(Annex 2-4)

4. The Marshlands in Kirehe

Contents

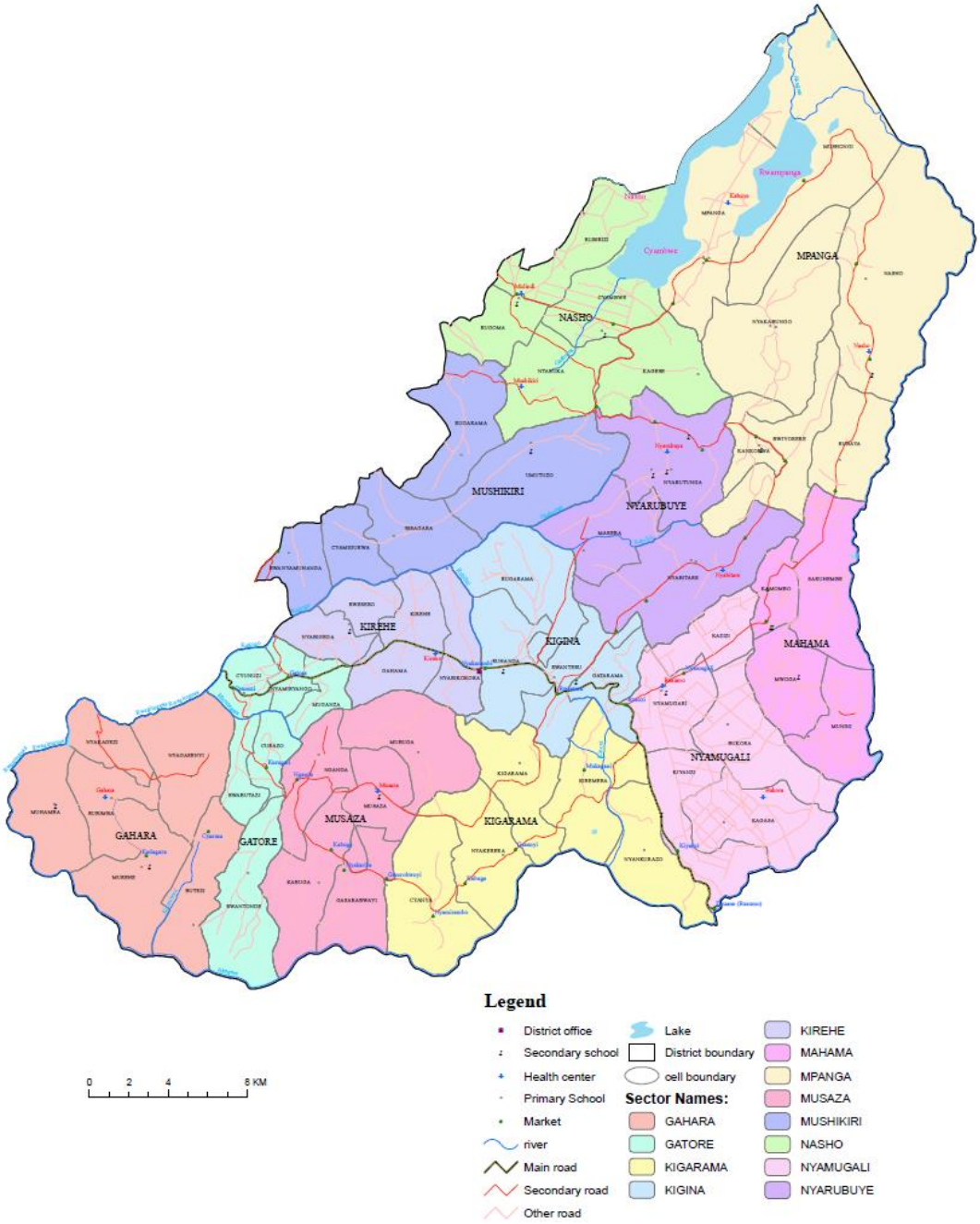
1. The Outline of the Kirehe District

(1) Geographical location

Kirehe District is one of the seven districts making up the Eastern province. It is made up of twelve administrative sectors which are: Gahara, Gatore, Kigarama, Kigina, Kirehe, Mahama, Mpanga, Musaza, Mushikiri, Nasho, Nyamugari and Nyarubuye, 60 cells and 612 administrative villages (Imidugudu). Kirehe District extends over a total area of 1,118.5 Km^2 with about 162,388 male and 176,174 female inhabitants equaling to 338,562 of its total population according to the newly provisional results released by the National Institute of Statistics of Rwanda (NISR). The Economy of Kirehe district is based on agriculture and livestock which is at least 90% of the population. The district borders with Tanzania in the East with the Districts of Ngara and Karagwe, in the south the District borders with Burundi, Ngoma District in the south western part and Kayonza District in the North.

The table below shows the population in Kirehe district by sector and sex, the average annual growth rate and the population density by administrative sector and the district.

KIREHE ADMINISTRATIVE MAP



(Figure 1 :Kirehe Administrative Map)

Table 1: Population specifics for Kirehe district

Sector	2002 Total Population	2012 Population			Sex Ratio	Population Change	Average Annual Growth Rate (2002-2012) %	Population Density (sq.km)
		Male	Female	Total				
GAHARA	29,659	18,872	20,909	39,781	90	34.1	3	379
GATORE	19,596	12,818	14,203	27,021	90	37.9	3.3	427
KIGARAMA	21,670	15,135	16,167	31,302	94	44.4	3.7	276
KIGINA	16,520	13,204	13,727	26,931	96	63	5	403
KIREHE	16,374	11,452	12,259	23,711	93	44.8	3.8	483
MAHAMA	13,130	11,503	12,355	23,858	93	81.7	6.2	374
MPANGA	22,336	15,502	16,446	31,948	94	43	3.6	129
MUSAZA	18,284	12,049	13,233	25,282	91	38.3	3.3	279
MUSHIKIRI	17,541	13,504	14,575	28,079	93	60.1	4.8	296
NASHO	20,146	12,825	13,873	26,698	92	32.5	2.9	259
NYAMUGALI	23,380	17,733	19,124	36,857	93	57.6	4.7	379
NYARUBUYE	10,832	9,415	10,100	19,515	93	80.2	6.1	227
KIREHE	**229,468**	**164,012**	**176,971**	**340,983**	**93**	**48.6**	**4**	**286**

Source: NISR Provisional results for 2012 for the District-Sector Population census

The table below also shows the population-Housing Census- Provisional Results in eastern Province by District sex ratio, Population change 2002-2012 (%) the average annual growth rate 2002-2012 (%) and the population density (sq.km) by District.

Table 2: Population specifics for Eastern Province

District	2002 Total Population	2012 Population			Sex Ratio	Population Change (2002-2012) (%)	Average Annual Growth Rate (2002-2012) (%)	Population Density (sq.km)
		Males	Females	Total				
RWAMAGANA	220,502	149,214	161,024	310,238	93	40.7	3.5	455
NYAGATARE	255,104	228,610	238,334	466,944	96	83	6.2	243
GATSIBO	283,456	208,355	225,642	433,997	92	53.1	4.4	275
KAYONZA	209,723	167,767	178,984	346,751	94	65.3	5.2	179
KIREHE	229,468	162,388	176,174	338,562	92	48.6	4	288
NGOMA	235,109	164,012	176,971	340,983	93	44	3.7	390
BUGESERA	266,775	177,404	185,935	363,339	95	36.2	3.1	282
EASTERN PRO	**1,700,137**	**1,257,750**	**1,343,064**	**2,600,814**	**94**	**53**	**4.3**	**275**
RWANDA	**8,128,553**	**5,074,942**	**5,462,280**	**10537222**	**93**	**29.6**	**2.6**	**416**

Source: NISR Provisional results for 2012 for the District-Sector Population census

(2) Relief

Kirehe District relief is that of a low plateau area. However, there exists a chain of mountains which divide the region into two geographical entities; these are characterized by a low altitude plain of more or less than 1,350m of altitude, separated by isolated hills and mountains with a plateau at the summits of Mountain Mahama and Mountain Migongo. The average of the District is 1500m above sea level.

(3) Hydrograph, Fauna and Flora

As regards hydrograph, Fauna and flora, the principal water course of the District is the Akagera River which surrounds the south-eastern part of the

District and continues into Lake Victoria. Vegetation is that of the eastern savanna type very dense and in big variety prevalent with acacia trees. Apart from natural forests which are tending to disappear completely, there are other forests planted by the District and those belonging to private individuals.

