

(Annex 2-1)

1. The Marshlands in Bugesera

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1. The Outline of the Bugesera District



source: Bugesera developmet plan archive.

(1) Demographic features

Bugesera is one of seven Districts of the Eastern Province in Rwanda. It covers a total surface area of 1337 Km² of which arable land is estimated at 91,930.34 ha. The mean size of land cultivated per HH is 0,59ha. The district is composed of 15 Sectors, 72 Cells and 581 Villages with a total Population of 363,339 people-177,404 males and 185,935 females (according to the 2012 general population census). its population Average Annual Growth Rate is 3,1%, with a population density of 282 people per km². The population of Bugesera district is estimated at 13, 9% of the whole Eastern Province population, and at 3.4% of the total population of Rwanda according to the 2012 general census and 48.4% are below poverty line (28.3% are poor and 20.1% are extremely poor) according to the EICV report whose part for Bugesera is in the annexes attached on this DDP. An illustrative graph showing demographic characteristics of Bugesera in the context of Eastern Province and Rwanda

Table 1: Population of Bugesera District

District	2002 Total Population	2012 Population			Population change (2002-2012) (%)	Average Annual Growth Rate (2002-2012) (%)	Population Density (sq.km)
		Male	Female	Total			
Bugesera	266,775	177,404	185,935	363,339	36.2	3.1	282
Eastern Province	1,700,137	1,257,750	1,343,064	2,600,814	53.0	4.3	275
Rwanda	8,128,553	5,074,942	5,462,280	10,537,222	29.6	2.6	416

Source: NISR 2012 general population census provisional results report.

(2) District geographical location

Bugesera is located in the south Eastern plains of Rwanda notably in the south west of the Eastern Province. The district of Bugesera is bordered in the south by the Republic of Burundi (Kirundo Province), Ngoma district to the East, Kigali city and Rwamagana district to the North. The district is sandwiched between Rivers Nyabarongo and Akanyaru which converge at the southern part to form Akagera River. Bugesera district's area is characterized by numerous lakes, the biggest of which are Rweru and Cyohoha. These two plus the other small lakes in the region comprise an estimated surface area of 10,635 hectares (MINITERE/CERECE 2003). The region is predominantly vegetated by dry savannas which are characterized by short grasses, shrubs and short trees characteristic of arid and semi-arid areas (MINITERE/CERECE 2003).

(3) Physical aspects

The topography of Bugesera is characterized with a mixture of plateaus with an altitude varying approximately between 1,100 m and 1,780 m and undulating hills dominated of varying heights. Most prominent of these hills are; Shyara (1,772 m the highest), Juru (1667 m), Maranyundo (1,614 m), and Mwendo (1575m). The relief is also constituted by a succession of low-plateaus with hills and dry valleys. The district is equally rich in marshlands alongside rivers; they cover an estimated area of 6,100 ha and are exploited at an average of 46.3% (Community Development Plan of Bugesera district).

(4) Climate and agriculture

Compared to other regions of the country, Bugesera climate is dry with a temperature varying between 20 and 30°C with an average ranging between 26 and 29°C. In the past the district was turning into a dessert zone however with increased government effort, the situation was reversed. The district has two dry periods and two rainy periods.

The table below shows Bugesera's climatic seasons

Climatic season	Duration
A short dry season	January to mid-march
Long rainy season	Mid-march to June
Long dry season	Mid-June to September
A short rainy season	October to December

Climate determines the fate of agriculture in Bugesera since the activity largely depends on nature currently despite some irrigation project , consequently there are two agricultural period seasons (A and B), season A begins from mid-September up to mid-February and the season B the remaining time.

(5) Hydrography

Bugesera district hydrographic network is mainly characterized by 3 rivers, namely Akanyaru,

Akagera and Nyabarongo. Besides rivers, Bugesera has 9 lakes however these have little effect in bringing rainfall can be exploited for fishing, tourism, power generation, agricultural irrigation and farming among others

(6) 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, lateritic soil 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. There are also many kinds 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.

(7) Flora

In BUGESERA, two plant formations remarkably dominate: the savannas densely shrubs covering the hills, and the grassy savannas covering the dry valleys and the trays of the hills.

The vegetation is composed largely by the acacia, euphorbiac and the cactuses with intertwined with gramineous and of spiny bushes. One also observes others rare species that, far from being gigantic, serve supports to the bushes and trailing lianas.

The grassy savannas: they are in the dry valleys and on the trays of hills and the dominant species are: *botriochlora*, *hyparrheniafilipendula*, *sporobulus*, *pyramidalis*, *themedatriandra* in the dry valleys and on the trays of hills, *andropogondiimeri*, *brachyariaeminnii*, *hyparrheniallecontee*, *brachyariadictnonaura*, *heteropogon*, *centertus* and *laudetiasimplese*.

The shrubby savannas: This part of vegetation occupies the biggest part of the whole vegetation and understands different types of bushes sprinkled among the herbs of the prairies. The savanna, yellow-straw color is in some places stained of green quick by bushes and latches to thorns serving stanchions to the lianas and other voluble species (*Umugunga*, *umukomagabo*, *umushabishabi*, etc, this vegetation is largely threatened by agriculturasists.

(8) Fauna

The extent of the District is today largely inhabited by the peole. The colonization of this former reserve of hunt and vast prairies started in the years 1960 following the floodings that destroyed the fields and the dwellings in the valley of the Akagera on the one hand; and on the other hand, with the flux of immigration of people of the other regions and provinces of the country in search of farm land. The various wild animal species were forced into exodus toward the National Park Nevertheless, one finds the anteaters, mice, a multitude of species, birds live either the bushes, the groves, the big trees or the terriers.

In the lakes, the marshes and the Nyabarongorivers, Akanyaru and Akageras rivers one can find hippos, the Crocodiles, the turtles, the water birds, the ducks and the wild geese , The lakes of the district contain fish: Tilapia, clarias, soles, silurids, etc.

