

**M I N I N F R A
EASTERN PROVINCE
REPUBLIC OF RWANDA**

**THE STUDY ON
IMPROVEMENT OF RURAL WATER SUPPLY
IN THE EASTERN PROVINCE
IN
THE REPUBLIC OF RWANDA**

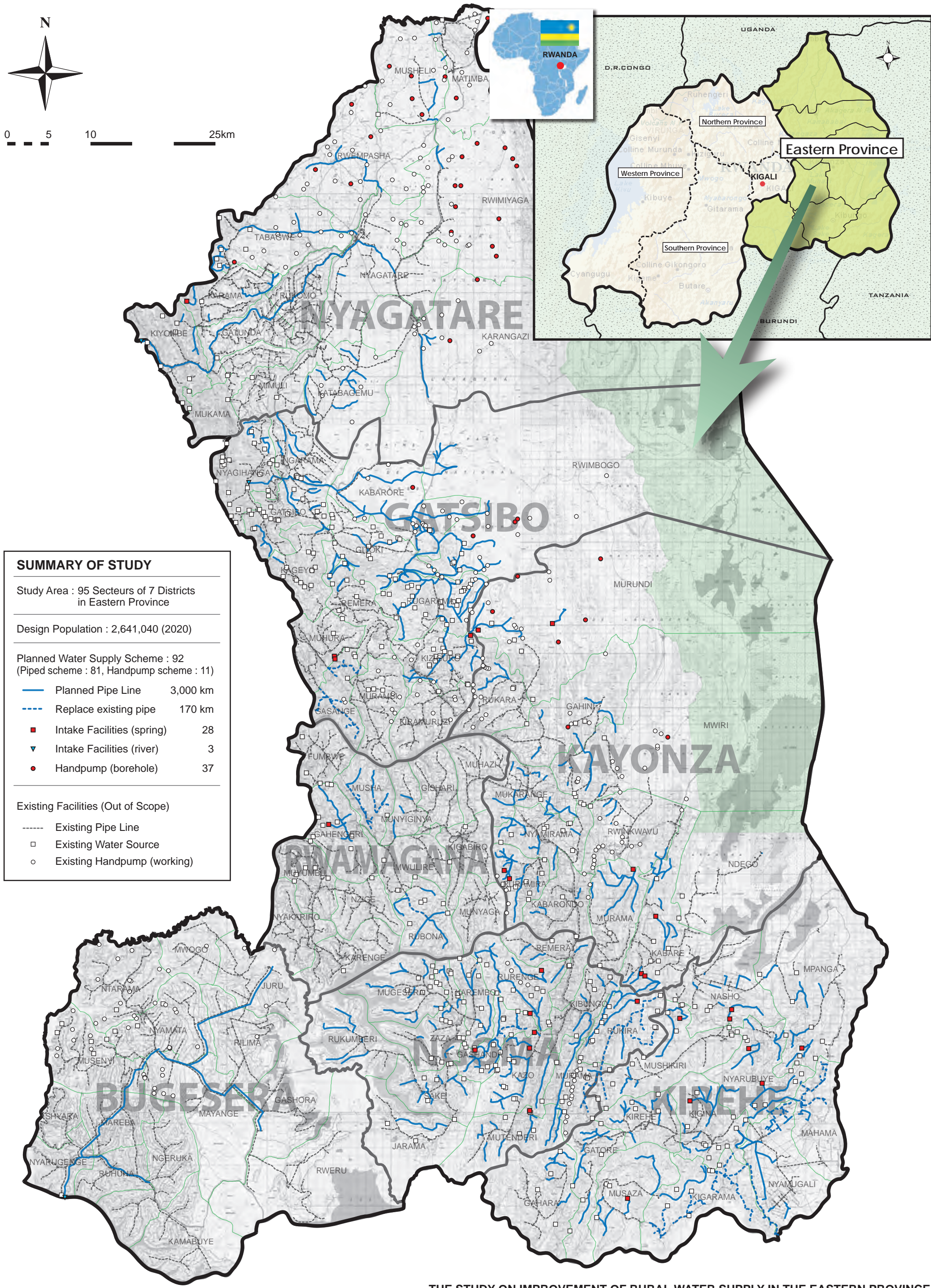
**FINAL REPORT
MAIN REPORT**

November 2010

JAPAN INTERNATIONAL COOPERATION AGENCY

**JAPAN TECHNO CO., LTD.
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SUMMARY OF STUDY

Study Area : 95 Secteurs of 7 Districts
in Eastern Province

Design Population : 2,641,040 (2020)

Planned Water Supply Scheme : 92
(Piped scheme : 81, Handpump scheme : 11)

— Planned Pipe Line	3,000 km
- - - Replace existing pipe	170 km
■ Intake Facilities (spring)	28
▼ Intake Facilities (river)	3
● Handpump (borehole)	37

Existing Facilities (Out of Scope)

- - - Existing Pipe Line
- Existing Water Source
- Existing Handpump (working)

THE STUDY ON IMPROVEMENT OF RURAL WATER SUPPLY IN THE EASTERN PROVINCE
TARGET AREA MAP

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ABBREVIATIONS

ASC	Agent Santé Communautaire
ASCB	Agent Santé Communautaire Binôme
ATP	Affordability to pay
BOP	Base of Pyramid
CDF	Common Development Fund
C/P	Counterpart
DIP	Ductile iron pipe
DDP	District Development Plan
DF/R	Draft Final Report
DRC	Democratic Republic of Congo
EDPRS	Economic Development and Poverty Reduction Strategy
EIA	Environmental Impact Assessment
EICV	Enquête Intégrale sur les Conditions de Vie des Ménages (Households Living Conditions Survey)
EIR	Environmental Impact Report
EIRR	Economic Internal Rate of Return
EU	European Union
FIRR	Financial Internal Rate of Return
F/R	Final Report
Frw	Franc rwandais (Rwandan franc)
GI	Galvanized iron
HAMS	Hygiène et Assainissement en Milieu Scolaire
HP	Handpump
IC/R	Inception Report
ICRC	International Committee of the Red Cross
IEC	Information, Education and Communication
IEE	Initial Environmental Examination
IT/R	Interim Report
jc	jerrican
JICA	Japan International Cooperation Agency
KfW	Kreditanstalt für Wiederaufbau
MDG	Millennium Development Goals
MINAGRI	Ministère de l'Agriculture (Ministry of Agriculture)
MINALOC	Ministère de l'Administration Locale, de la Bonne Gouvernance, du Développement Communautaire et des Affaires Sociales (Ministry of Local Government, Good Governance, Community Development and Social Affairs)
MINECOFIN	Ministère des Finances et de la Planification Economique (Ministry of Finance and Economic Planning)
MINEDUC	Ministère de l'Education, de la Science, de la Technologie et de la Recherche Scientifique (Ministry of Education, Science, Technology and Research)
MINELA	Ministry of Environment and Lands (Ministère de l'Environnement et des Terres)
MININFRA	Ministère des Infrastructures (Ministry of Infrastructure)

MINIRENA	Ministère des Ressources Naturelles (Ministry of Natural Resources)
MINISANTE	Ministère de la Santé (Ministry of Health)
MINITERE	Ministère des Terres, de l'Environnement, des Forêts, de l'Eau et de Ressources Naturelles (Ministry of Land, Environment, Forestry, Water and Mines)
MKM	Mwulire, Kigabiro, Munyaga (water scheme)
NISR	National Institute of Statistics of Rwanda
NGO	Non-governmental organization
NPV	Net Present Value
O&M	Operation and maintenance
OJT	On-the-job training
PDRCIU	Projet Développement des Ressources Communautaires et des Infrastructures de l'Umutara (Umutara Community Resource and Infrastructure Development Project)
PHAST	Participatory hygiene and sanitation transformation
PN	Nominal pressure
PNEAR	Programme National d'Alimentation en Eau Potable et d'Assainissement en Milieu Rural
PPP	Public Private Partnership
P/R	Progress Report
PVC	Poly-vinyl chloride
RARDA	Rwanda Animal Resources Development Authority
RC	Reinforced concrete
RDB	Rwandan Development Board
RECO	Rwanda Electricity Corporation
REMA	Rwandan Environment Management Authority
RURA	Rwanda Utility Regulatory Agency
RWASCO	Rwanda Water and Sanitation Corporation
SWAp	Sector Wide Approach
TOR	Terms of Reference
UNHCR	United Nations High Commissioner for Refugees
VLOM	Village level operation and maintenance
WFP	United Nations World Food Programme
WHO	World Health Organization
WSP	Water and Sanitation Program
WTP	Willingness to pay
WUA	Water Users' Association