(4) Climate and Agriculture

Concerning the Climate favorable for Agricultural field, the District of Kirehe has climatic intervals of 4 seasons per year making it possible to make 2 annual harvests on the same pieces of land. Agriculture is strongly dependent on the seasonal climatic changes, primarily with regard to rain. The tropical land relief is more widespread in the District. It is composed of different types of soil components that combine at a lenient level, all these grounds can be exploited and improve on its production.

(5) Topography of the area

The District of Kirehe is characterized, in general, by lowly undulating hills separated by valleys some of which are swampy and boggy. This kind of topographical layout constitutes an important potentiality for modern irrigation system and mechanized agriculture. All the above information is from the District's updated website.

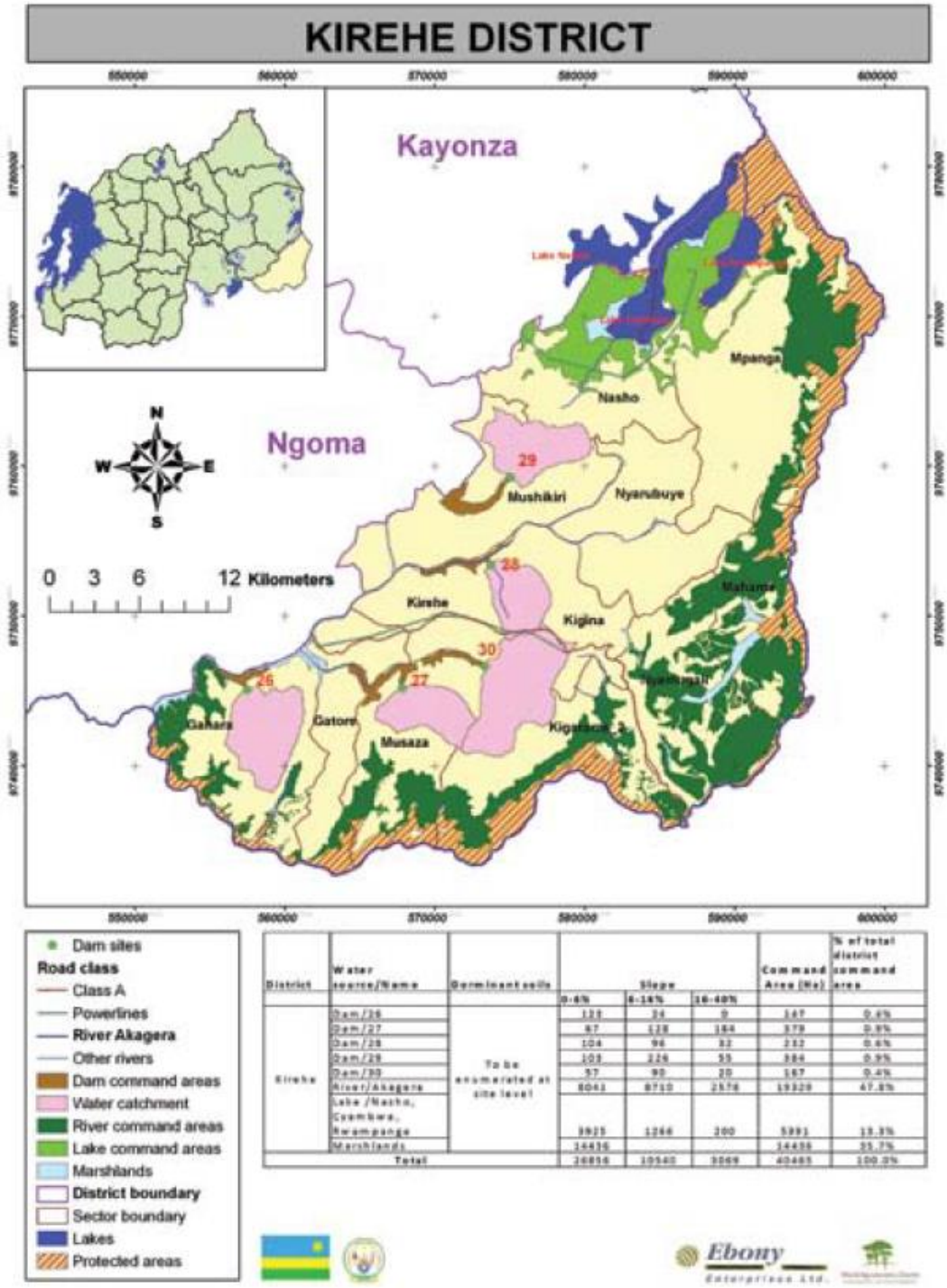
2. Kirehe District Irrigation Plan

The Potential Irrigation Area(PIA) for Kirehe district are in dam, river, lake and marshland domains with a total command area of 40 465 ha and irrigation water demand of 303.5 Mm3. The river domain PIAs draw their water from the Akagera river which has minimum flow rate of about 90m s-1 at the entry point of the district at Gahara sector, which increases to about 102m s-1 at the Northern tip of Mpanga sector as it exits the district. This gives a minimum average flow rate of about 96m s-1, which translates to an annual supply of 2 986 Mm3. The other sets of PIAs are from dam, marshland and lake domains. The PIAs from the lake domain draw water from lakes Nasho, Cyambwe and Rwampanga. The total irrigation water requirement for Kirehe is about 340 Mm3 partitioned into 144 Mm3 for marshlands and 195 Mm3 for the rest of the command areas. Access to road and electrical power grid to these sites is good.

Table 3:The Potential Irrigable areas in Bugesera

	Area(ha)	Ratio(%)
Dam	1,309	3.2%
Lake	5,391	13.3%
River	19,329	47.8%
Marshland	14,436	35.7%
Total	40,465	100.0%

The total area of Marshlands in Kirehe is **856 ha** which is **5.9%** of the Potential area of marshland.



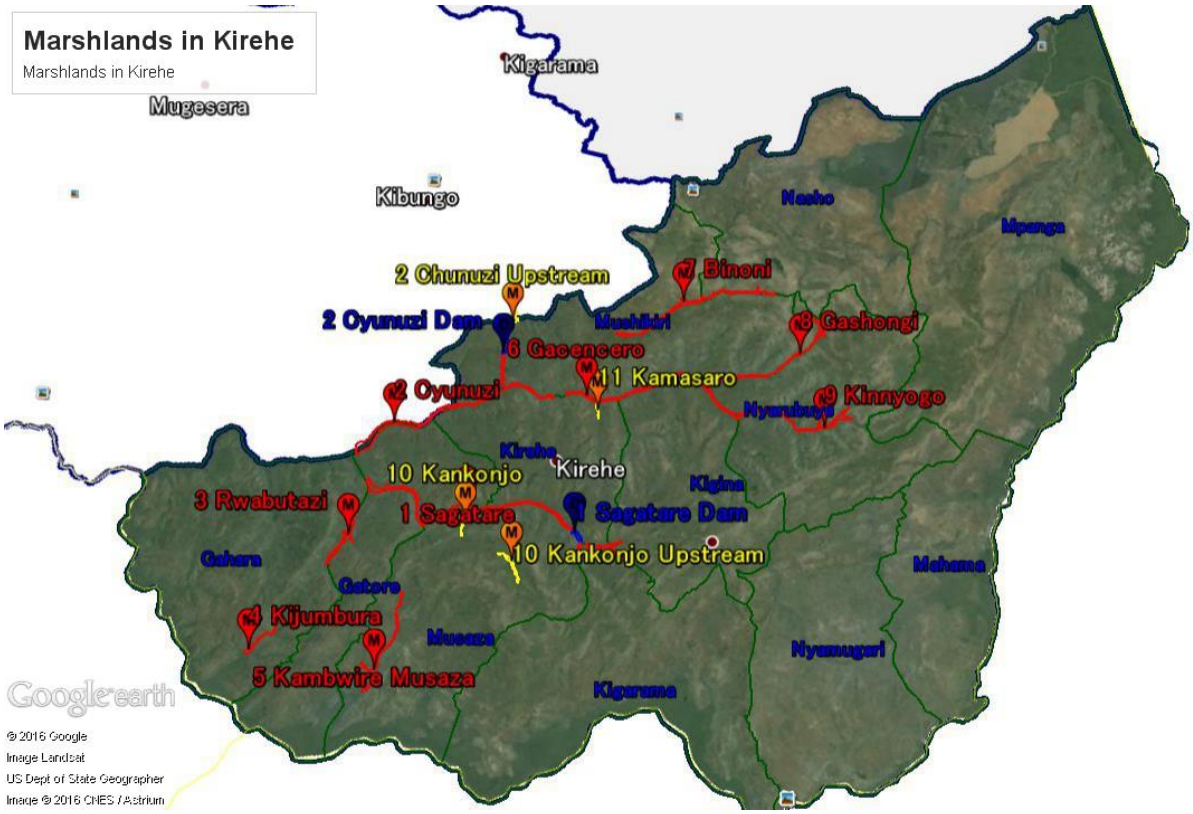
District	Water source/Name	Dominant soils	Slope			Command Area (Ha)	% of total district command area
			0-4%	4-16%	16-40%		
Kirehe	Dam/26	To be enumerated at site level	123	24	0	147	0.4%
	Dam/27		67	128	184	379	0.9%
	Dam/28		104	96	32	232	0.6%
	Dam/29		103	226	55	384	0.9%
	Dam/30		57	90	20	167	0.4%
	River/Akagera		8043	8710	2576	19329	47.8%
	Lake /Nasho, Cyambwa, Rwampanga		3923	1244	200	5891	13.3%
	Marshlands		14436			14436	35.7%
Total			26854	10540	3069	40465	100.0%

