Kz-M	**	**	**
13	Kb-Kj	NP	10,000	58,800
14	Kb-Mfn	NP	6,000	42,400
15	Kb-Ms	10,000	15,000	152,100
16	Kb-Ne	1,000	NP	26,450
17	Kb-Kl	15,000	NP	35,780
18	Kb-Mfs	NP	NP	14,300
Average		32,044	10,333	71,677

Source: Interview Survey Results by JICA Study Team, 2006 / NP*: No Purchasing / **: No response given by the interviewee

QP2: Shallow Well Irrigation

Part I

No	Recipient code	Kerosene	Firewood	Clothes	Soap	Lotion	Tooth cream	Shoes cream
1	Cy-Na	3,600	NA*	10,000	5,000	NA	NA	NA
2	Cy-Mj	1,000	NA	NA	1,500	NA	NA	NA
3	Cy-Ng	4,000	NA	16,000	6,000	2,000	NA	NA
4	Cy-Gg	6,000	NA	25,300	1,800	7,460	NA	3,000
5	Kz-Ut	5,000	NA	20,000	8,000	6,000	NA	NA
6	Kz-Na	3,000	NA	16,000	3,000	3,000	700	400
7	Kz-Mj	2,400	NA	10,500	3,400	2,200	600	1,000
8	Kz-Mv	3,000	NA	17,000	1,000	NA	1,500	1,200
9	Kb-Mj	4,000	NA	2,000	NA	NA	NA	NA
10	Kb-Mt	300	NA	20,000	2,000	NA	NA	NA
11	Kb-Tt	700	5,000	10,000	1,200	2,400	3,600	3,000
12	Kb-Kd	1,000	NA	2,500	1,000	2,000	NA	8,000
Average		2,833	5,000	13,573	3,082	3,580	1,600	2,767

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Not Applicable

Part II

No	Recipient code	Shoes	Bicycle	Cow	Matress	Radio	Watch	Belt
1	Cy-Na	1,000	NA	NA	NA	2,500	NA	NA
2	Cy-Mj	NA*	NA	NA	NA	NA	NA	NA
3	Cy-Ng	6,000	NA	NA	NA	NA	NA	NA
4	Cy-Gg	800	NA	NA	NA	NA	700	600
5	Kz-Ut	NA	35,000	30,000	NA	4,700	NA	NA
6	Kz-Na	NA	18,000	NA	NA	4,500	NA	NA
7	Kz-Mj	8,800	20,000	NA	12,000	NA	700	NA
8	Kz-Mv	4,000	NA	NA	NA	NA	NA	NA
9	Kb-Mj	NA	NA	NA	NA	NA	NA	NA
10	Kb-Mt	4,800	NA	NA	NA	NA	NA	NA
11	Kb-Tt	9,000	NA	NA	NA	NA	NA	NA
12	Kb-Kd	8,000	NA	NA	NA	NA	NA	NA
Average		5,300	24,333	30,000	12,000	3,900	700	600

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Not Applicable

Part III

No	Recipient code	Blanket	Guitare	Cutting hair	HH pots	Radio battery	Tile	Imisanzu
1	Cy-Na	NA*	NA	NA	NA	NA	NA	300
2	Cy-Mj	NA	NA	NA	NA	NA	NA	NA
3	Cy-Ng	12,000	NA	NA	NA	NA	NA	1,300
4	Cy-Gg	NA	NA	NA	NA	NA	NA	600
5	Kz-Ut	2,000	NA	800	NA	NA	NA	1,400
6	Kz-Na	4,200	7,200	2,000	NA	4,000	NA	NA
7	Kz-Mj	2,000	NA	300	NA	1,800	NA	1,000
8	Kz-Mv	NA	NA	NA	NA	NA	NA	3,000
9	Kb-Mj	NA	NA	NA	1,800	NA	NA	NA
10	Kb-Mt	1,500	NA	NA	NA	NA	15,000	400
11	Kb-Tt	4,500	NA	NA	NA	NA	NA	500
12	Kb-Kd	NA	NA	NA	NA	NA	NA	1,200
Average		4,367	7,200	1,033	1,800	2,900	15,000	1,078

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Not Applicable

Final part

No	Recipient code	Ceremonial occasion	School fees	Medical fees	Rental lands	Total
1	Cy-Na	2,000	NA	20,000	NA	44,400
2	Cy-Mj	NA*	33,300	900	NA	36,700
3	Cy-Ng	8,000	2,100	12,000	NA	69,400
4	Cy-Gg	38,000	NA	1,100	NA	85,360
5	Kz-Ut	NA	NA	NA	12,000	124,900
6	Kz-Na	NA	NA	1,200	NA	67,200
7	Kz-Mj	3,000	NA	4,000	20,000	93,700
8	Kz-Mv	60,000	10,000	150,000	5,000	255,700
9	Kb-Mj	NA	21,000	NA	NA	28,800
10	Kb-Mt	5,000	200	450	NA	49,650
11	Kb-Tt	35,000	NA	2,000	NA	76,900
12	Kb-Kd	2,400	300	NA	NA	26,400
Average		19,175	11,150	21,294	12,333	79,926

