United Republic of Tanzania
Ministry Lands, Water, Energy and Environment (MLWEE)
Zanzibar Water Authority (ZAWA)

Preparatory Survey on Zanzibar Urban Water Distribution Facilities Improvement Project in United Republic of Tanzania

Final Report

December 2017

Japan International Cooperation Agency (JICA)

NJS Consultants Co., Ltd. (NJS)

Yokohama Water Co., Ltd. (YWC)

6R
JR(先)
17-033

In this report, the foreign currency exchange rate as of July 2017 shown below is applied.

Exchange Rate：

TZS 1.00	= JPY 0.0493
USD 1.00	= JPY 111.00
USD 1.00	= TZS 2,250

TZS: Tanzania Shilling
JPY: Japanese Yen
USD: United States Dollars

United Republic of Tanzania
Ministry of Lands, Water, Energy and Environment (MLWEE)
Zanzibar Water Authority (ZAWA)

Preparatory Survey on Zanzibar Urban Water Distribution Facilities Improvement Project in United Republic of Tanzania

Final Report

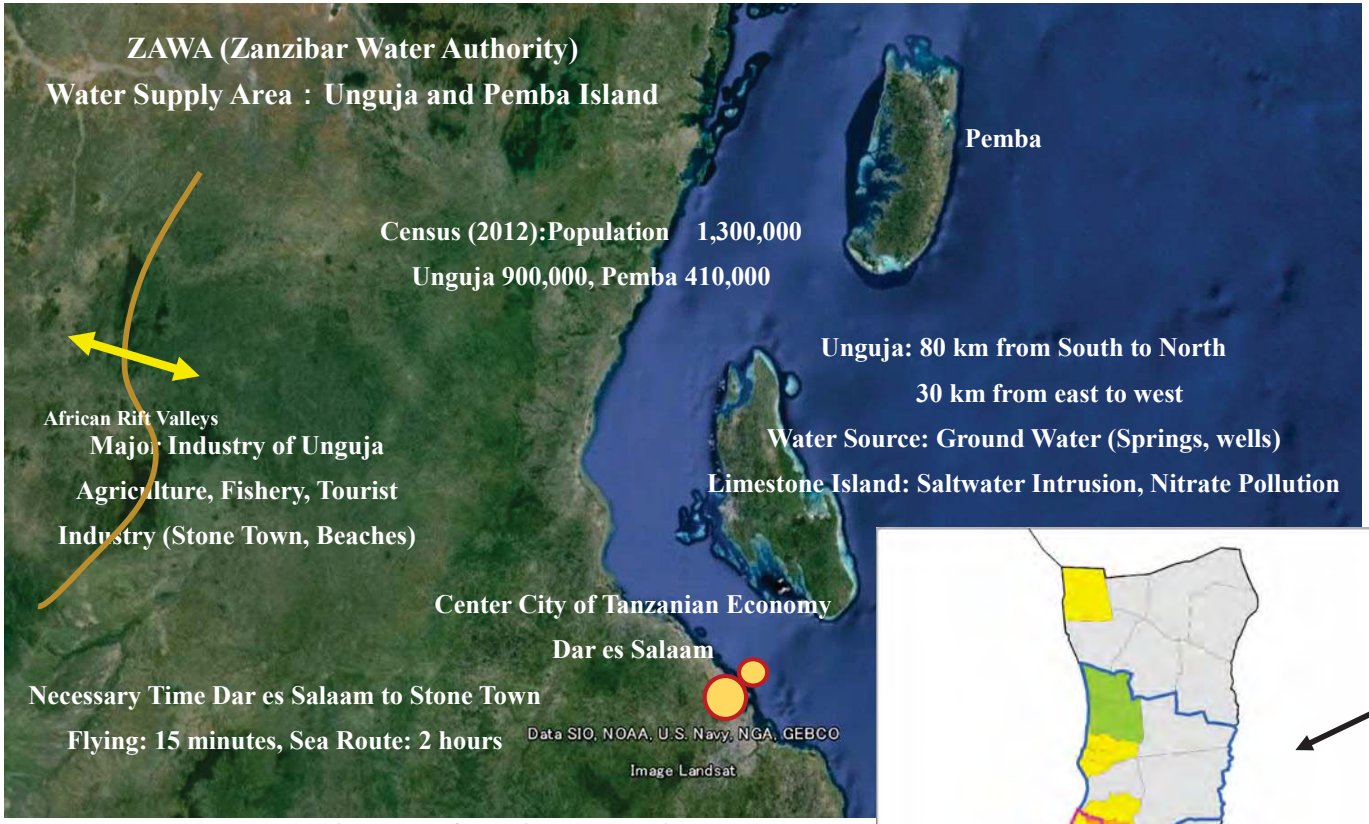
December 2017

Japan International Cooperation Agency (JICA)

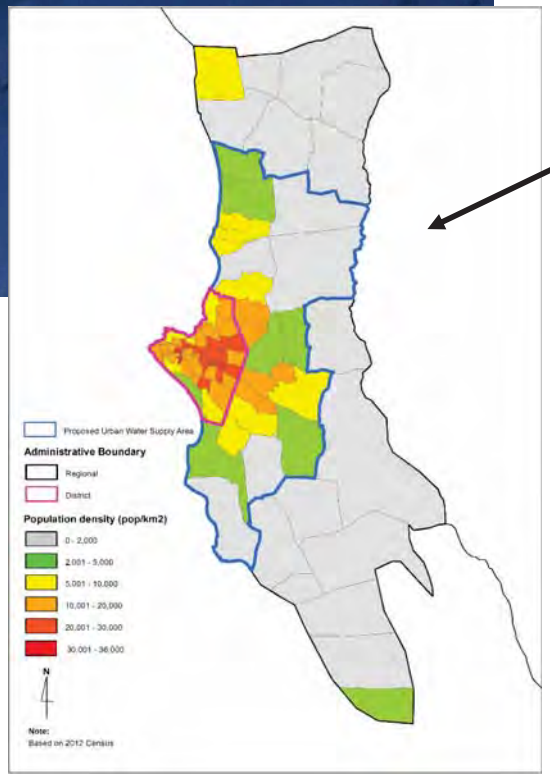
NJS Consultants Co., Ltd. (NJS)

Yokohama Water Co., Ltd. (YWC)

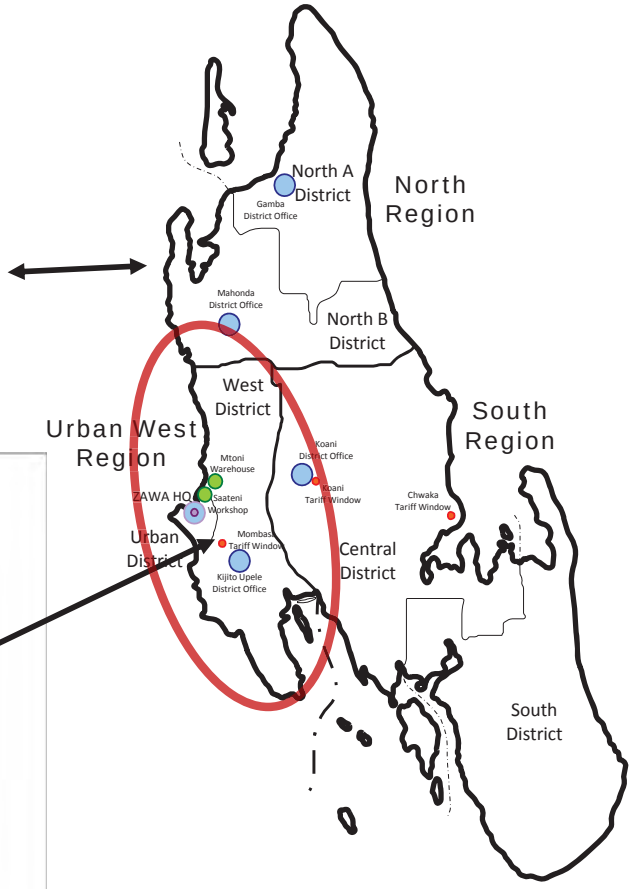
Location Map (1/2)



Location Map of Zanzibar, Tanzania



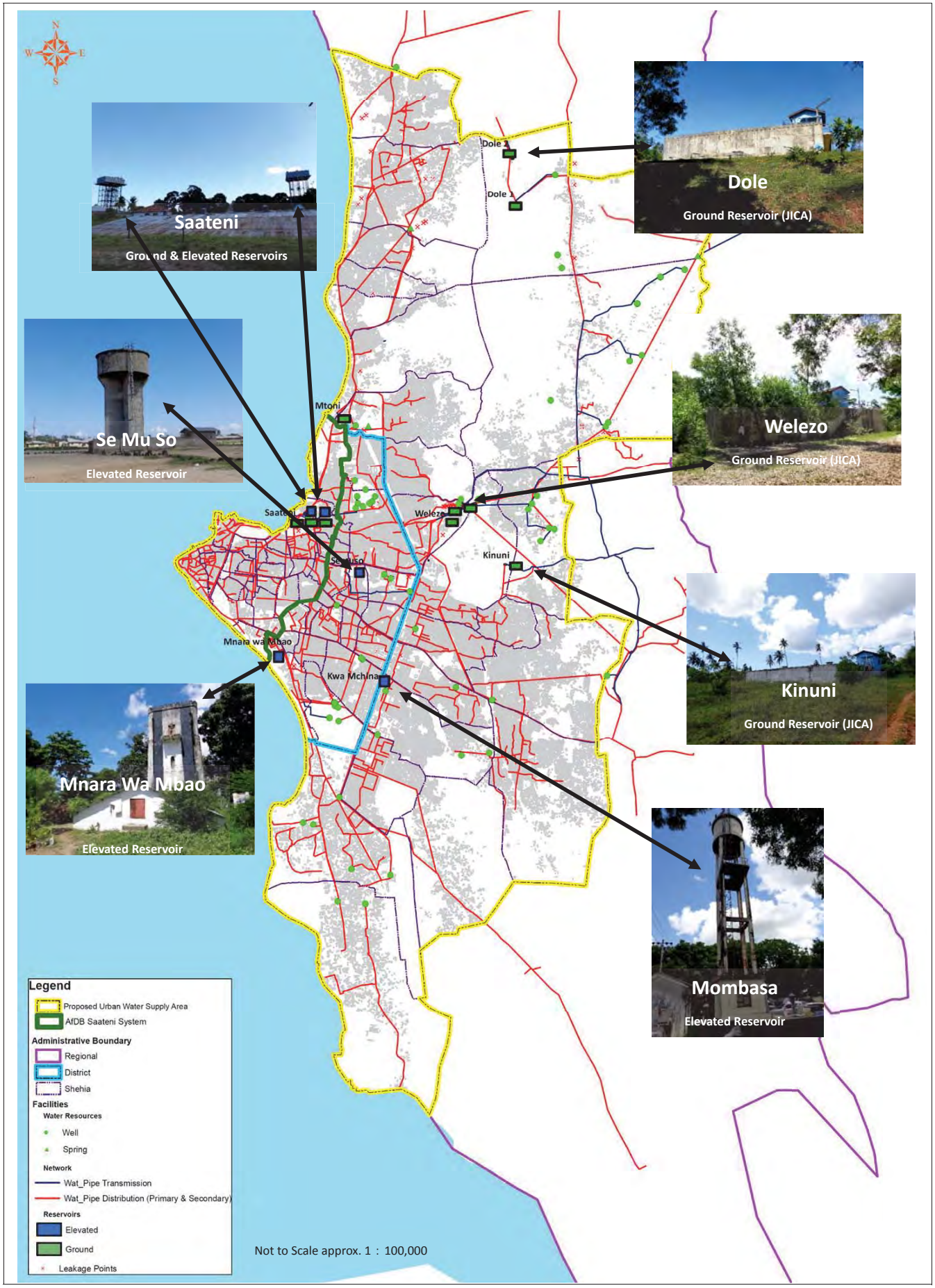
Urban West Region in Unguja Island: Population Density (2012 Census)



Unguja Island: Administrative Boundary

Legend: ZAWA's Office

Double Circle: HQ, Light Blue: Branch, Green: Warehouse, Red: Pay Counter



Location Map (2/2): Urban West Region (Jun 2016, Prepared by NJS Consultants)

Preparatory Survey on Zanzibar Urban Water Distribution Facilities Improvement Project in United Republic of Tanzania
Final Report

Table of Contents

List of Tables

List of Figures

Abbreviation

ABP	Annual Business Plan
AfDB	African Development Bank
BoT	Bank of Tanzania
DG	Director General of ZAWA
DMA	District Metered Area
DWD	Department of Water Development
F/S	Feasibility Study
FACF	Tanzania/Japan Food Aid Counterpart Fund
FINNIDA	Finnish International Development Agency
GDP	Gross Domestic Product
GIS	Geographic Information System
GTZ	German Technical Assistance Agency
IMF	International Monetary Fund
JAST	Joint Assistance Strategy for Tanzania
JFC	Joint Finance Commission
JFC	Joint Finance Commission
JICA	Japan International Cooperation Agency
KPI	Key Performance Indicator
LMB	Leakage Monitoring Block
MIS	Management Information System
MLWEE	Ministry of Lands, Water, Energy and Environment
NACTE	National Council for Technical Education
NRW	Non-Revenue Water
ODA	Official Development Assistance
OJT	On the Job Training
PDM	Project Design Matrix

RGoZ	Revolutionary Government of Zanzibar
SBM	Smart Billing Manager
SBP II	Strategic Business Plan II
TANESCO	Tanzania Electric Supply Company Limited
TAYI	Tanzania Youth Icon
TPWD	Technical and Public Works Department
UNDP	United Nations Development Programme
UN-Habitat	United Nations Human Settlements Programme
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WB	World Bank
WHO	World Health Organization
ZAWA	Zanzibar Water Authority
ZECO	Zanzibar Electricity Corporation
ZUWSP	Zanzibar Urban Water Supply and Sanitation Project

Executive Summary

1 Outline of the Survey

(1) Background

The water supply service in Unguja Island, Zanzibar of United Republic of Tanzania was created by the British autonomous branch of Technical and Public Water Works Development in the 1920's, using spring water sources to supply Zanzibar Town (currently Stone Town and its surrounding area). When Tanzania gained independence in 1964, RGoZ took over the operation, and from 1982, the water supply for domestic use became free of charge.

RGoZ has then faced a lack of funds to expand water facilities to meet increasing water demands and for renewing aging facilities, and therefore has not been able to fulfill consumer demands. Related activities of RGoZ include the publication of "Zanzibar Vision 2020" in 2002 and the "National Water Policy 2004", the formation of the Zanzibar Water Authority (ZAWA) in 2006, and the abolition of free water supply for domestic use.

Although a decade has passed, water supply facilities have not enough improved and estimated ratio of water loss is 60%, regardless of multiple donor supports such as the AfDB supported ZUWSP (Zanzibar Urban Water and Sanitation Project), the target area of which includes Stone Town. ZAWA's financial situation is not improved because of insufficient water revenue due to the low customers' willingness to pay by insufficient water supply service and insufficient customer registration by a negative legacy of the charge-free period. As a result, since it is impossible to replace and expand necessary facilities, leakage has occurred frequently, and it has obstructed the lives of residents. Therefore, improvement of water supply facilities is an urgent issue.

(2) Objective

This Survey is to be implemented to gather the information required for the appraisal of a Yen-Loan Project requested by the Government of Tanzania, by studying the Project's objective, outline, cost, implementation structure, O&M organization and environmental and social considerations.

(3) Target Area

Urban West Region, Unguja Island

2 Current Situation and Issues of the Water Sector

The current situation and issues of the Water Sector are detailed in **Chapter 3, Main Report**. The outlines are as follows.

(1) Water Source Facility

(a) Water Sources

In the Urban West Region, ZAWA owns 3 spring sources and 82 boreholes. The main issues are listed below.

- Due to the geographical features of Zanzibar, groundwater is the only water source, however water source management is insufficient.
- Many sources are not operating due to malfunctioning pumps.
- Intake amount is not measured due to malfunctioning flow meters.
- Many boreholes are distribution water directly from them.

(b) Disinfection Equipment

ZAWA has 4 main reservoirs (Saateni, Welezo, Kinuni and Dole) and small reservoirs and elevated tanks. Disinfection equipment are only installed at e main reservoirs, which have been installed through Japanese Grant Aid Projects. The main issues are listed in the following.

- Not all reservoirs are equipped with disinfection equipment.
- The disinfection target water amount is not measured due to the breakdown/missing flow meters, therefore accurate operation is difficult.

(c) Distribution Facilities

The current distribution system of Urban West Region is a mixture of gravity flow from reservoirs, borehole distribution using elevated tanks and direct distribution from boreholes. The main issues are listed as follows.

- Supply zones are not divided according to distribution method, capacity/location of reservoir and ground elevation of the supply area.
- Leakage from distribution pipes.
- Shallow earth cover for distribution pipes, inadequate service connections.

(d) Service Connections

- Inadequate service connections such as direct screwing connection to distribution pipeline without tapping saddle are observed.
- Inadequate service connections such as direct connection of suction pump to distribution pipeline are observed.

(2) O&M

Water supply facilities in Urban West Region are operated and maintained by ZAWA staffs. Due to lack of facility capacity and information necessary for operation and

maintenance, appropriate operation and maintenance are not implemented. The main issues are as follows.

(a) Facility Operation

- Facilities are operated without managing water flow, due to malfunctioning flow meters.
- Water sources and reservoirs are operated individually, and operation of the overall water supply system is not managed.
- Record keeping for facility operation is insufficient.

(b) Maintenance

- Patrolling and daily/regular inspection of the facilities are not carried out.
- Procurement of parts for the repair of Pumps and electrical equipment may require a long period.
- Broken flow meters are not repaired.
- Record keeping for breakdowns and repair works is insufficient.
- Information management of facilities and equipment for maintenance works is not sufficient.

(3) Business Management

Since water revenue is not enough due to the inadequate customer registration management and water charges collection, the financial situation of ZAWA is in a difficult situation. The issues of business management are shown below.

(a) Water Revenue

- Customer data registered in the customer management system is fewer than the actual customer numbers.
- Flat-rate and metered-rate water tariff systems exist, although most of the customers adopt flat-rate due to the lack of installed water meters.
- Flat-rate tariff is lower than the metered-rate tariff.
- Bills are not delivered to flat-rate customers.
- From the above, the tariff income is low, and cannot support the business operation.

(b) Financial Status

- Business is operating in the red due to the low water revenue, and cannot be operated without support from RGoZ.
- Deviation between the budget and the actual situation is large, and budget execution management is not performed.

3 Water Supply Facility Plan and O&M Plan

The water supply facility plans in Urban West Region are detailed in **Chapter 4, Main Report**. The O&M and water charges collecting structures after the facility development are detailed in **Chapter 5, Main Report**.

(1) Water Demand and Water Source Plan

(a) Water Demand

Setting 2032 as the Project target year, water demand was estimated based on the Design Manual of mainland Tanzania. The preconditions were; population growth based on past trend, improvement of water service connection ratio following facility developments, and reduction of leakage following overall renewals of distribution pipelines and service connections. As a result, the estimation for maximum daily supply amount of Urban West Region in 2032 was 182,100m^3/day, and 164L/person/day.

(b) Water Source Plan

The estimated water demand exceeds the water source capacity of ZAWA, therefore development of new water sources shall be necessary to meet the demands. However, according to the Water Resource Assessment reports studied on a project of African Development Bank, the water sources in Urban West Region cannot meet the required water source amount, therefore new water source developments shall be implemented in other regions.

(2) Policies for Water Supply Facility Plan

The water source facilities were planned following the policies below, to improve the current issues.

- Construct a distribution system using difference in elevation and gravity flow.
- Effective use of facilities developed by Japanese Grant Aid Projects.
- Change direct borehole distribution to distribution systems via reservoirs.
- Form distribution areas according to geographic conditions and location/ capacity of reservoirs, and introduce distribution management areas and leakage management areas.
- Construct a system to supply safe and disinfected water.
- Introduce monitoring equipment for intake/distribution management.

(3) Outline of Water Supply Facility Plan

(a) Water Source

To meet the water demands of Urban West Region, the construction of 118 new

borehole sources (50m3/h capacity) were planned in Central South Region.

To chance direct borehole distributions to distribution systems via reservoirs, pump replacement and pipelines from boreholes to reservoirs are planned.

(4) O&M Plan

(a) O&M Structure

Required O&M items, such as facility operation based on measured intake/distribution flow data, raw/distributed water quality management, distribution flow management, daily/regular inspections and record keeping of data necessary for O&M are promoted, and accordingly the personnel structure is planned. To complete the above, it is necessary to increase the O&M staff of Urban West Region from the current 141 to 247 gradually.