2. Bugesera District Irrigation Plan

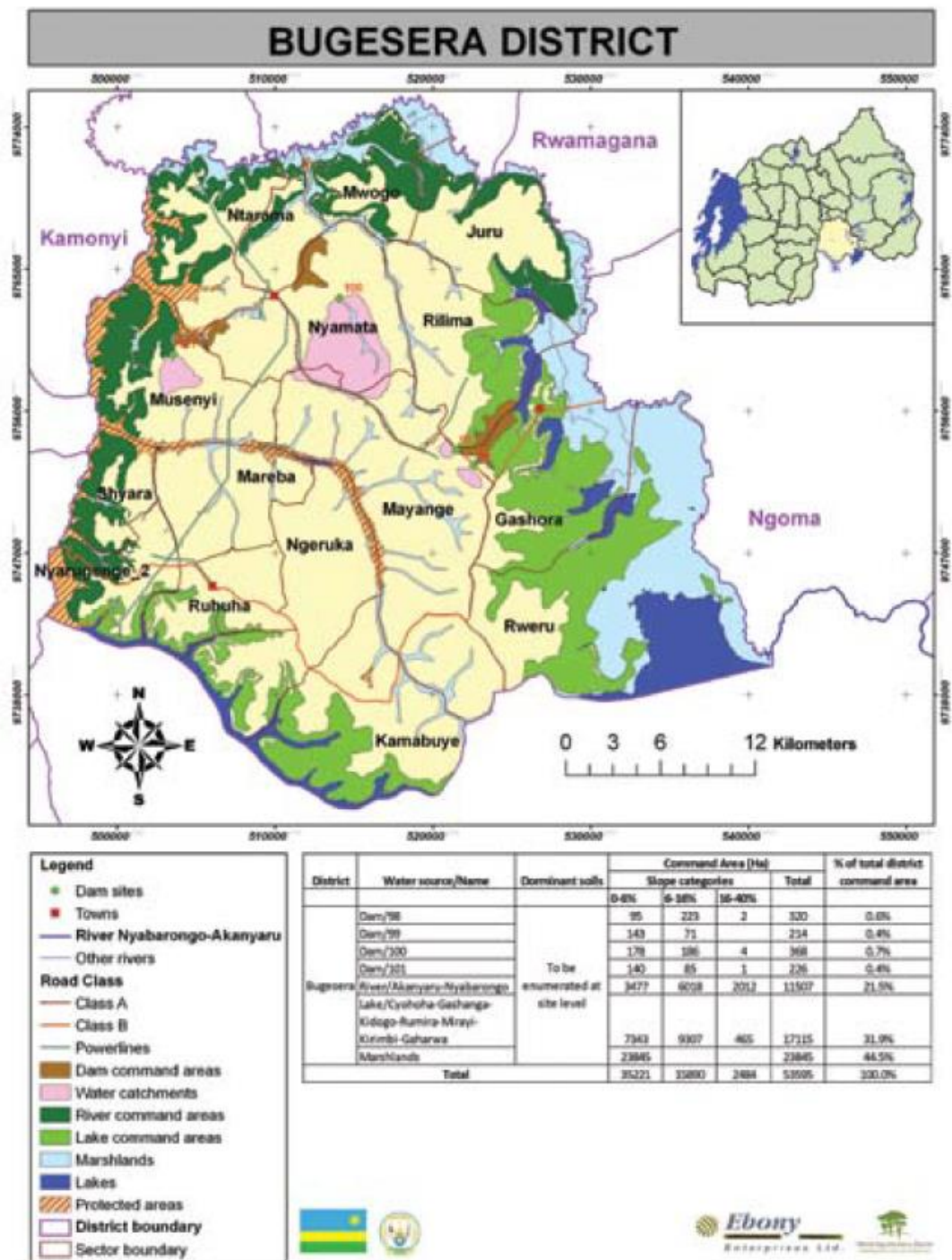
Bugesera district has command areas represented in lake, river, marshlands and dam domains. Riverine Potential Irrigation Areas are all located along Akanyaru and Nyabarongo rivers while the lake Potential Irrigation Areas would depend on lakes Cyohoha, Gashanga, Kidogo, Mirayi, Kirimbi and Gaharwa, leaving the marshlands evenly spread within the district.

The Irrigation Master Plan study for Rwanda indicates that a total of **53 595 ha** have good potential for conventional irrigation in Bugesera district. Of these, the marshlands, lake and river domains constitute the biggest portions with 23 845 ha (44.5%), 17 115 ha (31.9%) and 11 507 ha (21.5%), respectively. The rest of the command areas belong to the dam domain at 1 128 ha (2.1%). The total irrigation water requirement for Bugesera is about 461.6 Mm³, partitioned into 238.5 Mm³ for marshlands and 223.125 Mm³ for the rest of the command areas. Access to road and electrical power grid to these sites is good.

Table 2: The Potential Irrigable areas in Bugesera

	Area(ha)	Ratio(%)
Dam	1 , 1 2 8	2 . 1 %
Lake	1 7 , 1 1 5	3 1 . 9 %
River	1 1 , 5 0 7	2 1 . 5 %
Marshland	2 3 , 8 4 5	4 4 . 5 %
Total	5 3 , 5 9 5	1 0 0 %

The total area of Marshlands in Bugesera is **3,551 ha** which is **14.9%** of the Potential area of marshland is.



(Figure 1: The Potential Irrigable areas in Bugesera)

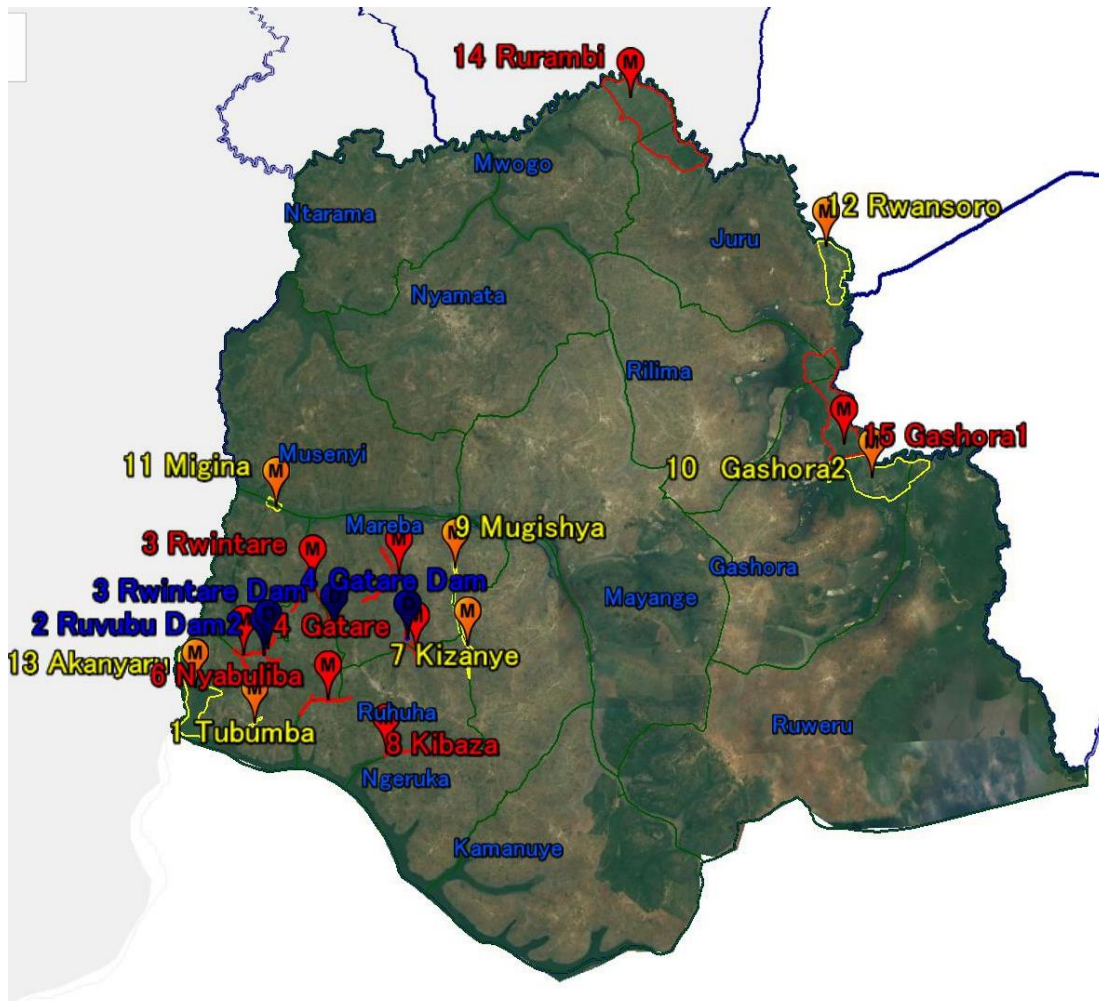
3. The Outline of the Marshlands in Bugesera District

(1) The Outline of the Marshlands in Bugesera District.

