

Figure 16-4 Location of Priority Districts for Master Plan of Rural Water Supply

16.2 Inventory of Existing Rural Water Supply Facilities and RGC Survey

To grasp the present situation of rural water supply in the sub-counties of the selected priority districts, the results of the inventory survey for Water Atlas Up-date Project (WATSUP Survey) conducted by DWD in 2010 are applied, and the inventory survey for the RGCs in the priority districts was also conducted by the Study Team to grasp the present water supply situation in the RGCs situated in the priority districts.

16.2.1 WATSUP Survey

(1) Purpose of WATSUP

It is necessary to grasp the rural water supply situations of the sub-counties in the selected priority districts. The results of the WATSUP (Water Atlas Up-date Project) survey done by DWD in 2010 are utilized for this purpose. As for the RGCs in the priority districts, it is difficult to grasp the socio-economic and water supply situations through the existing data and information, and the RGC (Rural Growth Center) survey on the socio-economic and water supply situations was conducted for RGCs in the priority districts.

- Strengthening the capacity of Districts in the field of data management
- Up-date of the water sources baseline survey carried out between 1998-2002
- Production and dissemination of an up-dated Water Atlas and improvement of accuracy, effectiveness and easiness in access

(2) Contents of WATSUP

The survey includes the following items.

Table 16-5 Survey Contents of WATSUP Survey

Item	Point Water Source	Piped Water System
1	Location of water source including GPS readings and information on whether the water source is located in an urban area, an RGC or a IDP camp.	Location of water source including GPS readings (readings to taken at the source for the piped scheme, i.e. whether the water is drawn from)
2	General information including year of construction, source number, source of funding and current ownership and estimated number of households served.	Service levels and service areas - overview of total number of connections, specification on connected institutions, service areas in rural and urban settings. General information including year of construction, source number and source of funding.
3	Type of point water source (protected spring, shallow well, borehole, rainwater harvesting tank, public stand post etc.)	Type of piped system - GFS, pumped piped system (groundwater based)
4	Operation and maintenance - type of management, information on existence and functionality of the WSC including no. of women in key positions.	Operation and maintenance - type of management, information on existence and functionality of the WB/WSC including no. of women in key positions.
5	Operational status (functionality) including time for non-functionality, reasons for non-functionality and details of recent major repairs.	Operational status (functionality) including time for non-functionality, reasons for non-functionality /non-use, reasons for reduced functionality and details of recent major repairs/replacements.

Source: WATSUP Data Collection Guideline (2009)

(3) Results of WATSUP Survey

The water sources located in the rural areas of the selected priority districts are plotted in Figures 16-5 to 16-7. Table 16-6 shows the number of safe water sources in each sub-county, and there exist 1,324, 927 and 1,143 safe water sources and 139, 94 and 168 non-functional sources in the rural areas of the Iganga, the Pallisa and the Doroti districts, resulting the functionalities of 89.5 %, 89.9 % and 85.3 %, respectively.

Table 16-6 Number of Water Supply Facilities and its Functionality

Sub-county	Deep Boreholes				Shallow Wells				Protected Springs				All Facilities			
	No. of Functional Facilities	No. of Non-functional Facilities	Total	Functionarity (%)	No. of Functional Facilities	No. of Non-functional Facilities	Total	Functionarity (%)	No. of Functional Facilities	No. of Non-functional Facilities	Total	Functionarity (%)	No. of Functional Facilities	No. of Non-functional Facilities	Total	Functionarity (%)
1. Iganga District																
Ikumbya	50	4	54	92.6	5	0	5	100.0	0	0	0	-	55	4	59	93.2
Bukooma	51	13	64	79.7	2	2	4	50.0	0	0	0	-	53	15	68	77.9
Bulongo	37	2	39	94.9	19	1	20	95.0	17	1	18	94.4	73	4	77	94.8
Irongo	31	4	35	88.6	12	2	14	85.7	18	0	18	100.0	61	6	67	91.0
Nawampiti	15	3	18	83.3	14	8	22	63.6	21	0	21	100.0	50	11	61	82.0
Bukanga	39	1	40	97.5	20	2	22	90.9	22	0	22	100.0	81	3	84	96.4
Waibuga	25	5	30	83.3	25	4	29	86.2	41	0	41	100.0	91	9	100	91.0
Nawandala	34	5	39	87.2	5	0	5	100.0	5	2	7	71.4	44	7	51	86.3
Nambale	49	5	54	90.7	7	2	9	77.8	0	0	0	-	56	7	63	88.9
Nabitende	41	2	43	95.3	6	1	7	85.7	3	1	4	75.0	50	4	54	92.6
Namalembe	41	2	43	95.3	16	3	19	84.2	1	1	2	50.0	58	6	64	90.6
Namungalwe	47	1	48	97.9	22	2	24	91.7	6	0	6	100.0	75	3	78	96.2
Buyanga	37	4	41	90.2	18	0	18	100.0	0	0	0	-	55	4	59	93.2
Nakalama	39	3	42	92.9	18	2	20	90.0	19	1	20	95.0	76	6	82	92.7
Bulanmagi	48	7	55	87.3	42	13	55	76.4	19	0	19	100.0	109	20	129	84.5
Nakigo	32	7	39	82.1	20	3	23	87.0	7	1	8	87.5	59	11	70	84.3
Ibulanku	58	4	62	93.5	27	7	34	79.4	15	4	19	78.9	100	15	115	87.0
Makuutu	28	4	32	87.5	5	0	5	100.0	6	0	6	100.0	39	4	43	90.7
Whole District	702	76	778	90.2	283	52	335	84.5	200	11	211	94.8	1,185	139	1,324	89.5
2. Pallisa District																
Gogonyo	18	1	19	94.7	10	4	14	71.4	0	0	0	-	28	5	33	84.8
Agule	26	6	32	81.3	4	1	5	80.0	4	0	4	100.0	34	7	41	82.9
Kameke	19	3	22	86.4	4	3	7	57.1	16	2	18	88.9	39	8	47	83.0
Kibale	24	4	28	85.7	2	1	3	66.7	15	1	16	93.8	41	6	47	87.2
Butebo	30	7	37	81.1	1	1	2	50.0	19	9	28	67.9	50	17	67	74.6
Kakoro	18	0	18	100.0	2	0	2	100.0	22	0	22	100.0	42	0	42	100.0
Kabwangasi	30	2	32	93.8	1	0	1	100.0	44	2	46	95.7	75	4	79	94.9
Apopong	26	0	26	100.0	6	0	6	100.0	0	0	0	-	32	0	32	100.0
Kasodo	42	1	43	97.7	4	0	4	100.0	0	0	0	-	46	1	47	97.9
Pallisa	19	1	20	95.0	2	1	3	66.7	6	0	6	100.0	27	2	29	93.1
Puti-puti	32	0	32	100.0	2	0	2	100.0	13	2	15	86.7	47	2	49	95.9
Kamuge	23	5	28	82.1	5	0	5	100.0	19	1	20	95.0	47	6	53	88.7
Petete	28	4	32	87.5	4	2	6	66.7	32	5	37	86.5	64	11	75	85.3
Buseta	34	2	36	94.4	8	1	9	88.9	0	0	0	-	42	3	45	93.3
Kibuku	17	0	17	100.0	3	0	3	100.0	0	0	0	-	20	0	20	100.0
Tirinyi	33	5	38	86.8	5	1	6	83.3	0	0	0	-	38	6	44	86.4
Kirika	34	0	34	100.0	4	0	4	100.0	0	0	0	-	38	0	38	100.0
Kadama	39	4	43	90.7	1	0	1	100.0	0	0	0	-	40	4	44	90.9
Kagumu	26	1	27	96.3	3	1	4	75.0	7	2	9	77.8	36	4	40	90.0
Bulangira	30	5	35	85.7	2	2	4	50.0	15	1	16	93.8	47	8	55	85.5
Whole District	548	51	599	91.5	73	18	91	80.2	212	25	237	89.5	833	94	927	89.9
3. Soroti District																
Tubur	35	14	49	71.4	4	0	4	100.0	10	8	18	55.6	49	22	71	69.0
Katine	47	4	51	92.2	6	2	8	75.0	4	0	4	100.0	57	6	63	90.5
Arapai	49	8	57	86.0	10	7	17	58.8	15	3	18	83.3	74	18	92	80.4
Kamuda	52	5	57	91.2	12	9	21	57.1	5	2	7	71.4	69	16	85	81.2
Soroti	29	5	34	85.3	11	8	19	57.9	20	2	22	90.9	60	15	75	80.0
Gweri	52	6	58	89.7	10	3	13	76.9	1	2	3	33.3	63	11	74	85.1
Asuret	48	6	54	88.9	29	3	32	90.6	14	0	14	100.0	91	9	100	91.0
Atiira	41	0	41	100.0	9	1	10	90.0	1	0	1	100.0	51	1	52	98.1
Olio	73	3	76	96.1	15	1	16	93.8	2	0	2	100.0	90	4	94	95.7
Kyere	47	1	48	97.9	14	4	18	77.8	12	2	14	85.7	73	7	80	91.3
Kateta	51	10	61	83.6	22	8	30	73.3	1	1	2	50.0	74	19	93	79.6
Bugondo	44	0	44	100.0	27	5	32	84.4	2	0	2	100.0	73	5	78	93.6
Kadungulu	30	4	34	88.2	8	9	17	47.1	0	0	0	-	38	13	51	74.5
Pingire	60	14	74	81.1	50	7	57	87.7	3	1	4	75.0	113	22	135	83.7
Whole District	658	80	738	89.2	227	67	294	77.2	90	21	111	81.1	975	168	1143	85.3