(b) Water Charges Collecting Works

As the number of installed water meters shall increase largely after the planned facilities are developed, an increase of personnel for meter reading and bill distribution is planned. In addition, to improve the convenience of payment, an increase of payment offices is planned. To complete the above, it is necessary to increase the number of staff of Urban West Region related to water charges collection from the current 50 to 175 gradually.

4 Project Plan

The Project Plan is detailed in **Chapter 6 to Chapter 8, Main Report**. The outlines are as follows.

(1) Preconditions of the Project Plan

(a) Water Source Development

Non-disclosure Information

(b) Policy for Selecting Target Areas

A cost–benefit analysis (CBA) was performed under the condition of without new water source development for each of the planned distribution zones, and the development priority was determined by the results.

(2) Project Plan

(a) Target Areas

Non-disclosure Information

(b) Project Package and Component

Non-disclosure Information

(c) Consulting Service

Non-disclosure Information

(d) Project Cost

Non-disclosure Information

(e) Project Schedule

Non-disclosure Information

(f) Operation and Effect Indicators

As the Project targets installing water meters to promote metered-rate tariff for ZAWA's financial improvement, the following items are proposed as indicators of service improvement for supplying disinfected and safe water, and leakage prevention: Revenue water ratio, water meter installation ratio and continuation ratio of disinfection works. The supplied population was also proposed as a reference indicator to monitor the supply coverage ratio of the Target Area.

- Project indicators: Revenue water ratio, water meter installation ratio and continuation ratio of disinfection
- Reference indicators: Supplied population of the Target Area, and the supplied population of the Target Area and ZUWSP area.

5 Environmental and Social Consideration

Environmental and social considerations of the Yen loan Project are evaluated in **Chapter 9, Main Report**.

General impacts, such as noise, vibration and dust caused by construction may occur, but there shall be no environmental contamination or harmful effects on the ecological system. In addition, land acquisition and involuntary resettlement shall not occur. Therefore, it was evaluated to have no particular issues for environmental and social considerations.

6 Economic and Financial Analysis

The economic and financial analysis is detailed in **Chapter 10, Main Report**. The outlines are as follows.

(1) Analysis Results

Non-disclosure Information

(2) Financial Improvement of ZAWA

The financial analysis in the above was performed on the precondition that ZAWA shall bear the total Project cost, including the loan payment, although it shall actually be RGoZ and the Government of Tanzania who pays back the loan. Additionally, if the water tariff is raised to 4% of the average disposable income, the cumulative cash flow of ZAWA's Project evaluation period shall be positive.

Chapter 1 Background and Objective of the Survey

1.1 Background of the Survey

The United Republic of Tanzania (hereinafter referred to as "Tanzania") is an East African country located along the coast of the Indian Ocean. The current Tanzania was established when Tanganyika and Zanzibar, both of which gained independence from the British in the 1960's, merged to form the United Republic of Tanzania in April 1964. Since its establishment, the Revolutionary Government of Zanzibar (hereinafter referred to as "RGoZ") has governed the archipelago with a strong autonomy granted by mainland Tanganyika.

Unguja and Pemba are the two main islands which form the Zanzibar archipelago. The beginning of a public water service entity in the larger Unguja dates back nearly 100 years. In the early 1920's, the autonomous branch of Technical and Public Works Development (hereinafter referred to as "TPWD") developed a spring water source and laid pipelines to supply water to the highly-populated Zanzibar Town (currently Stone Town and its surrounding area). Thereafter, the operation of a full-scale water service business, which had standards for water supply service/service connections and regulations for rate system, started in 1935.

When Tanzania gained independence in 1964, RGoZ took over operation of the public water service entity from TPWD, and from 1982, the water supply for domestic use became charge-free, meaning that the cost burden was shouldered by national tax. However, when served population increased and reached 200 thousand (40 thousand households) in 1990, RGoZ encountered difficulties in expanding facilities and developing new water sources due to the lack of finance. Since then, the quality of water service has declined and is characterized by long durations of water supply failures and low water pressure, mainly caused by frequent leakage due to aging pipes and poorly planned construction/repair/renewal works of the facilities.

Following the regulation of the Water Act in 2006, RGoZ transferred the operation of the public water service entity from the Department of Water Development (hereinafter referred to as "DWD") under the Ministry of Water, Construction, Energy and Lands (Name of Ministry at that time, current name is Ministry of Lands, Water, Energy and Environment, hereinafter referred to as "MLWEE") to Zanzibar Water Authority (hereinafter referred to as "ZAWA"). In the following year's "Water Regulation, 2007", it was declared that water supply would again be subject to charges. However, willingness to pay for water charges still remains low due to the poor water supply service provided by ZAWA, which in turn is due to the frequent leakages and facility malfunctions arising from the lack of facility renewal owing to its weak financial situation.

There is a "negative chain" between the unpaid water charges and degradation of water service quality. Unreliable water supply service eventually leads to a low water charge collection, which

in turn causes insufficient profit required for sustainable water supply management and operations, and ultimately, the renewal/expansion of facilities is delayed or becomes almost impossible. This recurring situation disrupts the daily life of the people of Zanzibar, where water leaks are prevalent, making the improvement of distribution facilities an urgent issue.

1.2 Outline of the Survey

1.2.1 Objective of the Survey

This Survey is to be implemented to gather the information required for the appraisal of a Yen-Loan Project requested by the Government of Tanzania, by studying the Project's objective, outline, cost, implementation structure, O&M organization and environmental and social considerations.

1.2.2 Scope of the Target Project

The Target Project aims to provide safe and stable water supply service in the urban water supply area of Urban West Region of Unguja Island, by the development/renewal of aging water distribution facilities. The target components are expected to include the following;

- Development of necessary water sources
- Construction of reservoir/elevated tank
- Installation of disinfection equipment
- Installation/renewal of water transmission/distribution pipes
- Installation of monitoring system
- Other supplemental items

1.2.3 Target Area

The target area is the urban areas of Urban West Region of Unguja Island.

1.2.4 Related Authorities

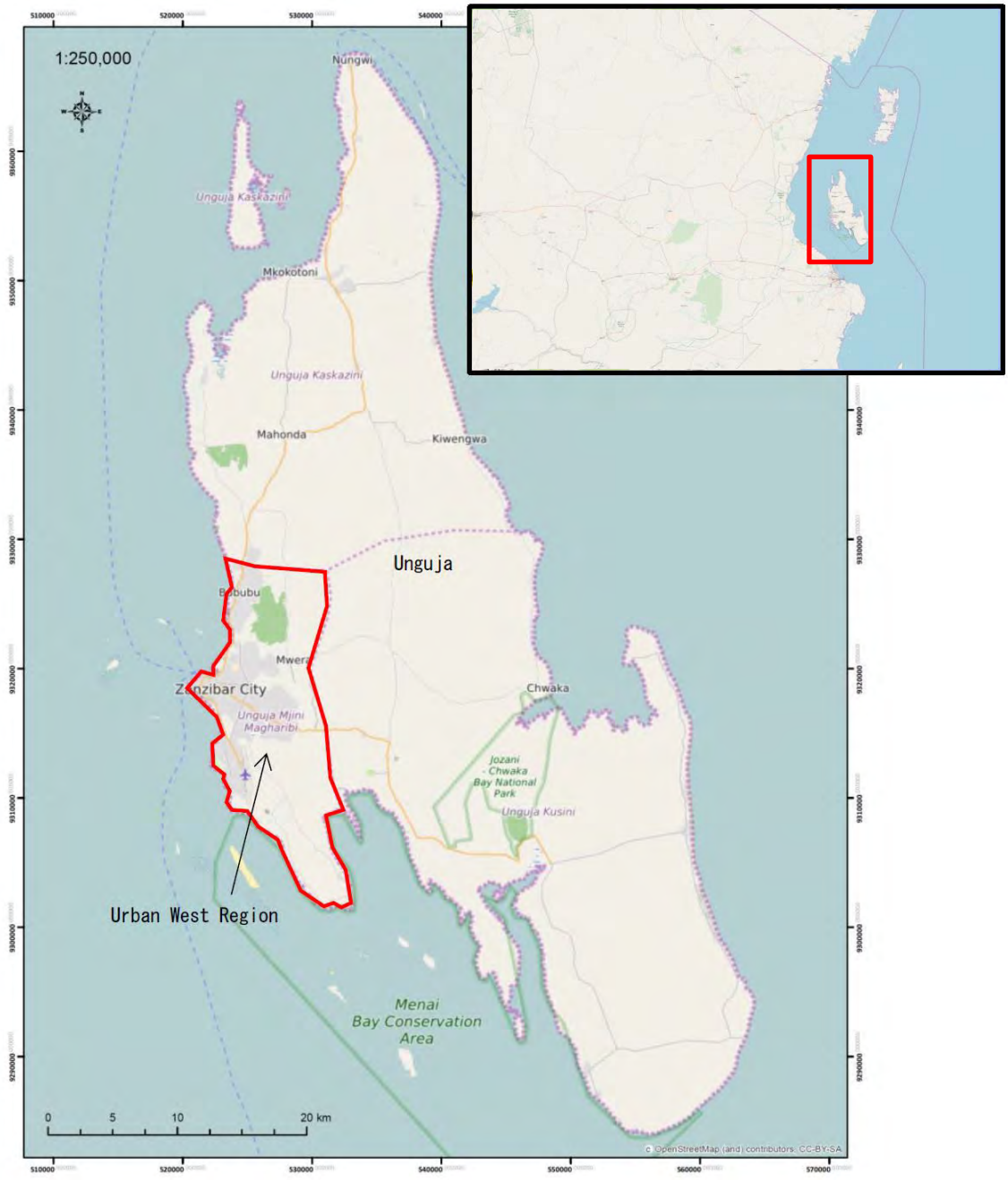
The authorities related to this Survey are the following:

Supervising Authority:	Ministry of Lands, Water, Energy and Environment (MLWEE)
Implementation Body:	Zanzibar Water Authority (ZAWA)
Related Organizations:	The Government of the United Republic of Tanzania Ministry of Finance and Planning of Tanzania Ministry of Finance and Planning of Zanzibar

1.2.5 Related Projects

The following are projects related to this Survey.

JICA Grant Aid Project: (Project Period)	The Project for Zanzibar Urban Water Supply Development in the United Republic of Tanzania (2006-2008) The Project for Zanzibar Urban Water Supply Development in the United Republic of Tanzania Phase 2 (2009-2010)
JICA Technical Cooperation Project: (Project Period)	The Technical Cooperation Project for Enhancement of Water Supply Management of Zanzibar Water Authority (Phase 1&2) (Phase 1: 2008-2010, Phase 2: 2011-2016)
Other Donor Project: (Donor, Project Period, Project Amount)	Zanzibar Urban Water and Sanitation Project (African Development Bank (hereinafter referred as "AfDB"), 2013-2017, 21 million USD) Zanzibar Well Drilling Project (Ras al Khimah, 2013-2015, 5.5 million USD) Improvement and Rehabilitation of Water Supply System in Zanzibar (Indian Government, 2017-, Maximum loan amount 92 million USD)



Source: JICA Survey Team

Figure 1-1 Target Area

1.3 Aid Trends for Zanzibar

1.3.1 Japanese Aid

(1) Japanese Aided Projects

Japanese aided projects are listed in **Table 1-1**. Mainly water supply facilities in the upstream of the reservoirs, which supply water to the urban area in Urban West Region, are developed under the “Project for Zanzibar Urban Water Supply Development” implemented as a Japanese

grant aid project. In recent years, JICA technical cooperation projects (hereinafter referred to as "Technical Cooperation") aimed at putting the management of ZAWA on a smooth path have been carried out, focusing on establishing a water tariff collection system and improving water service.

Table 1-1 Japanese Aid Projects for Water Section in Zanzibar

Project	Period	Target
The Project for Zanzibar Rural Water Supply Development (Phase I-IX) (Grant aid for grassroots project)	2003	Improvement of rural water supply and sanitation, in collaboration with UNDP.
The Project for Zanzibar Urban Water Supply Development in the United Republic of Tanzania (Grant aid project)	2006-08	Enhancement of water supply ability of ZAWA, by means of water source development and reservoir/supply main construction.
The Project for Zanzibar Urban Water Supply Development in the United Republic of Tanzania (Phase 2) (Grant aid project)	2009-10	Ditto
The Project for Enhancement of Water Supply Management of Zanzibar Water Authority (Technical Cooperation)	2008-10	Development of the ZAWA business fundamentals, by means of tariff collection system establishment.
The Project for Enhancement of Water Supply Management of Zanzibar Water Authority Phase 2 (Technical Cooperation)	2011-16	Improvement of ZAWA's business management, by means of water service improvement.

Source: JICA Survey team

(2) Outline of Related Projects

(a) The Project for Zanzibar Urban Water Supply Development in the United Republic of Tanzania (Grant aid project)

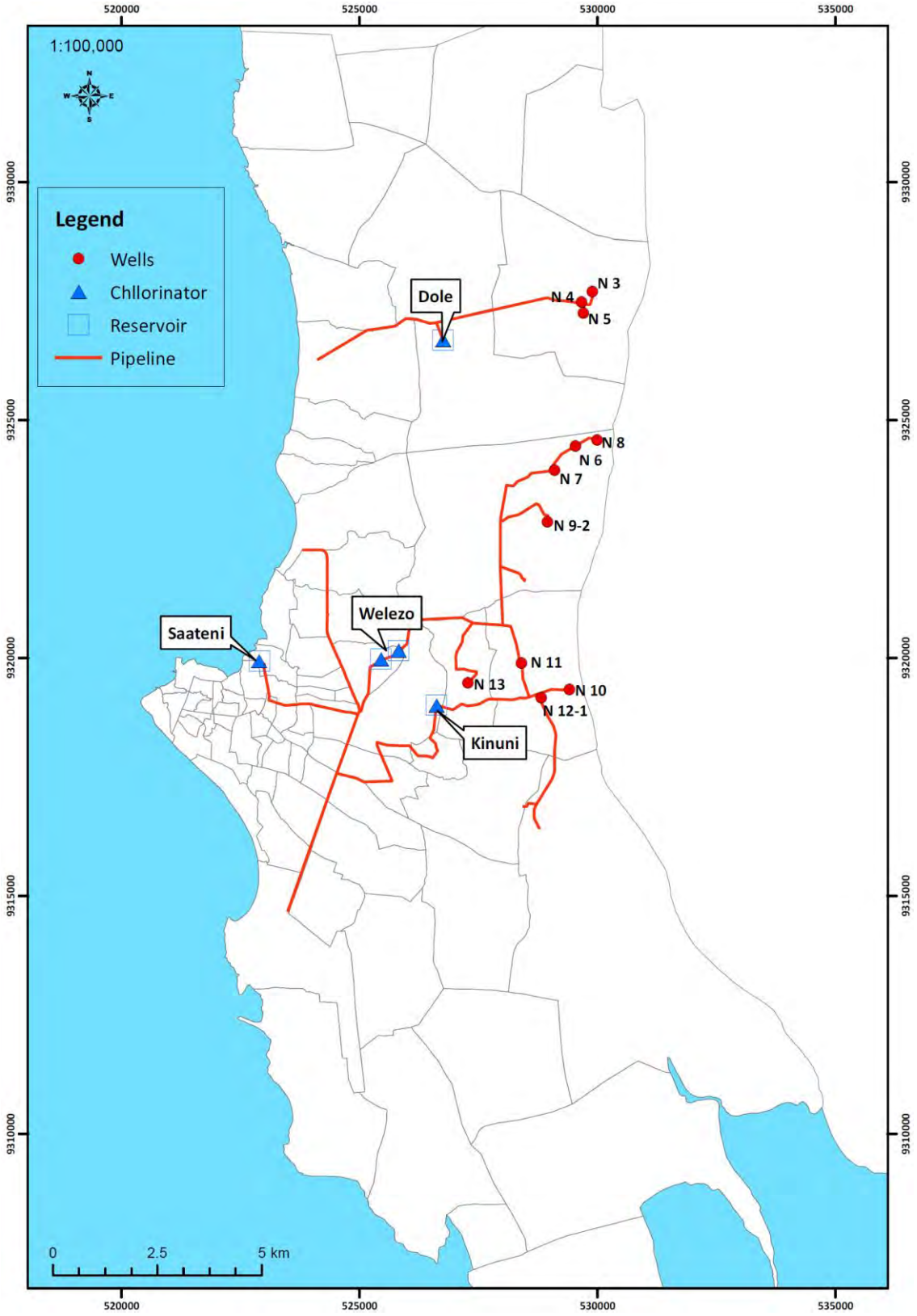
The objective of this project was to eliminate water shortage in the urban areas of Zanzibar through water source development, renewal of aging facilities and supply facility development including supply main construction. At the same time, organization enhancement for appropriate facility operations, water revenue collection and improved public relations with consumers was implemented to establish steady operation and sound management of the water supply system.

Through Phase 1 (2006-08) and Phase 2 (2009-2010) of this project, the facilities shown in **Table 1-2** and **Figure 1-2** were developed.

Table 1-2 Facilities Developed by the Project for Zanzibar Urban Water Supply Development

Facility Classification		Item	Specification	Phase 1	Phase 2	Notes
Deep Well Water Source	Well Pump station	Well	Well diameter:φ250 Well depth: 60-70m	6	5	New
		Well pump	Submersible pumps 60m^3/h×80-110m	6 units	5 units	New
		Electrical facility	Power receiving/ transformer units, distribution/ control panels, measurement instruments	6 sets	5 sets	New
		Well pump station	For electric panel	6 units	5 units	New
Water Distribution Facilities	Saateni	Supply pump	Double suction volute pump 400m^3/h×40m 200m^3/h×40m	2 units 2 units	— —	Renewal Incl. 1 stand-by Incl. 1 stand-by
		Electrical facility	Measuring board, distribution panel, supply pump panel, measurement instrument, etc.	1 set	—	Renewal
		Chlorination equipment	Powder chlorine dissolving tank, injector	1 set	—	Renewal
	Welezo	Reservoir	Square-shape RC, 4,000m^3	2	—	New
		Chlorination equipment	Breaching powder dissolving tank, injector	1 set	—	New
	Kinuni	Reservoir	Square-shape RC,2,700m^3	—	1	New
		Chlorination equipment	Breaching powder dissolving tank, injector	—	1 set	New
	Dole	Reservoir	Square-shape RC,1,200m^3	—	1	New
		Chlorination equipment	Breaching powder dissolving tank, injector	—	1 set	New
Transmission Pipes			DCIPφ150-φ600	13km	11km	New
Distribution Pipe			DCIPφ300-φ700	9.6km	10.3km	New

Source: Implementation Review Study Report on the Project for Zanzibar Urban Water Supply Development in the United Republic of Tanzania



Source: JICA Survey Team

Figure 1-2 Location of Facilities Developed by the Project for Zanzibar Urban Water Supply Development

(b) The Project for Enhancement of Water Supply Management of Zanzibar Water Authority

(i) Technical Cooperation Project (Phase 1)

This Project's duration was for 3 years from January 2008 to December 2010. The objective of this project was to improve ZAWA's business by increasing water revenue, through the establishment of a tariff collection system, enhancing the water supply business management and raising public awareness of water charge payment.

At the Terminal Evaluation (August 2010), it was indicated that additional activities shall be necessary to improve water service, which was evaluated to be the bottleneck of the activities.

Table 1-3 Terminal Evaluation Summary of Technical Cooperation (Phase 1)

Item		Evaluation Report
Overall Goal	ZAWA's financial fundamentals necessary for an autonomous water supply authority are developed	New PDM[1)] and activity input are necessary for water supply service improvement.
Project Purpose	Water tariff billing and collection system of ZAWA is established to the satisfaction of its customers	Expected to be achieved.
Output 1	Business mindset of a parastatal organization ingrained in the staff of ZAWA	Achieved: ZAWA's financial situation and future policies were shared among the staff through seminars and meetings, and the mindset of a public enterprise was recognized.
Output 2	A customer administration system is established	Achieved: Trainings for customer management system operation was held 2 times and 15 staff participated. Although there is some difference among the staff's understanding level, it is sufficient to use the system.
Output 3	Water tariff system is understood by customers	Partly achieved: Over 90% of the customers understood the necessity of tariff payment. The preparation of public tap management manual (tariff collecting system) did not progress due to the failure of organization creation.
Output 4	ZAWA's staff becomes conversant with practical work pertaining to billing, tariff collection and claim handling	Expected to be achieved: Over 77% of the meter reading staff understood the work. 95% of the complaints were registered in the database.
Output 5	A model of tariff collection is established	Difficult to be achieved: The pilot project had aimed to install water meters to establish a meter-rated tariff collection model, but the meter installation was delayed due to large-scale power failures and procurement issues. Billing started in November 2010.