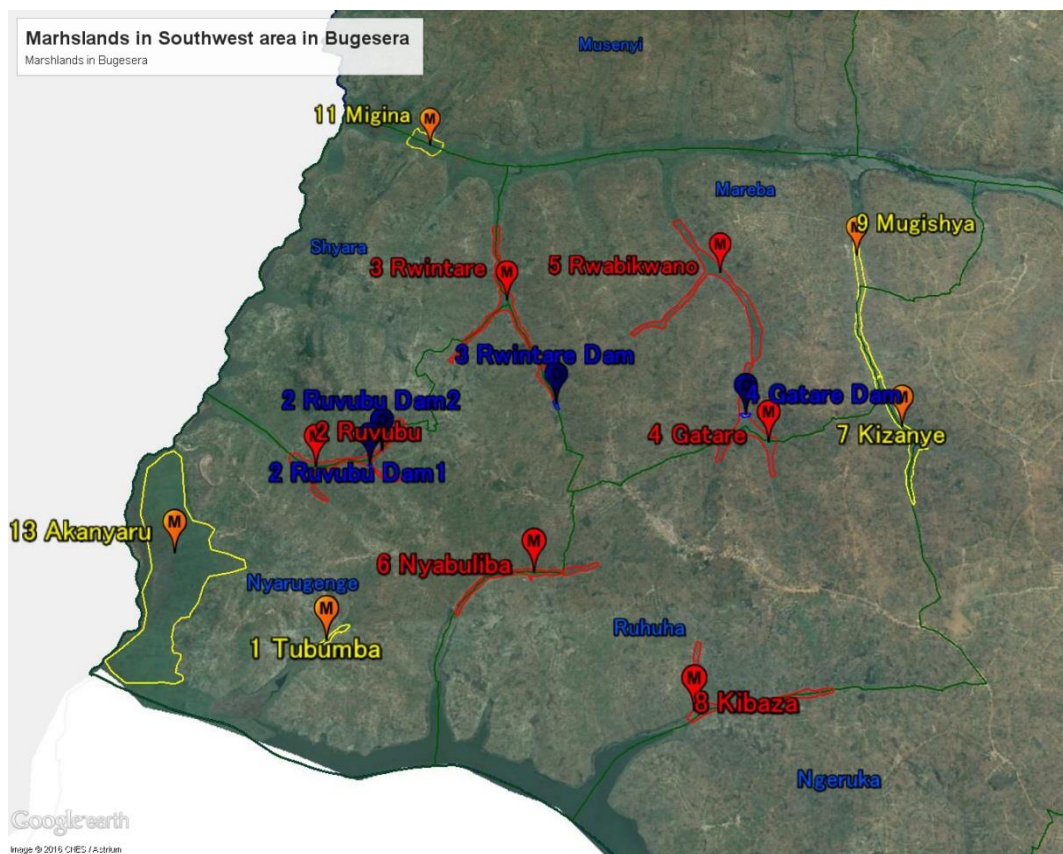
Bugesera District has Fifteen (15) Marshlands, 3,551ha. They are Eight (8) Developed Marshland, 2,004ha, and Seven (7) Non-Developed Marshlands, 1,547ha.

In the Southwest area of the District, there are Eleven (11) Marshlands, and in the northeast area, there are Four (4) marshlands.

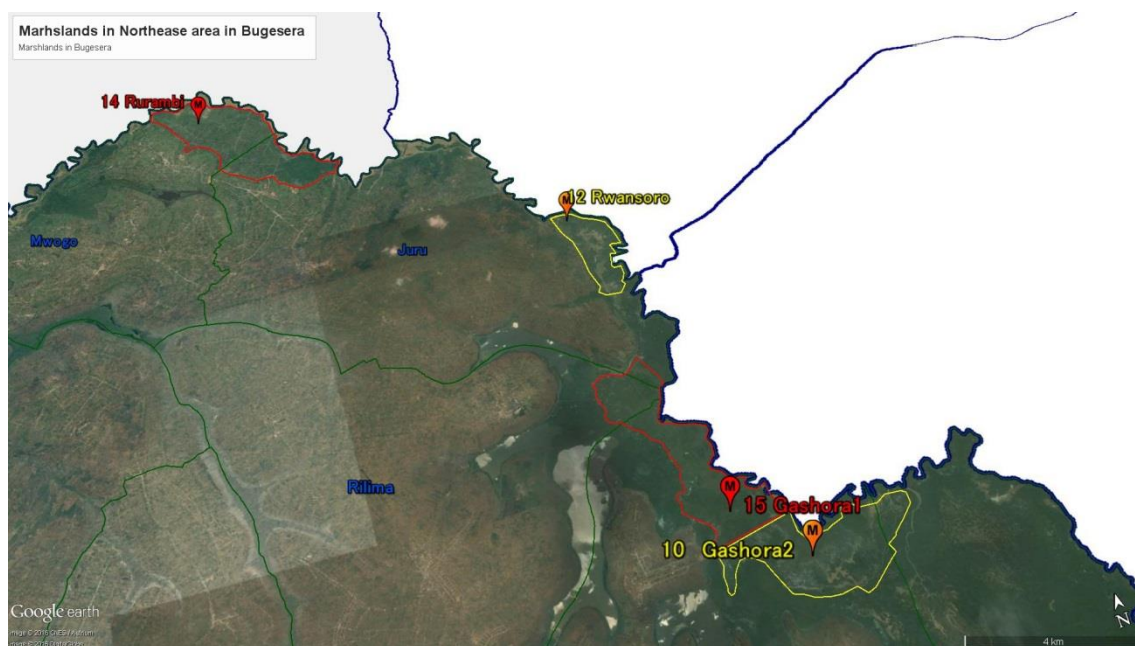
There are Five (5) Marshlands in the river basin, which are Rwansoro, Akanyaru, Rurambi, Gashora1, Gashora2. These Marshlands' command areas are big, but it is difficult to develop these Marshlands because of much flooded water. We should consider about the water control of the whole river basin if we started developing these Marshlands.



(Figure 2 : Marshlands in Bugesera)



(Figure 3 :Marshlands in the southwest area of Bugesera District)



(Figure 4: Northeast area of Bugesera District)

(2) Comments for Marshlands in the Bugeseta District

We can make a classification of the Marshlands in the Bugesera District for the Four (4) types below.

a) The Small scale Developed Marshlands

2) Ruvubu, 3) Rwintare, 4) Gatara, 5) Rwabikwano, 6) Nyabuliba, 8) Kibaza

The Small scale Developed Marshlands were developed by RSSP, QWMD and PAPSTA. The Small scale Developed Marshlands are consisted of Five (5) Marshlands. Especially, 2), 3) and 4) have Dams. Meanwhile, because of bad maintenance and poor design, the facilities have some problems. We have to clarify these problems and look for the solution of them.

b) The Small scale Non-Developed Marshlands

1) Tubumba 7) Kizanye, 9) Mughshya, 11) Migina

The Small Scale Non-Developed Marshlands are consisting of Four (4) Marshlands. Lack of water and Flood affect the farmers in these Marshlands. We have to clarify these problems and consider about conducting the new project like QWMD.

c) The Developed Marshlands in the River basin

14) Rurambi, 15) Gashora

The Developed Marshlands in River basin were developed by PADAB/PAIRB project funded by African Development Bank. However, the Rurambi schemes' situation is not good. We recommend them to re-design and reform them.

d) The Non-Developed Marshlands in River basin

12) Rwansoro, 13) Akanyaru, 10) Gashora

There are Three (3) candidate sites for development of Marshlands in River basin in Bugesera. However, we should consider about the water control of the whole river basin if we started developing these Marshlands. In Akanyaru, the farmers used to produce Maize and Beans, but due to heavy flood, the area is no longer cultivated. In Rwansoro, the farmers cultivate Maize, Beans, Vegetables, and Soy beans but the flood in rainy season and the lack of irrigation network limit the productivity in the area. In Gashora almost the total cultivated land before 2011 is flooded especially during rainy season.