UNITS

°	degrees
'	minutes
"	seconds
%	percent
°C	Degrees Celsius
kgf	kilogram force
km	kilometer
kVA	kilo-volt-ampere
kW	kilo-Watt
l	liter
lcd	liters per capita per day
m	meter
mm	millimeter
m ²	square meter
m ³	cubic meter
mS	milli-Seimens
NTU	Nephelometric Turbidity Unit
ppm	parts per million
sec	second

Conversion Rate

1\$ = ¥81.20

1Frw = ¥0.14

1\$ = 580Frw

CHAPTER 1 INTRODUCTION

1.1 Study Background

The Republic of Rwanda is a land-locked country within the Great Lakes Region surrounded by the Republic of the Congo to the West and Tanzania to the East, and is called the “land of a thousand hills”. About 9 million persons are living within a land area of about 26,000 km² and most of the population is settled into resettlement areas called imidugudu¹ created after the Genocide war. Imidugudu are located on high mountain ridges and slopes far from water sources.

Formulated first in 1992, then revised in 1997 and 2001, the “Sectorial Policy on Water and Sanitation” of Rwanda was finally validated in 2004 as a guideline for effective use of water resources. Presently an updated version, the “National Policy and Strategy for Water Supply and Sanitation Services”, was validated in March 2010. This policy promotes new concepts to Rwanda such as decentralization, participatory approach, privatization and fund allocation through program approach. Also, considerations are made for regional and international collaborations on water resources management and environment. The policy is also related to MDGs (Millennium Development Goals) and Vision 2020 (aiming for 100% water supply by 2020) with objectives of safe water and sanitation services to all residents. Other than MDGs and Vision 2020, the national development plans include EDPRS (2008-2012) which succeeds PRSP (2002-2005).

In the study target area of the Eastern Province, since annual rainfall is about 25% less than other areas of the country (about 1,000mm annually) and due to the increased ratio of newly resettled residents resulting from the imidugudu policy, accessibility to water is lower than other provinces. Therefore, residents who cannot procure safe water must rely on unsanitary surface water and stagnant water for their domestic use which can have inferior effects on their health such as diarrhea and other waterborne diseases. The Japanese government is giving assistance in the water supply and sanitation sector to Eastern Province through the Japanese grant aid project, the “Rural Water Supply Project” (fiscal year 2007) and the technical cooperation project, the “Project for Improvement of Water and Sanitation in the Southern Part of the Eastern Province (called PURA-SANI)” (2007 to 2011) which are being implemented in the former Kibungo Province (presently, Rwamagana, Kayanza, Ngoma and Kirehe Districts). However, even upon considering the beneficial effects of these projects, the average water coverage rate of Eastern Province is foreseen to remain at about 50% far below the country average of 71% for rural areas (2008)².

In this predicament, the Rwandan government requested the Japanese government for a development study to further formulate a water supply plan for Eastern Province. In response, a preparatory mission was dispatched in December 2007 to decide on the scope of this study, and the study started in October 2008.

¹ This is the local Kinyarwandan word for village under the resettlement policy of Rwanda where “imidugudu” is used for the plural case and “umudugudu” for the singular case.

² Source : National Policy and Strategy for Water Supply and Sanitation Services, February 2010

1.2 Study Objectives

The objectives of this study are as follows.

<i>Main Objectives</i>	1	Based on Vision 2020, a plan for water resources development and water supply facilities improvement will be formulated to raise the water supply coverage to 100% by 2020 in Eastern Province.
	2	From the above plan, preliminary designs will be made for projects having highest priority.
<i>Sub-Objectives</i>	1	Recommendations will be made on the institutional/organizational system and sanitation promotion system of local administration in the water and sanitation sector.
	2	Through the above activities, technology will be transferred to the counterparts (C/P).

1.3 Study Area

1.3.1 Natural Conditions

(1) Topography

Rwanda is a country landlocked in the central part of Africa between about 1° and 3° north latitude and about 29° and 31° east longitude, and is bordered by the Democratic Republic of Congo to the West, Uganda to the North, Tanzania to the East and Burundi to the South. Along the western border with Congo lies the Western rift valley which forms part of the Great African Rift Valley. Also in this area, Kivu Lake (elevation 1,460 m) formed by the volcanic activities of the rift valley and the Virunga volcanic mountain ranges where the country's highest peak Karisimbi (elevation 4,507 m) can be found. Starting from these volcanic mountain ranges, the Congo-Nile water divide range stretches to the south, with the Kivu Lake water basin to the west and the Akagera river basin to the east, which covers over 80% of the national land. The Akagera river basin spans from the central plateau to the Eastern plains gradually decreasing altitude and the flow of the Akagera River and its tributaries creates the topography forming the "land of thousand hills" with an average elevation of 1,600 m.

The study area of Eastern Province is located in the Eastern plains region having elevations from about 1,000 m to 1,500 m with many undulations in the southern part but becoming semi-plains going north. Lowlands and lakes of the Akagera river basin form the southeastern border area and the Akagera national park can be found along the eastern border. Compared to other areas, development of the Eastern Province is said to be delayed, but areas where humans and livestock can enter are already developed as cultivated lands and pastures. Even along the slopes in the southern area where undulations are plentiful, land is used for cultivation and various crops are being planted.