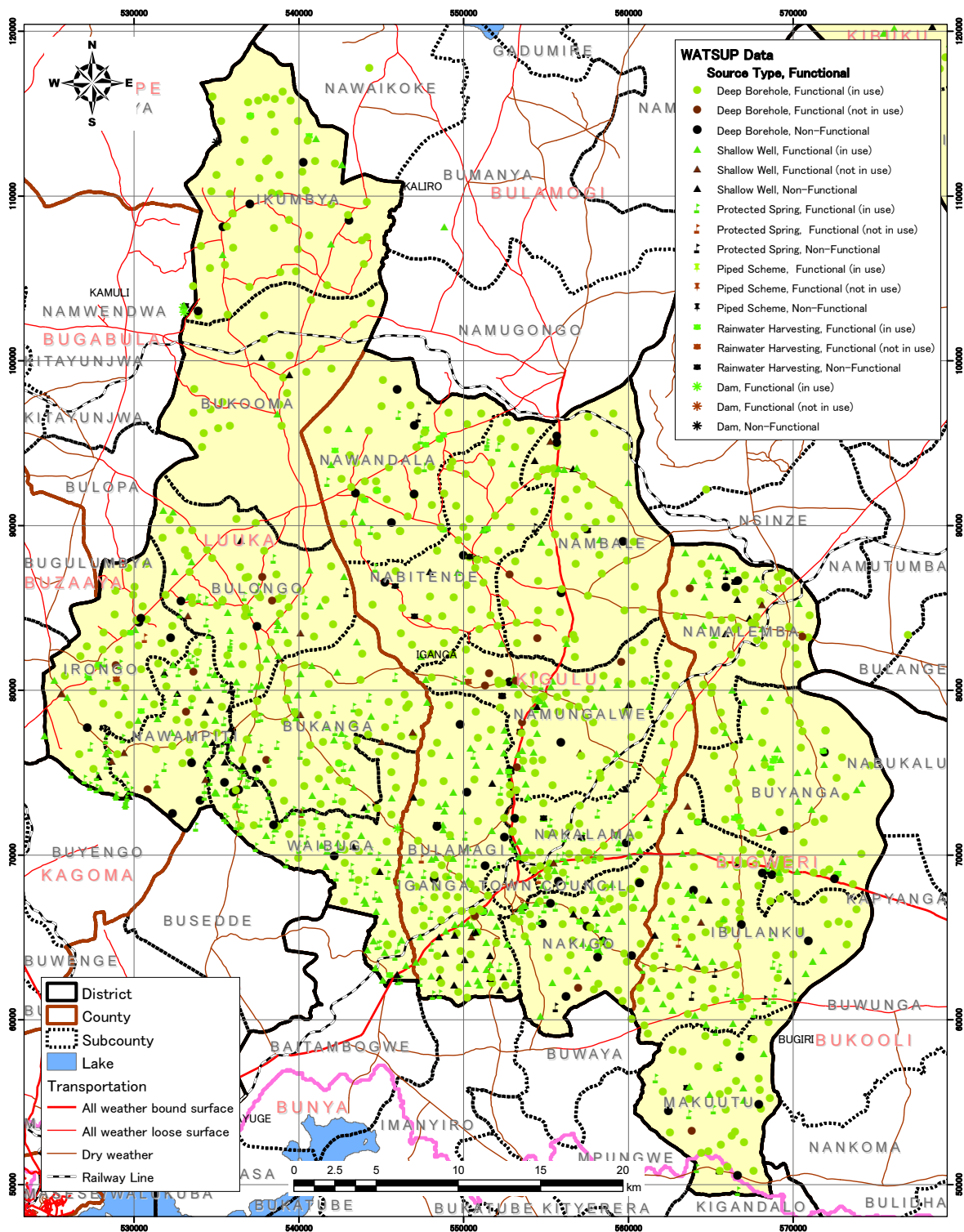


Figure 16-5 Position of Water Sources in Iganga District

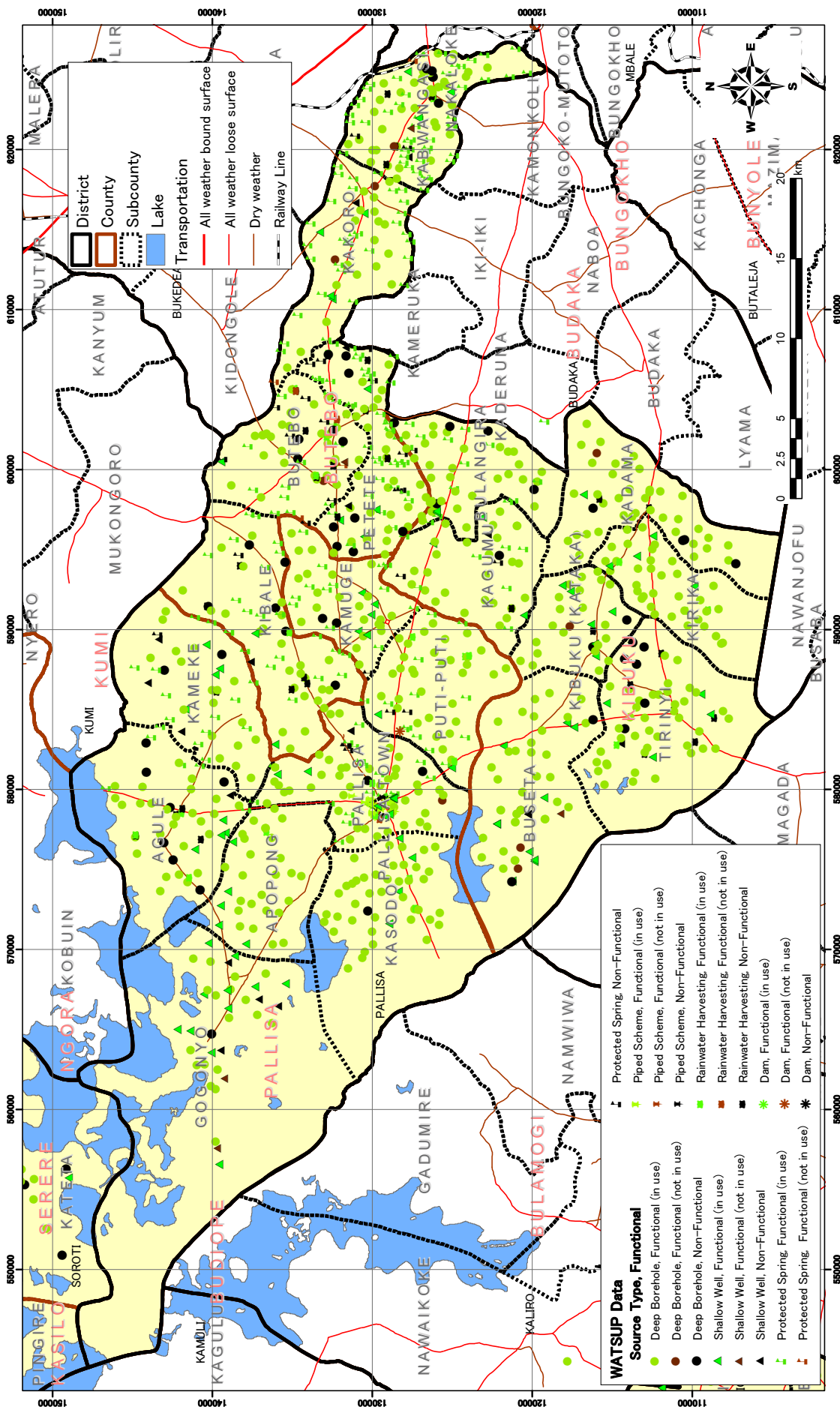


Figure 16-6 Position of Water Sources in Pallisa District

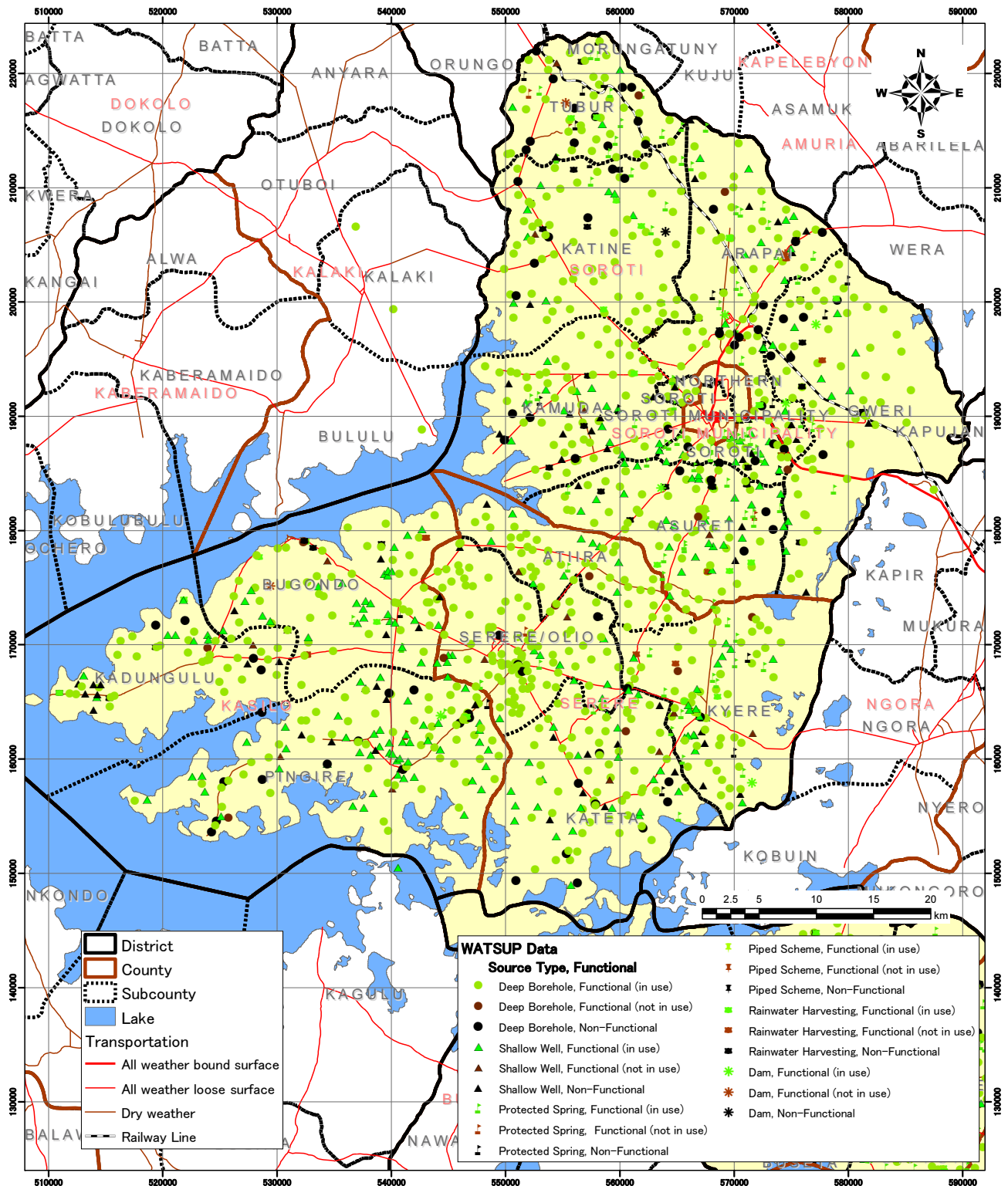


Figure 16-7 Position of Water Sources in Soroti District

16.2.2 Rural Growth Center Survey

(1) Background and Objectives of Survey

Rural Growth Centre (RGC) is considered neither as an administrative unit justified legally nor as the one based on any town and rural development plans, but is defined as those villages having trading centre and public facilities such as school, health centre, administrative office, etc. of which population is increasing. It is also defined generally as the village of which population is in a range from 500 to 5,000. The water supply of the villages of which population exceed 5,000 is treated as town water supply basically, but rural water supply often includes those of which population is over 5,000 also if they are not gazetted as towns.

The population density of these villages is rather higher than the other ones and it is considered desirable to apply the piped water supply systems but not the deep boreholes with a hand pump unit. The DWD takes up the water supply by this piped water supply system as one of the policies for the future water supply facilities. Therefore, the rural water supply master plan is required to be prepared for both of the two (2) types of areas such as the RGCs and the other rural villages. In the study on the plan for RGCs, however, there are some problems to be solved as follows:

- The population thereof may not be counted, since the boundary of RGC is not clearly defined.
- The population thereof may not be worked out from the statistical data and information, because most of the RGCs develop and extend around the intersections and it may traverse some village areas.
- The definition of RGC is considered to vary from administration to administration, and it is difficult to discuss on them on the same manner.

As stated above, the information necessary to prepare the rural water supply master plan for RGCs are lacking. It is, therefore, necessary to conduct the baseline survey (RGC surveys) to collect the data and information required for the master planning prior to the planning study.