1): PDM (Project Design Matrix)

Source: Prepared by JICA Survey Team based on Final Report, Technical Cooperation Project for Enhancement of Water Supply Management of Zanzibar Water Authority

(ii) Technical Cooperation Project (Phase 2)

The objective of this technical cooperation project (phase 2), which started in November 2011, was to improve the financial situation of ZAWA. In order to improve water supply revenue, which is directly connected to the financial status, it was considered that the improvement of ZAWA's water supply service level was essential. Therefore, after revising

the PDM twice, the project purpose was changed from the original "Improvement of the financial situation of ZAWA in the Project area" to "Improvement of ZAWA's management capacity through NRW (Non Revenue Water) reduction activities", by providing technical support through On-the-Job-Training (OJT).

- Project period: November 2011 – October 2016
- Target area: Unguja Island, Zanzibar
- Target group: ZAWA staff in Unguja Island
- Overall goal: ZAWA's water supply services are improved
- Project purpose: ZAWA's management capacity through NRW reduction activities is improved
- Outputs:
  (1) ZAWA's capacity of information management is enhanced
  (2) ZAWA's capacity of human resources management is enhanced
  (3) ZAWA's capacity of customer management is enhanced
  (4) ZAWA's capacity to plan and implement leakage reduction activities is enhanced

The activities focused on the improvement of the water supply business management abilities of ZAWA, especially on information management and human resources management. In addition, the project aimed to raise the water tariff collection rate to increase income and to reduce NRW for cost reduction and water source preservation, as the first step of financial improvement.

The activities and achievements were as below.

- **Project Purpose: ZAWA's management capacity through NRW reduction activities is improved**

  A NRW reduction project supported by African Development Bank (hereinafter referred to as "AfDB) was commenced. ZAWA secured budget (debt from infrastructure fund) for pipeline renewal in order to reduce NRW in the Pilot Area (Makadara Area). There was improvement in management capacity through exposure to project planning, funding (donor support and private funds) and pipe replacement works.

- **Output 1: ZAWA's capacity of information management is enhanced**

  The Management Information System (hereinafter referred to as "MIS") activities, which were introduced to gather basic management information, has been established and progress was made in its usage. Progress was also made in the preparation of the Annual Business Plan (hereinafter referred to as "ABP"). However, the budget required for the ABP had not been secured.

- **Output 2: ZAWA's capacity of human resources management is enhanced**

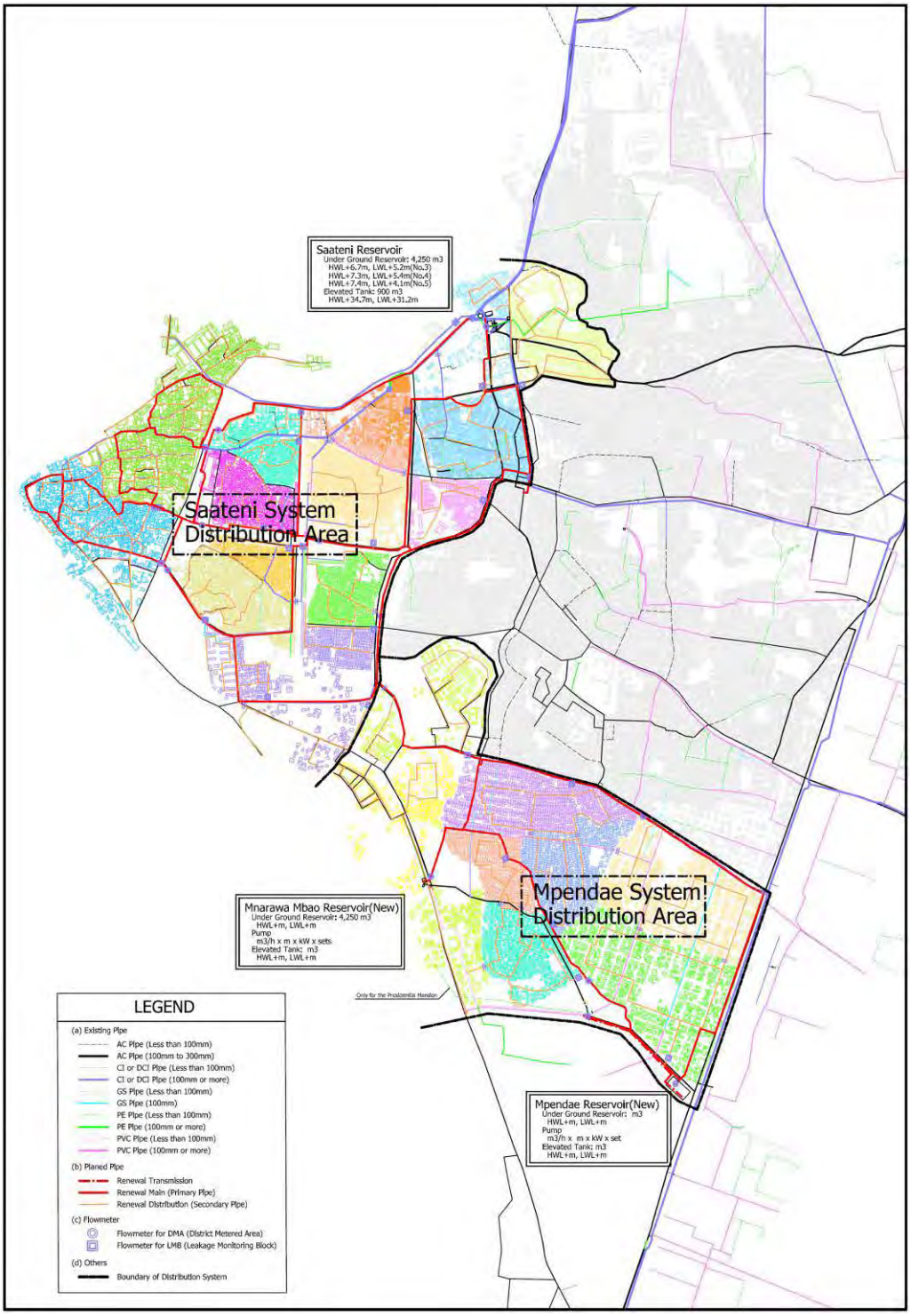
  Supporting activities for preparation of plans for recruiting staff for ZAWA HQ and district offices, preparation of plans for staff relocation and management improvement, re-planning and implementing of annual training programs, developing the scheme of service, and defining job descriptions were carried out, and as a result, the human resource management ability of ZAWA had improved. An organizational restructure for improving business efficiency was also implemented.

- **Output 3: ZAWA's capacity of customer management is enhanced**

  In preparation for an increase in the introduction of water meters in the future, technology transfer such as meter reading, invoice issuance and delivery work, etc., was completed. In addition, concerning customer management as the basis of meter reading and billing work, "Service Connection Survey" (hereinafter referred as "SC Survey"), to identify customers was advanced. However, at the present time there is a problem in customer management such as the result of the survey is not sufficiently reflected in the customer management system.

- **Output 4: ZAWA's capacity to plan and implement leakage reduction activities is enhanced**

  Technique transfer for basic skills required for pipeline construction and O&M had been completed through OJT for surface leakage detection and leakage repair, and OJT for distribution pipe and service connection replacement in the pilot area. The construction and supervising abilities of ZAWA had improved. In addition, support for distribution zoning plan was provided for Saateni and Mpendae system distribution areas (**Figure 1-3**). This planning method is also used in the Detail Design of Zanzibar Urban Water and Sanitation Project (hereinafter referred to as "ZUWSP").



Source: The Technical Cooperation Project for Enhancement of Water Supply Management of Zanzibar Water Authority (Phase 2)

Figure 1-3 Distribution Zoning Plan

Table 1-4 Achievement Status of Technical Cooperation Project (Phase 2)

Output and Activity		Output Value	Status
Overall Goal: ZAWA's water supply services are improved		—	—
Project Purpose: ZAWA's management capacity through NRW reduction activities is improved		・ZAWA's NRW reduction project, in collaboration with JICA Technical Cooperation, is commenced ・ZAWA's ABP with annual planned budgets is allocated with due consideration of overriding priority for ZAWA's utility operation	Achieved Mostly achieved
Output 1: ZAWA's capacity of information management is enhanced			
1-1	Define KPIs[1)] and monitoring indicators of activity in PDM, and collect and analyze them monthly	・MIS report is compiled on monthly basis and utilized by the management of ZAWA	Partly achieved
1-2	Establish MIS for comparison of KPIs[1)] in ZAWA and other utilities	・ZAWA's ABP is prepared and utilized for budget management for leakage reduction activities under JICA Technical Cooperation	Partly achieved
1-3	Strengthen the budgetary control through planning of water leakage reduction activities which will be incorporated into the ABP		
Output 2: ZAWA's capacity of human resources management is improved			
2-1	Develop a revised organization structure with transitional plan	・Revised organization structure is approved by ZAWA board	Partly achieved
2-2	Propose plan for improving recruitment, allocation and management of staff in ZAWA HQs and District Offices	・Amendment of staff rules and regulations is approved by ZAWA board	Achieved
2-3	Review the training policy, prepare and implement yearly staff training program.		
2-4	Review and propose amendment of staff rules and regulations		
Output 3: ZAWA's capacity of customer management is improved			
3-1	Register all households in UWS and customers in the Model System into SBM[2)]-GIS[3)] and update them	・All customers in Model System are newly registered into SBM[2)]-GIS[3)]	In progress
3-2	Improve the existing bill collection guideline	・Meter reading number per party in Model System[4)] is improved to 400 HHs/month	Achieved
3-3	Improve billing activities (from meter-reading to invoicing) within the Model System[4)]		
3-4	Enhance public relations to increase the sales of water	・The billing ratios in the Pilot Area are improved as follows. Ratio of billed customers: 95% Ratio of billed amount:98 %	Achieved
3-5	Prepare the tariff revision roadmap that reflects cost-benefit analysis of NRW reduction activities in the Model System[4)] (Saateni distribution system)		
Output 4: ZAWA's capacity to plan and implement leakage reduction activities is enhanced			
4-1	Conduct surface leakage survey in UWS and pipeline repair in Pilot Area	・Preliminary plan on leakage reduction is incorporated to ABP	Achieved
4-2	Prepare the standard drawings of piping works as a part of ZAWA's Technical Standards	・ZAWA reflects operating procedure in Pilot Area to the design report for ZAWA's Project under the other donor loan.	Achieved
4-3	Formulate an operating procedure composing of surface leakage reduction and zoning works (DMA[5)] and LMB[6)]) in the Pilot Area, and replace pipelines and install water meters	・ZAWA staff members become qualified in conducting: (1) leakage detection: 2 persons, (2) pipe placement/ replacement/ repair: 10 persons, (3) service connection: 4 persons, (4) construction quality control: 2 persons.	In progress
4-4	Design the draft project monitoring plan for the Model System[4)] and monitor leakage reduction works		
4-5	Encode information of distribution facilities, survey results and construction records in GIS[3)]		
4-6	Coordinate NRW/ leakage reduction projects assisted by other donors		

1) Key Performance Indicator, 2) Smart Billing Manager, 3) Geographic Information System, 4) Saateni Distribution Zone, 5) District Metered Area, 6) Leakage Monitoring Block

Source: Prepared by JICA Survey Team based on Final Report, Technical Cooperation Project for Enhancement of Water Supply Management of Zanzibar Water Authority (Phase 2)

1.3.2 Other Donor Aids

(1) Other Donors' Aided Projects

Many donors and agencies have donated capital / technical support for the Zanzibar water sector, such as the Finnish International Development Agency's (hereinafter referred to as "FINNIDA") "Zanzibar Urban Water Supply Project"; AfDB's "Zanzibar Urban Water Supply Project" and "Rural Water Supply Project"; the German Technical Cooperation Agency's (hereinafter referred to as "GTZ") "Zanzibar Urban Sewerage, Rain Water And Waste Management Project"; as well as other organizations such as the United Nations Children's Fund (hereinafter referred to as "UNICEF"); United States Agency for International Development (hereinafter referred to as "USAID") and countries such as the United Kingdom, Denmark and China. In recent years, water supply development projects supported by the United Nations Development Programme (hereinafter referred to as "UNDP") and UNICEF are conducted in Kikwajuni, Dole and Mwanakwerekwe areas of the Urban West Region. The data of recent donor aids are shown in **Table 1-5**.

For projects related to urban distribution facility improvement, the AfDB supported "Zanzibar Urban Water Supply and Sanitation Project" targets the urban area of Urban West region. The Feasibility Study (F/S) of the project was implemented in 2012, and the loan contract was concluded in 2013. The Detailed Design (D/D) has been implemented targeting the Saateni reservoir area including Stone Town with a loan commitment of 2.1 billion JPY, and the project is currently under progress.

In addition, a project supported by the Indian Government called "Improvement and Rehabilitation of Water Supply System in Zanzibar", will be started to improve water supply services in areas not covered by the other projects in the Urban West Region.

Table 1-5 Recent Donor Aids for Water Sector in Zanzibar

Project Name	Complete	Funds	Outline
Kikwajuni Water Supply Improvement Project (Phase I)	Aug 2015	UNDP/TAYI[1)], RGoZ	Developing boreholes, water supply/distribution facility, elevated tank and electric facility
Kikwajuni Water Supply Improvement Project (Phase II)	Jan 2017	FACF[2)]/TAYI[1)],RGoZ	Developing boreholes, water supply/distribution facility, elevated tank and electric facility
Dole Water Supply Improvement Project	Mar 2016	FACF[2)],RGoZ	Developing boreholes, water supply/distribution facility, elevated tank and electric facility
Mwanakwerekwe-C Water Supply Development Project	Mar 2017	UNICEF	Developing boreholes, water supply/distribution facility, elevated tank and electric facility
Zanzibar Well Drilling Project	May 2016	Ruler of Ras al Khaimah	Construction of 150 boreholes in Zanzibar and procurement of submersible pumps
Zanzibar Urban Water and Sanitation Project (ZUWSP)	Dec 2017	AfDB-Loan	Developing well, water supply/distribution facility, reservoir and chlorination equipment
Improvement and Rehabilitation of Water Supply System in Zanzibar	2017 (Planned)	Government of India	Development/ renewal of water supply facilities in Urban West Region

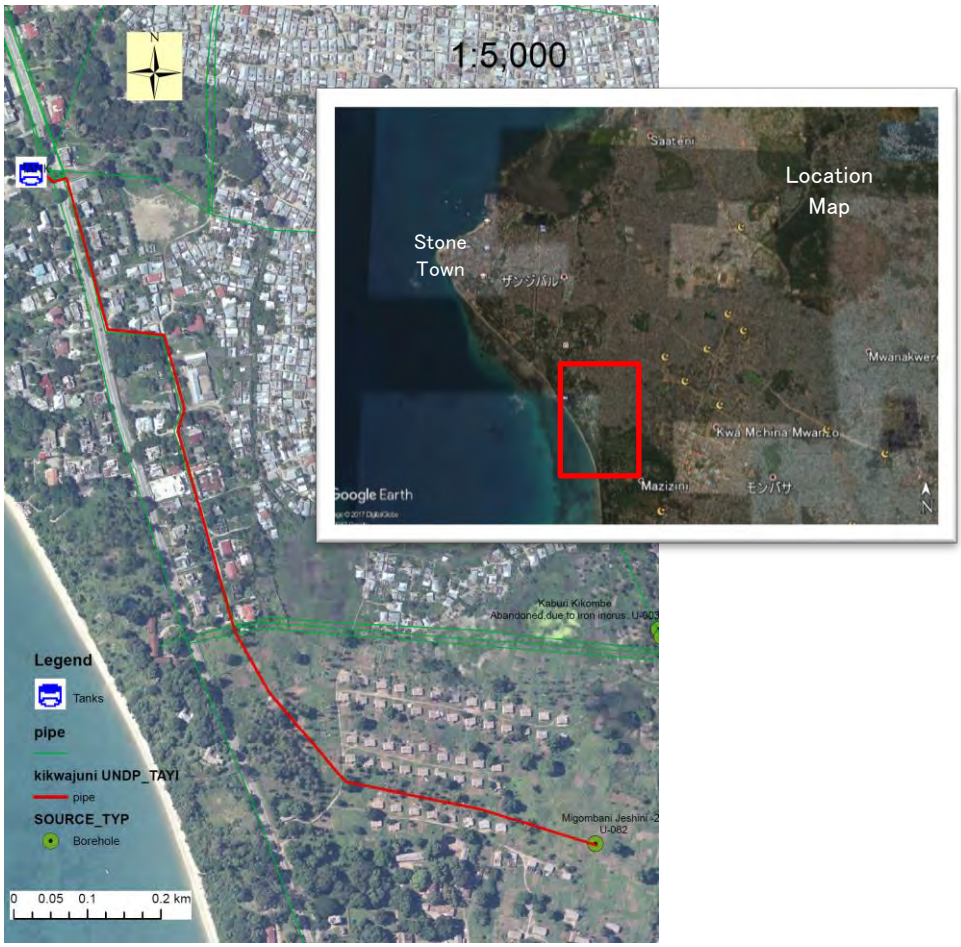
1) TAYI (Tanzania Youth Icon), 2) FACF (Tanzania/Japan Food Aid Counterpart Fund)
Source: Planning and Project Management, Water Development Department, ZAWA

(2) Summary of Related Projects

(a) Kikwajuni Water Supply Improvement Project (Phase I)

This project was implemented with financial support from UNDP and Tanzania Youth Icon (TAYI), and also contributions from ZAWA and the community.

The project activities shown in **Figure 1-4** include development of boreholes, installation of pump facility, development of pipe network, and installation of a 40m^3 FRP tank.



Source: Planning and Project Management, Water Development Department, ZAWA

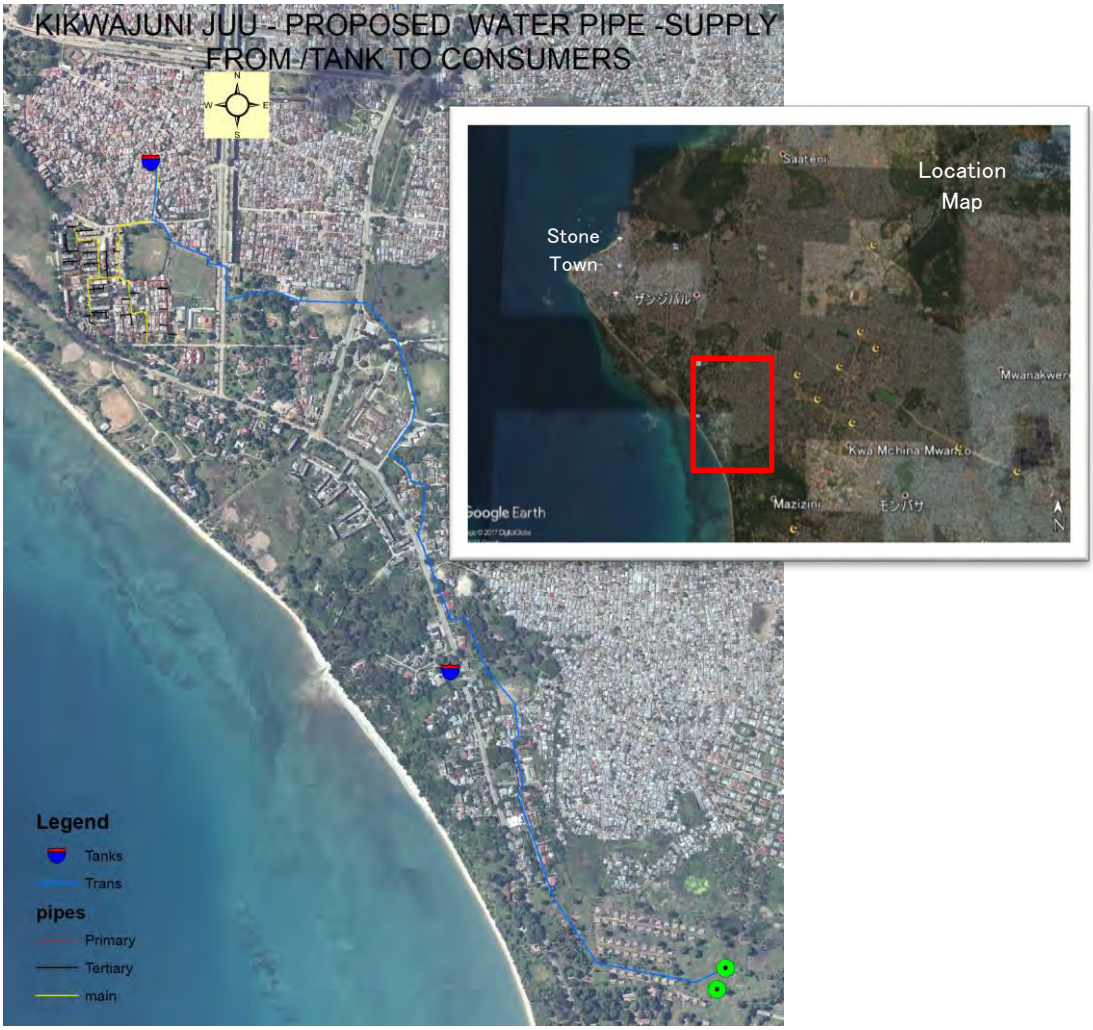
Figure 1-4 Outline of Kikwajuni Water Supply Improvement Project (Phase I)

(b) Kikwajuni Water Supply Improvement Project (Phase II)

This sub-project, which aims to improve the water supply services to the people of Kikwajuni Bondeni area in Kikwajuni district, was implemented with financial support from the Tanzania/Japan Food Aid Counterpart Fund (FACF) and TAYI, and also contributions from ZAWA and the community.