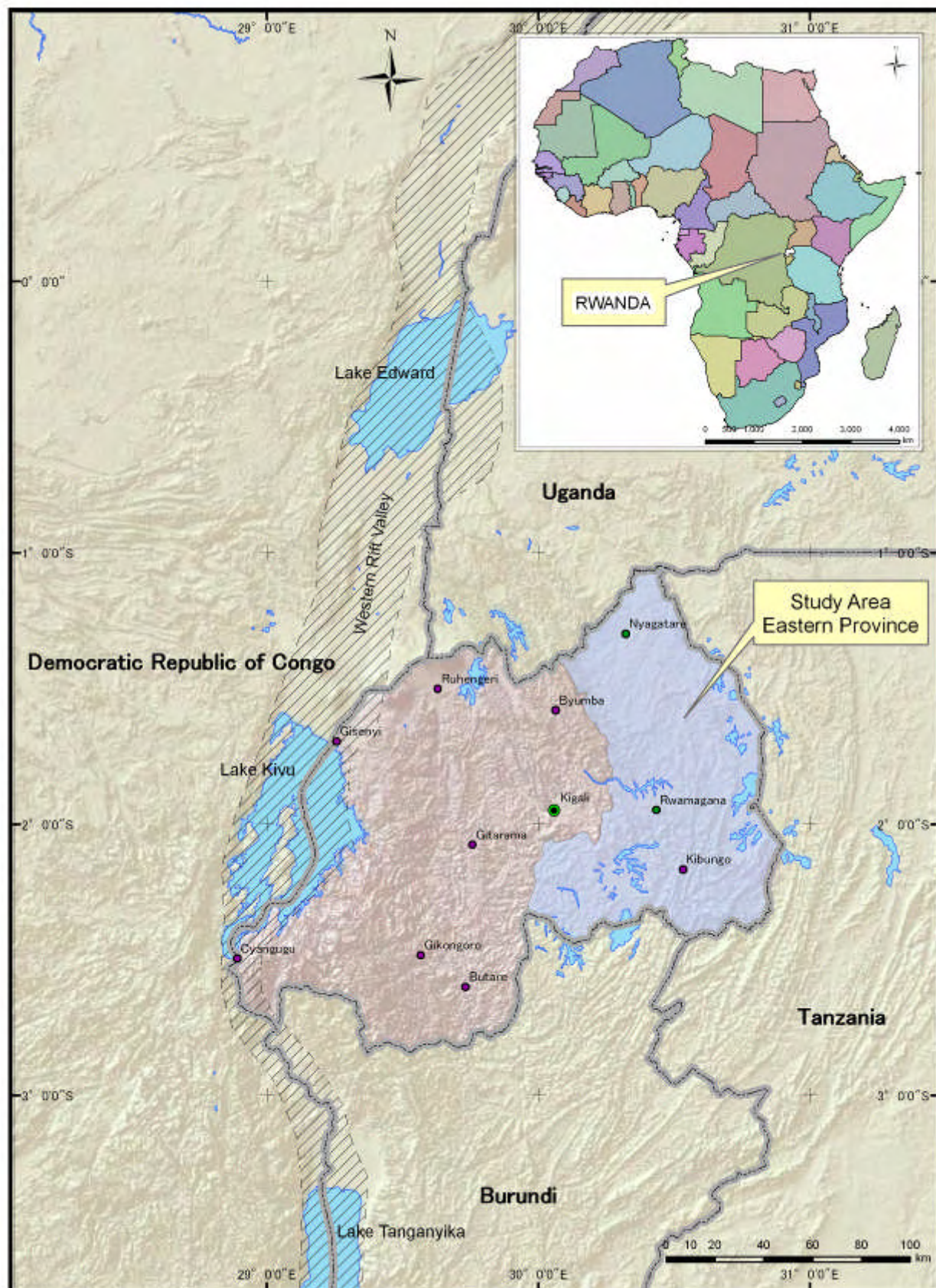


Figure 1-1 Study Target Area

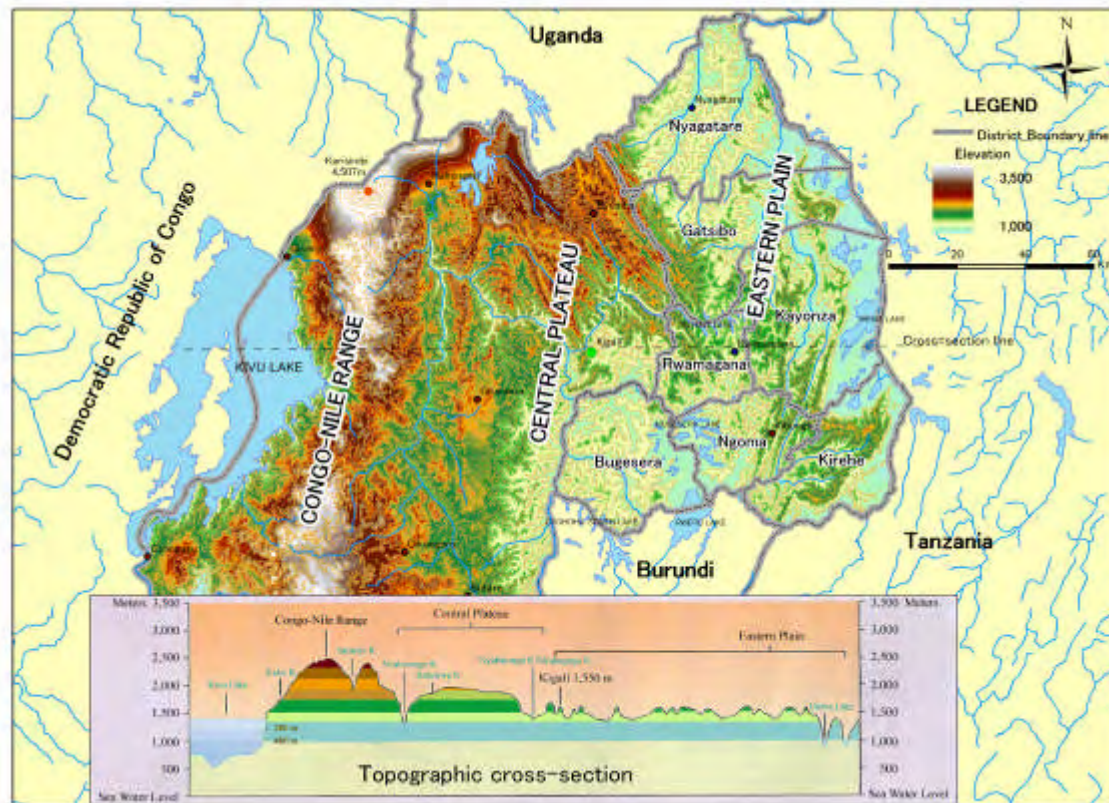


Figure 1-2 Topographical Map of Rwanda

(2) Geology

In Rwanda, bedrocks are generally composed of metamorphic rocks and granitic rocks of the Precambrian Period and they are distributed all over the country. Metamorphic rocks are mostly schists produced by low to medium pressure metamorphic actions of sandy to muddy sediments. Also, granitic rocks are intrusive rocks originating from metamorphic actions. After the Cenozoic era, activities of the Great African Rift Valley became active and due to the volcanic activities of the Virunga volcanic mountain range including the Karisimbi Mountains, the whole country became thickly covered with volcanic ashes. Eventually, when the volcanic activities came to an end, the thickly covered volcanic sediments gradually cracked and then talus cone layers from collapsing of mountain sides and sedimentations of gravel carried from the river upstream were distributed as alluvium lowlands and wetlands along rivers and valley floors. A characteristic of the geological formation is the metamorphic rocks of the Precambrian Period stretching in a belt shape from north to south with many faults running in similar directions due to narrowing of the country in the east-west direction by rift valley activities.

Intrusive type granitic rocks are widely distributed in the western part of the province from Nyagatare District through Rwamagana District to Bugesera District. Along the border with the Northern Province, metamorphic rocks are distributed in a narrow belt shape. In the central southern part of the province, schist-quartzitic metamorphic rocks as well as sedimentary rocks of mudstone and sandstone are distributed in the north-south direction. Along the eastern border with Tanzania is an area of lakes and marshes, and the surrounding area is filled with distributions of sediment alluviums of a few km widths. Also, alluvial layers composed of clay, sand and gravel layers are distributed along rivers and valley floors throughout the province.