(3) The record of the field visit

The field visits of Marshland survey in Bugesera were conducted on the schedule below. We asked the District agronomist or the Sector Agronomists to go to the Marshlands with us. On the field, we conducted the interview to the Sector Agronomists or farmers about the situation of the Marshlands, and picked up the contact persons' phone numbers of the Cooperatives or IWUOs in that field. After coming back to Kigali, we conducted the interview for those people by phone.

Date	Marshlands	Notes
21st April,2015	10)Gashora2	
3 rd June ,2015	14)Rurambi	
3 rd Feb,2016	Visit the agronomist of Bugesera District,Mr.Jean Dieu., 15)Gashora1	
9 th Feb,2016	1) Tubumba,2) Ruvubu, 3)Rwintare, 4)Gatare,5)Rwabikwano, 13)Akanyaru	
11 th Feb,2016	7)Kizanye, 8)Kibaza, 9)Mugishya	
16 th Feb,2016	11)Migina	
25 th July,2016	6)Nyabuliba,12)Rwansoro	

(Irrigation Adviser with the Agronmist of the Bugesera District)



4. The individual data of the Marshlands in Bugesera

(1) Tubumba Marshland

1)Sector: Nyarugenge

2)Size: 7ha

3)Status & Challenges: Not developed. This marshland suffers from the flood from the swamp of the Akanyaru.

4)Main crop: Rice

5)Comments: This is a small marshland limited by the swamp of Akanyaru.

6)Field visit date; 9th February,2016



(2) Ruvubu Marshland

1)Sector: Nyarugenge,Shyara

2)Size: 90ha

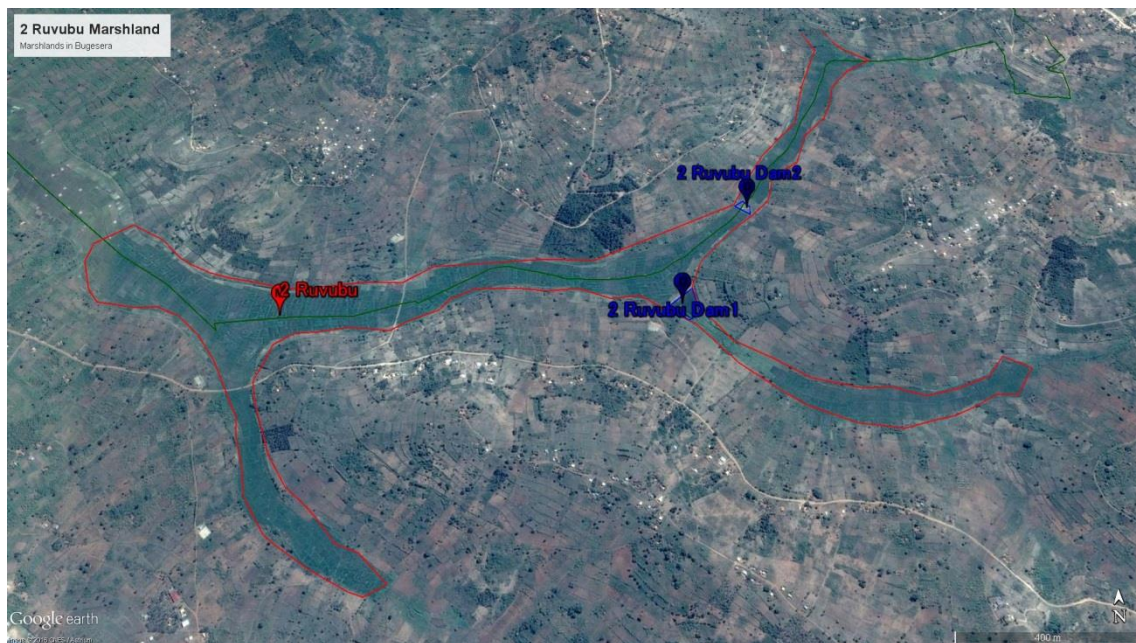
3)Status & Challenges: Developed by RSSP in 2005 with 2 dams.

Downstream is flooded and facilities are necessary to be rehabilitated.

4)Main crop: Rice

5)Comments: The dams of this marshland is not maintained well. We have to consider about not only rehabilitation but also capacity building of Operation & Maintenance for the farmers.

6)Field visit date:9th February,2016



(2-2) Ruvubu Dam(1)



The reservoir of the Dam1 is full of grasses.





The gate of intake of the Ruvubu Dam2 was broken.



The spillway seemed to be too small compare to the reservoir of the dam.



(2-3) Ruvubu Dam(2)



The facilities of Dam2 were not functioned well.



The reservoir of Dam2 was full of grasses.



(3) Rwintare Marshland

1)Sector: Nyarugenge, Shyara,Mareba

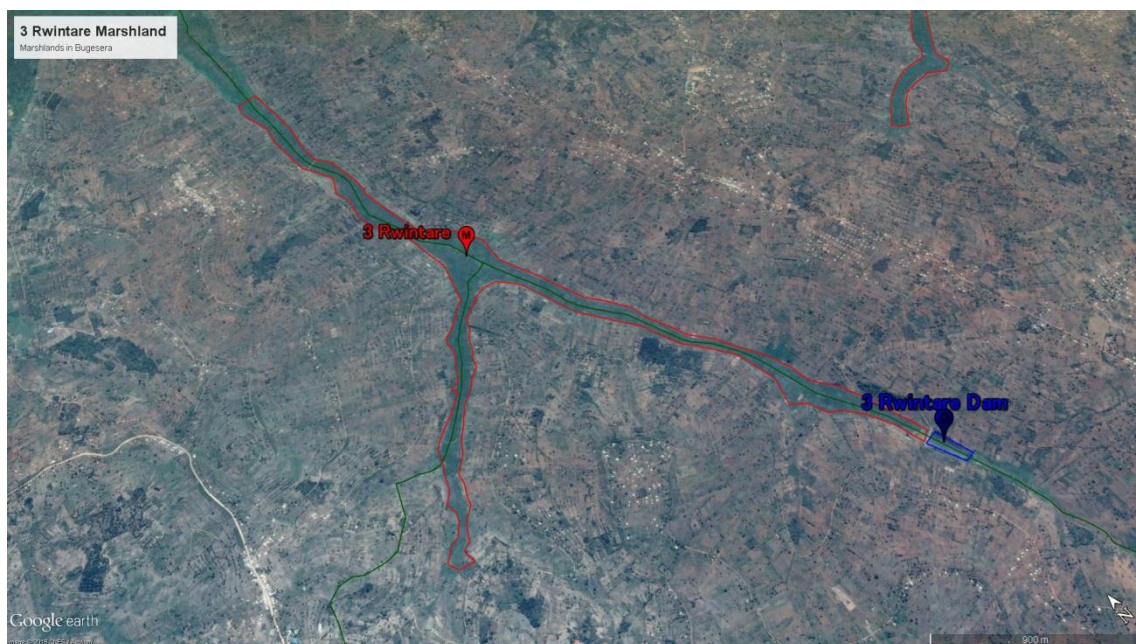
2)Size: 80ha

3)Status&Challenges: Developed by RSSP in 2005 with 1 dam. Canals are not effective.

4) Main crop: Rice

5) Comments: The dam is not maintained well. We have to consider about not only rehabilitation but also capacity building for IWUO.

6) Field Visit Date: 9th February, 2016



(3-2) Rwintare Dam



There is a pipe of domestic water on the top of the embankment of the dam.
The situation of the dam is not bad.



The situation of the reservoir is not bad.