(Figure 2 :The Potential Irrigable areas in Kirehe)

3.The Outline of the marshlands in the Kirehe District

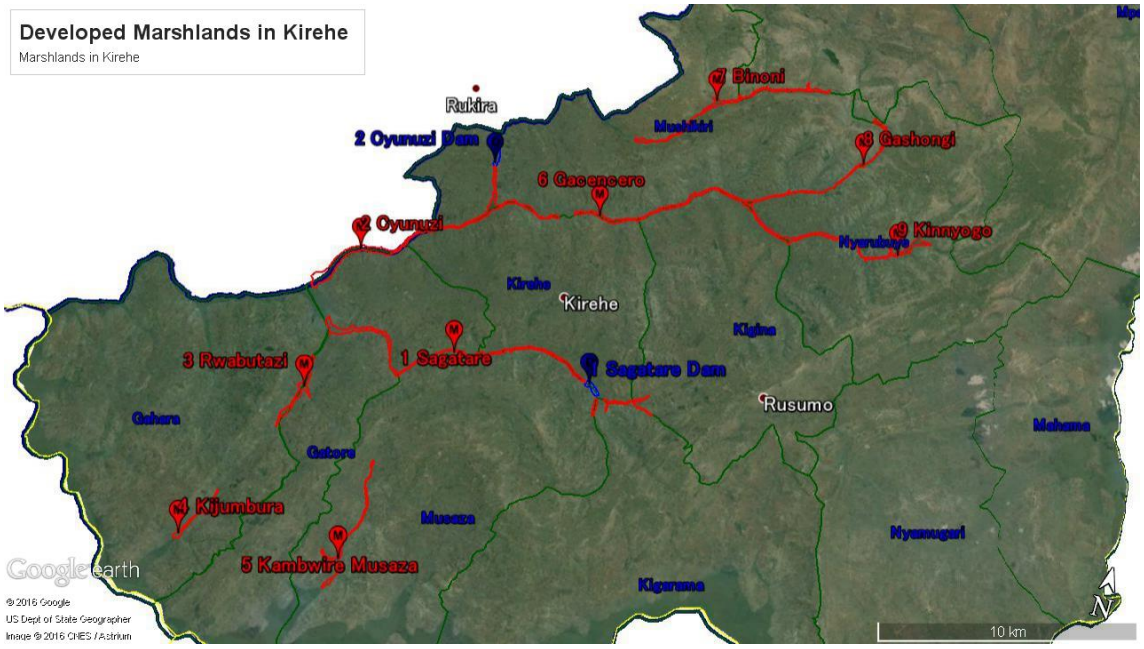
(1) The Outline of the marshlands in the Kirehe District.

Kirehe District has Eleven (11) Marshlands,856ha. There are Nine(9) Developed Marshland,830ha, and Two(2) Non-Developed Marshlands,26ha.



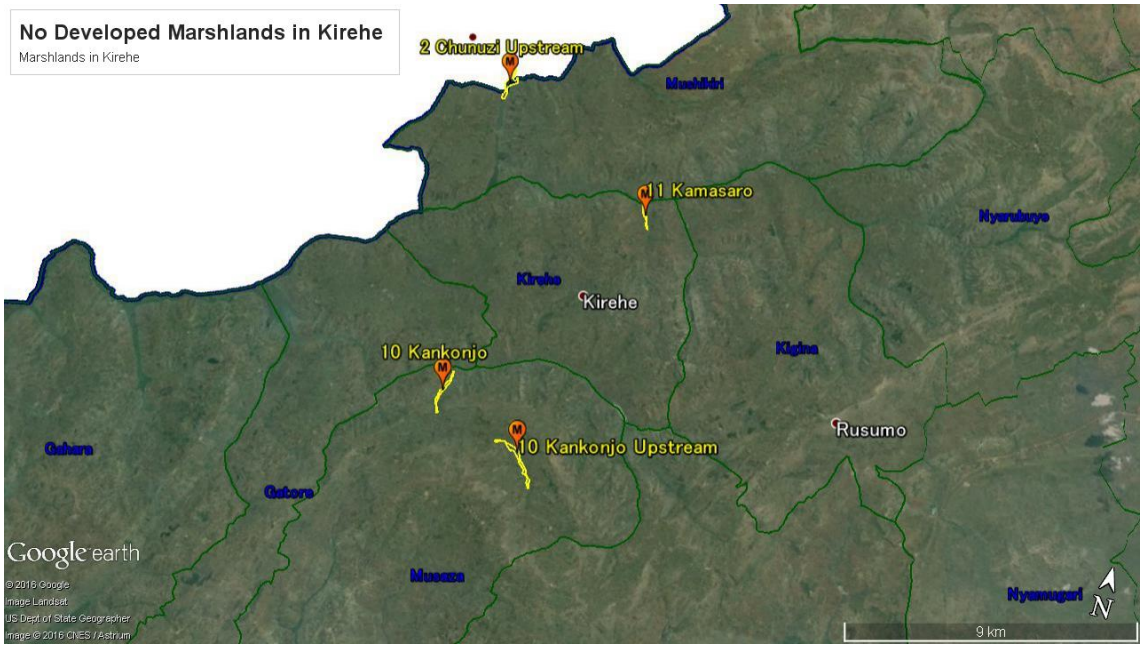
(Figure 3 :The Marshlands in Kirehe)

Regarding Marshlands in Kirehe district, almost all Marshlands were developed by Project like KWAMP, RSSP, which are 1)Sagatare, 2)Cyunuzi, 3)Ruwabutazi, 4)Kijumbura, 5)Kambwire-Musaza, 6)Gacencero, 7)Binoni, 8)Gashongi, 9)Kinnyogo.



(Figure 4 :Developed Marshlands in Kirehe)

There are Two (2) Non-Developed Marshlands in Kirehe, which are 10)Kankonjo, 11)Kamasaro. Additionally, the 2)Cyunuzi upstream has not been developed.



(Figure 5 :Non-Developed Marshlands in Kirehe)

(2) Comments for Marshlands in the Kirehe District

We can make a classification of the Marshlands in the Kirehe District for the Three (3) types below.

a) The Developed Marshlands by KWAMP

1)Sagatare, 2)Cyunuzi, 4)Kijumbura, 5)Kambwire-Musaza, 7)Binoni, 8)Gashongi,

These Six (6) Marshlands were developed by KWAMP in 2010-2015, and they constructed Two (2) Dams (Sagatare Dam and Cyunuzi Dam). The KWAMP project not only constructed facilities but also trained farmers on the site as well. So, these Marshlands should be models for all over the Rwanda.

b) The Developed Marshlands by RSSP, PAPSTA

3)Rwabutazi, 6)Gacencero, 9)Kinnyogo

These Three (3) Marshlands were developed by RSSP, PAPSTA in 2005. However, the situation of these facilities like weirs, canals, drainages, roads are not good. Especially, canals are not working well, so the farmers suffer from the shortage of water, the problem of the water distribution sometimes. They should be rehabilitated soon.

c) The Non-Developed Marshlands

The Non-Developed Marshlands are consisting of Two (2) (+One (1)) Marshlands.