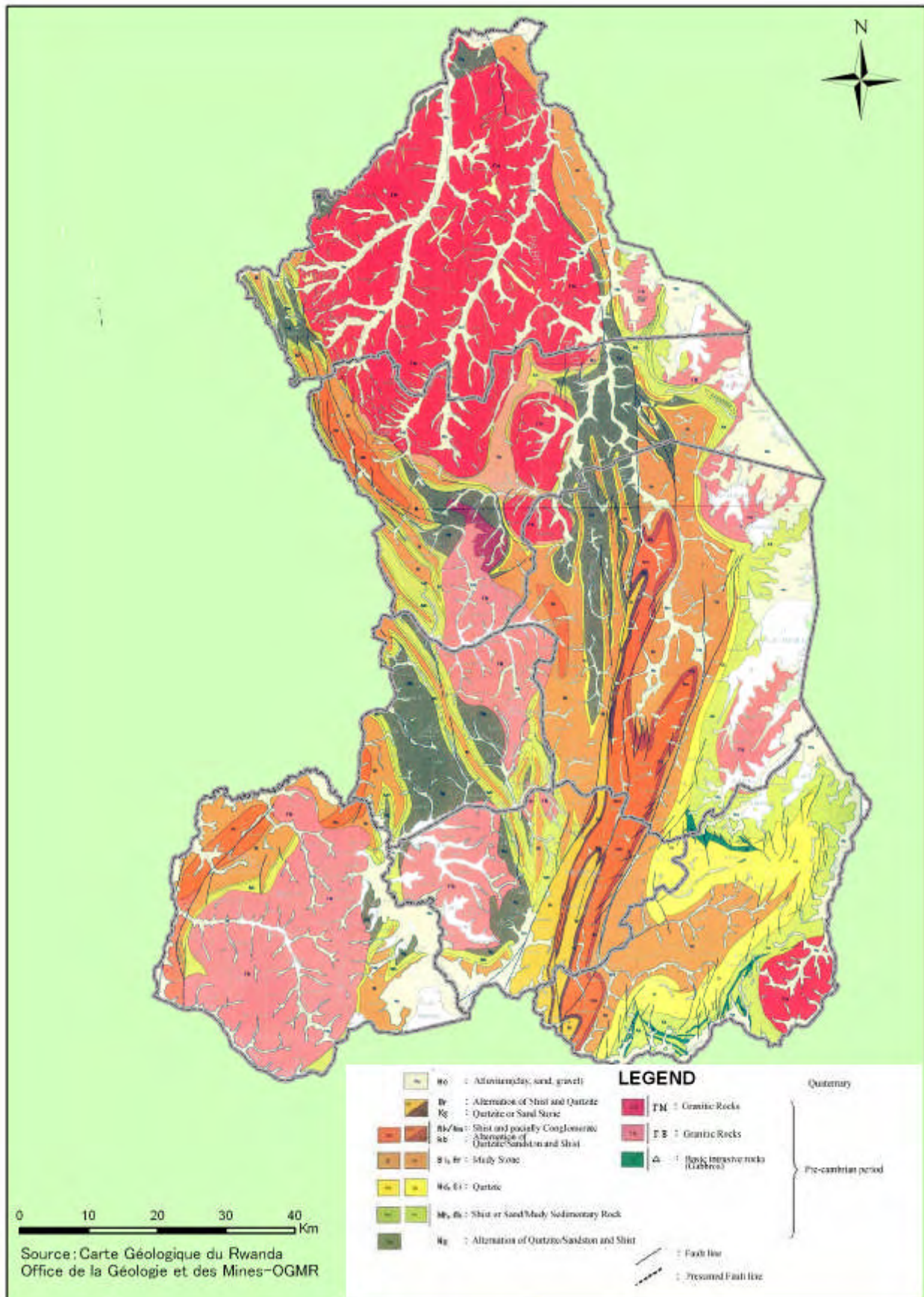


Figure 1-3 Geological Map of Eastern Province

(3) Meteorology

Observatories and Meteorological Data

The only functioning meteorological observatories are those at Kigali and in Eastern Province, Kibungo. At the Kigali observatory, temperature, rainfall, evaporation and relative humidity are being measured daily and at Kibungo, temperature and rainfall are measured daily, but some data are missing. Other than these, rainfall only is measured at 5 other observatories.

Table 1-1 Weather Observatories

Observatory	Latitude	Longitude	Altitude (m)	Measured Data	Remarks
Kigali	S 01°58'	E 30°08'	1,490	Temperature, rainfall, evaporation, humidity	Observation continuing
Kibungo (Ngoma District)	02°11'	30°30'	1,645	Temperature, rainfall	Observation continuing
Sake (Ngoma District)	02°13'	30°23'	1,407	Rainfall (from 2008)	Observation continuing
Gabiro (Gatsibo District)	01°33'	30°24'	1,472	Rainfall (until 1990)	Observation stopped
Kiziguro (Gatsibo District)	01°46'	30°25'	1,550	Rainfall (until 1990)	Observation stopped
Ngarama (Gatsibo District)	01°35'	30°14'	1,500	Rainfall (until 1990)	Observation stopped
Kagitumba (Nyagatare District)	01°03'	30°26'	1,280	Rainfall (until 1990)	Observation stopped

Temperature and Rainfall

The monthly average temperature at Kigali and Kibungo stays between 20 °C and 22 °C throughout the year without any large fluctuations. The annual maximum temperature at Kibungo is about 29 °C from March to April, and the minimum temperature is about 14 °C from October to November.

The annual rainfall at Kigali is about 943mm (average value from 2001 to 2008) and at Kibungo, between 1,000mm and 1,267mm (average from 2007 to 2009). Seasons are the rainy seasons occurring twice a year, from February to April and again in October and November, and the dry season from June to August with almost no rainfall. This rainfall pattern is the same around the whole province.

Figure 1-4 and Table 1-2 show meteorological conditions at these observatories.

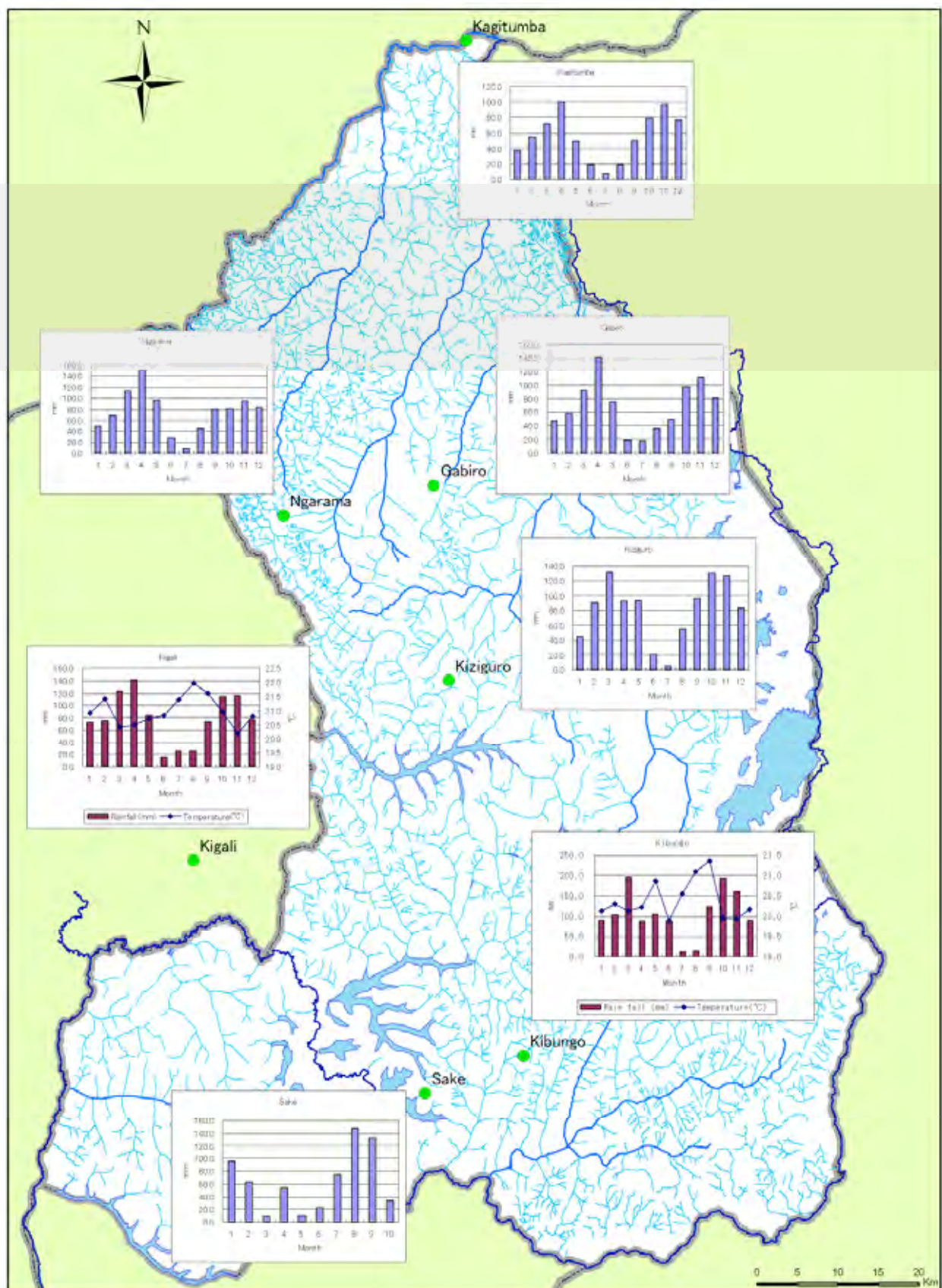


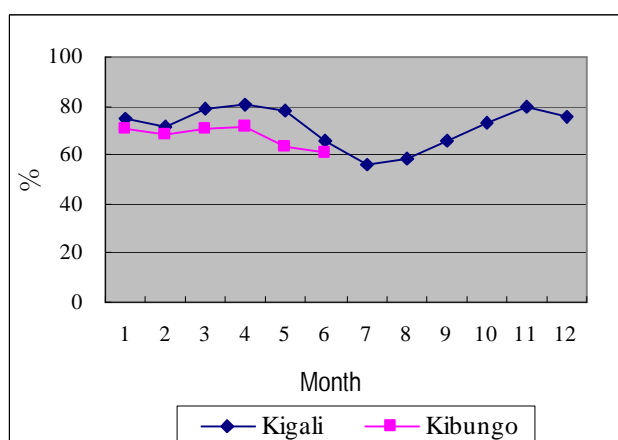
Figure 1-4 Locations of Observatories and Their Temperature and Rainfall