(4) Gatare Marshland

1) Sector: Mareba,Ruhuha

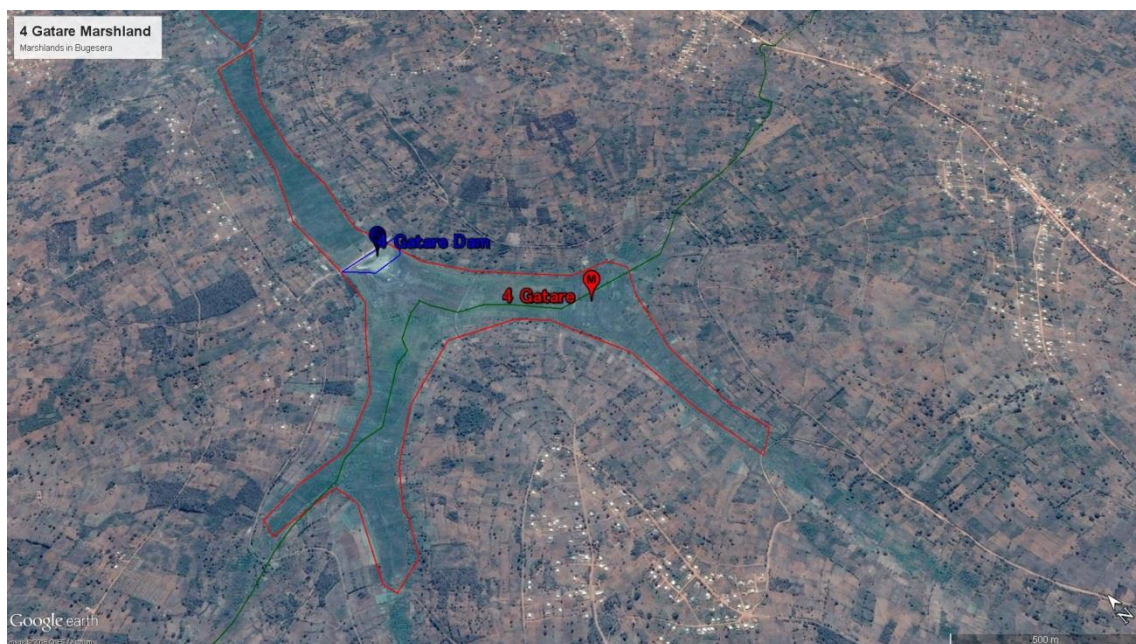
2) Size: 57ha

3) Status & Challenges: Developed by RSSP in 2005 with 1 dam. They are affected from the shortage of water, and lack of drying area.

4) Main crop: Rice

5) Comments: The reservoir of the dam is full of grasses. They have to address this issue.

6) Field Visit Date: 9th February, 2016



(4-2) Gatare Dam



The facility of the dam is not bad.



There are too many grasses in the reservoir.



(5) Rwabikwano Marshland

1) Sector: Mareba

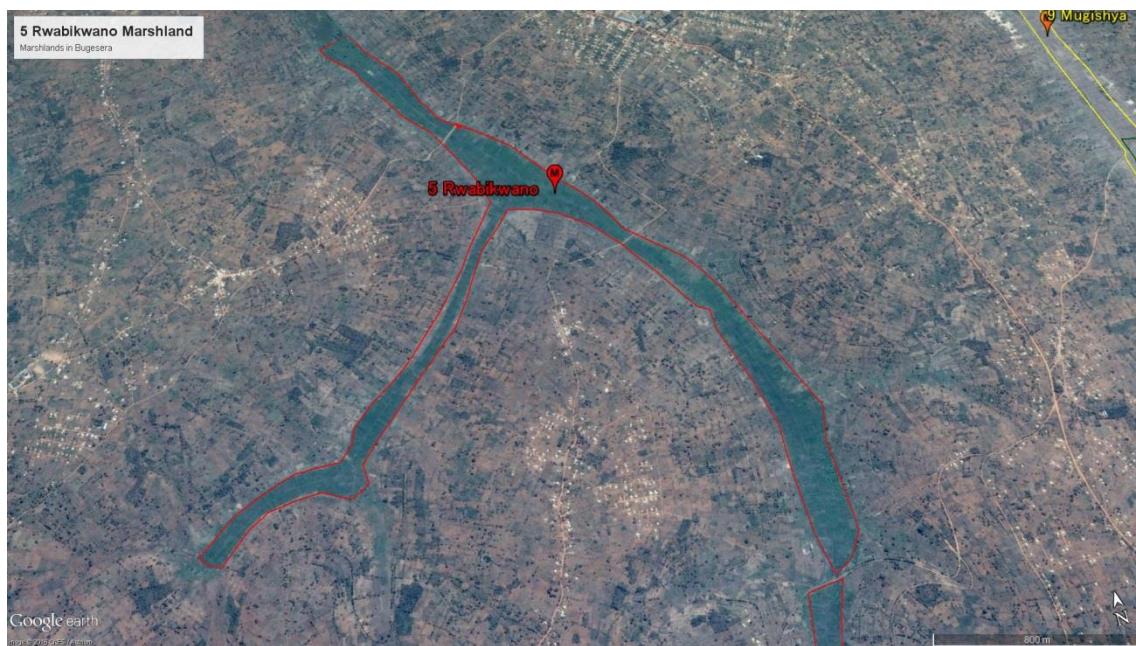
2) Size: 85ha

3) Status & Challenges: Developed by RSSP in 2005. They are affected from the shortage of water, and leveling is not enough.

4) Main crop: Rice

5) Comments: The reservoir of the dam is full of grasses. They have to address this issue.

6) Field Visit Date: 9th February, 2016



(6) Nyabuliba Marshland

1) Sector: Nyarugenge, Ruhuha

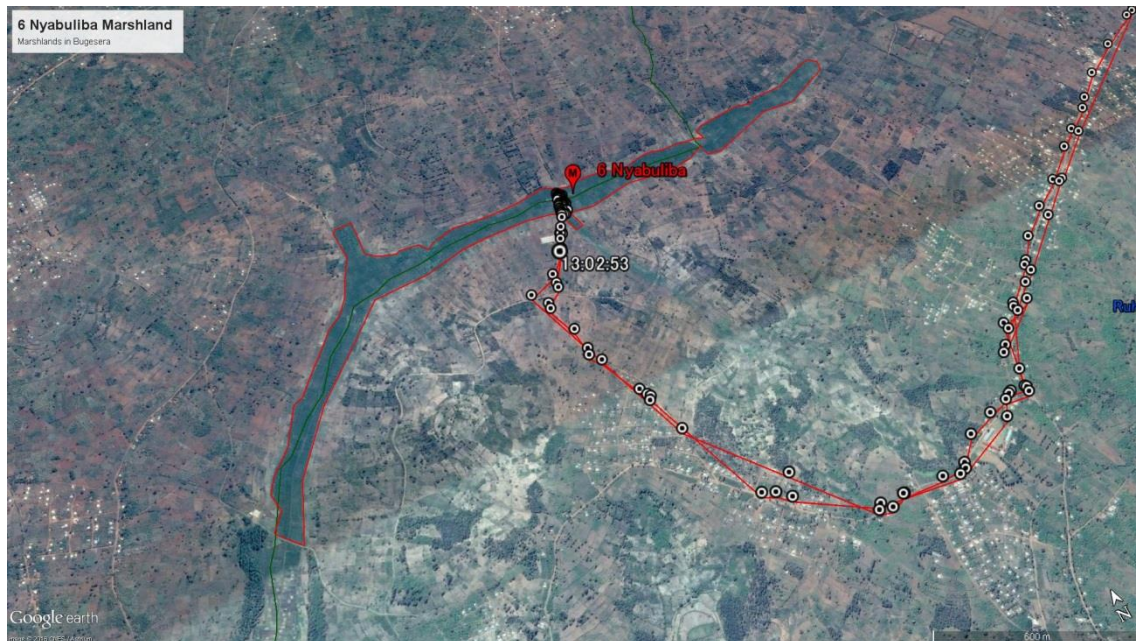
2) Size: 52ha

3) Status & Challenges: Developed by RSSP in 2001. Additionally, developed by QWMD in 2014. They are affected from the shortage of water.

