No.

The Republic of Rwanda

Ministry of Agriculture and Animal Resources

THE STUDY ON
SUSTAINABLE RURAL AND AGRICULTURAL DEVELOPMENT
IN
BUGESERA DISTRICT, EASTERN PROVINCE
IN
THE REPUBLIC OF RWANDA

FINAL REPORT

January 2009

JAPAN INTERNATIONAL COOPERATION AGENCY

SANYU CONSULTANTS INC.

NIPPON KOEI CO., LTD.

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PREFACE

In response to the request from the Government of Rwanda, the Government of Japan decided to conduct the study on Sustainable Rural and Agricultural Development in Bugesera District and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Michio GOTO of Sanyu Consultants Inc. and consists of Nippon Koei Co., LTD in a series of missions between February 2006 and November 2008.

The study team held discussions with the officials concerned of the Government of Rwanda and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the further promotion and implementation of the projects proposed therein and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the people of Rwanda and the officials concerned of the Government of Rwanda for their close cooperation extended to the study team.

January 2009

MATSUMOTO Ariyuki
Vice-President
Japan International Cooperation Agency

January 2009

Mr. MATSUMOTO Ariyuki
Vice-president
Japan International Cooperation Agency (JICA)

Letter of Transmittal

Dear Mr. MATSUMOTO,

We are pleased to submit herewith the Final Report on the Study on Sustainable Rural and Agricultural Development in Bugesera District, Eastern Province in the Republic of Rwanda. This Report was prepared incorporating with the advices and suggestions given by the authorities concerned of the Government of Japan and your good Agency through various kinds of site survey for over 34-month period from February 2006 to November 2008. Also included are comments made by the steering committee chaired by the Ministry of Agriculture and Animal Resources (MINAGRI), and the related organizations and local people during the technical discussions on the draft final report which were held at Kigali city and Bugesera District in November 2008.

The goal of this Study is to realize sustainable food security and poverty alleviation by improving livelihood of local population through implementing the sustainable agricultural and rural development in the Bugesera District, Eastern Province in Rwanda. The Study has been conducted in partnership with and by guidance from the MINAGRI, and incorporated the views of the beneficiaries and other stakeholders such as Bugesera District, Ntarama Sector, Ruhuha Sector, relevant organizations and local population. The process of this Study centered on the followings which themselves were the objectives of the Study:

1) Formulating an action plan for agricultural and rural development that reflects real needs of population in the Area allowing their own participation therein in a sustainable manner.
2) Capacity building of the administrative staff (in District and agricultural research institutes) and rural organization through the implementation of the pilot project.

To attain the above objectives, this Study was carried out in a phased manner divided into two; namely, Phase I dealing with the baseline survey for agricultural and rural development potential and constraints, implementing the Quick Project (QP) based on the needs of local population which are low cost, adequate techniques, and also immediately
appearing the effectiveness and selection of the pilot project (PP) components sites, and Phase II which were to implement the PP, monitoring and evaluation of the QP, & PP, to hold the technology transfer seminar in the presence of all stakeholders and also to provide the information and lessons learnt through the Study which are necessary to implement self-help and sustainable projects by local population in the DDP. The Phase I started in April 2006, and the Study itself completed in November 2008 upon presenting this Final Report.

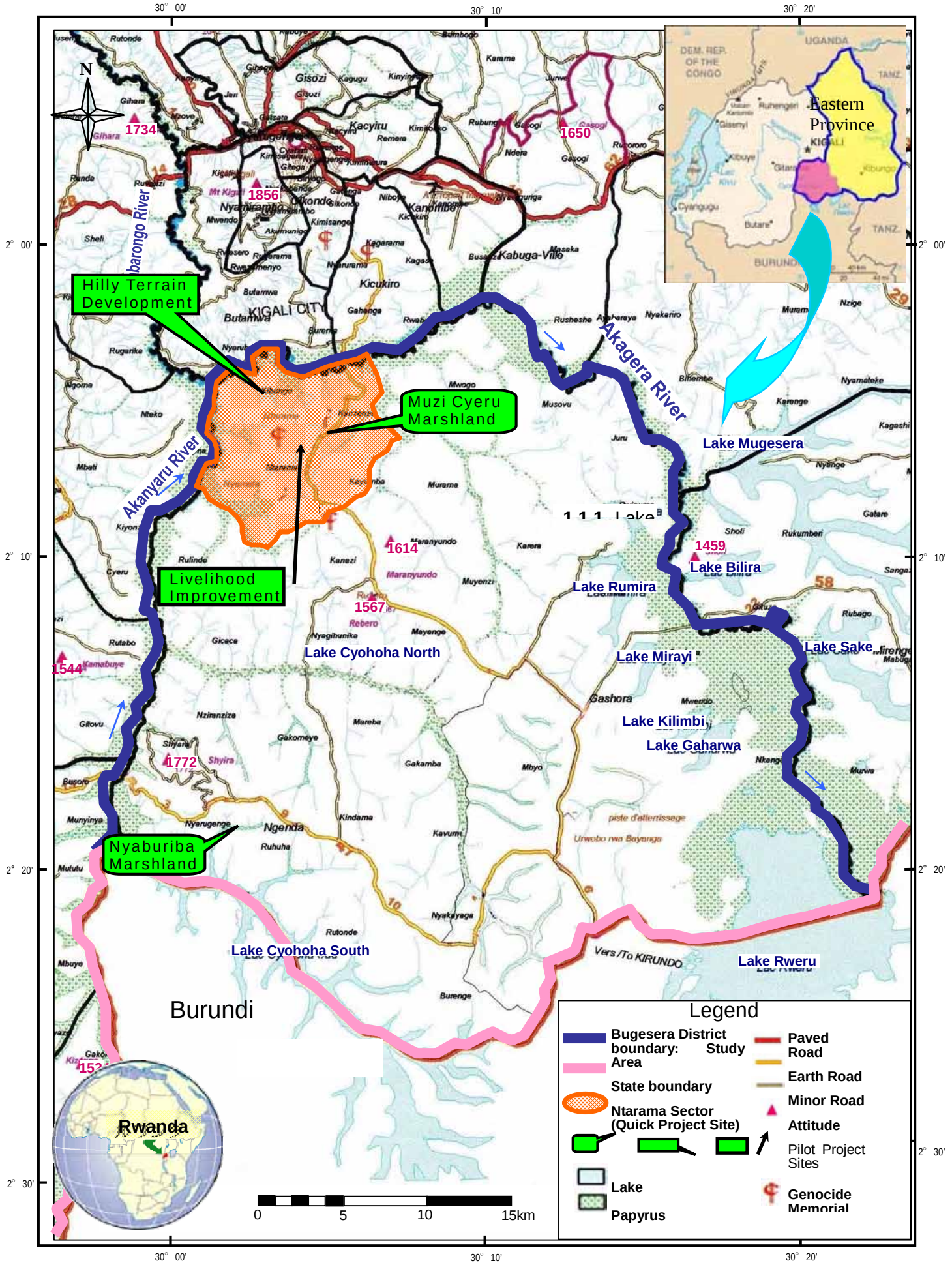
We wish to express our sincere gratitude to your Agency; the Ministry of Foreign Affairs; and the Ministry of Agriculture, Forestry and Fisheries for their continuous support throughout our activities in Japan. We also wish to express our sincerest gratitude to the Embassy of Japan for Kenya, your office in Rwanda, the JICA personals concerned, and the relevant agencies of the Republic of Rwanda for their close cooperation and assistances extended to us during our investigation and study in Rwanda.

Finally, we hope that this report will assist MINAGRI and other relevant agencies to advance sustainable rural and agricultural development in Bugesera District

Very truly yours,

GOTO Michio
Team Leader of the Study Team for the Study on Sustainable Rural and Agricultural Development in Bugesera District, Eastern Province in the Republic of Rwanda.

Location Map of the Study Area



SUMMARY

SUMMARY

BACKGROUND OF THE STUDY

The Study Area, i.e. Bugesera District, has abundant water resources in its lakes and rivers / streams, land resources like untapped marshlands. It is thus endowed with high potentiality of development and available resources, though prevailing farming practices remain at low level. The area has suffered from grave food shortage and the degradation of arable land by soil erosion and frequent drought in the hills.

With a view to improving such undesirable state, an action plan for agricultural and rural development that envisages poverty alleviation through the improvement of farming techniques on hillside has acutely been desired to harness food security in Bugesera District, and through soil conservation and exploitation of marshland and other means of improving livelihood against poverty and life style. Based on the request of the Government of Rwanda, JICA decided to conduct a Study aimed at formulating a sustainable agricultural and rural development plan to support the Study Area. The Study had commenced in April 2006 and was completed after 31 months in November 2008.

Objective of the Study are;

- Formulating an action plan for agricultural and rural development that reflects real needs of the population in the Area and allows their own participation therein in a sustainable manner.
- Building the capacity of the administrative staff (District and agricultural research institutes) and rural organizations through the implementation of a pilot project.

The Study Area encompasses Bugesera District of Eastern Province with a population of about 300 thousand and a surface area of 1,333.9 km^2 where 15 Sectors and 72 Cells are distributed.

AGRICULTURAL AND RURAL DEVELOPMENT SECTOR

PRSP is implemented through sector policies and strategies, a process recently completed by MINAGRI. The National Agricultural Policy was revised by MINAGRI in 2004, and the Strategic Plan for Agricultural Transformation (PSTA) was adopted to implement the policy and strategy of the National Agricultural Policy (NAP), as well as PRSP in January 2005.

Through the implementation of the PSTA programs, agricultural sector shall be transformed into a modern, professionally operated and market-oriented economic undertaking through the promotion of professionalism, specialization, technological innovations, and private-public partnerships. Currently, the Economic Development and Poverty Reduction Strategy (EDPRS), as well as PSTA2 have been developed to achieve the Vision 2020 goals building on the lessons learned from the PRS1 and PSTA1 respectively.

Through the decentralization process started in 2001, the role of MINAGRI has become that of policy and strategy formulation for the PSTA's operational programs, with local authorities at decentralized levels. MINAGRI is responsible for planning and coordination, follow-up, evaluation and reporting. The responsibility for program implementation was transferred to the District. Accordingly, MINAGRI staff was reduced from 144 staff members in 2001 to 69 staff members in 2005 and only 31

staff members were remaining in July 2006.

So as to implement decentralization policy, the government of Rwanda put in place the Common Development Fund intending to consolidate one of the three pillars of that policy, which is increasing means and capacity for local governments. In this context, CDF contributes to poverty reduction by creating employment and funding developmental projects across the country. Furthermore, local government capacity is reinforced through support to basic infrastructure and funding for income generating projects.

PRESENT CONDITIONS AND CONSTAINS IN BUGESERA DISTRICT

Bugesera area, as well as the Northeast (former Umutara province) and the East (Northeast and southern former Kibungo province), is counted as one of the rainfall deficit risk zone which is characterized by frequency of the rainfall deficit, the late rainfall onsets, early rainfall cessations and significant number of dry spells and average rainfall is estimated at about 810mm/year.

Bugesera District is characterized by a dry and very warm climate resulting from absence of mounts, relatively low altitude, scarcity of rain and excessively long period of drought. The mean atmospheric temperature varies with time but normally between 21º C and 23º C, also the maximum ranges 26º C and 29º C, whereas the minimum remains in the order between 13º C and 15º C.

The hydrographic network of Bugesera is mainly characterized by 3 rivers, namely Akanyaru, Akagera and Nyabarongo. The typical pattern of Akagera and Akanyaru River flow appears as the peak discharge (water level) from the beginning to middle of May with discharge of about 250 m^3/sec and the minimum discharge (water level) in September with discharge of about 50 – 100 m^3/sec.

The number of appointed staffs of Bugesera District is 26 in May 2006, which represents only 70% of the number planned, 35 according to MINALOC. Mayor, 2 vice-mayors and the District council members are elected for 5years term. The number of the District council members is 28 that consist of 15 representatives from each Sector and 8 from women and 5 from youth.

According to the Sector, there is a Sector Council under which 7 specific positions are arranged by the government. Moreover, almost all staffs were appointed on January or February 2006 based on the local administration reform so that they are not familiar with responsible area. Nevertheless, their field works tend to be abstracted because they don't have any transportation means such as motorcycle or bicycle and Sector office budget is too small (normally Rwf 200,000/month) to provide enough transportation fees to its officers.

Administrative activities in Cell are actually carried by 2 main positions: Executive Secretary appointed by District (paid) and Cell Coordinator (volunteer) elected by local population. Cell Coordinator is a leader of Cell Council, which consists of 2 committees. Those members are elected and have each own role. Due to the limited budget as well as lack of transportation, they haven't gotten enough information about their service areas.

Assuming that the population growth rate has ranged between 2.5% and 2.9% for the recent four years, present population in Bugesera District can be estimated at about 316,000. Hence, the present population density could be 235persons/$km^{2.}$ As for average family size, there are not so big differences among the 15 Sectors, ranging between 4.18 and 4.86 persons per household.

In Bugesera District, about 93 % of people have only primary level of education. On average, 57.4 % of the people over 15 years of age can both read and write in Bugesera District, but there are big differences among Sectors; namely from 46.5 % in Nyarugenge and to 71.7 % in Nyamata. Hence, the illiteracy rates (those who can neither read nor write) of Sectors range 25.0 % in Nyamata to 46.5 % in Nyarugenge. Females are commonly more illiterate than males.

The Sector that established hospital is only two, such as Nyamata and Rilima, out of fifteen Sectors. The Sectors, which have more than two health facilities, are only four Sectors. There are two Sectors, which have no health facility, such as Ntarama and Nyarugenge. The condition of health facility is poor in view of not only quantity but also quality. Most of health facilities have some problems, such as lack of doctors/ nurses/ staff, equipments, medicine, and budgets. The improvement of health system is required in Bugesera District.

In rural areas in Rwanda, it is general that well-organized information dissemination system exists at a Cell and/or community level. Information is normally disseminated through either *Nyumbakumi* or *Umudugudu* systems. There are also various kinds of communal activities in rural areas such as Umuganda, Umusanzu, Kugurizanya and Ubudehe. Among them, Ubudehe, which originally means collective/community action, now becomes the title of program supported by EU: the Ubudehe program.

Number of crops cultivated in small holder ranges from two to ten such as sorghum, maize, banana, beans, sweet potatoes, cassava, and so on. Market oriented farming system is also practiced along to the boundary zone between hillside and marshland in Ntarama Sector, cultivated with vegetables and maize.

Meanwhile, the sugarcane plantation, around 2,000 ha involving 1,500 farm households in the sugarcane associations supervised by Kabuye Sugar Works Co., Ltd is largely established in the marshland along to Nyabarongo River, adjacent to North west boundary of Ntarama Sector.

At present, the land holding sizes among the farmers in the Study Area vary from landless to more than 2 ha, and which resulted from out of control in the said land sharing system of “Paysannat”. Therefore, collection of land by some landholders with financial ability has occurred through buying and selling business under out of surveillance by the local administration, and land price is increased.

The prevailing farming practice in the Study Area highly relies on labor intensive farming practice based on machete and hoe, that plowing, weeding, transportation of farm produce and threshing operations highly depend on almost manpower, and nothing observed in animal traction as well as motor driven farm machinery. Farm inputs on self-consumed food crops are mainly seeds, and cow dung manure when it is available, and no application of agro-chemical inputs such as fertilizer and chemicals. On the other hand, farm inputs such as agro-chemicals and chemical fertilizers are usually applied to vegetables and other cash crops like maize and rice among the group farming or farmer’s association.

The major domestic animals raised in the Study Area consist of cattle, goat, sheep, poultry, pig, rabbit, and so on. Among the livestock, cattle, local species of Ankole, well adapted to Bugesera climate conditions is dominant. However, lactation of Ankole is extremely low level like 2 liter per day compared to fresian spp., 22 liter per day, and MINAGRI has promoted “One cow One family” policy to replace Ankole with exotic or crossbred cows in order to improve food security conditions through

income generation via sale of milk, manure supply to crop production and improvement of nutrition via milk consumption.

It is found that the cooperatives on rice are confined to the ex-Ngenda district, and fisheries in the ex-Gashora district where many lakes exist, respectively. One of the rice cooperatives interviewed in Luhuha consists of 4,315 members with 418 ha paddy fields in 2005, and sells milled rice in the local market by operating the three rice milling machines.

The grain storage cooperative allocated to each Sector is newly established in 2007 under the GOR initiatives because of food security view, and protection of producers from middlemen's buying at an unreasonably low price. In accordance with Government regulation, farmer is imposed to store 100 kg of specific crop harvest to the said cooperatives as obligation and buy the stored grains with fixed price when they need. At present, the said cooperatives collect sorghum grains from local farmers and store in either Sector or Cell Offices as storages.

A draft Performance Contract was formulated in consultation with the District representative and donors and NGOs operating in the Bugesera District, based on their annual activity plans and budgets. Then, considering the budgetary allocation from concerned ministries including MINAGRI, MINITERE, etc. and CDF, the Performance Contract has been finalized under the leadership of District Mayor.

The "Economic Development Components" in Performance Contract pertaining to Agricultural and Rural Development consist of erosion control for cultivation land, marshland and valley development, construction of farm ponds in hilly terrain, multiplication of improved seed such as rice, cassava, soybean, maize, coffee, as well as increasing the number of fruit trees, etc. which have given priorities.

Further, introduction of modern cows, bee keeping, rabbit rearing, promotion of handcraft for life style improvement as well as income generating activities have been proposed. As regards JICA Study support, the Contract mentions increase of rice production and introduction of modern cow under implementation. In accordance with the District Development strategy, the above-mentioned projects should be considered as candidate project components of Pilot Project.

Approximately 10,000 orphans live in Bugesera (3.6% of the total population). Only 10% of orphans live in orphanages, while 42% lives alone. The percentage of orphans is relatively high in Ntarama and Mayange Sectors exceeding 5%. Numbers of orphans are higher in Ngeruka, Nyamata and Mayange Sectors. On average 15% of the orphans are caused by the 1994 Genocide, suggesting that the influence of the Genocide is relatively small since it occurred 12 years ago. However, in Ntarama and Nyamata Sectors, the influence of the Genocide is still large; more than one fourth of orphans are caused by the Genocide. The percentage of male orphans are slightly higher than female (53% against 47%).

The influence of the Genocide is largely observed in the structure of households. On average there are 204 widows or widowers per 1,000 households in Bugesera. In other words, 6% of the population is considered to be either widows or widowers. The figure is the worst in Ntarama having 253 widows/widowers per 1,000 households followed by Ruhuha, Kamabuye, Mareba, 236, 234 and 227 widows/widowers, respectively. The widowed caused by the 1994 Genocide are rather high in these Sectors except for Kamabuye.

In Bugesera, on average approximately 5% of the population is vulnerable elderly people, while 7%

and 4% of the population are considered to be extremely poor and unsheltered family, respectively. More vulnerable elderly people are found in Kamabuye and Mayange Sectors, exceeding 8 persons per 1,000 households. A large number of extremely poor people is found in Juru, Kamabuye, Mwogo and Shyara Sectors (more than 10 persons per 1,000 households), while more sheltered families are found in Ntarama and Ruhuha Sectors (58 and 60 families per 1,000 households, respectively). It should be noted that the percentage of unsheltered households caused by the 1994 Genocide is distinctively high at Ntarama Sector (77%), suggesting that the remaining damages by the Genocide is still serious.

The principal problem in rural and agricultural development in Bugesera is the poverty. The poor nutrition condition and the lack of access to clean water have caused health problems. The poverty problem is believed to be mitigated by increase in agricultural production as well as livelihood development.

The problem of low agricultural production is three-fold: 1) flood in marshlands, 2) drought and low soil fertility in uplands, and 3) the lack of lands for agriculture. Unutilized marshlands are expected to be developed based on the orientation of master plan, but the current development is not well organized.

Livestock production is expected to improve livelihoods of the poor. However, the policy intervention does not practically support the entire complex systems. Tree plantings have been largely promoted in the last few years but lacking the integration with land management. Agroforesry, multiple-use of trees to support crop/firewood production as well as maintaining soil fertility, is not well developed.

Establishment of nursery schools for small children and literacy education particularly for women are important in the education sector. High birth rates are pushing up the population, particularly that of small children. Low accessibility to medical care is the main problems of the health sector.

In recent years, the region receives less rainfall (926mm in the last 12 years compared with 1,061 mm on average during 1977 to 1990). Particularly the droughts in 2000, 2003 and 2004 caused the serious problem in the southeastern parts of Bugesera (Rweru and Kamabuye Sectors). The starvation by drought was pointed out as a problem at 9 Sectors (Ntarama, Juru, Nyamata, Rilima, Mayange, Ngeruka, Mareba, Ruhuha, and Kamabuye) by Sector offices.

Rice is exclusively cultivated in the marshlands in Bugesera. The areas of existing paddy fields in Bugesera are estimated as 418 ha and are limited to Mareba, Ruhuha, Nyarugenge and Shyara Sectors. Rice cultivation can be expanded to 700 ha, the target cultivated area in 2006.

Rice productivity at farmers' plots is very low as compared with the potential suggested by ISAR (5t/ha against 10t/ha). The causes of low productivities are partly due to disease and pest.

According to the interview survey, damage caused by panicle blast reached 60 % of annual production in a marshland in Mareba. Integrated approach against the disease combining the use of agro-chemicals with introduction of resistant varieties needs to be promoted.

QUICK PROJECT (QP)

One of the characteristics of this Study lies in the implementation of quick project (QP), a proposed manner by the Study Team as an antecedent stage of pilot project. This QP is launched to meet what

the Government of Rwanda requested in the consultation therewith, i.e., request of "starting concrete activities as early as possible". The objects of the QP are

1) To extract the basal needs of the community within a short period, then proposes "highly and immediately effective project components that can readily be dealt by the initiative of local population and that do not need sophisticated technology".

2) In the process of implementing the QP, communication between the local population and administrative agencies concerned will be developed and potential of human recourses, current situation of the community as well as the local organizations. These outputs and lessons learnt will be referred to the performance contract as well as reexamine the District Development Plan.

After having discussions at a Cell level, each Cell prioritized the above possible project components. The Study Team brought the results of project components prioritization to the District and had a meeting. The District side excluded some of the components because the District and/or other donors have plans to implement them. Finally, the following components were selected as the QP components with the consent of both JICA headquarters and MINAGRI.

Supported by JICA Study Team

-Introduction of Modern Cow Cells
-Installation of Household Rainwater Storage
-Introduction of Shallow Well Irrigation
-Introduction of Road Side Irrigation System

Supported by Bugesera District

-Bulletin Boards at Ntarama Sector and three
-Nursery of Fruit Trees at Schools and Cells

Modern cow distribution project aims at income generation, soil improvement by applying cow dung manure and nutritional improvement of the local people. In total, 18 modern cows would be introduced in the three cells (6 cows per each cell).

Various problems attributed to model farmer's low level of knowledge on dairy farming and animal health, and insufficient training provided by the supporting organ are generated as follows.

Problems of Model Farmers

	Issues	Outlines
1	Animal health	disease（mulnutrition due to insufficient intake of essential elements, parasite, bacterial infection, suppuration suffered from dehorning, swollen of knees, poor appetite, injury of legs caused by kicking cowshed due to stress, etc）
2	Animal reproduction	stilbirth, miscarriage, AI failure, etc
3	Animal husbandry	difficulty of rearing aggressive heifer, poor lactation performance due to imbalance of feeding materials
4	Supporting framework	there is no reciprocal help each other except for exchanging rearing condition., and no activity of formation of association without support from Cell, Sector and District Offices
5	Association Activity:	there is no reciprocal help each other except for exchanging rearing condition., and no activity on formation of association without support from Cell, Sector and District Offices
6	Recommendation to the supporting administration by the model farmers	Strong dependence on external supporting body were observed such as i) regular visiting and guidance to the model farmer, ii) request of extension and training service about cow rearing, iii) suggestion of the model farmer's participatory system to select high quality of crossbred, iv) supporting of supplying drug and vet-technician's regular visiting system, v) replacement of

		low quality-crossbred delivered by RARDA-JICA because of not contributing to poverty reduction, and etc.

As long as observing other similar "One Cow, One Family Project", it was observed that weakness of animal disease prevention, weakness of AI operation framework for reproduction, weakness of training Model Farmers(MF) without any regular program, and great gap among lactation performance of the delivered cows.

The most vital factor to create model farmer's motivation is to deliver high quality (high lactation performance) of crossbred cow and bring the MF in benefit (sale of milk). As long as observing crossbreds delivered via "One cow, one family project", there was great gap by individual crossbred in terms of lactation performance. Breeding policy should be properly formulated about breeding high productive crossbred and distributing to MF.

In order to make it possible, it is essential for the key authority to formulate clear principle about breeding of homogeneity with high quality cow of lactation performance, distribution system and supporting framework.

Rainwater Storage Installation project aimed to achieve the following purposes:

- Make sure to get clean and safe water and reduction of expenditure purchasing water,
- Reduction of labor for fetching water, and
- Improvement of sanitary situation (reduction of disease caused by unclean water)

During the project period, rainwater storages were installed at 103 sites as the table below:

Results on Rainwater Storage Installation

Kinds of Model Farmers	Conventional type	Brick type	Wooden type	Total
Model farmers as original plan	2	77	11	90
Model farmers as recipients of Cow Distribution Project		11	0	11
Ngenda Vocational Training Center		2	0	2
Total	2	90	11	103

The following shows the result of evaluation and recommendations towards this Project by the external evaluation team.

- High benefiting effect is expected in terms of initial investment amount (i.e., expense to construct facility concerned). However, the amount of input per cistern, 245 US$ stays beyond the possible individual investment level by local inhabitants.
- The rainwater storage system constructed by this Project is rather inexpensive in comparison with indigenously available one. However, the initial investment level remains beyond the affordable amount as individual investment.
- The Project has an effect of time and labor saving in fetching water. It saves approximately 4.5 - 6 hours per day, while the saved time can be spent for household chores and other daily activities.
- It has reduced cases of infection with water-borne disease such as diarrhea, through the use of rainwater.
- This project has elucidated a heavy or excessive reliance of local inhabitants on others. Such

concept or pattern of behavior may cause an issue, negatively acting as a bottleneck or a limiting factor in area development based on inhabitant's self-help efforts.

Shallow Well Irrigation project aimed to achieve the following purposes:

- Improvement of agricultural income in dry season (Season C)
- Reduction of labor for fetching water for irrigation use

During project period, shallow well irrigation were introduced at 19 sites as the table below:

Results on Shallow Well Irrigation

Cyugaro Cell		Kanzenze Cell		Kibungo Cell	
Site (Umudugudu)	Participants	Site (Umudugudu)	Participants	Site (Umudugudu)	Participants
Cyato (Gatoro)	12	Kinyana (Kabeza)	12	Kagoma II (Kagoma II)	12
Kirera (Kayenzi)	15	Karumuna (Karumuna)	11	Gashamagariro (Kagoma II)	5
Gakurazo (Kingabo)	22	Kurugenge (Kurugenge)	12	Rujyabaguwe (Kagoma II)	26
Gasava (Kidudu)	12	Byimana (Ruwangara)	8	Nyaburiba (Nganwa)	14
Bwunyu (Rugunga)	22	Gasagara (Gasagara)		Ryarutanga (Ruhengeri)	
Ruwangeri (Kayenzi)	10			*Kagoma (Kagoma I)*	
Rubomborana	10			*Kiganwa (Kiganwa)*	
Total 7 sites	103	Total 5 sites	43	Total 7 sites	57
Site 19、Participants 203					

Mean annual household balance of farmers participating in the Model Project of shallow well irrigation stood at 6,819 Rwf on average. On the other hand, income from dry season cropping by shallow well irrigation in 2007 (equal to post-implementation state) was 6,300Rwf per person (or household). It means that nearly the same amount of income earned as annual balance have been obtained from only one dry season cropping for four months, verifying the effect of this Project.

Construction of the facility is extremely conventional, in addition, no economic burden on the farmers side takes place. Such advantages will lead to a self-propaganda for its high project benefits, possibly entailing in facial or two-dimensional diffusion of shallow well irrigation at farmers level. In order to achieve user's safety for their use of the shallow well, safety measures should be taken on the site. As one of measures, stretching a vinyl tape around the opening of the well is considered and it was actually carried out on the sites by the participants.

Earnest requests from farmer's side are made for the technical assistance on farm cultivation. Opinions are heard expecting liaison with Sector Office and Cell Office. Not only construction of facility (shallow well digging = hard portion), but assistance on cropping techniques (soft portion) is also essentially important for manifesting further project effect.

Besides, exploitation and holding of marketing outlets as ell as securing transport means are remaining to tackle from now onward. They can provide incentives for farmers.

The Roadside Irrigation project aimed to achieve the following purposes.

- Improvement of farming activity during the bimodal rainy season through increase of agricultural productivity through effective use of rainfall
- Soil conservation and underground water cultivation
- Income generation

During project period, roadside irrigation was implemented at 18 sites as the table below:

Results on Roadside Irrigation

Cyugaro		Kanzenze		Kibungo	
Nos. of Site implemented	Nos. of Persons concerned	Nos. of Site implemented	Nos. of Persons concerned	Nos. of Site implemented	Nos. of Persons concerned
5	7	2	5	11	11
Total of implemented sites and persons concerned of the Roadside irrigation project: 18 Sites, 23 Farmers					

The facility can be created using only labor contribution by farmers and the construction works are also simple /conventional. Moreover, no cost is to be borne by farmers in the construction.

From the aspect of crop cultivation, such measures as soil improvement and application of fertilizer would be necessary provided that field plot has poor fertility.

As to the result of introducing this system into banana plantation farm, farmers appreciated it because they sold a bunch at 500Rwf before introducing the system, but later they could sell it at 2,500Rwf owing to improvement in both yield and quality, thus leading to a great income increase.

Strong requests are issued from the model farmers for the assistance on farming/ cultivation techniques. Development and holding of market outlets are also issues to be tackled hereafter. These items of assistance can serve as incentives towards farmers.

PILOT PROJECT (PP)

The objectives of the Pilot Project (PP) is to verify effectiveness, feasibility of the project components in Bugesera District Development Plan (DDP) as well as methodology and effect of "from a spot to an area" (from a spot trial, then spreading over a wider area) deployment of the components, thereby feeding back. Therefore, components of PP were selected among candidate projects corresponding to priority sector in Bugesera District. In this concern, approaches have been made attaching priority on the following four key points.

- Capacity development of inhabitants, agricultural officers in charge in Districts and Sectors as well as Cell staff is enhanced through PP and coordination as well as strengthening collaboration with RADA, RARDA and ISAR are pursued.
- Paying respect to indigenous (self) development in communities, self-help oriented project management techniques for Umudugudu in particular are examined/ exploited.
- Methodology and effect of "from spot to an area" deployment of the project is verified.
- Fruit and lessons lernt through the implementation of PP is reflected in DDP.

Size of the project and expected effects of the decided PP are given in the following table. The scale of the facilities accompanying with the construction works such as trial plots for paddy testing and farm ponds was determined making the design of their facility structures as simple as possible so that the inhabitants themselves can construct, maintain and manage them even after the termination of PP.

Quantities of components of PP

Project component	Scale/ Quantity of the component	Expected effects/ concerned organizations
1- Improved Rice Seed Multiplication and Dissemination Project	Multiplication and dissemination of improved rice seed in 3 ha of existing paddy field	Increased food production, soil conservation, improved farming/ improved post-harvest techniques

2- Marshland Agricultural Development Project	Reclamation of 1ha（1 site） of new paddy land	Introducing farming/ improved post-harvest techniques, Increased food production
3- Hilly Terrain Agricultural Development Project	Construction of farm ponds in sites (1 pond/Umudugudu)	Improved livelihood, promoting better living, soil conservation, collaborated practices by Umuganda
4- Livelihood Improvement Project ▪ Vegetable cultivation ▪ Rabbit rearing ▪ Bee keeping ▪ Pineapple cultivation ▪ Fruits & cooking banana cultivation ▪ Simple treatment of marshland water ▪ Solar Cooker	1,000m^2 per Cell, total area 3,000m^2 48 rabbits in Kanzenze Cell in Cyugaro and Kibungo Cells (3AS) Each 1 ha for Kanzenze &Kibungo Cells, total: 2 ha 1ha for each Cell, total area: 3ha 3 sites for each Cell, total sites: 9 4 villagers per Umudugudu, total: 88villagers	Promoting improved livelihood, better living Making use of ISAR Karama experiment station
5- Follow-up project for QP ▪ Monitoring/ evaluation ▪ Repairing established facilities	One set	Promoting improved livelihood, better living
6- Study tour	▪ Visit to project sites in QP and PP by the representatives of the former 3 Districts ▪ Mutual study tour within PP project sites	Enlightenment/ extension

Improved Rice Seed Multiplication and Dissemination Project

The Nyaburiba marshland is located in the ex-Ngenda district, one of the six major rice production marshlands comprising of Ruvubu, Gatare, Kirufura, Nyaburiba, Kibaza and Rwabikwano, and where is accounted for around 418 ha paddy fields. The said marshland was selected based on relatively stable condition of irrigation water source through the year with active farmer's group organized into Corinyaburiba cooperative comprising of 524 members, and cultivated with 52 ha of paddy fields.

Rice farming in the marshland faces chronic issues like degeneration of rice variety because of no supply channel of improved rice varieties from out side, and a poor quality of rice has loosened competition combined with improper farming practice. In order to regenerate rice farming system in Nyaburiba Marshland, an introduction of new varieties combined with seed multiplication scheme is indispensable.

The pilot project is aimed at multiplying the improved rice seeds of the three promising varieties combined with improved farming practice focused on seed production in order to disseminate not only Nyaburiba but also other rice farming area of the marshlands existing in the ex-Ngenda District.

Around 400 - 500 m^2 plot was provided by rice variety, and which was equipped with 1 m - width rectangular beds for nursery. Each rectangular bed was made by hoe and T-shape leveling tools which was newly introduced in this pilot project.

The three primissing rice varieties supplied by ISAR are all late maturing variety with 160 days and explained as tolerant to blast disease. These three varieties were allocated to the upper, middle and lower site for sowing on nursery in the first rice cropping. In the 2nd rice cropping, the beneficiary farmers selected Gakire and Intisinze by making a point of its yielding ability. Meanwhile in the 3rd rice cropping, the most tolerant variety against disease, Insindagirabigega was selected among the three over the 3 sites beneficiaries .

Change of Variety Selection over the 3 Cropping Seasons

Variety		1st crop （7-12/07)			2nd crop(1-6/08）			3rd crop(7-12/08）		
		upper	middle	Lower	Upper	middle	Lower	Upper	Middle	Lower
1	Gakire					●	●			
2	Insindagirabigega		●					●	●	●
3	Intsinzi	•			•					

Source: JICA Study Team, August, 2008.

Roguing operation was practiced twice over the 3 rice cropping during the nursery period together with weeding. Roguing operation was easily applied to Gakire and Intisinzi varieties because of leaf sheath color differences between off-type and two varieties, but Insindabiragigega met some difficulty because of no typical difference about morphology with off-type. However, this rouging operation is practiced by different growth stage such as tillering, heading, flowering and ripening stages, thus it is possible to manage.

The proposed farming practice for transplanting by the JICA Study Team was summarized as below.

- One seedling/hill
- Planting Distance : 30 cm between lines and 15 cm between hills
- Well leveled paddy plots by using hoe and T-shape leveling tools

The first weeding operation was done by 60 units of the rotary weeder, manufactured by KIST workshop and delivered to the 60 beneficiary farmers. The participants appreciated its efficiency. Progress of rooting after transplanting showed uneven growth clearly such as vigorous plant and poor plant within a plot, and which was assumed to be caused by transplanting injury, improper transplanting depth, uneven leveling and imbalance of soil nutrients.

Paddy yield increased from the 1st crop to the 2nd crop in terms of the quadrant sampling as well as the total harvest of each seed multiplication plots. The paddy weight of the total harvest in the 1st crop ranged from 5.7 t/ha to 8.7 t/ha, however, the 2nd crop resulted in 8.1 - 9.3 t/ha. Percentage of ripening grain decreased 2-8 % compared with the 1st one but the number of panicles per hill slightly increased together with 25 -30 % increase of number of panicles per m^2.

Through implementing the project, some future issues area emerged; how to build beneficiary's capacity on seed production, and how to develop a seed market in further strengthening of project on production of certified seed. In order to establish the recommended rice farming practice among the beneficiary, it is essential for extension strategy to establish demonstration farm for displaying know-how of the recommended practice visually and disseminate them to rice farming area in the surrounding marshland.

Drastic change of the Corinyaburiba Coop within short period has received much attention in the rice sector. However, the Corinyaburiba Coop has just started a division of duties like accounting, agricultural extension, rice milling and loan to the coop member from a dictatorial management by the coop president before JICA study team intervened.

Therefore an institutional strengthening focusing on coop management based on financial basis is an important subject from now. Furthermore, the natural environment surrounding Nyaburiba Marshland holds a vital factor to protect soil erosion for stable rice production. Also, agriculture with livestock raising as major side line should be considered to supply compost by combining rice farming and livestock reciprocally in rice farming in Nyaburiba marshland.

Marshland Agricultural Development in Muzi Cyeru Marshland

During the workshops with the local people in each Cell, following issues were revealed in terms of marshland agriculture.

- No reclamation works have been done for marshland development.
- Due to lack of knowledge and abilities, marshland is presently unutilized.
- River flooding often damages crop harvest.

On the other hand, rice production in the marshlands is included as a priority program in the NAP, the PSTA, the National Rice Production Program and the DDP of Bugesera District. Hence, the marshland agricultural development project accords with the national policies such as food security and poverty reduction. The PP aims at enhancing food security through rice production in marshland paddy fields newly reclaimed with labor force.

The overall implementation framework for the PP is divided into two stage as construction stage of paddy field and rice cultivation practice stage in the Muzi Cyeru Marshland. The schedule was designed as follows:

Plan of Operation of Marshland Agricultural Development Project

Year	2007							2008								
Month	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Kick Off W/S, Tools Procurement	■															
PF Construction		■	■	■	■											
Farming Practice				■	■	■	■	■					■	■	■	■
Monitoring & Evaluation		■	■	■	■		■	■	■			■	■	■	■	■

During the project implementation period (June2007 - October 2008), the newly reclaimed pilot farm has cultivated with the first rice crop and the second rice has just been transplanted to the main plots on late August to early September 2008.

From August 27, 2007, puddling operation was started by pumping irrigation, while transplanting operation was begun from September 3rd. The three primissing rice varieties and planting density were same as Nyaburiba Pilot Projectl. Transplanting operation was practiced just after completion of land reclaimed plots followed by puddling work, and completed in the 17 plots on October 2, 2007.

Harvesting operation began from late January, 2008. Plant growth showed severe waves in the canopy associated with much empty grains. Irregularity of yield by plot was very severe and ranged from 1.2 t/ha to 4.4t/ha. Thus, poor growth caused by soil physical and chemical aspect should be ameliorated in marshland development.

Agricultural Development Project in Muzi Cyeru marshland is unable to apply gravity irrigation method because of the marshland directly being influenced by Akagera river water. In order to clear cost benefit for pump irrigation, break-even point of paddy yield and pump fuel cost was analyzed with the condition of input cost like pump fuel, fertilizer and agro-chemicals, and sale amount of paddy rice without consideration of O&M and labor cost of cultural practice and found that reasonable paddy yield should be necessary at least 3.2 t - 3.4 t harvest.

Sowing NERICA at hilly side twice from short rainy season and long rainy season, both sowing sites showed poor growth adaptability under unstable rainfall pattern. Form these reasons, introduction of NERICA is obliged to give up under rained condition. Meanwhile, termite causes plant damage when soil desiccation is on-going. From now on, upland NERICA is tested as paddy rice in a part of Muzi

Cyeru Marshland Agricultural Project, and its adaptability is tested.

The final field survey is scheduled to be phased out before harvesting of the 2nd rice cropping without solving agronomic issues so far arisen due to time constraints of the development study scheme.

Meanwhile, marshland agricultural development is one of key agricultural policy in Rwanda. However, this marshland agricultural development project is the first trial practice by JICA in Bugesera District, and these issues should be a valuable guideline for future marshland agricultural development project. Therefore, the present pilot project is preferred to be continued by ODA scheme like a technical cooperation project after the development study.

Hilly Terrain Agricultural Development Project

With a view to ameliorate the shortage of irrigation water, runoff loss of soil and subsequent deterioration in soil fertility, low crop yields due to lack of knowledge/ information on properly cultivated crops etc. on hilly terrain agriculture, the objectives of the project were to pursue stabilized food security by stabilized crop cultivation through supplemental irrigation during rainy season and to envisage improved livelihood by means of cultivating cash-crops during onset of dry season, through the construction and utilization of farm pond (FP).

FP for small-scale irrigation have been constructed at 22 sites in Ntarama Sector including operation work against water leakage from FP and Water Users Associations (hereinafter referred to as WUA) have been established for each FP.

Technical transfer was targeted to Umudugudu leaders and those who were engaged in the works. At the planning stage, the Study Team provided field instruction at the sites on the selection of correct FP types judging from topographical situation etc at the sites of construction, also at the implementation stage, peg driving of the excavation area, fixed ruler stretching, formulation of plan of operation, works for preventing soil erosion, those for flow energy dissipater, fencing and other conventional engineering techniques, as well as safety measures until these target stakeholders understood the contents of transferred techniques. In order to secure safety of users of the farm pond, safety measures should be taken on the site. The measures actually taken are i) creating a live fence with naturally grown Euphorbia which is generally utilized for hedging homesteads around the pond, ii) setting up the door at the entrance to the pond, iii) placing the signboard beside the pond.

As to the problem of water leakage from FP, matting with plastic sheets is applicable for addressing this problem and hereafter water use can be expected, hence it is essential to provide pragmatic system in which O.M is practiced by WUA in coordination with administration.

As for acquisition of knowledge in terms of FP construction techniques and water harvesting as “positive impact”, the evaluators account the Project as the chance of earning cash income strongly characterizing the Project with the view influenced by <Food for Work> and <Cash for Work>. Inhabitant’s heavily dependent attitude on external assistance remained and there also observed conservative attitude of not voluntarily involving in the Project, hence sustainability of the Project in this regard seems skeptical.

As regards “method of extension and deployment by way of Farmer to Farmer, if hereafter management of FP is made at WUA level, and if the effect is identified, there remains possibility by Farmer to Farmer. Yet, assistance by the administration is indispensable because eager requests for

assistance in the form of input have issued.

Livelihood Improvement Project

In general, **rabbits** increase rapidly and bring benefits quickly, which, in turn, makes the model farmers happy. The farmers also get benefits in two ways: meats for their diet and cash income. In addition, the rabbits eat weeds, which mean that any fodder crops are unnecessary to feed rabbits. It seems to be one of the important merits of rabbit rearing since the model farmers just need to collect some weeds in a short time and doesn't need to use many hours on the field to cultivate fodder crops. This means that even elderly people and women can do rabbit rearing.

These are facts that **modern bee keeping** needs a certain level of technical knowledge and some tools which are not available in rural areas. Moreover, some tasks need group works with others, which means that the farmers need to adjust their schedules prior to the group works. It seemed that these factors greatly affected the progress of modern bee keeping activities this time.

As for modern bee keeping, three existing associations had been supported together with 8 individual bee keeping farmers. Among them, activity progress had been better in one association in which many women are members. Since they are basically earnest and punctual, many of them come to group works. On the other hand, those men with less interest in bee keeping tend to cancel group works, which often retarded the association activities. For the income generating activities, in particular, for the non-agricultural ones, women involvement can be an important factor.

It was clear that **pineapple** suckers didn't grow well on the farmlands without proper mulching and the suckers were grown better on the fields with good mulching. To keep soil moisture and reduce evaporation from surface soil, mulching is essential for pineapple cultivation. It is also effective for surface soil conservation against torrential rain.

Before the implementation of the pilot projects, quick projects which included road side irrigation were implemented. This labor-intensive but inexpensive irrigation **improved banana** yield very much. If the farmlands are located next to any roads, this system can be introduced only with labor works. Road side irrigation should be simultaneously promoted together with the banana suckers distribution.

Fruit crops such as fruit banana and pineapples take more than one year to get fruits if they are planted with new suckers. This implies that the farmers have to wait for getting cash income more than one year. For those who need cash income urgently, multiple cropping such as intercropping and mixed-cropping should be promoted to get short term benefits from the same farmland. Otherwise these fruit crops are not recommendable for resource-poor farmers.

The local population seems to be interested in the use of solar cooker device to reduce expenditure for buying energy sources for home consumption such as kerosene. To see effectiveness of the device, however, it is essential to design/ devise and verify the shape of device, material to be used, cost for fabrication of the device, and so on. Furthermore, safety measures should be taken to secure safety of users because the solar cooker device would probably be heated hotter than the uses imagine.

Cost Benefit Analysis

The objective of the cost benefit analysis is to examine the economic efficiency at each project. Cost

benefit ratio was calculated comparing between the project cost and the benefit from the project at fixed period by project. If the cost benefit ratio is more than 1.0, the project becomes an economic relevance.

Pineapple cultivation and fruit banana cultivation same as shallow well irrigation and rabbit rearing mentioned above are expected to expand spot to area and to obtain the benefit with a little initial cost subject to introducing planned distribution to the 2nd applicant but it takes about 2 years to harvesting. Compare to the other livelihood improvement projects, bee keeping requires professional expertise and technique for operation and maintenance of daily activity so that it is necessary to support from outside continuously same as the modern cow distribution project.

Cost Benefit Ratio at each Project

Project Name	Assumed Benefit	Unit	Cost (C) Rwf	Benefit (B) Rwf	Cost Benefit (B)/(C)	Remarks
(1) Quick Project						
1) Modern Cow Distribution	1year	HH	310,590	108,000[1] 180,000[2]	0.35 0.58	5 lit/day[1] 9 lit/day[2]
2) Rainwater Storage Installation	10years	Site	167,800	323,000	1.92	5th year*)
3) Shallow Well irrigation	10years	Site	114,650	504,000	4.4	2nd year*)
(2) Pilot Project						
1) Improved Rice Seed Multiplication and Dissemination Project	1year	ha	2,873,095	3,911,500	1.4	0.7 year*)
2) Marshland Agricultural Development Project	1year	ha	1,234,900	231,500	0.2	3.5-4.0 t/ha is required
3) Hilly Terrain Agricultural Development Project (FP)	10years	Site	1,920,700	3,023,000	1.57	6th year*)
4) Livelihood Improvement Project						
a) Rabbit rearing	1year	HH	32,713	32,580	1.0	1st year*)
b) Bee keeping	3 years	HH	42,546	59,400	1.40	3rd yera*)
c) Pineapple Cultivation	1.5 years	ha	756,110	1,872,000	2.48	1.5years*)
d) Cooking & Fruit Banana Cultivation	2 years	ha	496,333	2,190,000	4.41	2 years*)

Note [1]、[2]: show selling price of milk at Nyamatam and Kigali, respectively.
Note [3] :Land reclamation cost of labor fee(3.4million Rwf) and construction tools and materials (1.9million Rwf) are excluding in Cost
Note *) :Break-Even Point; cost recovery period

Publicity Activites

The issue of newsletter was started from early July 2007 at the interval of every other week to broadly share such information as state of progress and topics of PP with those who are related with PP and inhabitants concerned. The newsletter has been distributed to the minister, secretary general and director of planning of MINAGRI, to the staff of related District, Sectors and Cells. Files of PDF type have been sent to the members of the steering committee and it has also been distributed to other donors through JICA Office. By the completion of this Study, late September 2008, the letter has been published up to serial No. 22.

Bulletin boards were provided means of public communication / diffusion activities, and they were distributed to each Cell by the end of July 2007. It was expected that these boards were utilized for providing information to the inhabitants. The above-mentioned Newsletters were put up on the board in Kanzenze Cell, thus conveying information to local inhabitants therein.

In reply to the request from the Study Team, a producer of radio-program by MINAGRI visited sites of QP and PP In each site, interview to model farmers in QP and beneficiary farmers in PP was made, based on which a radio program was produced and broadcast (date of broadcasting: 28th August 2007, 24th June and 30th September 2008).

SUPPORTING TO THE DISTRICT DEVELOPMENT PLAN (DDP)

The DDP outlines the priority needs of the population of Bugesera. Activities in the log frame were defined on the basis of due consultation with the beneficiaries and different stakeholders through meetings and workshops organized at district and sector level. Throughout the formulation process the district followed a bottom-up planning approach from the initial stage so as to effectively forumulate and prioritise strategies, which will ensure success in the implementation of the DDP. The DDP conforms to the priorities and orientations of the government as given in its strategies such as EDPRS, PSTA, Good Governnance, Decentralization Policy and also in line with all sectoral approaches concerning the youth, public service, education, gender, energy and infrastructure.

The DDP budget is estimated at 109.7 Billion Rwf in total including the external finance as development partners at 93.8 Billion Rwf (85%) and district budget at 16 Billion Rwf (15%). It is regrettable to say that the budget for the DDP still depends on external budget supports.

67 projects related to agricultural and rural development in the DDP are picked up and classified into 4 development strategies, namely 1) Sustainable Agricultural Production, 2) Promotion of Income Generation Activity, 3) Improvement of Life Style, and 4) Natural Environmental Conservation. The agricultural and rural development project components amount to 78.9 Billion Rwf (72%) against 99.8 Billion Rwf in total for the 5 year program.

According to MTEF in 2008, Bugesera district budget is estimated at 5.3 Billion Rwf. On the contrary the annual district budget for the DDP is estimated at around 20 Billion Rwf/year. There is 4 times gap between the DDP and District Budget. It shows that implementation of the DDP is very tight in the budgetary aspect.

According to the Scope of Work (SW) agreed upon 1st April, 2005 for the Study, An Action Plan (A/P) for agricultural and rural development in Bugesera District had to be formulated by the Study.

DDP (2008-2012) in Bugesera district was formulated on 24th May 2007 and Performance Contract in 2008 was also formulated in the beginning of the January 2008 as the first year's AP of DDP. DDP is in line with the central governmental strategy and policy such as PSTA, EDPRS and including the necessity of the projects components proposed by the Study in the ItR(1).

Taking into due consideration on the above, the objective of the Study is to reflect the lessons learnt and information on the DDP as recommendations through the implementation of the QP and PP verifying the probability for project implementation by local population, support from administrative structures to local population, extension and expansion plan through an approach "farmer to farmer" with trials and errors.

In land reclamation for paddy in Muzi-cyeru Marshland and construction of farm ponds in hilly terrain agricultural development, implementations were carried out by Umudugudu people as a main body. According to the final evaluation WS, it was cleared as below.

- Farmers are depending on the support from outside such as "Food for Work", or "Cash for

Work" and they don't work at their own initiative

- Weak to the Top-Down control and no independence
- Strong Umudugudu Leaders, Advanced farmers are very few in the community
- The progress of the work is dependent on the Umudugudu leaders, and if their performance is poor, he/her was removed. In general, strong leadership persons are very few

Muzi-Cyeru rice association was established and under the process to organize cooperative. Besides modern cow model farmers are also under organizing the cooperative as well as water users association has been established at each farm pond. Though the Study Team mainly supports these activities, an ability of local population got a little stronger and stronger; but it will take a long time to improve. It is very difficult to strengthen people's ability in a brief space of time within the limited period of the Study. Further supporting to strengthening Umudugudu by outside should be essential.

In "improved rice seed multiplication and dissemination project", strengthening of the Corinyaburiba cooperative having more than 20 years rice farming experiences has been tried introducing simple farming tools and instructing improved rice farming practices. Being different from the Muzi-Cyeru rice association, so many good results have been achieved within a year as below.

- Paddy yield is increased .from 3-4t/ha to 7-8t/ha
- One improved rice seed out of 3 was selected as certified seed by RADA and has been availed for sale.
- Letter of application from the Ministry of Labor issued to the Corinyaburiba coop for his good performance of rice farming activities.
- Corinyaburiba coop has opened his office in Ruhuha town and employed an accountant to strengthen accounting.
- Rice milling business has commenced purchasing of one-pass milling

The reasons why achieved such good outcomes are i) beneficiaries have experiences in rice farming and simple agricultural inputs provided and instruction of improved farming technologies are responded to their daily needs properly, ii) target to the existing farmers organization to strengthen, iii) president of the cooperation has strong leadership, and iv) give beneficiaries satisfied impact, etc.

On the other hand, it found a difficulty to establish and strengthen new organization because Muzi Cyeru Marshland rice association established in the Study has a first challenge to rice cultivation, and what was worse was low yield of paddy due to the barrier for growing as caused by marshland soils characteristics with discouraging beneficiaries' willingness to practice farming.

Distribution of modern cow was adopted according to the "one cow, one family" project as national policy. Through the implementation of the project, heifer distribution system has been agreed between Ntarama Sector and model farmers. Ntarama Sector has prepared the waiting list for next modern cow recipients. Based on the list, 2nd heifer will be distributed to the 2nd recipient as shown in the figure on the right. Within a year, modern cow will be able to be distributed to the applicant and continuously modern cow breeder will be disseminated and increased.

In the project 2 model farmers out of 18 have produced milk about 8 liter/day but others only 2 to 3 liter/day. One of the success model farmer was able to buy 2nd modern cow by loan, but almost all of them have a hard battle with low milk production.

Monitoring and instruction for heifer distribution is difficult for RARDA, Sector and Cell. For management of large scale husbandry, contract system between beneficiaries and NGO, such as Heifer International, etc. who has enough experience for cattle management is recommended to expand one cow, one family project.

Similar to the heifer distribution system, for rabbits, a pair of male and female baby is distributed to next applicant In comparison with the modern cow, rabbit rearing is much easier for poor farmers because small scale gages in the homestead is required and feed rabbits by weeds growing around the house only. According to the rabbit rearing, 48 rabbits provided in January 2008 have increasing up to about 160 rabbits in August 2008. Extension from farmer to farmer is able to be expected easily because demand of rabbit meat has been increased recently due to price escalation of chicken.

For rabbits, a pair of male and female baby is distributed to next applicant and pineapple and banana consist of stem distribution after growing those plants. From the 2nd recipients, they will get benefit with little investment and endeavourer. So that the extension from spot to area is possible.

This roadside irrigation system is mainly expected to expand from spot to area by farmer to farmer extension system as the project cost is almost zero and construction of simple and small scale canal only is required. According to the final evaluation WS, quantity and quality of banana had improved and the selling price increased by 5 times, being different from without project case as was reported by the model farmer.

This shallow well project is similar to the roadside irrigation project. Project cost is nearly zero and also small-scale shallow well or irrigation canal constructed by farmers are required. It was easy to enable implement the project by farmers and they reduced burden for fetching water to the farm. But extension of the project is only within the same site. In order to expand extension from spot to area, study tour or extension activities to the other site by experienced farmers to provide lectures were carried out.

Main issues were given to the model farmers namely, 1) lack of fund for vegetable seeds, pesticide, etc. purchasing and 2) provision of no extension services. As for the 1st issue, micro-credit and Ubudehe fund are applicable. Sector officer should inform and instruct the application ways to the community. The shallow well irrigation sites are increased from 6 sites in July 2006 to 19 sites in July 2008. It was reported one model farmer earned 6,000 Rwf in C season (dry season vegetable cultivation) equivalent to the annual benefit with project.

Taking into due consideration of the probability of extension from spot to area by farmer-to-farmer, lessons learnt from the Study includes so many suggestive ideas such as,

i) If project cost is expensive and the budget cannot be born by the community, initial investment cost should depend on support from outside. Introduction of modern cow is a good example; so that the distribution system was applied to small-scale livestock rearing as rabbit rearing in the PP.
ii) It goes without saying that the project introducing low/zero cost and easy technology to the local population is likely to extend through farmer-to-farmer approach oriented from spot to area development.
iii) And also, collaboration work in Umuganda, installation of bulletin board at each Umudugudu which is the information tools for local population, and utilization of MINAGRI radio program as promotion of the agricultural extension services are important for farmer’s enlightening campaign.

It was tried to introduce small-scale mobile pumps, simple threshing and milling machines that will be managed by Cell or Sector in the PP implementing stage. Thus, in order to create fund for operation of these administrative units, rental system to the farmers was tried in the PP. Through the implementation of the PP, it was found that it is still difficult for them to manage and operate these systems due to lack of ability and number of staff, and still necessary to support from development partners, NGOs.

GoR has encouraged the executive secretary in Cell to enter into the diploma course to enhance their capacity building supported by the scholarship system. Ex-executive secretary in Kanzenze Cell and Kibungo Cell have learned in university in Kigali applying the scholarship system.

On the other hand, RADA and RARDA will try to strengthen the CD for Sector and Cell staff through training workshop or seminar, etc. They have many chances to learn their expertism. The central administration should disclose information to the local administration and community because the CD for people is an essential need for rural and agricultural development.

CONCLUSION

- Through the implementation of the project, it was found that collaboration with the MINAGRI, RADA, RARDA and ISAR was difficult because of the lack of budget and staff as caused by decentralization policy.
- This situation is similar at District, Sector and Cell offices and it was confirmed that almost all of population has a mind to rely upon outside, strong suspicion and there are very few advanced farmers in the community. Accordingly, it is difficult to educe their self-help endeavor, activeness and solidarity which are considered essential to implement project by themselves.
- In response to the needs of Corinyaburiba Cooperatives, the Study team provided various inputs of the equipment & materials and proper techniques for rice farming. This has led to a considerable increase in paddy yield (from 3 to 4 t/ha to 7 to 8 t/ha) and strengthening of the Cooperatives as achieved remarkably.
- As for rabbit rearing, pineapple cultivation and fruit banana cultivation, if in case supporting initial cost and distribution to the 2nd applicant are implemented as planned, expansion of the project from the spot to area would be very possible as verified through the PP.
- .DDP budget is estimated at 20 billion Rwf/ year, which is 4 times bigger than the actual annual budget in Bugesera district then depending on the Donors' financial support. Furthermore, to formulate plans, implement and monitor the projects in DDP, there are various problems such as insufficient number of staff, inability of local administrations as well as the lack of transportation/communication means.
- In order to secure safety of the users of the shallow well as well as the farm pond, prompt measures should be taken soon after the construction of those facilities. As some of measures, stretching a vinyl tape around the opening of the shallow well, creating a live fence with naturally grown Euphorbia around the farm pond are considered to call user's attention.

RECOMMENDATIONS

Main actors promoting agricultural and rural development are Umudugudu and farmers organizations who play on the front line. It is necessary to support these organizations as well as strengthen CD of Umudugudu leaders. In parallel with this, places for provision of information to propagate their achievement among local population are also necessary. Bulletin board installed at administrative office and MINAGRI radio campaign should be practically used for enlightening of farming extension to the local population.

Relevance of the "One cow, one family" policy is appreciated and understood. In order to strengthen high lactation modern cow distribution system (replacement high potential lactation heifer) and beneficiaries' livestock husbandry technology for enhancing of beneficiaries' motivation, supporting system by RARDA is essential. As for poor farmers, small scale livestock rearing such as rabbit or chicken should be promoted in parallel with the modern cow. Because the former is very easy to breed with low initial cost and quick appearance of effectiveness, but the latter is very heavy burden for them to secure fodder field as well as to fetch water for drinking.