Table 1-2 Monthly Average Temperature (°C) and Rainfall (mm) at Each Observatory

Observatory	Month	1	2	3	4	5	6	7	8	9	10	11	12	Annual
Kigali (2001-2008)	Mean Temp.	20.9	21.4	20.4	20.5	20.7	20.8	21.4	22.0	21.6	20.9	20.2	20.8	-
	Rainfall	72.5	74.4	123.4	140.3	84.2	14.8	26.0	25.4	74.1	114.7	115.6	78.0	943.3
Kibungo (2007-2009)	Mean Temp.	20.1	20.3	20.1	20.2	20.9	19.9	20.6	21.1	21.4	20.0	19.9	20.2	-
	Rainfall	90.2	104.8	195.3	89.2	106.	87.6	11.5	14.1	125.9	191.4	161.7	89.6	1,267.3
Sake (2008-2009)	Rainfall	58.4	-	95.7	63.4	9.4	53.2	10.9	22.1	74.4	146.7	132.5	33.4	700.1
Gabiro (1981-1989)	Rainfall	47.4	57.8	91.8	141.1	74.9	19.2	18.0	35.7	49.8	97.6	110.3	80.6	824.1
Kiziguro (1981-1990)	Rainfall	44.6	90.1	132.3	92.7	93.5	21.0	5.1	55.4	96.5	130.7	126.7	83.9	972.4
Ngarama (1986-1992)	Rainfall	48.6	68.2	113.4	152.1	96.6	27.3	8.4	44.3	79.0	80.4	94.8	82.9	896.0
Kagitumba (1981-1990)	Rainfall	38.1	54.2	72.2	100.4	49.4	18.8	6.6	19.3	50.8	79.6	97.2	77.0	663.6

Relative Humidity

Although data on humidity from the Kigali observatory are available from 2001 to 2008, for Kibungo observatory, data only between January and June 2008 are available. In Kigali, relative humidity during the rainy season is about 80% and drops to 60% in the dry season.

**Figure 1-5 Relative Humidity Fluctuation (Kigali and Kibungo)****Table 1-3 Relative Humidity (%) at Kigali (2001-2008) and Kibungo (2008)**

Month	1	2	3	4	5	6	7	8	9	10	11	12
Kigali	75.2	71.4	79.1	80.7	77.8	65.6	56.5	58.7	66.0	73.4	80.0	75.5
Kibungo	70.5	68.1	71.0	71.3	63.0	60.7	-	-	-	-	-	-

1.3.2 Socio-Economic Conditions

After the 1994 genocide until the present, great efforts are being made towards reconciliation between both races. Peace and political stability have been re-established and democratic institutions and processes are being strengthened. Economically, Rwanda has been able to maintain overall macroeconomic stability and implement extensive reforms which have contributed to realize a strong economic growth

According to the data of The World Bank, the GDP of Rwanda is at the scale of US\$ 3.3 billion and economy grew 5.5% in 2006 and an estimated 6% growth in 2007. This is slightly below the GDP growth rates of the preceding decade (1995-2005), which averaged 7.4% per year.

Also, steady implementation of macroeconomic policies enabled Rwanda to reach completion point for the Heavily Indebted Poor Countries (HIPC) Initiative in March 2005 and to qualify for the Multilateral Debt Relief Initiative (MDRI) in March 2006. Parallel efforts have been made to put in place a sound economic governance framework, including independent regulatory agencies, stronger public expenditure management systems with independent audit agencies, and a strong focus on anti-corruption. Inflation has been contained at less than 10% almost continuously since 1997. However, recent indications show that trends in world markets and rising prices will likely result in higher levels of inflation than observed in the past.

On the other hand, constraints are high in this agriculture-based economy. Agriculture currently accounts for just fewer than 40 percent of GDP, while it provides jobs to 79 % of the population³. However, since most Rwandans rely on subsistence agriculture, participation in the market economy is limited. Production remains low, and constraints to agricultural growth are severe. The contribution of the private sector to the economy and poverty alleviation remains limited; there are only about 400 enterprises in Rwanda, of which half have less than 50 employees. Private sector development remains hampered mainly by a lack of infrastructure (especially roads and energy) services and, to a lesser extent, the weakness of the financial sector.

Table 1-4 shows the summary of basic outline of socio-economic conditions in Rwanda.

³ EICV 2 (Enquête Intégrale sur les Conditions de la Vie des Ménages : Households Living Conditions Survey), Final Report, 2007

Table 1-4 Basic Socio-Economic Indicators

Indicator	2007	Source
Surface area, total (km ²)	26,338	A
land	24,948	
water	1,390	
Population, total	9,735,541	B
Age structure (%)	(2008 est.)	A
0-14 years	41.9	
15-64 years	55.7	
65 years and over	2.4	
Population density (pers/km ²)	370	-
Population growth (annual %)	2.9	B
Life expectancy at birth (years)	46 (2006)	C
Mortality rate, under age 5 (per 1,000)	160 (2006)	C
Adult literacy rate, total (%)	64.9 (2006)	D
Gross combined school enrolment rate (%)	52.2 (2006)	D
Poverty headcount ratio at national poverty line (% of population below the upper poverty line)	56.9 (2006)	E
GNI (US\$ millions)	3,072	B
GNI per capita (US\$)	320	B
GDP (current US\$ millions)	3,319	B
GDP growth rate (annual %)	6	B
Inflation (annual %)	8.9	B
Agriculture, value added (% of GDP)	36	B
Industry, value added (% of GDP)	14.1	F
Services, etc., value added (% of GDP)	50	B

Source: **A**=The World Fact Book (CIA)
B=World Development Indicators Rwanda (The World Bank)
C=Genderstats Rwanda (The World Bank)
D=Human Development Indices 2008 Revised version (UNDP)
E=EICV Poverty Analysis for Rwanda's Economic Development and
Poverty Reduction Strategy (May 2007, NISR)
F=Rwanda at a glance (The World Bank)

1.3.3 Administrative Structure of Rwanda

The administrative structure of Rwanda from provinces to imidugudu is shown below.

Table 1-5 Administrative Levels of Rwanda

Administrative Level		Comment
English	Kinyarwanda	
Province	Intara	5 provinces: Kigali, Eastern, Northern, Western, Southern
District	Akarere	30 districts
Secteur ⁴	Umurenge	416 Secteurs
Cell ⁵	Akagari	2,050 Cells (as of Feb. 2010, but often fluctuates)
Village	Umudugudu ⁶	Over 14,000 (changes as resettlement progresses)

⁴ To distinguish between sector as in water and sanitation sector, the French word "secteur" will be used to mean the administrative level below the district.

⁵ "Cell" is the administrative level below the secteur, where the French word for cell is cellule, but the English word will be used.

⁶ Under the cell, the local Kinyarwanda word for village is used.

1.3.4 Structure of Water Supply and Sanitation Sector

The present organizations and their responsibilities of the water supply and sanitation sector of Rwanda are shown below.