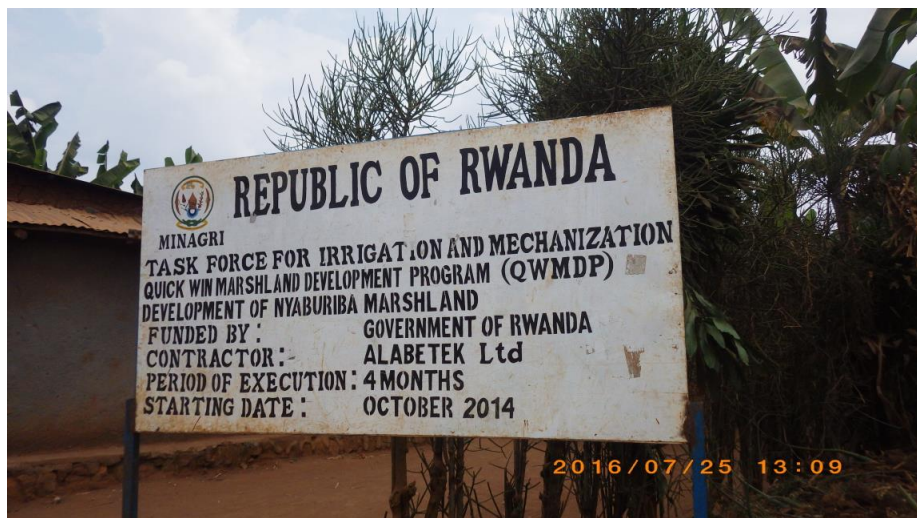
4) Main crop: Rice

5) Comments: No

6) Field Visit Date: 25th July, 2016



The QWMD Project rehabilitated this Marshland in 2014.



The facilities is not so bad.



The Nyabuliba Cooperative manager said they are suffering from flood in the downstream area of this Marshland because of the construction of the bridge in Akanyaru River.

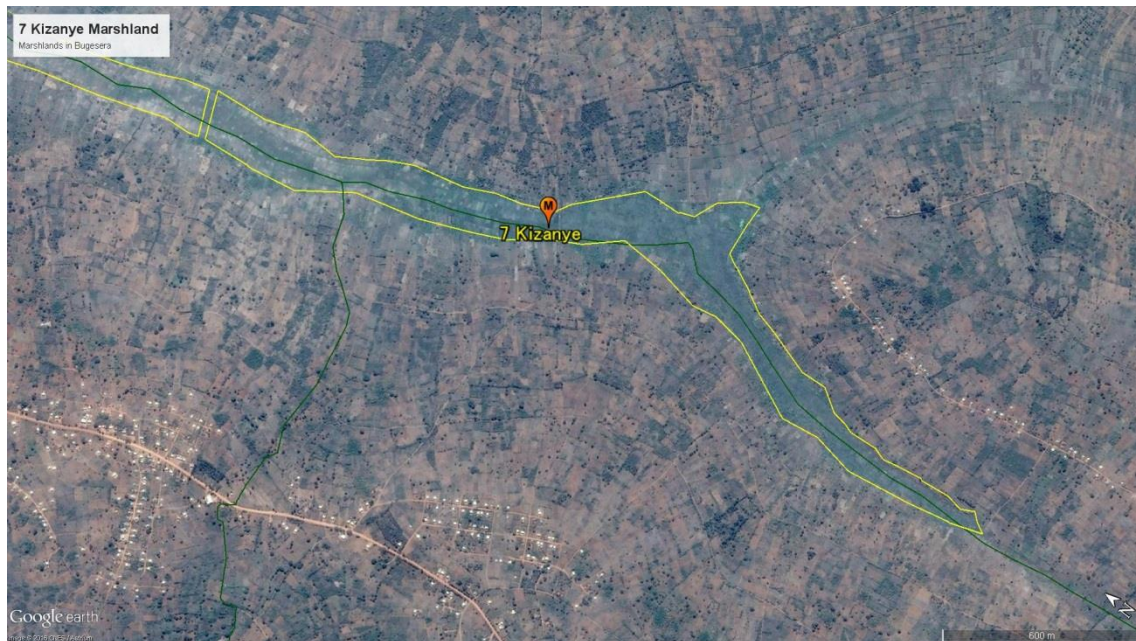


The farmer was transplanting rice as a method of planting in evenly, which was trained by the JICA Project.



(7) Kizanye Marshland

- 1) Sector: Ruhuha, Ngeruka, Mareba
- 2) Size: 60ha
- 3) Status Challenges: Not developed. They suffer from the shortage of water in some areas.
- 4) Main crop: Rice
- 5) Comments: The agronomist of the Bugesera district recommended us to develop this marshland because the potential of this marshland seems to be high.
- 6) Field Visit Date: 11th February, 2016



(8) Kibaza Marshland

1) Sector: Ruhuha, Ngeruka

2) Size: 40ha

3) Status Challenges: Developed by PAPSTA in 2001, but not completed. No drying area, No warehouse, and the canal is not conveying water efficiently. IWUO constructed some intakes but not professionally. There is no Dams and water resource is springs.

4) Main crop: Rice

5) Comments: This site was supported by Picropp, JICA technical cooperation program, so they have good skill to cultivate rice. This site should be the candidate to be rehabilitated.

6) Field Visit Date: 11th February, 2016



(9) Mugishya Marshland

1) Sector: Mareba

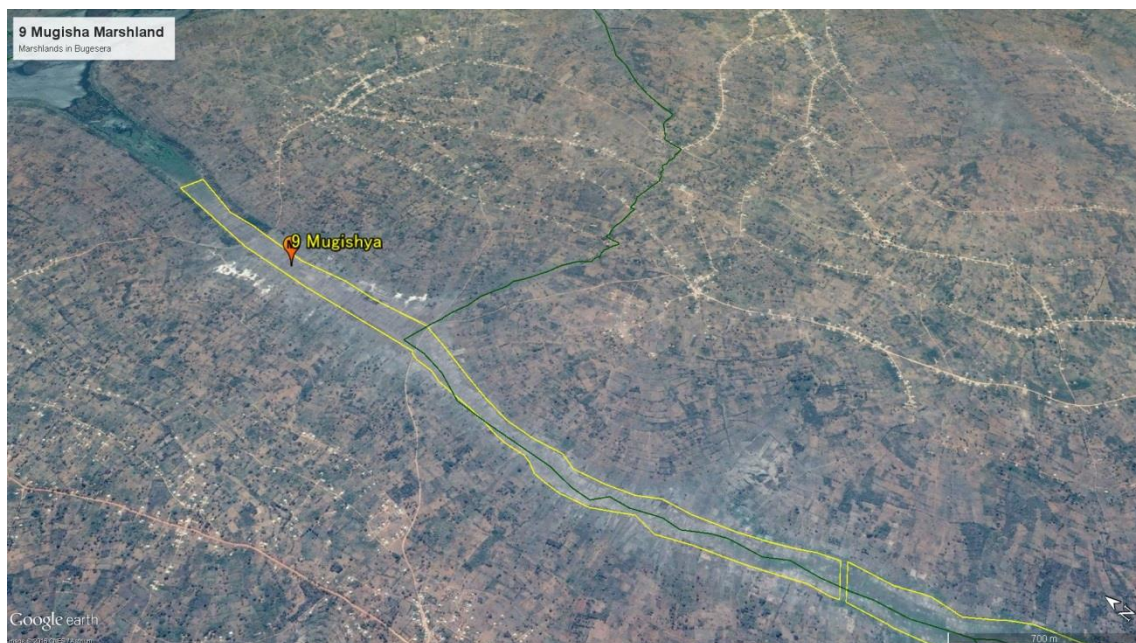
2) Size: 40ha

3) Status & Challenges: Not developed. They produce Maize, Beans and part upstream rice by rotation. Problem is flood from upstream and shortage of water in dry season.