The marshland development for rice cultivation has been promoted similar to the Muzi Cyeru Marshland in DDP and small scale land reclamation by labor force in community was verified in the PP . In marshlands directly connected with the Akagera River and Akanyaru River, water level in dry season becomes lower and pump irrigation is required and double cropping is difficult due to topographical condition, etc. Results from the rice cultivation project in Muzi Cyeru, beneficiaries found it difficult to pay pump fuel fee because of low yield of paddy caused by poor soil and water quality problems. If they harvested paddy more than 3.5 t/ha, the project will be sustained In case of new marshland rice cultivation, the administration should consider supporting system to the farmers until they secure enough production of paddy. Also to introduce double cropping of rice and vegetable cultivation, short matured variety rice should be verified.

It is possible to increase paddy yield dramatically through improvement of rice farming practice and proper water management, etc. at the existing marshland in ex-Ngenda area. In fact, paddy yield in Nyaburiba Marshland increased from 3-4 t/ha to 7-8 t/ha. It is therefore necessary to promote the Nyaburiba Marshland rice farming as well as strengthening Corinyaburiba Cooperatives to make it as a model area for rice farming at not only 360ha of neighboring Marshland but also the other districts nearby in future.

It is clear that there is no concept of "operation and maintenance" in Kinyarwanda. In order to operate and maintain their farm ponds and ancillary facilities in good condition by farmers themselves, awareness campaign to them should be done by local administration. Also, effective use of natural resources such as clay soils, sodding, etc., which are low cost and easy to maintain should be verified to prevent leakage from pond. In parallel with this, strengthening of Water Users Association (WUA) for O&M of farm pond and small scale irrigation technology should be supported by the local administration.. An important thing in using farm pond as well as shallow well is to secure safety of their users. Installing a live fence and a door at the entrance up on the site of farm pond as well as using a vinyl tape in case of the shallow well site are worthwhile to call the users' attention.

Implementation of the DDP has been depending on the donor's financial support but it will not be able to help but concern about the unstable economic situation of donors due to influence of oil prices escalation and so on. Under this situation, in order to increase income for local population step by step, projects from spot to area by local population should be prompted applying the low cost and easy/simple technology verified by the Study. Lessons learnt from the QP and PP is organized as the project sheet and guideline. These documents should be actively promoted for use for referring implementing the similar project and review of the DDP by local administration and Umudugudu level.

All the valuable accomplishments and lessons learnt under the Study should be disseminated and made available to not only Bugesera district but also to the other districts and provinces as widely as possible. In this regard, the central government agencies were expected to be involved in the Study positively but in fact it was not. In future MINAGRI and RADA, RARDA under the umbrella of MINAGRI should involve more deeply in the similar projects to be implemented with supporting by Japan and the other donors. To do so, the GoR is in need of taking necessary actions to improve the institutional system of central governmental agencies concerned.

Finally, it is noted that hilly terrain agricultural development and marshland agricultural development are essential for poverty reduction and food security in the Study Area like two wheels of a vehicle, as well, human resources development is necessary from now on. Especially, strengthening of CD for stakeholders through OJT in the field should be continuously necessary. Among others, strengthening of improved rice farming technology, promotion of improved rice seeds dissemination, improvement of hilly terrain agricultural farming practices (introducing of water harvesting methods, NERICA varieties and fruit trees) and strengthening of WUA, etc. should be continuously followed up by the GoR agencies concerned.

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Abbreviations and Acronyms

(E): English, (F): French

A/P	(E) Action Plan
ACORD	(E) Agency for Cooperation and Research in Development, NGO
AfDB	(E) African Development Bank (ADB) (F) Banque Africaine de Développement (BAD)
ATDT	(E) Agricultural Technology Development and Transfer
CD	(E) Capacity Development
CDC	(E) Community Development Committee
CDF	(E) Common Development Fund
CDP (PDC)	(E) Community Development Plan (F) Plan de Developpement Communautaire
CEPEX	(E) Central Public Investment and External Finance Bureau (F) Bureau Central des Investissements Publics et des Financements Extérieurs
CGIAR	(E) Consultative Group on International Agricultural Research
COMESA	(E) Common Market for Eastern and South Africa
DFID	(E) Department for International Development
EDPRS	(E) Economic Development and Poverty Reduction Strategy
EFU	(E) External Finance Unit
EIA	(E) Environmental Impact Assessment
EICV	(E) Household Living Conditions Survey (F) Enquête intégrale sur des conditions de vie des Ménages
EIS	(E) Environmental Impact Study
EMP	(E) Environmental Management Plan
EU	(E) European Union
FAO	(E) Food and Agriculture Organization of the United Nations
FARG	(E) Fund to Assist Genocide Survivors
FMD	(E) Foot and Mouth Disease
FP	(E) Farm Pond
FU	(E) Follow Up
GoR	(E) The Government of the Republic of Rwanda
GDP	(E) Gross Domestic Product
HIMO	(E) High Intensity Manpower
ICT	(E) Technology of Information and Communication
IDA	(E) International Development Association
IDP	(E) Integrated Development Program
IEE	(E) Initial Environmental Examination
IFAD (FIDA)	(E) International Fund for Agricultural Development (F) Fonds International de Développement Agricole
IMF	(E) International Monetary Fund
IOO	(E) Implementation and Operation Order

ISAR	(E) Institute of Agronomical Sciences in Rwanda (F) Insutitute des Sciences Agronomiques du Rwanda
KIST	(E) Kigali Institute of Science Technology and Management (F) Institut des Sciences Technologie et de Gestion de Kigali
KIST - CITT	(E) KIST Center for Innovations and Technology Transfer
LLDC	(E) Least less-developed countries
LWH	(E) Land-husbandry, Water-harvesting and Hillside-irrigation Project
MF	(E) Model Farm
MINADEF	(E) Ministry of Defense
MINAFFET	(E) Ministry of Foreign Affairs and Cooperation
MINAGRI	(E) Ministry of Agriculture and Animal Resources
MINALOC	(E) Ministry of Local Government, Community Development and Social Affairs
MINECOFIN	(E) Ministry of Finance and Economic Planning
MININFRA	(E) Ministry of Infrastructure
MINISANTE	(E) Ministry of Health
MINITERRE	(E) Ministry of Land, Environment, Forestry, Water and Mines
MTEF	(E) Medium Term Expenditure Framework
M&E	(E) Monitoring and Evaluation
NAP	(E) National Agricultural Policy
NEPAD	(E) New Partnership for African Development
NIS	(E) National Institute of Statistics of Rwanda (F) Institute National de la Statistique du Rwanda
OCIR CAFE	(F) Office Des Cultures Industrielles du Rwanda - Café
OCIR THE	(F) Office Des Cultures Industrielles du Rwanda - Thé
OJT	(E) On the Job Training
PADAB	(E) Bugesera Agricultural Development Support Project
PADEBL	(F) Projet d'Appui au Développement de l'Elevage Bovin Laitier
PAFOR	(F) Projet d'Aménagement des Forets du Rwanda, NGO
PAPSTA	(E) Support Project for the Agricultural Transformation Strategic Plan
PASAB	(F) Projet d'Appui à la Sécurité Alimentaire au Bugesera (Project of Caritas, NGO)
PCM	(E) Project Cycle Management
PDL-HIMO	(E) Labour Intensive Local Development Programme (F) Projet de Développement Local - Haute Intensité de Main d'œuvre
PDM	(E) Project Design Matrix
PF	(E) Pilot Firm
PO	(E) Plan of Operation
PP	(E) Pilot Project
PRSP	(E) Poverty Reduction Strategy Papers (F) Document de Stratégie pour la Réduction de la Pauvreté
PSTA (SPAT)	(E) The Strategic Plan for Agricultural Transformation (F) Plan Stratégique de Transformation Agricole
QP	(E) Quick Project
RADA	(E) Rwanda Agricultural Development Authority

RAQCA	(E) Rwanda Agricultural Quality Authority
RARDA	(E) Rwanda Animal Resources Development Authority
RDC	(E) Rural Development Cluster
REAP	(F) Responsable de l'eau et de l'Assainissement de Province
REMA	(E) Rwanda Environment Management Authority
RGPH	(F) Recensement Général de la Population et de l'Habitat
RNE	(E) Royal Netherland Embassy
RSSP	(F) Projet d'Appui au Sectur Rural (E) Rural Sector Support Project
Rwf	(E) Rwanda Franc (1 dollar US=560Rwf)
SC	(E) Steering Committee
ST	(E) Study Tour
SWAP	(E) Sector Wide Approach
SWG	(E) Sector Working Group
SWOT	(E) Strengths, Weaknesses, Opportunities and Threats
UNCDF	(E) United Nations Capital Development Fund
UNDP	(E) United Nations Development Program
UNEP	(E) United Nations Environment Program
USAID	(E) United States Agency for International Development
WS	(E) Workshop

Exchange Rate: 0.183 Yen/Rwf (as of November 2008,JICA designated rate)

Glossary

Gacaca (Gacaca courts):

Participatory community based courts to prosecute and try genocide crimes. They have to reveal the truth about the 1994 Rwandan genocide, to punish perpetrators and to reconcile the torn out Rwandan Community. Effective trials have started countrywide from July 2006 and Gacaca trials take place once a week. Gacaca courts'activities are supposed to be completed by the end of 2007.

Ibimina (ikimina):

A private group whose members provide money every month and one member gets the gathered amount in turn.

Kugurizanya:

To lend money each other. It may be inkind or in terms of labor force meaning X can cultivate for Y on Monday and on Tuesday Y can do the same for X.

Nyumbakumi:

'Nyumbakumi' used to be an informal organ at the very grass root level, not a legal entity. As the Swahili name means, it comprises ten houses. It was initially established by the community for security purposes. Shortly after the genocide, there was much concern about security and each ten households had to organize themselves and control their security. The newcomer among those ten households had to report to the head of those ten households. This informal organ is realized to be helpful for cell and sector authorities in mobilizing the cell population for useful community activities such as Umuganda, elections and other administrative matters. The recent institution of Umudugudu entity under the cell comprising more than 50 households, will take over the community role formerly held by Nyumbakumi.

Ubudehe:

Traditionally, Ubudehe consists of community mutual help through collective cultivation works. A villager who had a big plot to be cultivated could seek the help of his neighbors. Currently, such traditional system is not much still prevailing as laborers are often hired by wages. On the other hand, such scheme is promoted to allow collective activities within poverty alleviation among local community. In this development, with support of EU, MINECOFIN developed and piloted an approach for poverty alleviation through Ubudehe. Following successful implementation in Butare province, the Rwandan Government has now adopted it as a national scheme. (Source: Project for Support to Operationalisation of the Strategic Plan for Agricultural Transformation, Appraisal Report, Working Paper 3, Institutional Support to Agricultural Sector, IFAD, July 2005)

Umudugudu (imidugudu) :

First of all, umudugudu is a mode of resettlement in agglomeration to avoid traditional scattered

settlement in an effort to secure land use. The practice was widespread shortly after the genocide especially in eastern province. Today, with the territory reform, there is another concept of Umudugudu that is the smallest grassroots administrative Unit under the Cell, comprising at least 50 households.

Umuganda:

Community mobilization for manual works of public interest. Activities such as rehabilitation of roads, erosion control devices, tree planting among others are usually carried out within Umuganda framework. Currently, Umuganda takes place countrywide last Saturday of every month.

Umusanzu:

Any community contribution outside legalized taxes or other formally fixed and compulsory contribution. The Cell can mobilize the population for the rehabilitation of the meeting room for example. Each resident may contribute from 200 Rwf and above depending one's financial situation. The contributed amount is called Umusanzu. Likewise, apart from the recognized school fees, parents may decide to contribute *umusanzu* for the classroom construction. Membership fee for associations is as well called "Umusanzu in Kinyarwanda".

CHAPTER 1 BACKGROUND OF THE STUDY

1.1 Background

The Republic of Rwanda (hereinafter referred to as Rwanda) is one of the most poverty-stricken LLDC countries in Africa with a densely populated state , where the total population of 8.2 million resides in the total surface area of 26,338 km2. Rwanda is often called "the land of thousand hills" consisting of a number of hills and marshlands, where around 90% or more of the population residing in rural areas are engaged in subsistence farming. The Civil war during 1990-1994 that culminated in the genocide caused a toll of massacre of more than one million people. Thus, huge human resources were lost who, otherwise, could contribute to the national development. The mainstay of the country is agriculture that employs as large as 87% of labor force and produces 47% of the national GDP. Coffee and tea constitute major cash crops. Sorghum, maize and tuber crops account for 67% of the total agricultural production. They are planted in smallholder farm households with an average cultivated area as small as 0.76 ha. In addition to progressive land degradation due to vulnerable rain-fed and depriving farming, ever-increasing population has accelerated poverty so that 46%, on average, of the rural population has been impoverished, subject to lower food security (45,000 Rwf / capita / year).

The Study Area, i.e. Bugesera District, has abundant water resources in its lakes and rivers / streams, land resources like untapped marshlands. It is thus endowed with high potentiality of development and available resources, though prevailing farming practices remain at low level. The area has suffered from grave food shortage with a low line of food security, 52.8% in 2001, by far lower than the level of national average, owing to the degradation of arable land by soil erosion and frequent drought in the hills.

With a view to improving such undesirable state, an action plan for agricultural and rural development that envisages poverty alleviation through the improvement of farming techniques on hillside has acutely been desired to harness food security in Bugesera District, and through soil conservation and exploitation of marshland and other means of improving livelihood against poverty and life style. Based on the request of the Government of Rwanda, JICA dispatched a preliminary and appraisal mission in March 2005, and decided to conduct a Study aimed at formulating a sustainable agricultural and rural development plan to support the Study Area. The Study had commenced in April 2006 and was completed after 31 months in November 2008. The Quick Project implementation at Ntarama Sector had been completed from July to December 2006. In the process of the Study, follow up of the Quick Project in Ntarama and the Pilot Project in Ntarama and Ruhuha Sectors was started in July 2007 and completed in October 2008.

1.2 Study Objectives and Overall Goals

The Study had the following objectives and overall goals:

1.2.1 Objectives

- Formulating an action plan for agricultural and rural development that reflects real needs of the population in the Area and allows their own participation therein in a sustainable manner.
- Building the capacity of the administrative staff (District and agricultural research institutes) and rural organizations through the implementation of a pilot project.

1.2.2 Overall Goals

Rural and agricultural development is carried out through the initiatives of local people with the administrative support, hence, the condition of food security and poverty are alleviation improved. Approach to the goal is shown as below.

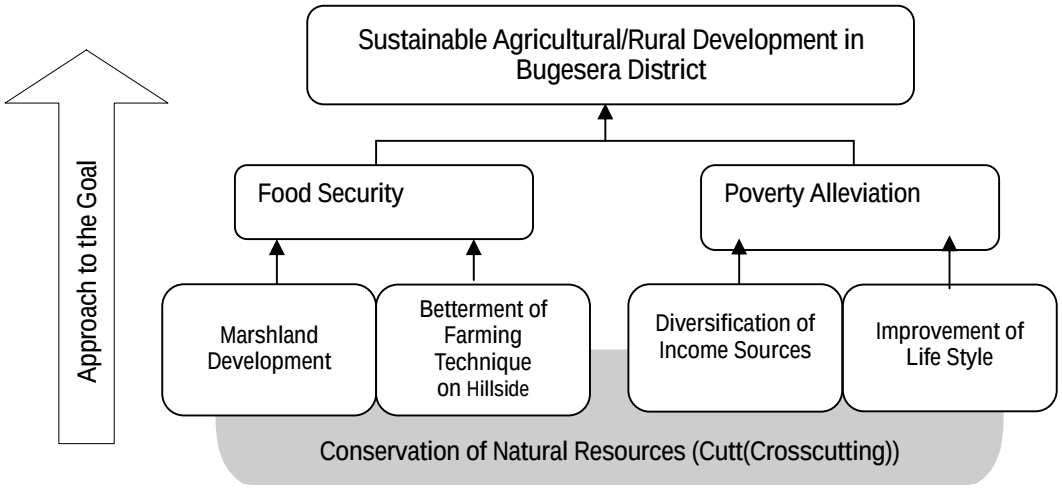


Figure 1.2.1 Approach to the Goal

1.3 Study Area

The Study Area encompasses Bugesera District of Eastern Province including three districts, i.e., Nyamata, Ngenda and Gashora in former Kigari Ngari Province with a population of about 300 thousand and a surface area of 1,333.9 km^2 where 15 Sectors and 72 Cells are distributed.

1.4 Organization Setup for the Implementation of the Study

As to implement the Study, MINAGRI took initiatives and established a Steering Committee having a coordinating role among concerned stakeholders of the Study, as agreed in the attachment of M/M of discussion / explanation of the Inception Report. In addition to the Steering Committee at the central administration level, working committee at the District level has been set up. The figure below indicates organisational structure among stakeholders in this Study.

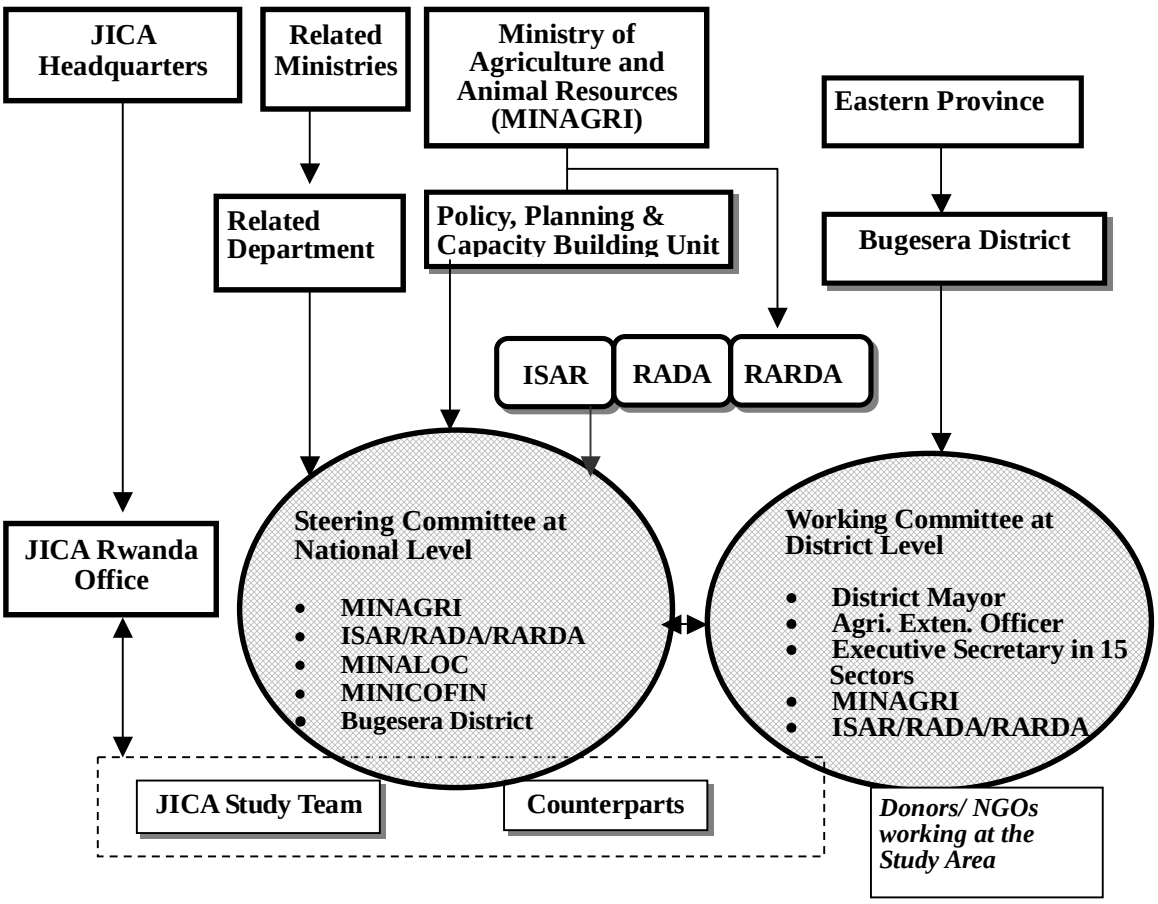


Figure 1.4.1 Organization Chart for the Implementation of the Study

CHAPTER 2 AGRICULTURAL AND RURAL DEVELOPMENT SECTOR IN RWANDA

2.1 Socio-economic and Financial situation

2.1.1 Socio-economic Situation

The Rwandan economy is mainly based on agriculture. In 2002, the population engaged in agriculture was 87% and agriculture contributes 47% to GDP, accounts for 71% of the national export revenues and it constitutes the main source of income for 87% of the population.

Rwanda has had an annual GDP growth rate of 4.1% over the past five years, with a rate of 9.6% in 2002 due to sufficient rainfall and good harvest. On the contrary, the figure fell to 0.7% in 2003 as a result of a slump in the agriculture and industrial sectors. Poor rainfall in 2003 was the main reason in this economic growth plow down. To fulfill the goals in Rwanda's Vision 2020 as well as PRSP, agriculture sector to needs achieve an annual average growth rate of 5-8%. However agricultural sector had a poor growth rate, estimated at only 0.1% in 2004. In 2005, estimated growth rate in the agricultural sector had risen to 4.8% and came down to -1.2% in 2007. As for GDP, despite the effects of electricity shortage, oil cost rise and poor rainfall, Rwanda's economic performance was strengthened in 2004. In 2006, growth in real GDP was 5.5%, while that of 2007 was estimated to be 6.0%.

Table 2.1.1 Growth in the Agricultural Sector from 2003 to 2007

	2003		2004		2005		2006		2007		Total	Average
		growth		growth		growth		growth	est	growth	Growth	Growth
Food Crop	263.83	-5.1%	259.16	-1.8%	275.67	6.4%	275.72	0.0%	272.19	-1.3%	-1.7%	-0.3%
Export Crop	7.11	-18.5%	11.24	58.1%	8.51	-24.3%	11.05	29.8%	9.15	-17.2%	28.0%	5.6%
Livestock	18.58	2.6%	19.08	2.7%	19.6		20.13		21.34	6.0%	11.3%	2.3%
Fisheries	10.96	2.6%	11.24	2.6%	11.53	2.6%	11.83	2.6%	12.14	2.6%	13.0%	2.6%
Forestry	3	2.4%	3.08	2.7%	3.16	2.6%	3.24	2.5%	3.33	2.8%	13.0%	2.6%
Agric.total	303.48	-4.7%	303.80	0.1%	318.47	4.8%	321.97	1.1%	318.15	-1.2%	0.2%	0.0%
% to GDO	36.8%		35.0%		34.2%		32.8%		30.6%			33.9%
GDP	825.37	0.3%	868.82	5.3%	930.42	7.1%	981.13	5.5%	1039.80	6.0%	24.1%	4.8%

Source: MINECOFIN MACRO UNIT Rwandan growth by sector, 2001-2005, 2006 to 2012

2.1.2 Financial Situation

The financial situation from 2001 to 2007 is summarized as table in the below. The revenue increased 2.7 times from 86 billion Rwf in 2001 to 230 billion in 2007. In parallel with this, grant increased 3.9 times from 62 billion Rwf in 2001 to 239 billion Rwf in 2007. GoR has been relying on the donors' support.

Table 2.1.2 Key Developments in Fiscal and Financial Management (billion Rwf)

	2001	2002	2003	2004	2005	2006	2007
Revenue and grants	148.19	160.26	195.40	263.63	310.34	396.20	465.79
Revenue	86.19	101.16	122.30	138.06	194.62	230.20	226.60
-Tax Revenue	79.50	94.60	114.60	134.56	184.23	218.40	214.50
-Non Tax Revenue	6.69	6.56	7.70	3.50	10.39	11.80	12.10
Grants	62.00	59.10	73.10	125.57	115.72	166.00	239.19
-Bugget Support	33.90	39.30	51.00	90.77	102.80	133.10	238.17
-Project grants	28.10	19.80	22.10	34.80	12.92	32.90	1.02
% Grants of Revenue and Grants	41.84%	36.88%	37.41%	47.63%	37.29%	41.90%	51.35%
Total Expenditure and net lending	158.03	164.92	217.86	275.36	335.83	389.00	490.90
Current Expenditure	107.40	123.65	162.76	164.06	215.99	266.90	304.70
Capital Expenditure	50.00	40.70	51.10	89.70	112.82	112.60	175.80
Net Lending	0.63	0.57	4.00	21.60	7.02	9.50	10.40
Overall Deficit(inc. grants)	△ 9.84	△ 4.66	△ 22.46	△ 11.73	△ 25.49	7.20	△ 25.11
Overall Deficit(ex. grants)	△ 71.84	△ 63.76	△ 95.56	△ 137.30	△ 141.21	△ 158.80	△ 264.30
Change in arrears	△ 31.75	△ 1.70	△ 13.20	△ 17.07	NA	NA	△ 7.00
Deficit	△ 41.59	△ 6.36	△ 35.66	△ 28.80	NA	NA	△ 32.11

Source: Annual Economic Report 2004, 2005, 2006 & 2007 published by MINECOFIN

2.2 Decentralization Policies and Administrative Reform

The National Decentralization Policy and Strategy was officially adopted in May 2000 under the responsibility of MINALOC. The overall objective of the Policy is to ensure political, economical, social, administrative and technical empowerment of the local population, to fight against poverty, and to participate in planning and management process of their own development. The three-year implementation of the Decentralization Policy started in January 2001. The implementation progress was reviewed through a nationwide appraisal in 2003. But a number of interventions were still required such as a) Lack of capacity at District and Sector levels to develop well integrated development and A/Ps. b) Low awareness as regard national laws and by-laws among local government leaders. c) Lack of ownership of community development plans by local populations. d) Difficult access to basic services, e) Inadequate financial resources and lack of budgetary management. The results, lessons and challenges for the 1st phase are reflected in the Decentralization Implementation Program (2004-2008) as the second phase.

2.2.1 Territorial Reform

In 2000, the country was divided into 11 provinces including Kigali City, 106 Districts, 1,545 Sectors and 9,165 cells. Subsequent to the latest territorial reform in 2005, with a view to use scarce financial and human resources more effectively, the administrative divisioning has been restructured into 4 provinces plus Kigali city, 30 Districts, 416 Sectors and 2,148 Cells.

Table 2.2.1 Comparative table of Former Administrative Organization and New Organization

Organization	Number of admin. entities		Number of staff per entity	
	Former System	New System	Former System	New System
Province	11(+Kigali)	4(+Kigali)	58	12
District	106	30	8	35

Sector	1,545	416	1	9
Cell	9,165	2,148	1	10

2.2.2 Responsibilities of the Central and Local government

Under the recent territorial reform, the new configuration of roles and responsibilities among the 5 levels is as follows.

Central Government: which has to design national policies and programs, mobilize local and external resources, ensure institutional and capacity building, and M&E.

Provincial Administration (PA): as a decentralized level of the Central Government, the PA is primarily responsible for ensuring that local government development planning is in line with the national policies and is promoting socio-economic development of the province based on its resource endowment.

District: It is the legal entity that is responsible for overall coordination of economic development, and coordinating planning, financing and implementing service delivery at Sector level, as well as for promoting cooperation with other local governments. An elected Council, a Mayor and an executive committee will run the District.

Sector: It coordinates activities of Cells and ensures the management of a number of basic services such as local development planning, local tax collection, statistics, education and social affairs, land use planning, housing and other local infrastructure, etc.

Cell: Its main responsibilities are focused on community action mobilization.

2.3 Relevant National Plans and Programs

The Government long-term development Plano revolve around the "Vision 2020" framework and the Millennium Development Goals (MDGs). In line with the Vision 2020, the Poverty Reduction Strategy has been adopted to effectively achieve local population- centered sustainable development through good governance and democratic decentralization. PRSP is implemented through sector policies and strategies, a process recently completed by MINAGRI. The National Agricultural Policy was revised by MINAGRI in 2004, and the Strategic Plan for Agricultural Transformation (PSTA) was adopted to implement the policy and strategy of the National Agricultural Policy (NAP), as well as PRSP in January 2005. Through the implementation of the PSTA programs, agricultural sector shall be transformed into a modern, professionally operated and market-oriented economic undertaking through the promotion of professionalism, specialization, technological innovations, and private-public partnerships. Currently, the Economic Development and Poverty Reduction Strategy (EDPRS), as well as PSTA2 have been developed to achieve the Vision 2020 goals building on the lessons learned from the PRS1 and PSTA1 respectively.

2.3.1 Poverty Reduction Strategy Paper (PRSP)

The National Strategy for Poverty Reduction (PRSP) was published in June 2002. This is one of several pillars of government policy framework to eradicate poverty through "rural development and agricultural transformation". MINAGRI published its National Agriculture Policy (NAP) in early 2004, which was followed by PSTA in October 2004. Since 2002, GoR has produced 3 Annual Progress Reports followed by the review of PRSP1 in 2005 and PRSP1 was found to be strongly relevant. The agricultural sector in PRSP1 was also evaluated by SWG. A second Poverty Reduction Strategy known as EDPRS was published in 2007.

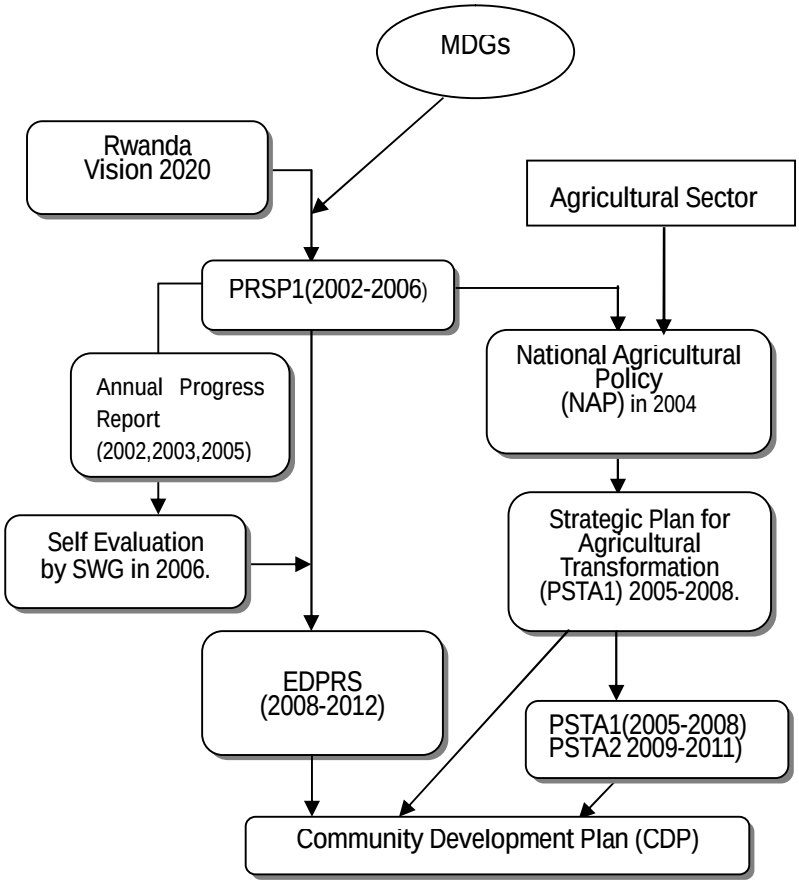


Figure 2.3.1 Relevant National Plan and Programs

2.3.2 Strategic Plan for Agricultural Transformation (PSTA)

(1) Summary of PSTA

Basing on policy orientation provided by the NAP, PSTA was prepared in January 2005 with the support of IFAD, DFID and Royal Netherlands Embassy (RNE). The overall objective, that is to contribute in a sustainable manner to poverty reduction and to support the national economic growth through increased production, diversification of income opportunities and natural environment conservation and maintenance, is to be achieved through the implementation of more than 30 projects. The PSTA 's four programs are: 1. Intensification and Development of Sustainable Production System, 2. Promotion of Farmers' Organization and Strengthening the Capacity of Producers, 3. Promotion of Commodity Chains and Development of Agribusiness, and 4. Institutional Development. The program with the operational tools, partner and resource mobilization, the formulation of the specific policies,

strategic legislation was refined in 2005 and implementing & testing, monitoring, reviewing and necessary adjustment to the PSTA programs have been executed. Funds needed for the above 4 programs for 4 years (2005-2008) are estimated at 167 million USD. The PSTA 2 formulation support comprising funds for a comprehensive consultation with the 30 Districts, as well as consultancy support for the revision of the PSTA Programs and Approach will be scheduled in the future.

(2) Summary of the Land Husbandry, Water Harvesting and Hilly Side Irrigation （LWH Project）

1) Project Goal:

To make effective contributions to the successful implementation of SPAT; participation of decentralized local governance in expansion of land care, water-harvesting and hillside-irrigation for improved food security and livelihoods; and to increase social, economical, environmental and political benefits.

2) Objective

The program would support commercial agriculture to contribute to food security of the rural communities of Rwanda through land-husbandry, water harvesting and hillside-irrigation sub-sectors by facilitating the quick introduction of appropriate technologies plus seeds, planting materials, tools. It also would help build functional capacity of relevant staffs and institutions of the governments and the private sector that will be sensitizing and promoting local-level, participatory and market-focused planning and development.

The Program would strengthen linkages between the Central Government, District Mayor Offices, Sectors and the rural communities. In total, 10,000 ha land will be irrigated by thirty two(32) valley-dam reservoirs to be constructed in the first phase and 69 more to be constructed in the 2nd phase. This enables to 3,100 ha and 6,900 ha horticulture farms to be put under hillside-irrigation scheme in the 1st and 2nd phases respectively. More than 30,250 ha land will benefit from intensive and comprehensive land-husbandry technologies and practices. Beneficiary farmers who opt for using their land under modern land husbandry and irrigation would be empowered to participate in producing commercial agriculture and to become prime-movers of the economic growth through pilot innovation schemes. In order to contribute to the overall objectives, 5 action points are proposed as below.

- **5 action points that contribute to the overall objective:**
  - Developing intensive, improved and sustainable production systems to address soil erosion, soil fertility reduction and unreliable rainfall;
  - Stimulating export diversification through high-value crops, horticulture fruits, forestry and livestock feed development. This needs control of soil erosion, replenishment and protection of soil fertility, irrigation and water harvesting systems;

- Demonstrating soil and water conservation, soil fertility replenishment and protection of downstream reservoirs, water harvesting and storage for hillside irrigation by direct involvement of beneficiaries;
- Establishing model organized farming communities apt in administering improved land-husbandry, water harvesting and hillside irrigation innovations and become effective market actors
- Amelioration of the micro-environment through protection of water catchments, avoiding soil erosion from the command areas and creation of water reservoirs.

(a) Project Location:

17 districts (Bugesera, Burera, Gakenke, Gatsibo, Gisagara, Huye, Kamonyi, Karongi, Kayonza, Muhanga, Ngoma, Ngororero, Nyamagabe, Nyanza, Nyaruguru, Rulindo, and Rutsiro) are selected as target areas.

(b) Project total cost:

$200 Million partitioned into US$: 30.00 Million GoR and beneficiaries, US$ 80 million donor grant and US$90 million loan are estimated.

(c) Implementation period:

4 years, 2009-2012 (Phase I: 2009-2010; Phase II: 2011-2012) by MINAGRI

Table 2.3.1 LWH Project Components

Major Component	Subcomponent	Details	Cost million USD
A. Infrastructure input and support services	1. Project management office to facilitate project implementation	Includes a project overseeing committee, 1 focal person, establishing office and staffing and equipment.	7.70
	2. Mobilizing, training and empowering rural communities in land husbandry and commercial agriculture (35,000 farmer households)	Aim is to establish a demand-driven and pluralistic extension delivery system to sensitize, mobilize and organize beneficiaries. 591 farmer organizations to be promoted	7.90
	3. Protection and rehabilitation of 30,250 ha of land in 17 districts by land husbandry measures	Land husbandry measures to fight erosion, soil acidity and infertility control will vary according to the slope gradient of the terrain and include: manure application and mulching, tree farming and forage development, progressive and radical terracing.	56.70
	4. Construction of 101 valley-dam reservoirs (370,000m3 each) and establishing water conveyance infrastructure to 10,000ha irrigable fields (Phase1: 32, Phasell: 69)	Includes construction of water harvesting dams and water distribution system for hillside irrigation, water for livestock and some for human use.	104.70
	5. Protecting 101 valley dam reservoirs from silt and environmental damages	Protecting water catchments to avoid the deposition of silt at the reservoir. This includes: tree farming and livestock feed (forage legumes and grasses).	2.30

	6. Planting 10,000 ha horticulture fruits and supplementary irrigation	Horticulture crops will include: coffee, tea, apple mangoes, avocado, pineapple, cooking banana and some forage legumes.	16.20
	7. Monitoring and Evaluation of the work progress of the project and the fitness of technologies and approaches that are used in implementing the above 6 specific objectives	Includes collection of reliable data on soils, hydrology and geologic formation of project sites; and monitoring and evaluation the activities	2.21
B. Strengthening staffs and institutions	- Establishment and running of an LWH implementation office, - Staffing and human resources capacity building program - Infrastructure, mobility, office equipment and ICT facilities - Training in technical issues and management at central and district levels	Includes training of technicians in the areas of Land husbandry, irrigation, horticulture management, value adding and marketing innovations, forage development, tree farming and enterprise, farmer's organization and entrepreneurship. Also includes study tours, meetings and workshops.	2.32

2.3.3 EDPRS and its Agricultural Strategy

(1) EDPRS

Based on the experience from the first PRSP1 (2002-2005), Rwanda's Economic Development and Poverty Reduction Strategy (EDPRS) has been formulated in July 2007 by the Ministry of Finance and Economic Planning. It provides a medium-term framework for achieving the country's long term development aspirations as embodied in Rwanda Vision 2020, the seven year GoR program, and the Millennium Development Goals and sets out the country's objectives, priorities and major policies for the next five years (2008-2012). The strategy instead of build on strong achievements in human capital development and promotes three flagship programs. These flagship program serve as a device to prioritize actions by the GoR, mobilize resources for development and improve policy implementation through more co-oriented interventions across sectors. The implementation of EDPRS will require Rwf 4,684 billion over five years period of 2008-2012.

In agriculture, the main programs include the intensification of sustainable systems in crop cultivation and animal husbandry; building the technical and organizational capacity of farmers; promoting commodity chains and agribusiness, and strengthening the institutional framework of the sector at central and local level. Under the EDPRS the agriculture and animal resources sector focuses on the following program areas, in line with the PSTA and aligned to the broader planning frameworks of the Common African Agricultural Development Program (CAADP) and Rwanda's Vision 2020:

1) Sustainable Production systems developed and agriculture and animal resources production intensified: Focusing on

- ✓ increasing the area protected against soil erosion;
- ✓ intensification in both crop and livestock production, including the 'One Cow per Poor Family' program;
- ✓ improved access to and use of agricultural inputs, especially inorganic fertilizer and improved seed;
- ✓ increasing area irrigated, especially on hillsides as well as increasing the area of reclaimed marshland developed.

2) A high level of professionalism acquired by producers supported by client oriented research and

extension services: Focusing on

- ✓ increased access to improved extension services;
- ✓ increasing the number of farmer associations transformed into cooperatives; and
- ✓ improving access to agricultural credit.

3) Market access expanded through improved competitiveness and diversification of Rwandan Agriculture: Focusing on

- ✓ increasing added value of agricultural exports by improving quality and by producing new commodities for export;
- ✓ supporting and increasing the number of farmers and farmers' cooperatives specializing in priority commodity chains; and improving post-harvest infrastructure.

4) Institutional framework functioning effectively and efficiently for the Agricultural Sector: Focusing on

- ✓ improving budget allocation and execution;
- ✓ improving information and communications technology; and
- ✓ improving sector capacity for harmonization and coordination.

(2) Summary of the National Rice Production Program (2006-2016)

1) Background

Since the 1980s, Rwanda has been suffering from a structural food deficit, resulting mainly from poor management of natural resources, overexploitation of land without restitution of nutrients removed by crops or leached by erosion, and from subsistence farming strategies characterised by lack of professionalism. This has resulted in low levels of production and, as a consequence, domestic production has not been able to meet food needs of the population resorting to commercial imports and food aid which is unacceptable and should be avoided.

To reverse the trend, the country has embarked on a strategy of intensification, with putting emphasis on a strategic food crops such as rice, maize, beans, Irish potato and wheat. The inclusion of rice among the selected strategic food crops is justified by the following reasons:

1. Rice crop gives a good option to combat the problem of food insecurity because it has high yield. It gives about 7 tons /ha of paddy, which no other food crop can make in flood prone valleys.

2. Rice consumption is preferred in towns, schools, hospitals, and other public entities mainly due to good taste and convenience in both handling and food preparation. For this reason, market for the crop is assured, giving limited chances for frustration to the grower. Furthermore rice market nationally has not been exhausted and yet there is an equally strong export potential in the COMESA region.

3. The rice crop allows the exploitation of flood prone valley bottoms, contrary to most of the other food crops. This reduces pressure on the hill side land making it possible to grow other food crops, thereby allowing optimal utilisation of land.

4. Rice production is a factor of monetization of the rural economy as almost the total production is easily commercialised, generating income for producers and other stakeholders.

5. Rice is easily conservable, marketable, transportable hence the post harvest losses are minimal and the value of the crop is maximum.

6. The bi-products of the rice crop are utilised in the preparation of animal feeds, therefore also supporting the development of the livestock sector, which holds a key position in the support of the livelihood of the population especially by the protein supplement as well as household income.

Based on the marshland master plan 2003, the national rice program (2006-2016) has been designed with the purpose of exploiting the full potential of rice cultivation in the country so that the country can achieve self sufficiency in rice food needs as well as for export.

This shall be achieved through the following:

- Improving productivity from the current 5tons/ha to7tons/ha of paddy rice.
- Expansion of the current cultivable area from the current 7,456ha to 66,094 ha of marshlands (8.9 times).
- Increase of the rice production from 49,942ton in 2004 to 925,316ton in 2009(18.5 times)
- Construction and/or maintenance of the water supply systems to permit exploitation of the cultivable areas through the two growing seasons.
- Ensure handling and processing infrastructure to minimise post harvest losses and to maximize harvest in quantity and quality.

(a) Objectives

The overall objective of the rice program is to ensure national food security, facilitate economic growth and contribute to the fight against poverty. The followings are the specific objectives:

1. Satisfy national rice needs in the medium term (3years).
2. Produce surplus for exports.

(b) Project Location

The implementation of the program shall give priority to high productivity areas of Cyangugu, Umutara, Kibungo and Kigali Ngali. However, the other areas of Butare, Gitarama, Ruhengeri, and other provinces should be equally exploited given the fact that even with the poor productivity; rice still gives better returns in such areas than any other food crops.

(c) Expected Outputs.

The following outputs are the expected:

1. Exploitation of all the 66.094 ha exploitable in rice production.
2. All growers trained in rice cultivation techniques
3. All growers organised in cooperatives
4. All rice growers access to the necessary inputs (fertilisers,seeds,pesticides)
5. Sufficient infrastructure for handling and processing are established.

(d) Strategies

The proposed strategies for the achievement of the stated objectives in the rice production will focus on addressing the identified constraints and capitalising on the existing potential. The following key strategies will be adopted:

1. Improve the crop productivity so as to get the maximum production out of the available land. This shall be achieved mainly through improved use of fertiliser and pesticides, adoption of better agronomic practices and improved planting material with better yields.
2. Ensure optimal utilisation of the available land by putting in place the required conditions for exploitation over all seasons.
3. Expansion of rice production area to achieve a total potential area of 66094hectares.
4. Facilitate the operation of research programs for the appropriate varieties
5. Organise farmers to ease the support operations as well as marketing and procurement issues.
6. Mobilise financing institutions to avail the required investment capital at terms and conditions consonant to the financing needs of the rice crop
7. Sensitise the public on the rice program, opportunities and challenges for the purpose to attract more private investors.
8. Establish a fund for the Recovery of the investments done in rice and ensure that it is revolved in the programme. This will require a separate study to elaborate how it would be operationalised.

(e) Projected returns on rice production

As shown below, the national needs in rice are satisfied in the fourth year (2009), and thereafter a surplus is generated for export. The annual average of the exports value is estimated at $175 millions.

Considering the initial investment of Rwf 329.9 billions required to generate the above product, it would take only 6years to be recovered, that is, by year 2011.

Table 2.3.2 Projected returns on rice production

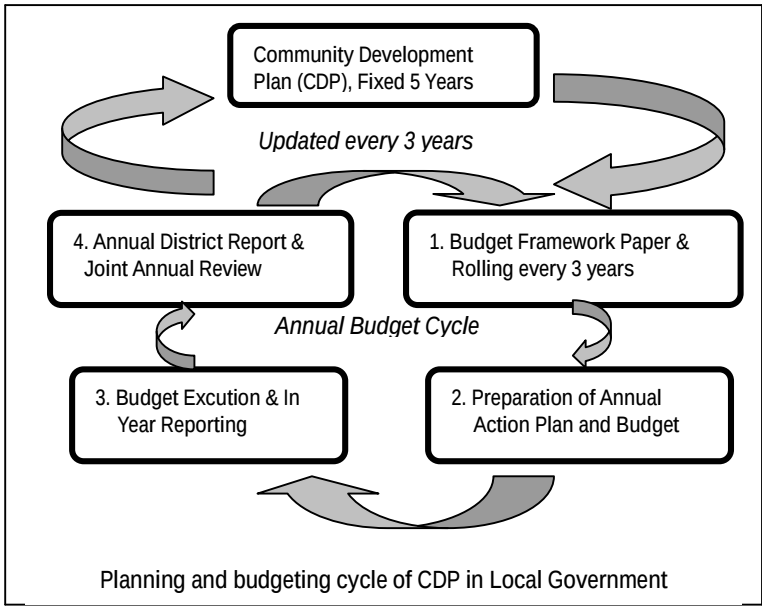
Year	2006	2007	2008	2009	2010	2011	2012	2013	2016
Production (ton/paddy)	74,560	104,380	104,380	925,320	925,320	925,320	925,320	925,320	925,320
processed Rice (ton)	48,464	67,850	67,850	601,455	601,455	601,455	601,455	601,455	601,455
Estimated National Rice Needs(ton)	131,031	134,831	138,741	142,764	146,905	151,165	155,549	160,060	174,393
Surplus for Export	-82,567.00	-66,981.30	-70,891.40	458,690.92	454,550.75	450,290.51	445,906.73	441,395.82	427,062.90
Average Price per kg (Rwf)	200.00	206.00	212.18	218.55	225.10	231.85	238.81	245.97	268.78
Value of Production (000Rwf)	9,692,800	13,977,018	14,396,328	131,445,311	135,388,670	139,450,330	143,633,840	147,942,856	161,661,153
Commulative Revenues)	-	23,669,818	38,066,146	169,511,457	304,900,127	448,533,967	592,167,808	740,110,663	1,211,105,533
Export Price($0.4kg FOB, Kigali)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Value of Export (000$)	0.00	0.00	0.00	183.48	181.82	180.12	178.36	176.56	170.83

Source: NATIONAL RICE PRODUCTION PROGRAM (PERIOD 2006-2016) by MINAGRI

2.3.4 Community Development Plan (CDP)

(1) Community Development Plan (CDP)

The role of Local Government is to deliver services within the context of national policies and guidelines aimed at responding to the needs of local population. To achieve these objectives, Planning and Budgeting Guidelines of Community Development Plan (CDP) for Local Governments have been prepared by MINECOFIN and MINALOC and ware applied to the Local Government in 2007. The CDP is a 5 year strategic planning instrument and sets forth the District long term vision, goals and explicit strategies geared towards achieving such goals within five years. The District CDP is intended to guide the identification of outputs and activities and the deployment of resources by the District in the Annual Action Plan and budget.



Planning and budgeting cycle of CDP in Local Government

Figure 2.3.2 Planning and budgeting cycle of CDP in Local Government

It is prepared once every 5 years and updated every 3 years as shown in the next page.

(2) District Performance Contract

The final annual action plan with the budget is approved by the District Council; the budget becomes a legal document by which the Council authorizes.the District administration to spend money on its behalf in order to carry out the Council programs. The Mayor signs the performance contract with the President. By signing the performance contract, the Mayor commits the District to delivering specific services and investments to the population of the District, for which he or she, together with the Council would be held accountable.

2.4 Governmental Organizations

2.4.1 MINAGRI

(1) Role and Staffing

Through the decentralization process started in 2001, the role of MINAGRI has become that of policy and strategy formulation for the PSTA's operational programs, with local authorities at decentralized levels. MINAGRI is responsible for planning and coordination, follow-up, evaluation and reporting. The responsibility for program implementation was transferred to the District. Accordingly, MINAGRI staff was reduced from 144 staff members in 2001 to 69 staff members in 2005 and only 31 staff members were remaining in July 2006. The restructuring was aimed at improving the capacity and performance of the Ministry on the selective basis so as to ensure a strong central system, orienting and ensuring sound, coherent, and effective sustainable implementation and practice at the decentralized level, as well as to reduce unnecessary hierarchy and bureaucracy with related delay. The organization chart of the MINAGRI is shown in Annex II, Figure 2.4.1.

Table 2.4.1 MINAGRI Budget from 2003 to 2005 (Unit: Billion Rwf)

year	MINAGRI BUDGET				Total Budget in Rwanda (5)	Ratio (6)=(3)/(5)
	Foreign Budget (1)	Own Budget (2)	Total (3)	Ratio (4)=(2)/(3)		
2002	6.95	2.60	9.55	0.27	151.24	0.06
2003	7.42	2.37	9.79	0.24	252.03	0.04
2004	9.91	3.37	13.28	0.25	328.91	0.04
2005	7.95	4.71	12.66	0.37	374.32	0.03
2006	8.05	5.22	13.27	0.39	404.74	0.03

Source: MINAGRI Calculations based on MINECOFIN data 2005

Law Determining the State Finance for the 2006 Fisical Year

(2) Budget

The table below shows the MINAGRI's budget from 2002 to 2005. Within 5 years, MINAGRI's own budget increased about 2 times from 2.60 billion Rwf in 2002 to 5.22 billion Rwf in 2006. On the contrary, the foreign supporting budget showed gradual increase from 6.95 billion Rwf to 8.05 billion Rwf, an increase of about 16% in 5 years. Ratio of the own budget against the foreign budget was about 30% being is still low.

2.4.2 MINAGRI Parastatal Agencies

(1) ISAR

A precursor of Institut des Sciences Agronomiques du Rwanda (ISAR) was born in Rubona in 1930 during the Belgian colonial administration and became ISAR following the legislative ordonnance no

R /118/52 of June 22nd 1962. At present, ISAR is reorganized as an autonomous public institution under the law no 21/1982 of June 10th 1982.

i) Missions

ISAR aims at promoting the scientific and technical development of agriculture and animal resources in Rwanda and has the following tasks.

Table 2.4.2 Task of ISAR

No	Tasks
1	Transform agriculture through changing subsistence farming to commercial agriculture
2	Making agriculture more profitable and competitive
3	Increase agricultural activity
4	Promote the broad needs of food security

Source: ISAR: History, Achievements and Trends

ii) Organization Structure and Staffing

As a public institution, MINAGRI supervises ISAR and the steering committee administers ISAR. The research framework of ISAR is comprised of the three regional centers, which are located in Karama, in Bugesera for the eastern lowlands (below 1400m), Rubona for the central plateau regions which ranges from 1400 m to1800 m, and Ruhengeri for the highland region above 1800 m. In total, 12 stations are scattered all over Rwanda in an attempt to address the country's agro-ecological constraints (See Table 2.4.3). Organization chart for ISAR is shown in Annex II, Figure 2.4.2).

Table 2.4.3 ISAR Research Station by Agro-ecological Zone

No	Regional Center	Agro-ecology	Dependent Research Stations
1	Karama	<1,400 m	Karama, Kibungo, Nyagatare
2	Rubona	1,400 – 1,800 m	Rubona, Songa, Ruhande, Ntendezi
3	Ruhengeri	1,800 m <	Ruhengeri, Rwerere, Tamira, Gishwati, Gakuta

Source: ISAR: History, Achievements and Trends

As regards the number of staff as of May, 2004, ISAR had a total of 376 staff members, including 35 % in technical division and 65% in administration.

iii) Research Activities

ISAR has conducted three research programs, namely crop production, forestry and animal production either in on-station or on-farm trials involving the participation of beneficiary farmers. The research programs by ISAR are as follows:

Table 2.4.4 ISAR Research Program

Department	Program	Subprogram
Crop Production	Cereals	Maize, Rice, Sorghum, wheat
	Leguminous	Beans, soybean, garden peas
	Roots and tubers	Irish potato, cassava, sweet potato
	Industrial crops	Coffee, tea, pyrethrum,
	Horticulture	Banana, fruits, flours and vegetables
	Soil Conservation and Management	Watershed management, terracing combined with plants
Forestry	Forest management, agro-forestry and	Agro-forestry, Natural forests, Tree seed

	tree seed center	center, Afforestation
Animal Production	Cattle and small ruminant	Fodder crops and cattle feeding, crossbreeding,

Source: ISAR: History, Achievements and Trends

Table 2.4.5 ISAR Major Research Constraints

1	Low funding for research (0.3 % AGDP) compared with countries with similar development (0.5-0.8 %) levels.
2	Lack of sufficient scientific staff
3	Need for strong capacity building
4	Difficulty to find regional adapted varieties

Source: ISAR: History, Achievements and Trends

iv) Research fund and Constraints

ISAR research budget highly depends on outside funding sources to finance its research activities that amount to around two million dollars annually. Meanwhile, the GoR can afford to pay salaries and small amount for research program not exceeding 400 million Rwf per year. ISAR face the following constraints in research activities.

v) New strategic Plan 2002-2007

So as to cope with the above constraints, a 7- year strategic plan (2002-2010) has been formulated in line with relevant national plans focusing on poverty reduction, food security and environmental sustainability as follows.

Strategy 1: Need to transform agriculture technology

Strategy 2: Focus on adaptive research

Strategy 3: Complete commodity-based research instead of biophysical research constraints

Strategy 4: Effective decentralization to bring research activity closer to the farming community

Strategy 5: More actions for in funding mobilization to cope with limited GoR budget

To successfully implement the above strategy, the vision of ISAR has been developed as follows:

Vision1. Partnership between researchers and research results users based on farmer-research concept.

Vision2. Adaptive or innovative research through strengthening partnerships with CGIAR and other regional research institutions, as well as national institutions.

Vision3. Applied & Fundamental Research in very precise and justified case such as biotechnologies

Vision4. Adaptive research in key sectors of economic growth

Vision5. Complete chain commodity- based research

Vision6. Effective decentralization of ISAR

Vision7. ISAR must be more active in funding search

(2) Rwanda Agricultural Development Authority (RADA)

RADA was established in February 2005 in accordance with the organic law No 14/2004 of 26/5/2004 and has the mission to strengthen farmer's supporting activities, including improved farming practice to marketing aspect as an autonomous institution under the umbrella of MINAGRI.

i) Missions

The functions of the Authorities consist of the following 11 tasks.

Table 2.4.6 Tasks of RADA

No	Functions and Tasks
1	Implement the National Agricultural Policy
2	Facilitate Technology transfer to the farming community in order to improve their yields
3	Facilitate technology transfer to farmers and others involved in agricultural activities and technology appropriate to ensure value addition to agricultural products.
4	Put in place systems to ensure service delivery to farmers of agricultural inputs, especially tools and fertilizers in a timely and cost effective manner.
5	Control disease and pests of crops
6	Ensure an efficient national storage program and availability of markets for agricultural products.
7	Sensitize farmers on good practices for soil and water conservation in order to improve productivity
8	Coordinate different actors involved in agriculture sector to ensure harmonization and complementarities
9	Facilitate the transfer of knowledge and skills to the farming community so that they can contribute to the transformation of their profession.
10	Consolidate agricultural statistics and information related to harvest and disease and pest situation in the country.
11	Implement the laws and decrees related to the agriculture sector.

Source:Instituting Rwanda Agricultural Development Authority

(ii) Organization Structure and Staffing

RADA is composed of six technical units with the administration and finance unit (Figure 2.4.3), and has the seed multiplication farms in Musenyi Sector for maize/cassava, and Gashora Sector for cassava in Bugesera District, but there is no rice seed multiplication farm in that District. The authority has signed a performance contract with MINAGRI on the following points;

i. The responsibilities of the management of the authority and other key positions.
ii. The targeted outputs of the Authority.
iii. The source of revenue to the authority, its utilization and the mechanism for monitoring.
iv. The means that will be used by the supervising minister to reprimand the board of directors and the management of the authority.

Concerning the staff, RADA 87 staff members were initially proposed for seven units, namely administration, crop production, crop protection, rice development unit, seed production, post harvest management and soil and water management units. However, RADA is compelled to reduce the number of staff down to the range of 40-50 staff members under the decentralization process. Organization of RADA is shown in Annex II, Figure 2.4.3.

(iii) Budget

RADA has been newly created, thus its budget scale is not finalized yet except for a temporal budget and negotiation is underway with a draft budget of three billion Rwf.

(iv) Strategy of Farmer Supporting Service

Strategy to implement RADA's mandate is basically focused on partnerships with local authorities,

private sector and civil society for it to be implemented at grassroots level through service contract and performance contract system with proximity service providers such as private enterprises, NGOs, skilled farmer's organizations, cooperatives, etc.

(3) Rwanda Animal Resource Development Authority (RARDA)

RARDA was established in February, 2005 by detaching the three centers, namely the National Center for Artificial Insemination (CNIA), the National Veterinary Laboratory in Rubirizi (LVNR) and the National Poultry Hatchery in Rubirizi (CNR) from MINAGRI as the stop centre to develop animal resources at national level.

(i) Missions

The tasks assigned to its authorities comprise the following nine task items.

Table 2.4.7 Tasks of RARDA

No	Tasks
1	Implement the national animal resources policy
2	Provide improved technology and extension services to farmers and other individuals dealing with products of animal origin in order to help them modernize their operations so as to increase marketing of products and raise their incomes
3	Provide farmers and individuals dealing with animal products improved technologies so that animal products fetch more on the market.
4	Monitor and control animal diseases and put in place measures that will ensure diagnosis and treatment of animal disease including those that are transmitted to man.
5	Coordinate activities of farmers and other individuals dealing with animal products.
6	Train farmers to allow them to play a significant role in their profession and in national development.
7	Coordinate activities aimed at improving animal resources so that they can complement each other.
8	Collect analyses and provide information and data on animal disease and animal products at national level.
9	Implement laws and regulations pertaining to animal resources.
	Source: Draft Law No --- of ---- establishing RARDA

(ii) Organizational Structure and Staffing

RARDA Headquarters is located in Kigali and comprises four technical units with an administration and finance unit. The offices are scattered in three sites over Masaka and Rubirizi (See Figure 2.4.4). The authority is headed by the board of directors and signs a performance contract with MINAGRI based on the legislative document, and Memorandum of Understanding (MOU) with ISAR. The satellite laboratories pertaining to the Diagnostic & Epidemiology Unit are located at Nyagatare, Kibungo, Butare and Gishwati and they are responsible for diagnostic and curative work in each coverage area. Apart from satellite labs, control posts and quarantine posts are placed countrywide and one of the control posts is located at the Bridge of Nyabarongo River in Ntarama Sector, Bugesera. District. As regards staffing, the initially proposed number of staff members has been reduced from 98 to the range 40-50 staff under the decentralization process. One RARDA staff member has been dispatched to Bugesera District Office for monitoring and surveillance of epidemic disease such as FMD in the coverage area. Organization of RARDA is shown in Annex II, Figure 2.4.4

(iii) Budget

The annual budget is not finalized yet as RARDA was just launched in last year and the draft budget

of 8.1 billion Rwf is still under negotiation with MINECOFIN.