The project activities shown in **Figure 1-5** include development of the boreholes, installation of pump facility, development of pipe network, and installation of a 120m^3 FRP tank.

Development of the boreholes is completed, however the other activities are awaiting disbursement of funds as of June 2017.



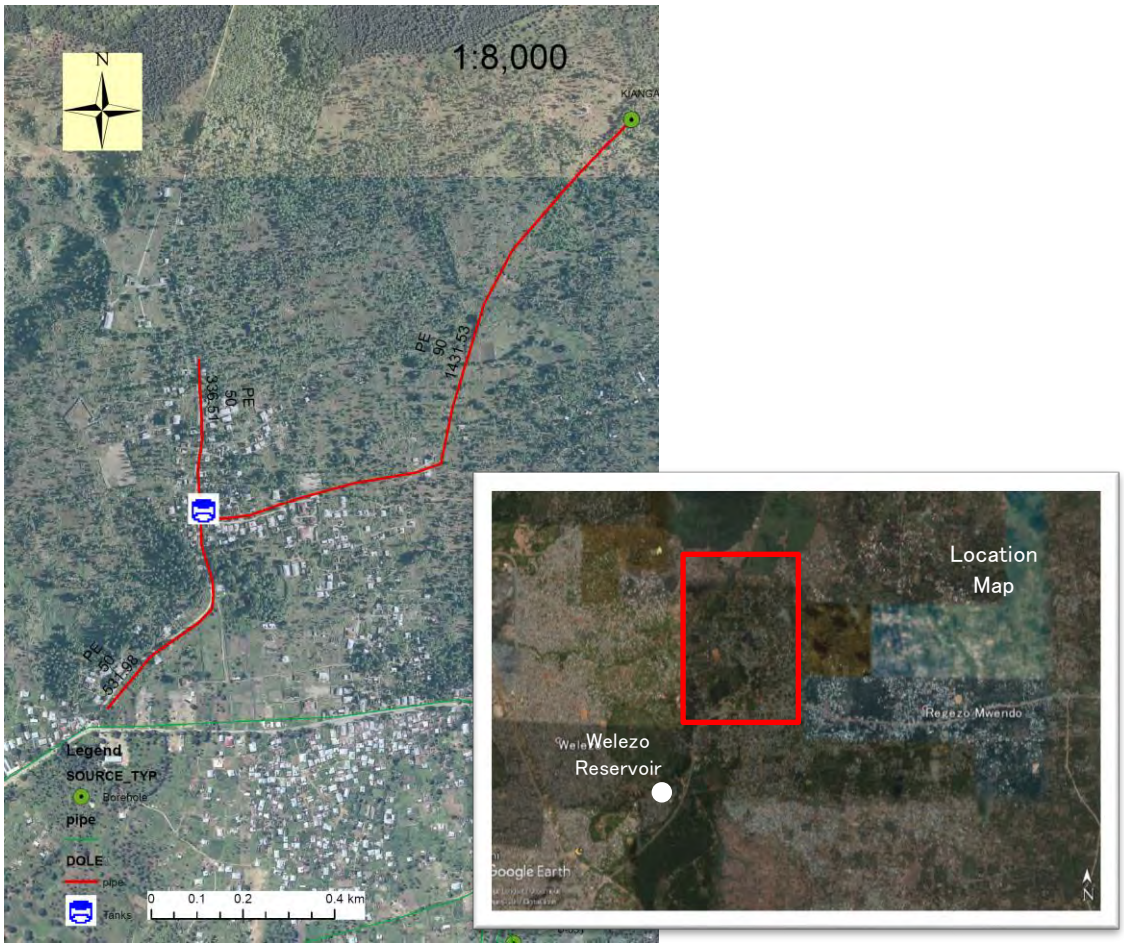
Source: Planning and Project Management, Water Development Department, ZAWA

Figure 1-5 Outline of Kikwajuni Water Supply Improvement Project (Phase II)

(c) Dole Water Supply Improvement Project

This sub-project aims to improve the water supply services to the people of Mazizini area in Dole district. The project was implemented with financial support from FACF and contributions from ZAWA and the community.

Project activities shown in **Figure 1-6** include development of boreholes, the installation of pump facility, development of pipe network, and installation of a 10m^3 FRP tank.



Source: Planning and Project Management, Water Development Department, ZAWA

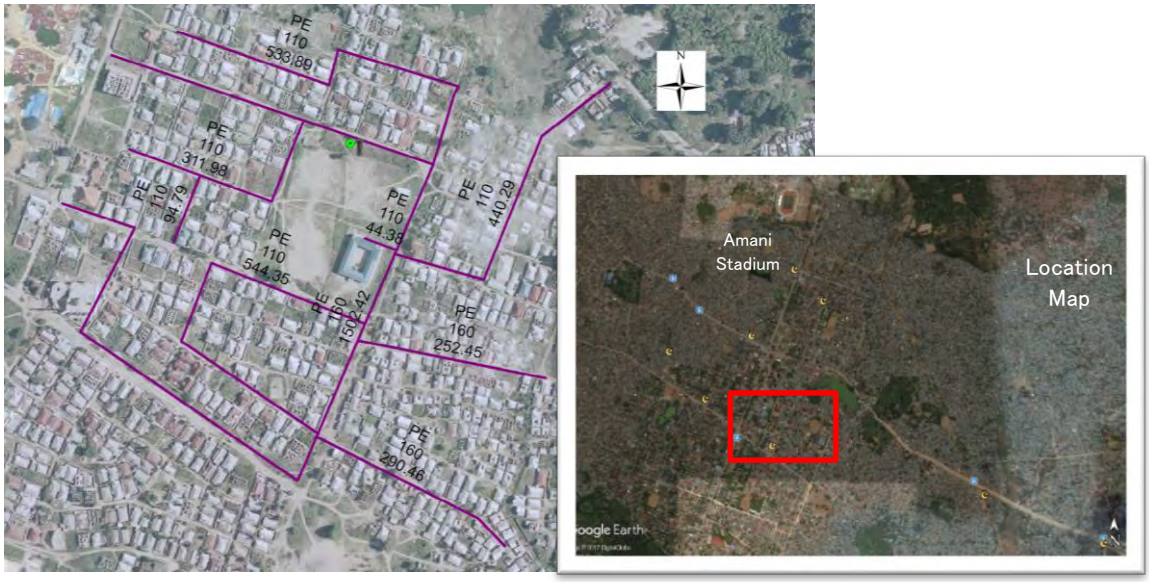
Figure 1-6 Outline of Dole Water Supply Improvement Project

(d) Mwanakwerekwe-C Water Supply Development Project

This sub-project which aims to improve the water supply services to the people of Mwanakwerekwe area was implemented with financial support from UNICEF and contributions from ZAWA and the community.

Project activities shown in **Figure 1-7** include development of boreholes, installation of pump facility, development of pipe network, and installation of a 10m^3 FRP tank.

The plan is not fully implemented due to the limited budget as of June 2017.



Source: Planning and Project Management, Water Development Department, ZAWA

Figure 1-7 Outline of Mwanakwerekwe-C Water Supply Development Project

(e) Zanzibar Urban Water and Sanitation Project (ZUWSP)

ZAWA is currently implementing this Project, which is an AfDB loan project. This project includes the development of reservoir facilities in Urban District, Urban West Region.

Details of this project are mentioned in **Chapter 3.4.1**.

(f) Zanzibar Well Drilling Project

This project includes drilling of 150 wells in Unguja and Pemba Island and procurement of submersible pumps and electrical panels funded by Ras al Khaimah, one of the emirates of the United Arab Emirates. In Urban West Region which is the target area of this project, construction of 50 boreholes have been completed.

Details of this project are mentioned in **3.4.2**.

(3) Future Plans of Aided Projects

(a) Support from Indian Government

The Prime Minister of India, Narendra Modi, visited Tanzania in July 2016, and the Indian and Tanzanian governments agreed upon five bilateral agreements. One of the agreements involves financing for the water sector of Zanzibar, with a line of credit of 92 million USD.

Following this agreement, RGoZ is planning to develop water supply facilities using the Indian loan, and the target area are the areas in the Urban West Region that are not included in the ZUWSP and the Japanese Loan Project.

As of July 2017, the procurement of the consultant for undertaking the Feasibility Study had

commenced. The Feasibility Study is to be conducted after the procurement of the consultant is completed.

(b) Others

Provision of reagent and equipment for water quality tests, to ZAWA's laboratory in Saateni Reservoir, is planned by UNICEF.

Chapter 2 Natural and Social Conditions

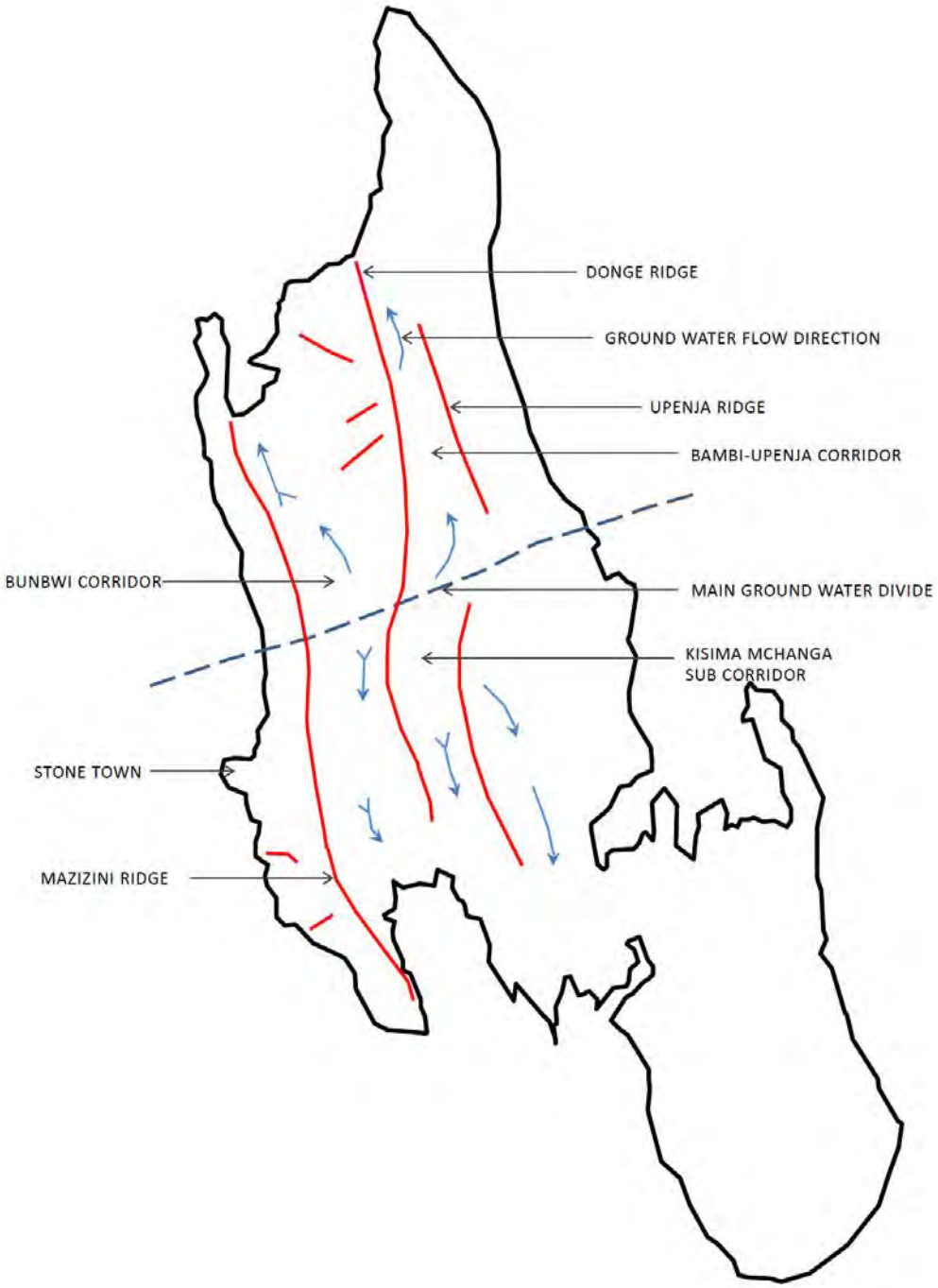
2.1 Natural Conditions

2.1.1 Topography and Geology

(1) Topography

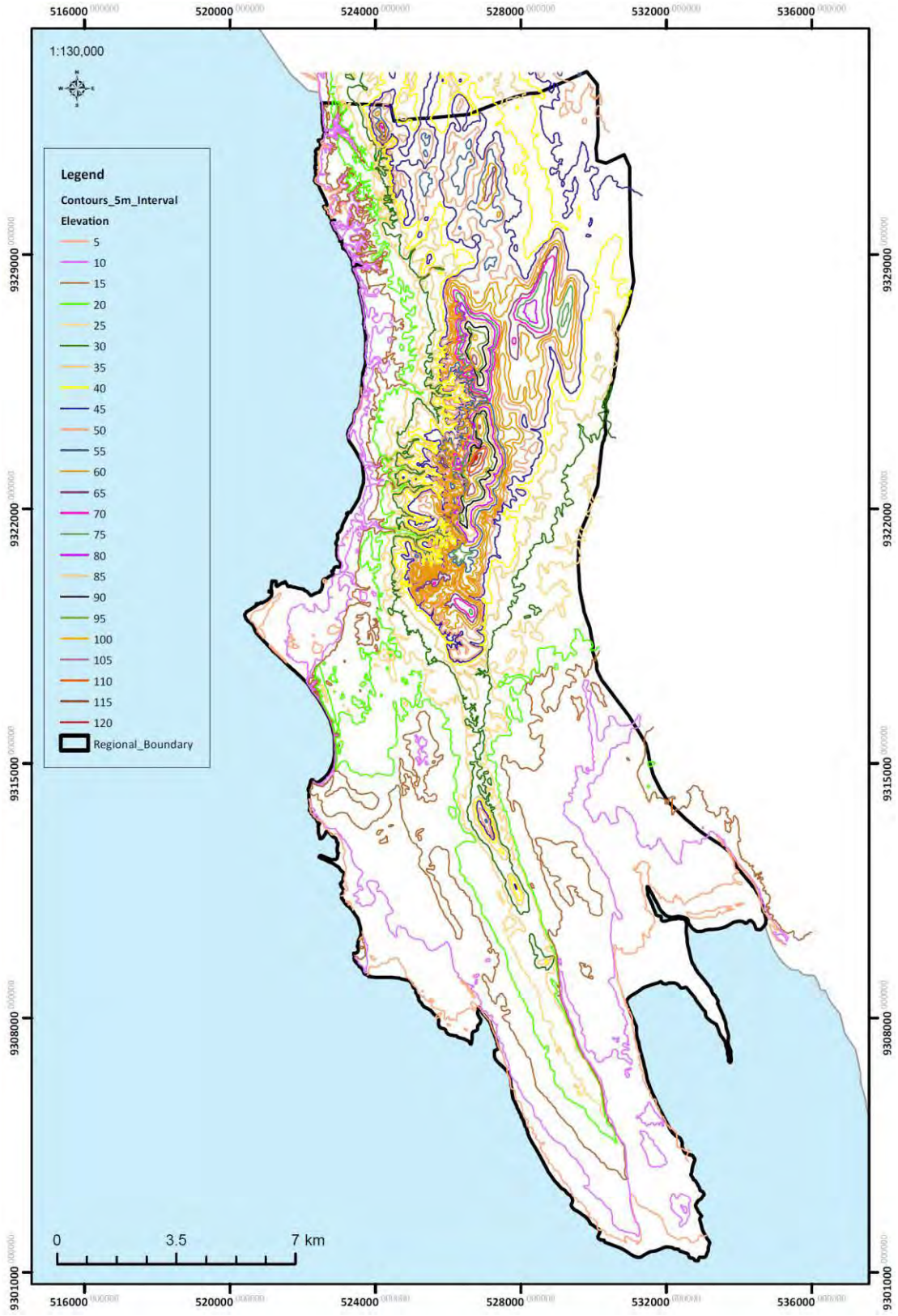
Unguja Island is located at a distance of 35 km from the Tanzanian mainland, with the Zanzibar Channel lying in between. The area of the island, which is surrounded by coral, is 1,658 km^2 and the width is about 80 km in the south-north direction and 30 km in the east-west direction. **Figure 2-1** shows the topology of Zanzibar. There are two lines of ridges from south to north in Unguja Island, namely the Mazizini ridge, located 3 km from the sea, and Donge ridge, located 8 km from the sea. Each ridge has a width of 4 km, and the highest location reaches an elevation of 120 m. Located in between the two ridges is a plain area with an elevation of around 40 m, called the Bumbwi terrain corridor. Since the central area is a catchment boundary, rain water flows both to the south and the north. However, due to the pervious nature of the soil with high limestone content, the water flow disappears through underground infiltration.

Figure 2-2 is a contour-line map of the Urban West Region. As shown in the map, the land slopes from the Mazizini ridge (highest point is 120 m above sea level) towards the sea. The houses are mostly concentrated in the relatively low sea level areas of Urban District, Urban West Region and the coastal areas, although there are houses also located on the ridges. As such, the water supply target area covers a wide range of elevations.



Source: Zanzibar Urban Water Supply Development Plan 1991-2015 (edited by JICA Survey Team)

Figure 2-1 Conceptual Map of Geology in Unguja Island



Source: Prepared by JICA Survey Team based on the data from Lands Department, MLWEE

Figure 2-2 Contour-line Map of the Urban West Region

(2) Geology

The Zanzibar Islands (Unguja and Pemba with islets) has been structured by the plate movements of crustal blocks with folds of anticline mountains and syncline valleys, which originated from the Great Rift Valley located in the eastern mainland.

Stratigraphy with its characteristics of geology in Unguja Island is shown in **Table 2-1**. Basement hydrogeology in the mainland Unguja Island is formed by consolidated sediments (M_3 and M_2) during the Miocene of Tertiary period. During the same period, consolidated reef limestone (M_1) covered the said basement. This consolidated reef limestone has a limited permeability and a thickness of which was confirmed at more than 50 m. In this regard, the amount of groundwater storage is expected to be large within this formation.

The main aquifers in Unguja are known as sand sediments (Q_3) formed at the river in the mainland and marine areas, and porous reef limestone (Q_2) during the Pleistocene of Quaternary period. Most of ZAWA's water sources for urban water supply abstract water from the Q_2 and Q_3 aquifers.

Table 2-1 Geological Stratigraphy with Characteristics in Unguja Island

Era		Code	Nature of the Soil	Hydrogeology
Cenozoic	Quaternary	Q_1	Variety of soils, lateritic soil, Maximum layer thickness:25m	Surface soil
		Q_2	Cellular homotypic limestone, Maximum layer thickness:35m	Major aquifer in terrain corridor
		Q_3	Marine fluvial sand layer, Maximum layer thickness :25m	Major aquifer in terrain corridor
	Tertiary	M_1	Consolidated homotypic limestone	Supply to Well and Spring
		M_2	Sand, Grit	NOT important aquifer
		M_3	Marlstone, Sandy clay, Clayey sand	NOT important aquifer

Source: Basic Design Survey Report on the Project for Zanzibar Urban Water Supply Development (March 2005, JICA)

(3) Land use situation

Land use zones of Urban West Region, which is the planning area, are defined as shown in **Figure 2-18** in the urban development plan in **2.2.5**. Many of the Urban West Region are residential areas and are dotted with commercial and industrial zones, but development is not progressing at present.

In Urban District, its western half is Stone Town and the eastern half is an urban area, and in West District, the residential area spreads north and south along the shape of the coast. In addition, Ndunduka Forest Reserve is located in the northern part of the West District as the main forest area.