Table 1-6 Demarcation of Responsibilities for Water and Sanitation Sector Stakeholders

Organization	Responsibilities
MININFRA ⁷	<ul style="list-style-type: none"> • Formulation of national policies, guidelines and strategies for the water and sanitation sector • Formulation of strategies and monitoring on effective use of resources as well as institutional and human resources capacity development of local administration • Overall coordination of the water and sanitation sector
PNEAR	<ul style="list-style-type: none"> • Confirmation on construction plans of water supply schemes • Promotion of capacity development of stakeholders to assure sustainable water supply management in rural areas • Coordination of donors and all projects in the water and sanitation sector
MINIRENA	<ul style="list-style-type: none"> • Conservation and management of water resources
MINISANTE	<ul style="list-style-type: none"> • Support to sanitation promotion through HAMS handled by MININFRA and water quality management
MINEDUC	<ul style="list-style-type: none"> • Cooperation with MININFRA on school sanitation education through HAMS
MINALOC	<ul style="list-style-type: none"> • Ministry in charge of decentralization • Management of rural water supply projects at grassroots level through CDF • Promotion of HAMS at schools as part of support to the water and sanitation sector
RURA	<ul style="list-style-type: none"> • Supervision for assurance of compliance with laws, regulations and standards related to water supply service provision
RWASCO (former ELECTROGAZ) ⁸	<ul style="list-style-type: none"> • Urban water supply and sewerage service provision • Technical support on rural water supply and sanitation facilities
Province	<ul style="list-style-type: none"> • Coordination, communication and directions on national policies • Coordination of reports on district water supply and sanitation service provision
District	<ul style="list-style-type: none"> • Formulation and implementation of water supply and sanitation related plans • As owner of water supply schemes, supervision on management of water supply schemes
Secteur	<ul style="list-style-type: none"> • Supervision of cell activities • Handling of imidugudu problems, requests and complaints • Sanitation promotion to residents • Management of water supply providers
Cell	<ul style="list-style-type: none"> • Handling of imidugudu problems, requests and complaints • Sanitation promotion to residents
Umudugudu	<ul style="list-style-type: none"> • Handling of residents' problems, requests and complaints
Water Service Provider	<ul style="list-style-type: none"> • Operation and maintenance of water supply facilities • Water supply provision to residents

⁷ Under MININFRA, PNEAR is the implementation unit for the rural water and sanitation sub-sector.

⁸ The former ELECTROGAZ was separated into 2 corporations, one for water supply service provision, RWASCO (Rwanda Water Supply and Sanitation Corporation) and another for commercial power service provision, RECO (Rwanda Electric Corporation).

The present water and sanitation sector is evolved around MININFRA as shown below.

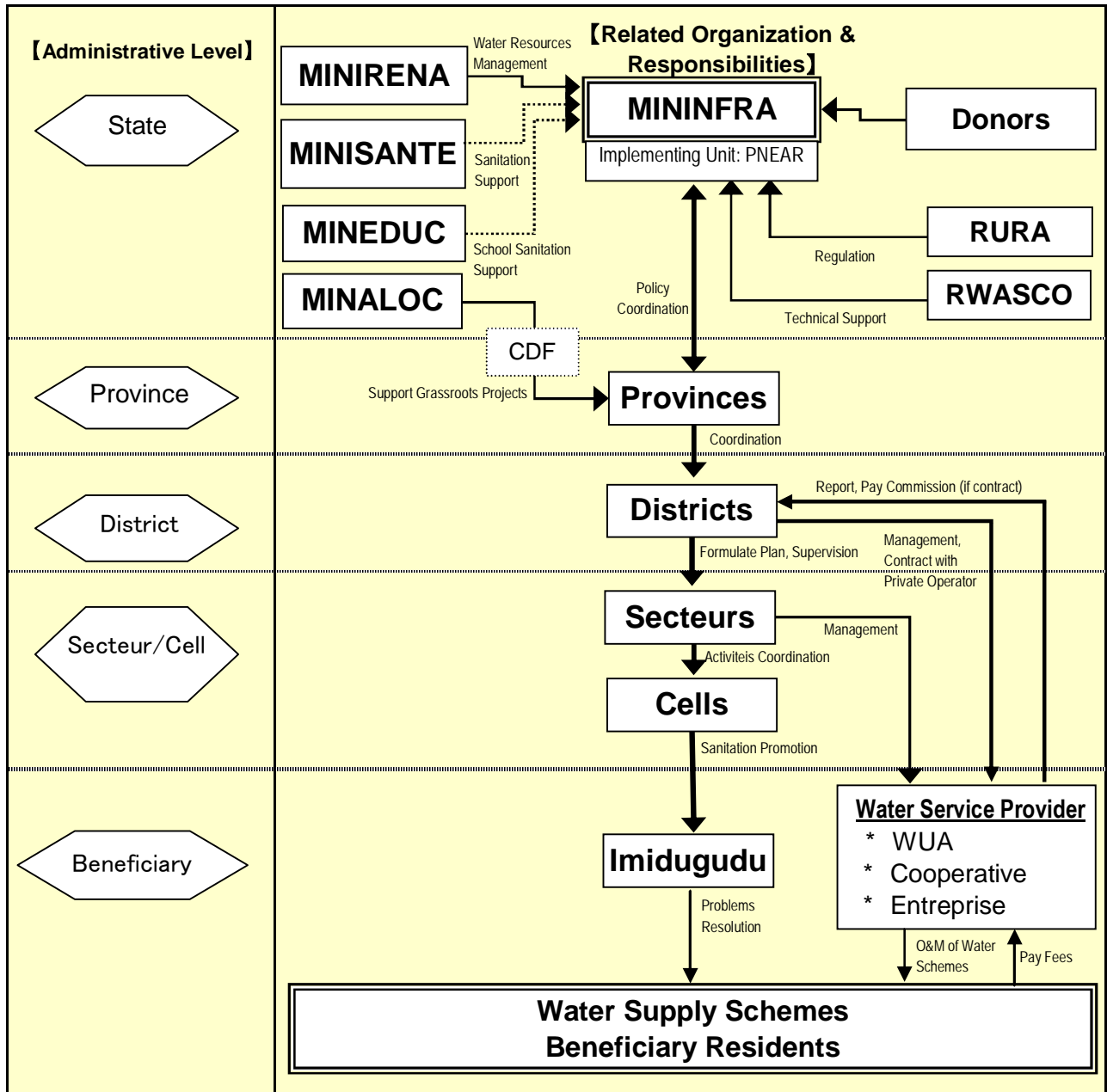


Figure 1-6 Rwanda's Water and Sanitation Sector Structure

1.3.5 Present State of Rural Water Supply

Water sources for drinking in Eastern Province are springs, groundwater and surface waters. For rural water supply, piped schemes by gravity or motorized pumps, groundwater equipped with handpumps and protected springs are found. Of these, motorized pumps for piped schemes are powered either by generators or using commercial power. Also, in some areas, house connections are made. Residents who cannot access safe water within reasonable distances are using distant water supply schemes, untreated surface waters or contaminated waters.

According to the household survey conducted in the target area, persons who fetch water are children, adult women and adult men, in this order, which can be thought of as work for the entire family. The total volume of water a household fetches is estimated between 60 to 80 liters a day, and varies from 13.3 liters to 16.0 liters per person showing differences between districts. Also, responses showed that time used to fetch water from a water supply scheme averaged 10 minutes to 3 hours one-way to public tap stands. Refer to Supporting Report for details of the social survey.

The water supply schemes are managed by water users' associations (WUAs), private operators (cooperatives and enterprises), RWASCO, central government and local administration. As for water fee collection, piped schemes are on volumetric (or metered) rate basis and handpump schemes are charged on a flat rate basis; at tap stands, fees are collected based on the jerrican (jc) which is a plastic water container of 20 liters, and house connections are billed by m³. Water fees differ for different water schemes of various water service providers, but the tariff is set upon discussions with the district. The organization types, characteristics of operation and maintenance, problems and countermeasures are explained in Chapter 5.

1.3.6 Target Area

The study area includes all 7 districts (Nyagatare, Gatsibo, Kayonza, Rwamagana, Kirehe, Ngoma and Bugesera) of Eastern Province. The location of the study area is shown in the map at the beginning of the report. Statistical data of each district are shown in Table 1-7.

Table 1-7 Present Situation of Target Area

District	Area (km ²)	No. of Secteurs	No. of Cells	No. of Imidugudu	District Population (2008)	Water Coverage (%)*
Nyagatare	1,741	14	106	628	329,101	48
Gatsibo	1,585	14	69	603	350,410	55
Kayonza	1,954	12	50	422	258,606	41
Rwamagana	692	14	82	474	255,653	60
Ngoma	738	14	64	474	277,144	73
Kirehe	1,225	12	60	612	278,712	25
Bugesera	1,334	15	72	581	294,014	70
Total	9,269	95	503	3,794	2,043,640	
Average	1,324	14	72	542	291,949	53

Source: Area, secteur no., cell no., umudugudu no. and population were taken from District Development Plans (DDPs), 2008-2012, and confirmed through NISR and inquiry surveys. For water coverage, refer to Table 2-5.