(2) Target RGC of Survey

The total of 59 RGCs consisting of 11, 19 and 29 in the Soroti, Pallisa and Iganga districts, respectively were listed through hearing from the district water offices as those requiring rural water supply system, and surveyed in the RGC survey. The RGCs listed for the RGC survey are shown in Table 16-7, and the locations of RGCs are plotted on Figure 16-8.

Table 16-7 List RGCs for RGC Survey

1. Iganga District			2. Pallisa District			3. Soroti District			
No.	RGC	No.	RGC	No.	RGC	No.	RGC	No.	RGC
1	Namungulwe	20	Ikonja	1	Kamsira	1	Aguma		
2	Nambale	21	Bosiro	2	Kameke	2	Kide tok		
3	Nabitanda B.	22	Nabitanda K.	3	Kibala	3	Pingins Etem		
4	Nawandale	23	Busekuru	4	Kagamu	4	Kadungub		
5	Bugano	24	Kabira	5	Kapala	5	Kagwam Post		
6	Nalulama	25	Nakigo	6	Kanuge	6	Mugema		
7	Bumanya	26	Wailama	7	Buwata	7	Kamilo Corner		
8	Kiwanyi	27	Buhaku TC	8	Tirinyi	8	Pingins CLRAM		
9	Nakivumbi	28	Buwologoma	9	Kabole	9	Gweri		
10	Buseba	29	Waibuga	10	Peete	10	Mulondo		
11	Nondwe			11	Bu tito	11	Iningo		
12	Ikumbya			12	Gogonyo				
13	Nakichya			13	Kachwa				
14	Bukowa			14	Nakawa				
15	Namusi			15	Bulungu				
16	Nalaboga			16	Kibuka				
17	Kyanvuma			17	Agule				
18	Lambala			18	Kabwari				
19	Nawampiti			19	Boliso I TC				

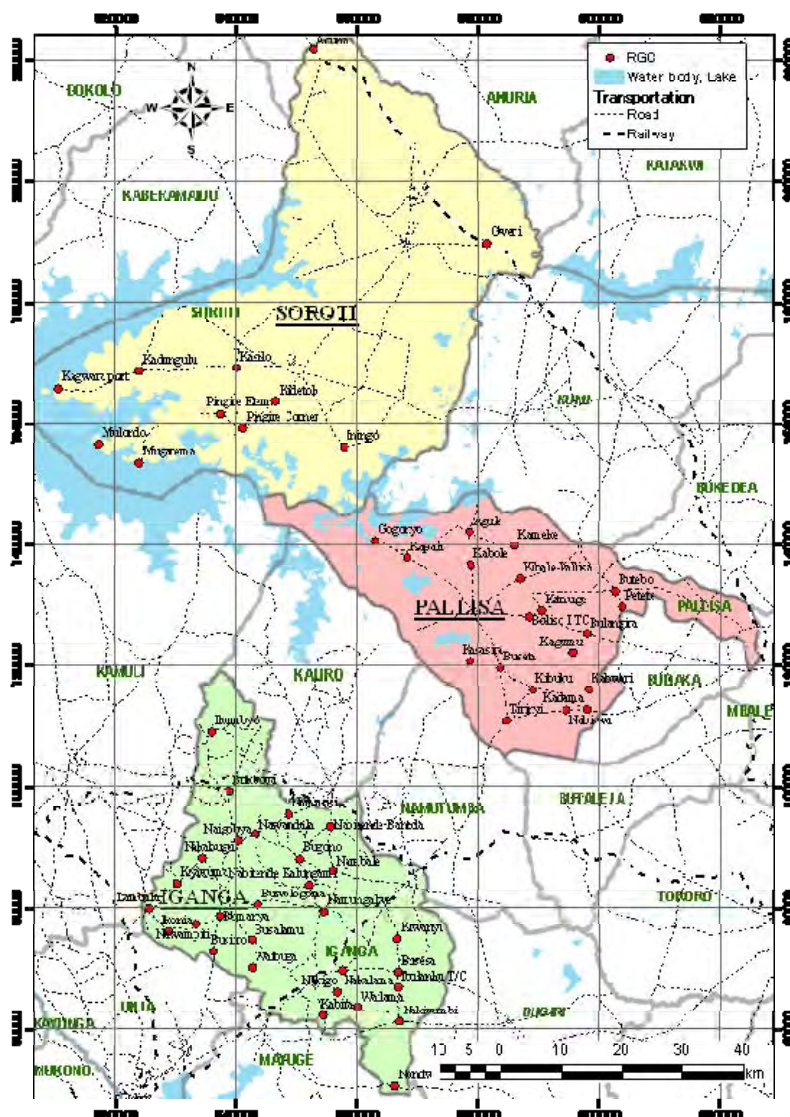


Figure 16-8 Location of Surveyed RGCs in Priority Districts

(3) Procedures

The RGC survey was carried out as follows:

i) Confirmation of Areas and Shapes of RGCs by Satellite Image Analyses

It is necessary first to set the boundary of RGC to grasp the present situation of RGC, but the boundary of RGC is not found clearly, because RGC is not defined as administrative unit. Further, it is not effective to find it through site reconnaissance one by one. Aerial photograph has been considered effective to grasp the situation of buildings and housing, and other development situations in and around the area, but the aerial photograph may not be so updated that the recent situations of RGC areas growing rapidly are reflected. Therefore, the satellite images shot recently will be used for extracting the necessary information on RGCs.