The inland is used mainly for livestock farming and cultivation of vegetables and spices. Other major crops are coconut, mango, citrus, cassava, sweet potato and sugarcane. Groundwater and rainwater are used for cultivation, but the water usage details are unclear.

(4) Natural environment

Regarding the vegetation in the project site, Zanzibar has no area with so-called native vegetation, it is vegetation formed secondarily by human activities. The Ndunduka Forest Reserve is located in the northern part of the West District as a nature reserve, which is also a national park. A variety of birds are confirmed in the project site, but no endangered species registered in the International Union for Conservation of Nature (IUCN).

The offshore of Zanzibar is shallow and calm. Mangrove forests located along the coast protect the land from erosion.

(5) Tourist spot

Figure 2-3 shows major tourist spots in Urban West.

The most famous sightseeing spot in Zanzibar is Stone Town registered as a UNESCO World Cultural Heritage Site. Stone Town is the old city of Zanzibar, which was formed around the time of the Great Voyage, and refers to the whole district protruding in the Indian Ocean in the western part of Urban District.

Also, on Changuu Island, located about 5.6 km northwest of Stone Town, the tortoise is protected and kept, it has observation and feeding hotel, it is known as a tourist destination. It is possible to observe and feed. There is also a swimming pool, tennis court, restaurant and hotel, it is known as a tourist spot.

There are also spice farms around Ndunduka Forest Reserve, and spice tours are also popular.

Source: JICA Survey Team (Background: Google Map)

Figure 2-3 Major Tourist Spot in Urban West Region

2.1.2 Climate, Weather, and Climate Change

(1) Climate and Weather

Climate in Zanzibar is categorized as Tropical Monsoon Climate (Am).

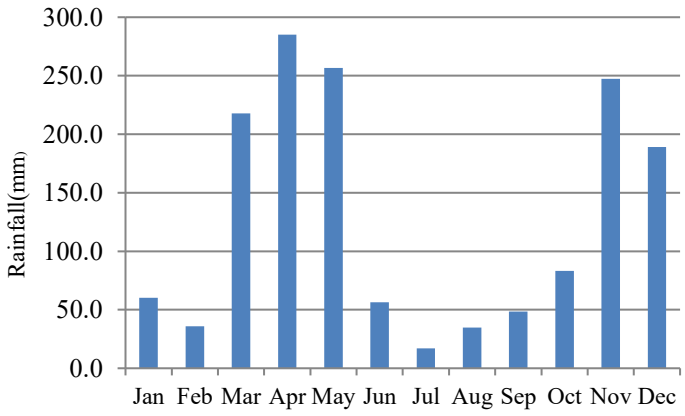
The monthly rainfall is shown in **Table 2-2**, the average rainfall over the past 10 years is shown in **Figure 2-4**, and the annual rainfall trend is shown in **Figure 2-5**. The season from March to May is categorized under large rainy season and from October to December is categorized under small rainy season. According to the data from the past 10 years, the highest amount of rainfall is in April, while the lowest is in July. The total amount of annual rainfall varies from 1,000 mm to 2,200 mm, and this amount has indicated a downward trend since 2008.

The highest and lowest temperature records are shown in **Table 2-3**, and the average of the past 10 years are shown in **Figure 2-6**. According to the data from the past 10 years, the highest temperature is in February (33.1°C), while the lowest is in September (21.6°C).

Table 2-2 Rainfall by Month

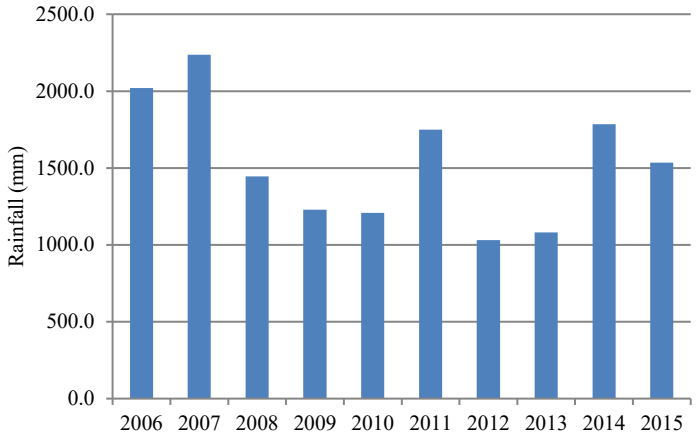
Year	Rainfall (mm)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2006	184.6	28.1	243.3	343.2	185.0	195.5	32.5	29.8	60.4	96.2	259.1	362.6	2020.3
2007	41.0	25.2	387.6	271.5	527.4	31.6	11.7	47.9	38.9	113.1	213.7	527.4	2237.0
2008	74.8	8.2	124.5	584.0	115.7	64.6	12.3	51.2	13.2	90.2	242.6	63.6	1444.9
2009	106.2	126.9	154.1	201.7	111.8	95.4	9.3	24.2	2.1	61.8	194.9	140.2	1228.6
2010	46.6	21.1	223.3	252.7	193.8	48.1	0.3	20.0	43.4	86.6	169.1	102.4	1207.4
2011	48.8	1.7	51.9	463.4	262.8	38.3	0.7	30.2	147.4	218.0	393.2	92.1	1748.5
2012	22.3	29.0	150.5	178.4	121.0	15.2	2.3	28.5	68.1	8.6	269.4	137.0	1030.3
2013	61.4	0.1	381.3	123.9	99.7	26.3	5.7	17.7	12.2	79.8	224.3	49.1	1081.5
2014	0.3	108.1	230.9	282.3	398.9	22.0	48.1	42.7	72.2	54.2	267.1	257.3	1784.1
2015	16.0	11.6	229.8	149.2	550.4	26.5	45.8	56.8	27.6	23.0	240.5	158.4	1535.6
平均	60.2	36.0	217.7	285.0	256.7	56.4	16.9	34.9	48.6	83.2	247.4	189.0	1531.8

Source: Tanzania Meteorological Agency Zanzibar Office



Source: Prepared by JICA Survey Team based on the data from Tanzania Meteorological Agency Zanzibar Office

Figure 2-4 Average Rainfall in the Past 10 Years



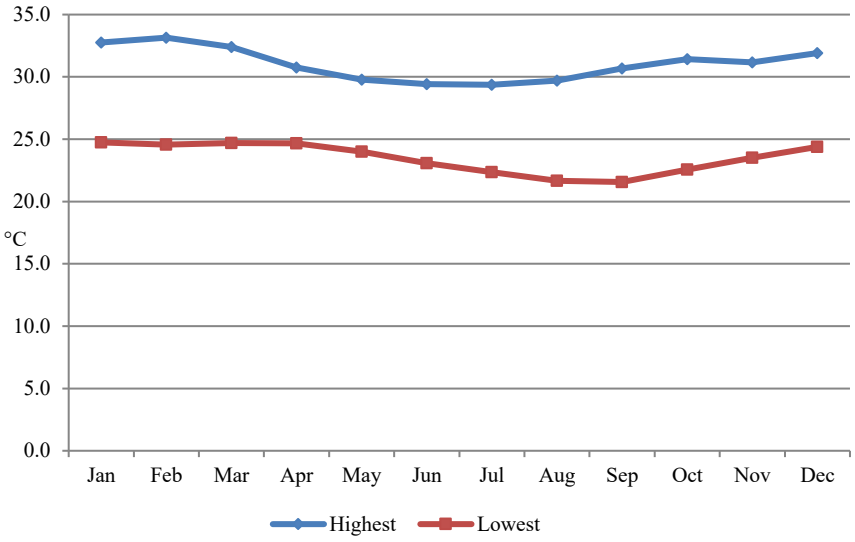
Source: Prepared by JICA Survey Team based on the data from Tanzania Meteorological Agency Zanzibar Office

Figure 2-5 Annual Rainfall Trend

Table 2-3 Highest and Lowest Temperatures in Zanzibar

Year		Highest/Lowest Temperature (℃)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2006	Highest	32.8	33.4	31.5	30.5	29.4	28.3	28.6	29.1	30.0	30.5	30.1	31.1
	Lowest	24.4	24.4	24.7	24.6	23.5	22.8	21.8	21.0	21.9	22.5	23.8	24.2
2007	Highest	32.6	33.8	32.6	30.7	29.0	29.2	29.3	29.5	31.0	31.0	30.8	29.5
	Lowest	25.1	24.7	24.7	24.0	24.0	22.8	22.2	21.7	21.6	22.0	22.5	24.0
2008	Highest	32.4	32.3	32.5	29.1	29.6	28.5	28.8	29.2	30.4	31.7	31.1	32.2
	Lowest	24.4	23.9	24.5	24.0	23.3	22.1	22.0	21.5	20.8	22.4	23.3	24.0
2009	Highest	33.2	32.0	32.2	31.1	30.3	29.8	29.1	30.1	31.3	31.7	32.1	32.0
	Lowest	24.2	24.3	23.9	24.6	24.1	22.9	22.1	21.2	20.9	22.5	23.4	24.1
2010	Highest	32.0	32.3	33.3	31.0	30.6	29.9	29.9	30.0	30.4	31.6	31.1	32.1
	Lowest	24.1	24.4	25.1	24.9	24.6	23.9	22.5	22.0	21.4	21.8	23.1	23.8
2011	Highest	33.1	33.9	33.2	31.1	30.2	29.8	29.8	29.9	31.6	31.1	30.6	32.4
	Lowest	24.3	24.6	24.4	24.6	23.9	23.2	22.7	21.8	22.5	22.8	23.5	24.5
2012	Highest	33.0	33.2	32.1	30.9	29.7	29.5	29.7	30.1	30.7	31.5	31.7	32.2
	Lowest	25.0	24.2	24.3	24.7	23.9	22.9	22.4	21.6	21.3	22.3	23.6	24.5
2013	Highest	32.5	34.0	31.7	31.1	30.0	29.6	29.4	29.6	30.7	31.2	31.1	32.3
	Lowest	25.1	25.3	25.3	25.3	24.3	23.2	22.4	21.2	21.6	22.8	23.6	24.8
2014	Highest	33.8	32.6	32.5	30.6	29.5	29.6	29.4	29.5	29.7	31.3	31.4	32.1
	Lowest	25.4	24.7	25.0	24.8	23.9	23.5	23.0	22.5	22.0	23.0	23.8	24.8
2015	Highest	32.2	34.0	32.5	31.5	29.6	30.0	29.7	30.0	30.9	32.6	31.6	33.1
	Lowest	25.4	25.1	25.0	25.1	24.6	23.6	22.5	22.0	21.6	23.4	24.5	25.0
Average	Highest	32.8	33.1	32.4	30.8	29.8	29.4	29.4	29.7	30.7	31.4	31.2	31.9
	Lowest	24.7	24.6	24.7	24.7	24.0	23.1	22.4	21.7	21.6	22.6	23.5	24.4

Source: Tanzania Meteorological Agency Zanzibar Office

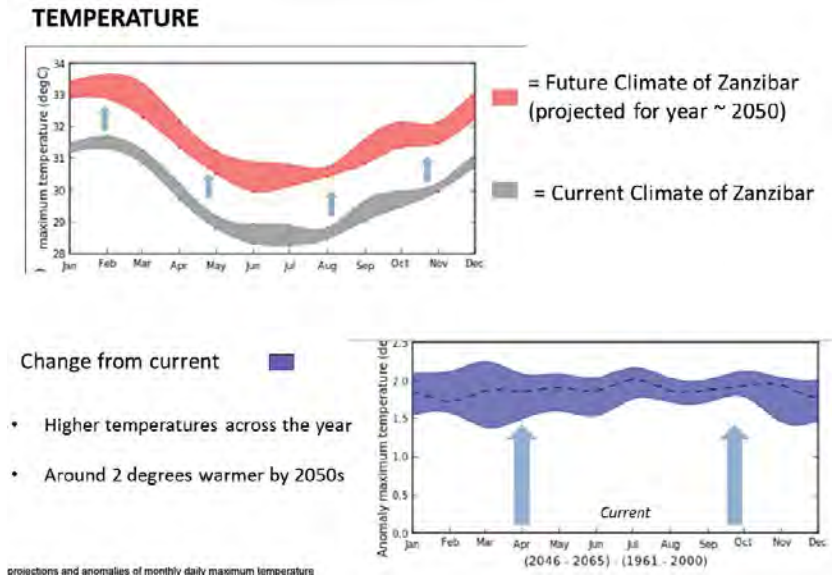


Source: JICA Survey Team

Figure 2-6 Highest and Lowest Temperature Monthly Average in the Past 10 Years

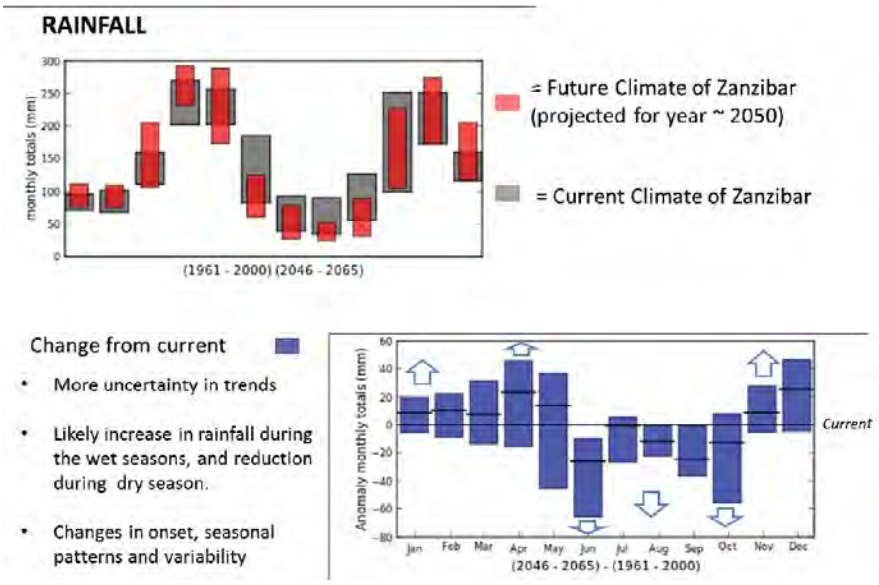
(2) Climate Change

According to the report "Economics of Climate Change in Zanzibar (Unguja, Pemba and other islands)", which is supported by the British government upon the request of RGoZ, signs of climate change have been observed in Zanzibar. Floods in 2005, heat waves and droughts in 2007, and storms in 2009 and 2011 are several examples. Changes such as temperature rise (2°C), increased rainfall during the rainy season and decreased rainfall in the dry season are major changes expected to occur by the year 2050.



Source: Zanzibar's Climate Change Strategy

Figure 2-7 Estimated Temperature



Source: Zanzibar's Climate Change Strategy

Figure 2-8 Estimated Rainfall

2.2 Socioeconomic Conditions

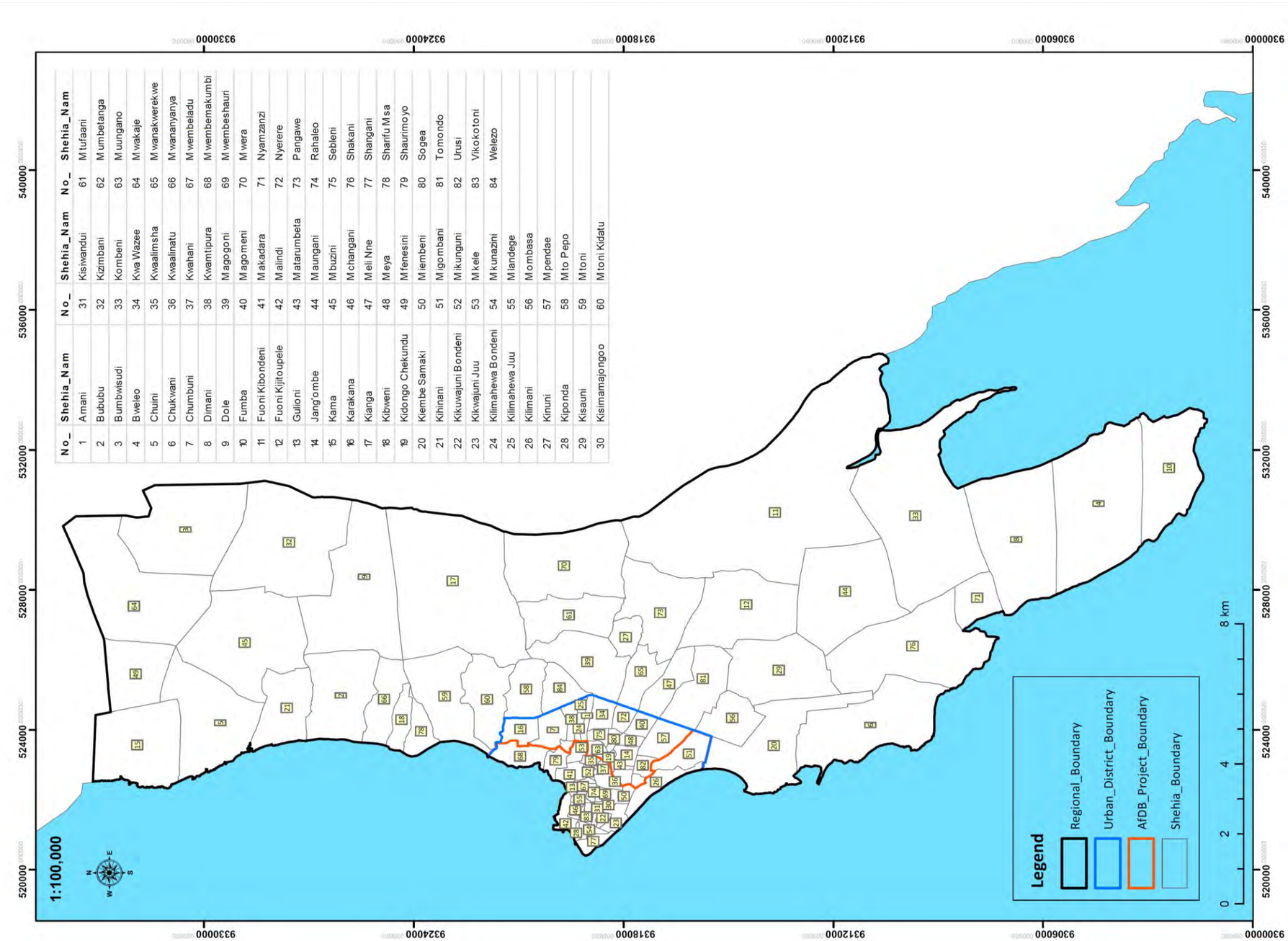
2.2.1 Administrative District and Population

(1) Administrative District

Zanzibar is composed of Unguja and Pemba Islands, and smaller islands around these two main islands. Unguja Island is divided into three regions (North, Urban West and Central South) while Pemba Island is divided into two regions (North and South). The regions are composed of districts, and the districts are composed of areas called "shehias".

Urban West Region, the target area of this survey, is made up of two districts (Urban and West). Urban District comprises 45 shehias, while West District comprises 39 shehias.

The administrative district and shehia locations of Urban West Region (as of 2017) are shown in **Figure 2-9**.



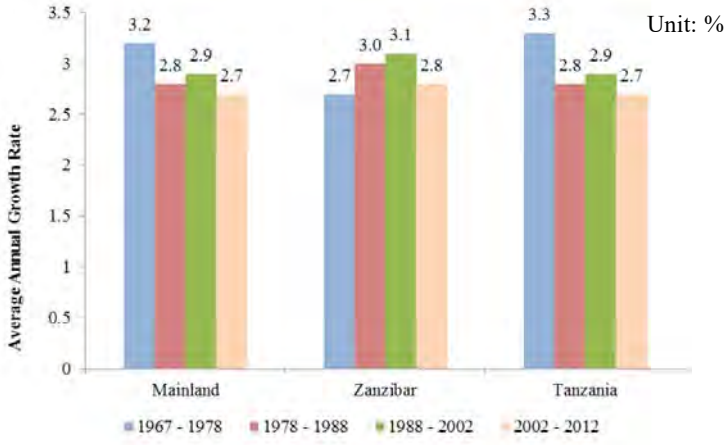
Source: Prepared by JICA Survey Team based on the data from Tanzania National Bureau of Statics

Figure 2-9 Location of Districts and Shehias in Urban West Region (as of 2017)

(2) Population

(a) Population of Zanzibar

As shown in **Figure 2-10**, the annual population growth rate has been approximately 3.0% since 1967 in both Tanzania and Zanzibar. The peak of the annual growth rate is 3.1%, recorded during 1998 to 2002. From 2002 to 2012, it has slightly decreased to 2.8%.