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Not Applicable

(3) QP3 : Roadside Irrigation

Part I

No	Recipient code	Kerosene	Clothes	Soap	Lotion	Tooth cream	Shoes cream
1	Cy-Ka	NA	15,000	2,100	3,000	1,500	NA
2	Cy-Mp	NA	NA	1,000	NA	NA	NA
3	Cy-Mn	3,600	15,000	1,200	5,200	2,400	NA
4	Kz-Kt	NA	30,000	1,500	3,000	NA	NA
5	Kz-Mm	6,000	20,000	3,000	1,000	NA	NA
6	Kz-Me	3,200	20,000	3,000	2,000	NA	NA
7	Kb-Mj	7,200	25,000	4,400	3,600	2,500	2,000
8	Kb-Mc	NA	19,000	3,400	4,600	2,700	NA
9	Kb-Ma	5,000	51,000	NA	NA	NA	NA
Average		5,000	24,375	2,450	3,200	2,275	2,000

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Not Applicable

Part II

No	Recipient code	Construction of house	Mobile phone	Radio	Chairs	Blanket	HH pots
1	Cy-Ka	NA	NA	NA	NA	NA	NA
2	Cy-Mp	NA	NA	NA	NA	NA	NA
3	Cy-Mn	NA	NA	NA	NA	NA	7,200
4	Kz-Kt	NA	NA	NA	NA	NA	NA
5	Kz-Mm	NA	NA	NA	NA	NA	5,000
6	Kz-Me	NA	NA	NA	NA	NA	NA
7	Kb-Mj	350,000	45,000	NA	NA	NA	NA
8	Kb-Mc	NA	NA	NA	8,000	NA	NA
9	Kb-Ma	NA	NA	7,000	NA	10,000	6,000
Average		350,000	45,000	7,000	8,000	10,000	6,067

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Not Applicable

Final part

No	Recipient code	Imisanzu	Ceremonial occasion	School fees	Medical fees	Rental Lands	Total
1	Cy-Ka	900	NA	NA	6,000	NA	**28,500**
2	Cy-Mp	NA	NA	900	40,000	NA	**41,900**
3	Cy-Mn	NA	NA	NA	NA	NA	**34,600**
4	Kz-Kt	NA	NA	NA	9,000	NA	**43,500**
5	Kz-Mm	900	20,000	NA	NA	NA	**55,900**
6	Kz-Me	1,800	NA	2,000	8,000	2,000	**42,000**
7	Kb-Mj	1,350	6,000	600	10,000	15,000	**472,650**
8	Kb-Mc	NA	NA	NA	9,000	NA	**46,700**
9	Kb-Ma	1,000	40,000	1,200	NA	NA	**121,200**
Average		1,190	22,000	1,175	13,667	8,500	**98,550**

Source: Interview Survey Results by JICA Study Team, 2006 / NA*: Not Applicable

(4) QP4 non food expenditure (Modern Cow Distribution)

Part I:

No	Recipient code	Domestic water	Kerosene	Clothes	Soap	Lotion	Tooth cream	Shoes cream
1	Cy-Kj	**NP***	2,000	13,000	3,000	1,200	1,200	0
2	Cy-Ms	**NP**	1,500	2,700	750	1,500	900	0
3	Cy-Mm	**NP**	**NP**	10,000	900	3,000	600	0
4	Kz-Km	18,000	7,200	60,000	30,000	4,000	1,200	1,200
5	Kz-Me	**NP**	3,240	6,000	850	4,000	720	0
6	Kz-Ko	**NP**	3,000	30,000	1,200	6,000	1,500	1,800
7	Kb-Mm	**NP**	1,800	**NP**	1,000	**NP**	**NP**	**NP**
8	Kb-Gi	**NP**	1,500	**NP**	1,000	800	360	**NP**
9	Kb-Rj	**NP**	**NP**	30,000	4,500	**NP**	300	900
Average		18,000	2,891	21,671	4,800	2,929	848	1,300

Source: Interview Survey Results by JICA Study Team, 2006 / **NP: No Purchasing**

Part II:

No	Recipient code	Shoes	Aid to relatives	Cutting hair	HOUSEHOLD pots	House keeper	Radio battery	Imisanzu
1	Cy-Kj	12,000	NP	NP	NP	NP	2,500	NP
2	Cy-Ms	NP*	NP	NP	NP	NP	NP	600
3	Cy-Mm	NP	NP	NP	NP	NP	NP	300
4	Kz-Km	10,000	45,000	4,800	5,000	72,000	NP	16,400
5	Kz-Me	2,800	NP	2,500	NP	NP	NP	500
6	Kz-Ko	NP	NP	NP	NP	NP	NP	4,550
7	Kb-Mm	400	NP	NP	NP	NP	NP	NP
8	Kb-Gi	NP	NP	NP	NP	NP	NP	600
9	Kb-Rj	NP	NP	NP	NP	NP	NP	1,800
Average		6,300	45,000	3,650	5,000	72,000	2,500	3,094

Source: Interview Survey Results by JICA Study Team, 2006 / **NP*: No Purchasing**

Final part:

No	Recipient code	Ceremonial occasion	Shool fees	Medical fees	Rental lands	Total
1	Cy-Kj	NP	NP	NP	NP	34,900
2	Cy-Ms	NP	NP	4,200	NP	12,150
3	Cy-Mm	NP	NP	1,000	NP	15,800
4	Kz-Km	100,000	2,400	12,000	NP	389,200
5	Kz-Me	10,000	NP	NP	NP	30,610
6	Kz-Ko	NP	30,000	20,000	NP	98,050
7	Kb-Mm	NP	300	NP	NP	3,500
8	Kb-Gi	15,000	15,000	3,600	30,000	67,860
9	Kb-Rj	NP	30,000	5,000	NP	72,500
Average		41,667	15,540	7,633	30,000	80,508

Source: Interview Survey Results by JICA Study Team, 2006 / **NP: No Purchasing**

Annex III : Questionnaire used for the Household Economy Baseline Assessment on the QP Model farmers in Ntarama Sector / District of Bugesera

Household Economy Survey for QP model farmers in Ntarama Sector

Notice:
Period asked in each question: July 2005 – June 2006
Season C: Jul-Sep 2005 → ***Season A: Sep 2005-Jan 2006*** → ***Season B: Feb-Jun 2006***

Relation of Quick Project and Each Questionnaire **Remark: A refers to applicable.**

	Quick Project	Header	Chap1	Chap2	Chap3	Chap4	Chap5	Chap6
1	Rain water Storage	A	A	A	A	A	A	A
2	Shallow well irrigation	A	A	A	A	A	A	A
3	Roadside irrigation	A	A	A	A	A	A	A
4	Modern Cow distribution	A	A	A	A	A	A	A

Header

1	**Applicable Quick Project No. (Check No) : 1._____, 2._____, 3._____, 4._____, If QP2 is checked, go next.**
	FH belongs to which shallow well site: 1. Cell Name_____: 2. Site Name _____:
2	**Name of enumerator: _____; Date:____ day____ month_____ _year**
3	**Name of Household Head: _____(Age: _____ *F /M*) ; Academic background :_____years**
4	**Name of *Umudugudu:* _____;*Cell:* _____;*Sector:*_____ :___**

1. General

About your family					
1.	Year immigrated to : 1. Immigrated on _____month_____year, 2. Born here				
2.	How many members are there in your family (living together including yourself)?				_____
3.	How many are engaged in farming?				_____
4.	No	Member	Age	Sex	Academic Background (Total Years)
	1	Wife / Husband			
	2	1. 2. 3. 4. 5. 6.			
	3	1. 2. 3. 4. 5. 6.			
	4	1. 2. 3. 4. 5. 6.			
	5	1. 2. 3. 4. 5. 6.			
	6	1. 2. 3. 4. 5. 6.			
	7	1. 2. 3. 4. 5. 6.			
	8	1. 2. 3. 4. 5. 6.			

	9	1. 2. 3. 4. 5. 6.			
	10	1. 2. 3. 4. 5. 6.			
	Member : 1. Son, 2.Daughter, 3.Adapted child, 4. Relative, 5. Friend, 6.Other				
5.	Who is a principle decision-maker or manager of house economy?				
	1	Farming practice and its expenditure	1. husband, 2. wife, 3.bothouseholdusband and wife, 4.other (_____)		
	2	Family food	1. husband, 2. wife, 3.bothouseholdusband and wife, 4.other (_____)		