The AVNIR2 and PRISM images of the Advanced Land Observing Satellite "DAICHI" of Japan will be used, and the images of AVNIR2 and PRISM are colour with a resolution of 10 m and black and white with a resolution of 2.5 m, respectively. It is possible to enhance the accuracy and distinction of the land objects by pan-shaping treatment of these images.

The configuration of RGC was conducted by the image analyses, and the base maps will be prepared after extracting the locations of road and houses in the RGC areas set in advance.

ii) Setting RGC Areas

RGC areas were confirmed based on the base maps through the discussions among the survey team and counterpart agency such as DWD and DRAM.

iii) Baseline Survey of RGC

The interview survey was conducted dispatching interviewers to the target RGCs, and the various information were collected including population of RGC, number of administrative and public facilities as well as business and commercial facilities, and number of water sources available for the water supply in the respective RGCs. In addition, the information relating to operation and maintenance situation of the available water sources is also collected as much as possible to grasp the actual situation of the operation and maintenance of water supply facilities. The results of survey were summarized and compiled in the map forms as shown in Figure 7-6, and the collected data and information are used for master planning of water supply for RGCs.

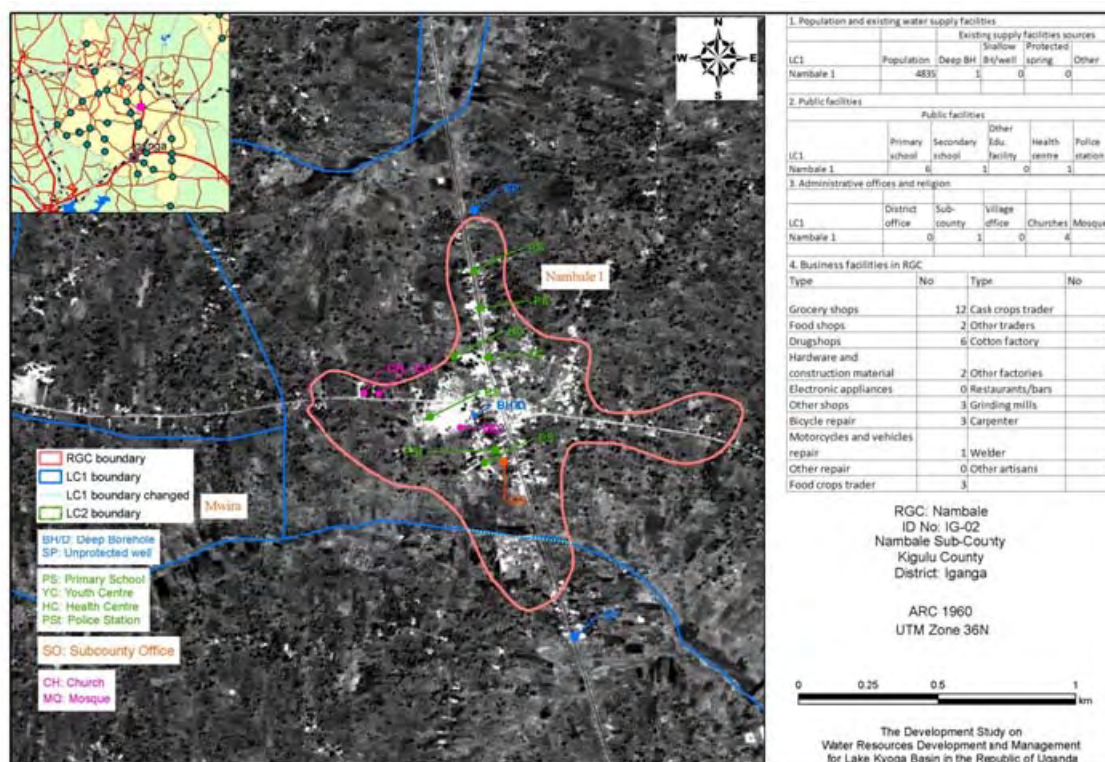


Figure 16-9 Example of RGC Survey Result Map

(4) Results of RGC Survey

i) Socio economical conditions

a) Administrative units related to RGCs

Administrative units in Uganda are classified into five levels as shown in Table 16-8. In the rural area, they are divided into districts, counties sub-counties, parishes and villages. Each unit has their parliaments but they do not have elections. Village parliaments consist of all adults in the villages, parish parliaments consist of all members of executive committees of village parliaments, and members of county parliaments are composed of all members of executive committee of sub-counties.

RGCs are not on administrative unit justified legally but is defined as villages having trading center and public facilities such as school, health center, administrative office, etc. RGCs are composed of one LC1 or parts of plural LC1s.

Table 16-8 Administrative Unit

Level	Rural	Urban		
		Town	Municipality	City
LC 5	District	District	District	City
LC 4	County		Municipality	City division
LC 3	Sub-county	Town	Municipal division	
LC 2	Parish	Ward	Parish	Parish
LC 1	Village	Village	Village	Village

b) Population and family numbers

Table 16-9 shows the population and family numbers in each RGC. Populations are calculated based on the family numbers surveyed and average numbers of family members shown in UBOS 2003: 5.1 persons/family in Iganga, 5.2 persons/family in Pallisa and 5.2 persons/family in Soroti. At present, the populations of four (4) RGCs in Iganga and four (4) RGCs in Pallisa exceed 5,000. In the districts where there are few industries except agriculture, the population of RGCs seems to increase.

Table 16-9 Population and Family Numbers

No.	Name of	Population	Family numbers	No.	Name of	Population	Family numbers
Iganga District				Pallisa District			
1	Namungalwe	12,240	2,400	1	Kasasira	5,616	1,080
2	Nambale	4,835	948	2	Kameke	2,600	500
3	Nabitende Banada	14,765	2,895	3	Kibale	2,387	459
4	Nawandala	1,295	254	4	Kagumu	15,080	2,900
5	Bugono	1,158	227	5	Kapala	2,168	417
6	Nakalama	5,840	1,145	6	Kamuge	2,210	425
7	Bumanya	1,928	378	7	Buseta	2,392	460
8	Kiwanyi	2,565	503	8	Tirinyi	10,400	2,000
9	Nakivumbi	2,326	456	9	Kabole	1,248	240
10	Busesa	4,080	800	10	Petete	3,744	720
11	Nondwe	3,606	707	11	Butebo	1,144	220
12	Ikumbya	1,275	250	12	Gogonyo	317	61
13	Naigobya	1,642	322	13	Kadama	10,858	2,088
14	Bukoova	2,142	420	14	Nabiswa	1,747	336
15	Namusisi	1,658	325	15	Bulangira	2,080	400
16	Nakabugu	4,916	964	16	Kibuku	2,402	462
17	Kyanvuma	1,734	340	17	Agule	4,524	870
18	Lambala	10,200	2,000	18	Kabweri	1,316	234
19	Nawampiti	2,101	412	19	Boliso I TC	1,056	203
20	Ikonia	1,811	355	Soroti District			
21	Busiuro	1,887	370	1	Acuna	1,700	327
22	Nabitende Kalungami	2,387	468	2	Kidetok	1,040	200
23	Busalamu	1,668	327	3	Pingire Etem	1,300	250
24	Kabira	1,397	274	4	Kadungulu	1,388	267
25	Nakigo	2,040	400	5	Kagwara Port	3,120	600
26	Wailama	444	87	6	Mugarema	4,212	810
27	Ibulanku TC	2,616	513	7	Kasilo Corner	156	30
28	Buwologoma	1,913	375	8	Pingire Corner	837	161
29	Waibuga	474	93	9	Gweri	1,820	350
				10	Mulondo	1,820	350
				11	Iningo	1,118	215

c) Infrastructures

Numbers and location of the public facilities (school, health center, police station, etc.), administrative offices (District office, Sub-county office, Village office, etc.) and religious facilities (church, mosque) inside RGCs are surveyed. RGC is the area where these facilities are located surrounding the trading center along the road. Farmland such as rice field spreads outside RGC.

d) Economic activities

Main commercial goods in the trading center.

Main goods are rice, grocery and drugs, etc. Restaurants and bars are also located.

Kinds of occupation and income of the people inside RGCs

Kinds of occupation and annual income as results of interview survey are shown in Table 16-10 and 11 respectively.