Source: National Census 2012

Figure 2-10 Annual Trend in Annual Growth Rate

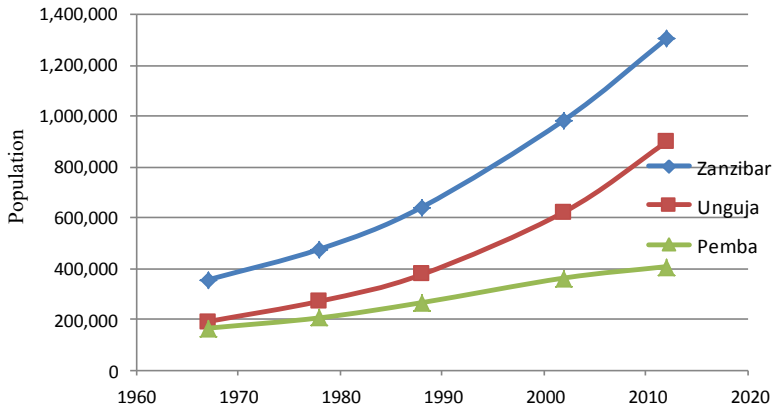
The population in Zanzibar from 1967 to 2012 is shown in **Table 2-4** and **Figure 2-11**.

Both Unguja and Pemba islands has recorded an increase in population. The population growth rate of Unguja Island reached its highest of 3.7% in 2002, and it has remained mostly flat since then. The rate of Pemba Island peaked at 2.6% during 1978 and 1988, and has since decreased.

Table 2-4 Population in Zanzibar

Area	1967	1978	1988	2002	2012
Unguja	190,494	270,807 (3.1%)	375,539 (3.3%)	622,459 (3.7%)	896,721 (3.7%)
Pemba	164,321	205,304 (2.0%)	265,039 (2.6%)	362,168 (2.2%)	406,848 (1.2%)
Zanzibar	324,815	476,111 (2.7%)	640,578 (3.0%)	984,627 (3.1%)	1,303,569 (2.8%)

Source: National bureau of Statistics, within the parenthesis is shown annual growth rate.



Source: JICA Survey Team

Figure 2-11 Population Transition in Zanzibar

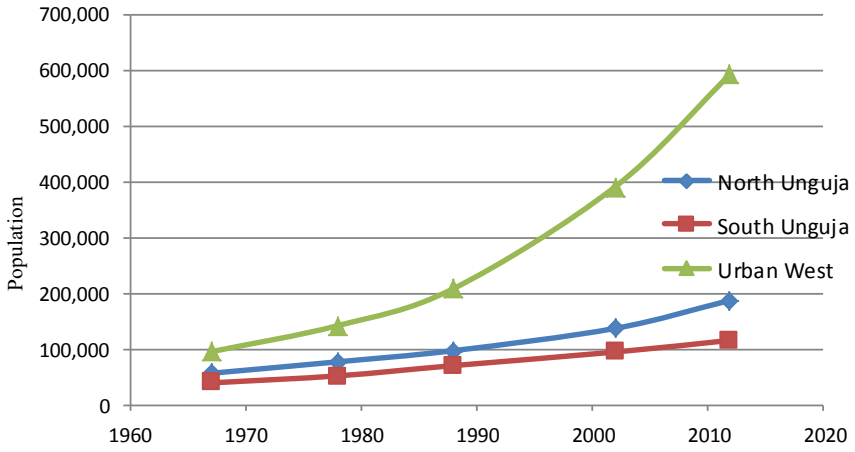
(b) Population of Unguja Island

The population trend in Unguja Island is shown in **Table 2-5** and **Figure 2-12**. The annual population growth rate from 2002 to 2012 was 4.3% for Urban West Region, 3.2% for North Region and 2.0% for Central South Region, with the Urban West Region recording the highest rate. The population growth of Urban West Region reached its peak at 4.6% during 1988 and 2002 and has decreased since, but the growth in the North Region has continued.

Table 2-5 Population Trend in Unguja Island

Region	1967	1978	1988	2002	2012
North	56,360	77,017(2.9%)	97,028(2.3%)	136,953(2.5%)	187,455(3.2%)
Central South	39,087	51,749(2.6%)	70,184(3.1%)	94,504(2.1%)	115,588(2.0%)
Urban West	95,047	142,041(3.7%)	208,327(3.9%)	391,002(4.6%)	593,678(4.3%)
Unguja	190,494	270,807(3.1%)	375,539(3.3%)	622,459(3.7%)	896,721(3.7%)

Source: National Bureau of Statistics, within the parenthesis is shown annual growth rate (%).



Source: JICA Survey Team

Figure 2-12 Population Transition of Unguja Island

(c) Population of Shehias of the Urban West Region

The population and household numbers of each shehia are shown in **Table 2-6** and **Table 2-7**, and the population density of Urban West Region is shown in **Figure 2-13**. The population density is 2,557 persons/km^2, which is the second highest in Tanzania; only Dar es Salaam has a higher value with 3,133 pop/km^2. The Urban West Region population is concentrated in the Urban District, where the population density is 15,172 pop/km^2 for the Urban District and 1,704 pop/km^2 for the West District.

As shown in the Figure, the population density is especially high in the Urban District and its surroundings, and also the Bububu area of the West District.

Table 2-6 Population and Household Numbers of Shehias (Urban District)

No.	Shehia	Population (Number)			Number of Households	Average Household Size	Sex Ratio	Area	Population Density	Household Density
		Both Sexes	Male	Female				km^2	cap/km^2	house/km^2
77	Shangani	3,886	1,910	1,976	680	5.7	96.7	0.365	10,642	1,862
54	Mkunazini	3,308	1,573	1,735	636	5.2	90.7	0.220	15,064	2,896
28	Kiponda	1,654	819	835	327	5.1	98.1	0.088	18,742	3,705
42	Malindi	3,204	1,719	1,485	586	5.5	115.8	0.417	7,688	1,406
46	Mchangani	2,211	1,016	1,195	439	5.0	85.0	0.148	14,946	2,968
55	Mlandege	2,070	946	1,124	416	5.0	84.2	0.103	20,174	4,054
67	Mwembeladu	2,954	1,376	1,578	529	5.6	87.2	0.140	21,090	3,777
13	Gulioni	2,488	1,186	1,302	458	5.4	91.1	0.141	17,647	3,248
41	Makadara	5,048	2,342	2,706	950	5.3	86.5	0.373	13,543	2,549
79	Shaurimoyo	8,335	3,927	4,408	1,503	5.5	89.1	0.511	16,311	2,941
68	Mwembemakumbi	8,354	3,945	4,409	1,453	5.7	89.5	0.926	9,021	1,569
7	Chumbuni	10,925	5,198	5,727	1,863	5.9	90.8	0.643	16,983	2,896
38	Kwamtipura	11,572	5,575	5,997	2,002	5.8	93.0	0.344	33,652	5,822
25	Kilimahewa Juu	4,714	2,341	2,373	866	5.4	98.7	0.211	22,330	4,102
1	Amani	6,156	2,880	3,276	1,210	5.1	87.9	0.263	23,391	4,598
72	Nyerere	9,657	4,618	5,039	1,794	5.4	91.6	0.387	24,956	4,636
75	Sebleni	5,102	2,450	2,652	897	5.7	92.4	0.233	21,923	3,854
40	Magomeni	6,165	2,906	3,259	1,151	5.4	89.2	0.418	14,741	2,752
57	Mpendae	13,252	6,362	6,890	2,404	5.5	92.3	1.047	12,660	2,297
82	Urusi	7,532	3,656	3,876	1,500	5.0	94.3	0.301	24,986	4,976
26	Kilimani	2,911	1,420	1,491	626	4.7	95.2	0.913	3,190	686
50	Miembeni	6,095	3,023	3,072	1,189	5.1	98.4	0.492	12,383	2,416
23	Kikwajuni Juu	2,408	1,062	1,346	477	5.0	78.9	0.409	5,881	1,165
22	Kikwajuni Bondeni	2,257	1,061	1,196	481	4.7	88.7	0.140	16,108	3,433
30	Kisimamajongoo	2,615	1,251	1,364	516	5.1	91.7	0.073	35,777	7,060
83	Vikokotoni	1,872	918	954	366	5.1	96.2	0.125	14,966	2,926
62	Mwembetanga	2,610	1,167	1,443	532	4.9	80.9	0.087	30,049	6,125
69	Mwembeshauri	1,933	894	1,039	379	5.1	86.0	0.108	17,927	3,515
74	Rahaleo	1,950	926	1,024	398	4.9	90.4	0.131	14,883	3,038
35	Kwaalimsha	3,479	1,630	1,849	686	5.1	88.2	0.132	26,367	5,199
52	Mikunguni	2,984	1,361	1,623	591	5.0	83.9	0.114	26,187	5,186
53	Mkele	7,140	3,394	3,746	1,384	5.2	90.6	0.273	26,190	5,077
63	Muungano	5,304	2,492	2,812	1,050	5.1	88.6	0.236	22,491	4,452
80	Sogea	4,801	2,295	2,506	975	4.9	91.6	0.168	28,535	5,795
14	Jang'ombe	6,122	2,945	3,177	1,221	5.0	92.7	0.324	18,894	3,768
19	Kidongo Chekundu	2,290	1,073	1,217	444	5.2	88.2	0.077	29,821	5,782
43	Matarumbeta	2,711	1,260	1,451	573	4.7	86.8	0.114	23,800	5,030
37	Kwahani	4,815	2,337	2,478	1,015	4.7	94.3	0.178	26,977	5,687
36	Kwaalinatu	5,438	2,680	2,758	1,105	4.9	97.2	0.476	11,431	2,323
16	Karakana	8,610	4,076	4,534	1,465	5.9	89.9	0.739	11,644	1,981
24	Kilimahewa Bondeni	5,116	2,390	2,726	992	5.2	87.7	0.184	27,844	5,399
34	Kwa Wazee	6,454	3,063	3,391	1,208	5.3	90.3	0.564	11,444	2,142
51	Migombani	7,164	3,674	3,490	1,258	5.7	105.3	1.051	6,815	1,197
48	Meya	5,777	2,755	3,022	1,090	5.3	91.2	0.226	25,588	4,828
31	Kisiwandui	1,590	719	871	323	4.9	82.5	0.087	18,191	3,695
Total		223,033	106,611	116,422	42,008	5.31	91.6	14.700	15,172	2,858

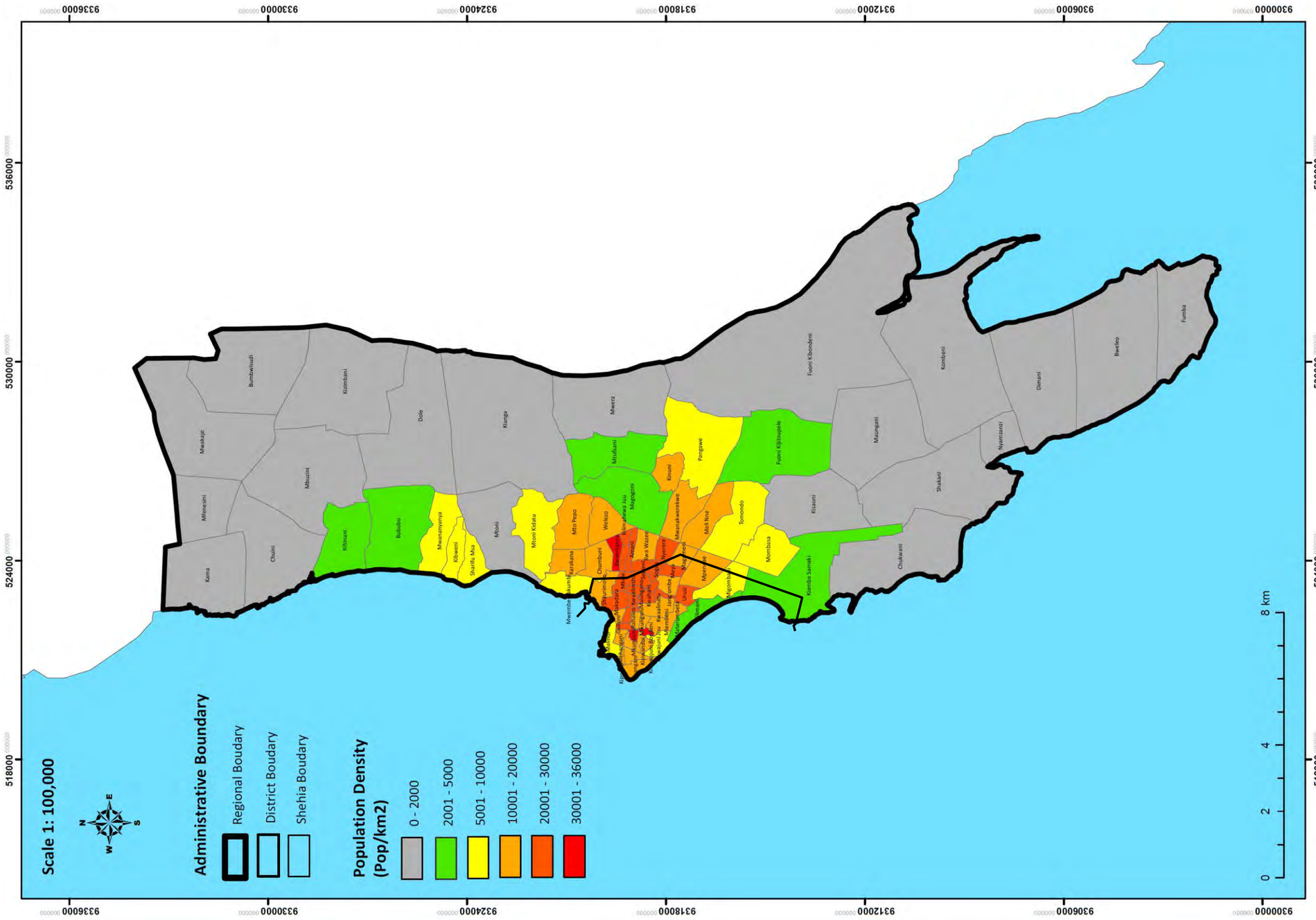
The numbers are following **Figure 2-9**. The order of Shehia depends on the order of the census.

Source: Census 2012, National Bureau of Statistics

Table 2-7 Population and Household Numbers of Shehias (West District)

No.	Ward	Population (Number)			Number of Households	Average Household Size	Sex Ratio	Area	Population Density	Household Density
		Both Sexes	Male	Female				km^2	cap/km^2	$house/km^2$
4	Bweleo	971	488	483	228	4.3	101.0	9.867	98	23
10	Fumba	981	492	489	232	4.2	100.6	4.249	231	55
33	Kombeni	3,162	1,580	1,582	688	4.6	99.9	13.133	241	52
8	Dimani	2,052	1,019	1,033	476	4.3	98.6	8.171	251	58
64	Mwakaje	2,907	1,490	1,417	633	4.6	105.2	10.370	280	61
3	Bumbwisudi	2,269	1,124	1,145	492	4.6	98.2	8.028	283	61
76	Shakani	2,760	1,351	1,409	622	4.4	95.9	7.590	364	82
32	Kizimbani	3,304	1,683	1,621	693	4.8	103.8	8.260	400	84
9	Dole	3,933	2,079	1,854	822	4.8	112.1	8.440	466	97
71	Nyamanzi	1,287	670	617	273	4.7	108.6	2.281	564	120
44	Maungani	4,048	1,984	2,064	837	4.8	96.1	7.089	571	118
15	Kama	2,921	1,450	1,471	544	5.4	98.6	5.064	577	107
11	Fuoni Kibondeni	15,400	7,468	7,932	3,108	5.0	94.2	24.085	639	129
45	Mbuzini	5,856	2,810	3,046	1,237	4.7	92.3	7.996	732	155
17	Kianga	9,908	4,759	5,149	2,003	4.9	92.4	13.393	740	150
49	Mfenesini	2,803	1,316	1,487	565	5.0	88.5	3.159	887	179
5	Chuini	6,158	2,868	3,290	1,284	4.8	87.2	5.934	1,038	216
6	Chukwani	8,298	4,042	4,256	1,679	4.9	95.0	7.202	1,152	233
70	Mwera	10,238	4,914	5,324	2,009	5.1	92.3	8.206	1,248	245
59	Mtoni	6,571	3,160	3,411	1,211	5.4	92.6	3.817	1,722	317
29	Kisauni	9,331	4,441	4,890	1,889	4.9	90.8	4.821	1,936	392
20	Kiembesamaki	11,760	5,548	6,212	2,412	4.9	89.3	5.354	2,197	451
61	Mtufaani	9,123	4,424	4,699	1,914	4.8	94.1	3.001	3,040	638
12	Fuoni Kijitoupele	19,374	8,944	10,430	3,940	4.9	85.8	5.580	3,472	706
2	Bububu	15,666	7,273	8,393	2,921	5.4	86.7	4.510	3,474	648
39	Magogoni	14,928	7,215	7,713	2,631	5.7	93.5	3.282	4,548	802
21	Kihinani	14,139	6,688	7,451	2,755	5.1	89.8	2.994	4,723	920
66	Mwanyanya	9,683	4,548	5,135	1,748	5.5	88.6	1.905	5,084	918
78	Sharifu Msa	4,975	2,395	2,580	906	5.5	92.8	0.951	5,232	953
73	Pangawe	26,275	12,164	14,111	5,233	5.0	86.2	4.336	6,060	1,207
60	Mtoni Kidatu	16,612	8,029	8,583	3,007	5.5	93.5	2.605	6,376	1,154
56	Mombasa	14,492	6,806	7,686	2,654	5.5	88.6	1.818	7,972	1,460
18	Kibweni	7,115	3,321	3,794	1,309	5.4	87.5	0.844	8,431	1,551
81	Tomondo	23,254	11,019	12,235	4,224	5.5	90.1	2.622	8,870	1,611
58	Mto Pepo	16,440	7,968	8,472	2,873	5.7	94.1	1.631	10,081	1,762
84	Welezo	13,119	6,360	6,759	2,318	5.7	94.1	1.159	11,318	2,000
47	Meli nne	16,984	8,032	8,952	3,178	5.3	89.7	1.474	11,525	2,156
27	Kinuni	11,333	5,527	5,806	2,096	5.4	95.2	0.845	13,414	2,481
65	Mwanakwerekwe	20,215	9,530	10,685	3,742	5.4	89.2	1.398	14,458	2,676
Total		370,645	176,979	193,666	71,386	5.19	91.4	217.461	1,704	328

The numbers are following **Figure 2-9**. The order of Shehia depends on the order of the census.
Source: Census 2012, National Bureau of Statistics



Source: Prepared by JICA Survey Team based on Population and Housing Census 2012

Figure 2-13 Population Density of Urban West Region

2.2.2 Economic Conditions

(1) Industry

Table 2-8 shows the index of major industries in Zanzibar. Zanzibar used to be a famous producer of clove, a type of spice, and it was the major foreign exchange earner which contributed to more than 70% of the total foreign exchange. However in recent years, the export value of the spice has decreased to 20% of its value in the 1970's, due to production increase in other countries. Meanwhile, tourism has emerged as the major industry and foreign exchange earner.

The major industries in Zanzibar are agriculture and tourism, but there is no competitive export item such as the clove once was, and domestic consumption accounts for a large percentage of the real GDP. The breakdown of industry in 2015 is: 19% for agriculture, fishery and forestry; 20% for industry; 49% for service industry; and 12% for VAT. This composition has not changed in six years. The highest share industry in real GDP in 2015 was construction at 9.4%, followed by agriculture, including home consumption crops such as cassava and banana and export products such as clove, but the percentage is on a downtrend (from 13.6% in 2010 to 9.1% in 2015). The share for manufacturing and tourism is both 8%, followed by commercial and repairing at both 7%. Governmental expenditure is 11%.