(iv) Strategy of Farmer's Supporting Services

The support services to livestock farmers by RARDA are provided in collaboration with other partners that offer services in animal production, including research through contract with RARDA. This framework has been already partially implemented in small scale and RARDA has currently prepared this system to deploy support service countrywide through contract with nominated partners. At present, RARDA has established the partnership with 14 stakeholders countrywide, including ISAR.

(4) RHODA : Rwanda Horticulture Development Authority (RHODA)

RHODA is a legally approved institute (June 2007) being run under MINAGRI. It is originated from Horticulture task force established in January in the same year. While RADA is responsible for extension works of common crops with the aim of food security, RHODA intends to enforce technical transfer and marketing/distribution of cash horticultural crops for export, a small and weak sector in Rwandan agriculture.

(i) Mission

RHODA promotes production and development of cash horticultural crops for export in line with the basis of Vision 2020, EDPRS, NAP, PSTA, and NHS (National Horticulture Strategy) through facilitation of appropriate production, post-harvest technology, organization of growers, infrastructure building, market information system, export compliance mechanism, and advisory/extension services.

(ii) Goal

RHODA contributes to poverty alleviation and economic development through production increase in cash horticultural crops for export; export revenue will be US$ 20 million in 2010, which is currently US$ 1.5 million.

(iii) Function

To achieve the above goal, RHODA works on the following duties at a national level.

- Increase production of quality horticulture exports.
- Investment mobilization & promotion
- Improving marketing infrastructure

(iv) Strategies

- Starting from a weak base, government will provide basic infrastructure, mobilise the private sector, help pioneers on soft loans and technical know how.
- Developing an information system that avails all data/information to potential investors/farmers from one stop centre. Availing information on land issues, market prices, market access and potential buyers, profitable horticultural products, etc will reduce transaction costs, reduce duplication, and attract potential investors.

- Focusing on the production and export of horticultural products that already have market and in which Rwanda has comparative advantage and then expand to more diversified ones once established
- Taking advantage of niche market for organic products
- Putting in place an organisational structure that incorporates the private sector as much as possible but at the same time short enough to reduce bureaucracy.

(v) Organization structure and staff

As of July 2007, RHODA holds 21 staff in total. 14 staff posted in the technical units are those selected from among the public (ISAR, RADA, NGO or Horticulture task force). Its organization structure is shown in Annenx II. Figure 2.4.5. Each Subunit of the technical Units holds one staff and the detail is show in the table right.

Table 2.4.8 Working Unit of RHODA

Unit	Subunit
Horticulture Production	Fruits & Nuts, Vegetables, Spices & Essential oil, Flower & Ornamental plants, Post-harvest
Horticulture Protection	Pest, Disease, Seed
Market development & Information dissemination	Domestic Market, International Market, Quality Control

As RHODA just implemented the Action Plan lately, performance contract has not been concluded yet with MINAGRI but one-year contract. Its office is located in the MINAGRI building and it is not sure at the moment if RHODA will have its own office like RADA in the future.

(vi) Budget

RHODA's budget for 2007 is approved for the period from May to December (detail unspecified). The estimated budget for the Action Plan in which RHODA, ISAR, or MINICOM are involved is US $ 9,950,000 over five years.

(vii) Farmer backup services

In many cases, Rwandan horticultural farmers are unorganized, causing many inconveniences in production or marketing. RHODA aims at formulating horticultural farmer unions and grower associations so that they can have more opportunities for land consolidation, link to markets, and access to extension services. RHODA provides technical supports to farmers at a district level, also developing partnership with private sectors such as enterprises and NGOs. For instance, there is MoU concluded with CARE International; RHODA provides technical supports to CARE beneficiaries. In July, RHODA intends to complete modules of sericulture and passion fruit cultivation as its first publicity matter for extension. In September, on-farm demonstration fields will be established in each District, and currently 22 nurseries are being prepared throughout the country (for passion fruits and avocado).

2.4.3 MINALOC

(1) Role and Staffing

The mission of the Ministry of Local Government, Good Governance, Community Development and Social Affairs (MINALOC) is "Promoting well-being of the population through good governance, community development and social affairs." And the key objectives of this ministry are (i) Decentralization and Democratization, (ii) Capacity Building, (iii) Social well-being of the population, (iv) Protection of vulnerable groups, (v) Management of risks and disasters, as well as supervising Province and District.

The organization chart is shown as below. The ministry functions in 6 units or departments: Local Administration, Local Finance, Decentralization and Good Governance, Social Security and Protection, Community Development, and General Service (Public Relations and Internal Resources Management). In addition, MINALOC has under its remit specific funds and organizations, especially CDF (Common Development Fund), FARG (Fund to assist Genocide survivals), RALGA (Rwanda Association of Local Government Authority), etc., which help the Ministry achieve its objectives. Organization of MINALOC is shown in Annex II, Figure 2.4.6.

Table 2.4.9 Budget of Related Organizations in 2006 (Billion Rwf)

Name	Budget	Ratio (%)
Rwanda	404.74	100.00
MINALOC	35.71	8.82
MINAGRI	13.27	3.28
Eastern Pro.	0.19	0.05
Bugesera	1.12	0.28

Source: Law Determining the State Finance for the 2006 Fiscal Year

(2) Budget

The budget of MINALOC accounts for about 9% of the total GoR budget in 2006 as follows. According to Bugesera District Action Plan in 2006, there are 4 services funded by MINALOC whose funds do not pass thorough CDF. Construction of shelters for needy people absorbs the big share of the budget allocated to those 4 services.

Table 2.4.10 Services in Bugesera District funded by MINALOC (except for CDF)

Category	Service	Local Target 2006	Available Resources (Rwf)	Source of Funds
GOOD GOVERNANCE	Training for elected organs	Organise training for all elected organs	20,000,000	District budget and MINALOC
GOOD GOVERNANCE	Training for elected organs	Identify people reaching the required age to get ID Card (100)	1,350,334	District budget and MINALOC
JUSTICE	Construct shelters for needy people	100 shelters will be constructed for needy people	300,000,000	FARG, MINALOC, Umuganda (Community works), TIG (Community service by released prisonners to serve part of their penalty)
JUSTICE	Register needy people	100% of needy people are identified	1,000,000	FARG, MINALOC
Total			322,350,334	

Source: Bugesera District Action Plan (till 2006) Prepared by Bugesera District

2.4.4 CDF

(1) General

So as to implement decentralization policy, the government of Rwanda through law No.20/2002 of 21st May 2005, put in place the Common Development Fund intending to consolidate one of the three pillars of that policy, which is increasing means and capacity for local governments.

In this context, CDF contributes to poverty reduction by creating employment and funding developmental projects across the country. Furthermore, local government capacity is reinforced through support to basic infrastructure and funding for income generating projects.

The mission entrusted to the CDF is as follows:

-To finance development projects; to distribute among the Districts, Towns and Kigali City funds allocated to those projects and to ensure these funds are equitably distributed to those entities.

-To monitor the use of the funds allocated to development projects in Districts, Towns and Kigali City.

-To serve as intermediary between the Districts, Towns and Kigali City, and donors who are specifically involved in funding development projects within these entities, though such entities may have direct partnership with donor community.

The GoR has decided to integrate Labor Intensive Public Works – Local Development Programs (PDL-HIMO) and Ubudehe Program at the level of the implementation of projects and approaches. The advantages of this initiative are as follows:

-Harmonizing mechanisms to fund projects from decentralized entities

-Integrating HIMO and Ubudehe approaches in the process of identification and implementation of projects

-Reducing recurrent costs in favor of costs for development actions;

-Putting in place security mechanisms to ensure the safe management of funds from donor community.

MINALOC is the line Ministry for CDF and PDL-HIMO and Ubudehe programs. The role of the Ministry, as regards this integration, is to ensure that decentralization, good governance and community development policies are implemented.

The Board of Directors ensures that funds, which are put at the disposal of CDF, PDL-HIMO and Ubudehe, are allocated to decentralized entities in accordance with community development plans and

provisions of partnership agreements signed with donors.

(2) Financing and allocating development funds to Districts, Towns and Kigali City Council

Funding process and allocation of development funds is as follow.

1) Project Analysis

Districts, Towns and Kigali City Council development projects are formulated basing on the following priorities (for year 2004):

-Production and income generating infrastructure to improve financial capacities for Districts and Towns
-Socio-economic infrastructure mainly communication infrastructure (roads and bridges)
-Energy (solar energy, hydroelectric energy, connection to ELECTROGAZ existing cables)
-Drinking water
-Environment protection (fight against erosion, deforestation, etc.);
-Promotion of tourism
-Rural telecommunication
-Administrative infrastructure (Sector office)

The project analysis is based not only on the respect of priorities but also on the assessment criteria (See Annex II. CDF: The Assessment Criteria for the Project proposed)

2) Drafting and Signing of Financing Agreement

After the approval of projects by the Board of directors, CDF drafted and signed agreement with Districts and Towns, each party having to respect and comply with rights and obligations specified therein. Hence, the agreement clearly determines the following:

-Cost for projects and their nature;
-Project implementation timeframe and place;
-Practical modalities for funds transfer , considering that amounts are disbursed by installments, per project progress ;
-Fund allocation in case possible interests are made on installments granted to Districts to implement projects;
-Book keeping for funds transferred;
-Monitoring system regarding the use of funds;
-Tender award procedures;
-Reporting system and to whom reports must be submitted;
-Rights and obligations for all contracting parties;
-Sensitization and mobilization of the population to involve them in the project implementation ;
-Behavior of contracting parties in case of modifications to the agreement, delays or litigation.

3) Funds Transfer to Districts and Towns

After signing the financing agreement with the concerned District / Town and for a given project, the District issues tender invitation for tender award process. Once tender is awarded to the contractor in

charge of the project implementation, the District signs the implementation contract. It is upon receipt of the report from the District that CDF transfers funds following the modalities hereunder:

-The amount for the project cost is transferred to the District in different installments as per activity progress and after justification of the preceding installment;

-First, CDF disburses to the District/Town, the first installment of an agreed percentage of the total cost of the project upon the presentation of the three documents, namely the tender award report, National Tender Board non-objection and the agreement between the District and the beneficiary of the contract;

-Thereafter, CDF provides to the District two other installments upon the presentation of the progress report and a report justifying the use of the previous installment, 40% for each installment.

-The percentage of installments is calculated basing on the total project cost as specified in the implementation agreement signed between the District and the contractor minus the value in Rwanda Francs for local contribution.

4) Monitoring projects

CDF ensures the monitoring of projects under implementation as follows:

- Prior to the project approval by the Board of directors, CDF organizes visits in Districts/Town to better understand the project implementation site and to assess beforehand the relevance of the project, as well as possible effects on environment and local communities.
- After the approval of the project, it is necessary to provide Districts/Towns authorities with consultancy services as regards invitation to tender and tender awarding procedures, as well as financial and project management in order to rectify in time possible mistakes or errors.

(3) Funds transferred to Bugesera District (from year 2003 to 2006)

Table 2.4.11 CDF Transferred to Bugesera District during the three Years

Year: 2006			
Former Dist.		Name of Project	Amount ('000Rwf)
1	Nyamata	Resettlement at Nyamata center	41,400
2	each District	Solar energy (Funded by CDF+District)	20,000
3	each District	One computer set (Funded by CDF+District)	15,000
		Total amount to Bugesera	76,400
		As % of total amount of funds transferred:	N/A

Year: 2004		The total number of project: 140	
		The total amount of funds transferred: 1,885,940 ('000Rwf)	
Former Dist.		Name of Project	Amount ('000Rwf)
1	Ngenda	Project to expand Ruhuha market	20,577
2	Ngenda	Ngenda afforestation project (HIMO)	35,865
3	Nyamata	Rehabilitation of Nyamata slaughter house	943
4	Nyamata	Project to plant trees alongside sectors' trails	117,745
5	Nyamata	Rural telecommunication project	7,119
		Total amount to Bugesera	182,249
		As % of total amount of funds transferred:	9.7%

Year: 2003		The total number of project: 149	
		The total amount of funds transferred: 830,999 ('000Rwf)	
Former Dist.		Name of Project	Amount ('000Rwf)
1	Ngenda	Project to expand Ruhuha market	4,092
2	Nyamata	Installation of 13 drinking water sources in Kayumba, Kanzenze Mayange and Nyamata slaughter house	1,744
3	Nyamata	Rehabilitation of Nyamata slaughter house	404
4	Nyamata	Rational development of a 12 ha swamp in Karugenege, Kanzenze	2,916
		Total amount to Bugesera	9,156
		As % of total amount of funds transferred:	1.1%

Source:TF and CDF Annual Report

(4) Constraints

The CDF operational constraints are as follows:

- District and Towns submit project proposals along the year after the planning phase. Therefore, the project implementation timeframe often goes beyond the financial year and causes difficulties as regards the budget management vis-à-vis project costs.
- Some contractors do not abide by agreement provisions, and fail to show professional expertise while implementing the projects.
- Districts and Towns need close assistance and coaching from provincial department;
- The project implementation pace still remains slow and, therefore, causes low absorption capacity for funds allocated to Districts, Towns and Kigali City Council.
- Price fluctuations significantly impact on project costs during the implementation process.

2.4.5 REMA

(1) Objectives

So as to implement the "Organic Law No. 04/2005 of 08/04/2005 determining Modalities of

Environment Protection and Conservation in Rwanda" (hereinafter referred to as "Environmental Law"), the Rwanda Environmental Management Authority (REMA) was established under the Ministry of Land, Environment, Forestry, Water and Natural Resources (MINITERRE) in April 2006. REMA will enjoy financial and administrative autonomy.

To fulfill its mandate, the legislator provides REMA with powers and assigns to it the following tasks:

-To implement Government environmental policy and decisions of the Board of Directors;
-To advise the Government on legislative and other measures for the management of the environment or the implementation of relevant international conventions, treaties and agreements in the field of environment, as the case may be;
-To take stock and conduct comprehensive environmental audits and investigations, to prepare and publish biannual reports on the state of natural resources in Rwanda;
-To review and approve environmental impact assessment reports of any field of socio-economic activities undertaken by any agency;
-To undertake research, investigations, surveys and such other relevant studies in the field of environment and disseminate the findings;
-To ensure monitoring and evaluation of development programmes in order to control observance of proper safeguards in the planning and execution of all development projects, including those already under way, that have or are likely to have significant impact on the environment;
-To participate in setting up of procedures and safeguards for the prevention of accidents and phenomena, which may cause environmental degradation and propose remedial measures where accidents and phenomena occur;
-To render advice and technical support, where possible, to entities engaged in natural resources management and environmental protection;
-To provide awards and grants aimed at facilitating research and capacity-building regarding environmental protection;
-To publish and disseminate manuals, codes or guidelines relating to environmental management and prevention or abatement of environmental degradation.

(2) Roles and Functions

In June 2006, REMA had fifteen (15) staff members, consisting of five (5) Directorates. The roles and functions of each Directorate are as follows:

1) Directorate of Finance & Administration

The Directorate is to render supportive administration, management of human resources, finances, procurement, logistics, security and maintenance of the Authority's equipment.

2) Directorate of Research, Environmental Planning & Development

The Directorate has to prepare and document the plans of the Authority, disseminate it to all stakeholders/partners. It develops and manages environmental projects. Organization of REMA is shown in Annex II, Figure2.4.7

3) Directorate of EIA Compliance & Enforcement

The Directorate has to conserve, preserve, monitor and to manage the environment, putting emphasis on natural resources. To achieve this, it has to conduct studies and find out the impact a given project

or activity may have on the environment with a view to minimizing the negative impacts. Those studies are carried out during the project conception and design stage, so that arisen issues can be taken into consideration during the financial planning stage. It provides guidelines in the Environmental Impact Assessment (EIA) and issues enable its developers, monitors to ensure that mitigation measures are implemented and environmental standards are adhered to. It implements the environmental legislation and advises the government on the legislative matters in international agreements on the environment. It periodically conducts environmental inspections and audits including their costs, prepares and produces biannual reports on the environment status in the country and liaises with other Agencies involved in the environment management.

4) Directorate of Environmental Education Institutions Support & Outreach

The Directorate supports and coordinates Institutions (including Provinces / Districts) in identifying their priorities in environmental management, gives technical advice regarding the support and promotion of community initiatives, ensures that environment is integrated at all levels of planning in the Provinces / Districts, carries out environmental education, collects and disseminates environmental information.

5) Directorate of Information Communication Technology

The Directorate in liaison with other research institutions conducts strategic research, surveys and investigations in the relevant field of environment to address priorities and disseminate the findings. It also provides technical assistance in the project development.

(3) The Project "Integrated Ecosystem Assessment (IEA)" in Bugesera District

REMA is implementing the project in collaboration with UNDP and UNEP. This project was planned for the period of February 2006 to September 2006 and conducted focusing on Bugesera District. According to the interview survey to the local consultant in this project, the latter practically started in June 2006 and it would be completed by the end of 2006.

Bugesera was selected as the project site since the District has experienced a steady decline in the level of ecosystem services from being the food basket of the country in the 1960s with widespread forest area and plenty of rainfall to its current status of frequent drought, soil erosion and lack of grazing land. With better understanding on the links between ecosystem services and human well-being in Bugesera, the outcome of the project is expected to provide useful lessons for decision-making for sustainable natural resources management in both Bugesera and the rest of the country.

The outline of the project is as follows:

Purpose of the project
1. To improve the information based on the linkages between ecosystem services and human well-being with a view point of informing and influencing PRSP II and improving environmental decision-making in Rwanda

2. To provide policy options for improved environmental management in Bugesera
3. To identify actors of change, which can inform the development of a monitoring and evaluation framework focusing on poverty and environment
4. To build Rwandese capacity to undertake Integrated Ecosystem Assessments
5. To demonstrate the advantages of the MA approach with a view point of mobilizing funds for a national assessment in the future.

Main Tasks

1. To conduct analysis of the linkage between human well-being and ecosystem services at two scales, including to identify actors of change and scenarios for the future
2. To evaluate and propose policy options for sustainable environmental management and improved human well-being in Bugesera

2.5 Rural Development Cluster (RDC)

In the evolution of the PSTA, the Rural Development Cluster (RDC) plays an increasingly important role regarding harmonization and alignment among the Development Partners (DP). The objective is to improve the effectiveness; efficiency and mutual accountability of aid in the rural development sectors and to better align development partners behind the relevant sector strategies. At present, 11 donors with approximately 20 projects have been engaged in the sector 4 of which support the sector budget (See figure right). The RDC is co-chaired by the Ministry / Secretary General of MINAGRI and a representative of the lead DP, currently the World Bank.

By the way the Name of "Agricultural and Rural Development cluster" was changed to "the Agriculture, Animal resources, Land and Environment Cluster" in July 17th 2007 by MINAGRI

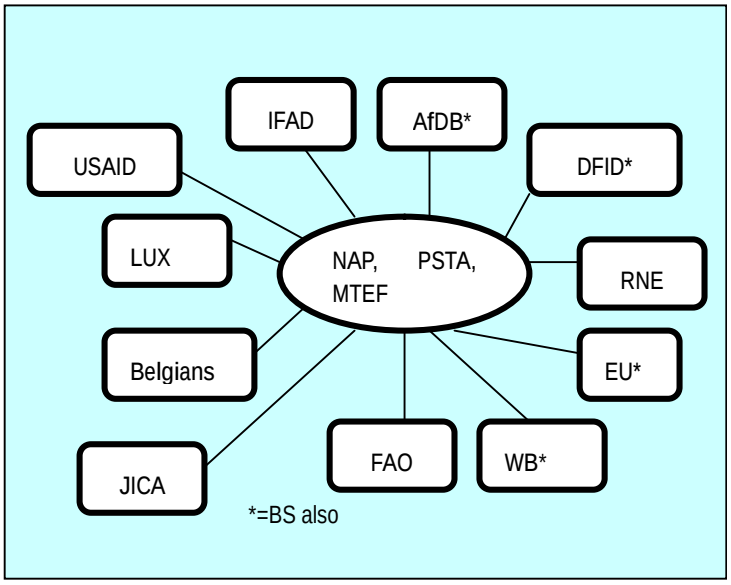


Figure2.4.1 Diagram of Rural Development Crustier

CHAPTER3 PRESENT CONDITIONS IN BUGESERA DISTRICT

3.1 Natural Environment

3.1.1 Topography and Geology

(1) General

Rwanda is a small, mountainous, landlocked and densely populated Central African country, generally known as "a land of 1,000 hills" with a total area of about 26,338 km2 of which 14,000 km2 are arable. The country is characterized by uneven mountainous terrain whose average altitude is 1,500 m above the sea level. The country extends between 1 degree and 3 degrees south of the equator, 29 degrees and 31 degrees east of Greenwich (Longitude). It enjoys a mundane tropical climate. The climate is moderate and characterized by temperate conditions, especially in higher altitudes in the northwest of the country. Today, about 80% of arable land is always under cultivation and the soil degradation has attained alarming levels. There exist important natural forest regions, lowland and wetland areas, but they are not exploited and put to use in an effective manner.

(2) Bugesera District as Study Area

Bugesera District, which belongs to Eastern Province, is located at southeast of Kigali, the capital city of Rwanda with a distance of 35 km to Nyamata center where is the seat of a District government. The District is natural region with 1,333.9 km2 of surface area. Topography and geology of Bugesera is summarized as follow:

Table 3.1.1 Summary of Topography and Geology in Bugesera District

Former District	Topography/Vegetation	Geology
Nyamata	Steep to gentle sloping undulating hills with thicker vegetation on the hill tops and scattered shrubs on the slopes and lands.	Granitic intrusions, in Central and Eastern parts. Meta-sedimentation and quartzite horizons in the northern and western parts of the District with regional fractures.
Ngenda	Undulating steep to gentle sloping hills with scattered shrubs.	Pre-cambrian granitic rocks, fractured in some valleys. Quartzite horizons overlying in a few places.
Gashora	Steep to gentle sloping undulating hills with thicker vegetation on the hill tops and scattered shrubs on the slopes and lands.	Granitic intrusions, in Central and Eastern parts. Meta-sedimentation and quartzite horizons in the northwestern and southeastern parts of the District with regional fractures.

(3) Relief

The relief of Bugesera has a succession of subsided plateaus whose altitude varies between 1,100 m and 1,780 m approximately. Bugesera is also characterized by an undulating plain of hills dominated by some mounts: Shyara Mount (1,772 m the most culminating of the District), Juru Mount (1667 m), Maranyundo Mount (1,614 m), and Mwendo Mount (1575m). The relief is also constituted by a succession of low-plateaus with old mounts, hills and dry valleys and some marshes due to tectonic collapse.

(4) Soil

The soils of the District are generally sandy with a low quantity of humus and are very permeable.

They dry quickly even after a great rain. The summits of some plateaus located in the center and the north of the District, the soils are often made of ochre clay, whereas the sides and the tops of the plateaus are made up of rocks and schist which contain gravel, laterite and quartz. They give quarry stones for construction works. In general, soils are more or less fertile but permeable and fragile.

The shores of the lakes and marshes give, in some areas; clay used in making bricks, tiles and traditionally made pottery. Moreover, there are many kind of sand used for construction of houses.

The soil in the valley is characterized by their richness in nutritious minerals but often with low content of organic elements and materials. They are hard during the dry season and muddy in the rainy season. They are made up of fine jointing elements, which retain water and do not let pass air discouraging the vegetable to take roots.

(5) Existing of Marshland

Topography of Bugesera District is characterized by its existence of marshlands where are located along rivers and in land. The total area of marshlands in Bugesera is estimated to 6,100 ha approximately, whereas the exploited area is of 2,830ha (Source: Community Development Plan of Bugesera District). There are soils with more humus which are more fertile because of silts periodically deposited by the floods of Akagera (Nyabarongo) and Akanyaru River. The marshlands give good harvests during the dry season (June, July, August). It could say that the marshlands have high potential for cultivation, therefore, there are a series of development plans formulated, some of them were already implemented, by MINAGRI, RSSP, LUX-Development, and so on. Location of those marshland development plans is shown on Figure 3.1.1.

(6) Utilization of marshland (wetland)

As mentioned in previous section, it is noteworthy of potentialities of the marshland in Bugesera, essentially during the third cultural season lasting from June to October (Season C). The population, therefore, has been cultivating at some places in marshland so far. However, marsh floods and whim/scarcity of rain causes the great losses of harvesting in the marshes. For this reason, the Community Development Plan of Bugesera District says that it is important to take necessary measures to encourage the peasants to exploit the marshes by means of:

- Irrigation and draining;
- Distribution of fertilizers near the marshes and campaign of seeds on the local market;
- The means to fight against the attack of worms, wild animals that damage to crops.

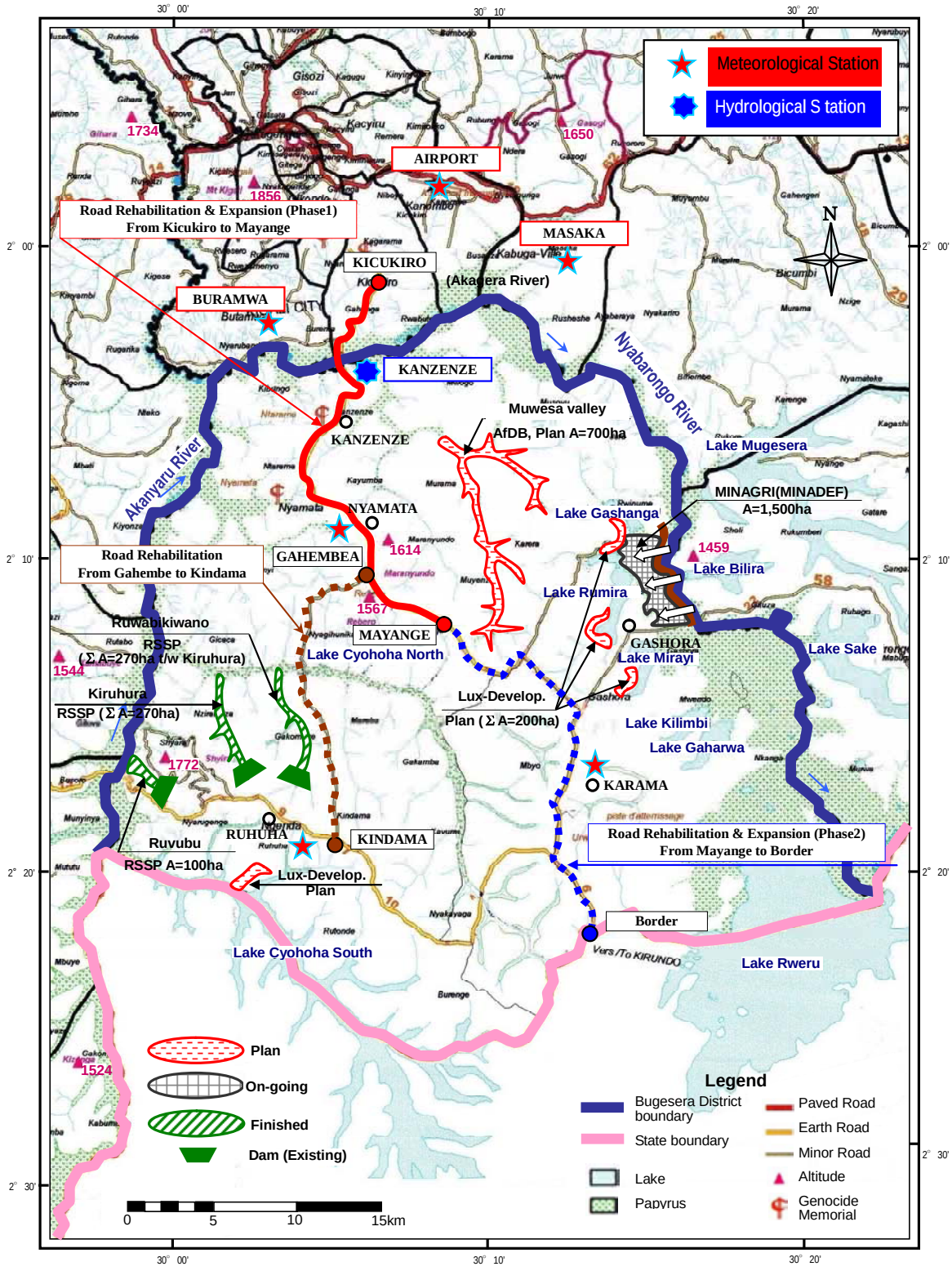


Figure 3.1.1 Location Map of Marshland Development and Road Rehabilitation Programs and Meteorological/Hydrological Station

The following table shows the name and area of available marshland for cropping in former Nyamata District:

Table 3.1.2 Marshland in former Nyamata (their surface area and major crops) unit :ha

Name of Sector	Name of Area	Available Area	Arable Area	Major crop
KANZENZE	Muzi, Karugenge, Nyamabue, Karumuna	501	300	Tomato, carrot, onion, cabbage, eggplant, chilly
KIBUNGO	Rusekera, Nyarunazi, Kagoma, Kiganwa	484	100	the same as above
NTARAMA	Cyato, Kingabo, Kidudu, Rugenge, Rutovu, Akanyaru	470	120	the same as above
MWOGO	Rugunga, Kageyo	705	532	the same as above
MWAMA	Umwesa	350	150	the same as above
Total		2,510	1,202	

Source: District agricultural report, Sept. 2003

Rice Growing Project in Gashora (by MINAGRI and MINADEF)

With funding from the MINAGRI, June 2006, the Ministry of Defense (MINADEF) has earmarked over 1,500 ha in Gashora Sector for maize farming through development of marshland. The project, under which a water reservoir (embankment of 8 km from Gashora to Rilima) had been constructed along Akagera River to provide water to the area over 2,000 ha, was completed in December 2006. The total marshland area covers more than 2,000ha but only 1,500 ha was reclaimed leaving the other area for environmental interests (Refer to Figure 3.1.1).

Apart from the project mentioned above, there are some development activities and projects of marshlands, which is mentioned in Chapter 3.4, Development Activities.

3.1.2 Meteorology and Hydrology

(1) General

In Rwanda, the annual rainfall amount increases from 700 mm in east to 1,600 mm in northwestern. The maximum is over Nyungwe natural forest and over northwestern highlands (1,500-1,600mm), while the minimum is located in northeast (eastern Umutara: 700-800mm). The regional relative minima arise over Bugesera area (Southern Bugesera: 800-900mm) and over western Gisenyi (Gisenyi: 1,000-1,200mm). The wide area of much rainfall amount is located in the western half of the country.

Bugesera area, as well as the Northeast (former Umutara province) and the East (Northeast and southern former Kibungo province), is counted as one of the rainfall deficit risk zone which is characterized by frequency of the rainfall deficit, the late rainfall onsets, early rainfall cessations and significant number of dry spells and average rainfall is estimated at about 810mm/year.

(2) Meteorological and Hydrological Stations and Available Existing Data

There are 5 rainfall stations and one river discharge observation station in and around the Study Area. Since 1994, after genocide, meteorological and hydrological data have not been observed at almost all

stations because of decentralization with shortage of budget to repair/renovate deteriorated observing instruments except for Kigali rainfall station. Observation record available and location at each stations are shown on Figure 3.1.3 and Figure 3.1.1 respectively.

Table 3.1.3 Observation Record at Each Station

Type	Station/Year	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04
Rainfall	Kigali Airport																																												
	Masaka																																												
	Nyamata																																												
	Ruhuha																																												
	Karama Pletau																																												
Hydro	Kanzenze																																												
Water L	(Nyabarongo/																																												
Dischar	Akagera)																																												

Measuring devices are not functioning.

As mentioned in main text, meteorological and hydrological measuring stations which are in and around Bugesera district have not been functioning except Kigali-Airport. When some certain action plans such as agricultural development plan are formulated, meteorological and hydrological data which are recorded for long years are essential. It is, therefore, recommended to re-start operating these measuring.

(at the right of Photos: The devices for measuring river water level at Kanzenze of Akagera river. They have been left as they are for long years.)

(3) Climate and rainfall

With comparison to other regions of the country, Bugesera District is characterized by a dry and very warm climate resulting from absence of mounts, relatively low altitude, scarcity of rain and excessively long period of drought. The mean atmospheric temperature varies with time but normally between 21º C and 23º C, also the maximum ranges 26º C and 29º C, whereas the minimum remains in the order between 13º C and 15º C.

The District presents four seasons characterized by alternate falling of dry and rainy seasons as table below.

Table 3.1.4 The Seasons through a year in Bugesera

Month	Jan.	Feb.	Mar.	Apr.	May	Ju.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Season	Short dry season (Urugaryi)			Long rainy season (Itumba)		Long dry season (Impeshyi)				Short rainy season (Umuhindo)		

The agricultural year starts by mid September and ends in mid September of the next year. The seasons of cultivating are divided into A,B and C (See figure 3.3.1). These seasons, however, capriciously change both the beginning and the duration. Besides, the last 12 years (1992-2004) have been characterized by many climatic irregularities and even less favorable rainfall condition with frequent long period of drought all over the area in Bugesera.

(4) Variation in rainfall intensity and climatic change

The District has been affected by poor rains. In particular, serious drought hit that area in 2000 and 2003 as the latest. According to the Kigali Airport rainfall record shown in Figure 3.1.2, annual rainfall is divided into 2 patterns from 1977 to 1991 (15 years) and from 1992 to 2004 (12 years). Average annual rainfall for the former case is estimated at 1,061mm and the later at 926mm. The difference between 2 patterns is around 140 mm in annual. Rainfall pattern shows a tendency not only to reduce amount of rainfall but also to fluctuate from year to year remarkably.

Compare the difference between the second in maximum and the second in minimum (maximum and minimum values are dismissed as abnormal value), the former shows 258mm/year and the later 572mm and annual variation from year to year becomes bigger and bigger. Under these circumstances, last 5 years severe droughts ranged 710 mm/year in 2000, 800 mm/year in 2003 and 810 mm/year in 2004. According to the survey by the Study Team, some people at Kidudu village, Cyugaro Cell where QP is under implementation died from starvation. On the contrary heavily intensified rain took place in Rweru Sector in May 2006 and some houses were damaged and the farmlands were eroded. These phenomena show examples of climate change.

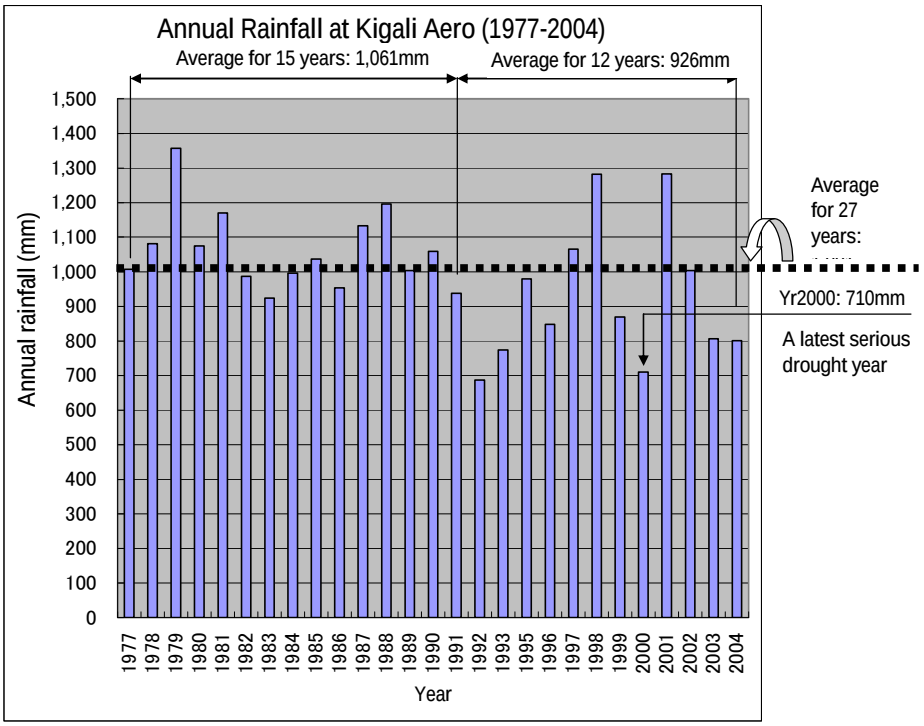


Figure3.1.2 Annual Rainfall Record at Kigali Airport (1977-2004)

(5) Hydrology

The hydrographic network of Bugesera is mainly characterized by 3 rivers, namely Akanyaru, Akagera and Nyabarongo.

Those rivers constitute its borders (i) in the West with the Districts of Kamonyi, Ruhango and Nyanza of the Southern Province, and (ii) in the North with the Districts of Kicukiro and (iii) Nyarugenge of Kigali City Council and (iv) in the East with the Districts of Rwamagana and Kibungo of the Eastern Province. In the South, the River of Akagera constitutes the border with the Republic of Burundi. The typical pattern of Akagera and Akanyaru River flow appears as the peak discharge (water level) from the beginning to middle of May with discharge of about 250 m^3/sec and the minimum discharge (water level) in September with discharge of about 50 – 100 m^3/sec (See Figure 3.1.5 and 3.1.6).

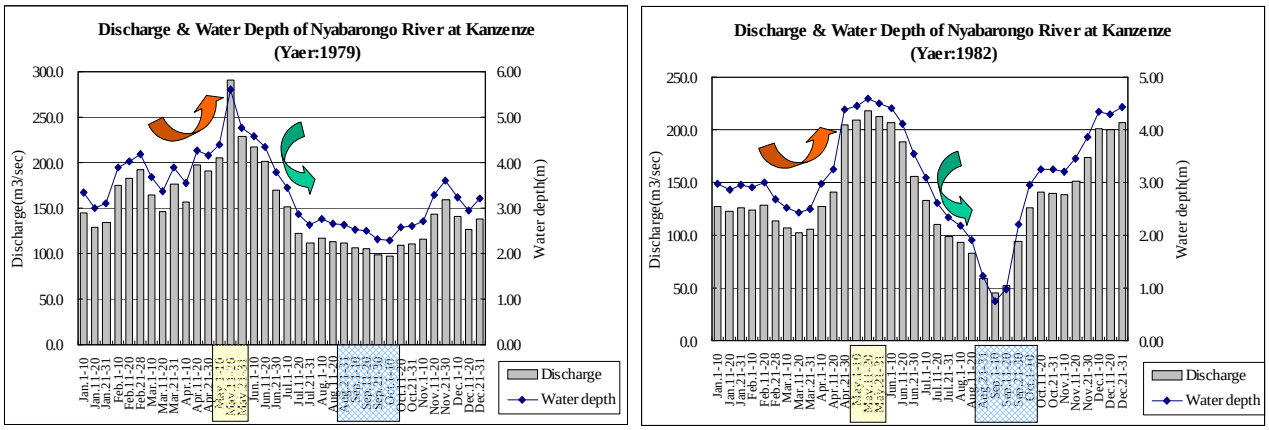


Figure 3.1.3 Typical pattern of Discharge and Water Depth of Akagera River

River water level quickly fluctuates with 3 meters within just 3 weeks.

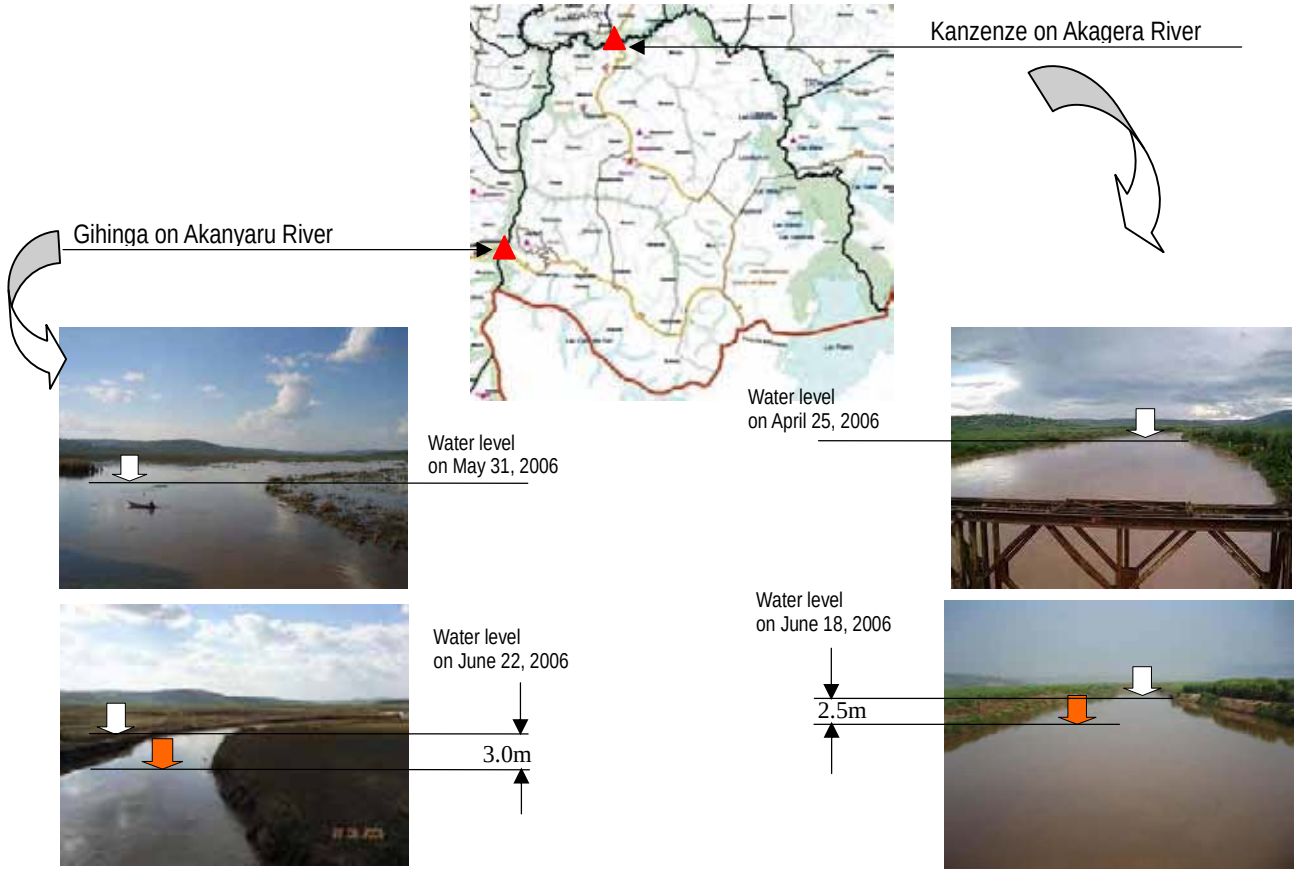


Figure 3.1.4 Actual Situation of River Flow

3.1.3 Water Resources

Water resources in Bugesera District are divided broadly into three (3) categories, namely, river, lakes (and marshes), and ground water. There are a few water springs in the District and some intermittent courses appear from streams, though they disappear during the dry season.

1) Rivers

The river of Akagera originating from the junction of the rivers of Nyabarongo and Akanyaru runs a along a part of the circumference of Bugesera, deposits fertile soil to marshlands in flood season and supplies at the same time water to the multitude of lakes of the southern basin.

The course of Akagera River runs with a gentle slope, where on infinite number of meanders exists along its majestic course. The river takes many directions, goes and comes back and finally rushes into the great cataracts of Rusumo, from there takes the direction to the North making the border of Rwanda with the Republic of Tanzania. The average width is approximately 4 meters whereas the depth is also 4 meters during the dry season. According to the annual discharge record of Akagera River at Kanzenze from year 1971 to 1988, the average annual discharge for 18 years is estimated at 3,960 MCM. This indicates a great possibility of utilizing the marshland area and potentiality of river water resources in Bugesera. (See Annex III, Table 3.1.1)

2) Lakes

Bugesera District has many lakes among which nine (9) are located in the Valley of Akagera, Rweru Lake and North and South Cyohoha Lake. However, as a consequence of prolonged drought, the Lake of Cyohoha North has been on the point of drying up from severe drought which occurred in the year 2000. The floods of Akagera River and the lake of Rweru have formed the lakes of Gashanga, Kidogo, Rumira, Mirayi, Kirimbi and Gaharwa.

The dimensions of each lake are summarized as in the table below, where the total capacity of the lakes as potentiality of water resources is estimated at 987 MCM.

Table 3.1.5 Characteristics of Lakes at Akanyaru = Akagera Complex

Name of the lake	Total surface area watershed	Surface area of streaming basin	Surface area marshland	Surface area of stretch of free water	Average depth (m)	Average volume (MCM)
1 Cyohoha South	508.0	424.0	2.0	82.0	3.0-4.0	287.0
2 Cyohoha North	337.0	327.0	2.0	8.0	1.4	11.2
3 Gashanga	56.0	53.3	NA	2.7	2.5	6.8
4 Rumira	29.0	24.5	NA	4.5	3.0	13.5
5 Mirayi	77.0	68.4	NA	3.5	3.5-4.0	12.5
6 Kilimbi				2.3	2.5	5.9
7 Gaharwa				2.6	2.5	6.3
8 Kidogo	2.3	NA	NA	2.3	2.5	5.6
9 Rweru	1,036.0	860.0	NA	116.0	5.0-6.0	638.0
Total	2,045.3	1,757.2	4.0	223.9	-	986.7

* Cyohoha Sud and Rweru are bordered on the south by Burundi.

* The surface area of Cyohoha Nord is decreasing due to ecological problem. The original surface area is said 13 km^2.

3) Ground water

The potentialities of ground water in Bugesera is not clear at this moment because of no data and/or study available so far, but there is a certain data in terms of the type of water source in the District as below. According to the table, as of year 2002, there were 699 various water sources such as boreholes, dug wells, springs, water holes, tanks, taps, and pump stations in Bugesera District. The status of these water sources varied from dry, non functional, functional, under construction, to under rehabilitation and so on.

Table 3.1.6 Water Sources in Bugesera District

Type of Source	Former District			Total
	Nyamata	Ngenda	Gashora	
Borehole	0	20	8	28
Dug well	20	0	23	43
Pump station	0	0	2	2
Spring	16	17	5	38
Tank	122	11	82	215
Tap	210	69	91	370
Water Hole	3	0	0	3
Total	371	117	211	699

Source: Final Report of "Hydrological Mapping of Bugesera Region", by ZOA,200

Among the type of sources, those obviously utilizing ground water are borehole, dug well, spring, and water hole. Then, the total number of these types of source is only 103 places out of 699 (The water resources of the others, namely, pump station, tank, tap, are not clear). Based on this fact, it can be said that there may be more room to

utilize the ground water in wetland and along the shore of marshland while there are fewer potentialities on hilly land. To grasp the potentialities of ground water in Bugesera, anyhow, it is essential to study and/or analyze the estimated amount of ground water deposits, movement of ground water, and so on.

3.2 Socio-economic Conditions

3.2.1 Local Administration

(1) Administrative Reform

The local administrative system in Rwanda significantly changed based on the "Territorial Reform Act" approved by the Parliament, December, 2005 and enforced in January, 2006. The number of Provinces, Districts and Sectors in the country decreased is as shown below.

Table 3.2.1 Number of Local Administrative Units in Rwanda

Unit	Province	District	Sector
Before (until 2005)	11 (+ Kigali City)	106	1,545
Present (after 2006)	4 (+ Kigali City)	30	450

Source: Report on Decentralization in Rwanda (in Japanese), JICA Rwanda Office, Jan. 2006

In accordance with the reform, the local administration system in Bugesera region changed, and Bugesera District was established, consisting of former three districts (Gashora, Ngenda and Nyamata). The table below summarizes the number change of local administration units and the following map shows the location of 15 new Sectors in Bugesera District.

Table 3.2.2 Number of Local Administrative Units in Bugesera

Unit	Province	District	Sector	Cell
Before (until 2005)	Kigali-Ngali Province	3	36	391
Present (after 2006)	Eastern Province	1	15	72

Source: Data obtained from MINALOC

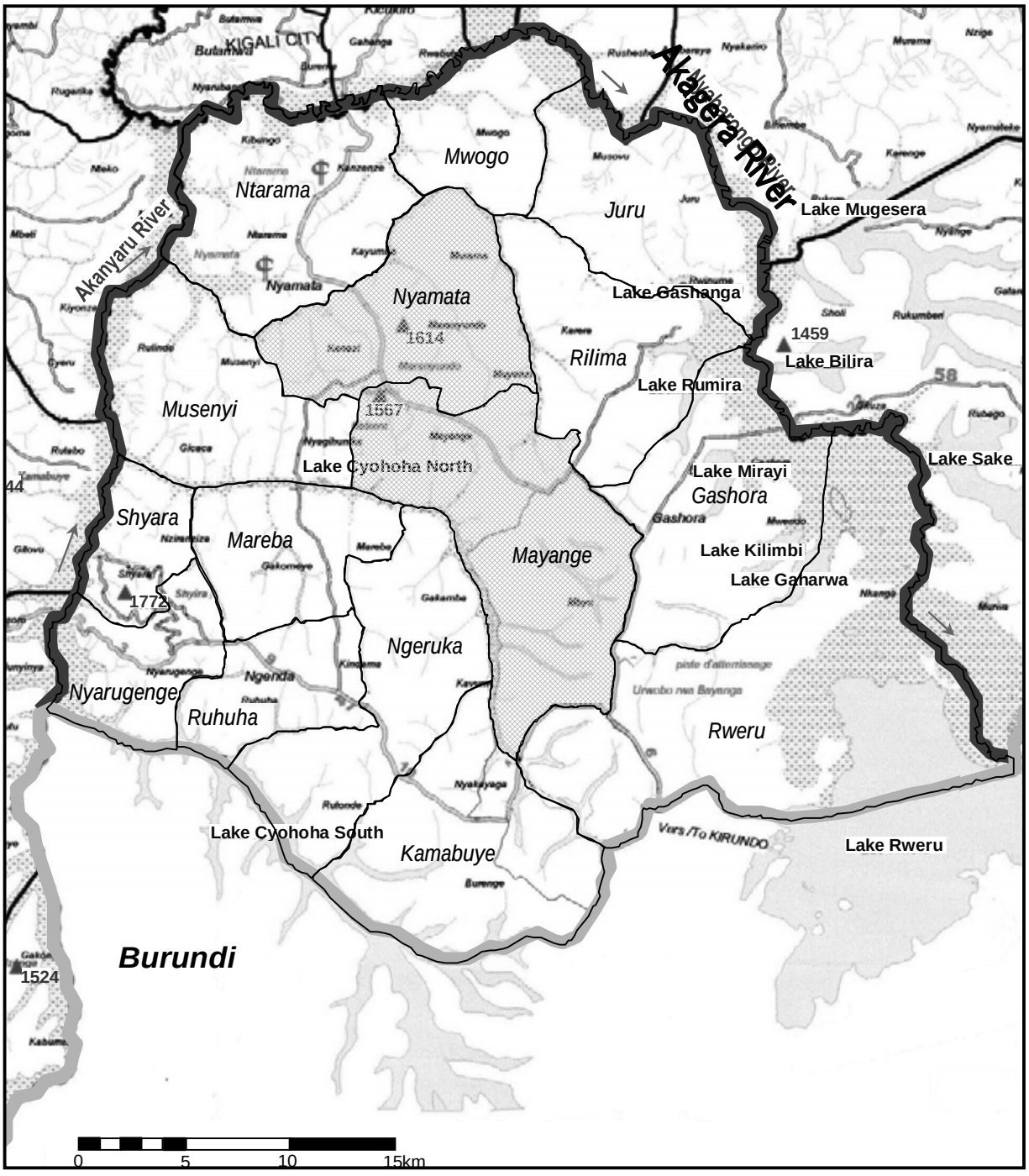


Figure 3.2.1 Location of 15 Sectors in Bugesera District

With the local administration reform, many officers who formerly worked at provincial offices were transferred to District offices. The District offices are, therefore, supposed to coordinate in providing administrative services, which had been done by former provincial offices. The Sector that generally consists of 7 staffs (executive secretary, accountant, agronomist, development planning, land/housing/infrastructure) is supposed to be an interface with local people and to work as a main

actor at the field level. Roles of local administrative units are summarized in the table below.

Table 3.2.3 Roles of Local Administrative Units

District: District is an autonomous administrative structure with a legal status and financial autonomy and its structure includes, the District Council, which elaborates the District policy, approves the District budget, mobilizes the population for development, and controls the activities of the Executive Committee of the District. The District Executive Committee recruits the District Executive Secretary, who is a technical officer responsible for coordinating all the technical and administrative units of the central and local administration that operate at District level. He/she is to ensure that the units effectively implement the directives of the Executive Committee, as approved by the District Council, in compliance with the legislation and Government's policies.
Sector: Sector is the next level of the democratic local government, and it includes, several Cells. Cells development plans are coordinated by the Sector Development Committees, who have been elected by members of the Cell Community Development Committees (CDCs). Members of the Sector CDCs elect their representative in the District CDC.
Cell: Cell is the grass-roots local government organization, administered by a freely elected Executive Committee. Each Cell elects a Cell CDC responsible for planning social and economic development activities. Cells are usually comprised of 100 to 200 households, and through Ubudehe the communities come together to identify their problems, prioritize them, find solutions and eventually implement the retained approach, and this is all in a participatory way.

Source: Project for Support to Operationalisation of the Strategic Plan for Agricultural Transformation, Appraisal Report, Working Paper 3, Institutional Support to Agricultural Sector, IFAD, July 2005

According to the Sector office interviewing survey conducted by the Study Team in May 2006, all of the Sectors don't have expected full human resources and, on average, there are only 5 staffs in each Sector. Moreover, the financial situation at a Sector level is unstable since all the Sector offices in Bugesera District receive only operational budget (normally, Rwf 300,000 per 3-month) without any other budgets related to development.

(2) Human Resources

1) District Level

The number of appointed staffs of Bugesera District is 26 in May 2006, which represents only 70% of the number planned, 35 according to MINALOC. The organization chart of Bugesera District is shown in Annex III, Figure 3.2.1. Mayor, 2 vice-mayors and the District council members are elected for 5years term. The number of the District council members is 28 in May 2006 that consist of 15 representatives from each Sector and 8 from women and 5 from youth. The District council has a competence to relieve post of mayor and vice-mayors during their tenure of office.There are many kinds of meetings held in the District office. Among them the District plans a regular meeting once a month with Sector representatives. However, especially the District Mayor and Executive Secretary, who have most important roles in the District are always busily occupied and that meeting is sometime postponed or cancelled. In addition, the District representatives have to attend a meeting held at the Eastern Province office once a month.

The District budget in 2006 is as shown in the table below. More than 60% of the income

depended on donors and NGOs. Therefore, there is an anxiety that the activities of the District staffs were driven by initiative of outsiders and the opportunity to improve their capacity for planning and implementing by them was reduced. In addition, expenditure for human resources development was only 3.5% of the total.

Table 3.2.4 Budget Data of Bugesera District in 2006

Items		Rwf	%
Central Government		1,178,725,929	24.3
Taxes in District		133,932,542	2.8
Donors and NGOs		3,247,295,900	67.1
CDF		205,294,548	4.2
Others		76,894,491	1.6
Total		4,842,143,410	100.0
Expenditure for:			
Items		Rwf	%
Salary for District Staff		1,290,630,521	32.3
Allocation for 15 Sectors		40,389,309	1.0
Infrastructure development		1,023,769,950	25.6
Medical and education development		292,341,557	7.3
Human Resources Development		139,860,451	3.5
Others:	Finance and Resources mobilisati	95,554,735	2.4
	Good Governance	300,743,056	7.5
	Prison of Rilima	311,688,472	7.8
	Planning and economic developm	310,457,455	7.8
	Coordination of District	190,230,721	4.8
Total		3,995,666,227	100.0

2) Sector Level

According to the Sector, there is a Sector Council under which 7 specific positions are arranged by the government. See Annex III, Figure 3.2.2. In case of Kamabuye Sector, there are 23 members in its Sector Council, whose backgrounds are categorized into 10 including Cell Coordinators, Cell Council members, women (30% of all members) and so on.

Regarding to the staff appointed by the government, however, there are only about 5 staffs in each Sector office although its number planed to be appointed is 9. Therefore, there are many cases that one Sector staff holds more than 1 post. Especially many Agriculture/animal husbandry/commerce/cooperative/artisan staffs hold other positions such as Land management/housing/infrastructure/environment and Development planning/tax collection/statistics.

Number of staff at each Sector in Bugesera district is shown in the the Annex III, Table 3.2.1.Moreover, almost all staffs were appointed on January or February 2006 based on the local administration reform so that they are not familiar with responsible area. Nevertheless, their field works tend to be obstracted because they don't have any transportation means such as motorcycle or bicycle and Sector office budget is too small (normally Rwf 200,000/month) to provide enough transportation fees to its officers.

3) Cell Level

Administrative activities in Cell are actually carried by 2 main positions: Executive Secretary appointed by District (paid) and Cell Coordinator (volunteer) elected by local population. Cell Coordinator is a leader of Cell Council, which consists of 2 committees. One committee is CPA (Administrative political committee), which has 4 members including Cell Coordinator and the other is CDC (Community Development Committee), which has 6 members. Those members are elected and have each own role. However, they work without any payment. Same as Sector officers, almost all Cell Executive Secretaries were appointed on January or February 2006. Further, due to the limited

budget as well as lack of transportation, they haven't gotten enough information about their service areas. Organization of Cell is shown in Annex III, Figure 3.2.3.

3.2.2 Demography

In August 2002, national census ("Recensement Général de la Population et de l'Habitat" in French, RGPH) was conducted in Rwanda and it is the official statistics presently available. According to the report ("National Census of the Population and Settlement (August 2002), Final Statistics: Sector Level, Volume 1: City of Kigali, Kigali Rural, Gitarama, Butare", MINECOFIN 2005), there is a population of 266,775 people in Bugesera District. Average population density of the District is 200 persons/km^2 while there are big differences among the 15 Sectors. In the Sectors located in south-western part of the District surrounded by two lakes, Cyohoha North and Cyohoha South Lakes, and Akanyaru River, population density is relatively high compared to other Sectors. Due to the existence of prison, the population density of Rilima is also high.

Table 3.2.5 Population and Population density at Each Sector in Bugesera District

New Organization		Former Organization		Area	Population			Population Density
UMURENGE	AKAGARI	UMURENGE	AKAGARI	(km^2)	Male	Female	Total	
GASHORA	5	2	26	100.38	7,183	8,065	15,248	152
JURU	5	3	28	82.97	9,050	10,161	19,211	232
KAMABUYE	5	2	26	104.86	8,217	9,187	17,404	166
MAREBA	5	2	25	58.13	8,750	10,350	19,100	329
MAYANGE	5	2	27	130.98	7,018	7,374	14,392	110
MUSENYI	4	4	42	86.43	9,814	11,026	20,840	241
MWOGO	4	1	20	53.78	5,614	6,548	12,162	226
NGERUKA	5	3	32	95.65	12,003	13,897	25,900	271
NTARAMA	3	4	25	101.41	6,783	7,194	13,977	138
NYAMATA	5	4	36	87.19	8,749	10,217	18,966	218
NYARUGENGE	5	1	16	48.01	7,051	8,292	15,343	320
RILIMA	5	2	39	84.89	16,431	10,915	27,346	322
RUHUHA	5	2	21	44.94	7,882	9,434	17,316	385
RWERU	6	2	15	221.25	9,223	10,414	19,637	89
SHYARA	5	2	17	33.03	4,678	5,255	9,933	301
Total 15	72	36	395	1333.9	128,446	138,329	266,775	200

Note: 1) Based on the Census 2002, population at each Sector is caluculated.
2) Area at each Sector is estimated by Study Team

Assuming that the population growth rate has ranged between 2.5% (Strategic Plan for Agricultural Transformation in Rwanda, MINAGRI 2004) and 2.9% (Vision 2020, MINECOFIN 2003) for the recent four years, present population in Bugesera District can be estimated at between 309,400 and 316,700. Hence, the present population density could be 232-237 persons/km$^{2.}$

Rilima, Ngeruka and Nyamata are the top three Sectors where more people live among the 15 Sectors. In general, male population in each Sector is less than that of female population. In Rilima Sector, male population is far larger than female because a male-dominated prison exists there.