Table 16-10 Kinds of Occupation

Kinds of occupation	Iganga		Pallisa		Soroti		Total	
	(Person)	(%)	(Person)	(%)	(Person)	(%)	(Person)	(%)
Shopkeeper	24	28	13	23	7	21	44	25
Farmer	18	21	13	23	5	15	36	20
Trader	13	15	15	26	5	15	33	19
Small service provider	18	21	2	4	2	6	22	12
Others	14	15	14	24	14	43	42	24
Total no. of interviewees	87	100	57	100	33	100	177	100

Table 16-11 Annual Income

Annual Income	(SH/person/year)			
	Iganga	Pallisa	Soroti	Ave
Max.	6,230,800 (3,280)	18,000,000 (9,470)	7,800,000 (4,100)	—
Min.	13,000 (7)	16,700 (9)	45,800 (24)	—
Ave.	851,200 (450)	2,089,000 (1,100)	1,372,000 (720)	1,437,400 (760)
Total no. of interviewees	87	57	33	

()... \$ Converted as 1,900 SH/\$

e) Existing organizations

There exists the parliament in each village (LC1). Village parliament consists of all adults in the Village. In each water source, there is the WSC, which manages, operates and maintains the water source.

f) Support from external agency

According to the officials of DWO, there is no support to the existing water sources from external agency, such as NGO and Donor etc.

ii) Water Supply Conditions

a) Water Source

All water sources for drinking water are point water sources. These are no water supply system by piping system.

b) Kinds and numbers of water sources

Table 16-10 shows the kinds and total numbers of water sources in the three Districts. In Iganga and Pallisa, about 90% of water sources are wells and 10% are springs. In Soroti, 100% of water sources are wells and no springs.

Table 16-12 Kinds and Number of Water Sources

Kinds of point water sources		Numbers		
		Iganga (RGC No. of : 29)	Pallisa (RGC No. of : 19)	Soroti (RGC No. of : 11)
1	Deep borehole (protected) (Depth : more than 30m)	46 (55%)	50 (83%)	17 (74%)
2	Shallow borehole (protected)	24 (29%)	3 (5%)	6 (26%)
3	Protected spring	9 (11%)	6 (10%)	0 (0%)
4	Unprotected spring	2 (2%)	1 (2%)	0 (0%)
5	Unprotected shallow well	3 (3%)	0 (0%)	0 (0%)
Total		84 (100%)	60 (100%)	23 (100%)

c) Usage ratio of water sources for drinking water.

Kinds of water sources and numbers of their users are shown in Table 16-13. Ninety percent of interviewees in Iganga and 80% in Pallisa and Soroti use ground water. In Pallisa and Soroti, some people have no access to the water sources and are forced to buy the drinking water from water vendors.

Table 16-13 Water Sources and Numbers of Users

Water source		No. of users		
		Iganga (Numbers of interviewees : 87)	Pallisa (Numbers of interviewees : 57)	Soroti (Numbers of interviewees : 33)
1	Deep borehole (protected)	78 (90%)	44 (77%)	26 (72%)
2	Shallow borehole (protected)	1 (1%)	1 (2%)	3 (8%)
3	Protected spring	2 (2%)	3 (5%)	0 (0%)
4	Unprotected shallow well	6 (7%)	5 (9%)	0 (0%)
5	Water vendor	0 (0%)	4 (7%)	7 (20%)
Total		87 (100%)	57 (100%)	36 (100%)

d) Other water sources

Except the above water sources for drinking water, river water and lake water are used for bathing, laundry and cleaning etc. Numbers of users are 37 persons (43%) in Iganga, 20 persons (35%) in Pallisa and 12 persons (36%) in Soroti.

e) Consumption of drinking water

Table 16-14 shows the result of interview survey regarding consumption of drinking water. Average consumption in three Districts is about 20 L / person / day: Consumption shown in the Table 16-14 is calculated by the following formula;

$$(\text{numbers of Jerry can (20 L) consumed per day}) \times (\text{20 L / numbers of consumers})$$

The percentages of interviewees who answered “not enough” are 97% in Iganga and 100% in Pallisa and Soroti.

Table 16-14 Consumption of Drinking Water

Consumption of Drinking Water	(L / Person / day)		
	Iganga	Pallisa	Soroti
Max.	66.7	50.0	40.0
Min.	7.1	1.8	8.0
Ave	19.8	20.4	24.3

f) Water quality

Regarding water quality of drinking water, 18.4% interviewees in Iganga, 40.4% in Pallisa and 69.7 % in Soroti answered “bad”. The reasons of “bad” are color, smell and taste.

g) Person fetching water

Proportion of persons fetching water by Jerry can on foot or by bicycle from water sources to their houses is shown in Table 16-15. About 90% of them are women and / or children. Proportion of women and children is almost 50%.

Table 16-15 Proportion of Persons Fetching Water

Person fetching water	Iganga		Pallisa		Soroti	
	Numbers	(%)	Numbers	(%)	Numbers	(%)
Woman	60	45	45	46	25	46
Child	63	47	42	43	21	38
Man	10	8	10	11	9	16
Total	133	100	97	100	55	100

(Numbers : No. replied by interviewees)

h) Time for fetching water

Table 16-16 shows the time for fetching water. Time for fetching water per one time is 1.8 hrs, frequencies are 2.6 per day and total time for fetching water per day is 4.4 hrs in average in three Districts, which is heavy burden for women and children.

Table 16-16 Time for Fetching Water

Item	Iganga	Pallisa	Soroti	Ave.
Time for fetching water per one time (lap)	Hr	Hr	Hr	Hr
Max.	6	5	4	
Min.	0.2	0.5	0.5	
Ave.	1.7	1.9	1.7	1.8
Frequency	Times / day	Times / day	Times / day	Times / day
Max.	8	6	10	
Min.	1	1	1	
Ave.	2.1	2.7	3.1	2.6
Time for fetching water per day	Hr / day	Hr / day	Hr / day	Hr / day
Max.	9.0	18	12	
Min.	0.2	1	1	
Ave.	3.4	5.1	4.8	4.4
Numbers of interviewees	87	57	33	

iii) Operation and Maintenance of Water Supply Facilities

a) O/M organization for point water sources

Numbers of WSC members in each point water source are shown in Table 16-17.

Table 16-17 Numbers of WSC Members

Number s of WSC member s	Iganga (Numbers of water sources : 84)					Pallisa (Numbers of water sources : 60)				Soroti (Numbers of water sources 23)	
	Deep borehole (protected)	Shallow borehole (protected)	Protecte d spring	Unprotecte d spring	Unprotecte d shallow well	Deep borehole (protected)	Shallow borehole (protected)	Protecte d spring	Unprotecte d spring	Deep borehole (protected)	Shallow borehole (protected)
Max.	8	7	5	3	0	9	6	6	4	9	9
Min.	1	1	1	0	0	0	1	0	4	1	1
Ave.	4	3	2	2	0	5	4	3	4	5	3
Total Number s of water sources	46	24	9	2	3	50	3	6	1	17	6

The National Water policy, 1999 provides for user ownership and management of rural point water facilities. It stipulates that all point water facilities are required to have WSCs, with half the membership being women, and at least two caretakers. These WSCs are responsible for management and maintenance, and should collect and manage (including banking) funds for maintenance and repair. According to DWD, a competent WSC of about 6-people is elected by the WUC, 50% being women. They would have the Chairman, Secretary, Treasurer and 3-Committee Members, 2 of these members could be the Caretakers of the facilities.

Table 16-15 is the result of hearing survey from mainly chairperson at each point water source.

The numbers of WSC members listed are those of working members actually.

The table shows that few WSCs have working members as stipulated with some exceptions.

WSCs should allocate the members as stipulated and Sub-county / District should guide and supervise them.

Main activities of WSC should be inspection and repair of the facilities and fee collection from the users.

b) Collection of water charge

Numbers of point water sources where WSCs collect the water charge are as follows.

Iganga District

- Deep borehole (protected)
17 among 46 (37%), Average fee: 36 SH / Jerry can (20 L)
- Shallow borehole (protected)
6 among 24 (25%), Average fee: 100 SH / Jerry can

Pallisa District

- Deep borehole (protected)
7 among 50 (14%), Average fee: 860 SH / person / Month

Soroti District

- Deep borehole (protected)
3 among 17 (18%), Average fee: 1,000 SH / person / Month
- Shallow borehole (protected)

2 among 6 (33%), Average fee: 500 SH / person / Month

As shown above, only few WSCs collect the water charge.

Total percentage of collection in three Districts is 21 % (35 / 167).

c) Maintenance of the facilities

Regular inspections are conducted by the members of WSCs at 80~90% of Deep boreholes and shallow boreholes (protected) in the three Districts.

d) Repair works

Repair works for point water sources are divided into minor repairs and major repairs. Minor repairs are divided into repairs for deep boreholes and shallow boreholes (protected) having hand pumps and repairs for springs without pumps. Table 16-18 shows the details of minor repairs for deep boreholes and shallow boreholes (protected). Table 16-19 shows the details of minor repairs for springs. And major repairs are summarized in Table 16-20.

Minor repairs for deep boreholes and shallow boreholes protected. (Table 16-18)

Repair items are mainly for hand pumps. Repair items and frequency vary depending on the types of pumps, parts materials and time of installation. Repair works are mainly conducted by the caretakers of WSCs and hand pump mechanics. Repair charge is mostly collected from users and sponsors and collected at the time of repair.

Minor repairs for springs (Table 16-19)

Repair items are those of apron and bank (concrete / soil works) and general cleaning. Repair charge is smaller than those of deep boreholes and shallow boreholes protected.

Major repairs (Table 16-20)

Repairs are mainly conducted by boring companies / hand pump suppliers and repair charge is higher than minor repairs. Percentage of numbers of water sources, where the replacement of water lift pipes have been conducted, is comparatively high.