1.4 National Policy for Rural Water Supply Services

As explained previously, the “National Policy and Strategy for Water Supply and Sanitation Services”, was enacted in March 2010 as the national policy for rural water supply services in Rwanda. This is placed as the action plan to contribute to achieving the goals set in the national development plans of Vision 2020 and EDPRS. This National Policy succeeds the Sectorial Policy on Water and Sanitation of October 2004 as the focal policy for the water supply and sanitation sector. However, as a result of the ministerial reform at the beginning of 2009, water resources were placed under MINIRENA and to review the environmental and public health sector, this policy was formulated to emphasize water supply and sanitation services to the population. The main points for implementation of this policy are the following.

- Priority to basic services
- Decentralization
- Community participation
- Cost recovery and financial sustainability
- Private sector participation
- Operational efficiency and strengthening of accountability
- Emphasis on sanitation and hygiene
- Interests of women and children
- Grouped settlements
- Environment and water resources protection
- Inclusive program approach
- Results-based management

For the policy, the following 9 objectives are given.

1. Raise rural water supply coverage by assisting the districts to plan, design, finance and implement high-quality infrastructure
2. Ensure sustainable functionality of rural water supply infrastructure by developing effective management structures
3. Ensure safe, reliable, financially viable and affordable urban water supply services
4. Raise household sanitation coverage to 65% by 2012 and 100% by 2020, and promote hygiene behavior change
5. Provide improved sanitation for schools, health centers and other public institutions and locations
6. Develop safe, well-regulated and affordable off-site sanitation services for densely populated areas
7. Enhance storm water management to mitigate impacts on properties, infrastructure, human health and the environment
8. Implement integrated solid waste management
9. Develop the sector’s institutional, capacity building, M&E (monitoring and evaluation) and knowledge management framework

For this study, an optimal master plan will be formulated in view of the above important factors and in consideration of the present situation and issues of water supply service in the target area.

1.5 Basic Study Policies

This study is divided into 2 phases and executed in about 14 months. In Phase 1 (from October 2008 to July 2009), within the first main objective for the master plan explained above, planning was made on facilities to be constructed and their locations. In Phase 2 (from August 2009 to March 2010), priority rankings were given and implementation scheduling was made on the planned schemes, and then preliminary designs were made for the top 10 projects. This study was carried out in consideration of the following policies.

(1) Measure to cope with changes in water supply administration

Since Rwanda is going through rapid changes in decentralization, privatization on management of water schemes, water sector restructuring and other developmental phenomena, this study was carried out by reflecting on these situations through information collected on trends in various related policies.

(2) Consideration on unit water supply rate

The unit water supply rate of 20 lit/cap/day, which is the design standard of MININFRA and is adopted in the national plan of EDPRS, will be used for this study. Since WHO/UNICEF⁹ recommends a minimum of 20 lit/cap/day as the objective unit supply rate in rural areas, this rate is determined to be feasible. By reflecting on the results of the socio-economic survey, the water supply plan made considerations so that limits in ability-to-pay the operation and maintenance costs by residents will not be exceeded due to water supply facilities designed with unnecessary capacities. However, the unit water supply rate was set upon consideration of the present water consumption rate in the target area and improvement of living conditions due to improved water supply environment.

(3) Use of latest satellite images

The presently available 1/50,000 topographic maps were based on aerial photos taken before implementation of the resettlement policy. Therefore, new satellite images (SPOT images) were used to obtain information on distribution of imidugudu, present settlements and house distributions.

⁹ WHO/UNICEF, "Global Water Supply and Sanitation Assessment 2000 Report".

(4) Selection of water sources

The main water sources targeted for planning are springs, groundwater (through boreholes) and surface waters (such as rivers and lakes). All utilizable water sources in the area were surveyed and the most appropriate water sources were selected according to exploitation costs and operation and maintenance costs being least expensive and initial investments being feasible. Since dust and debris may be contained in rainwater, this will be recommended for use other than drinking, and for sanitation promotion activities.

(5) Coordination with rural electrification plan

If the water source is located in a low area and the service areas are in higher areas, then water needs to be pumped up. In this case, water supply costs differ greatly between commercial power and generator. Therefore, since using less expensive commercial power can restrain operation and maintenance costs, which is an important factor for sustainability of water supply facilities, Rwanda's rural electrification plan was considered. For the electrification plan of Eastern Province, refer to Supporting Report.

(6) Application of geophysical prospecting results

To formulate a water resources plan within a limited study timeframe, geophysical prospecting most appropriate for the study area was conducted. In the first fiscal year, to confirm thicknesses of the alluvial sediments along valleys for deciding on areas of high groundwater potential, vertical prospecting was carried out. Also, based on results of the first year study, since groundwater development in the target area is difficult, for cases where water sources must be sought in hill areas of granite and metamorphic rocks, horizontal prospecting and electromagnetic prospecting were conducted during the second fiscal year study.

(7) Information sharing with recipient government

As a result of the restructuring in Rwanda, the numbers of staffs in the central and local governments are very few. Especially, district staffs are very busy and many are not necessarily aware of the detailed present conditions in the districts. However, in this study, counterparts from districts were requested to accompany the study team as much as possible to improve their capacities and as a means to share information with all stakeholders.

(8) Considerations on realization

The ability of the Rwandan side to bear the project cost (including donor investments) is considered to formulate a water supply plan having high possibility for realization. Also, the total project cost estimation and a list of donors having possibility for assistance will be shared with the recipient side at an early stage.

1.6 Environmental and Social Consideration

In order to achieve sustainable development from an environmental point of view, the Government of Rwanda (GoR) has made efforts in strengthening the environment sector and established a governmental organization, the Rwanda Environment Management Authority (REMA), under the Ministry of Natural Resources (MINIRENA), in 2005. Thereafter, the Rwandan Development Board (RDB) was established in early 2009 and the section in charge of environmental impact assessment (EIA) in development activities was transferred from REMA to the RDB. Procedures for EIA were also revised. This reformation was stipulated by the Organic Law N° 53/2008 of 02/09/2008 Establishing Rwanda Development Board (RDB) and Determining its Responsibilities, Organisation and Functioning (Article 3). Laws and policies related to environmental and social consideration in Rwanda are shown below.

Table 1-8 Laws and Policies related to Environmental and Social Consideration in Rwanda

Category	Name	Brief Description
Environment	Constitution of the Republic of Rwanda	The Constitution, consisting of 210 articles, was enacted in May 2003. With regard to the environment sector, it protects people's property rights and entitlements to well-conditioned and fulfilling environments (Article 29 and 30). In addition, it stipulates that every person is obliged to preserve and foster the environment (Article 49).
	Organic Law determining the modalities of protection, conservation and promotion of the environment in Rwanda (No. 04/2005 of 08/04/2005)	The Law was approved in 2005 and stipulates the basic issues for the natural and social environment in Rwanda.
	National Policy on Environment	The Policy was enacted in 2003 as a comprehensive policy. Its objective is "the improvement of man's well-being, the judicious utilisation of natural resources and the protection and rational management of ecosystems for sustainable and fair development". It consists of features, problems and strategic actions in the fields of natural environment, natural resources and biodiversity, and human environment. The institutional and legal framework is also shown for implementing the actions the Policy states.
Water	National Policy and Strategy on Water Supply and Sanitation Services	This version was enacted in March 2010 to update the "Sectorial Policy on Water and Sanitation" authorized in 2004. The updated version gives reference to solid waste management and stormwater treatment as well. In this policy, concerning "raising the access rate of safe water services" as specified in Vision 2020 and EDPRS, objectives for both urban and rural levels are set and action plans on how to achieve these goals are given.
Land	Organic Law determining the use and management of land in Rwanda	This Law was established in 2005 and determines the use and management of land. This law stipulates land management systems in practical manners including how lands in Rwanda may be categorized, in what way they may function, and how people may enjoy their land rights. Prescriptions and penalties are also determined.
	Law relating to expropriation in the public interest	This law stipulates the procedures of exploiting private property for public interests, for example, constructing public infrastructures and facilities, and the compensation system. In the law, only the government is authorized to carry out expropriation.
	National Land Policy	The Policy was enacted in 2004. The aim is "to establish a land system that is secure for all Rwandans, land reforms that are necessary for good management, and proper use of national land resources for a harmonious and sustainable development that ensures protection of the environment". It is expected to replace the customary law and achieve proper land management by establishing the regulations to be obligated by people with regard to land tenure, land administration, cadastre systems, land markets, planning and management of land utilization and legal frameworks.