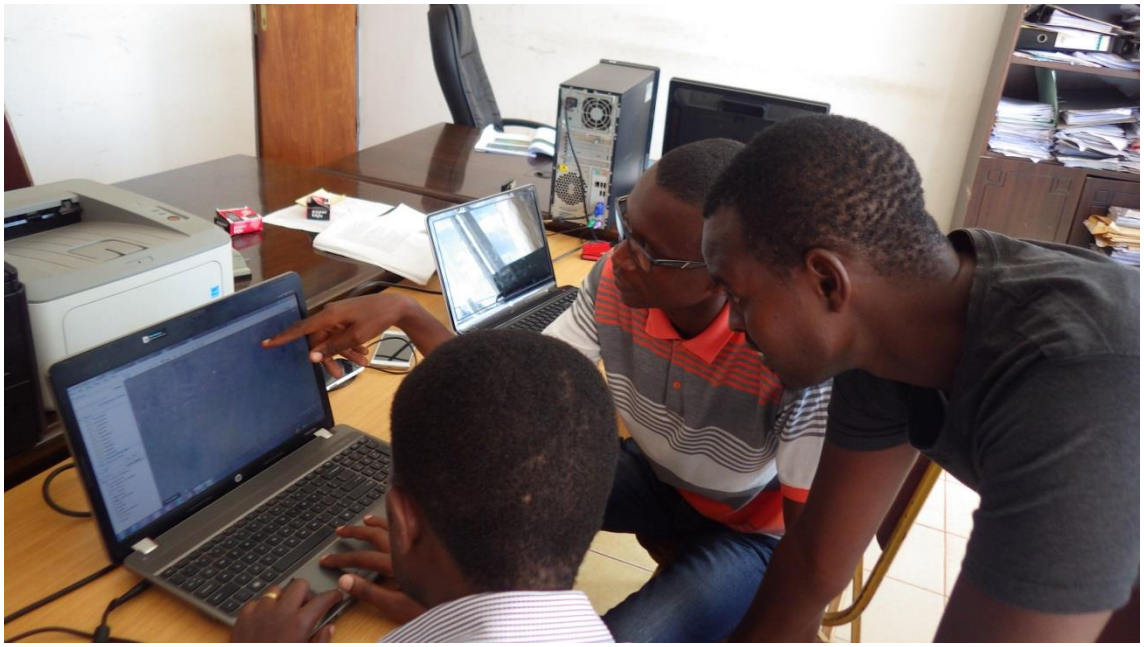
10)Kankonjo, 11)Kamasaro,(+2)Cyunuzi Upstream)

These Marshlands don't have enough water for rice, and some parts of these Marshlands are owned by individual farmers like hillside. Regarding these Marshlands, we have to consider about the irrigation for horticulture products like the Small Scale Irrigation.

(3)The record of the field visit

The field visits of Marshland survey were conducted on the schedule below. We asked the District Agronomist, the Sector Agronomists or KWAMP officers to go to the marshlands with us. On the field, we conducted the interview to the Sector agronomist or farmers about the situation of the Marshlands, and picked up the phone number of the contact persons of the Cooperative or IWUOs in that field. After coming back to Kigali, we conducted the interview for those persons.

Date	Marshlands	Notes
17th May,2016	1)Sagatare,2)Cyunuzi	
18th May,2016	3)Ruwabutazi,4)Kijumbura,5)Kambwire-Musaza, 6)Gacencero,7)Binoni, 8)Gashongi, 9)Kinnyogo	
19th May,2016	10)Kankonjo, 11)Kamasaro	



4. The individual data of the marshlands in Kirehe

(1) Sagatare Marshland

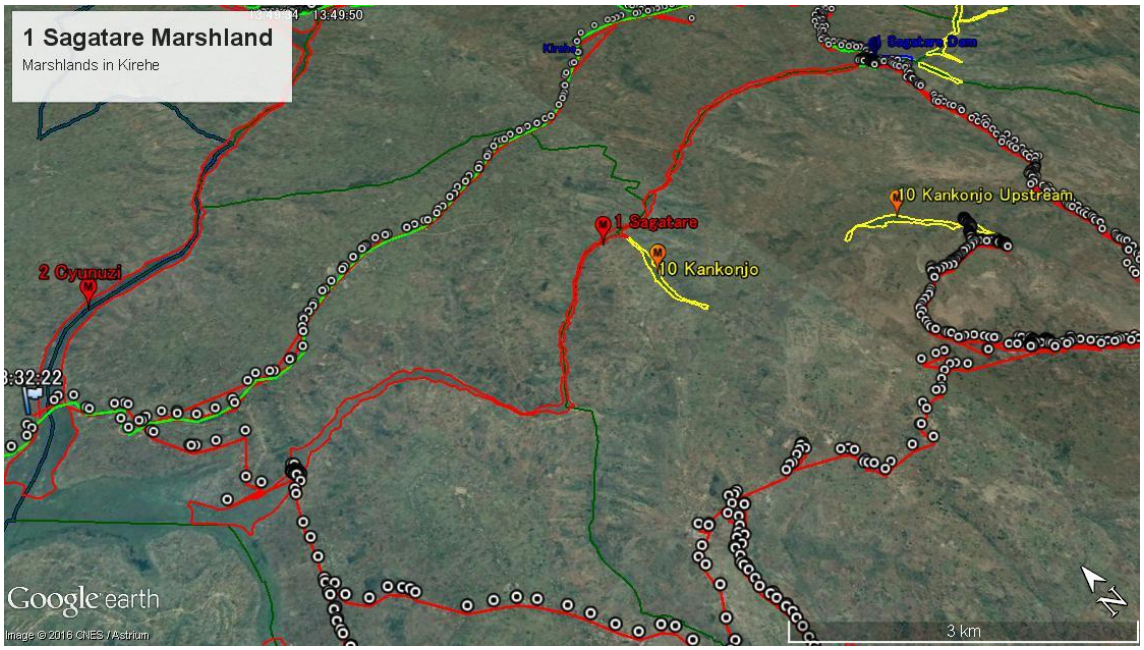
1)Sector: Kigina,Musaza,Kirehe,Kigarama,Gatore

2)Size: 95ha

3)Status & Challenges:1)Sagatare Marshland and 3)Rwabutazi Marshland are in one marshland. Sagatare Marshland was developed by KWAMP and Rwabutazi Marshland located downstream was developed by PAPSTA(Project). The main issue here is sedimentation from the erosion.

4) Main crop: Rice

5) Field visit date; 17th May, 2016

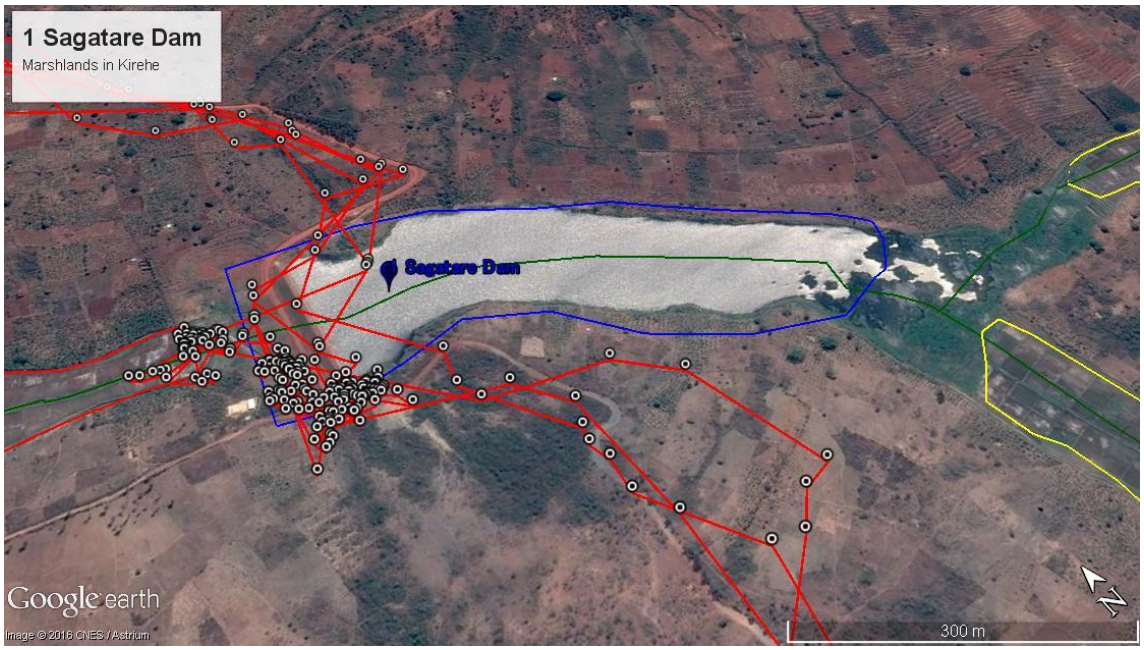


They cultivate rice in this Marshland.