6.	Meal											
	1	How many times do you usually have meal per day?										
	Month	8	9	10	11	12	1	2	3	4	5	6	7
	Time/ day												
	2	What is your family's staple food? (Chose all choice that is applicable.)											
	Season	Season C				Season A				Season B			
	Staple Food	1. Sorghum, 2.Maize 3. H/Bean 4.Banana, 5.Cassava, 6. S/Potato, 7.Others_____				1. Sorghum, 2.Maize 3. H/Bean 4. Banana, 5.Cassava, 6. S/Potato, 7.Others_____				1. Sorghum, 2.Maize 3. H/Bean 4.Banana, 5.Cassava, 6. S/Potato, 7.Others_____			

Land Tenure

7.	1. How many farm lands (including farmyard, crops) do you have?		_____ (ha) ____ (No of parcel sites)
	2 How many cultivated area do you own? (except for the area you lend)		_____ (ha) ____ (No of parcel sites)
	2-1	Hilly side: 1. With irrigation or 2. Rainfed, 3.Both	_____ (ha) ____ (parcel sites) , 1. 2. 3.
	2-2	Marshland (Igishanga): 1. With irrigation or 2. Rainfed, 3. Both	_____ (ha) ____ (parcel sites) , 1. 2. 3.
	2-3	Wetland (Akabande): 1. With irrigation or 2. Rainfed, 3. Both	_____ (ha) ____ (parcel sites) , 1. 2. 3.
	3. How many farm plots do you borrow?		_____ (ha) ____ (No of parcel sites)
	3-1	Hilly side: 1. With irrigation or 2. Rainfed, 3. Both	_____ (ha) ____ (parcel sites) , 1. 2. 3.
	3-2	Marshland (Igishanga): 1. With irrigation or 2. Rainfed, 3. Both	_____ (ha) ____ (parcel sites) , 1. 2. 3.
	3-3	Wetland (Akabande): 1. With irrigation or 2. Rainfed, 3. Both	_____ (ha) ____ (parcel sites) , 1. 2. 3.
	4. How many farm plots do you lend?		_____ (ha) ____ (parcel sites) , 1. 2. 3.
	4-1	Hilly side: 1. With irrigation or 2. Rainfed, 3. Both	_____ (ha) ____ (parcel sites) , 1. 2. 3.

	4-2	Marshland (Igishanga): 1. With irrigation or 2. Rainfed, 3. Both	_____ (ha) ____ (parcel sites) , 1. 2. 3.
	4-3	Wetland (Akabande): 1. With irrigation or 2. Rainfed, 3. Both	_____ (ha) ____ (parcel sites) , 1. 2. 3.

2. Income (July 2005 –June 2006)

Income from Farming (except for Association Activity)

8.	Kind	Plant month	Harvest month	Yield	Sales	Unit Price	Amount
	Season A (September, 2005 to January 2006)						
	Maize	Planting Period: From [_____month] to [_____ month]					_____ __frw
		Harvesting period: From [_____ month] to [_____month] = [ ] months					
		Number of times for sale of cobs [_____times]					
		Number of cobs per each sale [_____cobs], Sale price= [_____Frw/cob]					
		Number of bags for sale of maize grains [_____ times] , Sale Price= [_____ Frw/bag]					
	Haricot Bean	Planting Period: From [_____month] to [_____ month]					_____ __frw
		Harvesting period: From [_____ month] to [_____month] = [ ] months					
		Number of times for sale of **green pods** [_____times]					
		Unit for sale: 1. Basket [ ], 2. Plate [ ], 3. Heap [ ] , 4.Others [ ]					
		Unit Price [_____Frw/unit [ ], Sale Amount [					
		Number of times for sale of **dry beans** [_____ times]					
		Unit for sale: 1. Basket [ ], 2. Plate [ ], 3. Heap [ ] , [					
		Unit Price [_____Frw/unit [ ]、Sale Amount [_____ Frw/each time]					
	Sweet Potato	Planting Period: From [_____month] to [_____ month]					_____ __frw
		Harvesting period: From [_____ month] to [_____month] = [					
		Number of times for sale of sweet potato [_____times]					
		Unit for sale: 1. Basket [ ], 2. Plate [ ], 3. Heap [ ] , 4.Others [ ]					
		Sale Amount [_____ Frw/each time]					
	Tomato	Planting Period: From [_____month] to [_____ month]					_____ _frw
		Harvesting period: From [month] to [month] =					
		Number of times harvesting / week: [times]					
		Did you sell it or not at each time? 1. [_____yes] ,					
		Sale amount per each time: [_____Frw/time in average]___					
	Other Vegetables-1 [ ]	Planting Period: From [_____month] to [_____ month]					_____ __frw
		Harvesting period: From [_____ month] to [_____month] =					
		Number of times harvesting / week: [_____times]					
		Did you sell it or not at each time? 1. [_____yes] ,					