Table 2-8 Index of Major Industries in Zanzibar

Item		2010	2011	2012	2013	2014	2015
GDP (Actual Value) (Billion TZS)		1,050.8	1,344.1	1,565.2	1,849.9	2,133.5	2,230.8
GDP (Value in 2007) (Billion TZS)		848.2	927.5	972.8	1,042.9	1,115.4	1,188.6
Agriculture, Fishery, Forestry		205.1	214.6	196.8	222.8	221.8	227.9
Industry (Billion TZS)		116.1	118.1	96.4	118.4	109.9	108.0
(Manufacture)		152.0	179.9	193.4	200.1	212.0	235.5
(Construction)		61.7	58.9	68.7	72.7	71.4	95.5
(Others)		65.8	78.6	86.5	89.1	87.9	112.7
Service (Billion TZS)		19.5	21.1	23.8	25.7	28.5	27.2
(Tourist industry)		413.7	448.1	469.4	490.9	539.2	583.6
(Trade and Repair)		70.9	80.7	82.9	88.7	93.9	96.2
(Real Estate)		79.8	82.7	76.9	76.0	81.9	84.4
(Information and Communication)		49.1	48.1	53.0	63.6	76.3	67.7
VAT (Billion TZS)		6.3	3.5	7.5	13.8	59.6	41.3
Quantity Index (2007=100)		86.5	88.0	98.5	103.6	114.8	130.0
Inflation Rate (Value in 2007) (%)		77.4	84.8	113.2	129.2	142.3	141.4
GDP Deflator (2007=100)		115	126	132	142	152	162
GDP per capita	Value (1,000 TZS)	856	1,065	1,205	1,384	1,552	1,632
	Value (USD)	613	683	767	866	939	817
	Value in 2007 (1,000 TZS)	691	735	749	780	811	840
	Value in 2007 (USD)	554	589	601	626	651	674
Annual Inflation Rate	Food (%)	6.2	18.8	6.7	1.8	4.4	18.1
	Others (%)	6.2	9.9	13.2	8.5	6.8	5.2
	All items (%)	6.1	14.7	9.4	5.0	5.6	11.7
Import (Million TZS)		129,137	164,187	271,273	208,052	279,553	156,941
Export (Million TZS)		17,907	61,261	67,391	87,800	133,592	42,407
Balance of Trade (Million TZS)		-111,230	-102,926	-203,882	-120,252	-145,961	-114,534
Population (Thousand persons)		1,227	1,263	1,304	1,336	1,375	1,414

Source: Socio-economic Survey 2014, Office of the Chief Government Statistician (OCGS), April 2016,
Quarterly National Accounts Bulletin 2015 Dec (OCGS), April 2016

(2) Trade

Table 2-9 shows the balance of trade of Zanzibar. Since the economic structure is led by domestic demands, the balance of trade continues to be heavily negative, at minus 114,534 million TZS in 2015. The major commercial crop is still clove, and 64% of which is exported to UAE, India, Singapore, and Indonesia (2012). The total amount of commercial crops accounts for 74% of the total export figures in 2015. Meanwhile, main commodities, petroleum products and industrial products depend on importation.

Table 2-9 Trade Balance in Zanzibar

Item	2010	2011	2012	2013	2014	2015
Import (Million TZS)	**129,137**	**164,187**	**271,273**	**208,052**	**279,553**	**156,941**
Vehicle, Airplane, Boat and Ships	38,464	53,103	57,711	50,077	61,500	36,545
Machinery, Electricity	35,220	31,202	71,211	37,837	49,508	25,866
Base Metal and its Products	5,315	11,341	51,711	6,873	40,077	9,726
Textile and its Products	6,946	14,559	10,633	17,679	20,568	12,187
Mineral Product	5,959	17,192	15,596	23,471	18,303	16,090
Agricultural Product	1,127	2,349	14,725	22,752	16,719	7,578
Others	36,106	34,441	49,686	49,363	72,878	48,949
Export (Million TZS)	**17,907**	**61,261**	**67,391**	**87,800**	**133,592**	**42,407**
Total	15,475	56,509	63,160	75,393	103,979	31,420
Clove	11,181	50,036	42,965	-	-	-
Seaweed	3,969	6,404	5,151	-	-	-
Others	325	69	15,044	-	-	-
Others	2,432	4,752	4,231	12,407	29,613	10,987
Balance of Trade(Million TZS)	**-111,230**	**-102,926**	**-203,882**	**-120,252**	**-145,961**	**-114,534**

Source: Socio-economic Survey 2014, Office of the Chief Government Statistician (OCGS), April 2016
Socio-economic Survey 2015, OCGS, March 2017

(3) Financial Conditions of RGoZ

Table 2-10 shows the fiscal balance, and **Table 2-11** shows the revenue breakdown of RGoZ.

(a) Financial conditions

The economy in Zanzibar is facing a budget deficit in recent years. The deficit is basically covered by short-term loans from the Bank of Tanzania (hereinafter referred to as "BoT"). The deficit covering has relied partially on MDRI (Multilateral Debt Relief Initiative: an application of easing of conditions of repayment and/or debt relief for loans from IMF, etc.), but there have been no implementation of new MDRI negotiations in 2015/16. The loan cap from BoT is 3 billion TZS, therefore the RGoZ is carefully controlling expenditure to prevent lack of funds.

(b) Revenue

Indirect tax accounts for the majority of the revenue, and the share was 79% (24% in VAT for imported goods, 55% for domestic good and services), 14% for income tax and corporate income tax, and 6% in non-tax revenue (2014/15).

(c) Expenditure

Payment to a consolidated fund is one of the major expenditure items, which is payment to the Government's debt service fund, which includes the loan principal amount and interest

for public debt. This accounts for the 18.5% of the expenditure (2014/15). Development expenditure is the cost related to development projects such as ODA projects. This is composed of project cost subsidies by donors for development projects stated in the Development Cooperation Framework of RGoZ "Zanzibar Compact"[1] and the Zanzibar Strategy for Growth and Reduction of Poverty (MKUZA II[2]), Successor Strategy of MKUZA (2017-2021) and funds from RGoZ.

Table 2-10 Fiscal Balance of RGoZ

Item	Actual Performance (Million TZS)							
	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015
Annual Revenue	**110,652**	**135,951**	**142,633**	**199,731**	**225,047**	**266,644**	**330,715**	**361,973**
Tax	103,155	126,156	135,431	184,471	205,318	254,862	314,292	336,809
Non-Tax	7,497	9,795	7,202	15,260	19,729	11,782	16,423	25,165
Subvention	**74,328**	**46,755**	**107,136**	**43,429**	**82,451**	**84,473**	**87,480**	**44,554**
General Budget Subsidy	26,286	23,543	39,520	8,945	31,134	22,118	36,054	17,032
Project Cost Subsidy	48,042	23,212	67,616	34,484	51,317	62,355	51,426	27,522
Total	**184,980**	**182,706**	**249,769**	**243,160**	**307,498**	**351,117**	**418,195**	**406,527**
Annual Expenditure	**105,304**	**163,328**	**179,416**	**205,473**	**235,605**	**177,344**	**227,711**	**292,151**
Payroll	58,327	63,804	72,559	96,103	118,593	107,254	137,127	182,378
Goods, Service, Transportation	8,506	16,062	34,492	27,712	31,728	33,155	36,602	43,290
Consolidated Fund	38,471	83,462	72,365	81,658	85,284	36,935	53,982	66,482
Development Expenditure	**73,906**	**68,799**	**145,629**	**140,699**	**149,163**	**152,886**	**212,441**	**129,702**
Foreign Currency	63,762	47,122	110,246	106,144	114,695	31,279	42,339	48,764
Domestic Money Supply	10,144	21,677	35,383	34,555	34,468	121,607	170,102	80,937
Total	**179,210**	**232,127**	**325,045**	**346,172**	**384,768**	**330,230**	**440,152**	**421,853**
Balance	**5,770**	**-49,421**	**-75,276**	**-103,012**	**-77,270**	**20,887**	**-21,957**	**-15,326**

Source: 2008/2009~2011/2012(OCGS "Zanzibar Statistical Abstract 2012") 2013/2014-2014/2015 (Government of Zanzibar "Estimates of Government Revenue and Expenditure for the Fiscal Year 2014/2015")

[1] A prioritized medium-term implementation strategy aiming at closing the most significant gaps in development effectiveness by 2017, prepared by the GoT, RGoZ and donors to improve the efficiency and effectiveness of international aids and the communication among the related organizations. Commitment items by RGoZ (preparation and approval of the following mid-term plan), monitoring systems and frameworks or inter-participant meetings are regulated.

[2] A five year strategic plan starting in 2011, is declared as the priority economic strategy of RGoZ. It contains many policies related to the three clusters (Growth and Reduction of Income Poverty, Wellbeing and Social Services and n Good Governance and National Unity). To improve access to water sources and public sanitation, the following policies of the water sector are also included in this plan: Expand water infrastructure and access in both rural and urban areas, Improve and sustain water supply services in urban and rural areas, Ensure cleanness and safety of water, Strengthen ZAWA technical management, Enhance integrated management of database on ground water abstraction activities, Expansion of rainwater catchments system, Promotion of water source protection, Ensure efficient and effective Integrated Water Resources Management, etc.

Table 2-11 Break Down of Annual Revenue of RGoZ

Item	2011/12 (billion TZS)		2014/15 (billion TZS)	
	Revenue	Composition rate (%)	Revenue	Composition rate (%)
Custom duties	64.1	28.5	87.9	24.2
Income and corporation taxes	32.6	14.4	56.0	15.4
Domestic VAT, etc.	108.6	48.3	198.1	54.6
Non-tax	19.7	8.8	20.8	5.7
Total	225.0	100.0	362.8	100.0

Source: ZANZIBAR STATISTICAL ABSTRACT 2012 and Bank of Tanzania Annual Report 2014/2015

(d) Financial support

The Joint Finance Commission[3] (hereinafter referred to as "JFC"), established in 2003, gives financial counsels to the GoT and RGoZ. General Budget Support (hereinafter referred to as "GBS"; 4.5% of the financial support funding from the donor countries to the government of Tanzania following JFC reports is allocated to the general account) and development support-subsidy that is directly provided to projects by sectors are accounted for the financial support noted in the revenue of RGoZ.

The GBS is reviewed by the two governments in November of each year. Each aid agency notifies the GoT of the planned amount of financial aid on the general financial grants in January or February every year, and the RGoZ prepares budgets for the general financial grants, based on the notification from the GoT. The amount is allocated to the RGoZ within about one month after the GoT receives the financial aid[4]. However, financial assistance for 2014/2015 from several donor countries was suspended. The reasons were that investigations into an affair in which at least 250 million USD was fraudulently withdrawn from the government's public account, "the Tegeta escrow account" of BoT, had not proceeded, and the Government's reform and democratization processes have not progressed as committed. Eventually, AfDB, the World Bank (hereinafter referred to as "WB"), the European Union (hereinafter referred to as "EU") and several donor countries evaluated that the Tanzanian government's response had improved, and thereafter decided to continue their financial assistance. Currently, AfDB, WB, EU and Denmark have declared that they would grant financial assistance in 2016/2017, and other donor countries have decided to provide financial assistance for individual projects.

Project implementation for the Joint Assistance Strategy for Tanzania (hereinafter referred to

[3] The authorities of JFC regulated in the Constitution are as follows:
- Understand annual revenue and annual expenditure related to the federation matter (items that exceeds autonomy of the RGoZ), and to give both the GoT and the RGoZ advice for transaction and allocation
- Supervise the finance of federal government on the relations between both the GoT and RGoZ regularly
- Execute special mission under the legal requirement or at the President's direction

[4] Zanzibar – Public Financial Management Performance Report, Tony Bennett, Donald Mneney 7/2010, p42

as "JAST"), a five-year strategy, has been completed in 2011. The successor is a 10-year project named Development Cooperation Framework (hereinafter referred to as "DCF") which was planned to be implemented in 2014, but is still awaiting approval from GoT as of March 2017. According to the draft of the DCF, changes are to be made so that the GBS is to be directly disbursed to RGoZ.

(e) Donor debt balance

Current foreign debt balance and budget comparison is shown in **Table 2-12**. The foreign debt as of June 2015 has about tripled to 2,478 billion since June 2010. 88% of the foreign debt includes guarantees from the government of Tanzania. In addition, debt from multilateral aid agencies is 61.0%, which accounts for the largest percentage of the foreign debt. 27.0% of foreign debt is from bilateral aid agencies, and the rest is from export financing[5]. In terms of the deadline for payment, as of June in 2015, the deadline for payment within 10 years is 36.5% out of total foreign debt, the deadline for payment within more than 20 years is 62.3% and the deadline for payment from 10 years to 20 years is only 1.2%[6]. The ratio of remaining debt against revenue has been over 50% in the last six years.

Table 2-12 Donor Debt Balance

(Billion TZS)

Item	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Debt balance	84.8	214.2	175.3	205.7	214.2	247.8	237.5
Revenue	142.6	199.7	225.0	315.8	383.1	402.4	428.5
Ratio of debt against revenue	59.5%	107.3%	77.9%	65.1%	55.9%	61.6%	55.4%

Source: Bank of Tanzania, Annual Report 2014/2015. P29, 2008/09-2011/12 (OCGS "Zanzibar Statistical Abstract 2012"), 2013/14-2014/15 (Government of Zanzibar "Estimates of Government Revenue and Expenditure for the Fiscal Year 2014/2015"), and 2015 (Interview with Zanzibar MOF Commissioner)

(4) Living Standard and Poverty Group

Gross National Income (GNI) of Tanzania was 910 USD in 2015[7], which is below the 1,045 USD standard classification as a poor country.

Table 2-13 shows regional poverty population and ratio. In 2009/2010, half of the population in Zanzibar (44% in all Zanzibar, 34% in Unguja and 60% in Pemba) were living below poverty level considering the basic needs of life. According to the "Household Budget Survey 2014/15", for the income level of an adult for 28 days, the poverty level was defined as 38,071 TZS for food and 53,377 TZS for basic needs.

[5] Bank of Tanzania Annual Report 2014/2015, P29

[6] Bank of Tanzania, Annual Report 2014/2015, p30

[7] World Bank, http://data.worldbank.org/country/tanzania

Table 2-13 Poverty Population and Ratio by Region (2009/2010)

Area	Average Monthly Income (TZS)	Living below poverty level regarding food		Living below poverty level regarding basic needs	
		Population (Persons)	Population Ratio (%)	Population (Persons)	Population Ratio (%)
Unguja	**571,490**	**48,271**	**6%**	**264,199**	**34%**
Urban	681,064	11,479	4%	77,025	28%
West	569,066	15,102	7%	64,629	31%
North	413,930	13,926	8%	81,293	46%
South	558,409	7,764	7%	41,252	37%
Pemba	**347,141**	**117,657**	**24%**	**300,220**	**60%**
North	338,392	67,390	27%	171,134	68%
South	356,084	50,266	20%	129,086	52%
Total	**483,520**	**165,575**	**13%**	**564,419**	**44%**

Source: Household Budget Survey 2009/2010, OCGS, April, 2012

2.2.3 Infrastructures Situation

In this section, the situation of infrastructure related to the water supply sector is described.

(1) Power Supply

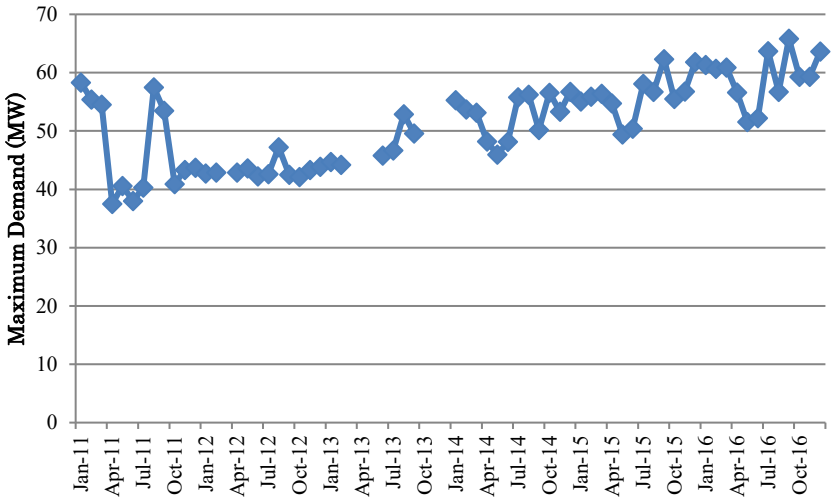
Electricity is supplied by the Zanzibar Electricity Corporation (hereinafter referred to as "ZECO"). ZECO depends on the Tanzania Electric Supply Company Limited (hereinafter referred to as "TANESCO") in the Tanzanian mainland, for it's the entire electricity generation. The electricity is transferred to Unguja Island by a 132 kV, 100 MVA submarine cable, and to Pemba Island by a 33 kV, 20 MVA submarine cable.

Electrical grid main consists of 33 kV or 11 kV lines depending on areas and transformers drop down the voltage to 400 V for three phase customers and 230 V for single phase customers.

As shown in **Figure 2-14**, the past maximum power demand for the island was 66 MVA in September 2016, so the submarine cable has sufficient capacity to meet the current demand. However, according to the "Zanzibar Research Agenda 2015-2020", a plan has been prepared to increase the coverage ratio from 40% (2015) and as shown in **Figure 2-15**, ZECO is estimating an increase in power demand. According to an Operations Manager at ZECO, by using the existing 100 MVA cable and resuming the use of a 40 MVA cable that is currently not in use, the facilities will be able to supply the required power up to 2030. If the power demand increases as per the estimation of ZECO, and if facility development cannot meet the demands, it is predicted that power supply may face difficulties in the long-term.

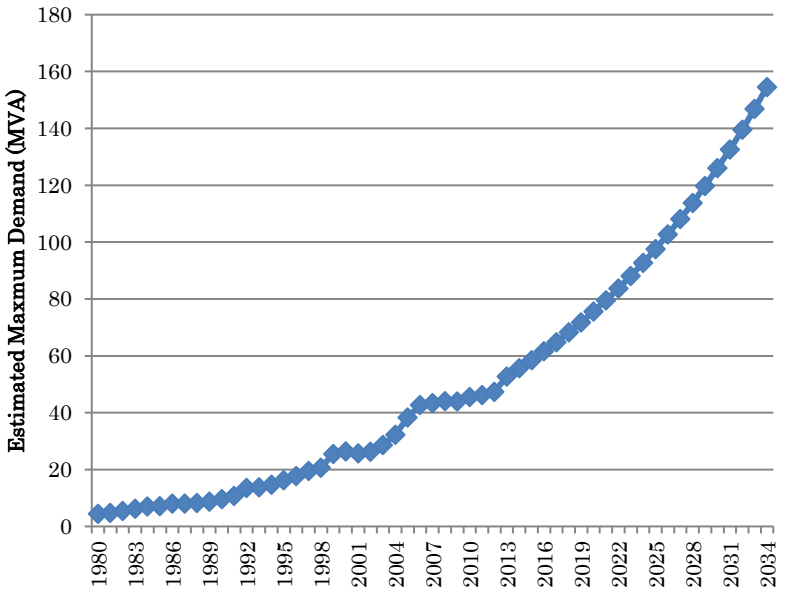
Zanzibar had faced power cut for a period of three months in 2008 due to the rupturing of the single submarine cable, and suffered large losses to its economy during and after the incident. Thereafter, no long-duration power cuts have occurred, but power disruptions lasting a few

minutes or hours often happens due to power distribution network related construction work and minor incidents.



Source: ZECO

Figure 2-14 Power Demand



Source: ZECO

Figure 2-15 Estimation of Power Demand

(2) Well Development by Community

According to ZAWA, wells were developed by communities to obtain water for domestic use. The wells are very small and shallow which cover a maximum of 10 households, and as there are no in-house piping or distribution network, the users directly fetch the water.

Although the location is unclear, approximately 20 community wells have been developed in the Urban West Region.

(3) Unofficial Water Supply

In the areas where ZAWA cannot supply water, water is supplied unofficially by suppliers other than ZAWA.

Said suppliers are seen especially in Stone Town area, and water is distributed to receiving tanks of each house from boreholes by PE pipe exposed in the air (**Photos 2-1, 2-2,** and **2-3**).

Currently, they are tolerated because ZAWA cannot provide enough water supply service to the area. An example of water tariff is 20,000 TZS per month, which is more expensive than ZAWA's flat water tariff rate of 4,000 TZS.

Photo 2-1 Exposed Pipe of Unofficial Supplier (1)

Photo 2-2 Exposed Pipe of Unofficial Supplier (2)

Photo 2-3 Storage tanks of Unofficial Supplier

(4) Sanitation Facilities

(a) Status of Toilet and Hand Wash

As shown in **Table 2-14**, the installation rate of toilets in the Urban West Region is higher than the value of the entire Zanzibar, and the rates of the flush toilet and the airflow-improved

pit type toilet are advanced. On the other hand, there is no data by district for hand wash, but as shown in **Table 2-15**, 67.9% of households in urban area do not have hand wash, and there is concern about the risk of infection with waterborne infectious diseases.