The situation of the diversion weir is not bad.

This is the overview in the upstream of the Sagatare Dam. You can see two branches of the Sagatare Marshland.

(1-2) Sagatare Dam



The Sagatare Dam was constructed by KWAMP project in 2011.

The situation of riprap of Dam is not bad.

You can see the dyke of Dam from the downstream areas.

There is a mesh on the spillway to stop flowing of fishes from a Dam reservoir

The IWUO members held the meeting near the Dam.

The president of the IWUO was proud of the IMTA(Irrigation Management Transfer Agreement).

This is the certificate of National Non-Governmental Organization for RGB.

This picture was taken with the members of Sagatare IWUO.

(2) Cyunuzi　Marshland

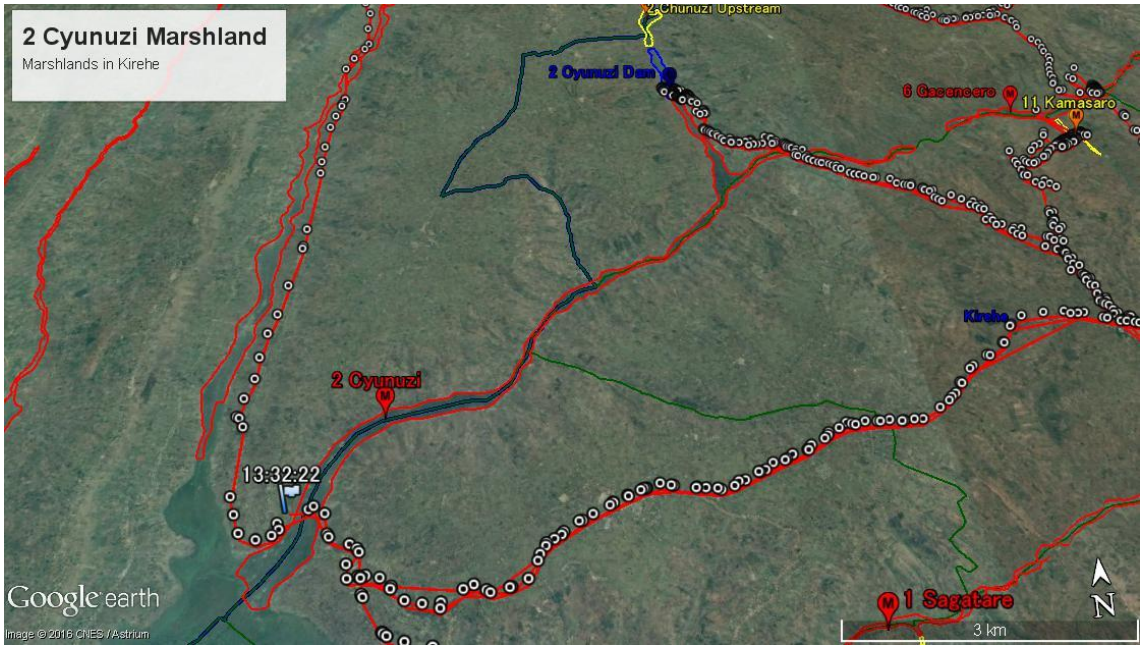
1)Sector: Kirehe,Gatore

2)Size: 196ha

3)Status＆Challenges: During rainy season, floods occur in the downstream areas of this Marshland. In the upstream areas of the Cyunuzi Dam, farmers are also cropping rice.

4)Main crop: Rice

5) Field visit date; 17th May,2016

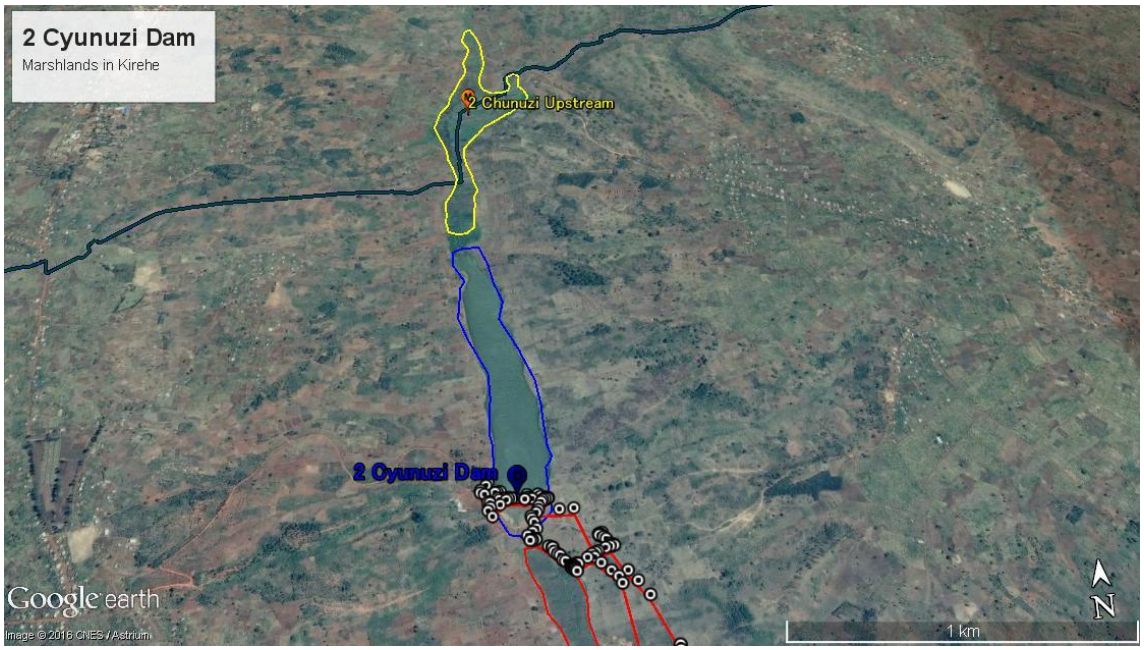


They grow rice. This Marshland was developed by RSSP in 2005.

A part of the intake is not working.

It is necessary to rehabilitate this intake.

(2-2) Cyunuzi Dam



This Dam was developed by KWAMP in 2010.

The situation of Dam is not bad.

This is the intake of this Dam.

The canal of the intake joins the spillway.

This is the spillway with mesh for protection of fish flowing.

(3) Rwabutazi Marshland

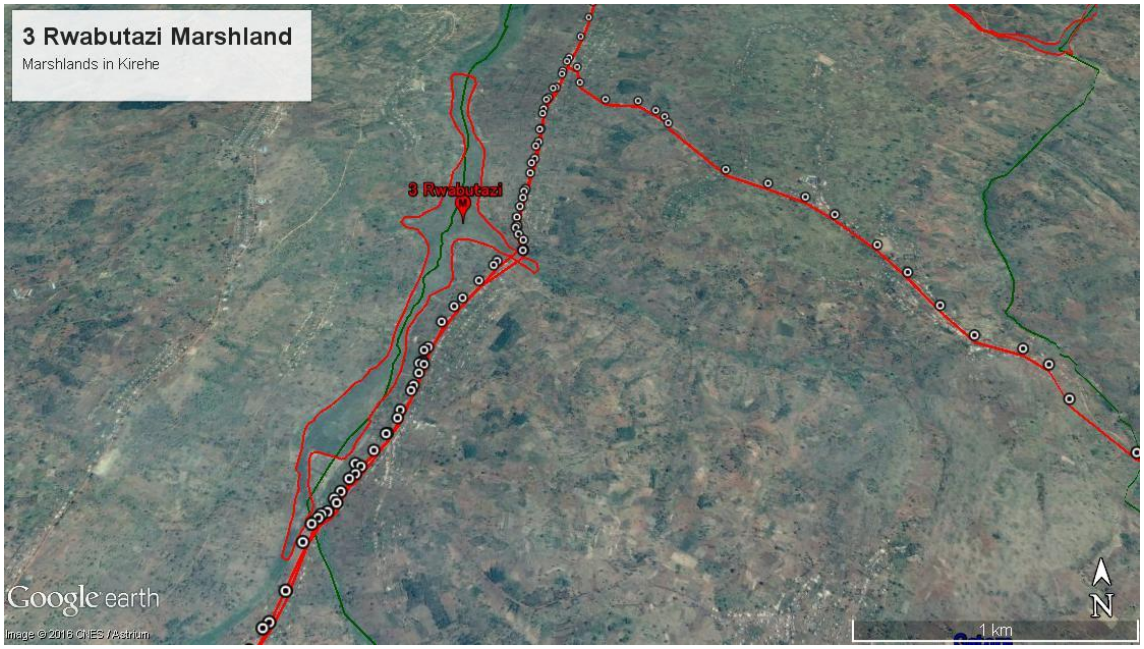
1)Sector: Gahore,Gahra

2)Size: 110ha

3)Status&Challenges: Rwabutazi was developed by PAPSTA(Project) before KWAMP. The Marshland has enough water.