		Sale amount per each time: [_____Frw/time in average]___	
	Other Vegetables-2 [ ]	Planting Period: From [_____month] to [_____ month]	_____ __frw
		Harvesting period: From [_____ month] to [_____month] =	
		Number of times harvesting / week: [_____times]	
		Did you sell it or not at each time? 1. [_____yes] ,	
		Sale amount per each time: [_____Frw/time in average]___	
			_____ __frw
			_____ __frw
		Season B (February –June 2006)	
	Sorghum	Planting Period: From [_____month] to [_____ month]	_____ _frw
		Harvesting period: From [_____ month] to [_____month] =	
		Number of times for sale of grain sorghum [_____times]	
		Unit for sale: 1. Bag [ ], 2. kg [ ], 3.Others [ ]	
		Sale Price : [_____Frw/unit [1., 2., 3.,]	
	Maize	Planting Period: From [_____month] to [_____ month]	_____ _frw
		Harvesting period: From [_____ month] to [_____month] =	
		Number of times for sale of cobs [_____times]	
		Number of cobs per each sale [_____cobs], Sale price=	
		Number of bags for sale of maize grains [_____ times] , Sale Price=	
	Haricot Bean	Planting Period: From [_____month] to [_____ month]	_____ _frw
		Harvesting period: From [_____ month] to [_____month] =	
		Number of times for sale of **green pods** [_____times]	
		Unit for sale: 1. Basket [ ], 2. Plate [ ], 3. Heap [ ] ,	
		Unit Price [_____Frw/unit [ ], Sale Amount	
		Number of times for sale of **dry beans** [_____ times]	
		Unit for sale: 1. Basket [ ], 2. Plate [ ], 3. Heap [ ] ,	
		Unit Price [_____Frw/unit [ ], Sale Amount	
	Sweet Potato	Planting Period: From [_____month] to [_____ month]	_____ _frw
		Harvesting period: From [_____ month] to [_____month] =	
		Number of times for sale of sweet potato [_____times]	
		Unit for sale: 1. Basket [ ], 2. Plate [ ], 3. Heap [ ] ,	
		Sale Amount [_____ Frw/each time in average]	
	Cassava	Planting Period: From [_____month] to [_____ month]	_____ _frw
		Harvesting period: From [_____ month] to [_____month] =	
		Number of times for sale of Cassava [_____times]	
		Unit for sale: 1. Basket [ ], 2. Plate [ ], 3. Heap [ ] ,	

		Sale Amount [_____ Frw/each time in average]	
	Tomato	Planting Period: From [_____month] to [_____ month] Harvesting period: From [_____ month] to [_____month] = Number of times harvesting / week: [_____times] Did you sell it or not at each time? 1. [_____yes] , Sale amount per each time: [_____Frw/time in average]___	_____ _frw
	Other Vegetables	Planting Period: From [_____month] to [_____ month] Harvesting period: From [_____ month] to [_____month] = Number of times harvesting / week: [_____times] Did you sell it or not at each time? 1. [_____yes] , Sale amount per each time: [_____Frw/time in average]___	_____ _frw
			_____ _frw
			_____ _frw
Season C(July 2005 – March 2006 for Igishanga/ Akabande Only)			
	Sweet Potato	Planting Period: From [_____month] to [_____ month] Harvesting period: From [_____ month] to [_____month] = Number of times for sale of sweet potato [_____times] Unit for sale: 1. Basket [ ], 2. Plate [ ], 3. Heap [ ] , Sale Amount [_____ Frw/each time in average]	_____ _frw
	Tomato	Planting Period: From [_____month] to [_____ month] Harvesting period: From [_____ month] to [_____month] = Number of times harvesting / week: [_____times] Did you sell it or not at each time? 1. [_____yes] , Sale amount per each time: [_____Frw/time in average]___	_____ _frw
	Maize	Planting Period: From [_____month] to [_____ month] Harvesting period: From [_____ month] to [_____month] = Number of times for sale of cobs [_____times] Number of cobs per each sale [_____cobs], Sale price= Number of bags for sale of maize grains [_____ times] , Sale Price=	
	Other Vegetables [ ]	Planting Period: From [_____month] to [_____ month] Harvesting period: From [_____ month] to [_____month] = Number of times harvesting / week: [_____times] Did you sell it or not at each time? 1. [_____yes] , Sale amount per each time: [_____Frw/time in average]___	_____ _frw
	Other Vegetables [ ]	Planting Period: From [_____month] to [_____ month] Harvesting period: From [_____ month] to [_____month] = Number of times harvesting / week: [_____times] Did you sell it or not at each time? 1. [_____yes] ,	_____ _frw