As for average family size, there are not so big differences among the 15 Sectors, ranging between 4.18 and 4.86 persons per household except for Rilima. Because it doesn't seem that the number of households data consider the prisoners in Rilima, the average number of male per household there (3.87 males per household) becomes far bigger than others which range from 1.89 to 2.37.

Table3.2.6 Demographic Data of 15 Sectors

Sector	Number (households, persons)				Proportion (%)				Average Family size
	House holds	Population			House holds	Population			
		Male	Female	Total		Male	Female	Total	
Gashora	3,420	7,183	8,065	15,248	5.9	5.6	5.8	5.7	4.46
Juru	4,124	9,050	10,161	19,211	7.1	7.0	7.3	7.2	4.66
Kamabuye	3,788	8,217	9,187	17,404	6.5	6.4	6.6	6.5	4.59
Mareba	4,482	8,750	10,350	19,100	7.7	6.8	7.5	7.2	4.26
Mayange	2,964	7,018	7,374	14,392	5.1	5.5	5.3	5.4	4.86
Musenyi	4,722	9,814	11,026	20,840	8.1	7.6	8.0	7.8	4.41
Mwogo	2,810	5,614	6,548	12,162	4.8	4.4	4.7	4.6	4.33
Ngeruka	5,965	12,003	13,897	25,900	10.2	9.3	10.0	9.7	4.34
Ntarama	1,994	4,067	4,499	8,566	3.4	3.2	3.3	3.2	4.30
Nyamata	5,318	11,465	12,912	24,377	9.1	8.9	9.3	9.1	4.58
Nyarugenge	3,735	7,051	8,292	15,343	6.4	5.5	6.0	5.8	4.11
Rilima	4,248	16,431	10,915	27,346	7.3	12.8	7.9	10.3	6.44
Ruhuha	3,891	7,882	9,434	17,316	6.7	6.1	6.8	6.5	4.45
Rweru	4,475	9,223	10,414	19,637	7.7	7.2	7.5	7.4	4.39
Shyara	2,377	4,678	5,255	9,933	4.1	3.6	3.8	3.7	4.18
Average	3,888	8,563	9,222	17,785	-	-	-	-	-
District	58,313	128,446	138,329	266,775	100.0	100.0	100.0	100.0	4.57

Source: "National Census of the Population and Settlement (August 2002), Final Statistics: Sector Level, Volume 1: City of Kigali, Kigali Rural, Gitarama, Butare", MINECOFIN 2005

As the population pyramids of the 15 Sectors clearly indicate, cohorts under 20 years of age predominantly represent the population in every Sector except for Rilima. Young generations (0-17 years old) occupy a half of the population (49.6-56.7%), but, again in Rilima, the existence of prisoners differentiates its population pyramid from others, where the proportion of young generations is only 39.7%. (See Annex III, Figure 3.2.4 to 3.2.7).

Proportions of people engaged in economic activities out of total population vary from 33.7% in Rilima to 54.5% in Mwogo. In Rilima, men's proportion is exceptionally high probably due to the existence of many prisoners. In general, proportion of women engaged in economic activities is higher than that of men in all the Sectors.

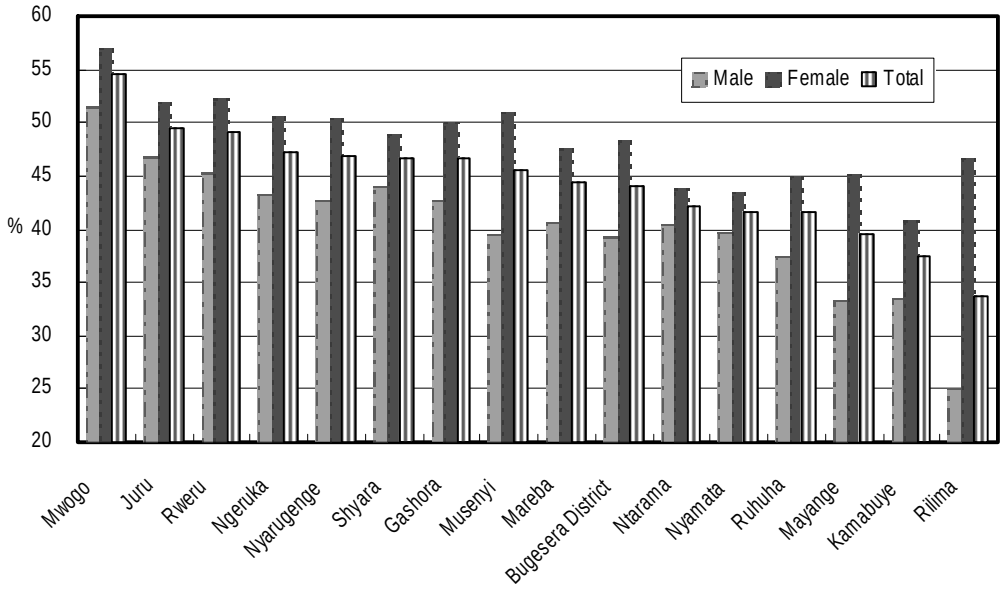


Figure3.2.2 Proportions of People Engaged in Economic Activities by Sex

Source: Recalculated data from Monographie du Ditrict de Gashora, Edition 2005, Province de Kigali-Ngali ; Monographie du Ditrict de Ngenda, Edition 2005, Province de Kigali-Ngali ; Monographie du Ditrict de Nyamata, Edition 2005, Province de Kigali-Ngali

Among the total population who engaged in economic activities, women represent more than a half in all the Sectors, ranging from 54.5% (Ntarama) to 59.3% (Musenyi). Although these facts may not imply that women get more income than men, it is quite clear that women's role is very important for livelihood in every Sector. Women headed families correspond to more than one third of households in all the Sectors. Musenyi, Ntarama and Mayange are the top three Sectors with more than 43 % of women headed households.

Table3.2.7 Some Gender Related Indicators by Sector

Sector	Gashora	Juru	Kamabuye	Mareba	Mayange	Musenyi	Mwogo	Ngeruka
Families[1]	37.0	33.2	37.1	37.7	43.4	45.3	35.0	36.6
Labors[2]	56.8	55.4	57.7	58.0	58.8	59.3	56.3	57.5
Sector	Ntarama	Nyamata	Nyarugenge	Rilima	Ruhuha	Rweru	Shyara	District
Families[1]	44.3	41.2	37.6	35.1	40.9	35.2	32.8	38.1
Labors[2]	54.5	55.2	58.2	55.2	59.0	56.5	55.5	57.0

Note: Families[1] denote the proportions of women headed families among the total households. Labors[2] denote the proportions of women among the total person who engaged in economic activities.

Source: Recalculated data from Monographie du Ditrict de Gashora, Edition 2005, Province de Kigali-Ngali ; Monographie du Ditrict de Ngenda, Edition 2005, Province de Kigali-Ngali ; Monographie du Ditrict de Nyamata, Edition 2005, Province de Kigali-Ngali

3.2.3 Road Networks

(1) General

One could say that the road networks in Bugesera District are relatively well spread in every corner over the whole District. The District has many roads connecting with all Sectors. They allow to link the Sector offices to the District office located in Nyamata center and to access to the public facilities such as the main trading centers, schools, community health centers, and so on. Bugesera is connected

with other regions by main roads. Those are the roads Kigali-Nyamata-Ngenda-Butare, Kigali-Nyamata-Nemba to Kirndo (Burundi), Mirenge (Kibungo)-Gashora-Ramiro.

The cumulative length of roads and communal passable paths for vehicles reaches at about 3,500 km with high road density comparatively. In spite of this fact and even though there developed very good routes before 1994, these roads are now actually in miserable conditions.

In general, each Sector or Cell relies on one primary or secondary route that is unfortunately poorly maintained. Although this is on account of public works of development (Umuganda) they are neglected in most of the Sectors. These routes are gnawed in some places (very often observed) by farmers and by this reason have become muddy and slippery everywhere during rainy season. The most serious problem however is found in defective state in which commercial circuit remains in underdeveloped stage for agricultural products, in particular vegetables that are mainly cultivated in marshlands.

The poor condition of roads negatively affects development by preventing accessibility to some areas. This constitutes a negative impact on trading of local products, communication and those areas become more isolated compared to the other regions. The difficult access to these areas harms their potential and consequently the investments.

Many transportation means are used for transporting goods and people (motor vehicles, bicycles, motorcycles, canoe). Bicycles are mainly used, which mainly belong to the private operators as association.

As for the trunk road which is connecting Bugesera District with Kigali, the public bus which commute from Kigali to Nyamata are operated. These roads, however, have also been in poor condition due to erosion, worn-out of road surface, and so on as well as rural roads and trails. Under the circumstances, the rehabilitation/expansion programs of road networks for trunk road are intensively in progress now.

(2) Road rehabilitation program

There are some rehabilitation programs of road networks in Bugesera District as follow:

Road Rehabilitation Program from Kigali to Border in Burundi and from Gahembe to Kindama are summarized as in the tables below respectively.

Table 3.2.8 Road Rehabilitation Program from Kigal to Border in Burundi

Phase	Phase 1 (on going)	Phase2 (Plan)
Distance	Kigali-Mayange, 40 km	Mayange-Border in Burundi, 20 km
Dimension	Effective width 6m, Total width 10 m	Same as left
Total cost	22million EURO	11million EURO (plan)
Funded by	OPEC and Saudi fund	AfDB

Implementation period	2006.May – 2007.July	From 2006.Dec (12 months)
Contractor	STRABAG	N.A.

Table 3.2.9 Road Rehabilitation Program from Gahembe to Kindama

Items	Discription
Distance	Gahembe - Kindama, 20 km
Dimension	Total width 5 m, laterite pavement Reshaping. Drainage facilities
Total cost	n.a.
Funded by	Luxemburg
Implementation period	On going

(3) A Plan of Access Road of New International Airport

Apart from the plans mentioned above, a connecting road has been planned to access to the new international airport which is planned for construction at KARERA by MININFRA being located in former Gashora Sector. The route of access road to the airport is planned with Nyamata center as the starting point (Refer to Figure 3.1.1).

3.2.4 Energy and Water Supply

(1) General

With a per capita income of approximately US $260, the typical Rwandan lives below the $1 per day poverty line. Approximately 90% of Rwandans are engaged in subsistence agriculture and only 6 % have access to electricity and clean water. Wood, charcoal, and biomass are the main fuel sources, even for many middle class urban Rwandans. As a result, deforestation and soil erosion are serious concerns. 2004 witnessed a severe electricity crisis which took the form of regular and long lasting power cuts across the country. The crisis resulted simply from the network which has not been able to supply enough electricity to meet demand. This problem arose due to two main reasons, first, years of under investment in the network infrastructure and, second, due to poor rainfall reducing the water level in the lakes and hence the productivity of the hydro power plants.

The Government has worked closely with its development partners and ELECTROGAZ to find a solution. During 2005 ELECTRIGAZ imported and began operating several generators to boost domestic supply and by the end of the year the number of power cuts had been significantly reduced. The budget for 2005 has also made allocation for network rehabilitation amounting to 14 billion Rwf.

ELECTROGAZ has seen its operational costs increase since it has had to import generators and increasingly more expensive fuel to supply them. Therefore the decision was made towards the end of 2004 to increase the tariff of electricity to all users, be they residential or business.

On the other hand, water from heavy rains cascades down the hills and mountains, washing away farms and increasing soil erosion. Then, people who go to fetch water, spend hours every day hauling

drinking water back up the hills and mountains, even in rainy seasons, which are experienced twice a year in Rwanda, there are no simple technologies to tap and preserve water both in towns with a middle class population and in villages with a poorer population. Furthermore, recent repeated drought gives an additional difficulty getting water to local population. And also, even he/she is living close to piped water, he/she do not access that water due to its cost. They still get the water from marshland, lake, and so on, despite the available duty water.

As such, water crises are experienced at all levels of the society.

(2) Energy

1) Energy saving practices

Almost all of population in Bugesera are said that they do not use any energy saving implements. The general failure to use energy saving implements in Bugesera means that the population relies largely on wood fuel. Given that the environment of Bugesera is generally dry and frequently stricken by drought, the continued encroachment on the environment poses a threat to the already fragile state. Therefore, It is important that the population be encouraged to adopt appropriate energy saving technologies and implements for more sustainable environmental management.

Like every where in Rwanda, the most used energy in Bugesera come from wood and 99% of the population use this kind of energy. The population and the institutions located in the centers of Ruhuha and Nyamata uses electricity. The solar energy and generators are only used in community health centers and by some individuals. The insufficiency of electricity is still a big issue to the economic development of the District.

2) Field of energy: difficult access to electricity

Electricity installations are found in some centers but do not cover the whole of the District as mentioned above. The blame goes to ELECTROGAZ who acts slowly slow in supplying electricity even if installations are in place. However, electricity is used only by rich people and the majority of Bugesera population is poor. The office of Sectors, the community health centers, the schools and some trading centers are connected to electricity. It seems that impact of electricity is not ignored on the development of activities even Cell level including solar energy.

3) Water Supply

Access to safe drink water is also another development handicaps for Bugesera District as well as the others. In the District, rare water sources make potable water supply difficult. Major part of the inhabitants do not have access to potable water, many people still use marshes and lakes water. This water shortage is attributable to many constraints, namely:

-Lack of water sources and the existing ones have not been improved or been depleted during dry season,
-Remoteness of water sources and / or of fountain taps,
-Water pipeline facilities are not enough and need rehabilitation,
-Feeble water pressure to Sectors located in higher altitude

Again, population in Bugesera has been suffering from securing safe water. Although the pipe water systems are there, there are a lot of residents who can not access to the clean water due to the water fee, a long distance to public tap, etc. They are fetching water almost every day with spending much time.

Furthermore, those who are taking water from river, swamp, marshland, and so on use the water for domestic without boil. The causal relationship between taking non-boiled water and disease like diarrhea, is not very clear but it is true that there are people who are affected with abdomen problem.

Problem on potable water is, anyhow, directly related to health and heavy labor. Here, it is attributable to various causes such as the very nature of the region with very limited resources, limited measures to convey water over a long distance or to maintain and utilize already constructed tap-water installations. This problem is worrisome because it may endanger human life and health, may affect livestock and agriculture and so on.

Under this circumstance, water supply system was completed in 2007 to cover the whole area of Bugesera, which funded by EU with 18 Million EURO. (See Annex III, Figure 3.2.8 Net work of water supply system) The dimensions of this water supply system are as below:

Table 3.2.10 Dimensions of Bugesera Water Supply System

Items	Description
Water resource	Lake Cyohoha-South
Water delivery system	Pump with pipeline
Amount of water lifted up	2,200 m^3/sec
Total length of pipeline	291 km
Total number of fountain	43 nos.
Total number of public tap	157 nos.
Construction cost	18 million EURO by EU
Construction period	18 months (Sep. 2006-Feb. 2007)
Contractor	SOGER-SATOM

Remarks;
1) Water supply system in former Ngenda District was installed by year 2005.
2) Apart from Bugesera system, Karange system in Kibungo District has been planed, too. This system will be constructed to convey water to Karenga are and also Kigali City from Mugesera Lake by pump system.

Construction of water supply system in progress

People suffer from non-accenbility of water

To get water is one of serious problem for population. Their water recourses are river, lake, marshland, etc. Residents, who are living in even the areas where are close to center of town which equips water supply system, spend several hours every day to fetch water due to the cost for pipe water, namely, 15 Frw/jerican is not affordable for them. To make matters worse, quality of water resource has been deteriorating in some places. In case of the photo below, it may be able to say that environment of Lake Cyohoha-North has been drastically changed sine year 2000 which is the year of serious drought. From that time, quality of lake water has been apparently changed, residents are complaining.

The Price of Safe Water

As an example, in the area of former Ngenda district, the Rwandan and Germany cooperation framework, a project of canalization of water and electrification started in 1996. This project has installed a water treatment plant at the Lake of Cyohoha South and from there many fountains have been installed in many areas. The distance for drawing water is shorter them one kilometer.

However, the drinking water is not accessible for almost of population because the price of one jerrycan still exceed its financial ability. It varies between 15 and 20 francs. For this reason, the purchasing power of the peasant does not allow him to use drinking water even if it is available next to him/her. In this way, due to the lack of financial means, the great part of the population still uses water directly from marshes and lakes.

In addition to the high cost, the ignorance of the population handicaps the use of drinking water. The majority of the population does not understand the importance of the use of drinking water. Even if they have money, some people prefer to use water from marsh instead of using drinking water. Also, the long distances to go to draw water constitute another handicap to be considered.

Safe water supply

A survey was conducted by World Vision, which focused on the sources of water for households during dry and rainy seasons in Nyamata area, in August 2005. Data was collected in regard to; distances to the water points in kilometers, time taken to and from the water points, method of supply-whether the water is sold or free, and where the commodity is bought, the cost per 20 liter Jerri can or whatever other means used to measure, and so on. The result of the survey is summarized as follows:

There are formidable challenges in accessing the commodity particularly in terms of distances covered to and from the water points, and time spent waiting at those water points. The distances to the water

points vary between 4 km and 8 km two-way. The average time taken to get water is 1.5 hours to 7 hours. The longer duration is spent waiting in the queue to fetch the water, although the length of waiting time depends on the number of people at the water points. Some people prefer to pay someone to forfeit their Jerri can of water at 100 Rwf rather than waiting for long hours.

The water sources are managed and controlled by the community, thus no fees is levied on users. However, some wells have management committees constituted by the community to manage and maintain the resource on its behalf. In such organized groups, the community contributes nominal fees for maintaining the wells and paying some allowance to the committee members.

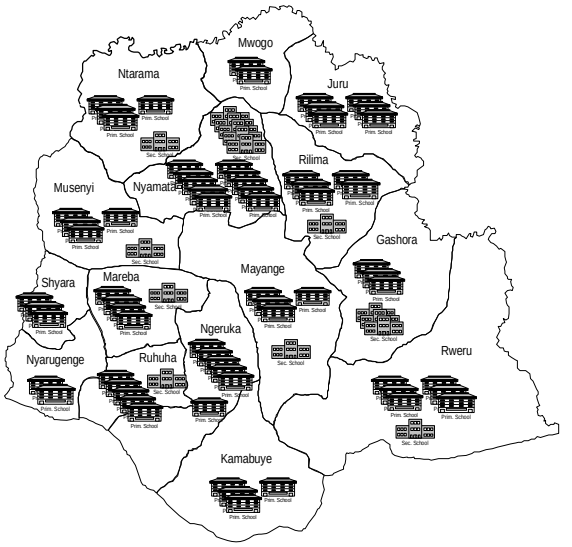
One big constraint is the quality of the water especially during the dry season. Some swamps have dirty water throughout the year while others get dirty during the dry season. The volume of water in the fountains also becomes less during the dry periods meaning that fetchers spend more time at the water point. Thus, the available water is often unsafe for use without treatment or boiling.

About 29.1 % of the women reported that their children have had diarrhea within the last one-month prior to the survey. Actions taken by mothers to address the problem ranged from "no-action" reported by 11.0 % of the women, 2 % gave home made fluids, 48 % gave a pill or syrup, 5% were injected and another 10% were given intravenous fluids. 37 % of the respondents reported giving home herbal remedies.

3.2.5 Education and Health Conditions

(1) Education

According to the field survey conducted by the Study Team, there are 43 primary and 11 secondary schools in Bugesera District. Comparing the number among the Sectors, there are the most schools in Nyamata, 5 secondary/high schools and 10 primary schools, but there are only 2 primary schools in Mwogo and Nyarugenge Sectors. In general, there exist more schools in the capital town of former three districts (Nyamata in Nyamta District, Gashora in Gashora District and Ruhuha in Ngenda District). There was one vocational center in Ruhuha, but it is not functional anymore because initial support from an NGO already terminated



	Nyamata	Gashora	Rweru	Rilima, Ruhuha	Ntarama, Musenyi, Mareba, Mayange	Juru, Ngeruka	Kamabuye	Shyara	Nyarugenge, Mwogo
Sec./High	5	3	1	1	1	0	0	0	0
Prim.	10	3	6	5	4	6	4	3	2
Total	15	6	7	6	5	6	4	3	2

Source: The JICA Study Team Field Survey

Figure 3.2.3 Distribution of Schools in Bugesera District

and tuition collected from students was not enough to continue its operation.

School lunch is provided to pupils in primary schools, and even breakfast is given in some schools. Basically, free school meals are supported by the World Food Program.

According to the baseline survey conducted by World Vision in 2005, there were 21 schools in the former Nyamta District jurisdiction with 19,110 pupils (male: 46%, female: 54%). The number of pupils who proceed to secondary schools were very limited, less than 2 %. There were a total of 272 teachers who were basically all trained. The average number of pupils per one teacher varied very much from 23 in Nyamata High School to 105 in Kanazi Primary School. See Annex III, Table 3.2.2.

Based on the development plan of the former Nyamata district, the average rate of primary school attendance was 67.1% in the educational year 2002/2003. On the other hand, the mean dropout rate was 11.1%. On the whole, primary education faces several serious problems the as followings:

- Insufficient classrooms: It is noted that increase in number of school-aged children has not been followed by consequent increase in number of classrooms and this led to overpopulated condition in some classes. (Typical examples exist in Mayange and Mwogo where pupils attend classes under tree shade and, in Rulindo, school buildings are too old.)
- Shortage of teaching material: desks, books and writing utensils etc.
- Far schools: Pupils have to walk to schools long distance in some places. (This problem exists in Marunyundo, Mwogo, Kanazi, Musenyi and Kibungo.)
- The parents have serious difficulty to pay schooling material costs for their children (chalk, stone plates, notebooks, textbooks, etc.).

Table 3.2.11 Attendance and Drop-out Rate in the Former Nyamata District

Grade	1st	2nd	3rd	4th	5th	6th	Average
Attendance rate	69.6	77.0	75.4	62.3	71.3	47.3	67.1
Drop-out rate	11.0	10.1	14.0	12.1	11.3	7.9	11.1

Source: "Plan de Développement du District de Nyamata (Plan Trienal 2004-2006)", Décembre 2003, District de Nyamata

Although it was surveyed four years ago (August 2002), national census (RGPH) results include various important data in terms of education. In Bugesera District, about 93 % of people have only primary level of education. In Mwogo, the rate is the highest (97.4 %), but the figures are almost near except for two Sectors: Mayange (82.5 %) and Nyamata (84.7 %). In these two Sectors, those who have secondary level of education account for 12 % as compared to low figures (1.8 – 5.9 %) in other Sectors. As for the higher education level, it is observed the similar situation that higher rates can be seen in Mayange (1.8 %) and Nyamata (0.9 %) while other Sectors range from 0 to 0.4 %.

On average, 57.4 % of the people over 15 years of age can both read and write in Bugesera District, but there are big differences among Sectors; namely from 46.5 % in Nyarugenge and to 71.7 % in Nyamata. The District average is the same as the national literacy data for rural area (55.8 %) surveyed

in 2003 (QUIBB - 2003)1. There are some 5 % of people who can read only in all the Sectors. Hence, the illiteracy rates (those who can neither read nor write) of Sectors range 25.0 % in Nyamata to 46.5 % in Nyarugenge. Females are commonly more illiterate than males.

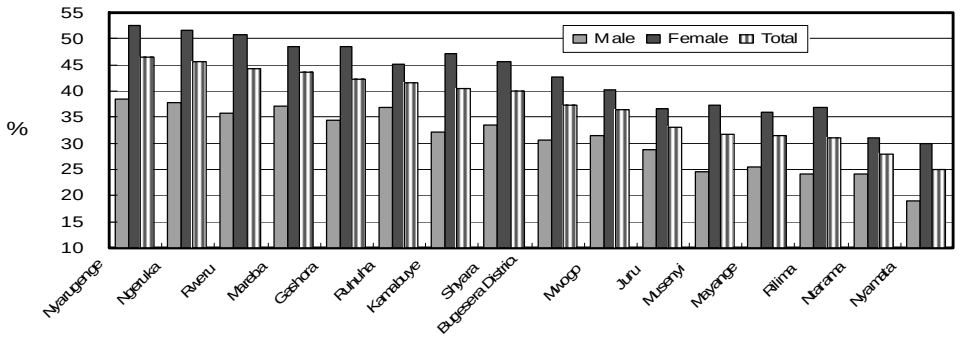


Figure 3.2.4 Illiteracy Rate by Sex and Sector

Monographie du Ditrict de Gashora, de Ngenda, de Nyamata, Edition 2005, Province de Kigali-Ngali

In the former Nyamata District, adult education was functioning according to the "Plan de Développement du District de Nyamata (Plan Trienal 2004-2006)". There were 150 literacy schools with 150 teachers who had been trained for teaching in these schools. Women and men over 45 years old can learn to read and write.It can be estimated that people between 10 and 17 years old occupy 22 % of the District total population. All of them are supposed to be literate if they go to school earnestly, but some 18 – 48 % of them are illiterate. It seems that some Sectors located in the southern part of District such as Rweru, Nyarugenge and Shyara have higher illiteracy rates than the Sectors located in the northern part. In addition, the tendency of differences among the Sectors seems to be similar to the adult illiteracy rate, hence, the literacy/illiteracy of parents may relate to their children's literacy.

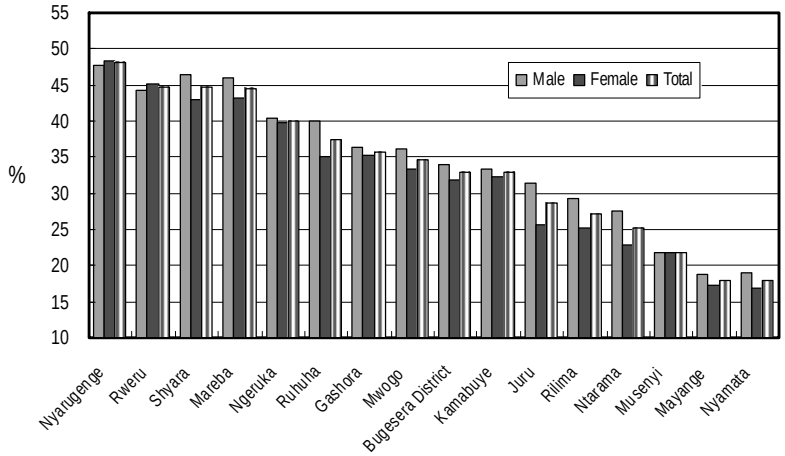


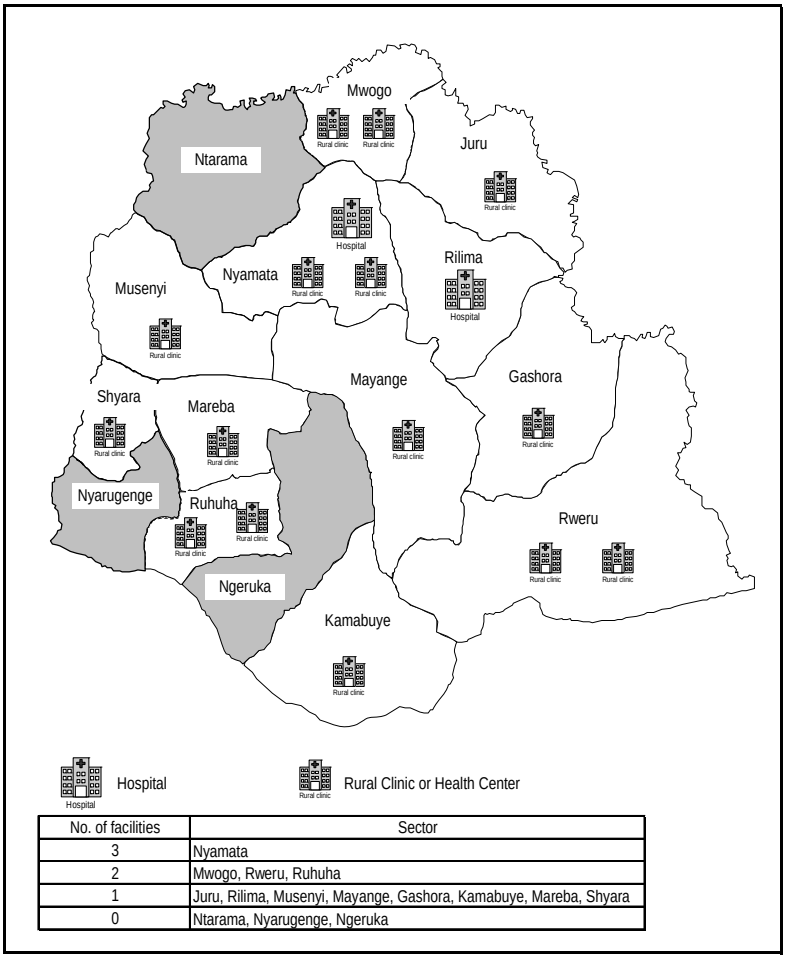
Figure 3.2.5 Illiteracy Rate of Pupils (10-17 years old) by Sex and Sector

Source: Monographie du Ditrict de Gashora, de Ngenda, de Nyamata, Edition 2005, Province de Kigali-Ngali

[1] ENQUETE SUR LES INDICATEURS DE BASE DU BIEN-ETRE (QUIBB-2003), RAPPORT D'ANALYSE DES RESULTATS, MINECOFIN, Mars 2004

(2) Health

The health level, especially in the field of infant disease control, reproductive health, malnutrition, access to medical care and malaria, is still low in Bugesera District. There is almost no system of solid waste management or wastewater treatment in the District. Many residents use river/wetlands water for domestic water including drinking without treatment. This is the cause of many water borne diseases. The inadequate disposal of wastewater becomes the favorable sites for the breeding of mosquitoes and other vectors of human and animal diseases.The numbers of health facilities, such as hospital, rural clinic, and health center, in Bugesera District are shown in the Figure 3.2.5. The Sector that established hospital is only two, such as Nyamata and Rilima, out of fifteen Sectors. The Sectors, which have more than two health facilities, are only four Sectors. There are two Sectors, which have no health facility, such as Ntarama and Nyarugenge.



No. of facilities	Sector
3	Nyamata
2	Mwogo, Rweru, Ruhuha
1	Juru, Rilima, Musenyi, Mayange, Gashora, Kamabuye, Mareba, Shyara
0	Ntarama, Nyarugenge, Ngeruka

Figure 3.2.6 Distribution of Hospital / Rural Clinic / Health Center in Bugesera District

The condition of health facility is poor in view of not only quantity but also quality. Most of health facilities have some problems, such as lack of doctors/ nurses/ staff, equipments, medicine, and budgets. The improvement of health system is required in Bugesera District. Regarding to more details, they are described in Chapter 3.2.4, (3) Energy and Water Supply.

3.2.6 Rural Society

(1) Living conditions

According to the national census conducted in 2002, people generally live in ordinary houses while a

few people (3.4 % of District population) in some Sectors live in collective houses. In Rilima, statistically, 26.6 % of Sector population lives in collective houses probably due to the existence of a prison. In Musenyi and Mayange, about 5 % of Sector populations live in collective houses. In other two Sectors, Nyamata and Ruhuha, less than 1 % of population lives in collective houses, but there are no other Sectors where people live in collective houses.As for type of housing, more than half of the households live in isolated houses as a whole. In some Sectors such as Ntarama and Gashora, about 40 % of households live in Umudugudu. In Rilima, nearly a half of households live in former grouped residences.

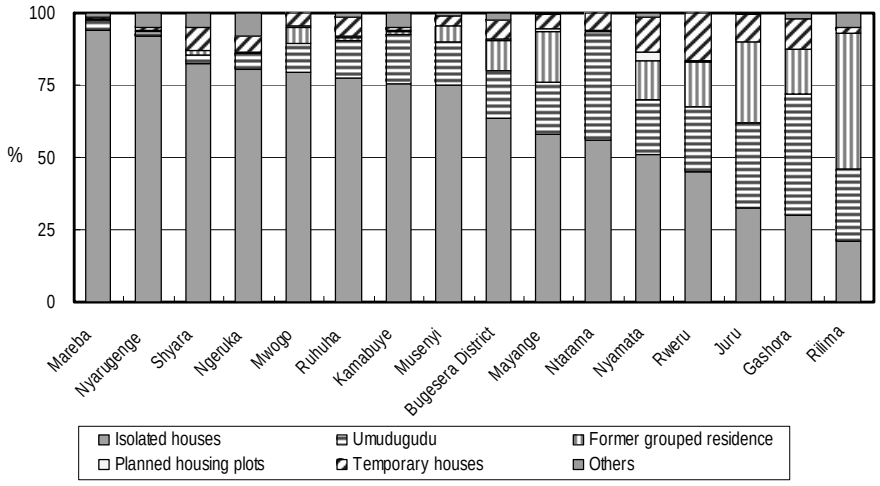


Figure 3.2.7 Distribution of Households by Type of Housing

Source: Recalculated data from Monographie du Ditrict de Gashora, de Ngenda, de Nyamata, Edition 2005, Province de Kigali-Ngali

For roof material, zinc is the most popular in Bugesera since it accounts two thirds of total households. In Juru, Rilima and Ntarama, it represents more than 85 % of households. It is normally assumed that people who live in grass roof houses are relatively poor. In Bugesera, one fourth of people live in the grass roof houses on average. However, in the following five Sectors, Rweru, Ruhuha, Ngeruka, Gashora and Kamabuye, more than one third of families live in grass roof houses, and these Sectors are mainly located in southern part of Bugesera.

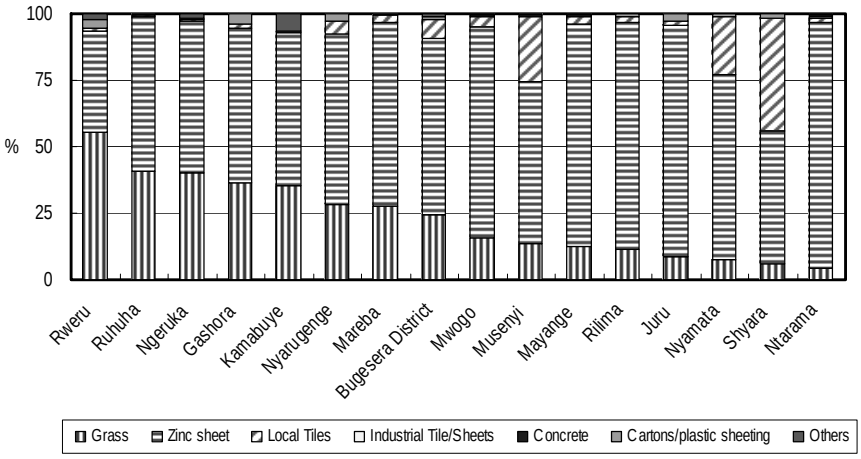
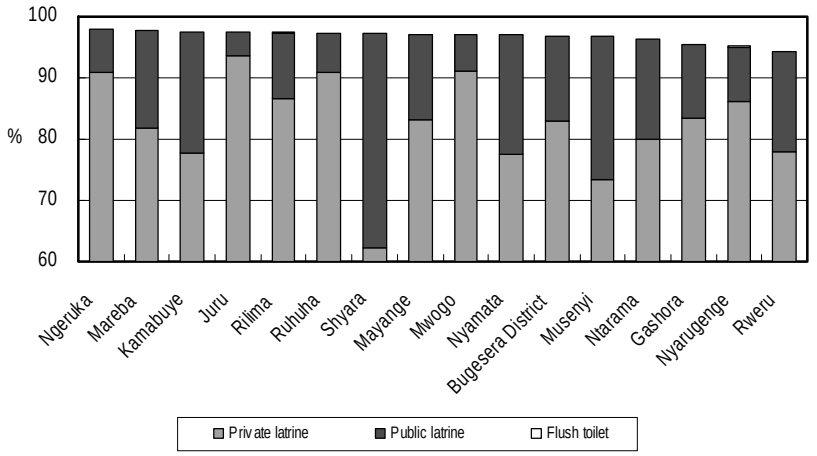


Figure 3.2.8 Distribution of Households by Type of Roof Material

Source: Recalculated data from Monographie du Ditrict de Gashora, de Ngenda, de Nyamata, Edition 2005, Province de Kigali-Ngali

In Bugesera, people normally use lamp for lighting since it occupies 80 % of households. Electricity is available only in limited areas such as a center of Nyamata (0.6 % of households). As for the main source of energy for cooking, firewood is predominantly used, counting 95.4 % of District households. In Nyamata where many shops and offices are there, 11.5 % of households use charcoal while firewood users still occupy 84 %. In every Sector, more than 90 % of people use tree materials, either firewood or charcoal. Either private or public latrine is widely equipped in households and it accounts for 94 % of households in Bugesera. In the four Sectors, namely Juru, Mwogo, Ngeruka and Ruhuha, private latrine is installed in more than 90 % of houses.

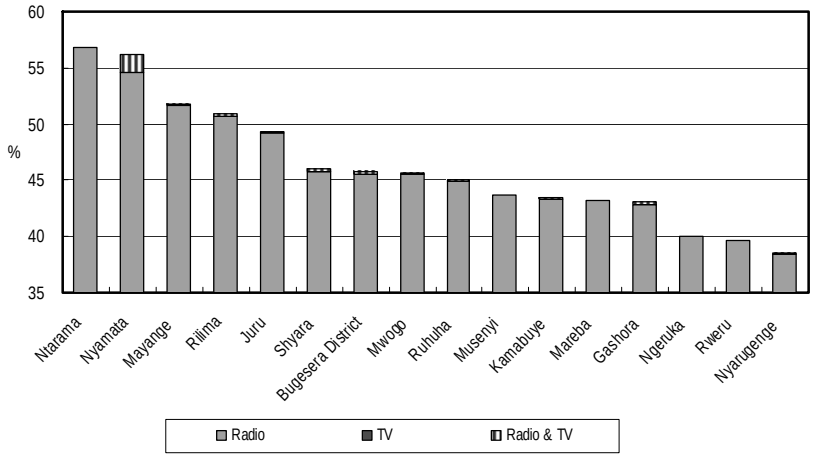


Source: Recalculated data from Monographie du Ditrict de Gashora, de Ngenda, de Nyamata, Edition 2005, Province de Kigali-Ngali

Figure 3.2.9 Distribution of Households with Latrines

Information and communication equipments are still limited. Those households who own TV and/or

radio are less than a half of the District households. In the four Sectors, Ntarama, Nyamata, Mayange and Rilima, more than half of households own TV and/or radio set. In the southern Sectors such as Nyarugenge, Rweru and Ngeruka, those who own TV and/or radio set represent less than 40 %.



Source: Recalculated data from Monographie du Ditrict de Gashora, de Ngenda, de Nyamata, Edition 2005, Province de Kigali-Ngali

Figure 3.2.10 Distribution of Households with TV and/or Radio Set

(2) Communal Activities

In rural areas in Rwanda, it is general that well-organized information dissemination system exists at a Cell and/or community level. According to the interview survey conducted in three Cells in Ntarama Sector, namely Cyugaro, Kanzenze and Kibungo, where quick projects (QP) would be implemented in the course of the Study. Information is normally disseminated through either Nyumbakumi or Umudugudu systems. Detail is shown in Annex III, Table3.2.3.

There are also various kinds of communal activities in rural areas such as Umuganda, Umusanzu, Kugurizanya and Ubudehe. Among them, Ubudehe, which originally means collective/community action, now becomes the title of program supported by EU: the Ubudehe program. Followings are typical examples observed in Ntarama Sector. Detail is shown in Annex III, Table3.2.4.

(3) Association Activities

There are many associations at a community level. They cover various activities including the genocide victim support, productive activities, mutual help, etc. One of the common characteristics among these associations is that many offer a kind of health insurance to member families on credit basis. In short, members pay fixed regular membership fee and can borrow money for medical treatment from their association when someone in their families gets sick. Even though the main objective of the association is not related to health issues such as farming, there are many cases that associations provide this credit support for emergency medical expenses.

As for the genocide victim support, the activities cover assistance of women headed households and

orphans, promotion of reconciliation, assistance for judgment processes, etc. For the productive activities, support for farming (seeds distribution, expansion of new technology, etc.), bicycle taxi and handicraft making are examples. Transportation of sick people is a typical case of mutual help association.

Some of the associations receive financial assistance from local and/or international NGOs, mainly located in Nyamata Town, but many of them are independent and self-supporting. The outlines of some associations are shown in Annex III, Table 3.2.5.

(4) Vulnerable People

As for the marital situations (aged over 12 years old), there is a big difference between the male and female proportions of the widowed: 2.1% of male and 13.9% of female. In Ntarama, 18.5% of women are widowed, the highest among the 15 Sectors. This might be attributed to the fact that the damage caused by the 1994 genocide was very severe there. For male, Rilima records the highest proportion, 5.7%, followed by 2.6% in Ntarama.

Table 3.2.12 Proportions of Widowed by Sex and Sector

Sector	Gashora	Juru	Kamabuye	Mareba	Mayange	Musenyi	Mwogo	Ngeruka
Male	1.1	1.4	1.9	1.5	1.2	1.3	1.7	1.4
Female	14.9	10.5	15.5	15.4	12.4	12.8	11.5	14.6
Total	8.8	6.3	9.3	9.3	6.9	8.0	7.2	8.7
Sector	Ntarama	Nyamata	Nyarugenge	Rilima	Ruhuha	Rweru	Shyara	District
Male	2.6	1.7	1.2	5.7	1.2	1.1	1.9	2.1
Female	18.5	13.8	14.4	12.8	16.4	12.6	13.4	13.9
Total	11.2	8.3	8.7	8.2	9.9	7.5	8.3	8.4

Source: Recalculated data from Monographie du Ditrict de Gashora, de Ngenda, de Nyamata, Edition 2005, Province de Kigali-Ngali

From the viewpoint of an orphan issue, it is more serious again in Ntarama Sector than in other Sectors. Among the children between 0 and 17 years of age, only 57.1% of them have both parents in Ntarama, while it records 76.9% in Juru and the District average rate is 70.5%. Those who lost both parents and father in Ntarama occupy 9.7% (District average: 4.8%) and 27.6% (District average: 20.2%), respectively, and the figures are both highest among the 15 Sectors.

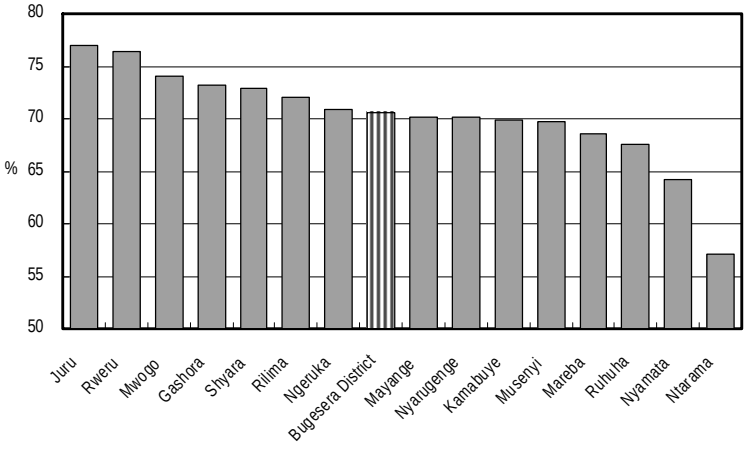


Figure 3.2.11 Proportions of Children whose Parents are Both Alive

Source: Recalculated data from Monographie du Ditrict de Gashora, de Ngenda, de Nyamata, Edition 2005, Province de Kigali-Ngali

Moreover, on average one percent of households were child-headed families (6-17 years old) when the survey was conducted in 2002. There are not big differences of percentage according to locality. In the former three districts in Bugesera, the child-headed families account for 1.0 % in Nyamata, 0.9 % in Gashora, and 1.0 % in Ngenda, respectively.

3.3 Agriculture

3.3.1 Agro-ecological Zone

(1) Agro-climatic Characteristics

Bugesera District is located in the South East of Kigali City and ranges in elevation from 1,110 m to 1,772 m.a.s.l. where is the highest point in Shyara Sector, in combination with hilly terrain, lowland (Akabande) and flood plain (Igishanga) along the Akanyaru and Akagera Rivers. Dominant vegetation like woody savanna and steppe is extended from the Northwest to the South West. Meanwhile, the east and south area consist of two vegetations like thickly shrubby savanna covering hills and grassy savanna covering dry valley and hilly plateaus. Further, marsh vegetation, namely Cyperus papyrus is widely seem along the river-flood plains.

Rainfall is bimodal with the long rainy season from February to May, and the short rainy season from September to December. Meanwhile a rainfall pattern is characterized as an erratic, unreliable and fluetuated with year to year, ranging from 761 mm to 1,192 mm at Ruhuha observation station in the North West area, 671 mm to 1,524mm at Nyamata, and 671 mm to 1082 mm at Karama in Gashora. Generally, it tends to have more precipitation in the North West than that of the South East area such as Reweru and Kamavue where explicitly severe drought problem occur. Therefore, a food famine is frequently happened in Bugesera District; however, wetland and marshland play an important role as a buffer function to mitigate food famine problems, i.e, the five Sectors (Nyarugenge, Shyara, Musenyi, Ntarama and Mwogo) along to Akanyaru and Akagera Rivers as well as Gashora Sector, where many wetlands (hill-bottom) exist, are no severe food famine because of planting food crops such as sweet potato in the wetland during the drought year and appear to be less famine compared to the other Sectors.

(2) Soil

Parent rock in Bugesera is dominantly extended with granite followed by schists and mylonitic phyllite which are expanded in the Northwest area and the East side along to Akanyaru and Akagera Rivers. Soils in the remaining whole area are dominantly based on parent rock of granite. Thus, soils on hilly side are dominantly composed of sandy loamy soils containing gravels, partially laterite soils. Meanwhile, soils on wetland and marshland are clayey with relatively fertile nature. Therefore, soils on hillside are fragile with low organic content and need measures for soil erosion protection.

(3) Land Use

No data on present land use is available, but prevailing land use in the Study Area is observed as the seven categories as mentioned below and the farming activity on land use is closely related to flood cycle of wetland/marshland and the bimodal rainy season. Residential area is located in hillside, and where farmland is expanded over the boundary to wetland and marshland. Moisture tolerant crops such as sorghum, cassava and sweet potato are generally cultivated in the hillside, while sensitive crops to moisture stress such as banana and vegetables are allocated in around of the hill bottom where soil moisture is relatively high compared to hillside, and irrigation practice is observed for vegetable production as well. Concerning wetland and marshland in the Study Area, both terms are generally defined as follows.

Table 3.3.1 Land Use Category

No	Land Use Category
1	Forest and bush land
2	Water body (lake, river)
3	Road and residential area
4	Farmland in hillside
5	Wetland (Akabande)
6	Marshland (Igishanga)
7	Wasteland

-Wetland (*Akabande* in Kinyarwanda) is defined as lowland in between hills without linkage of water system to river water flooding.

-Marshland (*Igishanga* in Kinyarwanda) is defined as lowland along river floodplain including lowlands linked to river water flooding system where Papyrus vegetation is predominant.

Both wetland and marshland are not systematically utilized in large scale and a big potential of crop production remains in food security view point.

3.3.2 Farming System

The prevailing farming system in the Study Area is more or less a livestock based mixed-farming system with a family labor on small plots, using hoe and machetes. A livestock-crop linkage is interactively influenced each other in terms of manure supply to crop cultivation and feeding stuff supply to livestock. However, livestock is rarely used for animal traction purpose, and which dose not result from religious custom or traditional culture. According to interview survey on farmers, an animal traction technology is not well aware among the farmers. No actors taking initiatives of this technology transfer is observed in the Study Area. Production systems, which are overwhelmingly small holder in nature, can be characterized as an intensive organic systems and involved the combination of food, fodder and tree crops. Intercropping, crop rotation and use of some soil and water conservation techniques are typically practiced.

Number of crops cultivated in small holder ranges from two to ten such as sorghum, maize, banana, beans, sweet potatoes, cassava, and so on. Market oriented farming system is also practiced along to the boundary zone between hillside and marshland in Ntarama Sector, cultivated with vegetables and maize. Meanwhile, the sugarcane plantation, around 2,000 ha involving 1,500 farm households in the

sugarcane associations supervised by Kabuye Sugar Works Co., Ltd is largely established in the marshland along to Nyabarongo River, adjacent to North west boundary of Ntarama Sector. Coffee plantation (Coffee Arabica L) in small scale is also prevailing, mainly in Musenyi and Shyara Sectors supported by OCIR.

Concerning prevailing farming systems in the Study Area, typical farming systems among the small holders are tentatively categorized into the 10 types as below. Finalization of the farming system in the tudy area is expected to have a basis on the output of the baseline survey by GTZ-JICA joint survey. This tentative category is not related to the six categories of poverty of households based on livestock and land ownership as mentioned in the PSTA.

Table 3.3.2 Type of Farming System in Bugesera District

	Farming Type	Remark
1	Landless FH	No land, just work as casual worker
2	Self subsistence FH	No livestock kept + small farmland
3	Self subsistence FH	With small livestock + small farmland
4	Market oriented farming FH	Sugarcane in marshland + Food Crop in Hillside
5	Market oriented farming FH	Beekeeping + Food crop in hillside
6	Market oriented farming FH	Vegetable production in boundary zone between hillside and marshland + food crops in hillside
7	Market oriented farming FH	Vegetable production in the boundary zone between hillside and wetland, and rice in wetland + food crops in hillside
8	Market oriented farming FH	Fruit crops like banana/pineapple + Food crops in hillside
9	Livestock keeper	Food crops and small scale of cattle keeping including local and crossbred cows
10	Livestock keeper	Large scale of beef cattle or dairy farm

Source: Field Survey by JICA Study Team, 2006, Note: FH refers to Farm Household.

3.3.3 Land Tenure System

In Rwanda, except for lands title owned in accordance with written law, all lands belong to the Government. In rural area, the right to use land is still regulated by a combination of customary law and modern regulation. The traditional way confers the usufruct right on his/her cultivated land and allows making his/her offspring to inherit the land properties.

In Bugesera District, a land sharing system known as “Paysannat “ was practiced over 1960 to 1970s and the GoR conferred immigrants on usufruct right to cultivate a plot of 2 ha equally. These plots were not allowed to be subdivided and sold. Further the GoR could reserve the right to take back usufruct of the plots by compensating the usufruct holder. The land belonging to the District such as grazing land, the GoR without any compensation could use marshland/wetland, etc, and most of the lands in Bugesera are used under the customary law.

At present, the land holding sizes among the farmers in the Study Area vary from landless to more than 2 ha, and which resulted from out of control in the said land sharing system of “Paysannat”. Therefore, collection of land by some landholders with financial ability has occurred through buying and selling business under out of surveillance by the local administration, and land price is increased. Lending and renting farmland are also widely practiced in the Study Area and lease agreement is

mainly annual basis but no fixed price by land size and lease agreement period appears to be existed.

In last July 2005, the organic law on determining the use and management of land in Rwanda has been proclaimed. In accordance with this written law, registration of land a person owns is stipulated as obligation.

3.3.4 Crop Production

(1) Cultivated Crops

Based on the reconnaissance survey and the sampling farm household survey of Bugesera District by MINGAGRI, major cultivated crops observed by the land use in the Study Area are summarized as below;

Table 3.3.3 Cultivated Crops in the Study Area

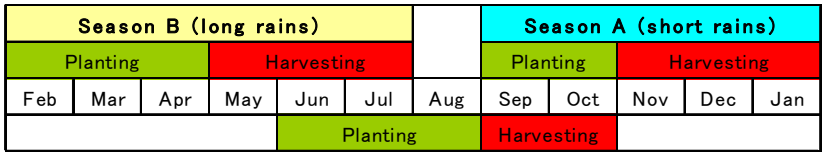
	Land Use		Cultivated Crops
1	Hillside	Crops	Sorghum, Maize, Sweet potato, Potato, Sunflower, Haricot Bean, Peanut, Peas, Cassava, Yam, Taro, Vegetables (tomato)、 Fodder crop (*Pennisetum*, *Tripsacom*)、
		Fruits/Tree crops	Coffee, Mango, Orange, Pineapple, Banana, Guava, Lemon, Avocado
2	Marshland, Wetland		Sorghum, Maize, Sweet potato, Rice, Potato, Vegetable (tomato, cabbage, onion, eggplant, carrot, cucumber, pumpkin)

Source: JICA Study Team, 2006

As mentioned in 3.3.2, the cultivated crops in the Study Area are characterized as well diversified. Also, banana variety is differentiated in accordance with purpose of its utilization such as fresh fruit, cooking and brewing banana beer. Similarly, sorghum variety is differentiated for porridge and sorghum beer as well.

(2) Cropping Pattern

Under the bimodal rainy season and flooding cycle of wetland and marshland, the cropping pattern in Rwanda is generally categorized into the following three cropping seasons as below. The cropping season starts from September and end in July in hillside, while in marsh and wet lands a cropping season ranges from June to next March depending on flood cycle of applicable area.



Source: WFP news, April 28, 2006

Figure 3.3.1 Normal Seasonal Calendar

Below figure shows the cropping pattern in the Study Area. Short matured crops like haricot bean and sweet potato are usually cultivated twice a year as double cropping in the hillside, while long matured crops like sorghum and cassava are single cropping by planting either beginning of the A or B seasons in the hillside. Meanwhile, rice is mainly cultivated in the wetland of ex-Ngenda district where

includes Ruvubu, Gatare, Kiruhura, Nyaburiba, Kibaza and Rwabikwano wetlands, as double cropping system under irrigation by constructing valley dams. On the other hand, vegetables are cultivated in the marshland and its boundary zone in the hillside from July to next March until next flooding cycle. Fluctuation of water level along to the boundary from hillside to marshland varies from site to site, and practice of recession cultivation is observed in Kibungo Cell of Ntarama Sector. That is, vegetable cultivation on marshland is extended along to recession of flood water and vice versa.

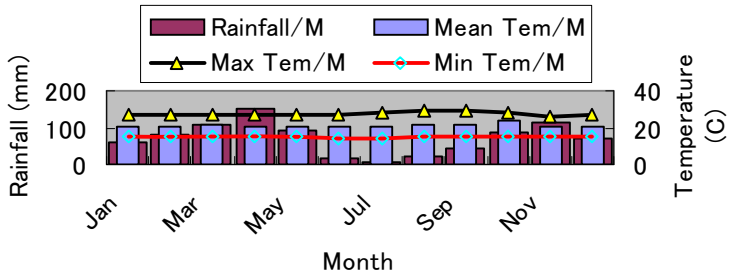


Figure 3.3.2 Monthly Precipitation, Temperature Condition in the Study Area

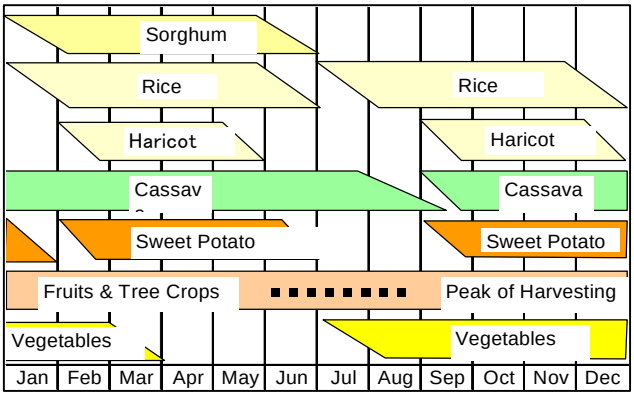


Figure 3.3.3 Cropping Pattern in the Study Area

(3) Crop Production

Statistical data on crop production in the Study Area is not available. The agricultural statistics in Rwanda is compiled in province-base by enumerating crop harvest (tons) without enumeration of cultivated area by crop. Further, Rwanda has culturally no metrology unit in terms of area and weight in rural area which could be convertible to internationally common unit such as hectare and kilogram. On the other hand, an administrative structure in the country has just been changed since this January, and the data accumulated in the ex-three districts in the Study Area has completely been missing through restructuring process. Thus, estimation of crop production with cultivated area in the Study Area is impossible. The data on crop production shall be expected to the outcome of the baseline survey of the whole household survey on the Study Area by the GTZ – JICA joint survey, starting from July, 2006.

3.3.5 Traditional Farming Technology


Plowing by Hoe

The prevailing farming practice in the Study Area highly relies on labor intensive farming practice based on machete and hoe, that plowing, weeding, transportation of farm produce and threshing operations highly depend on almost manpower, and nothing observed in animal traction as well as motor driven farm machinery. Farm inputs on self-consumed food crops are mainly seeds, and cow dung manure when it is available, and no application of agro-chemical inputs such as fertilizer and chemicals. On the other hand, farm inputs such as agro-chemicals and chemical fertilizers are usually applied to vegetables and other cash crops like maize and rice among the group farming or farmer's association. The sequence of the farming practices prevailing in the Study Area is generally summarized as below.

(1) Land Preparation and Plowing Operation

Land preparation and plowing operation are always practiced by machete and hoe with labor-intensive manpower. Plowing operation is usually practiced in either collective way like farmer's association group or hiring labor at wage rate of 400 Rwf per day.

(2) Sowing Operation

Sowing is manually done. Most of food grain and leguminous crops are either broadcasting or random drilling method, or rare case in line sowing by using line maker made of wood. In case of rice, transplanting in line is well adopted.

(3) Weeding, Fertilizer and Herbicide

Weeding practice is exclusively done by uprooting weeds by hand in combination with hoeing and no chemicals like herbicide used. Two types of chemical fertilizer are used in the Study Area, namely urea and NPK compound fertilizer (17-17-17), but which confines to mostly market-oriented vegetable and other grain crop farming like rice and maize cultivation. Meanwhile, food crops for self-sufficiency are rarely applied with chemical fertilizers except for cow dung manure when it is available.

(4) Harvesting, Transportation, Threshing and Winnowing Operations

After harvesting grain and leguminous crops, the harvests are transported to homestead by hand or on head so as to dry them under sunlight, and then threshing is practiced. Threshing operation is usually done by beating heaps of grain heads or pods with stick, and then winnowing them with Urutaro or Intara (conventional weaved basket) under natural wind blow.

(5) Storage Method

Leguminous and cereal grains are usually kept in their farm houses either in bag or as it are. Some interviewed farmers in Ntarama Sector replied that they use DDT for spraying grains by dissolving it

with water for prevention from pest damage, and washing out the grains when cooking at home. However, the agro-shop in Nyamata does not sell any DDT chemicals because of banning of DDT use in Rwanda and displays only two powder type pesticides such as Malathion and Actellic 50 % EC for grain storage.