4)Main crop: Rice

5) Field visit date; 18th May, 2016



They cultivate rice.

There is enough water.

(4) Kijumbura Marshland

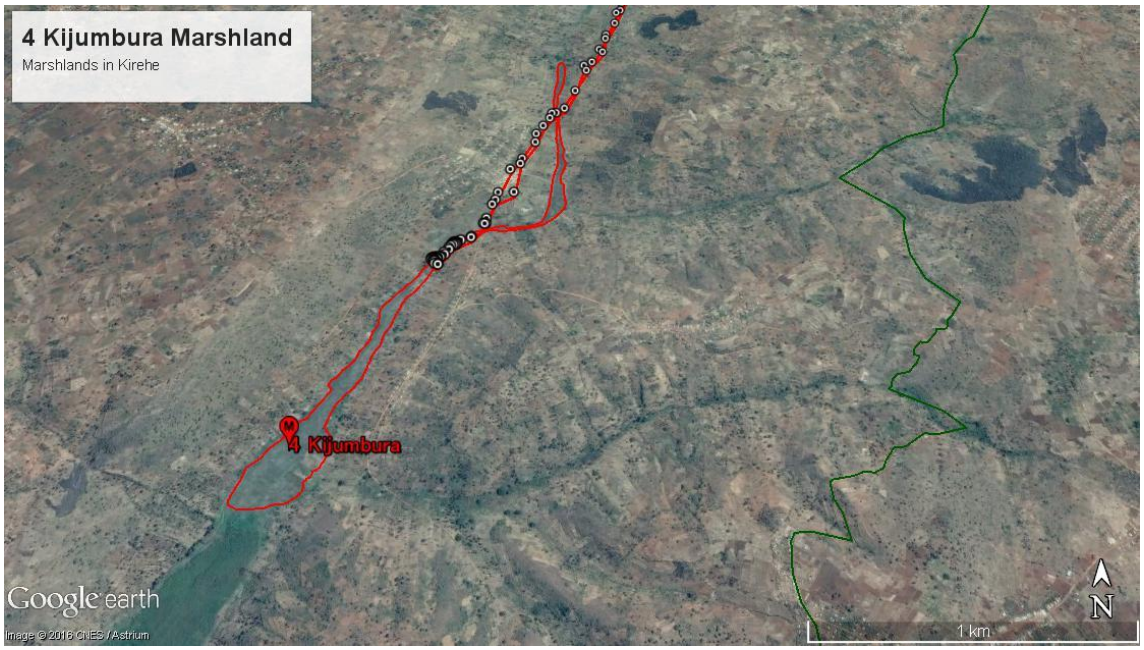
1)Sector: Gahara

2)Size: 18ha

3)Status & Challenges: Kijumbura was developed in December, 2015 by KWAMP. They can identify problems because they are going to harvest in the first season. To protect the command area, they are making a trench around the paddy field.

4)Main crop: Vegetable and sweet Potatoes

5) Field visit date; 18th May, 2016



This Marshland was developed by KWAMP in 2015.

This is a diversion Weir, but the canal on the left hand is not functioning well.

There is some sedimentation in the canal.

They are making the ditch to protect the erosion from hillside.

(5) Kambwire-Musaza Marshland

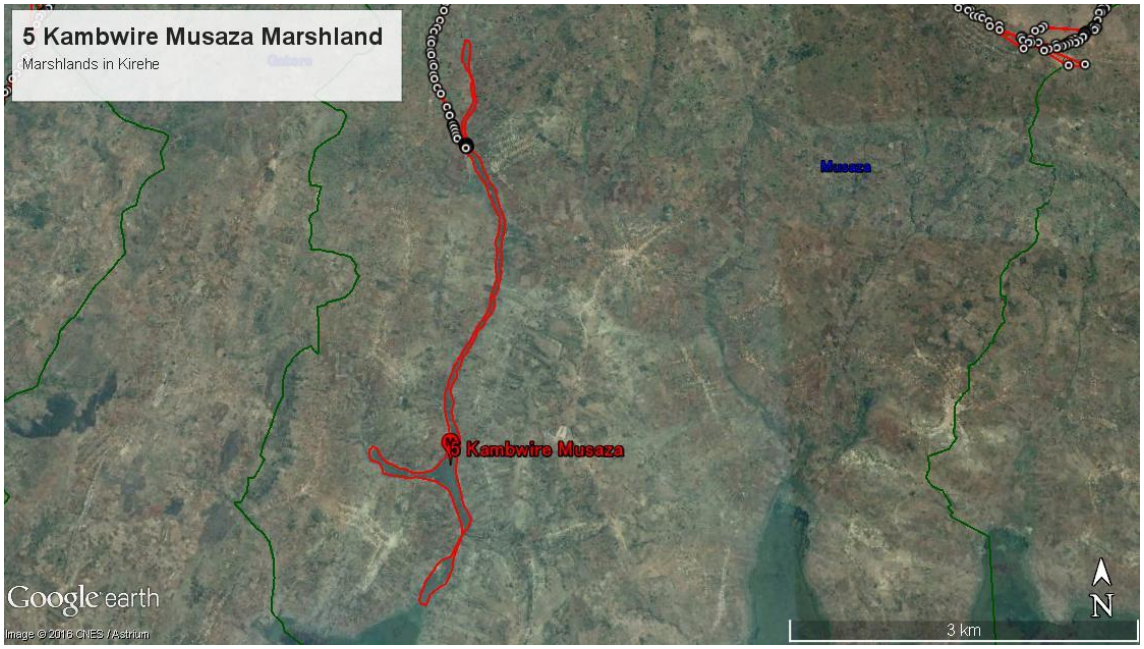
1)Sector: Musaza

2)Size: 89ha

3)Status&Challenges: Kambwire-Musaza is newly developed and farmers are doing leveling. They are also getting training from farmers in Rwabutazi. Upstream, and the big challenge is erosion.

4)Main crop: Rice, Vegetables and Sweet potatoes

5) Field visit date; 18th May, 2016



This Marshland was developed by KWAMP in 2015. They started cultivating rice. The problem is the leveling of the plot in this Marshland.

The situation of the diversion weir is not bad.