Table 16-18 Minor Repairs (Deep Borehole, Shallow Borehole)

Item	Percentage of numbers of water sources(%)					
	Iganga		Pallisa		Soroti	
	Deep borehole (Protected)	Shallow borehole (Protected)	Deep borehole (Protected)	Shallow borehole (Protected)	Deep borehole (Protected)	Shallow borehole (Protected)
1. Repair item and frequency	%	%	%	%	%	%
(1) Greasing (frequency : 2 times~6 times / year)	12.5	18.2	9.7	0.0	16.7	20.0
(2) Replacement of chain (1 times~4 times / year)	15.6	36.4	29.0	0.0	0.0	20.0
(3) Replacement of handle (1 times~2 times / year)	6.3	18.2	22.6	100.0	33.3	20.0
(4) Replacement of cylinder (1 times~6 times / year)	40.6	9.1	19.4	0.0	0.0	0.0
(5) Replacement of apron (1 times / year)	0.0	4.5	0.0	0.0	0.0	0.0
(6) Cleaning (2 times / year)	9.4	0.0	0.0	0.0	0.0	20.0
(7) Others (1 times~4 times / year)	15.6	13.6	19.4	0.0	50.0	20.0
(Total)	100.0	100.0	100.0	100.0	100.0	100.0
2. Repair person						
(1) Care takers of WSC	12/33(36%)	7/22(32%)	9/31(29%)	1/1(100%)	3/6(50%)	2/5(40%)
(2) Hand pump mechanics	15/33(45%)	15/22(68%)	21/31(68%)	0/1(0%)	3/6(50%)	3/5(60%)
(3) Others	6/33(19%)	0/22(0%)	1/31(3%)	0/1(0%)	0/6(0%)	0/5(0%)
(Total)	33(100%)	22(100%)	31(100%)	1(100%)	6(100%)	5(100%)

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Item	Iganga		Pallisa		Soroti	
	Deep borehole (Protected)	Shallow borehole (Protected)	Deep borehole (Protected)	Shallow borehole (Protected)	Deep borehole (Protected)	Shallow borehole (Protected)
3. Repair charge (SH)						
Ave	78,815	86,705	95,911	40,000	150,417	28,300
Average repair charge per person (SH / person)	50	46	55	58	73	27
4. Payer of repair charge						
(1) Water user	21/35(60%)	5/22(23%)	4/31(13%)	1/1(100%)	2/6(34%)	2/4(50%)
(2) Sponsor	12/35(34%)	11/22(50%)	27/31(87%)	0/1(0%)	4/6(66%)	2/4(50%)
(3) Support from Sub-county / District	2/35(6%)	6/22(27%)	0/31(0%)	0/1(0%)	0/6(0%)	0/4(0%)
(Total)	35(100%)	22(100%)	31(100%)	1(100%)	6(100%)	4(100%)

Table 16-19 Minor Repairs (Spring)

Percentage of numbers of water sources(%)

Item	Iganga		Pallisa
	Protected Spring	Unprotected Spring	Unprotected Spring
1. Repair item and frequency	%	%	%
(1) Repair of apron (1 times~2 times / year)	28.6	100.0	100.0
(2) Cleaning (2 times / year)	71.4	0.0	0.0
(Total)	100.0	100.0	100.0
2. Repair person			
(1) Care takers of WSC	5/7(71.4%)	0/1(0.0%)	1/1(100.0%)
(2) Others	2/7(28.6%)	1/1(100.0%)	0/1(0.0%)
(Total)	7(100.0%)	1(100.0%)	1(100.0%)
3. Repair charge (SH)			
Ave	6,350	6,500	9,750
Average repair charge per person (SH / person)	8	9	10
4. Payer of repair charge			
(1) Water user	0/5(0%)	0/1(0%)	0/1(0%)
(2) Sponsor	4/5(80%)	1/1(100%)	1/1(100%)
(3) Support from Sub-county / District	1/5(20%)	0/1(0%)	0/1(0%)
(Total)	5(100.0%)	1(100.0%)	1(100.0%)

Table 16-20 Major Repair

Percentage of numbers of water sources(%)

Item	Iganga		Pallisa		Soroti
	Deep borehole (Protected)	Shallow borehole (Protected)	Deep borehole (Protected)	Shallow borehole (Protected)	Deep borehole (Protected)
1. Repair item and time					
(1) Fishing of dropped pipes (0.2 years~2 years ago)	5/18(28%)	2/5(40%)	0/16(0%)	0/1(0%)	0/8(0%)
(2) Desilting (Cleaning of well) (2 years ago)	0/18(0%)	1/5(20%)	0/16(0%)	0/1(0%)	0/8(0%)
(3) Replacement of pipes (0.02 years~6 years ago)	9/18(50%)	2/5(40%)	12/16(75%)	1/1(100%)	8/8(100%)
(4) Others (0.2 years~2 years ago)	4/18(22%)	0/5(0%)	4/16(25%)	0/1(0%)	0/8(0%)
(Total)	18(100%)	5(100%)	16(100%)	1(100%)	8(100%)
2. Repair charge (SH)					
Ave	301,344	634,000	82,813	60,000	100,625
Average repair charge per person (SH / person)	190	335	47	87	49
3. Payer of repair charge					
(1) Water user	10/20(50%)	2/5(40%)	2/15(13%)	0/1(0%)	0/7(0%)
(2) Sponsor	8/20(40%)	3/5(60%)	13/15(87%)	1/1(100%)	7/7(100%)
(3) Support from Sub-county / District	2/20(10%)	0/5(0%)	0/15(0%)	0/1(0%)	0/7(0%)
(Total)	20(100%)	5(100%)	15(100%)	1(100%)	7(100%)

e) Setting and Collection of water Charge

As reported above, there are few water sources where WSCs collect the water charge. And many WSCs collect the fee at the time of repair. To secure the stable and good maintenance, WSCs in all point water sources should collect the water charge (tariff) from users after setting an appropriate charge.

Regarding the setting of water charge, “Long-term Strategy for Investment Planning, Implementation and Operation & Maintenance of Water Supply and Sanitation in Rural Growth Centres, DWD, 2005” gives a target of “0.94 SH / L (18.8 SH / Jerry can) for borehole water source with hand pump in RGCs having population of 1,500~3,000 persons ” Conducting a trial calculation in case of a deep borehole in Iganga, when water supply capacity is 20 L / person / day = 7,300 L / person / year, and average annual income is 851,200 SH / person / year, 0.94 SH / l (18.8 SH / Jerry can) corresponds to 0.8 % of annual income. However, in this survey, in Iganga average water charge in deep borehole is 36 SH / Jerry can, which is 1.9 times of the target.

In case of setting water charge, it should be considered that at least minor repairs could be conducted from the charge collected and people could pay the charge from their income. Regarding the major repair, according to “A National Framework for Operation and Maintenance of Rural Water Supplies, DWD, 2004”, the community may get external support from lower local government to meet those costs beyond their ability. WSCs should have consultation with Sub-county / District.

iv) Necessity of Improvement of Water Supply Conditions

a) Issues of the existing water supply facility and necessity of improvement

Water Supply capacity

Present usage of drinking water from the point water sources is 20~25 l / person / day in the RGCs in three Districts. By the results of interview survey, almost 100% of people replied “not enough”. Increase of water supply capacity by the development of water sources is required.

Quality of supply water

Quality of supply water from boreholes with hand pumps is comparatively good. But the quality of water from unprotected shallow bare holes and unprotected springs can not be guaranteed because of a possibility of contamination from outside. Stable supply of good quality water is inevitable.

Time for fetching water

Time for fetching water is very long, average 4.4 hrs / day in three Districts. And about 90 % of fetching persons are woman and children, which is heavy burden for women and children. Water supply system by yard taps, public hydrants or kiosks connected to the pipeline is preferable.

Maintenance organization of water supply facilities

WSCs are installed at almost all point water sources. However, in many locations, the actual working numbers of members are less than those regulated. Establishment of management system by regular numbers of WSC members is required.

b) Results expected from the improvement of water supply system

The following results could be expected by the development of water sources and improvement of water supply system.

- Increase of water supply capacity
- Secure of stable and good water quality
- Reduction of time for fetching water

By the above, the health of the people could be secured and improvement of the level of life would be expected by increase of economic activities.

c) Willingness to pay and amount of fee in case of piping system

Almost all interviewees in three Districts desire the water supply by piping system. Average amount of fee they enunciated was 74 SH / Jerry can in Iganga, 76 SH / Jerry can in Pallisa and 85 SH / Jerry can in Soroti.

v) Health and Sanitary Condition

a) Water borne diseases

In three Districts, water born diseases were malaria, diarrhea and bilharzia.

b) Latrine Coverage

According to the “Water and Environment Sector Performance Report 2009, MWE”, latrine coverage are 60~90% in Iganga and Pallisa and 40~45% in Soroti in FY 2008/9.

16.3 Groundwater Development

Groundwater is the most probable water source as rural water supply in the view of economy. In this section, hydrogeological condition in these target districts is summarized.

16.3.1 Topography and Geology in the Target Districts

Topography of 3 Districts selected as priority district is formed as peneplain of granite or gneiss, which has almost flat topography. In the peneplain, residual hills (called Inseberga) are in places. Figure 16-10 shows shaded relief map in the target area. Many streaks can be seen, these are valleys formed by erosion with rain water.

Places which peoples are living, especially RGC, are on the hill. And the RGC areas are limited by swamps.

Lineament cannot be recognized in this area. Because tectonic movements were not happened for long

time. It cause the developing the peneplain by peneplanation.