Thus farmer appears to take actellic 50 % EC for DDT because of the widely use before. Apart from the above method, a traditional storage bin called "Ikigega" which is made of woven wood and bamboo with cow dung is not observed in the Study Area. This is inferred that the production in the most of household level do not require big storage because of small harvest due to small arable land size. Meanwhile, tuber crops like sweet potato and cassava are harvested when family needs, thus field plays as storage function.

Sorghum Stalk used for mulch

(6) Utilization of Crop Residue and Cow Dung Manure

In accordance with the Action Plan for Bugesera District till 2006, the District has promoted a pair of soil pits excavation in farmyard for making compost and damping rubbish which are not easily decomposed, separately. Thus, organic matter such as crop residue, cutting weed are observed in the pit of Umdugudu village. On the other hand, grain stalk like maize, sorghum are fed for cattle, meanwhile sorghum stalk and napier grass are used for mulching materials for vegetable cultivation. (See right above Figure).

A Rice straw in Ruhuha Sector is widely used for mulching materials of tomato cultivation during the C season by shallow well irrigation. Cow dung manure is usually applied to banana, bean and vegetable field when it is available. Aquatic weed, Papyrus is used as compost materials for vegetable production in some boundary zone between hillside and marshland in Kanzenze Cell in Ntarama Sector.

(7) Crop Rotation and Mixed Cropping

Crop rotation is generally observed in hillside in a sequence of bean and grain crops like sorghum. Mixed cropping is widely prevailing in hillside in various combinations, i.e, a. beans and sorghum, b. cassava and sweet potato, c. cassava and banana with beans, d. coffee, napirgrass and beans, e. maize, bean and grevillea (tree spp.) or f. maize, cassava and bean, g. banana and taro, and so on. In wetland or marshland, monoculture is dominantly common practice. Most of the farmers interviewed gave the reason why they practice a mixed farming was just following to their parent's way and no logical theory was given. Mixing crops with tree species like Grevillia and Cedrela appear to be mainly reflection of agro-forestry in a view of environmental sustainability under promotion of planting tree seedlings to farmers through the Cell Office.

(8) Soil Conservation

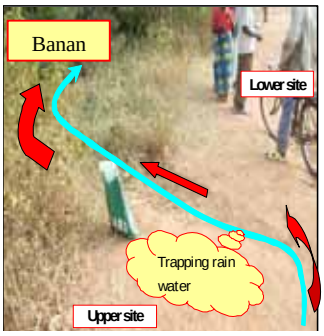
Specific soil conservation measures are not widely taken in the hillside farming, and gully erosion on

eeder roads to downhill toward wetland or marshland are usually observed. Sparse planted cassava field is usually planted with other crops like sweet potato or beans, and bare land surface area is less than monoculture of cassava crop, thus soil erosion seems to be mitigated in hillside.

Large scale of soil conservation measure is not widely taken in the Study Area and most common measures observed in the hillside are field reclamation at original slope. Further, napiergrass is usually planted along to the contour line to protect soil erosion. (See above Figure).

(9) Water Harvesting

Bugesera area is prone to drought due to erratic rain, and securing water for crop production is vital; however, water harvesting measure is not widely observed in the hillside. Only a few farmers apply this practice to banana fields to trap rain water by making ditch along to downhill feeder road(See right figure). Rainwater flows into depression made around banana planting hill, and then flow into next banana plant hill through gravity. Farm pond on the hillside is rarely observed except for the government work or donor project including valley dam for paddy field in Ngenda Area.



(10) Agro-processing

Major agro-processing activities in the Study Area consist of the five activities. The first is milling on cereal and leguminous crops like maize, sorghum, soy bean and dried cassava at several flour mills in each Sector. Milling price on grains ranges from 10 Rwf to 30 Rwf per kg depending on type of grains and milling machine is either electric or diesel engines. Apart from the above flourmill, home milling is also practiced at farm household level by using traditional manual tools like Urusyo (milestone), and Isekuro (mortar) and Umuhini (mallet) (See right Figure). The second and third are brewing banana and sorghum beers at household level. The former is very common agro-processing activity among the rural communities for income generation.

The fourth is coffee bean washing center in private basis to produce green coffee beans in Shyara Sector where coffee beans are collected from the major production area such as Musenyi and Sharya Sectors. The last one is rice-milling activities handled by rice cooperatives in the ex-Ngenda district.

(11) Rice Cultivation

1) Prevailing Farming Practice of Rice

Rice is widely cultivated in the ex-Ngenda district, Southwest of the Study Area. Several rice farmers and supporting NGO to rice farmers was interviewed. Common farming practices of rice cultivation

and production constraints are interviewed. Perception of the interviewed farmers and supporting NGO about paddy plot size, seed rate and fertilizer dosage per unit area is differed each other. From the interview results, most common practice in the area is shown in Annex III, Table 3.3.1.

2) Pest and Disease

The symptom explained by agronomist in the NGO appears to be panicle blast and usually damages about 60 % of paddy plot annually. With this disease, fly also cause severe damage on rice plant annually.

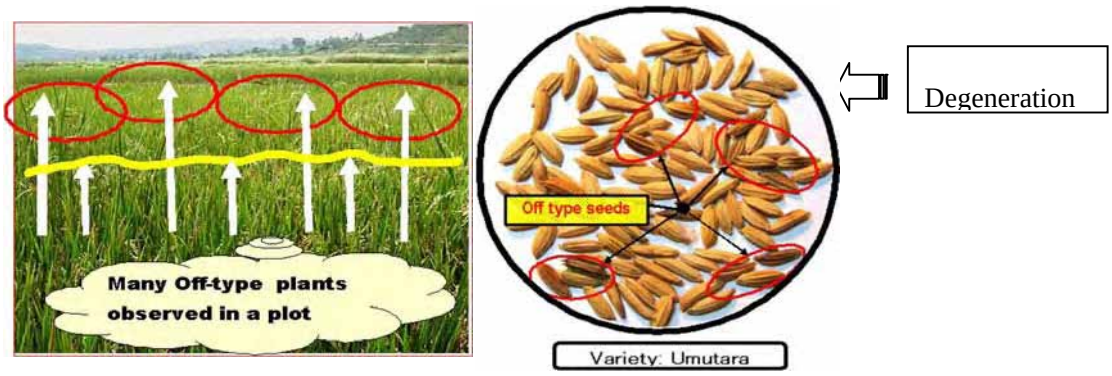
3) Production Constraints in Rice Production

The interview results to a board member of the rice cooperatives are summarized as below.

Table 3.3.4 Production Constraints of Rice Production in the Cooperatives

	Constraints	Details
1	Seed	Degeneration is ongoing and renewal of seed should be done.
2	Drying place	At present, paddy is dried by spreading on the ground directly for 4 days under sun light. Concrete drying place is necessary.
3	Rice mill	Broken rice is severely generated via milling process.
4	New rice variety	Marketable rice variety like Basmati is needed in stead of local rice variety.
5	Transportation	Paddy fields of 418 ha are scattered and difficult to collect harvest
6	Grain storage	The rice storage of the cooperatives is not enough space to accommodate the paddy harvest (at present only 30 t cap storage only)
7	Threshing	There is no threshing machine and doing it by using stick
8	Agro-chemicals	Agro-chemicals to control *Cyumya* and *Isaz* are short.

Source: Interview result to a cooperative board member by JICA Study Team, 2006



The above figures show on-going degeneration of rice variety in the farmer's field. Most of rice farmers in the Study Area uses own harvest for the next year seeds without any practice to remove off-type, thus several varieties within a plot are grown and result in degeneration of rice variety.

3.3.6 Livestock

(1) General view

The major domestic animals raised in the Study Area consist of cattle, goat, sheep, poultry, pig, rabbit, and so on. The statistical data of livestock by animal is not available and expected to acquire an output of the baseline survey of Bugesera District at the end of September, 2006 by GTZ-JICA joint survey.

Among the livestock, cattle, local species of Ankole, well adapted to Bugesera climate conditions is dominant, and number of heads in Kigali Ugari including the Study Area is reported the second to Umutara in the country. However, lactation of Ankole is extremely low level like 2 liter per day compared to fresian spp., 22 liter per day, and MINAGRI has promoted "One cow One family" policy to replace Ankole with exotic or crossbred cows in order to improve food security conditions through income generation via sale of milk, manure supply to crop production and improvement of nutrition via milk consumption. This policy is aimed at distributing modern cow to poor family who meets preconditions stipulated by MINAGRI-RARDA under zero-grazing system.

In early 2006, the President has granted 100 crossbred cows to the Study Area, specifically Musenyi, Mareba and Ruhuha Sectors. This project has involved the various stakeholders including RARDA, District-Sector-Cell level office concerned personnel, private vet-technicians, and the 100 recipients formed the farmer's associations to make it possible. So far, four crossbred cows in the project were reported to death and two of them due to poor animal health care in Musenyi. Concerning small livestock, no commercial farm is observed so far. Meanwhile, small to medium scale of dairy farming by rearing crossbred cows or exotic cows is mainly observed in the ex-Nyamata District. Some small landholder who has prepared feedlot and cowshed for expecting to get crossbred future is observed in Ntarama Sector.

(2) Development Constraints in Livestock Sector

In development of livestock sector, most critical constraints are confined to two problems as below.

Table 3.3.5 Constraints of Livestock Development in the Study Area

No	Constraints	Details
1	Fodder crop	Shortage of fodder crops during the dry season
2	Animal Health	-Insufficient of vet-technicians -Insufficient of watering points for livestock -Shortage of animal drugs -Nature of grazing system to transmit disease easily through livestock movement

Source: Interview result to RARDA by JICA Study Team, 2006

Concerning animal health, outbreak of animal disease such as i) Tick bone disease, ii) Worm disease* ,iii) Burcelosis, iv) Foot and Mouth Disease in 2002 is reported so far in the Study Area.

*Parasitic worm ranging in marshland and swamp is transmitted to lever or intestines of cattle when cattle herd move around swamp or marshland.

3.3.7 Inland Fishery

(1) Fisheries and aquaculture

In Bugesera District, aquaculture is slowing down and exclusively carried out in fishponds. The yield is very poor and limited for family consumption. On the other hand, there are serious damages for fishery due to environmental issue. As an example for the situation, it can see that fishery has no more practiced in Lake of Chohoha North after progressive water depletion. Thus, it needs protection from

ecological and scientific points of view to secure fish productivities in the future, too. Fishing in Bugesera, anyhow, is not in good condition and the causes for its situation can be summarized as follows:

- Presently, the exploitation of the stocks of fish is harmful: the number of fishermen and net is too high and fish are captured although they are still too young,
- The dry season during the years 1997-2000 influenced negatively the stocks of fish: due to the decrease of the water level of lakes and/or fishponds, fish are caught easily or die. It seems that the surviving fish have been in a critical condition and presently there is a serious deficit in the stock of the main parents (particularly among tilapia).
- Erosion around the lakes is harmful on long term basis.

Fishing being an important activity that generates incomes, in order to be of high profitability the following steps are expected to be taken: (i) introduction of new species and actively increase the quantity of fish in lakes, (ii) limitation of the number of fishermen authorized to fish in lakes (=fishing rights) with limitation of the number of nets and of the size of nets used, namely, 4 cm or larger, (iii) stopping periodically fishing to allow reproduction of fish in the future.

(2) Project to Support Comprehensive Development and Management of Inland Lakes (PAIGELAC),

The MINAGRI is now implementing a project which aims to strengthen fishery field in the country. The title of project is “Project to Support Comprehensive Development and Management of Inland Lakes (PAIGELAC)”. This section discusses an outline of the Project.

1) Background of the project

Rwanda is among the least developed countries. The endemic poverty since two decades affects around 60 % of households living below the threshold of poverty. To reduce poverty, the Government of Rwanda has defined following a large consultation of the population, civil society, non-government organizations (NGO) and donors. A poverty reduction strategy with six targets namely: (i)Rural development and agriculture transformation; (ii)Human resource development; (iii)Development of economic infrastructures; (iv)Good governance; (v) Development of the private sector, and (vi)Strengthening institutional capacities.

Specifically in fishery and fish farming (aquaculture), the poverty reduction strategy has re-affirmed the strategic targets of the national policy of fishery and fish farming: (i)Comprehensive development of water stretches or reservoirs (reconstituting fish stocks and their sustainable management); (ii)Protection of aquatic areas, watersheds of lakes and biodiversity; (iii) Increase of national fish production and adding its value; (iv) Development of private initiative and bringing up fisheries. To implement the strategy, the Government has applied for funding to the Bank, in accordance with

which, the Bank prepared, pre-assessed and assessed the Project to support comprehensive development and management of inland lakes). The project fits within the priorities of the Poverty Reduction Strategy Paper (PRSP), in Millennium Development Goals and the National Fishery and Fish farming Policy. It is also in line with the vision and strategic plan of the Bank, Africa Development Fund (ADF) IX objectives, and intervention strategy of the Bank formulated in Country Strategy Paper for 2002-2004 to intensify actions in agriculture and infrastructure sectors.

2) Objectives

The sector basis objective of the project is to contribute to the strengthening of food security. The specific objective is sustainable enhancement of income of fisheries.

3) Project specifications

The project components are: (i) Strengthen institutional capacities; (ii) Improve production and marketing; and (iii)Project management. Main achievements expected are: (i) Strengthen institutional capacity of fishing operators, NGOs, fishery administration and local collectivities; (ii) Comprehensive development of 25,000 ha of water stretches and protection of 35,000 ha of watersheds; (iii) Increase national fish production to 10,000 tons/year associated with livestock (poultry, pig) production of 1,000 tons/year, and (iv)Improve infrastructures, basic equipment and services to add value to fish production.

3.3.8 Agricultural Extension Services and Farmer's Organization

(1) Role of District Office in Agricultural Extension Service

The District Office has promoted the important agricultural policy focusing on livestock and crops in the command area as below.

Table 3.3.6 Important Agricultural Policy in Bugesera District

	Important Policy	Details
1	Livestock	1. Creation of Awareness on introduction of crossbred cow: Promotion of awareness creation for introducing crossbred cow by selling Ankole Cow through sensitizing population
		2. Promotion of replacing Ankole cow with crossbred cow
2	Promotion of Important Crop	1. Maize: Target cultivated area in 2006 is 1,000 ha. 2. Rice: Target cultivated area in 2006 is 700 ha (accomplished) 3.Cassava: Dissemination of anti-mosaic virus cassava (AMVC) varieties (TM-14, and 063), and establish at least 20 ha of AMVC field in each Sector in 2006. Cuttings production on AMVC is managed by CNS under RADA allocated in Musenyi and Gashora Sectors. 4. Coffee: 360,000 coffee seedlings are distributed to the command area via District office in this September, 2006. The seedlings are raised in the five Sectors including Musenyi, Mwogo, Shyara, Ruhuha and Nyamata.

		Background of promoting the important crops: Main reason of these 4 crops is as below. (1) Good cash crop to generate income compared to other traditional food crops like sorghum, sweet potato and so on. (2) Dissemination of AMVC is urgent issue to stop mosaic virus disease of cassava in Bugesera District (3) Maize and rice grains are preserved for long time.

Source: Interviewed Result to Bugesera District by JICA Study Team, 2006

Promoting the above policy in the District, the agricultural staff stationed at the District Office is four consisting of agronomist, agriculture cooperatives, coffee crop and vet-technician. The latter two staff is seconded from OCIR and RARDA, respectively. Apart from the District Office, an agronomist is stationed at the Sector Offices, in charge of agriculture and usually covering concurrently development plan, land, house, infra and environment as well.

The function imposed to the staff in the District and the Sector Offices is mainly confined to communication and reporting from the central level to local level, planning and monitoring work, and vise versa. Thus, public extension service is extremely limited. The task work of each staff concerned is shown in Annex III, table 3.3.2.

Needles to say, one of critical constraints for their activities is lack of transportation means for monitoring of on-going farming activities in grass root level of the whole District. Beside the said public service, many NGOs are involved in various Sectors in the Study Area (See Chapter 3.4.3).

(2) ISAR Karama Station

In the Study Area, ISAR agricultural research station is located at Karama in Gashora Sector, focusing on research in the agro-ecological zone of lown than 1,400 m altitude. The overall research outline of Karama Station is summarized as follows.

Table 3.3.7 Outline of ISAR Karama Research Station

	Outline of Station	Details	
1	Research Facility and Staffing	1) Research Facility -Total research area : 1,000 ha -Grass land : 700 ha -Research field : 100 ha -Building : 100ha 2) No of Research staff: 20 staff	
2	Livestock Research	Cattle	a. Preservation of genetic resources of Ankole species
		Goat	a. Goat (for meat): cross breeding of F1 and F2 based on Alpine, Bore and Gara species introduced from abroad for distribution to local Farmer
		Fodder crop	a. Selection of promising fodder crops (8 crops) including gramineae and leguminous species (grass and tree species) b. Distribution of promising fodder crop seeds to local farmer c. Economic hey and silage making method
3	Crop Research	Haricot bean	Selection of drought tolerant variety within 90 days maturity
		Cassava	Selection of high yielding variety based on anti-cassava mosaic virus resistance, taste under Bugesera agro-climate conditions
		Sweet potato	a. Selection of high yielding promising variety based on the 8 introduced varieties from CIP. b. Selection is basically made through cross-breeding method
		Sorghum	Selection of early maturity variety within 90 days

Source: Interview survey to ISAR by JICA Study Team, May, 2006

Concerning research-extension linkage, ISAR Karama station plays an important role in disseminating research output by distributing improved seeds and on-farm trials such as Murama watershed development project under participatory approach in Nyamata Sector, but access to the farmers is quite limited.

(3) Seed Multiplication Farm by RADA

RADA has operated seed multiplication farms, National Seed Center (CNS) in Musenyi and Gashora Sectors as follow.

Table 3.3.8 National Seed Center in the Study Area

	Site	Farm Area	Target Crops
1	Musenyi CNS	35ha	-Cassava (Anti mosaic virus variety), 5 Rwf/cutting -Maize
2	Gashora CNS	14 ha	-Cassava (Anti mosaic virus variety)

Source: Interview survey to RADA by JICA Study Team, 2006

In 2007, about 8 million cuttings of cassava were scheduled to be produced in the said NSCs for distribution.

(4) Farmer's Organization

The Rwandan farming world consists of different shapes of organizations more or less institutionalized. It is associations of traditional and customary help, of the collective work groupings, of the tontines, of the cooperatives, of the inter groupings and of the unions or federations of cooperatives. The associative movement took an important size since the years 1980s and has been stimulated more after the 1994 genocide. At present, the 40 cooperatives over the 10 types are registered in the District Office as below.

Table 3.3.9 Number of Cooperatives by Sector in Bugesera District

Sector		No of Cooperatives	Type of Cooperatives									
			Grain Storage	Rice	Loan & Saving	Food Crop	Coffee	Maize Farmer	Fishery	Basket Handicraft	Livestock	Environment Coservation
1	Mareba	3	1	1	1							
2	Shyara	5	1	1	1	1	1					
3	Nyarugenge	4	1	1	1			1				
4	Ruhuha	3	1	1	1							
5	Ngeruka	4	1	1	1			1				
6	Kamabuye	1	1									
7	Rweru	3	1			1			1			
8	Gashora	4	1						1	1		1
9	Rilima	2	1						1			
10	Juru	3	1			1			1			
11	Myange	1	1									
12	Nyamata*	2	2									
13	Ntarama	1	1									
14	Mwogo	2	1								1	
15	Musenyi	2	1			1						
Total		40	16	5	5	4	1	2	4	1	1	1

Source: Bugesera District Office, 2006

Remark: Grain storage cooperatives in Nyamata refer to District and Sector level, respectively.

In this table, it is found that the cooperatives on rice are confined to the ex-Ngenda district, and fisheries in the ex-Gashora district where many lakes exist, respectively. One of the rice cooperatives interviewed in Luhuha consists of 4,315 members with 418 ha paddy fields in 2005, and sells milled rice in the local market by operating the three rice milling machines.

Meanwhile, the grain storage cooperative allocated to each Sector is newly established this year under the GOR initiatives. The idea behind the establishment of these cooperatives is based on two reasons in terms of 1) food security view, and 2) protection of producers from middlemen's buying at an unreasonably low price. In accordance with Government regulation, farmer is imposed to store 100 kg of specific crop harvest to the said cooperatives as obligation and buy the stored grains with fixed price when they need. At present, the said cooperatives collect sorghum grains from local farmers and store in either Sector or Cell Offices as storages.

3.3.9 Microfinance

(1) Microfinance in Nyamata area

There are 5 microfinance namely i) Inkingi, ii) Amasezerano, iii)Urwego Community Banking, iv), and v) Vision Finance Company in Nyamata area.

(2) Condition of the finance

Interest of loan in all institutes is configured over a range of 2.0% to 3.5% per annual2.5, and repayment period is 1year to 2 years per one million Rwf. Regarding the loan limit, the Inkingi decides it with guaranty condition as bank account remaining value and job description of applicants. The Amasezerano and the COJAD decide the loan limit up to one thousand Rwf. On the other hand the Urwego Community Banking and the Vision Finance Company do not configuer the limited cost.

All institutes make a loan to applicants with conditions as i) member of association, ii) constituent member of cooperative, iii) he/she has account in borrowing institute, iv) coming up with a guarantor and the guarantee categories for borrowing are requested as land/farmland, livestock, house and forest.

(3) Roles of the Sector and District concerning the Microfinance

Sector or District office has roles of i) to confirm adequateness of applicants or to issue necessary documents to applicants, ii) to make an accusation against defaulter or to sell debtor's property, and to solicit loans, etc.

(4) Management of the Microfinance institutes

Numbers of shareholder and capital fund for each institution are shown in the following table. Number of the shareholder is from 13 to 50 persons and the range of capital fund is from 400 to 780 million Rwf. In order to establish institute, 300 million Rwf is necessary as initial cost. In general operating funds are

borrowing from corporate stock or banks and ii is possible to borrow the fund from the BNR (Central Bank) up to 600 million Rwf.

Name	Inking	Amasezerano	Urwego Comm. Banking	Vision Finance Company	COJAD
Shareholder	13	25	17	15	50
Capital Fund (million Rwf)	400	780	490	600	420
Interest	From 2.5% to 3.0% per annual				
Loan period					

3.3.10 Marketing System

(1) Major Markets

In the Study Area, there are three primary weekly markets in Nyamata, Ruhuha and Gashora where were ex-capital of the former district, respectively. These markets handle fruit and vegetables, food grains, meat and daily necessaries including clothes, bicycle repairing and so on. Apart from these weekly markets, the livestock market mainly for cattle including small livestock is operated monthly at Mbyo in Myange Sector, and in other Sectors, small livestock is traded every Wednesday, Saturday in Nyamata, and Thursday in Rilima as well.

Table 3.3.10 Major Markets in the Study Area

	Major Market	Marketing Day	Commodities	Physical Distribution
1	Nyamata	Wednesday, Saturday	Vegetables & fruits, grains, meat, daily necessaries, small livestock	Bugesera, Kigali, Gitarama, Kibungo area
2	Gashora	Tuesday, Friday	Vegetables & fruits, grains, meat, daily necessaries	Bugesera area and Burundi
3	Gashora	Friday of first week in every month	Small livestock (Goat, sheep, chicken)	In and around of Gashora
4	Ruhuha	Tuesday, Friday	Vegetables & fruits, grains, daily necessaries	Bugesera are and Burundi
5	Mbyo	Once in every Month	Cattle and small livestock(goat, sheep, chicken)	Whole Bugesera District
7	Rilima	Every Thursday	Crop, small livestock (Goat, sheep, chicken)	In and around of Rilima Sector

Source: JICA Study Team, 2006

(2) Marketing Price and Margin

The Study Team surveyed the farm gate price and retail price in the Nyamata Weekly Market in June. The commission charge of retailer in the Market varies with type of crops, buying unit from the producers and selling unit to the consumers, thus analysis is generally difficult. Limiting to commodities in the same unit of buying and selling from producer to consumer, it ranges 5 to 500 Rwf in fruits, 10-50 Rwf in legumes, and 5-150 RwF in vegetables. In local administration, Nyamata weekly market is controlled by Nyamata Sector, which imposes 120 Rwf per each market day to tenant in the market or 6,000 Rwf per year, and pays tax revenue to Bugesera District Office. Detail is

shown in Annex III, Table 3.3.3.

(3) Marketing Channels and Estimated Volume of Major Commodities

According to Health and Public Hygiene in Bugesera District, several marketing channels on food commodities are existed in Nyamata weekly market as below. As for agricultural crops, marketing channels consist of the three comprising of a. producer directly selling in the market, b. producer selling to the retailers in the market, and c. producer selling to the middlemen from other province, and the ratio of volume flow by each channel is roughly estimated at 60 %, 25 % and 15 %, respectively. However, another channel, which is not by way of Nyamata weekly market, is rising in Ntarama Sector where vegetables are cultivated in the marshland. The producer, either belonging to farmer's association or individuals directly carries to Kicyukiro market in Kigali by bicycle or hiring pickup truck. The reason why these farmers directly sell to Kigali is due to less demand with lower sale price in Nyamata market. Coffee, sugarcane and maize marketing channels, which involve in the private companies are also independent from the said channels.

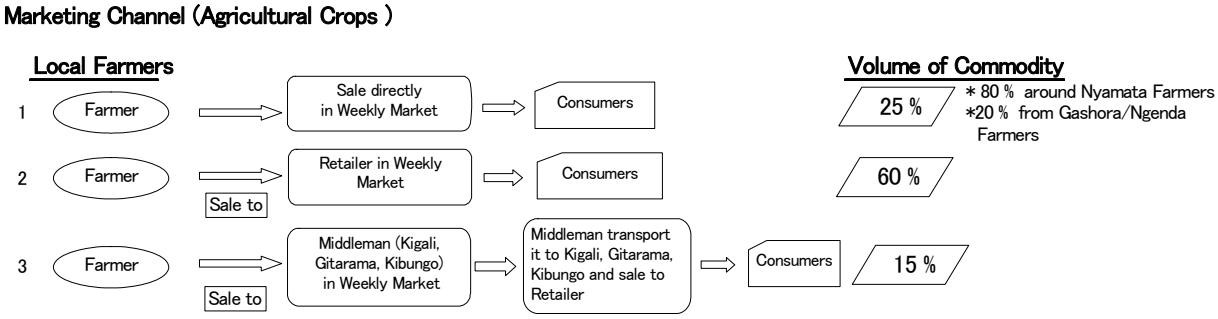


Figure 3.3.4 Marketing Channels in Nyamata Weekly Market

Food commodities such as maize and wheat flour in Nyamata Market are mostly brought from Kigali market via importation from Uganda (maize and wheat powders) and Kenya (wheat powder). Meanwhile, cassava powder is dominantly from Gitarama area via middlemen. The quantities of inflow on major agro-commodities in Nyamata Center are estimated through inflow of the cargo trucks in a year as follows.

Table 3.3.11 Quantities of Agro-commodities inflow to Nyamata Center unit: tons /Year

	Agro-commodities	Quantities inflow	Estimated Basis
1	Cassava powder	3,120	30 tons per market day via Kigali
2	Cassava tuber	2,000	19 tons per market day via Kigali
3	Sweet potato	300	Rough estimation
4	Green Maize	120	do
5	Grain maize	14	do
6	Haricot bean	567	3 cargo trucks(3.5t/cargo) per each marketing day in a year
7	Sorghum grain	224	4 cargo trucks (3.5 t/cargo) per market day during July to October (4 months harvesting months)

Source: Interview survey to Health and Public Hygiene in Bugesera District by JICA Study Team, June/ 2006

3.4 Development Activities

3.4.1 Rwandan Government

(1) Gashora Marshland Development Project

The Ministry of Defense (MINADEF) has reclaimed over 1,500ha of Gashora Sector, Bugesera District in the Eastern Province for the rice farming with funding from MINAGRI. A dike was constructed along the Akagera River from Gashora to Tabarali for a distance about 8km. The constructed dike was raised three meter above the ground and was expected to be completed by December 2006 and to cost over 1.5 billion Rwf, which was exclusively funded by the government to help drought damages in Bugesera District (Refer to Figure 3.1.1)

(2) Provision of Silos at each District

RADA through the MINAGRI will purchase the 100 silos that have 50 metric tons in storage capacity in each from Israel. The cost is estimated at US$1,422,400 equivalent to 793 million Rwf. The silos are expected to boost the people's production capacity and improve on the quality of commodities that are consumed on local markets and those to be exported. Also, it aims that the increase in production should match with measures for safe storage commodity as well as a move to stabilize prices in bad season. Silos will be located at every District's headquarters.

(3) Provision of Crossbred Cows to Bugesera District

In line with the governmental policy of one cow-one family, MINAGRI in collaboration with ISAR decided to provide 300 heads of crossbred cows and 100 heads of Ankole cows to the Bugesera District within 2006.

In order to exchange the mutual information among agencies concerned with the crossbred cows, a meeting was held on 14th July 2006 hosted by Bugesera District in the presence of JICA Study Team, Luxemburg, CARITAS/PASAB, and ISAR Karama. These agencies had a plan to introduce modern cows with their own budgets in 2006. The plans of each agency are shown as below.

Table 3.4.1 Cow Distribution Plan of each Agency in Bugesera District

Agencies	Project Components	Quantity	Remark
MINAGRI/ISAR	Provision of cows	Crosbred cows 300 heads *Ankole* cows 100 heads	
JICA Study	Provision of cows	Crosbred cows 18 heads with cow sheds, Training for recipients, and M&E	By QP
CARITAS/PASAB	Provision of materials	Fodder crop seeds & cow shed materials	27 million Rwf
Luxemburg	Provision of cows	Supporting by micro finance Crosbred cows 25 heads	

(4) Extension of Improvement of Cooking Stove by MINADEF

MINADEF has disseminated the improvement of cooking stove to the Bugesera District in cooperation of the Bugesera District. Since the middle of 2006, demonstration of the improved cooking stove has been conducted at each Cell by his own budget.

(5) Integrated Participatory Watershed Management Project in Murama by ISAR

The project gives boost to the government's current policy of protection, conservation and promotion of environment in Rwanda. The project was planned and executed by the local population in Murama village 7km from Nyamata in a participatory model with ISAR as a facilitator. The project was started in middle of 2005 and completed in middle of 2006. Total cost is estimated at 82,707,500 Rwf financed by Rwanda government. The project components were shown as below.

- Farm Pond: for small scale irrigation in dry season (5 numbers, 10m x 10m, depth in 1.5m)
- Construction of Contour Band with 25m horizontal intervals.
- Check Dams at road side ditch to prevent the soil erosion and water was introduced to farm pond.
- Demonstration Farm for Agro forestry (Moringa and Neem plantation)
- Animal Husbandry: provision of improved breed goats and its training for maintaining goats, and artificial insemination, etc.

The project was just completed the middle of 2006 and lessons learned from the project served as a useful reference for the formulation of the Pilot Project under the JICA STUDY.

(6) Rainwater Harvesting Project by MINITERE

The proposed project site, Rilima, is located about 55 km south of the capital city, Kigali. The project will be implemented under overall supervision of the Ministry of Land, Environment, Forestry, Water and Natural Resources (MINITERE) in cooperation with Bugesera District.

MINITERE has recognized the need to pilot and disseminate appropriate water harvesting (WH) techniques to supplement the indigenous practice to protect crops failure against moisture stress in moisture deficit parts of the country. The water harvesting effort has to be integrated with natural resources protection and management for better and sustainable results.

Communities in the proposed project area are vulnerable because the recurrent droughts have depleted the household assets and their ability to withstand shocks. Traditional agriculture-based livelihood systems no longer provide adequate resources for household needs in most years. The natural resources have been degraded and no longer support the growing population. The planned project attempts to address the root causes of the problem through protection of natural resources degradation and water harvesting. Based on the severity of water shortage and natural resources degradation, Rilima Sector is selected for piloting of water harvesting and natural resources protection pilot project. Implementation of the project is under preparation.

(7) Construction / Rehabilitation for School Sanitation in Bugesera

In line with the Performance Contract, Bugesera District intends to put up nursery schools; adult education centers at each Cell, and also supports education activities in primary, secondary, and technical institutions in the District. Sanitation in schools had deteriorated, causing health threats to

hundreds of school children so that the District planned to spend Rwf 10 million on the building and rehabilitation of toilet facilities in fifty-two primary schools during the June-August holidays in 2006.

3.4.2 Bilateral Assistance and International Agencies

(1) Luxemburg: Development of the Rural Economy in Bugesera

Objectives of development are to increase, to secure and to vary the agricultural production and to improve the incomes of the farmers in Bugesera. 240 ha of land will be exploited by modernized irrigation systems, the productivity of the agricultural system of 750 members of agricultural promotion groups will be increased, and the agricultural economy of the Bugesera will be integrated better in the national economy (see Figure 3.4.1). Three main works will be pursued:

- Around some lakes will be developed progressively by irrigation of pumping and aspersion.
- Beneficiaries of the peasants / their groupings will be organized / enhanced.
- Two municipal markets at Nyamata and Rilima as well as two important farming roads will be constructed.

The budget of the Luxemburg contribution is of 8,541,500 EURO as shown in the table below.

Table 3.4.2 Budget of the Financial Contribution of the Luxemburg Grand Duchy

	Components	Total	2003	2004	2005	2006	2007
1	Human resources	2 486 000	830 800	493 800	443 800	358 800	358 800
2	Facilities & materials	730 000	80 000	280 000	180 000	190 000	0
3	Works	4 221 500	894 000	1 070 000	1 502 500	660 000	95 000
4	Formation	205 000	29 000	67 000	50 000	44 000	15 000
5	Follow-up & Assessment	205 000	45 000	15 000	60 000	15 000	70 000
6	Other contributions	694 000	70 000	211 000	131 000	131 000	151 000
	Total en EURO	8 541 500	1 948 800	2 136 800	2 367 300	1 398 800	689 800

Due to the decentralization policy and territorial reform, schedule was delayed by about 3 years and the implementation has started from the beginning of 2006.

(2) Egypt: Sustainable Water Resources Management for Bugesera

Rwanda is one of the 10 Nile Basin countries and member of the free trade agreement within the COMESA. In the context of good relationship and cooperation between the Arab Republic of Egypt and Republic of Rwanda, the Government of Egypt and Republic of Rwanda agreed to send 2 Egyptian experts in irrigation to study the Bugesera area and make primary design for the irrigation system and capacity building for the Rwandese counterparts. C/P agency is MINITERE (Ministry of Lands, Environment, Forestry, Water and Mines). Main objectives are (i) Help identify suitable design for Bugesera irrigation system, (ii) Explore ways for local communities to participate in irrigation management, (iii) Capacity building for the Rwandese counterparts

Bugesera District requested to concentrate on 8 Sectors, which are Gashora, Rilima, Kamabuye, Mwogo, Rweru, Nyarugenge, Ngeruka, and Juru. Field survey was executed during 3 October 2005-7 July 2006 about 7 months and A pilot area was chosen at south west of Bugesera right hand side

Akanyaru River at 5 places with area of approximately 600ha. Pilot project sites are identified but implementation schedule including finance has not been known but it should be noted to avoid duplication with the Pilot Project proposed by the JICA STUDY.

(3) AfDB: Project to Support Agriculture Development in Bugesera

The objectives are to increase agricultural production in Bugesera District through development of wetlands, protection of watersheds, agriculture development and capacity building of farmers. The project components are described as below. Total cost is estimated at 12.4 million US$ (AfDB:10 million US$, GoR:2.4 million US$). The project will be 5years but the budget for detail design has not been allocated yet.

1) Physical development and economic development of natural resources

Mitigate drought effects in Bugesera District through water resources and agriculture developments for irrigation of watersheds and slopes and secure agriculture productions during dry seasons. Proposed irrigation area is about 650 ha

- Water and soil conservation through developments of slopes of these watersheds and lakes
- Facilitate the marketing of agricultural products through rehabilitation of rural trails, construction of market places and store houses. These developments pertain to the three Sectors in Bugesera District and are particularly concerned with Mwesa Valley and the lakes of Cyohoha Sud, Gashanga, Kidogo, Rumira and Mirayi

2) Agriculture Development

It aims at increasing food production through: (i) creation of irrigated area, (ii) Organisation and training of producers, (iii) dissemination of improved seeds; (iv) promotion of the techniques to step up production and water and soil conservation, and (v) extension of processing, water and soil conservation techniques.

(4) FAO: Production and Supply of Cassava Stems to Extremely Poor Households in Bugesera

The objective is to assist the GoR in fighting against food insecurity in Bugesera by supporting extremely poor households to rehabilitate their cassava plantations for better prevention, preparedness and coping with frequent drought encountered in the District. The project components are described as below.

- Evaluate the extreme rural poverty in Bugesera and define prioririties for rapid intervention
- Produce 24 millions of cassava stems from varieties resisting against Cassava mosaic

Supply the mosaic virus disease resistant cassava stems to 12,000 extremely poor households in collaboration with the Catastrophy Managing Coordination of the Office of the Prime Minister, MINAGRI, Province Authorities and NGO partners of FAO. ISAR Karama will produce cassava stems.Expected results at the end of the project are;

- Establishment of production contracts of cassava stems from varieties resisting against mosaic virus:
- Training of farmers on techniques of cassava stem multiplication
- Production of 24 millions of cassava stems without mosaic virus
- Cultivate around 2,400ha, on average 0.2 ha per household
- The 2,400 ha have the potential production of around 24,000 tons of fresh cassava (10 tons/ha).

Activities to be carried out are the following;

- Collect and analyse the existing documentation on extreme poverty and the background of drought in Bugesera District
- Quick survey on extreme rural poverty in the District so as to specify the concerned categories, affected areas, the number of households, indicators to be used, solidarity traditional mechanisms, livelihood coping strategies and priorities for rapid interventions.
- Together with ISAR identify sweet and bitter cassava varieties needed in the area
- Together with ISAR and RADA (National Service of Seeds) identify associations or rural groupings of Bugesera to be able to produce cassava stems. Spotting the sites for production
- Training for producers conducted by ISAR and RADA (National Service of Seeds) researchers
- Establish production contracts between SNS, FAO and the producers.
- Purchase stems from ISAR (one million of stems of 30 cm), transport to the multiplication sites
- Supervise activities plantation and maintenance of wood park
- Purchase of the first cutting (24 millions of stems) and supervise the distribution at local level, beneficiaries coming themselves to get stems from the multiplication sites that will have to be decentralised.

(5) IFAD

There are 3 projects supported by International Fund for Agricultural Development (IFAD) not only Bugesera District but also countrywide. Summary of the projects are shown as below.

1) Support Project for the Strategic Plan for the Transformation of Agriculture (PSTA)

The objective of the project is to support GoR in implementing its strategy to affect a gradual shift from subsistence agriculture to market-based agriculture. The project will provide support for farmers' organization, the GoR, the private sectors and other partners to put in place technical innovations such as embocagement, or the use of living hedges around household plots, as well as dairy production, and intensified rice production and raise the quality of services provided to farmers.

Plans call for pilot programs in watershed protection, livestock development, marshland cropping and strengthening of the research and extension system. The project will also help lay the groundwork for the agriculture sector program to be launched in 2008.

Table 3.4.3 Outline of IFAD Support Project for PSTA

Total Cost	IFAD Finance	Duration	Direct benefiting	Co financing	Partners
Us$20.1M	Loan for US$8.2M Grant forUS$ 200,000	2006-12	20,000HH in former District of Budaha , Bukonya, Karaba, and, Ngenda	United Kingdom of Great Britain, Northern Ireland and the Netherlands	MINAGRI and United Nations Office for Project Services

2) Rural Small and Micro enterprise Promotion Project Phase II

An aim of the project is to strengthen rural micro enterprises of individuals or associations in order to modernize them, improve their management and create jobs. Priority is given to disadvantaged groups such as women, young people, orphans, landless peasants and families affected by HIV/AIDS.

Table 3.4.4 Outline of IFAD Rural Small and Micro Enterprise Promotion Project Phase II

Total Cost	IFAD loan	Duration	Direct benefiting	Partners
Us$17.6M	US$14.9M	2004-2011	10,000HH	Copecya and Union of People's Banks of Rwanda (UBPR)

3) Smallholder Cash and Export Crops Development Project (PDCRE)

The project is intended to increase incomes for 28,000 poor rural farmers in former four provinces by improving their tea and coffee yields and also contribute to privatizing one of the state-owned industrial plantations and redistributing it to 4,000 poor smallholders householders, of whom some 2,000 are headed by women. The main objective is to assist coffee and tea growers in setting up cooperatives producing and processing Arabica coffee and high-quality tea

Table 3.4.5 Outline of IFAD Smallholder Cash and Export Crops Development Project

Total Cost	IFAD loan	Duration	Direct benefiting	Co financing	Partners
Us$25.1M	US$16.3M	2003 -2011	28,000HH in former provinces of Gikongoro, Kibuye, Kibungo, and Kigali-Ngali	Arab Bank for Economic Development in Africa (BADEA) and local banks	OCIR The', OCIR Café', Twin Trading Ltd., BNR, BRD

Source: Pamphlet of IFAD in Rwanda

(6) WB / IDA: Rural Support Project

The Rural Support Project is to support a long-term poverty reduction program developed by the GoR with the support of the International Development Association (IDA) and World Bank. The program is planned to cover 14 years and divided into 3 phases. Phase 1 was started in 2001 and almost 1 year behind the schedule due to the recent decentralization policy and territorial reform.

- Phase 1 (2001-2005): Building of the institutional and technical capacities, called as the Rural Sector Support Project (RSSP)
- Phase 2 (2006-2011): Acceleration of the pace of intensification and commercialization of agricultural production
- Phase 3 (2012-2017): Utilization of the stimulus resulting from faster growth in the rural areas and extend the productive employment of available resources.

Table below shows the RSSP Sub projects implemented until the end of 2005 in Bugesera District.

Rehabilitation/expansion of small dams with irrigation facilities at Kiruhura, Rwabikiwano, and Ruvubu marshlands in Ngenda Sector and intensification project of maize growing at Hilly area in Nyamata, Ngenda Sectors had been implemented. At present Cooperatives have been established and operated actively at each site but extension services by related agencies concerned are very poor.

Table 3.4.6 Summary of the RSSP Sub projects in Bugesera District until 2005 (unit:Rwf)

Code	Period	Sub project title	Type	Sectors	Grant amout	Disbursed
A27/4	1/4/04-1/4/05	Technical support ISANGANO (extension	Extension	Nyamata	3,521,460	2,823,636
A15/4	1/4/04-1/3/05	Technical support IZMGM (extension programme)	Extension	Ngenda	3,464,380	3,364,882
A91/4	1/9/04-1/1/05	Emergency support to the maize intensification project in Ngenda	Extension	Ngenda	4,607,000	4,517,350
A90/4	1/9/04-1/1/05	Emergency support to the maize intensification project in Nyamata	Extension	Nyamata	5,870,000	3,860,000
A01/4	25/2/04-1/1/05	Intensification of maize growing in Ngenda 2004	Extension	Ngenda	8,257,407	8,257,407
A81/4	25/2/04-1/1/05	Intensification of maize growing in Nyamata District of 2004	Extension	Nyamata	13,828,065	13,828,065
-	'-4/2/05	Nkanga Market site upgrading :study (2 phase)	Market	Gashora	1,130,308	
112/5	16/6/05 -31/12/05	Intensification of maize growing in Nyamata marshlands-AGRO CONSULTANTD 2005	Extension	Nyamata	5,880,490	4,589,600
112/5	16/6/05 -31/12/05	Intensification of maize growing in Ngenda marshlands-AGRO CONSULTANTD 2005	Extension	Ngenda	4,946,260	3,987,500
152/5	19/9/05 -30/10/06	Training in construction & maintenance of agricultural facilities in Kiruhua, Rwabikwano, Rubuvu marshlands 270ha	Extension	Ngenda	27,527,000	4,588,840
					79,032,370	4,588,840

Source: MINAGRI/Rural Sector Support Project Office

(7) Others

1) Millennium Village Project supported by UN with Columbia University

The GoR selected the Millennium Village in Kagenge Cell, Mayange Sector as a pilot area in August 2005. The project prioritized agricultural development to fight hunger that hits the area, health to fight malnutrition-related diseases, HIV/Aids and malaria, education and water supply by digging boreholes in the District. An implementation of the sub projects has been started in February 2006 for the 5 years project. The amount of budget in agricultural interventions is allocated in the amount of about 70,000US$ this year.

2) Rehabilitation of the Main Road from Kicukiro to the Boundary of Burundi

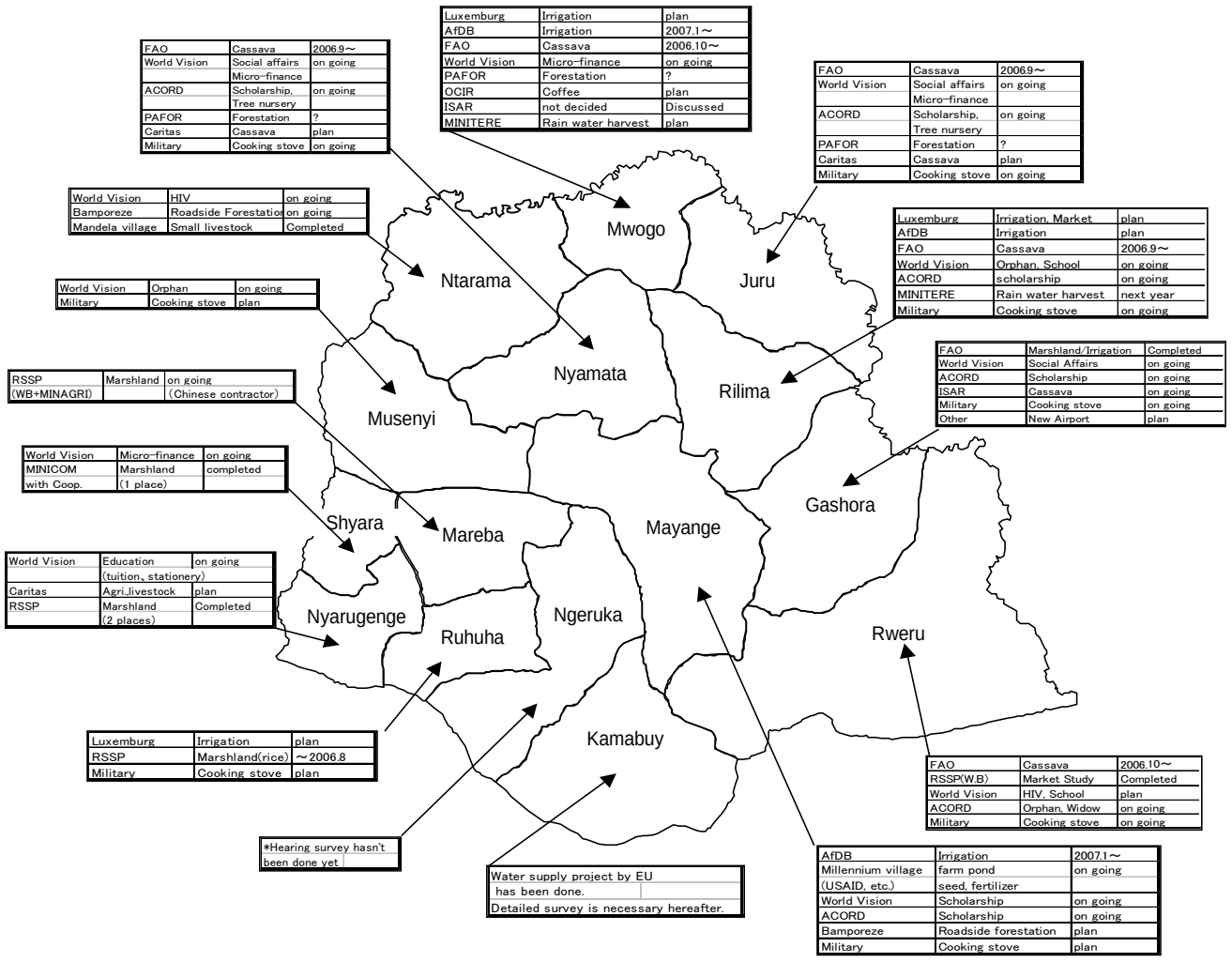
Refer to Chapter 3.2.3, (2) Road Rehabilitation Program

3) Water Supply Project in Bugesera District

Refer to Chapter 3.2.4, (3) Water Supply

3.4.3 NGO

The number of local and international NGO that have conducted activities in Bugesera District is about 25 according to the Action Plan in 2006, CDP in 2005 of Bugesera District and survey by Study Team.Their sectors are as follow. Many NGOs are targeting vulnerable people like HIV patients,



Other Information

*EU : Water supply project is done in all sectors in former Nyamata and Gashora district (has already beendone in former Ngenda district)

*IFAD : Rural development program is planned in former Ngenda district.

*Luxemburg : 2 roads maintenance and 2 markets establishment are planned besides irrigation project.

*RSSP(World Bank) : Technical support (extension program) and maize intensification project were done in former Nyamata and Ngenda district (the location is not clear).

*MINAGRI : Tree seeds distribution for nursery establishment（in all sector? Confirmation is necessary）

*OPEC, Saudi Fund : Kigali-Bugesera asphalt road project is under implementation.

Figure 3.4.1 Activities of Foreign Donors and NGO's in Bugesera District

victims of Genocide such as widows and orphans etc., and supporting them in various sectors like agriculture, animal husbandry, education, health, income generating activities etc. Other donor's activities in Bugesera district is shown in Figure 3.4.1 and Annex III, Table 3.4.1.

Table 3.4.7 Main Activities of NGOs in Bugesera District

Name of sector	Name of NGOs	No of NGOs
Agriculture	Bamporeze, Caritas, FRAD, SSS(Selected Seed Service), World Vision, ZOA	6
Animal Husbandry	Caritas, IBUKA, World Vision, ZOA	4
Reforestation	ACORD, Bamporeze, Caritas, PAFOR, RDO(Rwanda Development Organizetion), Vi-Life, ZOA	7
Microfinance	CRATER RIM, INTAMBWE, INKINGI, SERUKA, URWEGO, World Vision (Vision Finance Company S.A)	6
Income generation	Bamporeze, SERUKA	2
Education	ACORD, AAA(Agro Action Allemande), Caritas, Compassion International, IBUKA, Save the Children, World Vision	7
Health	Bamporeze, Catholic Sisters, Compassion International, Save the children, Trust and Care, Vi-Life, World Vision, ZOA	8
Habitat	IBUKA, World Vision	2
Water	World Vision, ZOA	2
Other	AVEGA Agahozo, Food for Hunger, Haguruka, RDA, Vi-Life(improved cooking stove)	5

Source: Action Plan in 2006 and CDP in 2005 of Bugesera District and hearing by JICA Study Team from 15 Sector offices and NGOs staff

In agricultural and animal husbandry sector, distribution of seeds and goats etc. are typically conducted and accompanied by training or enforcement of recipient associations. Modern cow distribution is under trial by some NGOs like World Vision and Caritas (Caritas is going to support fodder crop production and cow shed construction). Micro-finance managed by some NGOs also helps farmers. Farming techniques are sometime trained in ways to conserve soil fertilities like manure making, terracing etc. In other case for example, FRAD is concentrating in assistance of a rice-farming cooperative in former Ngenda district area. The cooperative consists of 90 associations, 5,436 members (2006), and using 6 swamps (Rwabikwano, Gatare, Kiruhura, Rububu, Nyaburiba, and Kibasa)

To improve income generation besides agriculture and animal husbandry, some activities are assisted such as soap making, carpentry training (Bamporeze) and bee-keeping (SERUKA). Environmental activities that the Bugesera District is strongly promoting are reforestation sector and many NGOs are participating in. To reduce consumption of firewood, improved cooking stoves are also introduced by Vi-Life.

The activities in education sectors are such as scholarship, donation of stationary, desks, uniform etc. Moreover World Vision is conducting school constructions. In health sector, typical activities are related to AIDS and many NGOs support people infected with HIV and conduct prevention campaign while there are some other activities like supporting health center and nutrition center, distribution of mosquito coils against malaria etc. In water section, there are activities such as water tank foundation at school (World Vision) and shallow well construction (ZOA).

Some NGOs have their office in Bugesera. World Vision is one of the biggest NGOs assisting Bugesera disitrict and has 3 offices in Nyamata, Ruhuha and Rilima, respectively to implement its program named ADP (Area Development Program) as well as 1 office in Nyamata for the other program named DAP (Development Assistance Program). Moreover it has 3 offices of its branch

company "Vision Finance Company S.A." next to the ADP offices. Caritas has also its office in Nyamata and FRAD has one in Ruhuha. Bamporeze is using rooms of Nyamata, Gashora and Ruhuha Sector offices.

One of the problems of NGOs activities is harmonization or collaboration issue. Some NGO's activities are collaborated with each other but few. For example, Bamporeze and RDO (Rwanda Development Organization) work together in reforestation sector. The Project "PASAB" conducted by Caritas from 2006 to 2009 is collaborated with World Vision and Luxemburg project. However, such cases are still limited. Another problem is budgetary limitation. For example, fund of Bamporeze financed by UNICEF for orphan assistance is until Dec. 2006, so it has to look for next donor to continue activities. World Vision is also in trouble of finance and decided to reduce main target area from current 15 Sectors.

3.5 CURRENT SITUATION OF BUGESERA DISTRICT

3.5.1 Financial Situation

(1) Medium Term Expenditure Framework (MTEF) in Bugesera District

The table below presents MTEF in Bugesera District from 2006 to 2008. Expenditures show respectively 1.44 billion Rwf in 2006, 1.51 billion Rwf in 2007 and 1.59 Rwf in 2008, and annual increased rate of expenditure is 5% per year.

Table3.5.1 MTEF in Bugesera District from 2006 to 2007 (unit: Rwf)

MTEF 2006 - 2008 BUGESERA DISTRICT	2006	2007	2008
	1,441,237,462	1,513,299,335	1,588,964,202
01. ADMINISTRATION MANAGEMENT AND COORDINATION OF SERVICES	28,091,213	29,495,774	30,970,563
02. PLANNING AND COORDINATION OF PROJECTS	18,223,442	19,134,615	20,091,345
03. DEVELOPMENT OF ECONOMIC INFRASTRUCTURES AND ENVIRONMENT PROTECTION	16,062,667	16,865,800	17,709,090
04. DEVELOPMENTOF SERVICES, AGRICULTURE AND LIVESTOCK	28,370,782	29,789,321	31,278,787
05 EDUCATION ,SOCIO-CULTURAL DEVELOPMENT OF THE POPULATION	660,532,087	693,558,692	728,236,626
06 GOOD GOVERNANCE, GENDER AND SOCIAL AFFAIRS	371,748,135	390,335,541	409,852,318
07 PROMOTION OF HEALTH AND SOCIAL WELL-BEING	300,417,402	315,438,272	331,210,186
08 FINANCES AND MOBILISATION OF RESOURCES	17,791,734	18,681,321	19,615,387
	100%	105%	110%

Sourced by Bugesera District in 2006 december

(2) District Development Budget in Bugesera District from 2007 to 2009

The 3 years District Development Budget in Bugesera District from 2007 to 2009 is based on the budgets of GoR, Donors, NGOs and District itself as the table below shows. The development budgets are respectively 15.9 billion Rwf in 2007, 20.8 billion in 2008 Rwf and 22.4 billion Rwf in 2009. It comes out that budgets allocated to "Education, Youth, Sport and Entertainment" and "Good Governance" tend toward gradual increase whereas those allotted to "Health, Gender, Family Promotion and the Protection of Children's Right" tend toward decrease. Through the 3years, ratio of the MINAGRI budget shows 4% to 5% but the CDF budget is remarkably reducing from 26% in

2006 to 12% in 2009.

Table 3.5.2 Bugesera District Development Budget from 2007 to 2009 (Unit: million Rwf)

	2007				2008				2009			
	CDF	MINAGRI	Others	Total	CDF	MINAGRI	Others	Total	CDF	MINAGRI	Others	Total
PLANNING, ECONOMIC DEVELOPMENT AND LABOUR PROMOTION	388	632	2,991	4,011	670	890	2,430	3,990	310	1,063	3,130	4,503
INFRASTRUCTURE,LAND, TOWN MANAGEMENT AND SETTLEMENT	2,537	-	5,370	7,907	172	-	7,169	7,340	120	-	7,008	7,128
EDUCATION,YOUTH,SPORT AND ENTERTAINMENT	120	-	1,601	1,721	260	-	7,311	7,571	276	-	7,921	8,197
GOOD GOVERNANCE	1,085	-		1,085	1,245	-		1,245	2,025	-		2,025
HEALTH,GENDER, FAMILY PROMOTION AND THE PROTECTION OF CHILDREN'S RIGHTS	48	-	1,117	1,165	120	-	577	697	0	-	577	577
Total	4,178	632	11,080	15,889	2,467	890	17,487	20,843	2,731	1,063	18,636	22,430
Ratio (%)	26%	4%	70%	100%	12%	4%	84%	100%	12%	5%	83%	100%

Source: Planning Unit in Bugesera District January, 2007

3.5.2 Performance Contract and Action Plan (A/P) in 2007

A draft Performance Contract was formulated in consultation with the District representative and donors and NGOs operating in the Bugesera District, based on their annual activity plans and budgets. Then, considering the budgetary allocation from concerned ministries including MINAGRI, MINITERE, etc. and CDF, the Performance Contract has been finalized under the leadership of District Mayor. The table below summarize the Performance Contract of Bugesera District in 2007. It consists of 4 administrative services and was estimated at 12.2 billion Rwf. Refer to Annex I for further details.

Table 3.5.3.Summary of the District Performance Contract in 2007 (Unit: million Rwf)

Services	Contents of Services	Budget	Fund Sources
1.Good Governance	Addressing Requests from the Population, Fight against Justice, Security, Community-based Activities (CBAs), Unity & Reconciliation, GACACA, TIG, National Women Council, Register, Assistance to Vulnerable People	832	District, NURC, GACACA Institution, TIG, NWC, Rwanda Partners, RIEPA, CNF, Sectors, Civil Society, FARG, World Vision
2. Economic Development	Erosion Control, Valley and Marshland management, Multiplication of Improved Seeds, Increasing Fruit Trees, Coffee Trees, and Crop Production, Crop Storage, Livestock, Animal Husbandry, Bee Keeping, Fish Farming, Promoting the Private Sectors, Promoting Cooperatives, District Funds, Small Agricultural Processing Industries, Handcrafts, Roads, Drinking Water Supply, Economical Use of Water, Energy, Settlement, Irrigation, Markets, Land, Environmental Measures	9,168	CBAs, CDF, Millennium, World Vision, WFP, PRODEV BUGESERA, MINAGRI, ADB, FAO, PASAB, Ruhuha Catholic Parish, District, CARITAS, CNLS, MINITERE, PAFOR, OCIR/MINICOM, FAO, JICA, RADA, RARDA,SERUKA, RDO/TROCAIRE,etc.
3. Social Affairs	Health Insurance Scheme, Family Planning Program, Voluntary HIV-AIDs Counseling and Testing, Anti-Aids Clubs, Health Centers, Birth Delivering at Health Centers, Fighting against Malaria, Gender and Family Promotion, Public Hygiene, Education for All, Technology in Schools, Nursery Schools, Adult Literacy Centers, Youth Vocational Training Centers, Youth Funds, Promoting Culture, Fighting against Aids in Schools	2,146	District, EGPAF, CNLS, Akarere, MOH, Millennium, MAP, PNILP, NWC, MINITERE, CBAs, MINEDUC, BAD, World Vision, Rafiki Foundation, Primary School, UNICEF, CARE, ADEPR, NCA, Cells, GRUNHEME, NCV, CNLS, Private Sector
4. Justice	Laws, Implementing Courts Decisions, Gacaca, TIG, Finding suitable office for the District Courts	109	District, MINIJUST, MINITERE, GACACA, TIG, Supreme Court
Total		12,225	

The "Economic Development Components" in Performance Contract pertaining to Agricultural and Rural Development consist of erosion control for cultivation land, marshland and valley development, construction of farm ponds in hilly terrain, multiplication of improved seed such as rice, cassava, soybean, maize, coffee, as well as increasing the number of fruit trees, etc. which have given priorities. Further, introduction of modern cows, bee keeping, rabbit rearing, promotion of handcraft for life style improvement as well as income generating activities have been proposed. As regards JICA Study support, the Contract mentions increase of rice production and introduction of modern cow under implementation. In accordance with the District Development strategy, the above-mentioned projects should be considered as candidate project components of Pilot Project. (Detail is shown in Annex III, Table 3.5.1)

The Action Plan (A/P) in 2007 was prepared by the District Planning Unit in cooperation with development partners in Bugesera. In these developments, a workshop had been held from 8 to 10 February 2007 at Nyamata Café conference room bringing together all Directors of District Units, Sector Executive Secretaries and development partners operating in Bugesera District to formulate the log frame of 2007 A/P within EDPRS and Performance Contract frameworks. The workshop was co-funded by JICA Study Team and GTZ and through the 3 days workshop, the 2007 draft A/P was formulated by participants basing on their respective assignments.