		Sale amount per each time: [_____Frw/time in average]___	
			_____ _frw

Permanent Crop												
Banana (1)	**[For Brewing of Banana Beer Variety]** No of Bunches harvested in each month (in average)											
Month	8	9	10	11	12	1	2	3	4	5	6	7
Bunches Harvested No												
Bunches Sold No												
Total Number of Bunches sold [_____Bunches/Year] , Sale Price of Bunch												
Total Income: [_____Frw/Year]												
Banana (2)	**[For Cooking Banana Variety]** No of Bunches harvested in each month (in average)											
Month	8	9	10	11	12	1	2	3	4	5	6	7
Bunches Harvested No												
Bunches Sold No												
Total Number of Bunches sold [_____Bunches/Year] , Sale Price of Bunch												
Total Income: [_____Frw/Year]												
Banana (3)	**[For Fresh Fruit Banana Variety]** No of Bunches harvested in each month (in average)											
Month	8	9	10	11	12	1	2	3	4	5	6	7
Bunches Harvested No												
Bunches Sold No												
Total Number of Bunches sold [_____Bunches/Year] , Sale Price of Bunch												
Total Income: [_____Frw/Year]												
Other Fruit [ ]	**[For Fresh Fruit]** No of Fruits harvested in each month (in average)											
Month	8	9	10	11	12	1	2	3	4	5	6	7
Fruit Harvested No												
Fruits Sold No												
Total Number of Bunches sold [_____Pieces/Year] , Sale Price of Fruit [_____Frw/Piece in average]												
Total Income: [_____Frw/Year]												
Other Fruit [ ]	**[For Fresh Fruit] No of Fruits harvested per each month (in average)**											
Month	8	9	10	11	12	1	2	3	4	5	6	7
Fruit Harvested No												
Fruits Sold No												
Total Number of Bunches sold [_____Pieces/Year] , Sale Price of Fruit [_____Frw/Piece in average]												
Total Income: [_____Frw/Year]												
Trees	**[Timber or Log] No of Timbers or Logs sold per each month in average**											
Species	**Name of Tree Species [_____]**											
Month	8	9	10	11	12	1	2	3	4	5	6	7
Timber Cutting No												

Timber Sold No												
Total Number of Timbers sold [_____ Timbers/Year]												
Total Income: [_____Frw/Year]												
Trees Seedlings	**[Seedlings] No of Seedlings sold per each month in average**											
Species	**Name of Tree Species [_____]**											
Month	8	9	10	11	12	1	2	3	4	5	6	7
No of Seedlings sold												
Total Number of Seedlings sold [_____ seedlings/Year], Sale Price of seedling [_____Frw/tree]												
Total Income: [_____Frw/Year]												

Income from Livestock (except for Association Activity)

9.	Do you have livestock?	1. Yes (answer below), 2. No			
	Kind	Rearing Numbers	Sales	Unit Price	Amount
	Goat		_____head/year	_____frw/head	_____frw/year
	Ankole Cow		_____head/year	_____frw/head	_____frw/year
	Crossbred Cow		_____head/year	_____frw/head	_____frw/year
	Cow Milk	—	_____Lt/Day	_____frw/Lt	_____frw/year
	Other Cattle (Calf)		_____head/year	_____frw/head	_____frw/year
	Chicken		_____head/year	_____frw/head	_____frw/year
	Chicken egg	—	_____pc/year	_____frw/pc	_____frw/year
	Sheep		_____head/year	_____frw/kg	_____frw/year
	Honey	—	_____kg/year	_____frw/kg	_____frw/year
	Fishing	—	_____pc/year	_____pc/year	_____frw/year

Income from Off Farming (except for Association Activity)

10.	Kind of Income source	Qty	Unit Price	Amount
	Casual work	_____day/year	_____frw/day	_____frw/year
	Lending Land	_____ha or parcel	_____frw/ha or parcel /year	_____frw/year
	Banana Beer	_____jerry can/year	_____frw/jerry can	_____frw/year

	Sorghum Beer	_____jerry can/month × _____month	_____frw/jerry can	_____frw/year
	Donation	_____frw /month × _____month		_____frw/year
	Carpentry	_____time/year	_____frw/time (in average)	_____frw/year
	Pension	_____ Month/year	_____ Frw /month	_____frw/year

3. Expenditure

Expenditure for Farming (except for Association Activity)

11.	Items (kind)	Qty	Unit Price	Amount
	Seed (	_____kg or bag/year	_____frw/kg or bag	_____frw/year
	Fertilizer (	_____kg or bag/year	_____frw/kg or bag	_____frw/year
	Pesticide (	_____kg or bag/year	_____frw/kg or bag	_____frw/year
	Tools	_____Pieces/year	_____frw/Piece	_____frw/year
	Transportation cost for Agricultural activity	_____ Times/year	_____ Frw/time	_____frw/year