In Rwanda, in case projects for public works require expropriation of private land, a developer must follow the Law No. 18/2007 of 19/04/2007 relating to Expropriation in the Public Interest and prepare compensation plans including resettlement action plans if necessary. Projects for constructing water supply schemes such as the priority projects proposed in the Study are not specifically stated in the Law. However an article in this Law has a description saying that “basic infrastructure and any other activities aimed at public interest which are not indicated on this list that are approved by an Order of the Minister in charge of expropriation, at own initiative or upon request by other concerned persons”. Because water supply facilities may contribute to public livelihoods, projects of setting up water supply schemes may be categorized to the item.

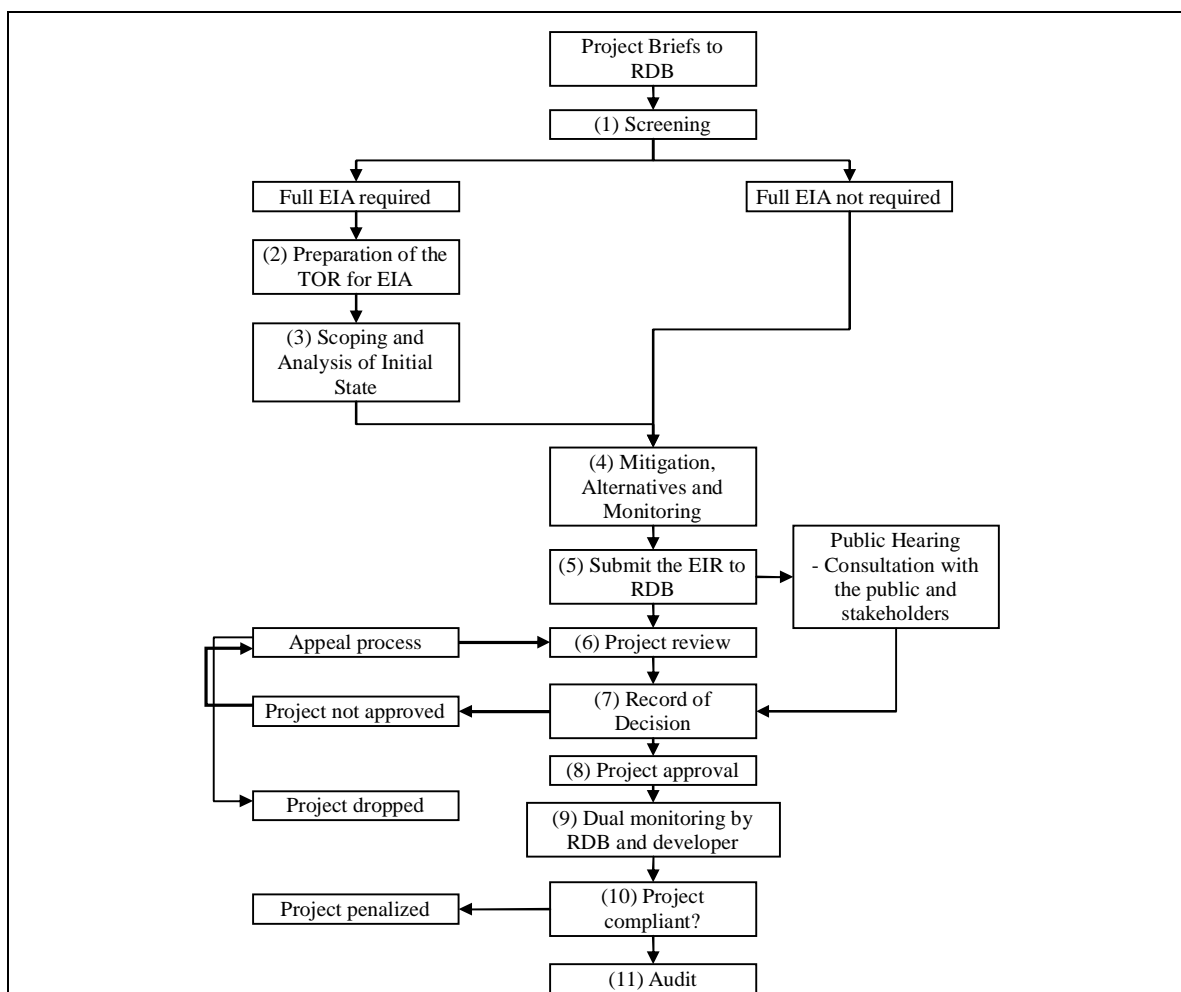
While emphasizing environment protection in Rwanda as described above, Article 67 of the Organic Law states that EIA is mandatory for implementing development projects in the infrastructure, agriculture, industrial and mining sectors. As the result, “General Guidelines and Procedure for Environmental Impact Assessment” (hereinafter called as “the Guidelines”) was established in 2006. At present, the Environment Compliance Department in the Rwandan Development Board (RDB) is in charge of the EIA since the establishment of RDB.

The objectives of EIA are determined in the Guideline as follows.

- Mid-term aim: to inform the process of decision-making by identifying potentially significant environmental effects and risks of development proposals
- Long-term aim: to promote sustainable development by ensuring that development projects do not undermine critical resources and ecological functions or the well-being, lifestyle and livelihood of communities and people who depend on them

In order to achieve these objectives, it may be essential to identify environmental risks and potential adverse impacts and clarify possible mitigation and monitoring measures for any negative aspect identified before the implementation of projects. Therefore, the Guideline recommends conducting EIA before project implementation through cooperation of related administrative bodies including REMA as well as private organizations including project area residents and communities.

Since priority projects described in Chapter 3 will be categorized into “Water distribution activities and sanitation”, they will be required to follow the EIA process shown in Figure 1-7. This procedure may take around three months and all the costs for EIA may be disbursed by project implementation organizations.



EIA steps, as stipulated in the Guidelines

- (1) **Screening:** RDB examines the Project Brief prepared by a developer according to the screening criteria, and clarifies whether or not the project may need further environmental analysis
- (2) **Preparation of TOR for EIA:** If a project is categorized as one which may have critical impacts to natural resources, the developer is required to identify mitigation measures against them and describe how to practice the TOR for impact assessment surveys.
- (3) **Scoping and analysis of initial state:** On the basis of the TOR, the developer works on scoping and analysis of the pre-project situations with stakeholders' involvement and develops their TOR
- (4) **Mitigation, alternatives and monitoring:** Throughout impact assessment surveys determined in the TOR, the developer proposes measures of mitigating possible impacts and monitoring methods.
- (5) **Submission of the EIR to RDB:** A developer submits to RDB the Environmental Impact Report (EIR), describing the results of the survey.
- (6) **Project review:** RDB reviews the EIR and makes decisions on whether the project is approved or not. The EIR is distributed to relevant ministries and local authorities. If necessary, RDB conducts public hearings with stakeholders over the area affected by the project
- (7) **Record of Decision:** After the decision on whether the project is approved or not is finalized by the Executive Committee (RDB and relevant ministries), a Record of Decision is prepared by RDB.
- (8) **Project approval:** Following step (7), the official document on the decision is published.
- (9) **Dual monitoring:** Regular monitoring proposed in the EIR is conducted by the developer and RDB. REMA is also involved if necessary.
- (10) **Project compliant:** Referring to the monitoring results, RDB observes whether the agencies have implemented the project in manners determined by the approval.
- (11) **Audit:** The agencies continue self-auditing of the project.

Source: The Guidelines (modified according to inquiries to RDB by the Study Team.)

Figure 1-7 EIA Procedure in Rwanda