3.5.3 Current Situation on CDF

17 CDF projects were prepared in 2006 by Bugesera District, but Nyamata Center Construction Project, which was one of the CDF was not passed through the NTB (National Tender Board) criteria due to defective implementation plan. In addition, Gashora Guest House Construction Project was canceled as the contractor had deserted construction works. Total amount to implement the projects was 1,067 million Rwf, or about 171% of the initial estimated budget cost. The CDF projects in 2006 are summarized in the table below.

Table 3.5.4 Summary of the CDF Project for Bugesera District in 2006 CDF

No	Projects	Sectors for implementation the Project	Amount (Rwf)
1	Electricity supply in Nyabagendwa - Gashora	Gashora and Rilima	295,144,086
2	Electricity supply in Gasenga, Murambi, Staff village, Rugarama and commercial quarter in Nyamata Centre	Nyamata	195,551,223
3	Construction of 17 bridges in the District	Ruhuha, Mareba, Shyara and Nyarugenge	14,683,200
4	Construct the fence of Ruhuha market and 19 shops	Ruhuha	87,902,940
5	Construction of Sector office	Kamabuye	26,518,600
6	Construction of Sector office	Rweru	26,321,000
7	Construction of Sector office	Ngeruka	25,974,000
8	Construction of Sector office	Musenyi	25,974,000
9	Construction of Sector office	Mwogo	26,321,000
10	Installation of solar energy at Sector Offices	Rilima, Juru, Ntarama and Mayange	27,994,000
11	Installation of solar -energy at Sector Offices	Ngeruka, Rweru, Mwogo and Musenyi	27,397,100
12	Installation of solar energy at Sector Offices	Shyara, Nyarugenge, Mareba and Kamabuye	27,994,000
Drought Coping Framework			
13	Erosion control terraces I	Ngeruka, Rilima and Nyamata	77,974,678
14	Erosion control terraces II	Rweru, Kamabuye and Mayange	76,859,880
15	Tree planting (HIMO)	Ngeruka, Mayange, Nyarugenge, Nyamata and Musenyi	105,240,000
	Total Amount		1,067,849,707

3.5.4 Progress of DDP Formulation

In cooperation with MINALOC and Rural Development Clusters, the District Development Plan (DDP) is under elaboration since October 30th 2006. For Bugesera District, the DDP will jointly be prepared by MINALOC –GTZ and the Planning Unit of Bugesera District. To formulate the DDP, a socio-Economic survey at Cell level was carried out at the end of December 2006 and Participatory Research Appraisal (PRA) has been executed from the middle of February 2007 at Cell level. According to the roadmap for the DDPs elaboration, DDP was formulated in May 2007. Road map to formulate Bugesera District is shown in Annex III, Table 3.5.2.

3.6 Constraints and Potentials for Sustainable and Rural and Agricultural Development

3.6.1 Baseline Survey

(1) Survey Method, Schedule and Contents

1) Introduction

JICA Study Team sounded out a joint survey of the baseline survey with GTZ which had planned to carry out a whole household and Sector/Cell office interview surveys in Bugesera District, in collaboration with NIS, MININFRA, MINECOFIN, and UNICEF, and basically agreed with each other in late June, 2006. JICA Study Team participated in the kick-off workshop on the explanation of

GTZ baseline survey held in Bugesera on June 28, for grasping the whole survey scheme. Moreover, reviewing the questionnaires for household and Sector/Cell levels drafted by GTZ, JICA Study Team proposed additional survey items from the view of JICA Development Study. GTZ agreed with JICA proposal to conduct together with GTZ baseline survey on July 17, 2006. The method and Results on the baseline survey are as follows.

2) Survey Methods and Schedule

Eight enumerators were recruited in each Cell for the baseline survey and briefed prior to commencement. Household interview was done based on Nyambakumi basis, an informal inhabitant group at a grass root level under the Cell office which comprises of around 30 households. Simultaneously, the interview survey on Sector and the Cell office level were made as well. Collected questionnaires were computerized by spending two months with 100 operators in the National Institute of Statistics (NIS) and examined via 10 days intensive workshop fewer than 20 participants including GTZ, NIS, Sector Heads and Planning Div of District Office. The time schedule on the baseline survey was vastly delayed with more than two months due to unexpected time-consuming operation for data input. Thus, the final output of monograph on Bugesera District in English version was scheduled in late January 2007. Detail of time schedule is shown in Annex III, Table 3.6.1

3) Contents

(a) Household Level Questionnaires

The questionnaires drafted by the GTZ comprises the 10 categories as follows.

Table 3.6.1 Major Survey Categories on Household Level

No	Survey Category	No	Survey Category
0	General Situation of Households in Nyambakumi	6	Small Scale Investment and Loan
1	Education	7	Employment
2	Health	8	Communication within the Household
3	Social Affairs	9	Housing and Settlement
4	Agriculture	10	Vulnerable Group
5	Livestock		

Source:GTZ, 2006

Based on the original questionnaires contents, JICA Study Team proposed additional survey items based on the view of JICA Development Study and summarized as below. In this process, the 149 questions were supplemented over the three categories including newly created, “Perception on Environmental Protection”.

(b) Sector and Cell Level

The questionnaires consists of the three categories of education, health and water for the Sector levels. Meanwhile the questionnaires for the Sector/Cell level originally consisted of the five categories (Agriculture and Livestock, Infrastructure and Trade, Transporting of goods and communication, Number of Roads, Association and Cooperatives). JICA Study Team proposed the six additional questionnaires and accepted by the GTZ.

(2) Overall Results

Overall raw Excel data converted from the SPSS file was submitted to the JICA Study Team on late November, 2006. Reviewing the Excel data, some of the questionnaires proposed by JICA Team in household level was mistranslated into the local language and found as no sense in results. Meanwhile the collected questionnaire on Sector/Cell level was found in many unfilled questions, specially concentrated on the questions related to agriculture and livestock sectors. Considering the time constraints on analysis of baseline survey results, these raw data prior to finalizing data process was forced to use for analysis of constraints and potentials on Bugesera District, and of which details were discussed in the next chapter.

3.6.2 CONSTRAINTS AND POTENTIALS FOR SUSTAINABLE RURAL AND AGRICULTURAL DEVELOPMENT

(1) Current Situation

1) Demography

The population of Bugesera in 2006 is approximately 270,000. The average population density of the district is 205 persons/km2 ranging from 91 persons/km2 in Rweru and 396 persons/km2 in Ruhuha Sectors (Table 3.6.2). In the south western part of the district surrounded by the Cyohoha North and South Lakes and the Akanyaru River, the population density is relatively higher than the other areas. Due to the existence of a prison, the population density of Rilima is also high.

Table 3.6.2 Population and Population Density of Each Sector (2006)

New Organization		Area (km^2)	Population			Population Density Persons/km^2
UMURENGE SECTOR	AKAGARI CELL		Male	Female	Total	
GASHORA	5	100.4	7,381	8,287	15,667	156
JURU	5	83.0	9,299	10,440	19,739	238
KAMABUYE	5	104.9	8,443	9,440	17,883	171
MAREBA	5	58.1	8,991	10,635	19,625	338
MAYANGE	5	131.0	7,211	7,577	14,788	113
MUSENYI	4	86.4	10,084	11,329	21,413	248
MWOGO	4	53.8	5,768	6,728	12,497	232
NGERUKA	5	95.7	12,333	14,279	26,612	278
NTARAMA	3	101.4	6,970	7,392	14,361	142
NYAMATA	5	87.2	8,990	10,498	19,488	224
NYARUGENGE	5	48.0	7,245	8,520	15,765	328
RILIMA	5	84.9	16,883	11,215	28,098	331
RUHUHA	5	44.9	8,099	9,693	17,792	396
RWERU	6	221.3	9,477	10,700	20,177	91
SHYARA	5	33.0	4,807	5,400	10,206	309
Total 15	72	1334.0	131,979	142,134	274,113	205

Note: 1) Population at each Sector was calculated based on Census 2002 and estimated increase.
1) Area at each Sector is estimated by JICA Study Team

2) Land Resources

The population of Bugesera largely suffers from the poor accessibility to lands. Currently, approximately 30% of households are landless and another 40% owns less than a half-hectare (See Annex III, Figure 3.6.1). The situation is particularly serious in Gashora and Nyamata Sectors; approximately one-half of the population is landless. Consequently, renting and borrowing farmlands are largely practiced. On average 19% of the population rents lands, while 3% borrows. The percentage of the population with renting lands is relatively high in Goshora and Ngeruka Sectors (30 and 28%, respectively). In general the lease agreement is made on an annual or biannual basis.

3) Water Sources for Domestic Use

Various water sources for domestic use are existent in Bugesera: water taps, fountains, lakes, swamps, water tanks, rivers, etc.. On average approximately one third of the population has access to the water supply system through water taps (Table 3.6.3). The access to the water supply system is relatively high in Juru, Mayange, Ngeruka and Rilima Sectors (higher than 50%) and very low in Gashora, Museny, Mwogo, Ntarama, and Rweru Sectors (less than 10 %).

Water from swamps and lakes are also used for domestic water supply. While the lakes are the primary water sources in Gashora Sector (77%), the water of swamps is largely used in Mwogo, Ntarama and Rweru Sectors (73%, 32% and 29%, respectively) (Table 3.6.3). Fountains are the main water sources in Mareba, Musenyi, Nyarugenge, Ruhuha, and Shyara Sectors (particularly high in Musenyi Sector, approximately 90%).

It is considered that rainwater can be effectively utilized as a water source . However, rainwater storage is practiced by only 0.7% of the population. The installations percentage of rainwater storages is relatively high in Nyamata, Ntarama, and Mwogo Sectors (2.3%, 1.7% and 1.3%, respectively.

Table 3.6.3 Main Water Sources for Domestic Use

Sector	Water Tap	Fountain	Lake/Pond	Swamp
GASHORA	3.3	7.2	77.5	10.2
JURU	53.4	4.5	28.8	14.4
KAMABUYE	44.3	13.2	40	1.9
MAREBA	28.8	51	9.9	9.8
MAYANGE	58.2	13.5	25.9	4.2
MUSENYI	1.4	89.9	1.6	4.5
MWOGO	2.6	7.7	14.6	73
NGERUKA	48.8	30.7	16.8	4.3
NTARAMA	6.5	27.7	27.9	31.7
NYAMATA	30.5	48.8	1.4	11
NYARUGENG	23.5	53.4	13.8	3.8
RILIMA	68	3.1	21.5	4.1
RUHUHA	37.6	58.3	1.6	2.4
RWERU	5.7	23.9	43.8	29.2
SHYARA	17.1	50.7	11.5	16.3
District average	30.4	33.2	21.8	12.9

Source: GTZ-JICA Baseline survey, 2006

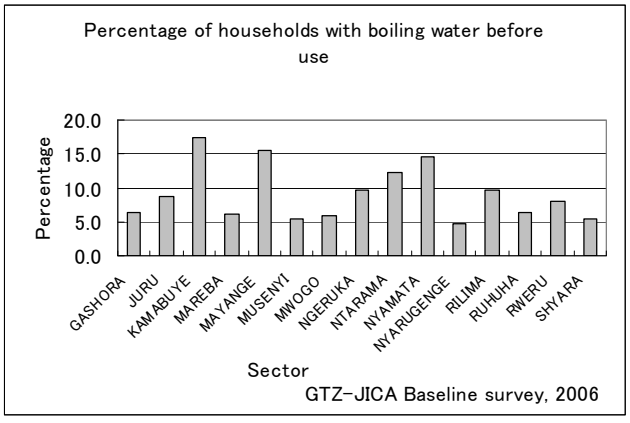


Figure 3.6.1 Percentage of HHs with Boiling Water before Use

The use of unclean water for drinking causes health problems. In Bugesera, water is hardly treated

before domestic use. On average two thirds of the population use water without treatment. On average only 9% of the population boils water before using (Figure 3.6.1). The percentage of water treatment is low in Gashora, Mareba, Nyarygenge, Ruhuha, Mwogo, and Shyara Sectors. It may suggest that the water problems are most serious in Gashora and Mwogo Sectors, which have high rates of direct using lake/swamp waters. Moreover, only 4% of the population uses commercially treated water.

Time consumption for fetching water

In Bugesera, water sources are located rather far away from villages and the existing water sources are depleted during the dry season. Consequently, fetching water is a heavy burden on farmers' daily lives. Approximately 7% of the population spends more than 2 hours to fetch water from water sources (Figure 3.6.2). The percentages are larger than 10% in Gashora, Mayange, Nyamata, Rilima, and Rweru Sectors (particularly high in Rweru Sector, larger than 20%).

Approximately one-half of the population feels that water is expensive. Fifteen percent of the population cannot afford paying for transportation of water to their houses. Jerry cans are generally used for water fetching. Most of the households use 1 or 2 jerry cans of water per day. One household generally pays 10-15 Rwf for one jerry can of water.

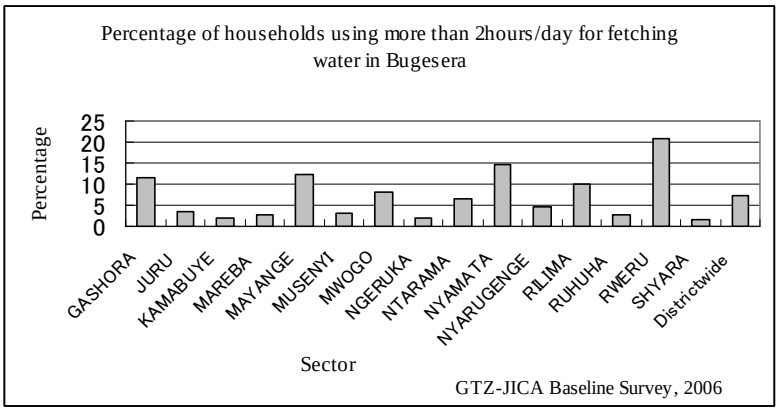


Figure 3.6.2 Percentage of HHs Spending more than 2hours/day for Fetching Water

4) Infrastructure

(a) Road network development

The road network in Bugesera is relatively well established throughout the district but the roads are in fact in poor conditions.

The roads connecting each Sector/Cell are poorly maintained. The roads are supposed to be maintained by communal works for development (Umuganda). The roads are very often gnawed by farmlands, and become muddy during the wet season. The poor road conditions disturb transportation of agricultural products, particularly vegetables that are commercially traded.

In the trunk roads connecting Bugesera with Kigali, where the public bus services are operated

between Kigali and Nyamata, the roads are under poor conditions due to erosion and worn-out of their surface. The conditions of these roads are expected to be dramatically improved by the on-going Road rehabilitation programs connecting Kigali to Mayange and Gahembe to Kindama. Due to the new road construction, approximately 300 households are forced to move out from their houses. Compensation for these households will be paid depending upon the values of the houses.

A new international airport is planned to be constructed at KARERA (in former Gashora Sector). The route of the access road to the airport is planned to start from Nyamata center. The heavy traffic is then expected in the trunk roads.

(b) Energy

In Bugesera, installation of electricity is confined to the centres of Nyamata and Ruhuha Sectors. Electricity is provided to Sector offices, community health centers, schools and some trading centers through solar panels. The radios using solar panels are well distributed.

(c) Water supply

As mentioned above, the access to potable water is a serious problem in Bugesera. Although pipe water systems are existent, many facilities need rehabilitation. Water from rivers, lakes and swamps is used without boiling. The water supply system that covers entire Bugesera is under construction by the cooperation of European Union with 18 Million EURO budget.

5) Agriculture

The economy of Bugesera is largely based on agriculture. More than 80% of the population lives on agricultural activities. Agriculture in Bugesera is mostly for subsistence; on average only 18% of households in Bugesera are producing for market. More market-oriented households are found in Ntarama, Musenyi, and Mayange Sectors, where 38 and 30% of households produce for market, respectively (Figure 3.6.3).

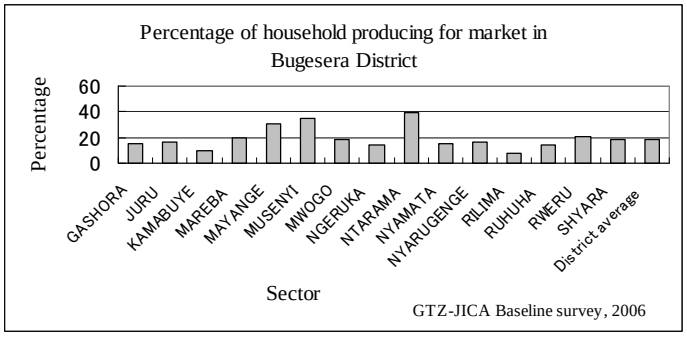


Figure 3.6.3 Percentage of HHs Producing for Market

(a) Farming types

In Bugesera, mixed farming (crop and livestock production) is the most common farming systems.Thirty-five percent of households is engaged in mixed farming (Figure 3.6.4). These figures are relativelyhigh in Juru and Musenyi Sectors, 50% and 47%, respectively (Table 3.6.4). On the other hand,

approximately one third of households (32%) is engaged only in crop production (without livestock

production). In Kamabuye, Shyara, Ngeruka, and Nyarugenge Sectors, more than 40% production are found in Nyamata and Ruhuha Sectors (11.2% and 8.7%, respectively), where large towns are existent.

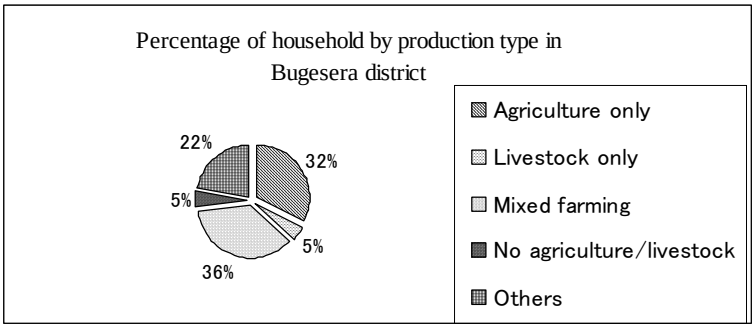


Figure 3.6.4 Percentage of HHs by production type

Table 3.6.4 Percentage of Farming Type by Sector

Sector	Only agriculture	Only livestock	Agriculture+livestock	No agriculture/livestock
GASHORA	21.1	2.2	37.3	1.9
JURU	24.3	3.3	50.0	2.1
KAMABUYE	44.1	5.3	34.1	2.2
MAREBA	39.4	5.8	30.1	1.8
MAYANGE	33.6	5.2	38.3	2.5
MUSENYI	25.0	3.2	46.6	1.3
MWOGO	38.4	5.0	34.4	2.5
NGERUKA	40.1	4.6	35.0	1.4
NTARAMA	28.1	4.9	33.5	2.6
NYAMATA	23.8	4.3	28.4	9.3
NYARUGEN	40.3	3.1	34.2	1.5
RILIMA	21.5	4.6	41.4	3.4
RUHUHA	35.7	5.1	33.5	7.4
RWERU	30.9	5.2	28.3	2.1
SHYARA	41.6	3.7	31.3	1.5
District	32.5	4.4	35.8	0.0

(b) Distribution of marshlands

In Bugesera, approximately 10,000ha of marshlands are existent, but only 4.4% is reclaimed. Marshlands used for agricultural cultivation are found in Nyarugenge, Shyara, Nyamata, Mareba, Musenyi, Mwogo, Ruhuha, Rweru, Juru, Ngeruka, and Gashora Sectors. Reclaimed marshlands are dominated by rice cultivation.

(c) Agricultural products

The main crops cultivated in the district are maize, cassava, sweet potato, sorghum, bean, soybean, and peanut. The other crops cultivated in the district include rice, Irish potato, taro, green peas, and vegetables (e.g. cabbage, tomato, eggplants). Rice, maize, and vegetables are cultivated in the marshlands, while maize, cassava, sorghum, soybean, and peanut are cultivated in the hillside.

Banana and pineapple are the most important fruits cultivated in Bugesera providing cash income for local communities. Coffee is an only traditionally exported crop largely concentrated in the southwestern part of Bugesera.

Table 3.6.5 Land use for major crop cultivation

	Land Use		Major Cultivated Crops
1	Hillside	Annual crops	Maize, Sorghum, Cassava, Sweet potato, Potato, Soybean, Taro, Bean, Peas, Peanut, Sunflower
		Fruits/Tree crops	Banana, Pineapple, Coffee, Avocado, Mango, Orange, Guava, Lemon
2	Marshland		Maize, Sorghum, Rice, Sweet potato, Bean, Soybean, Vegetables (tomato, cabbage, onion, eggplant, carrot,

Distribution of crop production in Bugesera has the distinctive pattern principally influenced by the availability of the marshlands. Poduction of beans, maize, and sorghum are relatively well distributed but many crops are concentrated in a few Sectors (e.g. cassava in Musenyi; rice in Ruhuha and Mareba; sweet potato in Musenyi, Rweru, and Juru) (See Annex III, Table 3.6.8 and 3.6.9). Rice production is dominant in Ruhuha, Mareba, Nyarugenge, and Shyara Sectors due to the existence of paddy fields in marshlands (Figure 3.6.6). Irish potato is largely produced in Mwogo and Nyarugenge Sectors.

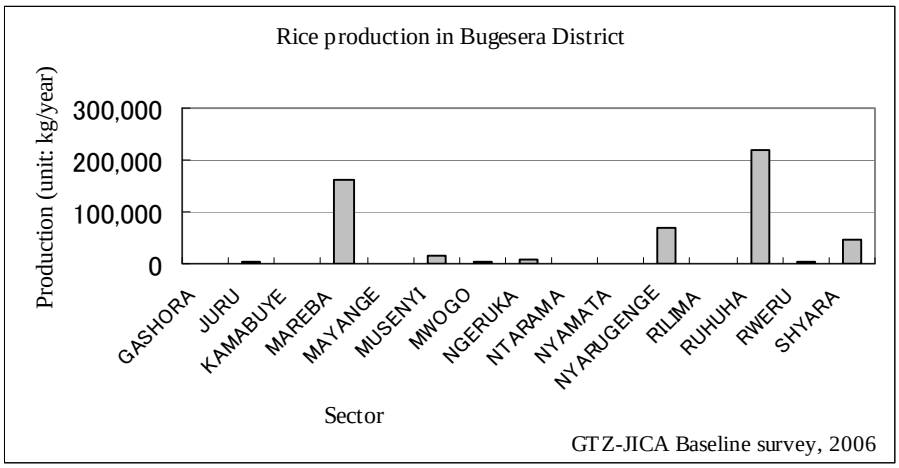


Figure 3.6.5 Rice Production

(d) Vegetable cultivation

Vegetable production is also concentrated in a few Sectors due to the availability of marshlands. Production of cabbage and tomato are concentrated in Juru and Shyara, and Musenyi Sectors, while those of eggplant and Zucchini are dominant in Mareba Sector (Table 3.6.6).

Table 3.6.6 Major Vegetable Production (Unit: kg/year)

	Cabbage		Tomato		Egg plant		Zucchini	
Sector	Production	%	Production	%	Production	%	Production	%
GASHORA	4,170	0.3	401	0.1	3,436	0.9	1,921	0.6
JURU	582,523	37.4	29,080	10.0	5,757	1.5	1,303	0.4
KAMABUYE	5,800	0.4	8,748	3.0	1,103	0.3	311	0.1
MAREBA	8,853	0.6	14,106	4.9	338,173	86.0	334,038	97.3
MAYANGE	3,082	0.2	1,580	0.5	1,937	0.5	297	0.1
MUSENYI	210,933	13.5	128,446	44.4	4,837	1.2	454	0.1
MWOGO	13,806	0.9	35,087	12.1	2,668	0.7	117	0.0
NGERUKA	19,347	1.2	7,983	2.8	2,531	0.6	134	0.0
NTARAMA	120,431	7.7	12,510	4.3	2,489	0.6	263	0.1
NYAMATA	5,385	0.3	6,605	2.3	1,248	0.3	0	0.0
NYARUGENG	9,078	0.6	10,661	3.7	8,228	2.1	667	0.2
RILIMA	3,144	0.2	4,215	1.5	2,745	0.7	23	0.0
RUHUHA	18,064	1.2	12,549	4.3	8,337	2.1	618	0.2
RWERU	43,988	2.8	9,851	3.4	6,649	1.7	2,931	0.9
SHYARA	508,527	32.7	7,770	2.7	3,117	0.8	257	0.1
Total	1,557,131	100	289,592	100	393,255	100	343,334	100

Source: GTZ-JICA Baseline Survey, 2006.

(e) Fruit production

Bananas, pineapple, and avocado are the most important fruits in Bugesera. Production of banana is concentrated in Musenyi Sector, while those of pineapple in Musenyi and Mwogo Sectors (Table 3.6.7). Production of Avocado is relatively high in Mwogo Sector. Mango, orange, and passion fruit are also produced but in a limited scale.

Table 3.6.7 Major Fruit Production (Unit: kg/year)

	Banana		Pineapple		Avocado	
Sector	Production	%	Production	%	Production	%
GASHORA	35,885	0.6	1,562	1.9	8,491	0.2
JURU	584,811	10.3	6,681	7.9	96,255	2.5
KAMABUYE	51,470	0.9	3,500	4.2	358,035	9.4
MAREBA	84,931	1.5	4,340	5.2	403,976	10.6
MAYANGE	18,871	0.3	422	0.5	18,822	0.5
MUSENYI	2,546,689	45.0	12,654	15.0	161,045	4.2
MWOGO	138,594	2.4	16,967	20.2	856,288	22.5
NGERUKA	374,043	6.6	5,720	6.8	206,524	5.4
NTARAMA	256,018	4.5	7,795	9.3	28,553	0.8
NYAMATA	118,674	2.1	1,441	1.7	460,697	12.1
NYARUGENG	320,659	5.7	7,984	9.5	492,694	13.0
RILIMA	25,876	0.5	621	0.7	379,910	10.0
RUHUHA	507,542	9.0	3,749	4.5	137,443	3.6
RWERU	499,510	8.8	7,774	9.2	37,521	1.0
SHYARA	98,796	1.7	2,979	3.5	152,939	4.0
Total	5,662,369	100	84,189	100	3,799,193	100

Source: GTZ-JICA Baseline Survey, 2006

(f) Coffee production

Coffee was identified as the most suitable crop with regard to regional specialization in Rwanda and is

the only traditionally exported crop produced in Bugesera. More than 5,500 farmers cultivate coffee in their farmlands, largely concentrated in Musenyi and Shyara Sectors (Figure 3.6.7). A washing station is existent in Shyara Sector.

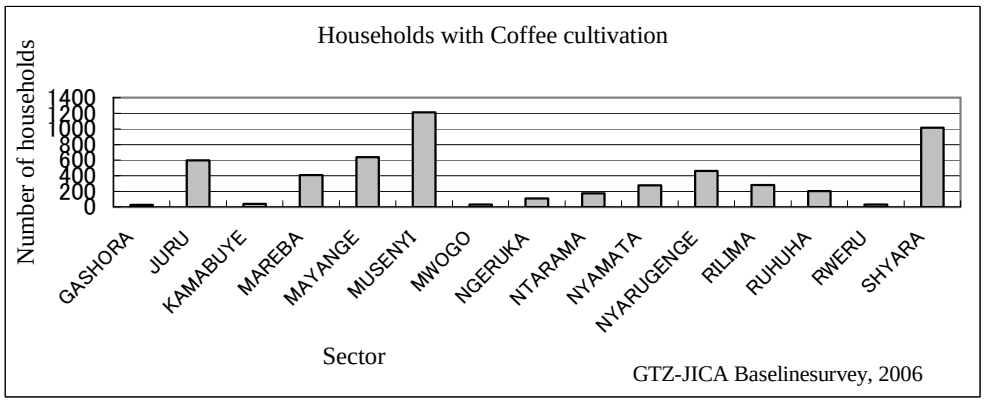


Figure 3.6.6 Households with Coffee Cultivation

(g) Households forming associations

Since a large part of the population (more than 30%) does not have the lands for crop cultivation, the forming associations to rent lands is an important way to the access to the lands. However, on average only 10.4% of farmers belongs to associations. The figures are relatively high in Mareba, Mayange, Nyarugenge, Musenyi, and Shyara Sectors (Figure 3.6.7), suggesting that association is limited where marshlands can be utilized.

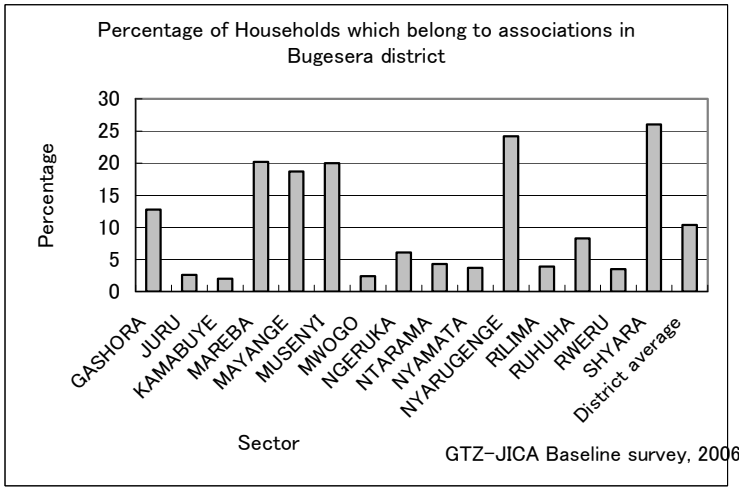


Figure 3.6.7 Percentage of HHs Forming Associations

(h) Use of selected seeds

Farmers who were benefited from selected seeds are very few, only 7% for once a year and 1.6% for twice a year on average, respectively (Figure 3.6.8). Larger numbers of beneficiaries are found in Mareba, Mayange, Musenyi Sectors.

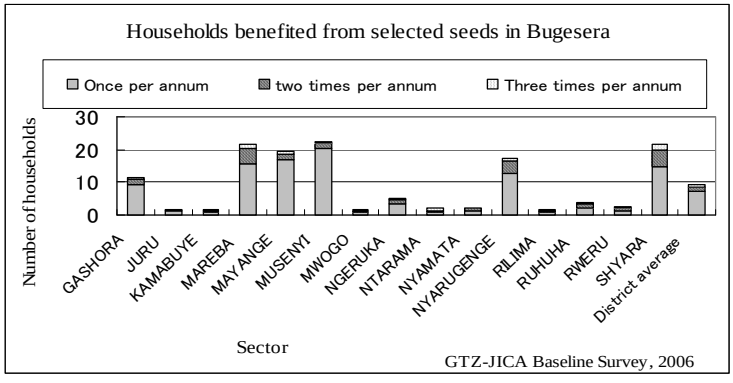


Figure 3.6.8 Households Benefited from Selected Seeds

(i) Use of chemical fertilizer

In Bugesera, chemical fertilizer is hardly utilized (3.4% of households on average) but organic inputs are used by approximately one-half of the households (See Annex III, Figure 3.6.2). Farmers who use chemical fertilizer are concentrated in Mayange Sector because of Millennium Village project.

(j) Use of agricultural tools

Only simple tools are used for agricultural activities in Bugesera. Hoes and machetes are the major tools used for agriculture. The dissemination rates of these tools for households are 100% for hoes and 77% for machetes (GTZ-JICA Baseline survey, 2006). No other tools are generally utilized except for mortar and pestle, and axes. The dissemination rate for other tools are mortar and pestle (53%), axes (26%), shovel (19%), millstones (7%), wheelbarrows (3%), manual sprays (2%) (GTZ-JICA Baseline survey, 2006).

(2) Education

1) Enrolment rate

Education in Bugesera is characterized by the high enrolment rate for primary education and the very low enrolment rate for secondary and post-secondary education. On average children younger than 14 years old represent 33% of the total population. The percentage of children is relatively high in Rweru and Mareba Sectors, representing more than 40% of the total population. Currently, 74% of children (age between 6 and 13 years old) go to primary school in Bugesera (Figure 3.6.9). The percentages are relatively low in Nyamata and Ntarama Sectors, 65 and 62%, respectively. The enrolment rates for secondary school and university/higher education are only 15% and 3.6% on average, respectively.

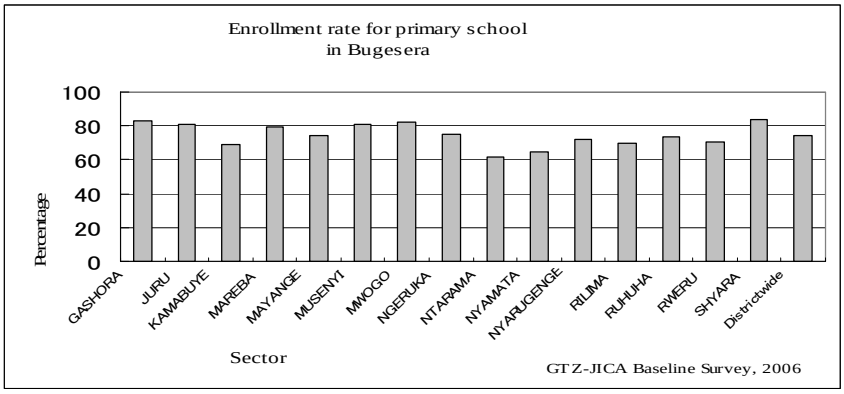


Figure 3.6.9 Enrollment Rate for Primary School

2) Vocational schools

In Bugesera, there are 2 vocational schools: Centre de Formation de la Jeunesse in Mayange and Centre de Formation Professionnelle de Ngenda in Ruhuha2. The one in Ruhuha offers two-year courses in tailoring, electricity, construction, and welding for 181 students (Table 3.6.8). Since the assistance from a NGO completed in 2004, parents of students currently manages the school.

[2] Established by Assist Rwanda Orphanage (ARO) in 1998.

Table 3.6.8 Number of Students by Course in Vocational School in Ruhuha

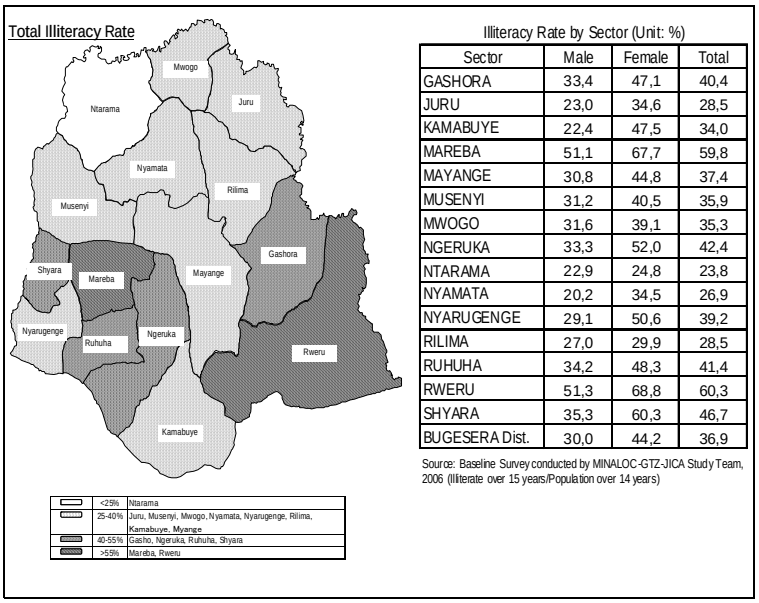
Course		No. of Students (2006)		No. of Teachers	Remarks
		Male	Female		
Tailoring	1st	5	58	3	Course period: 2 year Classes: 7:45-15:40 There is one language teacher for French and English.
	2nd	5	44		
Electricity	1st	34	3	1	
	2nd	9	2		
Construction	1st	12	0	1	
	2nd	9	0		
Welding	1st	(34, with Electricity)	0	1	
Total		74	107	6	

Source: the field survey by the JICA Study Team, 2006.

In Nyamata, there is one A2 level technical school (upper secondary school for students between 16-18 years old) supported by the Ministry of Education (MINEDUC). Currently, the school has 15 classes with 220 students and the extension to 18 classes with 450 students is planned in 2007. The school has 6 departments (electricity with ICT, tailoring, construction, carpentry, mechanical engineering, and electrical engineering) with 30 teaching staff. Low rate of school fee collection is a serious problem at both schools; 20-30% of students cannot pay their entire tuitions.

3) Illiteracy rate

Even though relatively high enrolment rate is achieved, the adult illiteracy rate remains high in Bugesera. Currently average illiteracy rate is 37% of the population over 15 years old in district (Figure 3.6.10). The highest rates are found in Mareba and Rweru Sectors (60 % for both Sectors). The illiteracy rate of female (44%) is much higher than male (30%).



Illiteracy Rate by Sector (Unit: %)

Sector	Male	Female	Total
GASHORA	33,4	47,1	40,4
JURU	23,0	34,6	28,5
KAMABUYE	22,4	47,5	34,0
MAREBA	51,1	67,7	59,8
MAYANGE	30,8	44,8	37,4
MUSENYI	31,2	40,5	35,9
MWOGO	31,6	39,1	35,3
NGERUKA	33,3	52,0	42,4
NTARAMA	22,9	24,8	23,8
NYAMATA	20,2	34,5	26,9
NYARUGENGE	29,1	50,6	39,2
RILIMA	27,0	29,9	28,5
RUHUHA	34,2	48,3	41,4
RWERU	51,3	68,8	60,3
SHYARA	35,3	60,3	46,7
BUGESERA Dist.	30,0	44,2	36,9

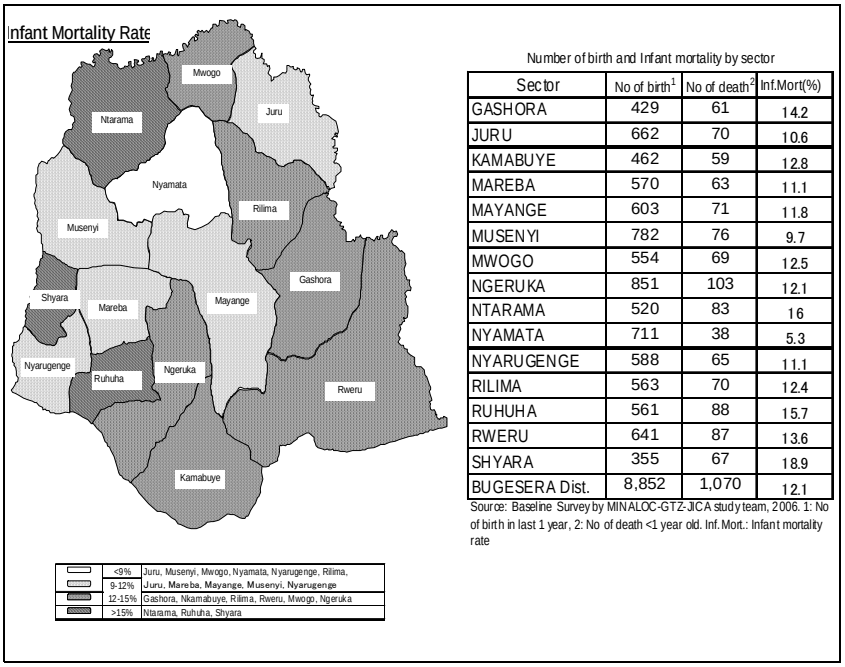
Source: Baseline Survey conducted by MINALOC-GTZ-JICA Study Team, 2006 (Illiterate over 15 years/Population over 14 years)

Figure 3.6.10 Illiteracy Rate by Sector

(3) Health and Sanitation

1) Access to medical service

Bugesera District has a hospital in Nyamata, and health centers in Mareba, Kamabuye, Ruhuha, Gashora, Rilima, Mwogo, Mayange, and Nyamata Sectors. On average only 18% of the population has the access to medical service. The rate is very low in Gashora Sector, where only 9% recieves the medical service.



Number of birth and Infant mortality by sector

Sector	No of birth[1]	No of death[2]	Inf.Mort(%)
GASHORA	429	61	14.2
JURU	662	70	10.6
KAMABUYE	462	59	12.8
MAREBA	570	63	11.1
MAYANGE	603	71	11.8
MUSENYI	782	76	9.7
MWOGO	554	69	12.5
NGERUKA	851	103	12.1
NTARAMA	520	83	16
NYAMATA	711	38	5.3
NYARUGENGE	588	65	11.1
RILIMA	563	70	12.4
RUHUHA	561	88	15.7
RWERU	641	87	13.6
SHYARA	355	67	18.9
BUGESERA Dist.	8,852	1,070	12.1

Source: Baseline Survey by MINALOC-GTZ-JICA study team, 2006. 1: No of birth in last 1 year, 2: No of death <1 year old. Inf.Mort.: Infant mortality rate

Figure 3.6.11 Child Birth and Infant Mortality Rates by Sector

2) Birth rate and infant mortality rate

Bugesera is characterized by high crude birth rate and infant mortality. On average crude birth rates are 32. The crude birth rates are relatively high in Myange, Mwogo and Ntarama Sectors exceeding 40 (particularly high in Ntarama 50). On average infant mortality is 12%, the highest in Shyara (19%), followed by Ruhuha (16%) and Ntarama Sectors (16%), respectively (Figure 3.6.11).

3) Access to daily meals

A large population of Bugesera suffers from the difficult access to the daily meals. On average approximately 40% of the population has either one meal per day or having difficulty to have daily meals (23 and 16%, respectively) (Figure 3.6.12). The number of households with having difficulty to access daily meals is particularly high in Ruhuha, Shyara, Kamabuye, and Nyamatam Sectors (33%, 23%, 22%, and 21% respectively).

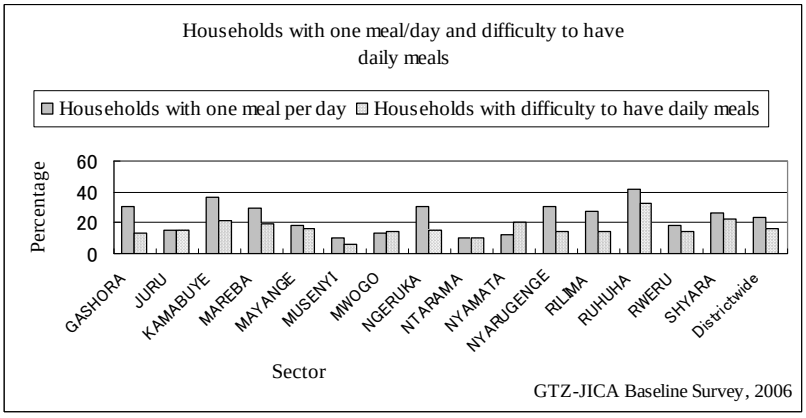


Figure 3.6.12 Households Having Difficulty to Have Daily Meals

4) Garbage, sewage and toilets

Few people receive garbage collection service in Bugesera (only 0.3% of the population). However, it

seems that organic garbage is well collected. Waste disposal is commonly utilized in Bugesera. On average 82% of the total households own compost pits, suggesting that the Government's promotion to prepare two pits per household (one for incombustible and the other for combustible garbage) was effective. In Nyamata, the highest percentage of the population (6%) owns dustbins at home, probably because of the existence of many shops at a district center. However, garbage is also thrown away to the field (6.4%) and to bush (2.1%), burned (0.3%), or thrown away to rivers (0.1%). More than 10% of households throw garbage in bush or field in several Sectors. Particularly, in Gashora, where 23% of households throw garbage in bush/field, administrative guidance might be necessary in order to change the way to dispose waste. There is no sewage disposal in Bugesera.

Approximately 90% of households own latrines as toilet facilities in their houses. On average, 89% of households in Bugesera have either roofed or non-roofed latrines around their house compound. Those who have no toilet facilities or use bush account for only 2.6% of the total households.

5) Livestock Production

The major domestic animals raised in Bugesera are cattle, goat, sheep, poultry, pig, and rabbit. Typical better-off farmer owns 5 Ankole cows and a few goats, middle class with 1-3 cows and 5-8 goats, poor class with only a few goats and the very poor class with only a few rabbits (REMA, 2006).

(a) Cattle production

Unlike agricultural crops that are largely concentrated in specific Sectors, the population of cattle are well distributed in the district. The population of cattle in Bugesera is approximately 20,000, the highest in Kamabuye and Nyamata Sectors and the lowest in Shyara and Nyarugenge Sectors (Figure 3.6.13). Eighty-six percent of cattle in Bugesera is traditional, while modern (100% European blood) and crossbred cattle represent 3.6%and 10.6%, respectively. Higher percentage of modern cattle is found in Shyara Sector (12%), while those of crossbred cattle are found in Juru and Ruhuha Sectors (approximately 20%). On average one household owns 0.35 cattle in the district, ranging from 0.20 in Nyarugenge to 0.65 in Ntarama Sector (Figure 3.6.14).

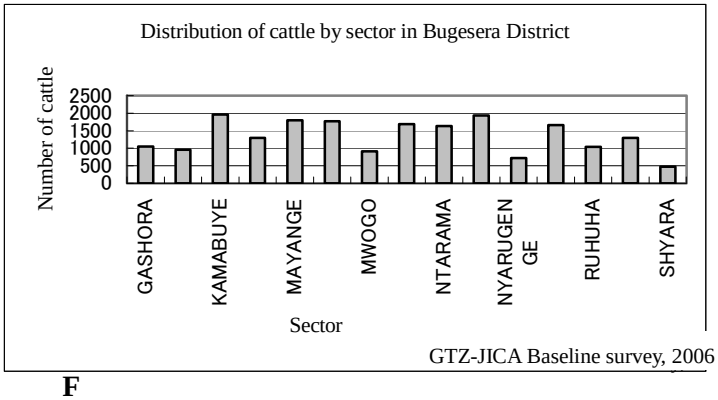


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Figure 3.6.13 Distribution of Cattle by Sector

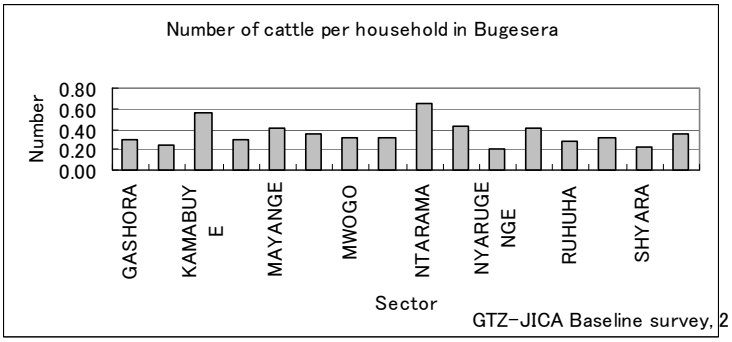


Figure 3.6.14 Number of Cattle per Household

Twenty-two thousand liters per day of cow milk are produced in Bugesera. The highest production is found in Kamabuye Sector (approximately 6,000 liter/day) (Figure 3.6.15). On average 23% of milk produced is sold, suggesting that most of milk produced are used for domestic own consumption. The largest amount of saleable milk is produced in Rilima Sector (approximately 1,300 liter/day) (Figure 3.6.16). Approximately 13,000 cattle are sold in the last 12 months. Rilima, Juru, and Kamabuye report high cattle production (Figure 3.6.17).

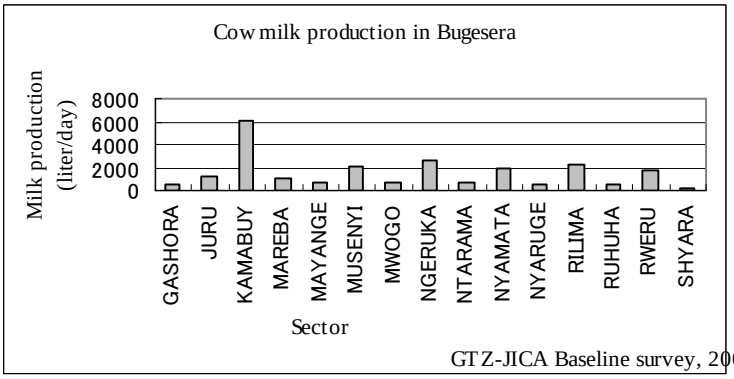


Figure 3.6.15 Cow milk production

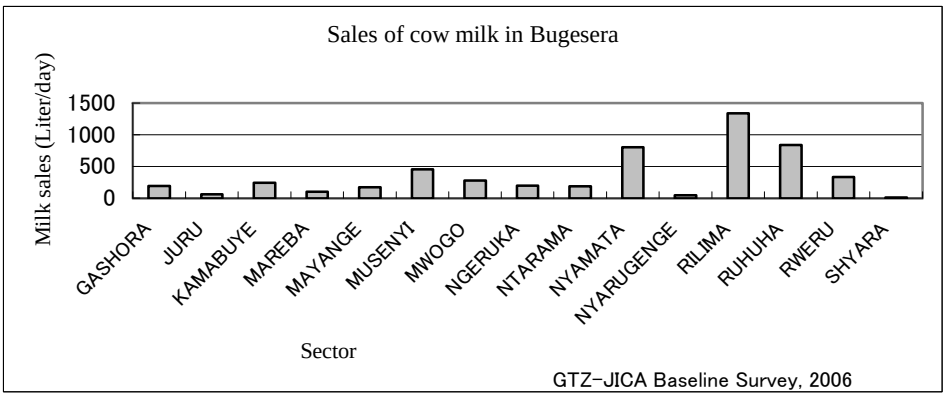


Figure 3.6.16 Sales of Cow Milk

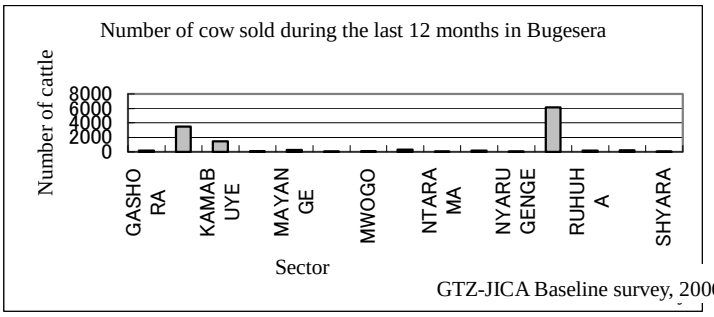


Figure 3.6.17 Number of Cow Sold during the Last 12 Months

(b) Goat production

Goat is the most common livestock in Bugesera, well distributed in the district, like cattle. Approximately 71,000 goats are found in Bugesera (on average 1.2 goats/ household) (Figure 2.1.20). On average 98% of goats are traditional, while modern and milk goats represent 1.2% for both types. Modern and milk goats are concentrated in Mareba and Ruweru Sectors. The number of goats per household is relatively high in Gashora, Rilima, Rweru and Juru Sectors, and low in Nyarugenge Sector (Figure 3.6.18).

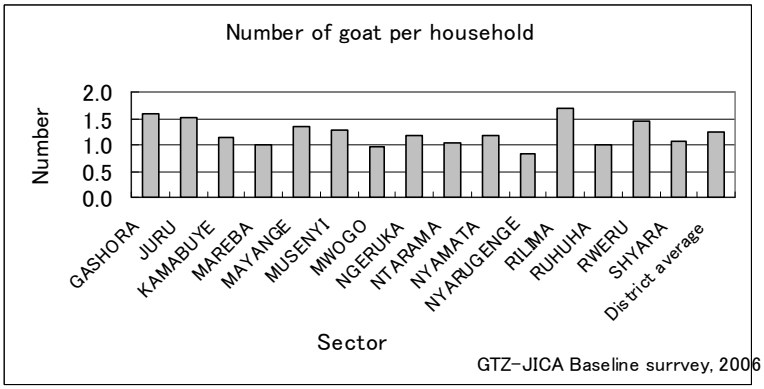


Figure 3.6.18 Number of Goats per Household

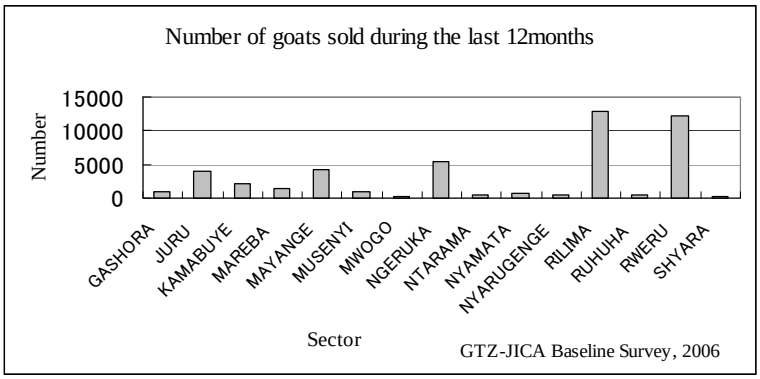


Figure 3.6.19 Number of Goats Sold during the Last 12 Months

The production of goat milk is very limited and largely concentrated in a few Sectors. In Bugesera, 3,700 liters of goat milk is daily produced, 83% of which comes from Rilima Sector (Figure3.6.19)Forty-seven thousand goats were sold for meat in one year, 54% of which comes from Rilima and Rweru Sectors.

(c) Production of small animals

Pig and sheep are rather rare animals found only approximately 3,000 animals in the district, respectively (Table 3.6.9). Sheep are concentrated in Juru Sector, while pigs in Musenyi and Rweru Sectors. Approximately 40,000 hens are found in Bugesera, 95% of which are traditional ones. Average number of hens per household is 0.7, the highest in Musenyi Sector (one hen per household) (Figure 3.6.20). The number of Rabbits per households is relatively higher in Shyara and Juru Sectors (Figure 3.6.21).

Table 3.6.9 Number of Small Livestock by Sector

Sector	Sheep	Pig	Hen	Rabbit
GASHORA	61	185	2,734	118
JURU	884	202	2,772	198
KAMABUYE	164	152	2,042	30
MAREBA	205	226	2,530	143
MAYANGE	169	117	2,609	94
MUSENYI	234	396	4,958	140
MWOGO	266	123	2,047	24
NGERUKA	160	315	3,648	162
NTARAMA	183	143	2,162	91
NYAMATA	207	104	2,540	79
E	121	188	2,465	93
RILIMA	361	203	2,654	153
RUHUHA	111	263	1,671	68
RWERU	220	377	3,656	107
SHYARA	118	177	1,323	127
Total	3,464	3,171	39,811	1,627

Source: GTZ-JICA Baseline Survey, 2006

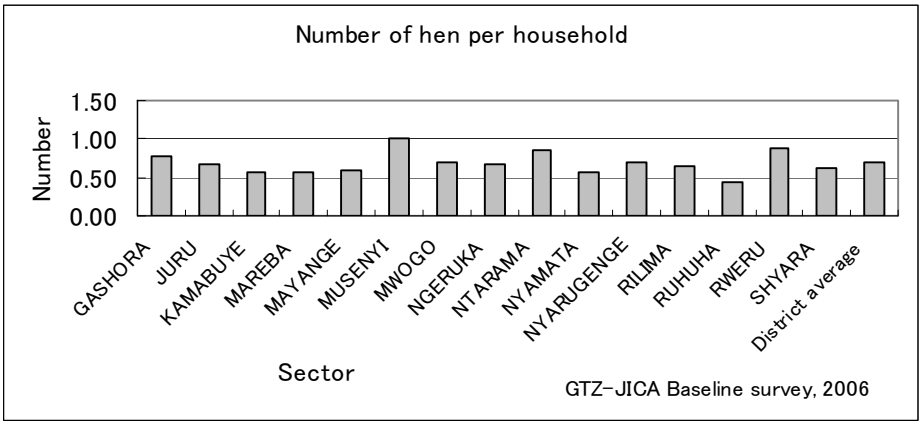


Figure 3.6.20 Number of Hen per Household

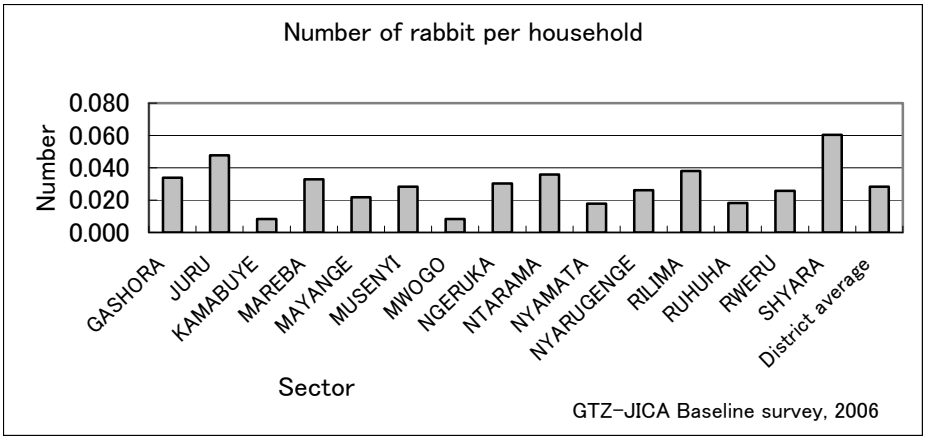


Figure 3.6.21 Number of Rabbit per Household

Sales of processed livestock products are very small in Bugesera and concentrated in a few Sectors. Sales of cheese are concentrated in Ngeruka Sector, while large amounts of butter are sold in Kamabuye, Mareba and Rilima Sectors (Table 3.6.10)

Table 3.6.10 Sales of Cheese and Butter (Unit kg/year)

Sector	Cheese Sales old in the last 12 months	Butter sold in the last 12 months
GASHORA	0	21
JURU	1	0
KAMABUYE	1	465
MAREBA	0	116
MAYANGE	2	1
MUSENYI	6	9
MWOGO	3	0
NGERUKA	36	24
NTARAMA	0	3
NYAMATA	1	12
NYARUGENGE	4	0
RILIMA	4	124
RUHUHA	1	2
RWERU	5	22
SHYARA	1	1
Total	65	800

Source: GTZ-JICA Baseline survey, 2006

(d) Honey Production

Approximately 2.800 hives are found in Bugesera. Eighty-eight percent of hives is traditional ones. More hives are found in Rilima and Juru Sectors (Figure 3.6.22). Approximately 2,800 kg/year of honey is produced in Bugesera. The production is concentrated in Rilima and Rweru Sectors (Figure 3.6.23)

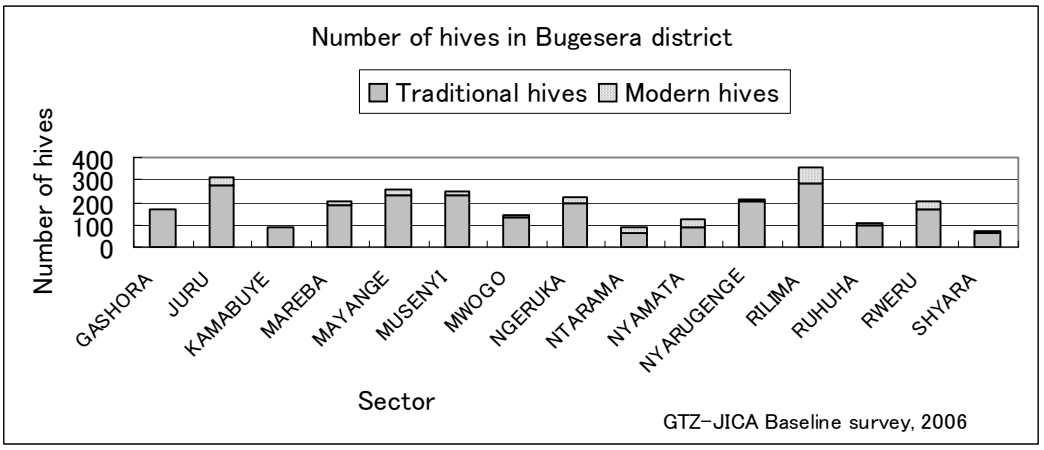


Figure 3.6.22 Number of Hives

6) Forest Resources

Forest resources are extremely in shortage in Bugesera. Only 2% of the lands is forest areas (Table 3.6.11). The main forest resources in Bugesera are Eucalyptus, which were introduced by the colonial authorities. Deforestation in Bugesera caused by agricultural development, resettlements, fuelwood collection, and charcoal production is at an alarming level. The demand for fuelwood has been accelerated by the population pressure since the fertility rates in Bugesera is among the highest in Rwanda. Bugesera has been a major charcoal supplier for Kigali accounting for 75% of the total demands for charcoal in Rwanda (REMA, 2006).