Expenditure for Hired Labour (except for Association Activity)

12.	Operation	Season (A, B, C)	man-day (No of workers x days)	Unit Price (Frw/man-day)	Amount (Frw/year)
	Ploughing				
	Weeding				
	Harvesting				

Expenditure for Food (Season refers to the1st Page)

13.	Kind	Season A (Frw/month)	Season B (Frw/month)	Season C (Frw/month)
	Sorghum grains			
	Sweet Potato			
	Cassava			

	Cassava flour			
	Maize flour			
	Beans			
	Soybeans			
	Groundnut			
	Banana			
	Irish potato			
	Meat			
	Rice			
	Vegetables			
	Sugar			
	Cooking Oil			
	Salt			
	Milk			
	Honey			

Expenditure for Non food Items (except for Association Activity)

14.	Kind	Season A	Season B	Season C
	Domestic Water	_____Jerry can/day ×_____frw/jerry can	_____Jerry can/day ×_____frw/jerry can	_____Jerry can/day ×_____frw/jerry can
	Kerosene	_____Frw/month	_____Frw/month	_____Frw/month
	Firewood	_____Frw/month	_____Frw/month	_____Frw/month
	Clothes	_____Frw/month	_____Frw/month	_____Frw/month

	Soap	____________Frw/month	____________Frw/month	____________Frw/month
	Lotion	____________Frw/month	____________Frw/month	____________Frw/month
	Tooth cream	____________Frw/month	____________Frw/month	____________Frw/month
	Shoo cream	____________Frw/month	____________Frw/month	____________Frw/month
		____________Frw/month	____________Frw/month	____________Frw/month
		____________Frw/month	____________Frw/month	____________Frw/month
		____________Frw/month	____________Frw/month	____________Frw/month
		____________Frw/month	____________Frw/month	____________Frw/month
	Others			
	Umusanzu	________time /year	_________frw/time	____________frw/year
	Contribution in community except for Umusanzu	________time /year	_________frw/time	____________frw/year
	Ceremonial Occasion	____________frw/year		
	School Fee	____________frw/year		
	Medical Fee	____________frw/year		
	Rental Land	____________frw/year		

4. Association Activity (If you belong to Association)

General			
15.	1) Name of Association:________________________________		
	2) Year, month to be a member: ____________________		
	3) Number of Members ____________________		
	5) Main activities of Association (Just check 1 or 2)	1. Farming 2. Non Farming (Specified) ______________________________ ______________________________________ ____________:	
Land Tenure			
16.	1 How many farm plots does association have?		_____ (ha) _____ (parcel sites)
	1-1 Hilly side:	1. With irrigation, 2. Rainefed, 3 Both	_____ (ha) _____ (parcel sites) 1. 2. 3.

	1-2	Marshland (Igishanga): 1. With irrigation, 2. Rainfed, 3. Both	_____ (ha) ____ (parcel sites) 1. 2. 3
	1-3	Wetland (Akabande): 1. With irrigation, 2. Rainfed, 3. Both	_____ (ha) ____ (parcel sites) 1. 2. 3.

Income/Year

17.	Items (quota /member)	Amount you get from:	Amount you sold to:
		: _____kg or Bags _____	Amount: _____ kg _____ or _____ Frw _____ bags _____
		: _____kg or Bags _____	Amount: _____ kg _____ or _____ Frw _____ bags _____
		: _____kg or Bags _____	Amount: _____ kg _____ or _____ Frw _____ bags _____
		: _____kg or Bags _____	Amount: _____ kg _____ or _____ Frw _____ bags _____
		: _____kg or Bags _____	Amount: _____ kg _____ or _____ Frw _____ bags _____
		: _____kg or Bags _____	Amount: _____ kg _____ or _____ Frw _____ bags _____

Expenditure

18.	Kind of Income Source	Amount
	Entrée Fee	. _____ frw
	Member fee /1. Year or 2. Month	. _____ frw
		. _____ frw
		. _____ frw

5. Traditional Support Systems in Rural Community

19.	Umuganda		
	1	Participation	1.Yes, 2.No (Reason if any_____)
	2	Frequency to participate	1. Once a month, 2. other _____
	3	What kind of activities	1. Repairing road, 2 Repairing house of vulnerable people, 3. Farming in communal land, 4.other _____ _____ _
	Ubudehe		