(6) Gacencero Marshland

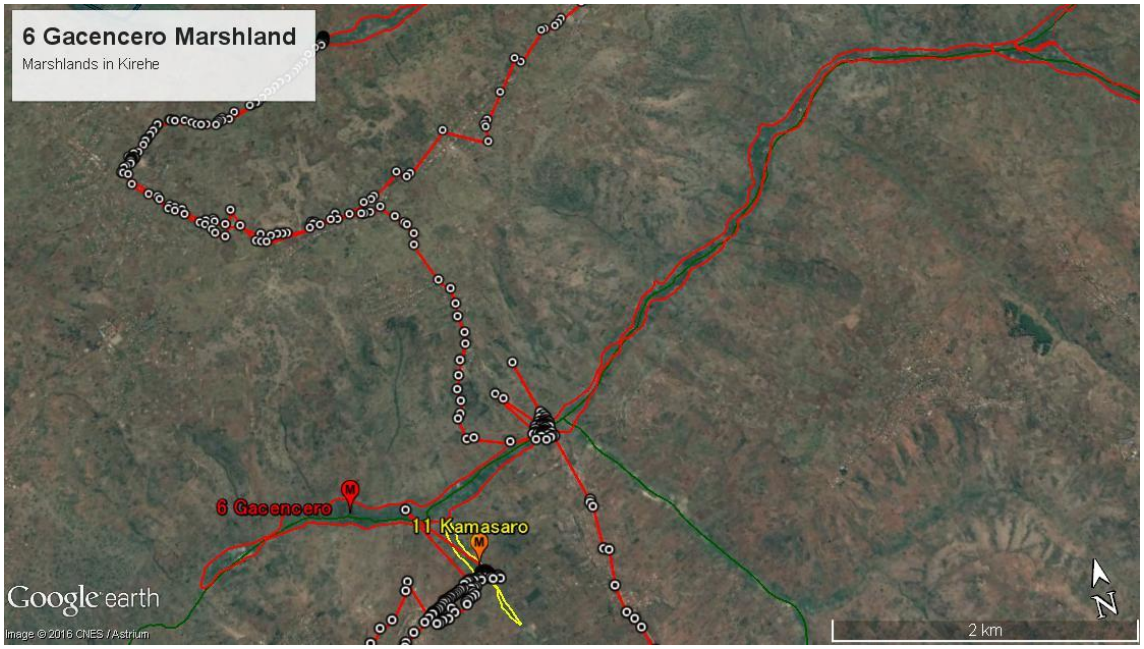
1)Sector: Mushikiri,Kirehe,Kigina

2)Size: 64ha

3)Status & Challenges: Gacencero Marshland was developed by RSSP. In some areas, irrigation facilities' level is lower than the paddy field's level.

4)Main crop: Rice

5) Field visit date; 18th May,2016



This marshland was developed by RSSP in 2005. They cultivate rice.

The situation of the irrigation facility is not good. The first canal doesn't have water.

It is necessary to study the reason of this problem and to rehabilitate this canal system.

The farmers made the weir of the timber. This timber weir was supported by SMAP(Japanese technical support project).

(7) Binoni Marshland

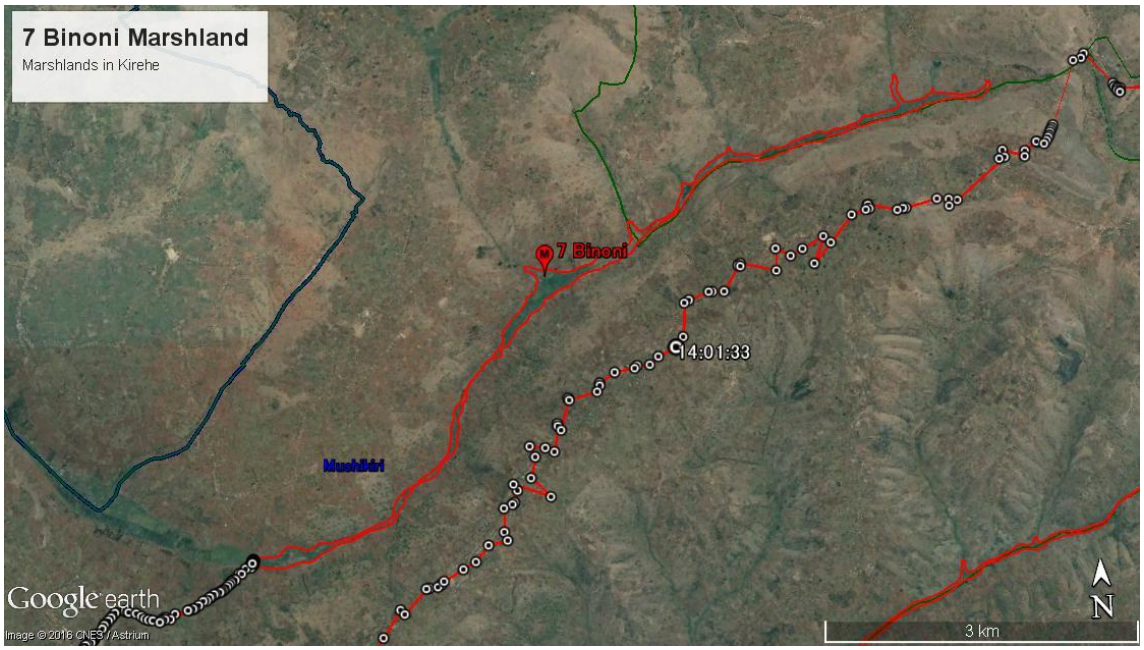
1)Sector: Mushikiri ,Nasho

2)Size: 138ha

3)Status＆Challenges: This Marshland was developed by KWAMP in 2016.

4)Main crop: Rice

5) Field visit date; 18th May,2016



They cultivate rice.

You can see the drainage of this Marshland.

This Marshland was developed by KWAMP in 2016.

(8) Gashongi Marshland

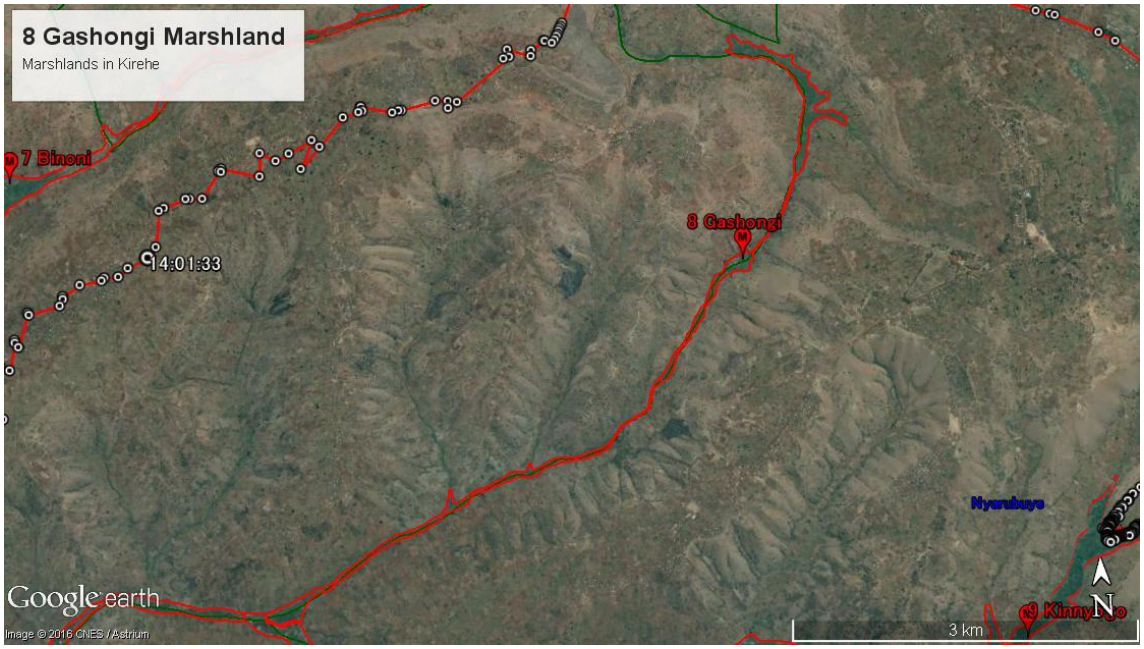
1)Sector: Mushikiri,Nyarubuye

2)Size: 55ha

3)Status&Challenges: Gashongi Marshland was newly developed and they are protecting the scheme. Farmers don't have experience to crop rice.

4)Main crop: Vegetable and Sweet Potato

5) Field visit date; 18th May, 2016



This Marshland is located near the rocky hillside. This Marshland was developed by KWAMP in2015.