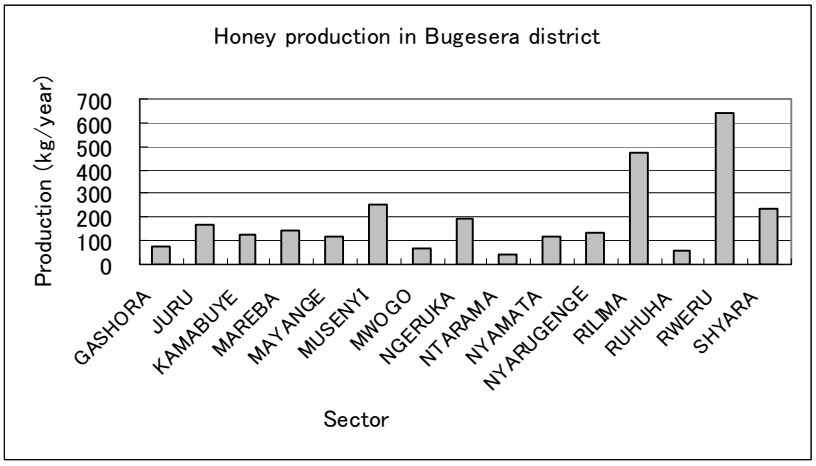


Figure 3.6.23 Honey Production

Table 3.6.11 Forest area in Bugesera District (Unit: ha)

Former district	Government owned	District owned	Others	Total
Gashora	980	203	302	1,485
Ngenda		56	32	88
Nyamata	30	39	1,042	1,111
Total	1,010	298	1,375	2,683
Percentage	37.6	11.1	51.3	100.0

Source: Strategic plan for Ngali Province, 2004

In Bugesera, approximately one-half of forests is publicly owned. Twenty-three percent of the public forests is owned by the District. In general large forests are publicly owned, and smaller ones privately. According to GTZ-JICA Baseline survey, 8% of the households have forests in their fields. The ownerships of forests are low in Gashora, Kamabuyu, Mayange, Ngeruka and Rweru (less than 5%), and high in Ntarama and Shraya (more than 15%).

In order to overcome the deforestation, trees are actively planted in Bugesera. On farmlands, Cassia spectabilis, Grevillea robsta, Imiyenze (Euphorbia spp.) and Ficus spp. are commonly found. 2.8 million trees were planted in the last four years (2003-2006) through four NGOs through the government funds over 600 million FRW (Table 3.6.12). Cassia spectabilis, Grevillea robsta, Malkamia lutea, Cedrela sp., Moringa (Moringa ovalifolia), Caliandra, and Alnus sp. are main species planted on roadside and farmlands.

According to GTZ-JICA Baseline survey, on average 15% of the households planted more than 20 trees last year. Trees are more actively planted in Rilima (40%), and less in Kamabuye and Mayange Sectors (6% for both Sectors) (Figure 3.6.24).

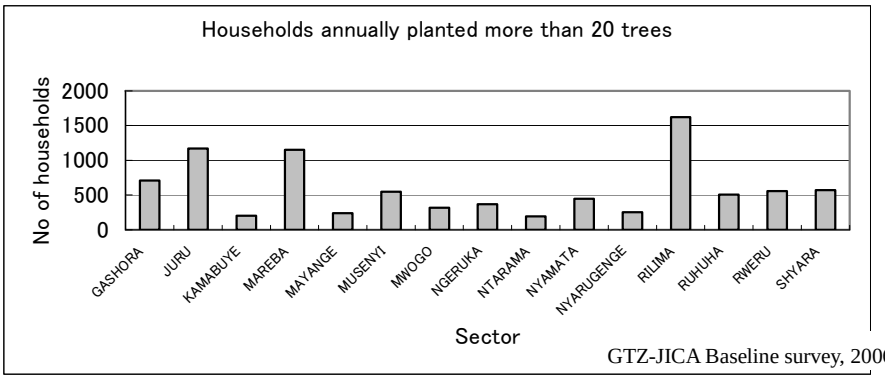
Euphorbia spp. are commonly used for live fencing, but least preferred by the local population to use as fuelwoods. Sisal (Agave sisalana) is naturally grown in the district and utilized for producing

handicrafts by the local population, particularly by women's groups. Papyrus (Cyperus papyrus) covers a large part of Marshlands. Papyrus is used for the materials of roofs, hats, rope, and baskets.

Moringa, multi-purpose trees with high nutrient in its leaves, was introduced from Uganda by Moringa growers' association in Kibungo. Gliricidia sepium, common multi-purpose trees for agroforesty systems, was introduced from Uganda in 2006 and currently planted in Gahara in Kirehe district and Rilima in Bugesera for multiplification. It is expected to be introduced in agroforestry systems in Bugesera.

Table 3.6.12 Tree Planting Activities

Former province	Budget (FRW)	No. of tree planted	Implementation NGO
Ngenda	89,661,200	653,976	RDO
Nyamata	138,662,000	577,889	BMPOREZE
Nyamata	155,699,112	398,116	SOCAMAF
Gashora	105,170,000	570,453	TWISNGIBIDUIKIKIJE
Gashora	135,120,000	665,415	RDO
Total	624,312,312	2,865,849	



GTZ-JICA Baseline survey, 2006

Figure 3.6.24 Households Annually Planted more than 20 Trees

7) Inland Fishery

Fishing is practiced at lakes and fishponds in Bugesera. There are 17 fishponds and12 lakes in Bugesera where fishing has been practiced but most fishponds need recuperation of fish habitat (Table3.6.13). Many fishermen fish as a part time basis: farming in the daytime and fishing at night. The peak period for fishing is April, June and August. Approximately 10,000 kg of fish is produced monthly, one-half of which comes from Gashora (28%), Rweru (13%), and Rilima (11%) Sectors where lakes are existent (Figure 3.6.25). Fishing in Bugesera suffered from tremendous declines in production. Main reasons for the decline are disappearance of fish from the lakes due to drying

up of water bodies, infestation of weeds (particularly water hyacinth), and introduction exotic species (e.g. Nile perch).

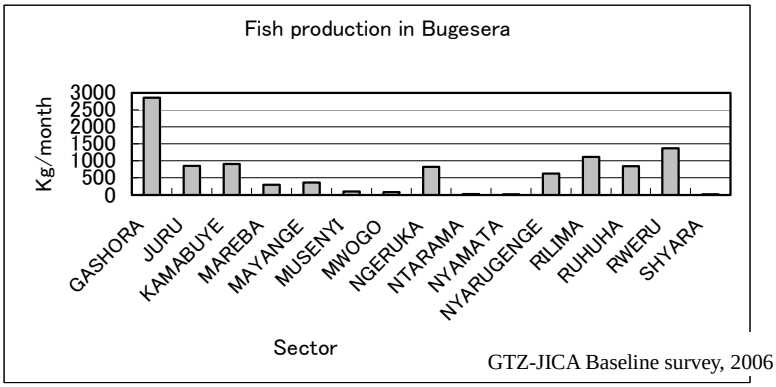


Figure 3.6.25 Fish Production

Table 3.6.13 Locations of Fishing Practice

	Fishponds		Lakes	
Former district	With fish	Without fish	Large lakes	Small lakes
Gashora			7	2
Ngenda	3	12	1	1
Nyamata		2		1
Total	3	14	8	4

Source: Strategic plan for Kigali-Ngali Province, 2006.

8) Vulnerable Population

(a) Orphans

Approximately 10,000 orphans live in Bugesera (3.6% of the total population). Only 10% of orphans live in orphanages, while 42% lives alone (Figure 3.6.26). The percentage of orphans is relatively high in Ntarama and Mayange Sectors exceeding 5%. Numbers of orphans are higher in Ngeruka, Nyamata and Mayange Sectors (Figure 3.6.27). On average 15% of the orphans are caused by the 1994 Genocide, suggesting that the influence of the Genocide is relatively small since it occurred 12 years ago. However, in Ntarama and Nyamata Sectors, the influence of the Genocide is still large; more than one fourth of orphans are caused by the Genocide. The percentage of male orphans are slightly higher than female (53% against 47%).

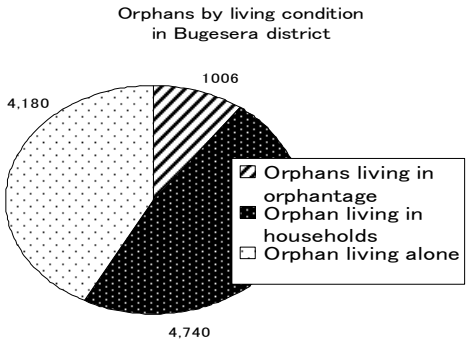


Figure 3.6.26 Orphans by Living Condition

(b) Widows or Widowers

The influence of the Genocide is largely observed in the structure of households. On average there are 204 widows or widowers per 1,000 households in Bugesera. In other words, 6% of the population is considered to be either widows or widowers. The figure is the worst in Ntarama having 253 widows/widowers per 1,000 households followed by Ruhuha, Kamabuye, Mareba, 236, 234 and 227 widows/widowers, respectively (Figure 3.6.28). The widowed caused by the 1994 Genocide are rather high in these Sectors except for Kamabuye.

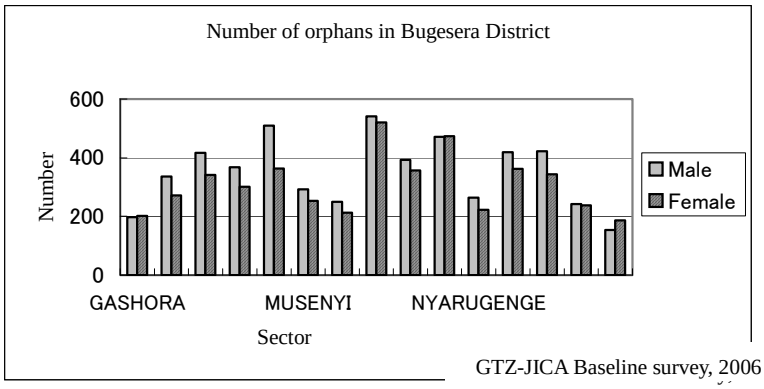


Figure 3.6.27 Number of Orphans by Sector

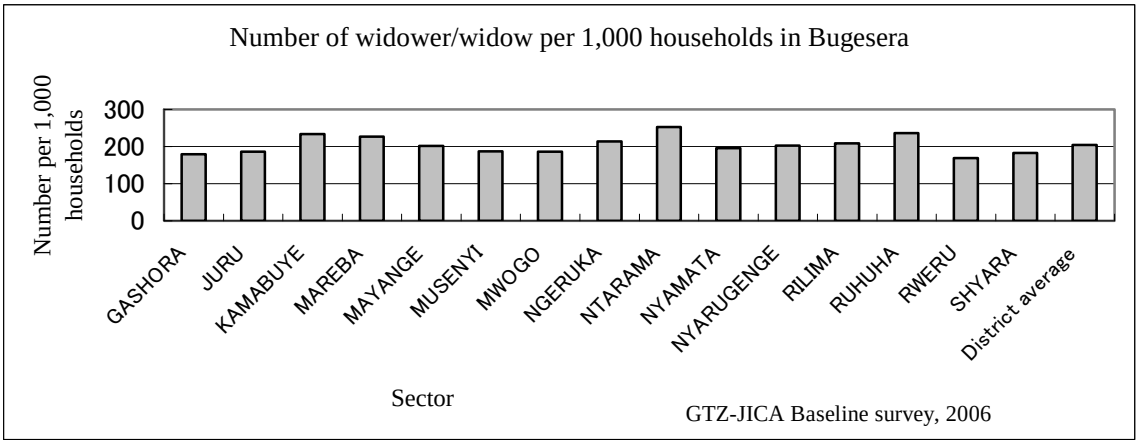


Figure 3.6.28 Number of Widower/Widow per 1,000 HHs

(c) Elderly and Poor People

In Bugesera, on average approximately 5% of the population is vulnerable elderly people, while 7% and 4% of the population are considered to be extremely poor and unsheltered family, respectively (Figure 3.6.29). More vulnerable elderly people are found in Kamabuye and Mayange Sectors, exceeding 8 persons per 1,000 households. A large number of extremely poor people is found in Juru, Kamabuye, Mwogo and Shyara Sectors (more than 10 persons per 1,000 households), while more sheltered families are found in Ntarama and Ruhuha Sectors (58 and 60 families per 1,000 households, respectively). It should be noted that the percentage of unsheltered households caused by the 1994 Genocide is distinctively high at Ntarama Sector (77%) (Figure 3.6.30), suggesting that the remaining damages by the Genocide is still serious.

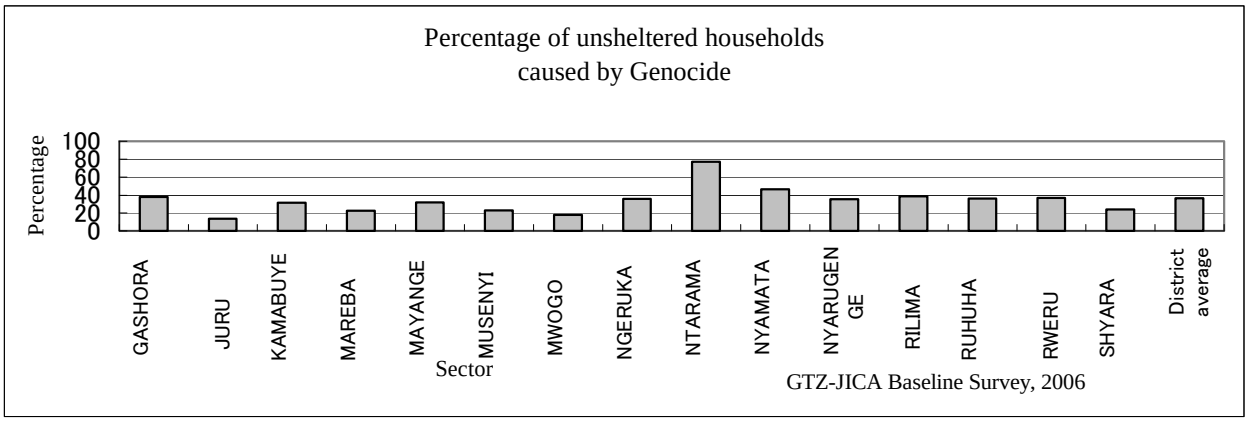
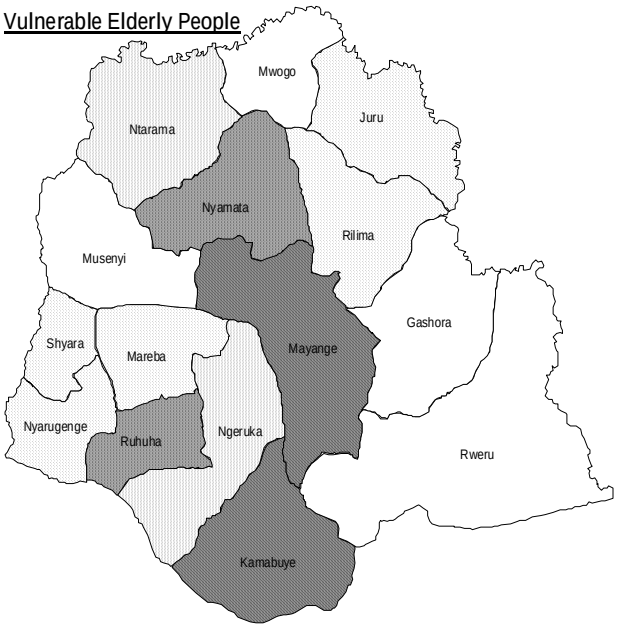


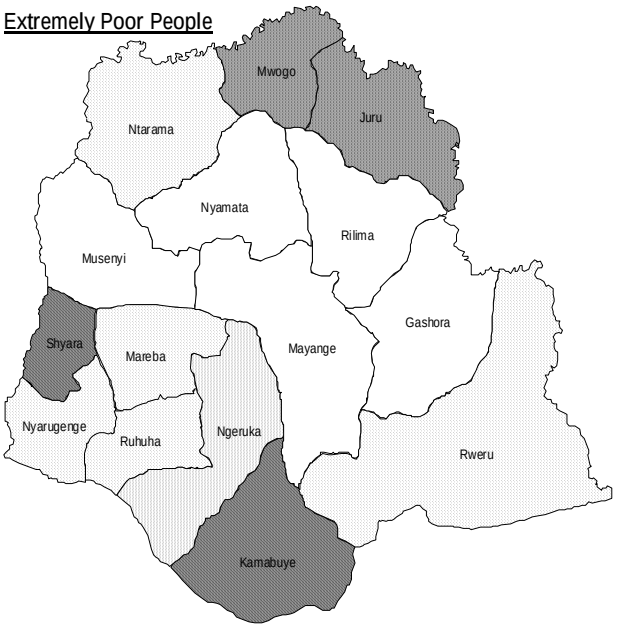
Figure 3.6.29 Percentage of Unsheltered Households Caused by Genocide

Vulnerable Elderly People



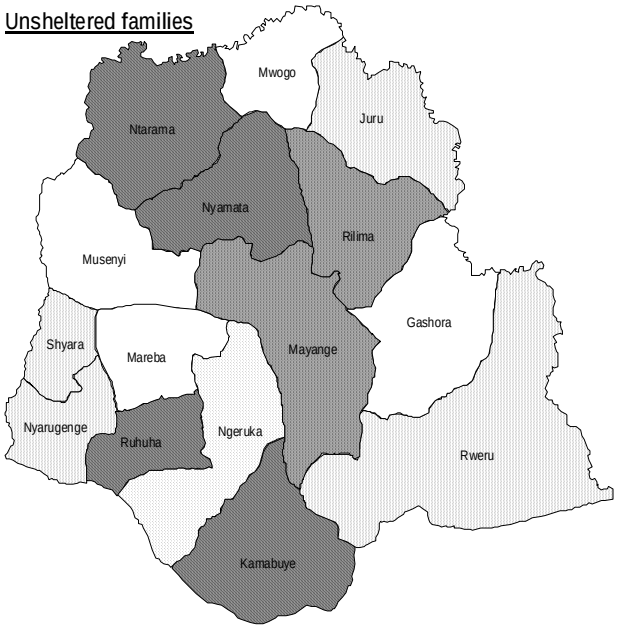
	<40	Gashora, Rweru, Mwogo, Musenyi
	40-50	Rilima, Juru, Shyara, Mareba, Nyarugenge
	50-60	Ntarama, Ngeruka
	60-70	Ruhuha, Nyamata
	>70	Mayange, Kamabuye

Extremely Poor People



	<60	Nyamata, Musenyi, Rilima, Gashora, Mayange
	60-80	Mareba, Ntarama, Nyarugenge, Ruhuha, Rweru
	80-100	Ngeruka
	100-120	Mwogo, Juru
	>120	Kamabuye, Shyara

Unsheltered families



	<25	Mwogo, Musenyi, Gashora, Mareba
	25-30	Ngeruka
	30-35	Nyarugenge, Juru, Rweru, Shyara
	35-40	Rilima, Mayange
	>40	Kamabuye, Ntarama, Ruhuha, Nyamata

(Figures are expressed per 1,000 households.)

Sector	Vulnerable elderly people (persons)	Extremely poor people (persons)	Unsheltered families (households)
GASHORA	33.5	55.5	24.0
JURU	41.5	109.3	31.4
KAMABUYE	78.7	120.6	50.3
MAREBA	48.7	64.8	24.4
MAYANGE	76.9	56.9	38.9
MUSENYI	38.3	35.2	22.9
MWOGO	37.4	101.8	22.8
NGERUKA	51.9	96.8	27.6
NTARAMA	51.4	70.3	58.2
NYAMATA	66.2	34.8	77.4
NYARUGENGE	49.0	72.6	31.0
RILIMA	40.2	53.8	35.7
RUHUHA	60.7	73.0	60.4
RWERU	33.6	76.0	31.5
SHYARA	44.3	125.7	33.3
BUGESERA Dist.	50.4	73.8	37.6

Source: Baseline Survey conducted by MINALOC-GTZ-JICA Study Team in 2006

Figure 3.6.30 Percentage of Unsheltered Households Caused by Genocide

(d) Vulnerable women and the Disabled

The population density of the disabled people is higher in Ntarama, Mayange and Rweru Sectors. In particular Ntarama has high density of disables, 113 disabled people per 1,000 households. Ntarama Sector also records the highest density of mentally disabled people, 61 per 1,000 households. More vulnerable women-head households are found in Kamabuye, Nyarugenge, and Ruhuha Sectors reaching approximately 14% of the households (Figure 3.6.31).

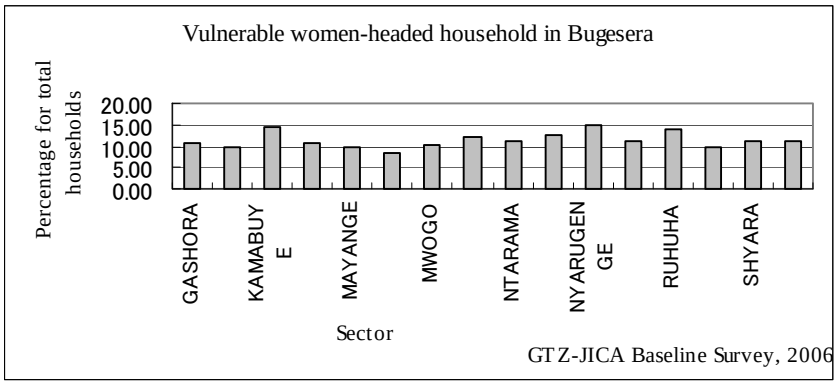


Figure 3.6.31 Vulnerable Women-headed Household

9) Farmers' Organizations

(a) Grain Storage and Sales Cooperatives

Grain storage and sales are very important for food security in Bugesera, where intermittent drought causes frequent famines. The government initiated to establish cooperatives to store local farm produce in order to prevent famine and protect farmers from middlemen who buy crops at low prices.

The cooperatives established by the government have two levels: District and Sector levels. District level cooperative (CODERIBU: Coopérative de Développement et de Ressources Internes de Bugesera, established in October 2005) provided instructions to Sector level cooperatives for their operations. Sector level cooperatives were established in May/June 2006 with shareholders from Sector levels. Each cooperative received credit of Rwf 5million from financial institution (Banque Populaire) with the guarantee of the District.

Sector level cooperatives buy crops from local farmers with higher prices than middlemen. The Sector level cooperatives store crops (sorghum, maize, haricot beans, soybeans and rice) and sell stored crops to local farmers at lower price than market with a margin of Rwf 10/kg. They also sell stored crops to traders who are authorized to buy from the District level cooperative.

Many Sector level cooperatives also provide free storage services for local farmers. When farmers are short of food, the cooperatives return the stored crops. Some sector level cooperatives oblige local farmers to store certain amount of harvest in order to provide food when hungers occur (e.g. 20kg of produce per household in Juru Sector.).

Each Sector level cooperative has a committee. The members of committees are: president, vice-president, secretary, accountant, 3 councillors, and 3 auditors. In some Sectors, Sector agronomist works also as a committee member. In some Sectors, cooperatives work as fertilizer broker in order to help local farmers who cannot buy large amount of fertilizer (e.g. Mwogo Sector).

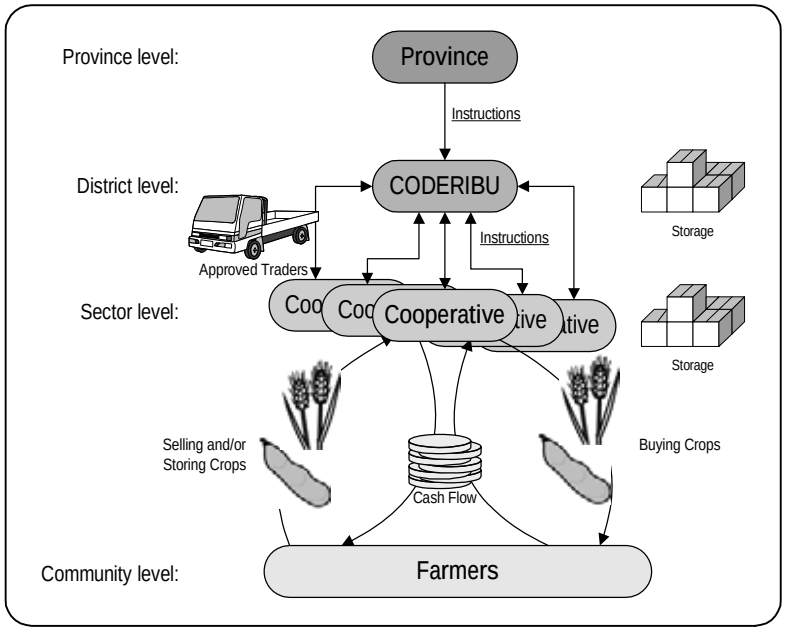


Figure 3.6.32 Flowchart of Grain Storage and Sale Cooperative Scheme

Some cooperatives have already repaid the first instalment to the Bank as scheduled. However, it was observed that many cooperatives have financial problems. It is necessary to evaluate the overall performance of the cooperatives after one year when the repayment period of the loan is completed. Some cooperatives had to terminate buying crops from farmers since initial fund provided by District was not sufficient. In addition, the margins, Rwf 10/kg for any crops, are not sufficient since the costs for operation (e.g. renting warehouses, hiring watchmen) are rather high. It seems that many committee members are currently working without payment. Farmers who want to sell their products quickly are likely to use private unauthorized traders.

(b) Other Cooperatives

Other cooperatives are categorized into 8 types based on types of their commodities (Table 3.6.14). Major characteristics of the cooperatives are summarized in Annex III, Table 3.6.4.

Table 3.6.14 Type and number of cooperatives

Type of Cooperative	Number	Location
Fishing Cooperative	4	Rweru, Gashora, Rilima, Juru
Agricultural Cooperative	3	Rweru, Shayra, Mareba
Rice Farmers' Cooperative	3	Ngeruka, Ruhuha, Mareba
Loan and Saving Cooperative	2	Ngeruka, Nyarugenge (including one association)
Maize Farmers' Cooperative	2	Ngeruka, Juru
Livestock Cooperative	1	Mwogo

Coffee Farmers' Cooperative	1	Shyara
Handicraft Cooperative	1	Gashora
Total	17	

(c) Association

Many associations are existent at a community level in Bugesera. Their activities include the genocide victim support, technical assistance for agricultural production (e.g. seeds distribution, expansion of new technology), development of economic activities (e.g. handicraft production, bicycle taxi), and mutual help (e.g. transportation of sick people). The associations support women-headed households and orphans, promotion of reconciliation, and judgment process for genocide criminals.

Many associations are operated on self-support basis, though some associations receive financial assistance from local/international NGOs. Some associations offer health insurance to member families on credit basis. Members pay fixed regular membership fee and borrow money for medical treatment from the associations when needed.

10) Living Conditions of Local Households

(a) Source of income

Agricultural products are the most important income source for local community. On average 45% of income comes from sales of agricultural products i, followed by daily work (25%), and sales of banana (14%) and sorghum beers (4%) (Figure 3.6.33). Sales of agricultural products are relatively low in Kamabuye, Rilima, and Ruhuha Sectors, where partly replaced by daily work particularly in Ruhuha Sector (income from daily work is 41%). A large income from banana beer suggests that banana is an important product in the region. Sales of banana beer are relatively high in Musenyi, Shyara, Ntarama, Juru and Nyarugenge Sectors exceeding 10% of household income.

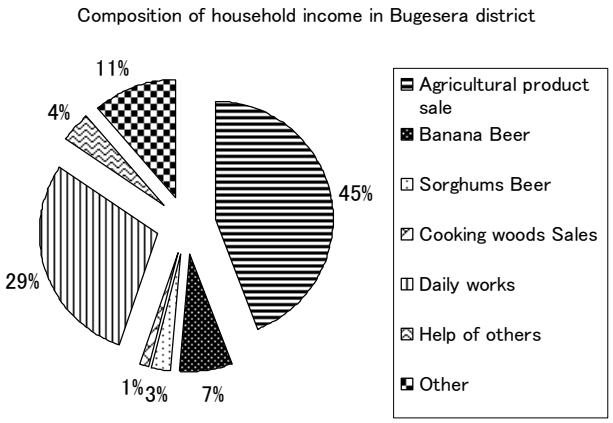


Figure 3.6.33 Composition of Household Income

(b) Housing Conditions

Housing materials reflect the economic status of households. The most common material for roof is iron sheet in Bugesera; more than one-half of the houses (57%) are roofed with iron sheet (the highest in Juru and Mayange Sectors exceeding 70%). In the Sectors along the Akanyaru River (Ntarama, Musenyi, Shyara and Nyarugenge), tile roof is more common, particularly in Shyara (53%) and Musenyi (46%) Sectors (Figure 3.6.34), suggesting higher economic standards in these Sectors. On the

other hand, more than 30% of houses are grass-thatched in the southern 6 Sectors (Ngeruka: 42%, Rweru: 41%, Kamabuye: 37%, Gashora and Ruhuha: 35%), suggesting the larger poor population in these Sectors.

In Bugesera, the clear contrast is observed in house wall materials. Wooden houses are predominant in Musenyi, Mwogo and the seven sectors located in the former Ngenda District, while sun-dried bricks houses are common representing more than 30% in Ntarama, Nyamata, Mayange, Gashora, Rilima and Juru Sectors. This result may suggest low timber availability in these Sectors. On average 1% of houses are made with concrete, indicating the upper class in the society.

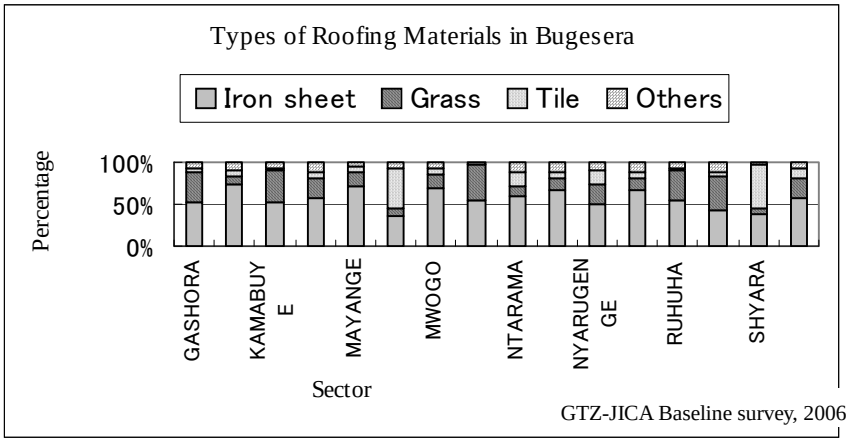


Figure 3.6.34 Types of Roofing Materials

On average 35% of houses are located in umudugudu (houses constructed in settlement sites) or centers/towns. Houses in umudugudu are relatively common in Juru (46%), Rilima (49%), Mayange (50%), and Gashora (45%) (Figure 3.6.38). On the other hand, houses scattered in isolated area are more common in Mareba (55%), Ngeruka (56%), Ruhuha (56%), Shyara (63%), and Nyarugenge (63%).

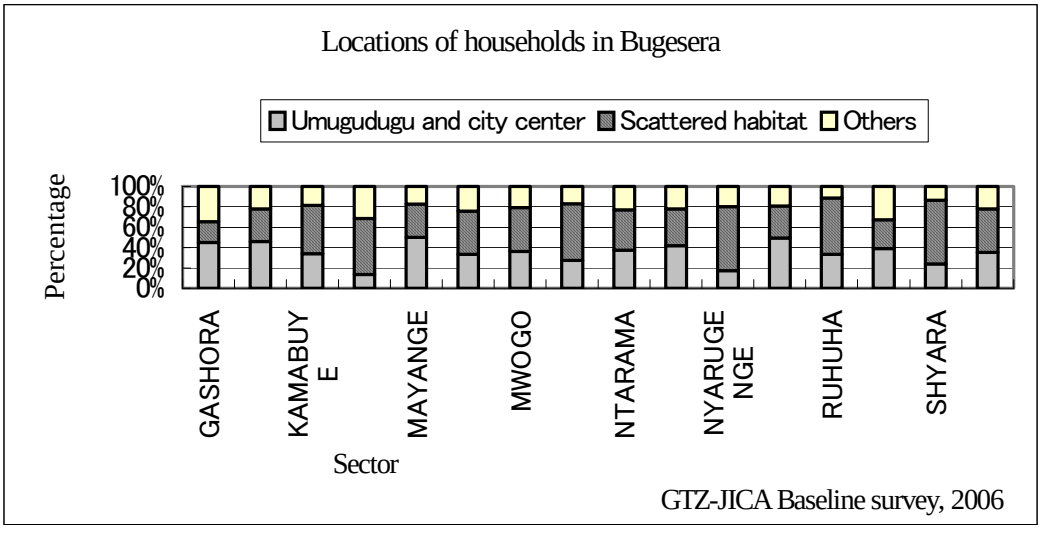


Figure 3.6.35 Location of Households

(c) Energy Source for Lighting

In Bugesera, 80% of households uses kerosene with small tin. Dissemination rates of kerosene lamps

are relatively higher in Nyamata, Rilima, Ntarama, Mayange and Ruhuha Sectors representing more than 10% of households (Figure 3.6.36). Electricity is available in very limited area in Bugesera District; households accessing electricity represent merely 0.9%. Electricity is provided only at the centers of Nyamata and Ruhuha, where approximately 4% of the population uses electric lights.

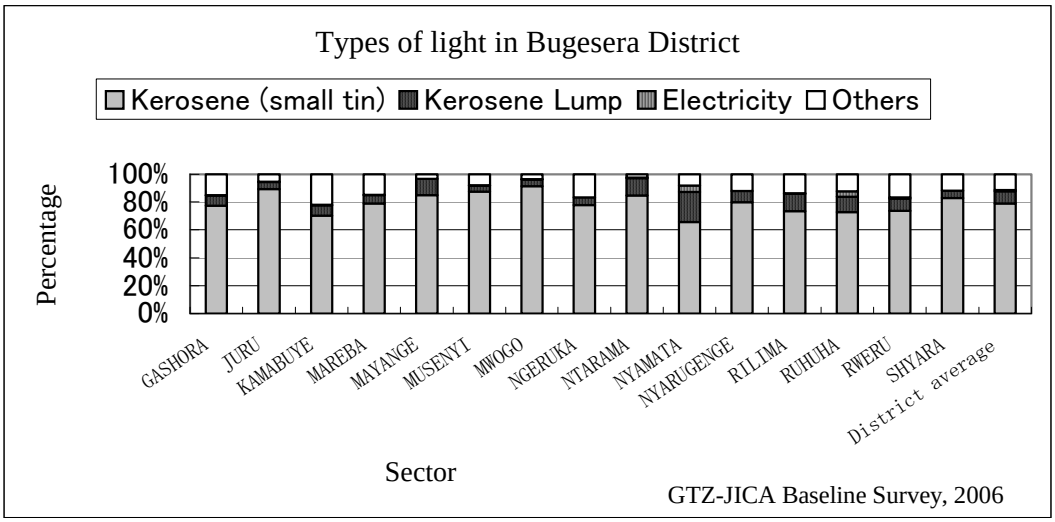


Figure 3.6.36 Types of Light

(d) Source of Cooking Energy

Firewood is a dominant source for cooking energy in Bugesera; on average 73% of the population uses firewood for cooking. Only 2 % of the population uses charcoal. In Ntarama, Nyarugenge and Shyara Sectors, more than 80% of households collect firewood in their vicinity, while more households purchase firewood in Gashora, Rilima and Rweru Sectors, 28%, 16%, and 16% respectively. On average, 10% of households purchases firewood. In particular, households using purchased firewood account for 28% in Gashora. In Juru and Mareba, more than one fourth of households use their own firewood. 70-80% of labours who collect fuelwood are either women or children in Bugesera (REMA, 2006).

On the other hand, local authority has tried to disseminate energy-saving stoves among local people in collaboration with the Rwandan Army. The stove can be made with sun-dried bricks and wooden frames locally provided.

(e) Communication and Transportation

Mobile telephone is more popular than ground line telephone in Bugesera. The number of mobile telephones per 1,000 households is 4-23 times larger than that of ground line telephones. In particular, mobile telephone is popular in Nyamata where 107 mobile telephones are used per 1,000 households.

Radio is a major mass media in Bugesera. On average 53% of households has radio sets. The figures are relatively high in Ntarama and Nyamata Sectors(64 and 61%,respectively), and low in Mareba and Ngeruka Sectors(44%).On average only 1% of households has TV sets in Bugesera. The high

dissemination rates of TV sets are found in Nyamata and Ruhuha Sectors,where electricity is available

Bicycles are the most popular means of transportation in Bugesera. On average 265 bicycles are owned per 1,000 households ranging from 177 bicycles in Shyara to 378 bicycles in Rilima. The eastern half of Bugesera have high possession rate.On average, 5 motorbikes are found per 1,000 households, ranging from 1.4 in Mareba to 17 in Ruhuha, while 7 vehicles are found per 1,000 households ranging from 2.4 in Shyara to 17 in Ruhuha.

Minibus services are operated between Kicukiro (in Kigali) and Nyamata, mainly by private buses. Daily bus services (Kigali-Nyamata-Ruhuha) are operated except for Sunday by ONATRACOM (public bus company). The service terminates at Nyamata on Wednesday.

11) Environment

In Bugesera most of crops cultivated on uplands are grown on slope. The slope level in Bugesera is moderate (<15%), but it is generally agreed that slope steeper than 5% requires erosion control measures. Intensive rainfall in cultivated farmlands on slopes creates large amount of surface runoff with eroded soil. Clearly the Akanyaru and Akagera rivers carry large amount of the eroded soil, losing organic matter and nutrient that can be utilized for crop production.

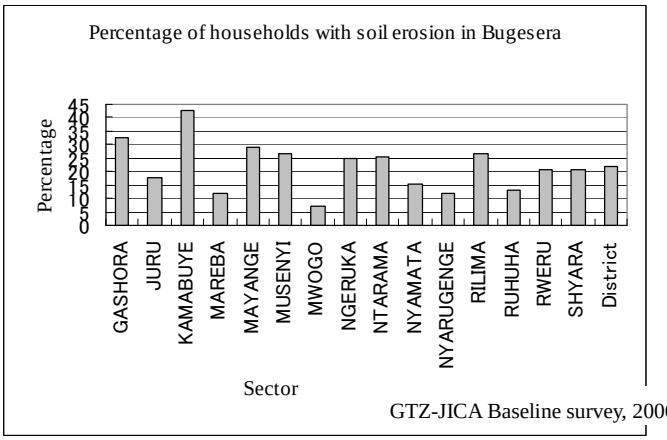


Figure 3.6.37 Percentage of Households Having Soil Erosion

In Bugesera, 22% of the households reports soil erosion, ranging from 7% in Mwogo to 43% in Kamabuye (Figure 3.6.37). Soil erosion control is a common practice in Bugesera. Approximately one-half of the households had erosion control devices in their fields. However, devices such as trenches along the contour in farmlands are not well maintained and often constructed exactly along the contour line, therefore, there may have some danger to increase soil erosion conversely.

Soil conservation in the watershed of the North Cyohoha Lake is particularly critical in order to conserve water resources in the area. The government has started terrace development in Bugesera in 2006. Moreover, soil erosion by road construction through Road Rehabilitation Program between Bugesera and Kigali was observed. Appropriate measures for preventing soil erosion are expected.

Flood

Flood is a large problem for households that have crop fields in marshlands. Approximately 10% of households suffer from flood problems. The flood problem is serious in Mwogo and Gashora Sectors (approximately 20% of households) (Figure 3.6.38). It should be noted that flood is common

throughout the district.

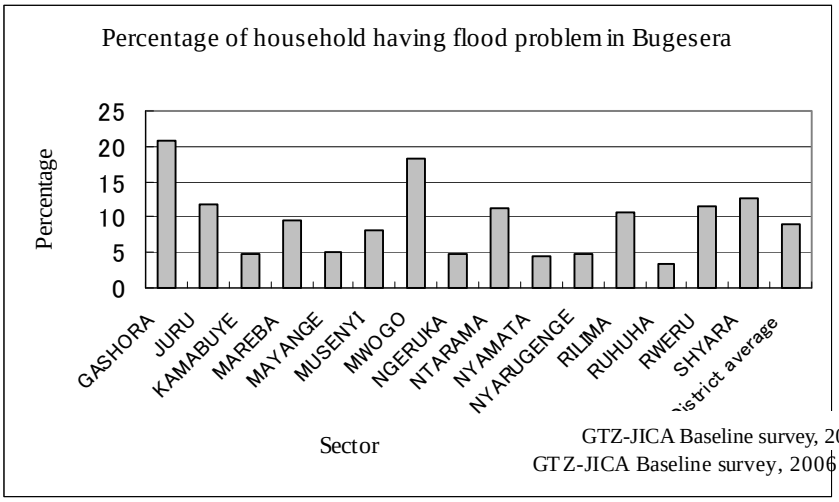


Figure 3.6.38 Percentage of HH having flood problem

Water pollution

In addition to the water supply systems not well distributed in Bugesera, the problems related to water quality is also existent. On average approximately one third of the population reports the problems related to water pollution in Bugesera, the highest in Mwogo, Gashora and Ntarama Sectors (>50%) (Figure 3.6.39). The results of water quality analysis conducted at boreholes in Gashora and Rweru suggested that many indicators (colour, turbidity, conductivity, hardness, the contents of ammonium (NH4+), Sulphate (So4-), Chloride (Cl-), and iron (Fe)) did not meet environmental standards for treated water. In particular, the results of Rweru Sector are serious with regard to hardness, the contents of ammonia, Sulphate and Chloride. Since local population drinks this water, it is essential to provide other water sources with these people.

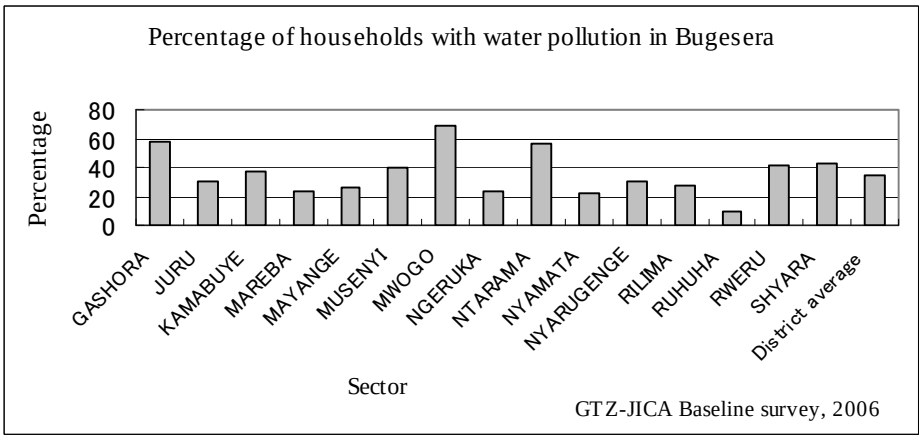


Figure 3.6.39 Percentage of HH Having Water Pollution Problem

3.6.3 Constraints and Potentials

The principal problem in rural and agricultural development in Bugesera is the poverty. The poor nutrition condition and the lack of access to clean water have caused health problems. The poverty

problem is believed to be mitigated by increase in agricultural production as well as livelihood development. Water pipeline systems to distribute clean drinking water is expected to be constructed throughout the district, but effective utilization of rainwater harvest should be also considered in order to increase the water availability.

The problem of low agricultural production is three-fold: 1) flood in marshlands, 2) drought and low soil fertility in uplands, and 3) the lack of lands for agriculture. Unutilized marshlands are expected to be developed based on the orientation of master plan, but the current development is not well organized.

Livestock production is expected to improve livelihoods of the poor. However, the policy intervention does not practically support the entire complex systems. Tree plantings have been largely promoted in the last few years but lacking the integration with land management. Agroforesry, multiple-use of trees to support crop/firewood production as well as maintaining soil fertility, is not well developed.

Establishment of nursery schools for small children and literacy education particularly for women are important in the education sector. High birth rates are pushing up the population, particularly that of small children. Low accessibility to medical care is the main problems of the health sector. The situation of vulnerable people is very serious; the populations of extremely poor people, vulnerable elderly people, and orphans who are not taken care of are many in Bugesera.

(1) Land and Water Resources

1) Scarce land resource for increased population

Displacement of the population caused by the genocide in 1994 has led to massive deforestation in Bugesera. The population increase rate in Bugesera among the districts is the highest in Rwanda. Increased population resulted in continuous cultivation on the same plots, lowering soil fertility particularly on steeper slopes. Average farm size in Bugesera has declined tremendously in the last two decades (11 times increase in the percentage of households with less than one-hectare land) (REMA, 2006). Traditional farming systems based on the fallow system is no longer practiced; no cultivated lands are left for fallow longer than 2 years (REMA, 2006). Relatively well-off farmers purchase the lands especially from the poor immigrant farmers (REMA, 2006). Consequently, many poor farmers lost their lands and have to rent them from others. Usually these poor farmers can rent only marginal lands for agriculture, which are vulnerable against any shock caused by climatic changes. Currently, approximately 30% of the households are landless and another 40% owns less than a half-hectare in Bugesera (GTZ-JICA Baseline survey, 2006). Particularly in Gashora and Nyamata Sectors, approximately a half of the population is landless. On average, 19% of the population rents lands for agricultural production.

2) Scattered farm units

Farming units have become increasingly scattered. More households are forced to have their farmlands

in separated plots. Scattered farming units are a problem for many farmers. Farmers need to carry out premature harvest in order to prevent their products from theft. In addition it is difficult to introduce modern agricultural technologies (e.g. mechanization) to fragmented farmlands.

3) Unstable rainfall and drought

A rainfall pattern in Bugesera is characterized as erratic and unreliable. The amount of annual precipitation is largely varied from year to year, ranging from 761 mm to 1,192 mm at Ruhuha station, 671mm to 1,524mm at Nyamata, and 671mm to 1,082mm at Karama in Gashora. Heavy rain causes serious damage on farmlands in the wet season (e.g. Rweru in May 2006), while the drought causes serious problems in upland agriculture in the dry season.

In recent years, the region receives less rainfall (926mm in the last 12 years compared with 1,061 mm on average during 1977 to 1990). Particularly the droughts in 2000, 2003 and 2004 caused the serious problem in the southeastern parts of Bugesera (Rweru and Kamabuye Sectors). The starvation by drought was pointed out as a problem at 9 Sectors (Ntarama, Juru, Nyamata, Rilima, Mayange, Ngeruka, Mareba, Ruhuha, and Kamabuye) by Sector offices.

The problem of drought not only reduced agricultural production but also reduced local employment, leading farmers to cultivate more marshlands. Farmers have to buy food crops with higher prices since they are not locally produced. Farmers eat less meal per day and eat sorghum, which was originally used for porridge or brewing beer. On average approximately 40% of the population has either one meal per day or having difficulty to have daily meals (GTZ-JICA baseline survey, 2006). The percentage of households that has difficulty to have any daily meal is high in Ruhuha, Shyara, Kamabuye, and Nyamata Sectors, representing 33%, 23%, 22%, and 21%, respectively.

4) Decline of water resource

The watersheds of Bugesera largely consist of 1) the Akanyaru/Akagera river basin, 2) the watersheds of the lakes (Gashanga, Kidogo, Rumira, Mirayi, Kirimbi, Gaharwa, Rweru, South Cyohoha Lakes) located in floodplains of the Akanyaru/Akagera river, and 3) the North Cyohoha Lake basin forming an independent watershed. It is noted that the size of the North Cyohoha Lake has shrunk by 5 km2 due to severe drought occurred in 2000 (REMA, 2006).

(2) Agriculture

1) Low agricultural productivity

According to the interview survey conducted by JICA Study Team, most farmers experience decline in productivity of almost all crops. Farmers perceive that the low production is caused by lowered soil fertility. The comparison study for major crops showed that the productivities on farm in Bugesera are much lower than those demonstrated at ISAR plots (one-fourth for cassava, a half for maize, 20% for beans, and one third for Plantain/Banana), suggesting the large potential for agricultural production

through enhanced technologies. However, current economic conditions do not allow farmers to use chemical fertilizers except for vegetables that are commercially traded. Traditional fallow systems are no longer practiced due to the shortage of lands. The poor soil conditions restrict the choice of crops. It was found that sweet potato that used to be eaten as local defence for food security is produced less due to soil water stress (REMA, 2006).

2) Crop production in marshlands

The soil of marshlands is fertile supported by periodical deposits through floods of the Akagera and the Akanyaru rivers. The total areas of marshlands in Bugesera are estimated as approximately 10,000 ha, whereas the exploited area is only 2,830ha. Ccultivation in marshlands plays an important role for food security. Many marshlands are found in Nyarugenge, Shyara, Musenyi, Ntarama, Mwogo, and Gashora Sectors along with the Akanyaru and Akagera Rivers. These areas did not have severe famine problems during the drought years because of food crops cultivated in the marshlands (e.g. sweet potato).

With the funding of the MINAGRI, the Ministry of Defense (MINADEF) has started development of 2,000 ha marshland in Gashora Sector. The project has already constructed an embankment of 8 km in Gashora to Rilima along the Akagera River. However, the embankment was partly destroyed due to excessive water flow of the river. It was suggested that the construction of the embankment might cause exhaustion of the lakes in floodplains, which are planned to utilize in the irrigation systems in Luxemburg-Development project. Marshland development based on the orientation of Master plan for marshland development and for protection of catchment areas is expected.

3) Enhancement of agricultural production by introducing water-harvesting technologies

Higher crop production can be achieved by effectively utilizing water resources. Roadside irrigation and shallow wells demonstrated in the Quick Projects showed some results.

The roadside irrigation improves crop production in the wet season. Participants of the Quick Project reported faster growth of banana after introducing roadside irrigation. It should be noted that the roadside irrigation not only increases production but also reduces soil erosion on slopes when utilizing the soil deposited on the canals. In addition, the roadside irrigation combined with contour bunds can effectively control water availability in larger crop fields. Water runoff along roads can be also collected in farm ponds and reserved water can be provided to crop fields.

Furthermore, water availability in the dry season at the bottom of hills can be improved by introducing shallow wells. In Bugesera, large areas are covered with the floodplains of the Akagera and the Akanyaru rivers. These floodplains are cultivated in the dry season, but in a limited scale due to the long distance to water of the river. Shallow wells in the floodplains can be promoted in order to expand crop production in the marshlands in the dry season.

4) Rice cultivation

Rice is exclusively cultivated in the marshlands in Bugesera. The areas of existing paddy fields in Bugesera are estimated as 418 ha and are limited to Mareba, Ruhuha, Nyarugenge and Shyara Sectors. Rice cultivation can be expanded to 700 ha, the target cultivated area in 2006.

Rice productivity at farmers' plots is very low as compared with the potential suggested by ISAR (5t/ha against 10t/ha). The causes of low productivities are partly due to disease and pest. According to the interview survey, damage caused by panicle blast reached 60 % of annual production in a marshland in Mareba. Integrated approach against the disease combining the use of agro-chemicals with introduction of resistant varieties needs to be promoted. In addition, damages by birds are largely reported. In order to lower damages by birds, scaring birds by making noise, beating tin and throwing stones to bird flight during the ripening stage need to be conducted.

Several problems are found in drying, milling, and threshing processes. Currently, rice is dried by spreading directly on the ground for four days under sunlight. Drying place made from concrete is desired. A large amount of broken rice is produced through the milling process. The production of broken rice is caused by excessive dryness, mixture of different varieties, inappropriate structure of milling machines, etc. Threshing is largely conducted by trashing rice directly to ground or by stick. A pedal thresher would improve the quality of threshing and lower labor work.

Current capacity of rice storage of cooperative unions is low. In order not to lose the harvest, larger storage capacity is needed. Most of rice farmers in Bugesera use seeds obtained from their own harvest without removing off-type. In order to prevent degeneration, the seeds need to be selected or renewed.

5) Dissemination of anti-mosaic virus cassava varieties

Cassava used to be an important agricultural product for self-consumption and income generation in Bugesera. However, its production has declined dramatically due to low moisture caused by the climate change. Currently the production is only 2200t/year, largely dominated in Musenyi Sectors (73% of total production). In addition, Bugesera has faced serious infestation of cassava mosaic virus. Twenty ha of anti-mosaic virus cassava (AMVC) fields were planned to be established in each Sector in 2006. AMVC needs to be disseminated in order to overcome the problem.

6) Terrance development in hillside agriculture

A large part of Bugesera is under the hilly environment, which is vulnerable against soil erosion. Prevention of soil erosion is one of the main components of national environmental strategies. Combining engineering with vegetative measures can prevent soil erosion. Most of slopes in Bugesera have moderate gradient (less than 12%). For these slopes, progressive terrace development by combining planting with trench on contour lines can be introduced. The front of terraces should be covered by vegetation in order to bind the soil. For steeper slope (>12%), development of radical

terrace is recommended due to the higher water velocity to flow beyond the bunds. Palatable grass for livestock can be also planted along the contour bunds.

It should be noted that after developing terrace, productivity of crops generally declines since it is difficult to maintain the topsoil on the surface, though the productivity is expected to recover in a few years after the terrace establishment. Therefore, in order for farmers to accept terrace development, it is important to provide fertilizers to farmers for maintaining crop yields.

7) Introduction of agroforestry in hillside agriculture

In order to reduce soil erosion and obtain benefits from trees, agroforestry in hillside agriculture should be promoted. Nitrogen-fixing legume trees such as Lesena (Leucaena leucocephala) and Calliandra (Calliandtra calothyrsus) can be planted along contour and used as mulching for food crops as well as forage for livestock.

8) Potential for coffee cultivation

Coffee is the only traditionally exported crop in Bugesera. Currently 5,500 farmers produce coffee in Bugesera, (largely from the south-western part). Three hundred thousands of coffee seedlings were distributed to local farmers through District office in Musenyi, Mwogo, Shyara, Ruhuha and Nyamata Sectors in 2006.

However, these seedlings are non-shade variety that requires large inputs in order to maintain production. Coffee is naturally grown under shade. Considering the poor economic conditions of Bugesera, the use of coffee variety with shade trees that requires low inputs for sustainable production can be recommended. Grevillea robsta, the common species found in farmlands in Bugesera, is utilized as shade trees in other countries. Nitrogen fixing legume trees such as Albizzia spp. and Erytrina spp. have large potential to be introduced as shade trees in Bugesera. These trees can improve soil fertility and sustain coffee production with low inputs. Moreover, coffee plantation mixed with banana trees can be also considered at the lower part of valley.

9) Vegetable cultivation

One of the advantages of Bugesera is its location close to Kigali (30km). The construction of the main roads of Bugesera would dramatically change the transportation of agricultural products. Currently vegetables such as cabbage and tomato are mainly concentrated in Juru and Musenyi Sectors (approximately a half of the production). Production of eggplants and zucchinis are dominant in Mareba Sector (approximately 90%). Currently the use of fertilizer is largely restricted in Mayange Sector due to the implementation of Millennium Village Project. The vegetable production in other sectors by using water-harvesting techniques together with the use of fertilizer can be promoted. Moreover, the vegetable production in the dry season can be promoted by using shallow well in the marshlands.

10) Enhancement of banana production

Banana is an important product in Bugesera. The banana production is estimated as 5,600 t/year in Bugesera (98kg/year/household). On average, the production of banana beer accounts for 7% of total household income. In particular in Musenyi, Ntarama, and Shyara Sectors, the income from banana beer exceeds 13% of the total income. Currently, banana production is concentrated in Musenyi Sector that accounts for 45% of the total production in the district. Varieties of larger fruits with shorter height have higher productivity. Banana production is generally more concentrated in bottom of hills due to the water availability. The production of banana on slope can be enhanced by increased water availability in the soil through the roadside irrigation. In addition, it should be noted that banana could be utilized as a measure for preventing soil erosion by developing banana fields along contours.

11) Potential for fruit cultivation

Bugesera has large potential for fruit cultivation as seen in various fruits produced there. Main fruits produced in Bugesera besides banana are pineapple and avocado (84t/year and 112t/year, respectively) (GTZ-JICA Baseline survey, 2006). However, production of pineapple is concentrated in certain areas in Musenyi and Ngeruka. Passion fruit, mango, and orange are also produced but in a limited scale (6-8t/year) (passion fruit in Ruhuha, Mareba, mango in Juru, Rilima, Rweru and Nyarugenge, orange in Rweru, Gashora, Mareba, and Nyarugenge). Vanilla and macadamia are also introduced and cultivated by some farmers (69 and 72 farmers, respectively). These fruits can be promoted in a larger part of Bugesera.

Fruit trees can be planted in home gardens in order to improve nutritional status and to generate income of local households. In general women are particularly interested in improving home gardens since they are physically attached to their home and concern more about nutritional status of their family (particularly small children). Fruit production in home gardens can be promoted through organizing women's groups. In order to have higher production, it is important to select optimal varieties.