4) Main crop: Maize and beans but the cooperative wishes to produce rice if the marshland is developed.

5) Comments: The agronomist asked us to conduct the development of this marshland.

6) Field Visit Date: 11th February, 2016





(10) Gashora2 Marshland

1) Sector: Gashora, Ruweru

2) Size: 750ha

3) Status & Challenges: Not developed. This Marshland is located in the Akagera river basin. It is very important to consider about the drainage before development. This marshland is cultivated by farmers from different Sectors of Bugesera and Ngoma District but suffers from flood in rainy season.

4) Main proposed crop: Rice

5) Comments: We should consider about the water control of the whole river basin.

6) Field Visit : 21st April, 2015



This is the overview of the Gashora2 site. The Nyabarongo River is going through the marshland windingly. It is very difficult to develop this marshland because the flood protection is not easy.



(11) Migina Marshland

- 1) Sector: Shyara, Musenyi
- 2) Size: 40ha
- 3) Status & Challenges: Not developed. The area is located in Cyohoha swamp with peat soil. It is difficult for this marshland to be developed because it is a part of swamp.
- 4) Main crop: Rice
- 5) Comments: This marshland is located in the middle of Akanyaru River and Lake Cyohoha North. It is difficult to develop this marshland.
- 6) Field Visit Date: 16th February, 2016





(12) Rwansoro Marshland

1) Sector: Juru

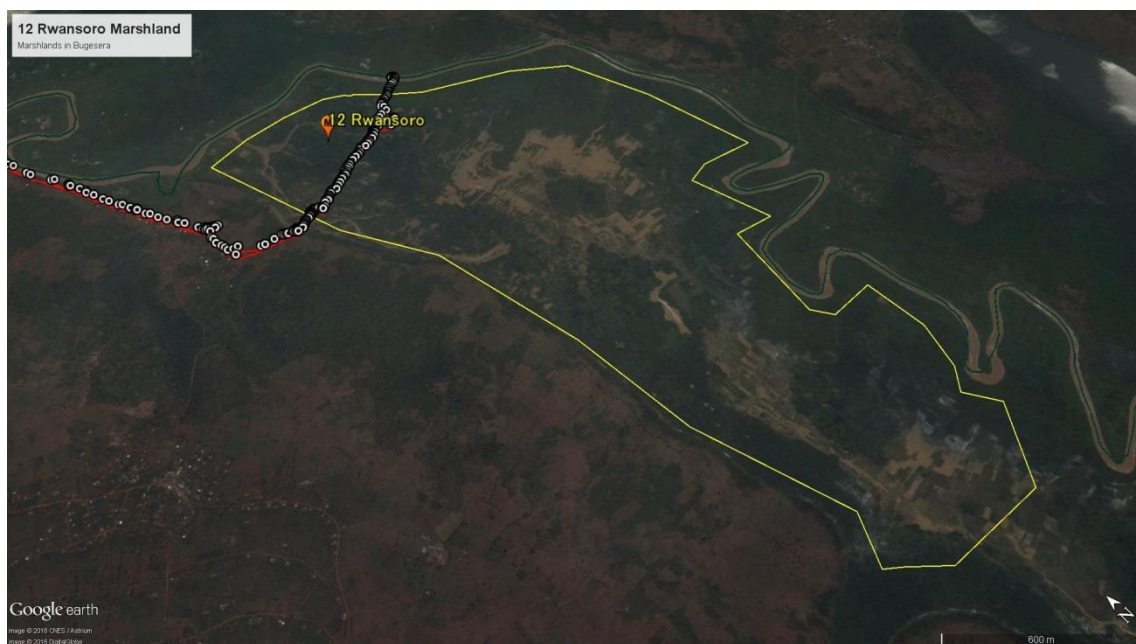
2) Size: 300ha

3) Status & Challenges: Not developed.

4) Main crops :Maize, beans, vegetables and Soy beans

5) Comments: This marshland is located in Akagera Marshland same as Rurambi and Gashora1. However, on the premise of development, they should think about the water control of the whole Akagera river basin.

6)Field Visit : 25th July,2016



This is the overview of the Rwansoro Marshland.



This Marshland is flooded in the rainy season, but change to the good big farm like this in the dry season.



There is ground water in this Marshland, so farmer dig the pond for irrigation.



This Marshland is along the Akagera (Nyabarongo) River.



(13) Akanyaru Marshland

1) Sector: Shyara, Musenyi, Nyarugenge

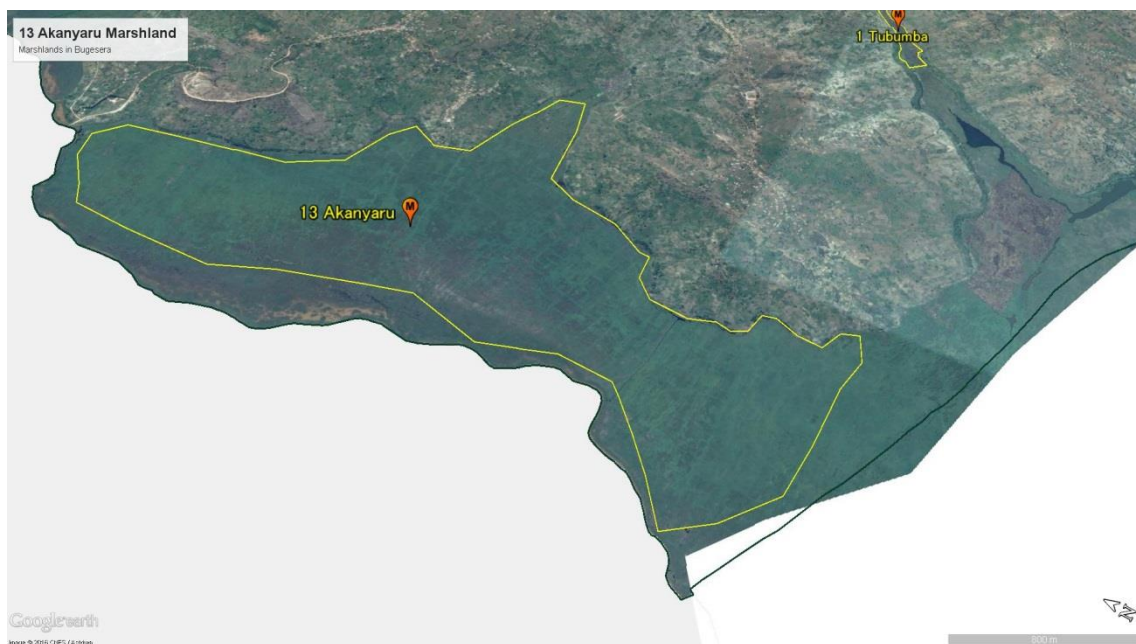
2) Size: 350ha

3) Status & Challenges: Not developed. This Marshland is located in the Akanyaru river basin. This Marshland is flooded now.

4) Main crops :Maize

5) Comments: We should consider about water control of the whole river basin before the development of this marshland.