Northern part of Soroti district has a geotectonic line, called Aswa Shear Zone, from northwest to southeast direction. This is only a lineament which we can recognize. But it is not clear in this area.

Geology of this area is called Basement Complex composed by granite and gneiss in almost all area. Geological map is shown in Figure 16-11. In the south-western part of Soroti district, Kadungulu, Pingire and Kyere subcounties, metamorphosed sedimentary rocks, i.e. schist, slate and phyllite are observed. And it can keep much groundwater. In the southern part of Iganga district, metamorphosed rocks of Nyanzian and Granites are observed.

Clayey laterites are covering on the Basement Complex. The thickness of laterite layer has 20m to 30m in average.

Especially swamp area has very thick clayey layer. Topographic and geological features are summarized in Table 16-21.

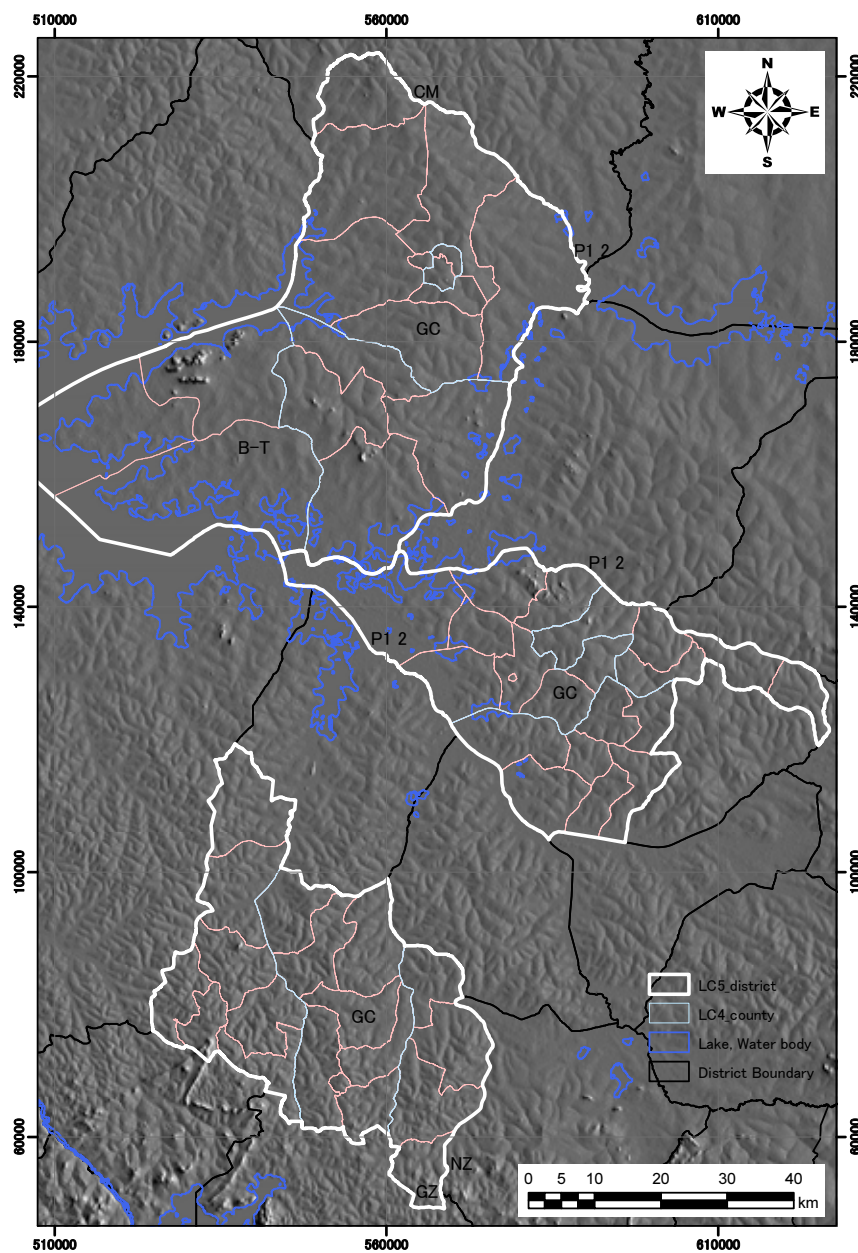


Figure 16-10 Shaded Relief Map around the Priority Districts

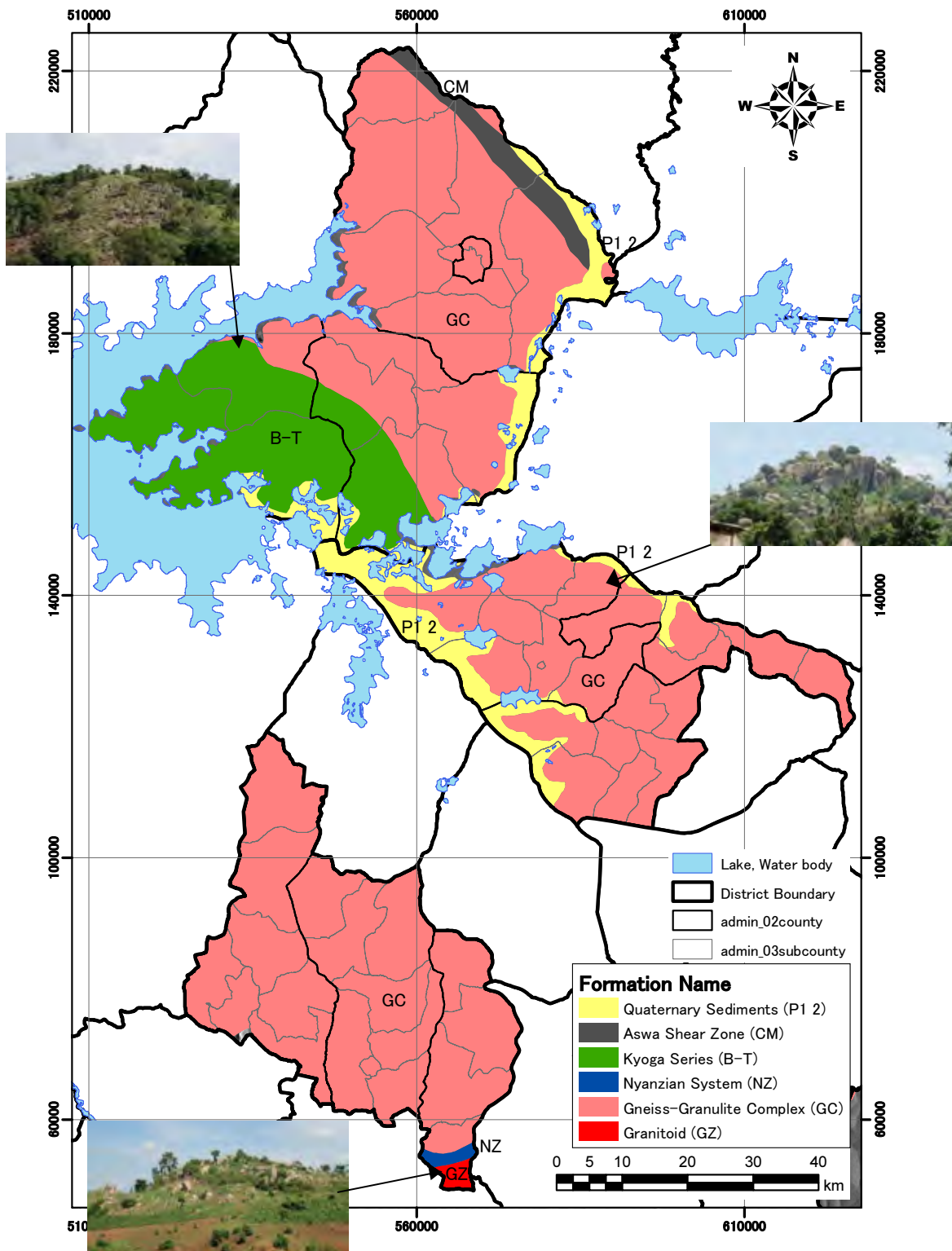


Figure 16-11 Geological Map in the Priority Districts

Table 16-21 Topographical and Geological feature of the Priority Districts by Subcounty (1)