(9) Kinnyogo Marshland

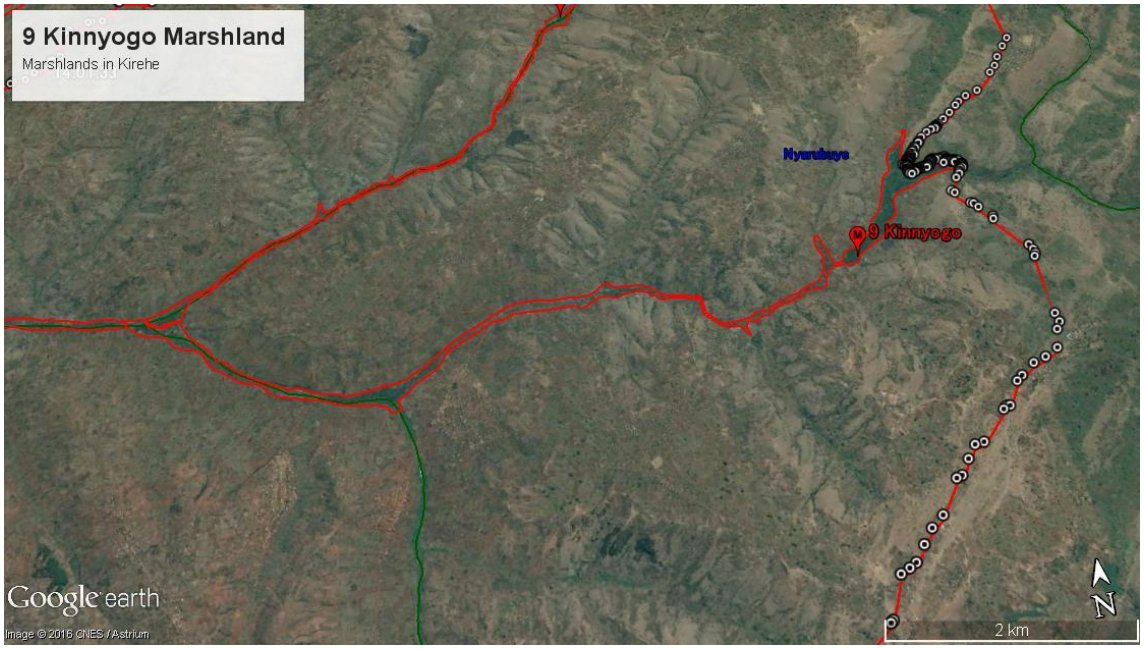
1)Sector: Nyarubuye,Kigina,Mushikiri

2)Size: 65ha

3)Status&Challenges: This Marshland was developed by RSSP in 2005 but also canals are not conveying water efficiently. Intakes are at lower level compare to irrigation canals

4)Main crop: Rice

5) Field visit date; 18th May, 2016



They cultivate rice. This Marshland was developed by RSSP in 2005.

However, the rice was damaged by disease, which might be caused by cold weather.

They have a dry area. Now, they are harvesting rice.

The canal system is not work efficiently.

The diversion weir was not working well. We discussed how to repair the water distribution system including this diversion weir avoiding the negative impact on the bridge.

(10) Kankonjo Marshland

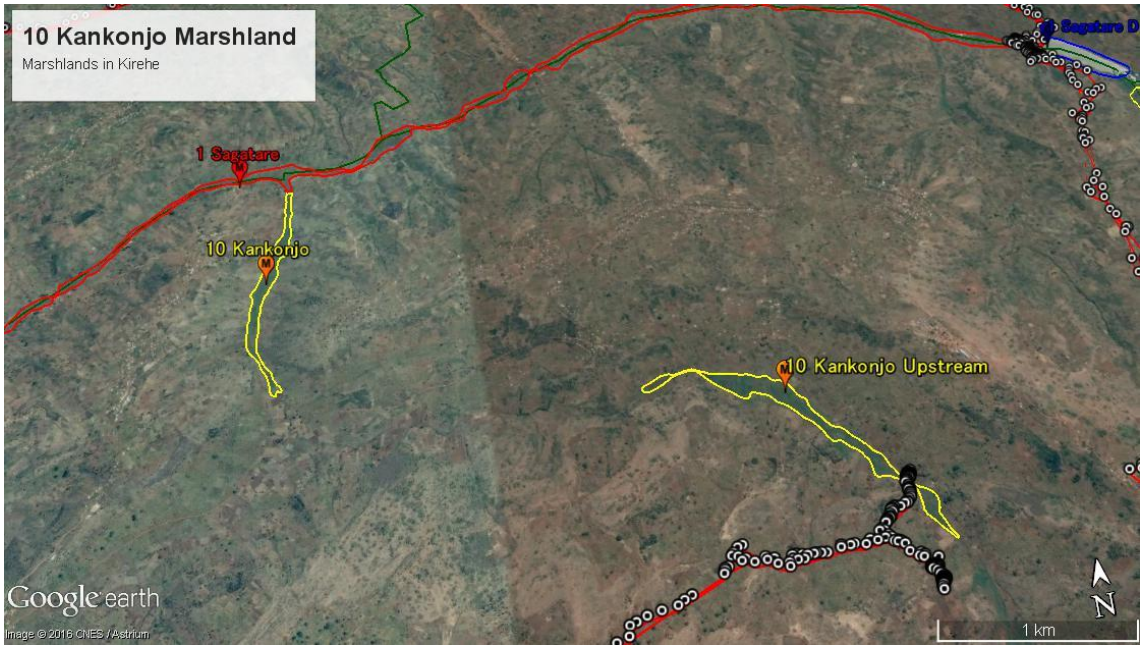
1)Sector: Musaza

2)Size: 21ha

3)Status & Challenges: Kanjongo Marshland has not been developed and water is not enough for rice. Farmers in Cooperative are growing Vegetables. They would like to improve their irrigation system by introducing SSIT(Small Scale Irrigation Technology). If the Marshland was developed, they prefer to continue to grow Vegetables.

4)Main crop: Vegetables

5) Field visit date; 19th May,2016



We visited the upstream areas of this Marshland. They cultivated Vegetables like cabbages and tomatoes.

This is a cabbage farm.

The water in this area is not sufficient for rice. They have the problem of the water distribution, so it is necessary to consider about the development of this Marshland.

One of farmers in this area is cultivating Vegetables in good conditions, so he is thinking about the Small Scale Irrigation.

(11) Kamasaro Marshland

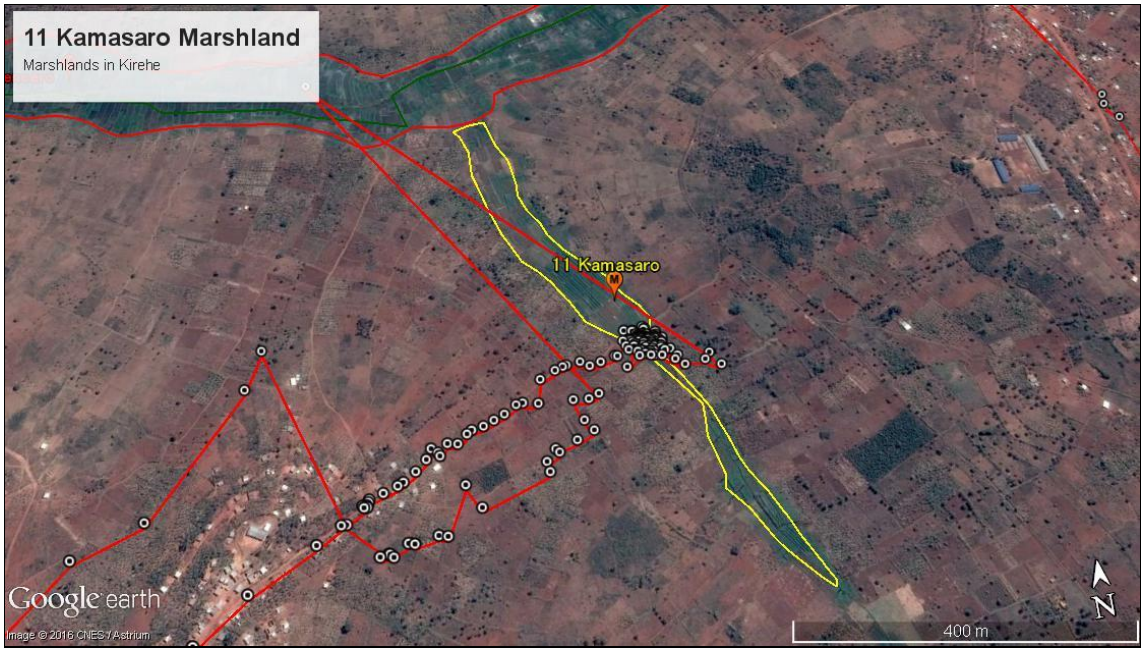
1)Sector: Kirehe

2)Size: 5ha

3)Status&Challenges: Kamasaro Marshland is a small branch of Gacencero Marshland. There is not so much water and farmers individually are growing Vegetables and Sweet potatoes. This area is considered as a hillside because farmers in this Marshland have the land title.

4)Main crop: Vegetables and Sweet Potatoes

5) Field visit date; 19th May,2016



They cultivate Vegetables and Sweet potatoes in this marshland. I heard that some farmers cultivate rice at a downstream part of this Marshland.

The water is not enough for rice in this area.

This Marshland has not been developed and owned by private individuals.

(The end)