6)Field Visit : 9th February,2016



(14) Rurambi Marshland

1) Sector: Juru

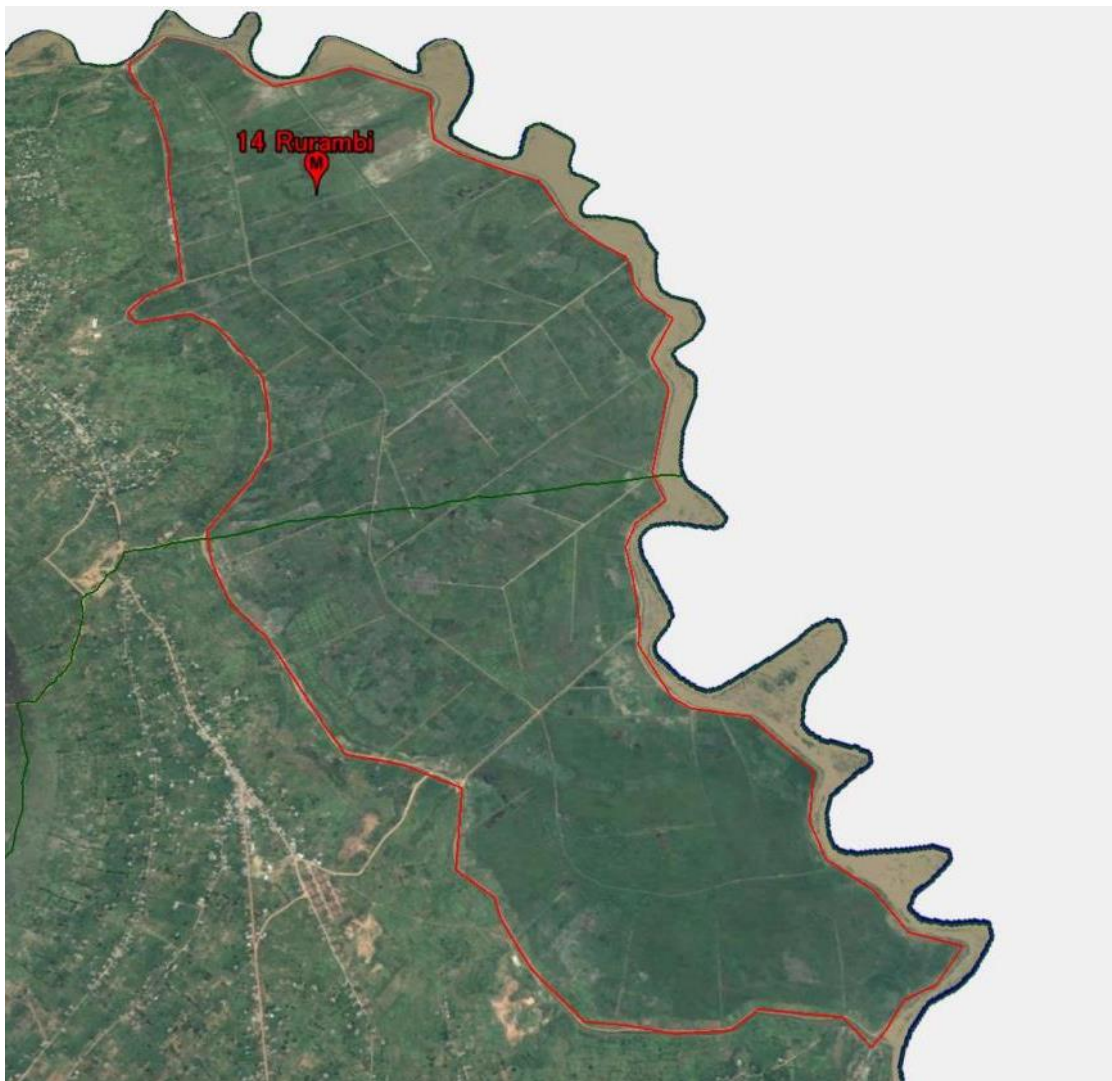
2) Size: 850ha

3) Status & Challenges: This marshland was developed by PADAB/PAIRB project which is funded by Africa development Bank in 2015. However, the facilities are not working well.

4) Main crop: Rice

5) Comments: They should consider about improving these facilities.

6)Field Visit : 3rd June,2015



This is the view of the Rurambi project. They developed 850ha marshland as a paddy field.



They are using pump to pump up the water from Nyabarongo River.



Unfortunately, they are annoyed by the sedimentation from the river. So they hire labors to dig the mud at the intake near the river.



This is the drainage of this site in the middle. You can see the marshland with papyrus on the right site. This part is distributed to the private company, but they have not cultivated there yet.



(15) Gashora1 Marshland

1) Sector: Gashora, Rilima, Juru

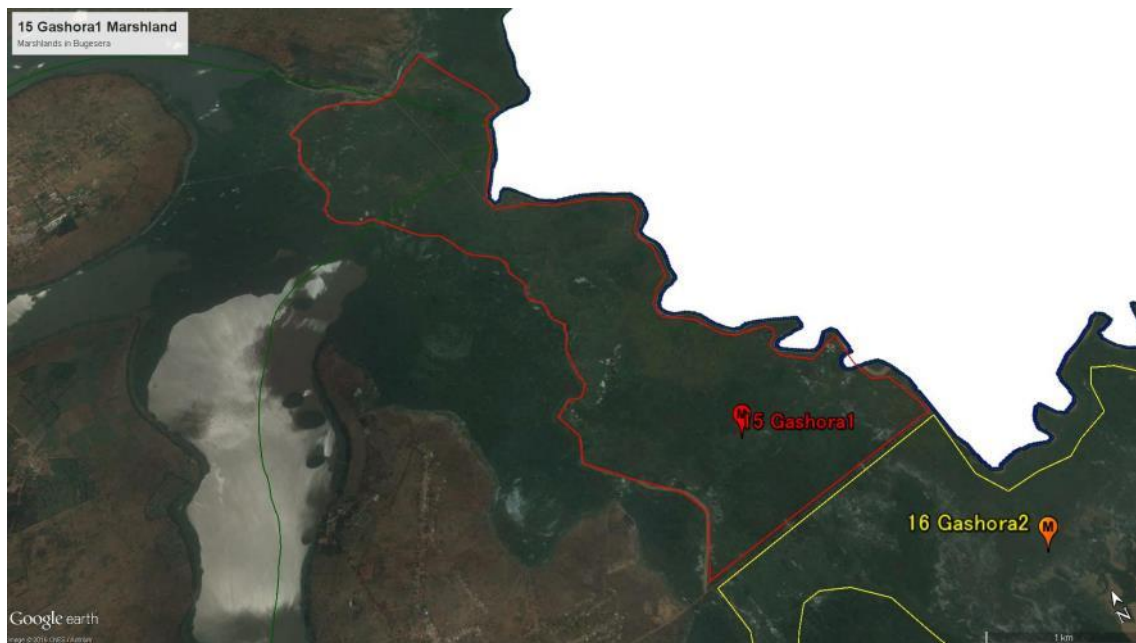
2) Size: 750ha

3) Status & Challenges: The PADAB/PAIRB Project which is funded by African Development Bank is constructing the facilities of dyke, pump and so on. However, because of too much ground water, they cannot cultivate well.

4) Main crops: Different crops

5) Comments: We should consider about the water control of the whole river basin.

6) Field Visit : 3rd February, 2016



We went to the Gashora 1 project site after visiting the district office. They were constructing the pump station near the Nyabarongo River.



They are tentatively using pump to drain water from the drainage canal in the command area. However it is not so effective.



(The end)