	1	Participation	1.Yes, 2.No. (Reason if any_____)
	2	Situation	1. We call people to help us. 2.We are called by people to help them 3. We call and also we are called
	3	What kind of activities	1. Ploughing for _____crop, 2. Harvesting of _____ 3. other_____
	3	Frequency	1.Every year, 2.Sometimes3. Rarely 4.other_____
	Ibimina		
	1	Participation	1.Yes, 2.No. (Reason if any_____
	2	Number of members	_____
	3	How much do you pay per month	_____frw /month
	4	How much do you get	_____time per year, _____frw /time
	Kugurizanya		
	1	Participation	1.Yes, 2.No. (Reason if any_____)
	2	What kind of activities	1. Borrowing and lending money (how much_____frw/time) 1. Ploughing for _____crop, 2. Harvesting of _____ 3. other_____
	3	Frequency	1.Every year, 2.Sometimes3. Rarely 4.other_____

6. Others

Fetching water and Collecting firewood				
20.	**Fetching Water**			
	How many water do you need per day by Jerry Can basis? 20 Lt JC x [ ] + 10 Lt JC [ ] + 5 Lt JC [ ]			
	What are your water sources for domestic use? 1. Tap water, 2. River, 3. Lake water, 4 marsh/swamp water			
	Do you have any rain water storage system ? 1. Yes, 2.No			
	If you have, how much rain water could you store per day under normal rain? [ ] Jerry can/day			
	Season	How much jerry can/day does your family fetch (except for purchase)?	How many times /day does it take to fetch water?	How many hours / each time does it take to fetch water
	A			
	B			
	C			
21.	Collecting Firewood			
	Season	How many times /week does it take to collect firewood?	How many hours /time does it take to collect firewood?	
	A			
	B			

	C		

Spare Time

22.	What day of the week do you take rest? [_____Day]
	Regular working hours per day [From _____am to _____pm: Hours/day]
	What do you do in your spare time?
	1. We don't have spare time 2. To take rest 3. To visit friends or relatives 4. To do some group activities (kind of activities_____ 5. To take care or play with our children 6. Others _____ _____ ___

Soil fertility

23.	1	Do you observe any change of your production (Quantity) in a same plot over past 10 years ? **[Normal Year]**	Legume Crops 1. Increase 2. Stable 3. Decrease	Serial Crops 1 Increase 2. Stable 3.Decrease	Tuber Crops 1.Increase 2.Stable 3.Decrease
	2	If answer of Q23-1 is 3, this change is caused by what factor You assume?	1. Decrease of soil fertility 2. Increase of Pest/Disease 3. Both 1 & 2	1. Decrease of soil fertility 2. Increase of Pest/Disease 3. Both 1 & 2	1. Decrease of soil fertility 2. Increase of Pest/Disease 3. Both 1 & 2
	3	Do you use chemical fertilizer?	1.Yes, 2.No If Yes, Go to below. Target Crop:[1._____ 2. _____ 3._____] Quantity: [1._____kg/Crop, 2._____ kg/Crop, 3._____kg/Crop]		
	4	Do you use manure?	1.Yes, 2.No		
	5	How do you get manure?	1. Making from own livestock, 2 Get from neighbours 3. Other (Specified) _____		
	6	What kind of irrigation method have you practiced ?	1. Bucket Irrigation (Watering Can), 2. Roadside Irrigation (trap rainwater), 3. Pump irrigation 2. Target Crop (Specified)_____ _____:		

Health

24.	How many times do you (and your children if you have) suffer from diarrhea?	
	Person	Frequency
	You	1-2/year, 3-4/year, 5-6/year, 1/month, 2/month, 3/month, 1/week, other_____
	Yong child	1-2/year, 3-4/year, 5-6/year, 1/month, 2/month, 3/month, 1/week, other_____
		1-2/year, 3-4/year, 5-6/year, 1/month, 2/month, 3/month, 1/week, other_____
		1-2/year, 3-4/year, 5-6/year, 1/month, 2/month, 3/month, 1/week, other_____
25.	Apart from diarrhea, what health problem do you often get ?	

	Person	Frequency
	You	Problem: _____:_ _____: times /year
	Your Child	Problem: _____:_ _____: times /year
		Problem: _____: _____: times /year
		Problem: _____:_ _____: times /year
		Problem: _____: _____: times /year
		Problem: _____:_ _____: times /year
	How many times do you or your child usually go to nutrition center ? [ ] per 1. Month, or 2. Year	
Draught Coping measures		
27.	How do you cope with severe drought year for survival? (check as much as applicable below)	
	1. Casual Work 2. Sales of Livestock 3. Asking loan to relatives 4. Asking Donation 5. Emigration to other place 6. Sale of Farmland 7. Others_____ _____ _____ :	
	What is your vision to cope with severe draught when you are faced?	
	Your Vision or Plan: _____ _____ _____: _____ _____ _____: _____ _____ _____: _____ _____ _____: _____ _____ _____:	