12) Introduction of Moringa trees

Moringa trees (Moringa oleifera) were introduced to Rwanda from Uganda in 2003 by Moringa growers' cooperative and were largely planted in 2006 in Bugesera. Its leaves are edible with high nutritional values and, roots and barks are used as medicine. Ben oil, produced from seeds, is used as cosmetic materials and spice. Moringa planted in Kibungo started producing large amount of fruits in three years after planting. In addition, Moringa can be mix-planted with vegetables/tubers as agroforesry systems. Thus, Moringa has large potential in order to improve nutritional status as well as income generation. Production of Moringa products through cooperatives can be promoted.

(3) Education

Currently, approximately 80% of children (age between 6 and 13 years old) go to primary school. Average illiteracy rate is approximately 20%, which has been improved dramatically since 2002. However, on average 37 % of the population over 15 years old is illiteracy in Bugesera. It may suggest that illiteracy rates were largely improved by children's education. It is also important to provide literacy education for adult. The illiteracy rates of adults are particularly high in Mareba and Rweru Sectors (approximately 60%). The illiteracy rates of female are generally much higher than male (44% against 30% on average). Literacy education for women in these Sectors is the most expected.

At Cell level workshops, it was suggested that nursery schools were in shortage due to the increased number of small children. It is important to increase the number of nursery schools since many mothers of the children are widows and are engaged in economic activities.

(4) Health

On average only 18% of the population in Bugesera has the access to medical care. The situation is particularly serious in Gashora Sector, where only 8.5% has the access to medical care.

The average crude birth rate is 32. The crude birth rate is particularly high in Ntarama Sector (50). On average the rate of giving birth at home is 63% in Bugesera. The figures are particularly high in Mareba, Rweru and Shyara Sectors, where more than 70% of women give birth at home. Training for midwives would effectively support pregnant women in these Sectors.

(5) Livestock Production

1) Introduction of crossbred cattle

Local race of cattle, Ankole is dominant (86%) in Bugesera, well adapted to climatic conditions (GTZ-JICA Baseline survey, 2006). The number of cattle in Kigali Ngari, which includes the current Bugesera, was the second to Umutara in Rwanda, indicating the high potential of livestock production in the district. However, since milk yields of Ankole is low (2 liter per day) compared to European cattle, MINAGRI is promoting "One cow One family" policy, aiming at replacing Ankole with crossbred cows under the zero-grazing system. The introduction of crossbred cows is supposed to help poor family in income generation through milk sale, provide manure to crop production, and improve nutrition status through milk consumption. Currently 10% of cattle in Bugesera is crossbred with European breeds. One hundred crossbred cows were introduced in Musenyi, Mareba and Ruhuha Sectors in the early 2006; however, four of them were reported to have died due to poor animal health care.

Main problems of livestock production in Bugesera are a shortage of fodder crops and poor animal health. It is generally understood that one adult cattle needs one hectare of grazing lands with natural pasture. Availability of grazing lands is limited in Bugesera. Napier grass (Pennisetum tripsacom) is

widely planted in farmlands as a fodder crop in order to feed cattle by cut and carry systems. Fodder crops can be planted for soil conservation measure on contour bunds. Agro-silvopastoral systems to combine crop/livestock production with tree planting should be promoted. If lands are available, associations can be organized to produce forage on public or rented lands.

The lack of vet-technicians, the shortage of animal drugs, and the lack of watering points are considered as problems of livestock production. Outbreaks of tick bone disease, worm disease, Burcelosis, and Foot and Mouth Disease were reported in Bugesera. Improvement of veterinary service is essential in order to modernize livestock production systems. GTZ-JICA baseline survey suggested that approximately one-half of cattle in Bugesera needs to walk longer than 2 km to get to a watering point. Rainwater harvest is expected to introduce in the process of livestock modernization.

2) Small livestock production

Livestock production has great potential for livelihood development for the poor. Livestock can be raised and sold when famine occurs. Small livestock can be raised easier than cattle since their fodder requirement is smaller. In Bugesera, goat is the most common livestock. On average one household owns 1.2 goats. However, its productivity is very low; only 3,700 liter/day of milk is produced. Meat sales are also limited in a few sectors; within 47,000 goats sold annually, 53% is dominated in Rilima and Rweru Sectors. The goat production in other sectors can be increased. Associations can be organized for shared goat herding. It is important to introduce control grazing in order not to degrade lands. Landless farmers in Bugesera often keep rabbits. Rabbits rearing can be also promoted at schools. Technical assistance to support small livestock production can improve the livelihoods of the landless poor.

3) Beekeeping

Bugesera has large potential for beekeeping. Currently there are 2,800 hives explicitly in Rilima and Juru Sectors (GTZ-JICA Baseline survey, 2006). Modern beekeeping techniques can be promoted through organizing cooperatives.

(6) Inland Fishery

The problems of fishery in Bugesera are: 1) overexploitation of fishery resources by excessive number of fishermen, 2) fishery operation using a net with small holes that captures young fish, 3) loss of water in lakes particularly by droughts between 1997 and 2000, and 4) soil erosion that reduces the size of the lakes. Currently there is a serious deficit in stock of parents; survival of fish, particularly that of tilapia, is critical. In the Lake Chohoha North, fishery activities are limited due to the progressive water depletion. It is necessary to protect fish habitat in order to secure fish production.

(7)Vulnerable Population

1) Orphans

Approximately 10,000 orphans live in Bugesera, 42% of which lives alone (GTZ-JICA Baseline survey, 2006). More orphans who live alone are found in Mareba, Mayange, Ngeruka, Ntarama, Nyamata, Rilima and Ruhuha Sectors exceeding 300 orphans. In particular Ruhuha and Mayange more than 400 orphans live without care.

2) Widow and widowers

The population of widow/widower in Bugesera is tremendously high. On average 204 widow/widowers per 1,000 households live in Bugesera (GTZ-JICA Baseline survey, 2006). The density of widows/widowers are relatively high in Ntarama, Ruhuha, Kamabuye, and Mareba Sectors, having 253, 236, 234 and 227 widows/widowers per 1,000 households, respectively. Moreover, widow/widowers who are victims of the 1994 Genocide represent only 5% on average. The figures exceed 10 % in Ntarama, Nyamata, and Ruhuha Sectors. In these Sectors, Genocide related Funds (e.g. FARG: Fonds d'Assistance aux Rescapés du Génocide/Genocide Survivors Fund) could be utilized for their supports.

3) Income generation activities

Grass-thatched houses, which are considered to be an indicator of the poor economic status, represent a quarter of the total house number in Ngeruka, Rweru, Kamabuye, Gashora and Ruhuha Sectors. In fact torrential rainfall destroyed many grass- thatched houses and caused injuries of many people in Rweru in May 2006. Income generation activities can be focused on these Sectors.

Papyrus (Cyperus papyrus) covers a large part of marshlands in Bugesera. Papyrus is used to produce baskets as well as materials of roof. Sisal (Agave sisalana) is naturally found in Bugesera and used for weaving materials. Production of weaving products can be promoted by organizing women's groups.

(8) Farmers' Organizations and Extension Services

1) Potential and problems of cooperatives

Cooperatives play an important role in stabilizing their members' livelihoods in Bugesera. According to the interview survey, many cooperatives are likely to work reasonably well. For instance, grain storage and sales cooperatives, which were established in 2006 in each Sector by the government, are currently well functioning and protecting farmers from middlemen. Cooperatives have committee members who manage daily activities and provide credit systems to their members. The credits are provided to their members with interests for economic activities (e.g. buying seeds and fertilizers) and without interests for emergency needs (e.g. death of a family member, repairing a house).

However, our interview survey also suggested that it is difficult for cooperatives to collect the repayment from their members. The difficulty of repayment for the farmers is largely caused by low agricultural production. Therefore, in order to raise productivities it is important for cooperatives to provide technical assistance in farming to their members. Extension services of advanced farming

practices should be carried out by various means (e.g. distribution of pamphlets, group trainings, study tours) combining water harvest technologies (e.g. development of farm pond, irrigation and drainage canals) with agronomical technologies for higher yields (e.g. fertility control, soil erosion control, appropriate seed selection, disease and pest control).

In addition, it is likely that the management skills of committee members are not sufficient for their operation. Administrative supports for the cooperatives are very limited. Many cooperatives need member training for both organization management and technical development.

2) Lack of Agricultural Extension Service

In Bugesera, the personnel engaged in agricultural extension is limited: only five staff in Planning, Economic Development and Employment unit in the District office (director, and specialists in agronomy, cooperatives, coffee crop, project, and planning), and one agronomist in the Sector office of Ntarama. The functions imposed to the District and Sector Officers are largely confined to communication with the central level, planning and monitoring work. Thus, public agricultural extension service is extremely limited. The most critical constraint for the extension service is lack of transportation.

Approximately 60% of households have radio sets in Bugesera; hence radio programs can be used for extension of agricultural technologies. Currently MINAGRI has a radio program for agricultural extension (twice a week, 30 minutes). This program can be enhanced specifically for Bugesera agricultural development.

(9) Forest Resources and Environment

1) Loss of forest resources caused by the expansion of croplands and savanna

Before 1970s, Bugesera was largely covered with natural forests. However, the land use in Bugesera was dramatically changed in the last 2 decades. Since the beginning of 1970s, immigration to Bugesera from all parts of Rwanda has destroyed natural forests for their resettlement and agricultural fields. As a result, the areas of marshlands, rangelands as well as small forest plantations were declined and converted into farmlands. It was estimated that two-thirds of forests were lost in the last four decades (REMA, 2006). In addition, compared with the land use map in 1978 with that in 2000, it is observed that large croplands have changed to grasslands with sparse shrubs particularly in the eastern parts of Kamabuye and Ngeruka Sectors (REMA, 2006). Currently only 2% of the lands are forest areas in Bugesera. Protection of remaining forests as well as developing new woodlots, particularly on upper parts of the hills are important because they will prevent soil erosion and that the humus created in the soil by the forests would provide crops in the lowlands with nutrient through in the surface runoff.

2) Shortage of firewood and tree plantation

The high demand for firewood, the main source of energy, has accelerated deforestation. Bush fires leading to land degradation and deforestation are very frequent during the dry season, particularly in the eastern and south-eastern parts of Bugesera

More than 80% of households in Bugesera collect fuelwood for their cooking energy in their vicinity. Main species used for cooking energy are Eucalyptus, Gravelia, Cassia, Euphorbia, etc. (REMA, 2006). Euphobia spp., one of the most commonly trees found in Bugesera has very low calorific contents; therefore, it is least preferred for firewood. Suitable trees for fuelwood should be promoted.

Trees are largely planted in Bugesera by the government initiatives. 2.8 million trees were planted in 2003-2006. On farmlands, Cassia spectabilis, Grevillea robsta, Cedrela sp. are often found. Gliricidia sepium, the common agroforestry legume tree largely used for fencing, was introduced from Uganda and is expected to be introduced in Bugesera.

Development of woodlots for fuelwood, Protection of riparian zone, and recuperation of degraded lands by tree planting can be considered. Moreover, it should be noted that Bugesera has a problem of termites that eat up young trees and nurseries. Planting of termite resistant trees or use of pesticide is important.

Energy-saving stoves made from local materials are promoted among local people in collaboration with MINIDEF (the Rwandan Army). Solar stoves for cooking, which can be made with low cost and operated without any fuel, can be promoted. Promotion of energy-saving stoves can be prioritised in Gashora, Rilima and Rweru Sectors where more households purchase firewood.

3) Waste disposal

According to the GTZ-JICA Baseline survey, on average 82% of total households has waste disposal in Bugesera. It is likely that waste disposals were well distributed due to the government's promotion to set up two pits per household (one for incombustible and the other for combustible garbage). It may imply that local population follows administrative guidance if they are useful for their livelihoods. Use of organic waste for crop production should be promoted.

4) Flood control

Farmlands located near marshlands are vulnerable against flooding. According to the GTZ-JICA Baseline survey, approximately 10% of households suffers from flood in Bugesera. The flood problems are more serious in Gashora and Mwogo Sectors. In order to protect the farmlands from flood, trees can be planted along the river at the bottom of the hills. Bamboos, which have a strong root system, are plants with high potential for protection of riparian zone.

5) Marshland conservation

Marshlands are important habitats for animals. Bugesera has large marshlands (approximately 10,000

ha) along the Nyabarongo and the Akagera Rivers covering floodplains. The marshlands in Bugesera harbor not only fish species (e.g. catfish, tilapia) but also reptiles (e.g. cobra, crocodile), and large mammals (Hippopotamuses). Biodiversity of birds are abundant in marshlands. A threaten bird on IUCN list (e.g. Laniarius mufunbiri) and other birds on CITES list (Bostrychia hagedash, Bubulcus ibis, Ploceus cucullatus) were found in the Lake Rweru. However, the results of bird survey at the Lake Rweru showed the reduction of bird species3. It may suggest that the loss of nest trees due to marshland exploitation by agricultural cultivation threatens bird habitats. Fauna protection should be considered in the process of marshland development.

3.6.4 Project Components to be necessary for Agriculture and Rural Development

Based on the data/information until now and lessons learnt from the implementation of the QP as well as considering of capacity on the stakeholders regarding rural development project such as administrator and community leader together with community needs, the draft project components are scrutinized based on the following four major concepts.

1) Food security based on sustainable farming practice using the local natural resources effectively
2) Income generating activities based on low/zero cost and feasible technology
3) Improvement of living environment focusing on reduction of housekeeping by women and children
4) Development of hilly terrain and marshland are compatible with conservation of natural environment

Anticipated project components are strongly related to Program/Project

[3] Etudes Relatives à la Protection Intégrée et Conservation des Ressources Naturelles des Zones Humides Cretiques du Rwanda, MINITERE.

Table 3.6.15 Components to be necessary for Agricultural and Rural Development and its

Program Name	Food Security				Livelihood Improvement			
Project Name / Necessary Project Component	Small Scale Infrastructure	Farming Betterment, Extension	Marshland Paddy Reclamation	Development of Hilly Area	Promotion of Livestock Farming / Fishery	Livelihood Improvement	Improvement of Living Environment	Conservation of Natural Environment
Construction of Small-scale Reservoirs / Weirs	***	*	*	*	*	*	*	*
Improvement of Existing Paddy Irrigation Facilities	***	*	*	*		*		
Rearrangement of Parcels	***	*	*	*				*
Hillside Terracing	*	*		***				*
Agro-forestry Practices		***		*		*		*
Water Harvesting Practices (Utilization of Roardside Rainwater)		***		*		*		*
Introduction of Chemical Fertilization		***	*	*		*		
Small-scale Irrigation System with Shallow Well				***	*			*
Preparation of Fermented Organic Manure		***	***	*	*	*		
Improvement of Model Plots		***	*	*				*
Diversification of Crop types (e.g., mashrooms)		***	***	*	*	*		*
rice seed, Pinapple, and Upland NERICA)		*	*	*		***		
Introduction of Bio pesticides (Neem, White popinac, and Moringa)		*	*	*		***	*	*
Distribution of Mosaic Virus-resistant Cassava								
Promotion of Coffee Cultivation								
Prevention Works of Soil Erosion		***	***	***			*	***
Utilization of Public Nurseries (e.g., Papaya, Avocado, Mango)		***		*		*	*	
Improvement of Paddy Cultivation		***	***			*		
Introduction of Dairy Cattle (Promotion of Dairy Farming)				*	***	*		
Strengthening of Linkage between Research and Extension		***	*	*	*	*	*	
Support of Establishment and Strengthening of Farmers' Association (e.g. AS, Agricultural Cooperative)						***	*	
Rearing of Small Livestock (e.g., Chicken, Rabbits, Goats, Pigs, Ducks)					***	*		
Reconstruction and Extension of Rural Roads	*						***	*
Processing of Agricultural Products (e.g., Food Storage)	*				*	***	*	
Micro-Credits		*	*		*	***		
Aquaculture in Sweet Water					***	***		
Apiculture						***		
Handicraft Manufacturing Activities						***		
Campaign for Increase in Utilization Percentage of Improved Cooking Stoves						***	*	
Greenization (Public Facility, Homestead)							***	***
Intoduction of Rainwater Storage Facility System							***	*
Introduction of Purification Equipment for Marshland Water, etc.							***	
Introduction of Solar Cooker						*	***	***
Introduction of Biogas System Utilizing Livestock Manure						*	***	***
Introduction of Oil Press (e.g., Sunflower seed) and Extractor (Juicer)						*	***	
Homestead Vegetable Garden / Orchards		*		*	*	*	*	***
Anti-Malarian Measures			*		*	*	*	***
Monitoring of Lake/River Water Quality			*			*	*	***
Alphabetization （Lecturers: Teachers and Students of Primary Schools)						*	***	
Improvement of Access to Clinics						*	***	
Vocational Training						***	*	
Study Tours	*	*	*	*	*	*	*	*
Installation of Bulletin Board （Information sharing）	*	*	*	*	*	*	*	*

*** : Major Components, * : Highly Related Components, ▭ : Project Implemented in QP

CHAPTER 4 ENVIRONMENTAL CONSIDERATION

4.1 Environmental Evaluation System in Rwanda

4.1.1 Environmental Law in Rwanda

(1) Objectives

As a fundamental environmental law, the Environmental Law was enacted in April 2005. This Law shall:

1. Regulate the environment, people and their habitats;
2. Establish fundamental principles related to environment protection , any means that may degrade the environment with a view to promoting natural resources, discouraging any hazardous and destructive factor;
3. Promote the social welfare of the population considering equitable distribution of the existing resources;
4. Consider resource sustainability, putting emphasis on equal rights for present and future generations;
5. Ensure to all Rwandans sustainable development that is friendly for environment and social welfare of the population;
6. Establish strategies to protect and reduce negative effects on the environment and replace the degraded environment.

(2) Fundamental Principles

The fundamental principles are set forth as follows:

1. **Protection principle:** activities considered or that are likely to have negative impacts on environment shall not be implemented, even though such impacts have not yet been scientifically proved. Scientific uncertainty should not be taken into consideration for environment harm; rather it should be used in environment conservation.

2. **Principle of sustainability of environment and equal opportunities among generations:** The right to development must be achieved in consideration of the needs of present and future generations.

3. **Polluter pays principle:** Every person who demonstrates behaviour or activities that cause adverse effects on environment is punished or is ordered to make restitution. He or she is also ordered to rehabilitate it where possible.

4. **Principle of information dissemination and community sensitization in conservation:** Every person has the right to be informed of the state of environment and to take part in devising strategies aimed at protecting the environment.

5. **Cooperation principle:** Authorities, international institutions, associations and private individuals are required to protect the environment at all possible levels.

(3) International Convention on Environmental Protection

Rwanda government signed a number of international conventions on environmental protection such as Kyoto Protocol to the Framework Convention on Climate Change in 1998, and Cartage a Protocol on Biosafety to the Convention of Biodiversity in Nairobi in 2000,etc. Detail is shown in Annex IV, Table 4.1.1

4.1.2 Marshes Order in Rwanda

MINITERE established "Ministerial Order No.2 of 24/9/01 related to the Exploitation and Management of Marshes in Rwanda" (hereinafter referred to as "Marshes Order") in September 2001. This Marshes Order has the following objectives:

This Order concerns the use and management of marshes before putting in place a policy and a law on marshes.

Marsh lands are administered and allocated by the Minister holding lands within his remit or by his delegate. Applications for allocation of marsh lands are submitted to the Minister holding lands within his remit through the Minister having in his/her attributions the activity to be carried out in the marsh. This Minister holding lands within his remit allocates the land for rent while the concerned land's exploitation permit or authorization is issued by the Minister holding the involved activity within his remit.

All marsh development and exploitation works shall be preceded by a study of the said works' impact on human health and environment. Those works shall be started upon the approval by the Minister holding environment protection within his remit.

4.1.3 Land Law in Rwanda

(1) Objectives

MINITERE established "Organic Law No. 08/2005 of 14/07/2005 Determining the Use and Management of Land in Rwanda" (hereinafter referred to as "Land Law") in July 2005. This organic law determines the use and management of land in Rwanda. It also establishes the principles that are respected on land legal rights accepted on any land in the country, as well as all other natural or artificial appendages.

- Urban and rural land
- Individual ownership of land
- State land (public domain/ Private state owned land)
- District, town and municipality land

(2) Categorization of Land

The land is categorized into the table right:

4.2 Conservation Activities in Bugesera District

The Unit of Land, Urbanization, Habitat and Infrastructure is established in Bugesera District Office. Three staff members are assigned in this unit, namely Director of Unit, a staff member in charge of infrastructure, and staff member in charge of environment and natural resources. The projects on environment in Bugesera District Action Plan in 2006 are shown in Table 4.2.1.

Table 4.2.1 Project on Environment in Bugesera District Action Plan 2006

Service	Local Target 2006	Budget ('000Rwf)			Implementing Body
		District	Others	Total	
Sensitize the population on environment conservation	80% of the population have been sensitized about environment conservation	6,000	0	6,000	District and MINITERE
Combat water hyacinth from rivers and lakes	Uproot all water hyacinth found in Bugesera lakes	12,000	0	12,000	District and MINITERE
Protect and increase forest production	Plant 2,000,000 tree seedlings	11,947	1,936	13,883,	District, Vi Life and PASAB

4.2.1 A Forestation Activities

In general, MINITERE implements the planning of a forestation across the country, and distributes tree seeds, mainly Grevillea robusta, Cedrela sp., to each Province. MINITERE works in cooperation with ISAR, which produces seeds. Each District is provided with seeds from province and budget from MINECOFIN, and Districts distribute seeds and budget to each Cell through Sector. Cell office plants seeds at its nursery through "Umuganda" or NGOs such as PASAB (the project of Caritas, NGO) and PAFOR. Seedlings are freely provided to the population, the population plants seedlings at their farmland and some public space such as roadside, which is appointed by Cell office. In response to the government policy, planting 2 million tree seedlings for a forestation as described in Table 4.2.1 is under way in Bugesera District in collaboration with ISAR, Vi Life (NGO) and PASAB and Mayor in Bugesera disclosed in July that trees will be planted around the lakes this year.

4.2.2 Soil Erosion Control

MINAGRI is the responsible agency for soil erosion control. Three methods for soil erosion control are adopted in Rwanda, such as Contour Bund, Trench Ditch, and Terracing. Contour Bund method is to set up the bank along the counter line; some grasses such as Napier grass (Pennisetum purpureum) are planted on the backs. ISAR implemented a pilot project in Murama in partnership with the local association called TITA (Turwanye Isuri Tuzigama Amazi). This method is suitable for gentle slope, so ISAR envisages spreading this method in Bugesera District.

Trench Ditch method consists in setting up ditch (length: 10m, width: 40~50cm, depth: 30cm). These ditches are found in some places in Bugesera District. However this method is for steep slope, therefore ISAR researchers intend to stop using this method in Bugesera. Although terracing is relatively effective at steep slope and it is costly, that method is found in most of farmlands in Bugesera District. However, small-scale soil erosion controls such as check dam, fence with rock and trees crossing the trails are not found.

4.2.3 Extermination of Water Hyacinth

The water hyacinth (Eichhornia crassipes) found over the entire extent of wetlands constitutes a serious threat for their biological resources and inland fishing activities. Among the damaging effects of the water hyacinth, one can point out the degradation of the quality of water since it covers water

and leads to the reduction of the quantity of dissolved oxygen, pH and temperature, the direct result of this being the reduction and disappearance of the biodiversity of affected wetlands. So MINITERE is looking for ways and means to exterminate it from some lakes.

Many Donors, NGOs, Associations, etc. practice environmental protection activities; however its actual conditions, such implementing body, location, term, kind of activities, etc., are not clear. JICA Study Team will continue data collection and field reconnaissance.

4.3 Considerations Needed for the Project Implementation

The following activities on rural and agricultural development are prohibited by the Environmental Law:

- ✓ Dumping or disposal of any solid, liquid waste or hazardous gases substances in a stream, river, lake and in their surroundings;
- ✓ Damaging the quality of air and of the surface or underground water;
- ✓ Non authorized bush burning;
- ✓ Dumping any substances, in any place, which may 1) destroy sites and buildings of scientific, cultural, tourist or historic interest,; 2) kill and destroy flora and fauna; 3) endanger the health of biodiversity ; and 4) damage the historical sites and tourist beauty at the lakes, rivers and streams;
- ✓ Dumping in wetlands 1) wastewater, except after treatment in accordance with instructions that govern it; and 2) any hazardous waste before its treatment;
- ✓ Damaging the quality of water;
- ✓ Keeping or dumping waste in a place where it may 1) encourage the breeding of disease carriers; and 2) disrupt the people and the property;
- ✓ With exception of activities related to protection and conservation of streams, river and lakes, an agricultural activities shall respect a distance of ten (10) meters away from the banks of streams, and rivers and fifty (50) meters away from the banks of lakes. In such distances, no agricultural activities shall be allowed;
- ✓ No pastoral activities that require agricultural activities in swamps that shall be carried out without respecting a distance of ten (10) meters away from the banks of rivers and fifty (50) meters away from the lake banks. Cattle kraals shall be built in a distance of sixty (60) meters away from the banks of streams and rivers and two hundred (200) meters away from the lake banks. The location of fish ponds as well as species of fish to be used in fish farming shall require authorization from the Minister having environment in his or her attributions or any other person the Minister shall delegate;
- ✓ To construct houses in wetland (rivers, lakes, big or small swamps), in urban or rural areas, to build a sewage plant that can damage such a place in various ways, and to construct in a distance of twenty (20) meters away from the bank of the swamps.

The following activities on rural and agricultural development are prohibited in the Marsh Order:

- ✓ Agricultural activities are allowed 10 m away from the rivers' bank and 50 m away from the lakes' shores. No agricultural activity is allowed within those limits. However, a Governor of Province may decide otherwise according to the marsh's dimensions. In the case of many provinces' convergence on one and same marsh, it is up to the Governors of involved Provinces to decide; in case of disagreement, the Minister holding agriculture within his remit shall decide.
- ✓ It is prohibited to plant in the marshes tree species likely to threaten environment, particularly those derived from modified living organisms.

- ✓ Pastoral activities shall respect the margin of 10 m away from the rivers' banks and that of 50 m away from the lakes' shores. Building cowsheds for cattle is strictly prohibited within a belt of 150 meters adjoining the 10 meters of the bank from rivers and 50 meters for lakes. The location of fish ponds, as well as species of fishes to be used in fish farming require the common consensus of the Ministries in charge of animal resources and environment.
- ✓ It is prohibited to plant eucalyptus and banana trees in marshes except for the purposes of protecting environment and this only after consensus between the Ministries holding agriculture, forestry, animal resources and environment within their remit.
- ✓ It is prohibited to carry out fishing and hunting activities in marshes without a written authorization. Authorization to fish in marshes is granted by the Ministry holding animal resources within its remit except for marshes located within the limits of National Parks. For this case, it is up to the Rwanda Tourism and National Parks Authority to issue authorization after consensus with the Ministries holding animal resources and environment within their remit. In case of dispensation, authorization to hunt in marshes shall be issued by the Rwanda Tourism and National Parks Authority (ORTPN) after consensus with the Ministry holding environment protection within its remit.

4.4 Environmental Impact Assessment (EIA)

4.4.1 Basic Concept for EIA in Environmental Law

Environmental Impact Assessment (hereinafter referred to as "EIA") is prescribed in Environmental Law. EIA is subscribed in the Environmental Law as follows:

- Every project shall be subjected to the environmental impact assessment, before obtaining authorization for its implementation. This applies to programmes and policies that may affect the environment. An order of the Minister having environment in his or her attributions shall determine the list of projects mentioned in this organic law.

EIA shall at least indicate the following:

1. A brief description of the project and its variants;
2. A study of direct or indirect projected effects on a place;
3. Analysis relating to the initial state of a place;
4. Measures envisaged to reduce, prevent or compensate for the damage;
5. Reasons based on in selecting such place;
6. A brief description of points from 1. to 5.
7. An explanation of the methods that will be used in monitoring and evaluating the state of the environment before, during the activities of the project, in using the installation but particularly after completion of the project;
8. An estimation of cost of the measures recommended to prevent, reduce or compensate for the negative effects the project may cause on the environment as well as the measures for examining and controlling the status of the environment.

EIA shall be examined and approved by REMA or any other person given a written authorization by REMA. The promoter pays a levy reduced from the operating cost of his or her project excluding the working capital. This tax is determined by the law establishing the National Fund for the Environment. EIA shall be carried out at the expense of the promoter.

4.4.2 EIA Regulations and EIA Guidelines

EIA Regulations and EIA Guidelines are being prepared by REMA and are to be approved in the near future. JICA Study Team obtained the Draft EIA Guidelines and some information through interview survey to REMA staff, local consultants, and literates. In this section, the expected outline is

discussed.

(1) Projects requiring EIA

Projects related to rural and agricultural development, which require EIA, are as shown in Table 4.4.1. The scale or classification of new project/ rehabilitation project is scarcely prescribed, except "reclamation and drainage of swampland" and "irrigation projects on land" for the scales and infrastructure projects for classification of new project/ rehabilitation project.

Table 4.4.1 List of Projects Requiring EIA related Rural & Agricultural Development (Under Discussion)

Developments on lakeshores, riverbanks, rivers, lakes and wetlands

- Reclamation of land from wetlands
- Dredging/ mining on lake bottoms and riverbeds

Land use and Construction projects

- Construction of schools
- Construction of hospitals and healthcare facilities

Glass and ceramics

- The manufacture of grass and fiberglass
- The manufacture of ceramic products by burning, in particular roofing tiles, bricks, refractory bricks, floor tiles, stoneware or porcelain

Forestry

- Planting commercial forest plantations on more than 5 hectares
- Harvesting more than 2 hectares of forest cover at once
- Planting non-indigenous trees
- Making more than half a ton of charcoal
- Activities carried out in national parks or around national parks

Rubber industry

- Manufacture, treatment and recycling of rubber products

Extractive industry

- Hard rock quarry [Including restoration of disused quarries]
- Soft rock quarry
- Gravel quarries
- Sand quarries
- Clay quarries
- Groundwater abstraction wells and artificial recharge schemes
- Mineral processing industries [Including cement processing plants, rock processing plants, ready-mix concrete plants, concrete block/ brick plants, tarmac production plants and lime kilns.]
- Salt extraction schemes

Agricultural projects

- Reclamation and drainage of swampland of more than 5 hectares
- Irrigation projects on land exceeding 5 hectares
- Commercial livestock projects [Including commercial rearing of poultry, pigs, rabbits, beef cattle, dairy cattle, ostriches and crocodiles (and any other animals which can create an ecological imbalance if they escaped into the wild)]
- Aquaculture projects (farms and hatcheries) rearing aquatic plants or animals on more than 5 hectares
- Commercial fishing
- Greenhouses and protected crops
- Crop and animal farming activities on more than 50 hectares that use fertilizers and chemicals to increase production
- Agricultural activities that use hybrid seeds
- Agricultural activities that use pesticides
- Farming of non-indigenous crops and animals

Food processing

- Manufacture of vegetable or animal fat
- Packing or canning of animal or vegetable products
- Manufacture of dairy products
- Beer brewing
- Bottling of beverages
- Baking and confectionary
- Animal slaughter houses and abattoirs
- Manufacture of industrial starch
- Fish meal or fish-oil industry
- Sugar processing
- Commercial production of livestock feeds
- Commercial grain storage and milling
- Coffee processing plants

Infrastructure

[including construction and rehabilitation]

- Road projects, bridges and tunnels
- Landing sites or boat marinas on lakeshores
- Dams, reservoirs or other installations for storing water on a long-term basis
- Pipelines, sewers and underground electricity or communications infrastructure
- Solid waste management (collection, transportation and disposal) facilities [including landfills, transfer stations, incinerators, recycling facilities and waste processing/ treatment destruction plants.]
- Liquid waste management facilities [including industrial wastewater and sewage treatment plants.]
- Water treatment, supply and distribution infrastructure
- Telecommunications infrastructure [including masts, base stations and optical cable networks]

Textile, leather, wood and paper industries

- Manufacture of fiberboard and plywood
- Manufacture of pulp and paper
- Fiber drying factories
- Cellulose processing and production facilities
- Tannery and leather industries
- Timber treatment and processing facilities

(2) EIA Procedure

The outline of EIA procedure is as follows: Flow diagram of the procedure is shown in Annex IV, Figure 4.4.1.

1) Project Application and Registration by REMA

The first step of the EIA process is the submission by a developer of an application for EIA of a proposed project to the REMA in the form of a Project Brief. REMA registers the Project Brief as the developer's formal application for an EIA. The purpose of a Project Brief is to provide sufficient information on the project to enable the REMA establish whether or not the proposed activities are likely to have significant environmental impact, and also enable to determine the level of EIA required (screening). If adequate mitigation measures are identified in the Project Brief, this may eliminate the need for a full EIA and a project may be approved with or without implementation conditions.

A Project Brief shall contain the following information:

- Details of the developer;
- An explanation of the nature of the opportunities and problems being addressed by the development, and of its general economic, social and environmental objectives;
- A description of the general strategy employed, and of the production process and operational methods to be used, and any alternative methods considered, in reaching the social, environmental and economic objectives of the development;
- An indication of the proposed duration of the project and a justification for its preference;
- An indication as to where the project is economically

2) Screening

Screening carried out by the REMA is a process to determine impact level of a proposed project, which then determines extent of the EIA study. When REMA receives the Project Brief, it reviews it seeking input from appropriate Local Governments and other relevant stakeholders. Based on information in the Project Brief and established project screening criteria of the project site shown in Box below, REMA determines whether or not an EIA is required and the developer is accordingly notified. Screening enables categorization of projects according to their Impact Level as follows:

- Impact Level 1: Project not requiring further environmental analysis
- Impact Level 2: Project not requiring a full EIA but necessitates further level of assessment
- Impact Level 3: Project requiring a full EIA

Box Screening Criteria of the Project Site

The project is not located in, and will not affect, environmentally-sensitive areas such as:

1. National parks
2. Wetlands
3. Productive agricultural land

4. Important archeological, historical and cultural sites
5. Areas protected under legislation
6. Areas containing rare or endangered flora or fauna
7. Areas containing unique or outstanding scenery
8. Mountains or developments on or near steep slopes
9. Forests
10. Lakes or their shores
11. Areas important for vulnerable groups such as fishing communities
12. Areas near high population concentrations or industrial activities where further development could create significant cumulative environmental problems
13. Groundwater recharge areas or drainage basins

3) Scoping and Terms of Reference (TOR)

Scoping is the initial step of the Environmental Impact Study (EIS) phase and involves input from relevant stakeholders and developer to obtain their comments on what should be included in the study and what alternatives should be included in the study and what alternatives should be considered. Screening is the role of REMA.

4) Environmental Impact Study (EIS) Reporting & Submission

EIS phase is the investigative stage of the EIA process for which a developer hires EIA experts. This phase begins by a developer selecting expert(s) among the list of EIA experts provided by REMA. The developer and EIA expert shall work together throughout the EIS phase to develop adequate measures to mitigate negative impacts and enhance positive ones. After completion of EIS, EIA experts produce EIA Report including Environmental Management Plan (EMP), and Developer submits EIA Report to the REMA.

5) EIA Report Review and Decision Making

Review of EIA documents submitted to the REMA enables subsequent decision-making on either approval or disapproval of a project. Once EIA documents are received by REMA, copies are forwarded to Local Governments and the general public so that they can provide comments that would be useful in making the final decision about proposed project approval. During the process to review EIA report, public consultation is conducted by REMA. At the level of REMA, two committees, namely the Technical Committee and the Executive Committee review EIA documents. Performing specific roles is done as follows:

a) Review by Technical Committee

EIA documents submitted to REMA are first reviewed by a Technical Committee. The committee appointed by the Director General of the REMA, reviews technical aspects of the EIA report and public consultation report. Depending on nature, location and impact level of a project, the Technical Committee is made of experts selected from:

- REMA (EIA Compliance & Enforcement Unit)
- Academic institutions
- Recognized experts in the field of project

After the review, the committee chair will draft a Technical Summary Report including the following:

- The project summary.
- The decision by the Technical Committee concerning acceptability of the project
- Rationale for adopting changes in the EIA report
- Any other information suggested by the Technical Committee

The Technical Summary Report is signed by all Technical Committee members and submitted to the Executive Committee for final review.

b) Review by the Executive Committee

The Executive Committee makes the final decision on the acceptability of the proposed project. The Committee comprises three members, namely Director General of REMA (as Chair), Director of EIA Compliance & Enforcement Unit, and the representative of the relevant Agency. The review mainly focuses on consideration and choice of alternatives, while for mitigation measures, the decision would be based on their effectiveness. A unanimous agreement of the Executive Committee is required for the project approval.

6) Record of Decision

After the review of EIA documents, the REMA decides to either approve the project with or without conditions, or rejects it. A Record of Decision is prepared by the Executive Committee and issued to the developer. If the project is approved, the developer is issued with an EIA Certificate of Authorization, which permits implementation of the project in accordance with mitigation measures in the EIA Report and any additional conditions as the REMA might consider necessary.

7) Implementation and Operations Order (IOO)

After the record of decision approving project implementation has been made, the Director of the EIA Compliance & Enforcement Unit in REMA issues Implementation and Operations Order (IOO) to the developer.

8) EIA Certificate of Authorization

REMA issues the Authorization Certificate after the proposed project is approved. This is a legally binding document which authorizes the developer to implement a proposed project, subject to any terms and conditions stipulated.

4.4.3 Existing Situation of EIA for JICA Study

The Environmental Law in Rwanda was just established in 2005. All kinds of regulations and rules, such as EIA Regulations, EIA Guideline, EIA Fund, EIA Committee, etc., which prescribed to establish the Environmental Law, were not yet provided by the end of July 2006. The structure and the number of REMA staff, as an EIA evaluating body is not completed yet. On the other hand, MINAGRI as the counterpart institution of JICA Study has no environmental staff. So Rwandan EIA system is not yet full-functioned and the structure of MINAGRI for EIA is not yet put in place.

Prior to implementing any project, at least the Project Brief should be provided by the implementing body. Therefore, JICA Study Team has already prepared Quick Project (QP) (detail is in the section 5.6 of this report). The candidates of the implementing body of QP are the MINAGRI, Bugesera District, Ntarama Sector, and the three Cells. As mentioned above, the MINAGRI has no environmental staff, and the Sector and Cell has no margin for the implementing body because of their limited staff and budgets. Actually most of the environmental staff in Sector holds this post concurrently as agronomist. Fundamentally the MINAGRI should be an implementing body for all projects assisted by JICA Study; however the District is most eligible as an implementing body for QP at present. JICA Study Team had some discussions with REMA, and submitted the Project Briefs of QP with the name of the District as an implementing body after some amendments.

JICA Study Team proposed the Pilot Projects (PP) on February 2007. The scales of PPs were larger than QPs, therefore some PPs might require full-EIA. When MINAGRI needs to implement EIA, they have to hire the EIA registered consultants. In general, ten million Rwf are needed for EIA procedure. However, by the end of July 2006, MINAGRI had not yet provided budgets for EIA implementation. JICA Study Team is able to assist Rwandan side; however the EIA including Project Brief should be prepared by Rwandan counterpart. JICA Study Team recommends that an environmental specialist be appointed in MINAGRI.

4.5 Initial Environmental Evaluation (IEE)

4.5.1 Existing Environmental Condition

As mentioned above, REMA is implementing the project named “Integrated Ecosystem Assessment (IEA) in Bugesera” in cooperation with UNDP and UNEP. EU is also planning to conduct the study on “Environmental Profile in Bugesera”. This means there are few data on environmental existing condition in Bugesera.

JICA Study Team has been seeking to collect those data, but has not yet managed to obtain them. In this section, the existing environmental condition is described basing on some collected data and the results of field reconnaissance.

(1) Natural Environment

1) Relief

Rwanda’s relief presents varieties. From East to West, the altitude varies between 1,000 and 4,500m. The setting of this relief is composed mainly in the east by lowlands (1,100 - 1,500m), in the centre by hills (Central Plateau, 1,500 -2,000m), and in the west by high mountains (Congo-Nile Ridge, 2,500 - 3,000m). The Bugesera District is located in South East edge of Central Plateau, and its altitude is around 1,400m -1600m. The relief of Central Plateau is made of hills with tops that are sometimes stretched, sometimes round, separated by deep valleys of 50 to 15m, often filled up with alluvial deposits. The lowlands of the East are dominated by depression of the relief.

The Bugesera District is located southeast edge of the Central Plateau. Therefore, it has some characteristics of lowlands. It consists of hills, wetlands along the Nyabarongo, Akanyaru, and Akagera Rivers, and some lakes.

2) Climate

Rwanda shows a temperate continental tropical climate. The thermal rhythm is relatively constant. In the course of the year, temperature varies between 18 and 21°C in the Central Plateau, and 20 to 24°C. Annual rainfall varies between 1200 and 1400mm in the Central Plateau, and 700 to 1400mm in the lowlands of the East. The Bugesera District's temperature ranges from 26 to 29°C; annual rainfall is 250 to 800mm. From the viewpoint of climate, the District has characteristics of lowlands.

Rwanda has increasingly been experiencing long periods of drought which tend to become cyclical and persistent, particularly in the East and South East, where Bugesera District is located. These climatic changes may have a direct relationship with those recorded in the world particularly due to the global warming of the planet. Details on climate in Bugesera District are to be found in 3.1.2 Meteorology and Hydrology.

3) Flora and Fauna

(a) Flora

Bugesera District is a mildly undulating basin surrounded by alluvial plains, marshlands and the lakes from Akanyaru and Nyabarongo down stream. The District is characterized by two types of natural environment such as hill area and its surrounding area. The tree species adapted to Bugesera District, are shown in Annex IV, Table 4.5.1.

a) Hill Area

Hill area is characterized with clayey soil and very poor granulated laterite. Climate is characterized by few rainfalls and a long dry season. There is no groundwater of low or average depth and soil dryness is the dominant element of the ecology of this area. The natural vegetation is marked by copses in dense formations. These have a complex structure and have hundreds of species with Carissa sp. The grass is on the soil between copses, which constitutes good pasture lands. Until 1975, there was under populated and was only mostly used for extensive cattle livestock and hunting. Since 1975, rapid and controlled populating of the area and an intensive tree cutting led to a number of environment problems linked to soil degradation and climate irregularities. No trees are found in places under cultivation activities and soils are at the great stake of dryness and loss of fertility. In less fertile areas which have kept their pastoral activities, the poor management of zones with copses is a threat for the whole ecological system, whereas overgrazing leads to severe desertification problems, especially at Karama in Gashora Sector. On the depleted and dry soil, implementing agro-forestry system would restore the essential functions, which were fulfilled by copses: freshness, abundant litter, humidity recycling and nutritive elements thanks to deep roots. The agro-forest species, which have

the potentiality to be introduced in Bugesera District, are shown in Table 4.5.1

Table 4.5.1 Agro-forest Species, which have the Potentiality to be introduced in Bugesera District

Scientific Name	Local Name	Scientific Name	Local Name
Acacia albida	-	*Grevillea robusta*	Gereveliya
Acacia sieberana	Umunyinya	*Iboza riparia*	Umuravumba
Acrocarpus fraxinifolius	-	*Jacaranda mimosaefolia*	Jakaranda
Albizzia gummifera	Umusebeya	*Leucaena leucocephala*	Lesena
Albizzia lebbek	-	*Maesopsis eminii*	Umuhumuro
Alnus nepalensis	-	*Markhamia lutea*	Umusave
Cajanus cajan	Umukunde	*Morus alba*	Iboberi
Calliandra calothyrsus	-	*Pithecellobium dulce*	-
Cassia siamea	Ikasiya	*Prosopis chilensis*	-
Cassia spectabilis	Ikasiya	*Pterygota mildbraedii*	Umuguruka
Cedrela serrata	Sedrela	*Ricinus communis*	Ikibonobono
Ceiba pentandra	-	*Sesbania sesban*	Umunyegenyege
Erythrana abyssinica	Umuko, Umurinzi	*Tephrosia vogelii*	Umuruku, Umurukuruku
Euphorbia tirucalli	Umuyenzi	*Trema orientalis*	Umudoboli, Umugwamporo
Ficus thonningii	Umuvumu, Igitoma	*Vernonia amygdalina*	Umubilizi, Umugaragara
Gliricidia sepium	-		

Source: Les Arbres et Arbustes Agroforestre au Rwanda

b) Surrounding Area

Surrounding area is on the edges of the alluvial plains and on the colluviums of large valleys, which benefit from more favorable hydraulic conditions due to large rivers and their marshy and lacustrian conditions, and the alluvial plain of Nyabarongo is formed with a complex mosaic of marshlands and ponds. It is partially cultivated and grazed during its periods of water level dropping. The alluvial and colluvial soils are also more fertile and densely cultivated. Several types of natural vegetation tending to disappear are still present on marshland shores depending on the soil nature and humidity: on humid alluviums on lake and marshland shores; Savanna with Acacia sp., Markhamia sp., and big Ficus. The dry valleys are covered with grassy savanna whereas bushy savanna with Grewia, Rhus, Kigelia, Entada, and Acacia cover the colluviums.

Surrounding area is the most densely cultivated; various species or formations can be introduced depending on the area and types of habitats and main desired functions: Acacia Sieberana vermoesenii, Acacia hockii, Entada abyssinica, Ziziphus mucronata, Haplocoelum galaense. As afforestation species along humid shores are Markamia Lutea, Acacia polycantha, Sapium ellipticum, big Ficus.

There are no sites for Ramsar Convention in Bugesera District. However, wetlands along the rivers such as Nyabaronngo, Akanyaru, and Akagera, and some lakes are very important for Rwanda's ecosystem. Especially the eastern part of Bugesera District, which has many lakes, such as lakes Gashanga, Rumira, Mirayi, Kilimbi, Gaharwa, Rweru, etc., along the Akagera River has the role of water basin for the entire country.

(b) Fauna


Muzi Marshland, Kanzenze Cell


Rugazi Marshland Kibungo Cell

The flora, which is the base to habitat for animals, is already cultivated in Bugesera District. Therefore, the fauna decrease its quantity and quality. Large animals are not found at hill area, just medium or small ones only such as some monkeys and rats. These monkeys sometimes damage agricultural crops. Few hippopotamuses and crocodiles are reported to be in Nyabarongo and Akagera Rivers. Few fishes such as catfish and tilapia have habitat in the lakes, and small size fishes are in rivers. The wetlands harbour some snakes and reptiles. Certain cobra species are said to often attack and harm local population. Birds are relatively many in the wetland. Then some pecking damages by birds are reported in some places, but the bird flu is not yet confirmed in Rwanda. On the contrary, due to the current exploitation of the wetlands by associations or private farmers, nests trees for birds have decreased from year to year and this is a threat to their habitat. The results from bird survey at Lake Rweru are shown in Annex IV, Table 4.5.2

(2) Social Environment

The economic activity in Bugesera District is mainly agriculture; therefore most of the population is widely engaged in agriculture. Infrastructure such as road, health facilities, education facilities are very poor, and electricity and water supply are not yet availed except for some centers. In this respect, the main road construction from Kigali to Mayange on a distance of 40km and water adduction system covering the whole District have been being implemented respectively from May 2006 and September 2005. With respect to the government laws, the issue to evict the population along the road was raised and the Government or contractor has compensated for houses to be removed, as well as farmlands damaged by construction works. It is worth noting a number of trees and bushes have been cut as well. No problem has arisen until now among the involved residents but it should be carefully examined to conserve natural and social environmental aspects arisen by such a way of constructing in the future.

Main Road Rehabilitation Work


Water adduction Works in Rweru

There are Batwa in some rural area, and they mainly engage in pottery.

4.5.2 Environmental Problems

Rwanda's environmental problems are mainly associated with inadequate management of natural resources. There are also problems caused by industrial, commercial and human settlement activities and various pollutions.

(1) Natural Environment

1) Degradation of Forest and Soil Erosion/ Flood

Rwanda's relief is uneven and formed of steep slopes, and its soils are fragile and vulnerable, thus, very sensitive to erosion. The displacement of the population caused by the genocide leads to massive deforestation. The use of wood, which is the main source of energy in Rwanda, has accelerated deforestation. Illegal cutting is still practiced. Therefore, soil erosion has occurred across the country, especially in western mountain areas. Bugesera District has not much steep slopes, but soil erosion has occurred in hilly area and at riverbanks, as well as on the trails accessing to the marshlands. As a result of field survey, the eastern part of Bugesera District is more sensitive to soil erosion. The damage by heavy rain was observed in Rweru Sector. It occurred on 21 May, 2006. The victim, who is sixty, said that was the heaviest rain she had ever known (more details is shown in 3.1.2, (4) Climate change).


Nyabarongo River


Kanzenze Cell, Ntarama Sector


Rweru Sector

2) Drought

During the previous recent years drought calamity befell to Rwanda, especially eastern lowlands including Bugesera District. The destruction of the plant cover and poor drainage of marshlands have resulted in capacity reduction and water retention period, the drying up of water sources and lakes. This adds to the increasingly frequent climatic disturbances and progressive reduction of natural water reserves in that region. More details on chapter 3, 3.1.2 (4) Climate change.

3) Water Pollution

JICA Study Team could not find any data on water quality analysis of rivers and lakes, and any document on the existing conditions of water quality in Bugesera. As a result of interview survey, the water of Nyabarongo River is polluted by fertilizers and agrichemicals which are used by some coffee or tea plantations, located upper part of the River. During the field survey, it was observed some water

pollution sites at some lakes, such as Lake Cyohoha North and Lake Cyohoha South. It is forecasted that the water pollution is caused by domestic wastewater, solid waste, and agricultural wastes. The water volume at lakes is reported to have been progressively decreased during the recent years due to recent drought and degradation of water keeping function by deforestation.

ZOA implemented the water quality analysis of the 10 sites in Bugesera District. Detail is shown in Annex IV, Table 4.5.3. The results in some parameters, such as colour, turbidity, conductivity, hardness, ammonium (NH4+), iron (Fe), etc. at 9 sites out of 10 sites are not satisfied with water standard. Although this water is not suitable for drinking, local population cannot help but drink this water since they have no other alternative.

4) Bush Fire


Wetland in Nyabarongo river

Bush fires are very frequent during the dry season, especially in the eastern and south-eastern regions.It causes land degradation, deforestation and loss of diversity. As a result of interview survey, Bugesera District is very famous for its bush fires to exploit farmland, as well as to prevent monkeys from browsing on sorghum during harvest season. It occurs not only during the dry season but also in the wet season, and not only in wetlands but also in hillside in Bugesera. Grass such as papyrus is burnt in wetlands, tree in hillside. Recently burning of solid waste including incombustibles such as plastics and glasses also became a crucial problem in urban area.

(2) Social Environment

1) Vulnerable People

There is a big difference between the male and female proportion of the widowed population: 2.1% of male and 13.9% of female. This might be caused by the 1994 genocide. Ratio of women- headed households is 38.1% on average and among the total population who is engaged in economic activities, women represent 57% on average in the Bugesera District. It might be quite clear that women's role is very important for economic activities as well as livelihood for women. Accordingly, they are forced to do heavy work along the day. As regards orphans' issues, on average about 1% or 583 households were child-headed households (6-17 years) old in 2002 (refer to section 3.2.2 and 3.2.6). They live on tenant farming or lending their land to nearby farmers or governmental supports but not so much. At present, there are no real figures available on the vulnerable people in Bugesera District. More details were expected to know after the social-economic baseline survey results in October 2006.

2) Returnee's Resettlement to Imidugudu

Rwandan government adopted a national human settlement policy aimed at establishing an improved rural human settlement model, grouping settlements in villages generally known as "imidugudu", which meet the criteria of environmental viability through the recognition of the national space, land form, improved housing quality, etc. In Bugesera District, most of residents in imidugudu are genocide survivors whose houses were destroyed during the genocide and new returnees. They were settled in imidugudu most of the time by NGOs and agencies in charge of rehabilitation.

The target benefits in imidugudu settlement were primarily easy access to basic human needs such as school, water and electricity. During the site survey by JICA Study Team, it was noticed that the residents in imidugudu in Ntarama Sector where is the target area of quick project faced water shortage problem like the rest of the population in the District and no power supply as well. Similarly, other returnees in imidugudu in Mwogo and Nyamata Sectors are allocated with farmland but no houses.

3) Trauma caused by the Genocide

The 1994 genocide affected the Rwanda by large and its aftermaths resulted, among others, in trauma problems for genocide victims. Bugesera is one of the severely affected Districts and counts a number of genocide victims. The interview survey carried out among some medical services and trauma counselors in Bugesera revealed symptoms of trauma cases include wailing, beating, and making noise. Trauma mostly breaks out during the mourning period from April to June. 90 % of these patients are women who experienced violence during the genocide, the rest are mainly teenagers who were too young during that period. Trauma cases are unable to carry out their usual activities or properly pursue their studies. About 102 patients were medically treated in Nyamata Hospital (District hospital in Bugesera) or all health centers in Bugesera, 2005. A trauma counselor said she has a consultation and mental training for patients without medicines and injections, but treatment is very difficult. With respect to trauma caused by the 1994 genocide, Gacaca Courts, a sort of kangaroo court dealing with Genocide cases is regularly opened in Cell, Sector and District level respectively since July, 2006 in the Study Area and the 110 defendants have been convicted of guilt so far.

4) Health Problems in the Study Area

In the Study Area, several health problems pertaining to their living environment are reported. Below Table 4.5.2 shows 10 primary morbidity causes for patients treated in 12 Health Center in Bugesera District in 2005. The top three patients are reported to malaria, IAVRI (Respiratory disease) and intestinal parasitosis (amoeba). The number of malaria patients including presumed malaria indeed amounted to 50 % of total treated patients. Intestinal parasitosis presumably caused by domestic water amounted to 10.5 % following to respiratory disease.

Table 4.5.2 10 Primary Morbidity Causes in 12 Health Center in Bugesera District (in December 2005)

No	Diseases	0-11 months	1-4 yrs	5-14 yrs	15 yrs +	Total	%
1	Confirmed malaria	401	876	629	1709	3615	35.8
2	IAVRI (respiratory disease)	261	330	190	646	1427	14.1
3	Presumed malaria	194	704	175	276	1349	13.3
4	intestinal(stomach) parasitosis	44	170	146	703	1063	10.5
5	IAVRS	74	176	169	538	957	9.5
6	Skin diseases	35	102	151	225	513	5.1
7	no bloody diarrhea	112	127	38	166	443	4.4
8	Physical traumas	8	34	126	259	427	4.2
9	mouth- dental diseases	1	14	48	116	179	1.8
10	Blood Diarrhea	9	16	12	101	138	1.4
	Total Patients by Age	**1139**	**2549**	**1684**	**4739**	**10111**	**100.0**
	Percentage (%)	**11.3**	**25.2**	**16.7**	**46.9**	**100.0**	

Source: Nyamata Hospital in Bugesera District, December 2005

Most possible causes of intestinal parasitosis is presumed that most of the population living in the rural area use river/lake/wetlands water for domestic use including drinking without treatment. This is the cause of many water borne diseases.

5) Social situation of Minorities in the Study Area

The New Constitution including harmonization of tribes was enacted in 2003. Concerning minority in the Study Area, interview survey to stakeholders concerned was carried out during July 2006. The survey results are summarized as follow.

In Bugesera District, Twa tribe is reported to reside in Nyamata and Ntarama Sectors; however, no official data is available because of the said constitution. According to Nyamata Sector Office, 500 to 600 homeless households including Twa tribe are reported. On the other hand, the seven households in Ntarama Sector are recognized and their situation in the community is as below.

Table 4.5.3 Living Condition of Twa Tribe in Ntarama Sector

	Basic Condition	Actual Condition
	Houses	Generally, no own house, and renting house at 800 Rwf house rent per month. Unable to live in *Imidugudu* (for returnee's settlement houses) due to low priority because of non-returnee.
	Farmland & livestock	No farmland and livestock is owned, and no external assistance from the Government
	Income source	Traditionally, Twa tribe lives for hunting and making pot for sale, thus they usually live nearby the site where clay soil is available. However, income for pot sale is insufficient and work as casual worker.
	Education	No opportunity to go to school due to poverty
	Health	Difficult to receive proper medical treatment due to poverty

Source: Interview results by JICA Study Team, 2006

4.5.3 Results of Initial Environmental Evaluation

JICA Study Team carried out an initial environmental evaluation when rural and agricultural development project is implemented in the wetland and hill area in Bugesera District.

(1) Impacts on Social Environment

1) Impacts on Social Life

Due to the implementation of rural and agricultural development, some impacts caused by resettlement will occur. However, Rwanda has many experiences of resettlement through "Umidugudu" policy. Therefore, the impacts are not forecasted, when the adequate resettlement programme is provided. The change of life style, economic activity, infrastructure, and community will take place. These will improve their life; therefore the impacts are positive rather than negative.

The rural and agricultural development will have some potential to affect the minority, such as Batwa, There are some unknown factors on their life. Therefore, an in-depth survey is required, when the development is located near minority's community.

2) Impacts on Health

Agriculture is the main economic activity in Bugesera District. The waste, which will be generated by rural and agricultural development, is mainly natural materials. Therefore, the impacts are not forecasted, when adequate management of waste is implemented.

When the development activity includes the usage of fertilizer or agrichemicals, some impacts will take place. As a result of hearing survey, DDT is still used by some farmers in this District. Therefore, complete management program through seminar, workshop, etc. is required.

3) Impacts on Cultural Property and Aesthetics

This District has been highly affected by the genocide, so there are some genocide memorial sites. Therefore, some consideration to these memorial sites will be required at the development planning stage. The aesthetics of this District consists on natural factors. The impacts will be not forecasted, because the aesthetic which appear newly is also natural factors.

(2) Impacts on Natural Environment

1) Impacts on the Ecosystem

The most part of hillside is already used for agriculture, so the ecosystem in this area is not so valuable. Therefore the impact on ecosystem in hill area is not forecasted, when the existing condition of flora and fauna considered at planning stage. However, careful attention is required, when development is proposed at wetland. Rwanda's watershed is almost one system. Nyabarongo River is the mainstream in this country. Therefore, wetland along this river plays an important role on watershed mechanism. The Nyabarongo, Akanyaru, and Akagera Rivers flow the boundary of Bugesera District, and there are many lakes along these rivers. The special attention to wetland ecosystem should be paid at planning

stage, especially in the eastern part of this District.

The wetland has also rich fauna, especially birds. The Ramsar sites are not in this District; however the government has the intention to establish some Ramsar sites in this District. At the planning stage, the movement of the government should be watched.

2) Impacts on Soil and Land

Some small scale soil erosions is already observed, especially at rural roads in this District. There are many prevention methods in technical by low cost but introduction of these methods is at small scale. Soil erosion is due to heavy rain caused by global warming, characteristics of soil, appearance of bare land as a result of deforestation or inadequate land management, etc. Adequate land management appears not to improve easily, but prevention of small-scale soil erosions and reforestation can be relatively easily done. Introduction of reforestation as one of development components highly needs to be considered.

3) Impacts on Water System

When the development at wetland has some activities to change water flow of surface water or groundwater, the impacts on volume of water or water quality will be forecasted. Especially, the development in the eastern part of the District will have the potential to dry up the lakes. Therefore special attention should be paid at planning stage.

Eutrofication at some lakes is already found in Bugesera District. One of eutrofication factor is inflow of fertilizer. Therefore, adequate usage of fertilizer is required.

In general, the rural and agricultural development is relatively environmental-friendly activities, and JICA Study will propose small-scale projects, the significant impacts on environment are not forecasted.