District	County	Subcounty	Sub-Basin	Topography	Geology
Iganga	Bugweri	Buyanga	Mpologoma	Highest elevation is about 1140m in this area. There are no big Inseberg, but granite is exposed at many places.	Granite – gneiss Basement Complex
		Ibulanku	Mpologoma	East side of the subcounty is flat, on the other hand west side is bit steep.	Granite – gneiss Basement Complex
		Makuutu	Mpologoma	There is a big inseberg at the center of the subcounty. Highest elevation is about 1240m. lowest elevation is about 1100m.	Basement Complex in northern part of the subcounty, Metamorphic rock of Nyanzian in central part, Granite in south.
		Namalemba	Mpologoma	Almost flat. highest elevation is about 1120m, and lowest is about 1060m.	Granite – gneiss Basement Complex
		Bulamagi	Lumbuye	Highest elevation is about 1180m in southern area. Iganga town is 1140m. lowest elevation is 1100m, Almost flat.	Granite – gneiss Basement Complex
		Nabitende	Mpologoma Lumbuye	Northeast of the subcounty is in Mpologoma sub basin, and southwest is in Lumbuye sub basin. Highest elevation is 1130m, lowest is 1070m.	Granite – gneiss Basement Complex
		Nakalama	Mpologoma	Almost flat. Especially, northeast area is very gentle. Highest elevation is 1170m at boundary of subbasin. Southeast area is flat, the elevation is about 1080m.	Granite – gneiss Basement Complex
		Nakigo	Mpologoma Lumbuye	There is an inseberg, elevation; 1190m, at southwest area in hte subcounty.	Granite – gneiss Basement Complex
		Nambale	Mpologoma	Sloping from southwest to northwest in whole subcounty. Highest elevation is 1120m.	Granite – gneiss Basement Complex
		Namungalwe	Mpologoma Lumbuye in western part	Almost flat. Highest elevation is 1150m.	Granite – gneiss Basement Complex
		Nawandala	Lumbuye, Mpologoma in eastern part	East area is gentle, west area has relatively steep topography. Highest elevation is about 1130m.	Granite – gneiss Basement Complex
		Bukanga	Lumbuye	Valleys are relatively deep in western area of the subcounty. Highest elevation is about 1180m. lowest is about 1070m.	Granite – gneiss Basement Complex
		Bukooma	Lumbuye	Almost flat in the subcounty. Highest elevation is about 1110m.	Granite – gneiss Basement Complex
Luuka	Bulongo	Lumbuye	There is a big monolith of granite at northern part of the subcounty, the elevation is about 1200m.	Granite – gneiss Basement Complex	
	Ikumbya	Lumbuye, Kyoga Lake Side in western part	Almost flat in the subcounty. Highest elevation is about 1110m.	Granite – gneiss Basement Complex	
	Irongo	Victoria Nile in western part, Lumbuye in eastern part	Almost flat in the subcounty. Highest elevation is about 1110m.	Granite – gneiss Basement Complex	
	Nawampiti	Victoria Nile, Lumbuye	There is a mountain in south of the subcounty. Highest elevation is 1300m. Others area is flat.	There is a mountain of metamorphic rock of Buganda-Toro System in south, Basement complex in otherpart	
	Waibuga	Lumbuye	Almost flat. Highest elevation is 1200m. lowest is 1120m.	Granite – gneiss Basement Complex	

Table 16-21 Topographical and Geological feature of the Priority Districts by Subcounty (2)

District	County	Subcounty	Sub-Basin	Topography	Geology
Pallisa	Pallisa	Agule	Lwere	The subcounty is facing Lake Nyaguo and Lake Nyasala in the north. Sloping from south to north in whole. There are many big inserbergs in northeast of the subcounty. Highest elevation is 1140m.	Granite – gneiss Basement Complex
		Apopong	Lwere, Mpologoma	North part of the subcounty is in Lwere sub basin, and south is in Mpologoma sub basin. Almost flat. Highest elevation is about 1090m.	Granite – gneiss Basement Complex
		Gogonyo	Lwere, Kyoga Lake Side, Mpologoma	Almost flat. Highest elevation is about 1080m. The subcounty is facing Lake Gigati, Lake Meiteo and Lake Geme in the north, and Lake Nyakwa in the south.	Granite – gneiss Basement Complex
		Kameke	Lwere	There are many big inserbergs in the north of the subcounty. Highest elevation is about 1100m.	Granite – gneiss Basement Complex
		Kamuge	Lwere, Mpologoma	Almost flat. Highest elevation is about 1130m at the dividing ridge and Kamuge RGC. Lowest elevation is about 1070m.	Granite – gneiss Basement Complex
		Kasodo	Mpologoma	Almost flat. Highest elevation is about 1080m.°	Granite – gneiss Basement Complex
		Pallisa	Mpologoma, Partially Lwere	Almost flat. Highest elevation is about 1100m.	Granite – gneiss Basement Complex
		Puti-puti	Mpologoma	Almost flat. Sloping from northeast to southwest. Highest elevation is about 1120m.	Granite – gneiss Basement Complex
		Butebo	Lwere	Almost flat. Sloping from north to south. Highest elevation is about 1140m.	Granite – gneiss Basement Complex
		Kabwangasi	Lwere, Mpologoma	Almost flat. Highest elevation is about 1170m. There is a small inserberg at the boundary with Kakoro subcounty. Lowest elevation is about 1100m.l.°	Granite – gneiss Basement Complex
		Kakoro	Lwere	Almost flat. Highest elevation is about 1150m, and lowest is about 1050m.	Granite – gneiss Basement Complex
		Kibale	Lwere, Partially Mpologoma	There is an inserberg in the center of the subcounty. Highest elevation is about 1130m.	Granite – gneiss Basement Complex
		Petete	Lwere	Almost flat. Highest elevation is about 1130m, and lowest is about 1070m.	Granite – gneiss Basement Complex
		Bulangira	Mpologoma, Partially Lwere	Almost flat. Highest elevation is about 1130m, and lowest is about 1070m.	Granite – gneiss Basement Complex
Kibuku	Kibuku	Buseta	Mpologoma	Almost flat. Highest elevation is about 1080m.	Granite – gneiss Basement Complex, Alluvium sediment around swamp
		Kadama	Mpologoma	Almost flat. Highest elevation is about 1150m.	Granite – gneiss Basement Complex
		Kagumu	Mpologoma	Almost flat. Sloping from north to south. Highest elevation is about 1140m.	Granite – gneiss Basement Complex
		Kibuku	Mpologoma	Almost flat. Highest elevation is about 1100m.	Granite – gneiss Basement Complex
		Kirika	Mpologoma	The subcounty is facing big swamp of Mpologoma river. Almost flat. Highest elevation is about 1110m.	Granite – gneiss Basement Complex
		Tirinyi	Mpologoma	Almost flat. Highest elevation is about 1100m. the subcounty is facing big swamp in the south and west of the subcounty.	Granite – gneiss Basement Complex

Table 16-21 Topographical and Geological feature of the Priority Districts by Subcounty (3)

District	County	Subcounty	Sub-Basin	Topography	Geology
Soroti	Soroti	Arapai	Okere, Akweng	Northeast part of the subcounty is belonging to Okere sub basin, and southwest part is belonging to Akweng sub basin. Highest elevation is about 1150m. Almost Higher area is in the center of the subcounty. Sloping east towards Lake Kyoga in the west, and sloping west towards Awoja river gently. Highest elevation is about 1150m.	Granite – gneiss Basement Complex, Aswa ShearZone in northern part Granite – gneiss Basement Complex
		Asuret	Akweng, Awoja	Northern part of the subcounty is belonging Okok sub basin, and southern part is belonging Awoja sub basin. Sloping from north to south gently.	Granite – gneiss Basement Complex, Aswa ShearZone in northern part
		Gweri	Okere, Awoja	Sloping from east to west gently. Western part of the subcounty is facing Lake	Granite – gneiss Basement Complex
		Kamuda	Akweng	Sloping from Northeast to southwest gently. there is a small inserberg at Ochuloi. High elevation is about 1140m.	Granite – gneiss Basement Complex
		Katine	Akweng, Partially Okere	Rural area of the subcounty is surrounding the Soroti municipality. Almost flat.	Granite – gneiss Basement Complex
		Soroti	Akweng, Awoja	Almost flat. highest elevation is about 1180m. Granite rock is exposed around Tubur RGC.	Granite – gneiss Basement Complex, Aswa ShearZone in northern part
		Tubur	Akweng, Partially Okere	The subcounty is facing Lake Kyoga in the north of the subcounty. There are several mountains in the northern part. Highest elevation is about 1360m.	Shale, Phyllite of Kyoga Series in western part, Granite – gneiss Basement Complex in east.
		Bugondo	Akweng, Kyoga Lakeside	The subcounty is peninsular to Lake kyoga. Almost flat. Highest elevation is 1040m. There is a small inserberg in the eastern part of the subcounty.	Shale, Phyllite of Kyoga Series
		Kadungulu	Kyoga Lakeside, Partially Akweng	The subcounty is peninsular to Lake kyoga. Almost flat. Highest elevation is 1090m. The center of the subcounty is small hill.	Shale, Phyllite of Kyoga Series in western part, Schist in eastern part
		Pingire	Kyoga Lakeside	Sloping from east to west. Western part is facing to Lake Kyoga. Highest elevation is 1120m. Almost flat.	Granite – gneiss Basement Complex
Serere	Serere	Atira	Akweng, Partially Awoja	There is a big inserberg in the northern part of the subcounty. Highest elevation is about 1190m. Facing to Lake kyoga at the south of the subcounty. There are several small inserberg.	Shale, Phyllite of Kyoga Series in western part, Granite – gneiss Basement Complex in east. Under the Kyoga Series, Basement Complex is lying
		Kateta	Kyoga Lakeside	The subcounty is facing Awoja river in the east. Sloping from west to east gently. Highest elevation is 1170m. There are several inserbergs in the subcounty.	Granite – gneiss Basement Complex
		Kyere	Awoja	There is an inserberg near Olio town. Other area is almost flat. Highest elevation is about 1160m. Center of the subcounty is higher than other area.	Shale, Phyllite of Kyoga Series in southwestern part, Granite – gneiss Basement Complex in northeastern part
		Serere/Olio	Akweng, Kyoga Lakeside		