Table 2-14 Status of Toilet Facilities in Urban West Region

Toilet Type	Urban District	West District	Zanzibar
No toilet	0.1%	0.9%	16.3%
Flush toilet	46.4%	51.1%	33.0%
Vault toilet	44.3%	30.6%	40.0%
Airflow improving pit type toilet	8.8%	16.9%	10.0%

Source: Household Budget Survey 2014/15

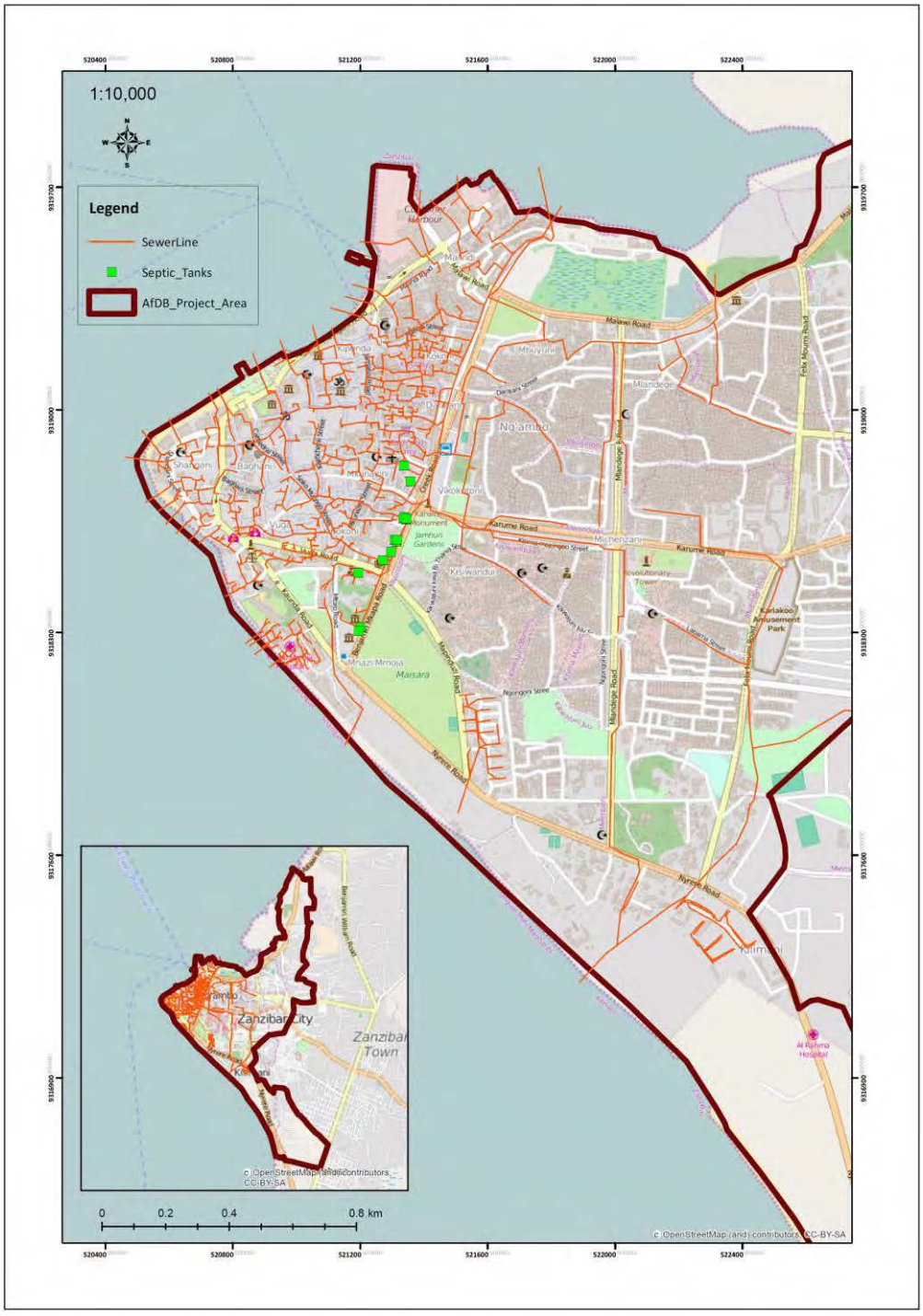
Table 2-15 Status of Hand Wash in Urban West Region

Item	Rural Area	Urban Area	Total
None	80.6%	67.9%	74.2%
Exist	18.8%	31.7%	25.4%
No answer	0.5%	0.4%	0.5%

Source: Household Budget Survey 2014/15

(b) Sewerage System

Sewerage was developed with the support of GTZ when Stone Town was registered as a world cultural heritage site. Under the Project, septic tanks and sewer pipes were constructed. The developed area is a part of Urban West region (in and around Stone Town), and within the project area of ZUWSP (**Figure 2-16**).



Source: Planning and Project Management, Water Development Department, ZAWA

Figure 2-16 Existing Sewerage Plan View

2.2.4 Sanitary Conditions

The average ratio of patients (2012-15) against the population (2012) is shown in **Table 2-16**, the breakdown (2012-15) by district is shown in **Figure 2-17** and the disease situation, including water-borne diseases, of Urban West Region is shown in **Table 2-17**.

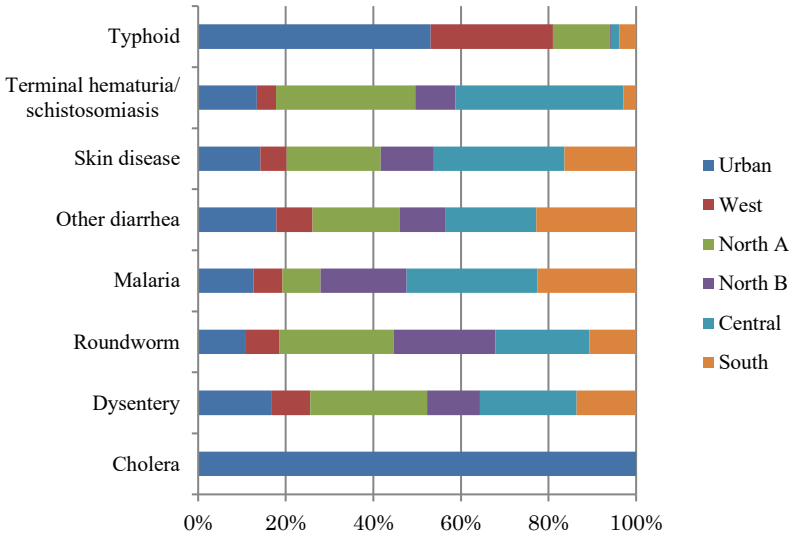
According to the figures, although the number of cholera patients in 2015 is relatively low at four, the disease was reported only in Urban West Region. Typhoid patients were also most reported in Urban West Region.

There was however, an epidemic of cholera in 2016. According to the web site of WHO, 3,057 patients (including 51 deaths) were reported. The number of patients and deaths in Unguja were 1,818 and 38, and in Pemba 1,239 and 13, respectively.

Table 2-16 Average Ratio of Patients against Population of 2012

Item		Urban	West	North A	North B	Central	South
Population (2012)		223,033	370,645	105,780	81,675	76,346	39,242
Percentage	Cholera	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Dysentery	0.34%	0.18%	0.55%	0.25%	0.45%	0.28%
	Roundworm	1.28%	0.91%	3.09%	2.73%	2.54%	1.26%
	Malaria	0.34%	0.18%	0.23%	0.53%	0.80%	0.60%
	Other diarrhea	9.05%	4.16%	10.14%	5.22%	10.53%	11.56%
	Skin disease	9.14%	3.86%	13.88%	7.85%	19.23%	10.54%
	Terminal hematuria/ schistosomiasis	0.10%	0.03%	0.23%	0.07%	0.28%	0.02%
	Typhoid	0.22%	0.12%	0.05%	0.00%	0.01%	0.02%

Source: Prepared by JICA Survey team based on data provided by Ministry of Health, Zanzibar



Source: Prepared by JICA Survey team based on data provided by Ministry of Health, Zanzibar

Figure 2-17 Composition Ration of Patient by District

Table 2-17 Number of Patients for Diseases of Urban West Region

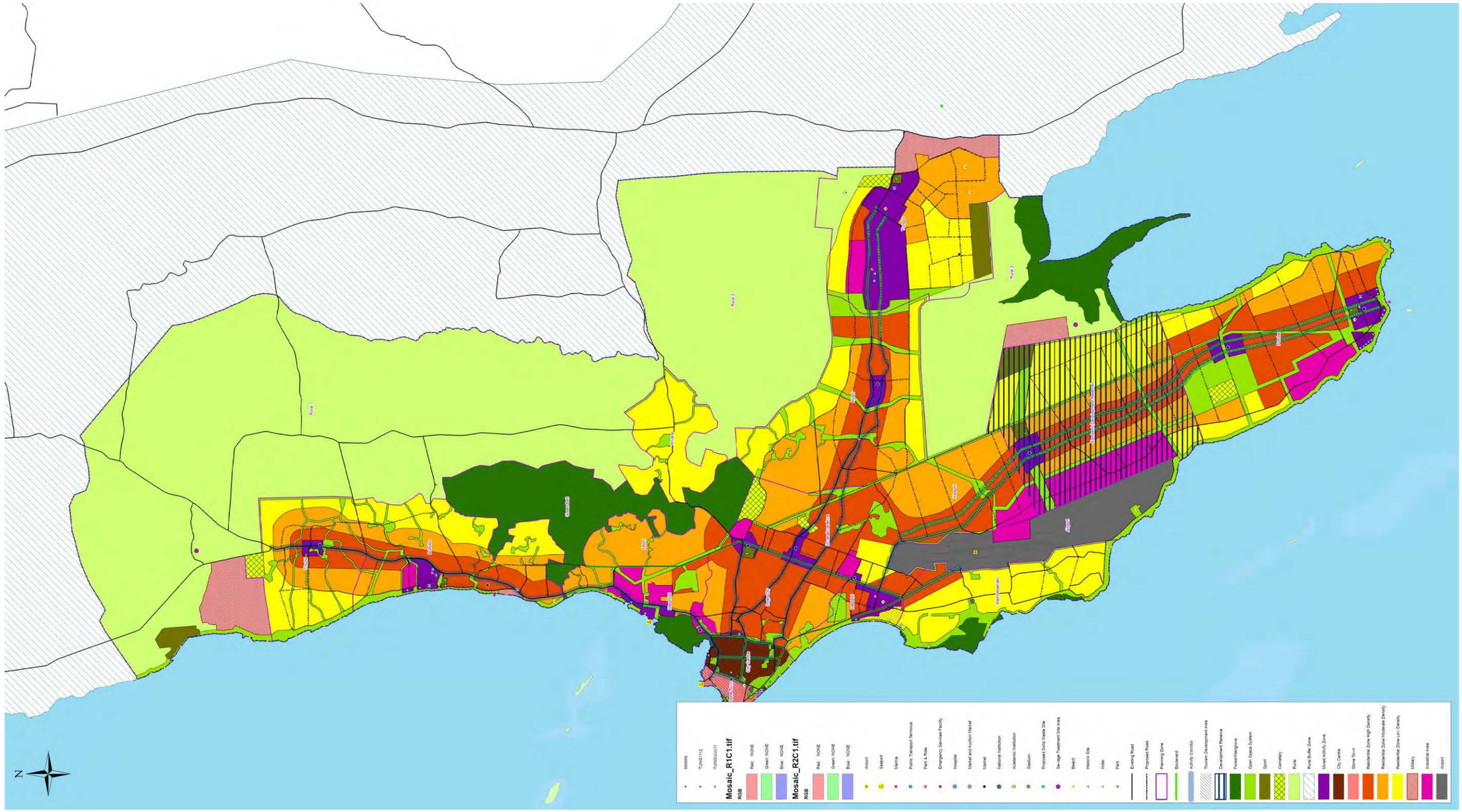
District	Disease	2012	2013	2014	2015
Urban	Cholera	0	0	0	4
	Dysentery	604	1,031	852	588
	Roundworm	2,994	3,701	2,782	1,986
	Malaria	297	848	914	973
	Other diarrhea	16,056	18,909	24,763	21,011
	Skin disease	13,112	21,505	23,514	23,431
	Terminal hematuria/ schistosomiasis	208	371	239	53
	Typhoid	170	356	222	1,247
West	Cholera	0	0	0	0
	Dysentery	592	620	764	685
	Roundworm	4,506	3,909	2,630	2,407
	Malaria	539	602	778	698
	Other diarrhea	18,796	14,601	14,738	13,591
	Skin disease	14,635	14,610	14,770	13,267
	Terminal hematuria/ schistosomiasis	181	146	47	100
	Typhoid	170	696	282	600
North A	Cholera	0	0	0	0
	Dysentery	104	768	647	793
	Roundworm	1,928	2,801	4,191	4,144
	Malaria	190	174	326	301
	Other diarrhea	12,580	9,112	11,156	10,063
	Skin disease	18,271	13,649	14,558	12,257
	Terminal hematuria/ schistosomiasis	115	727	78	57
	Typhoid	27	131	16	57
North B	Cholera	0	0	0	0
	Dysentery	101	190	333	186
	Roundworm	2,371	2,574	2,118	1,872
	Malaria	320	310	608	485
	Other diarrhea	3,362	3,793	5,410	4,492
	Skin disease	5,621	5,644	7,366	7,024
	Terminal hematuria/ schistosomiasis	74	54	45	44
	Typhoid	2	0	0	1
Central	Cholera	0	0	0	0
	Dysentery	271	326	455	331
	Roundworm	2,257	2,194	2,069	1,235
	Malaria	401	625	646	779
	Other diarrhea	6,932	7,007	9,093	9,112
	Skin disease	12,841	13,990	15,358	16,537
	Terminal hematuria/ schistosomiasis	179	199	308	168
	Typhoid	14	4	3	5
South	Cholera	0	0	0	0
	Dysentery	50	99	147	140
	Roundworm	575	476	542	382
	Malaria	77	308	299	263
	Other diarrhea	4,450	4356	4298	5,042
	Skin disease	4,738	4,400	3,547	3,865
	Terminal hematuria/ schistosomiasis	7	16	8	2
	Typhoid	8	11	4	2

Source: Ministry of Health, Zanzibar

2.2.5 Urban Development Plan

MLWEE has implemented an urban development plan called "Technical Assistance for Preparation of a Diagrammatic Indicative Structure Plan for Zanzibar Municipality and Its Immediate Periphery and Urban Development Policy for Zanzibar Town", supported by World Bank, and the final report, termed "Structure Plan", was finalized by the Department of Lands of MLWEE and an Israeli Consultant in April 2015.

The target area of the plan is Urban West region, a part of the North and Central South region. The plan proposes planning zones, residential development, integrated green system, primary economic active zones, transportation system, infrastructural facilities and integral land use. The plan view of the Structure Plan is shown in **Figure 2-18**.



Source: Department of Lands, MLWEE

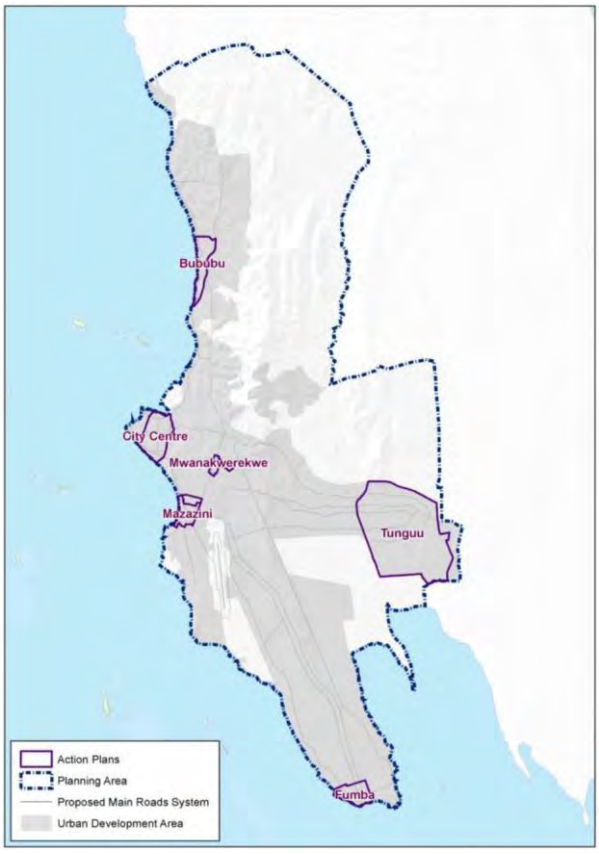
Figure 2-18 Plan View of Structure Plan

In the report, action plans were proposed as shown in **Table 2-18** and **Figure 2-19**. According to the Department of Land, commencement of the plans depend on fund availability, and only three plans have detailed implementation plans. The outline of the three plans is mentioned below.

Table 2-18 Action Plan of Structure Plan

No.	Action Plan	Scale	Services Commencement
1	Tunguu New Town	1.45 km^2	
2	Mazizini Business Park	124 ha	
3	City Centre Upgrade & Enhancement	238 ha	
4	Darajani Market Precinct Upgrade & Enhancement	10 ha	
5	Stone Town Traffic Moderation & Calming	N.A.	2018
6	Public Transport System Development	N.A.	2019
7	Bububu New Town Centre	158 ha	
8	Fumba New Town Centre	131 ha	
9	Mwanekerwekwe Node Upgrade.	43 ha	
10	Malawi Rd. Pilot NMT Corridor	4 km	2019

Source: Structure Plan Report, Department of Land, MLWEE



Source: Structure Plan Report, Department of Land, MLWEE

Figure 2-19 Location of Action Plans

(a) Project for Stone Town Traffic Moderation & Calming

- Objective
  - Conservation of characteristic Stone Town buildings and roads
  - Creation of pedestrian (resident/tourist) friendly environment
  - Contribution to urban revitalization

- Outline

  Regulations for car entrance and parking, regulations for usage of carts at markets and shops, development of parking lots, development of bicycle and pedestrian lanes, road paving, reducing the congestion at the port, development of shuttle service in Stone Town.

- Proposed Schedule

Table 2-19 Stone Town Traffic Moderation & Calming Plan Schedule (Draft)

Year	2014	2015	2016	2017	2018
Item	Concept design	Detailed design	Procurement, development	Construction	Service commencement

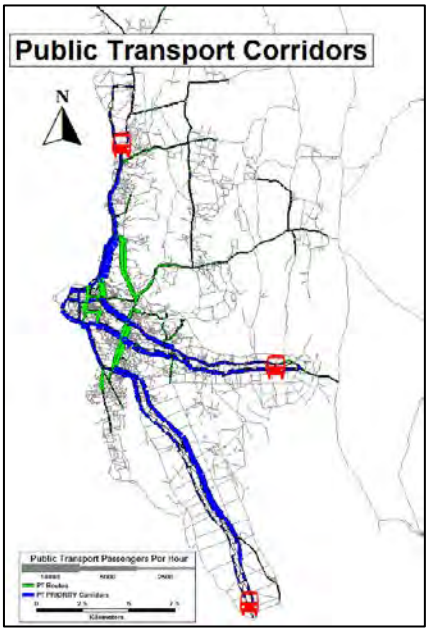
Source: Structure Plan Report, Department of Land, MLWEE

(b) Project for Public Transport System Development

- Objective
  - Increase the use of public transportation
  - Improve the public transportation system to meet international standards of safety, reasonability, attractively and environment-friendly

- Outline

  For the priority of public transportation, development of separated lanes for the North Main, East Main, South Main and Mombasa Road (**Figure 2-20**).



Source: Structure Plan Report, Department of Land, MLWEE

Figure 2-20 Public Transport System Development Plan

- Proposed Schedule

Table 2-20 Public Transport System Development Plan Schedule (Draft)

Year	2014	2015	2016	2017	2018
Item	Planning	Detailed design	Procurement	Development	Construction

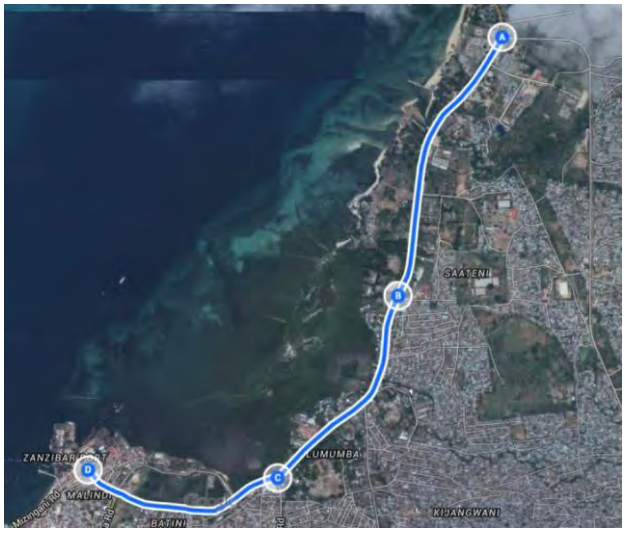
Source: Structure Plan Report, Department of Land, MLWEE

(c) Project for Malawi Rd. Pilot NMT Corridor

- Objective
  - Develop safe roads for pedestrians and bicycles along the main roads
  - Maintain the current 50% for transportation without using vehicles

- Outline

  Develop roads for pedestrians/bicycles along Malawi Road for the area between the Malawi/Mombasa Road intersection and Stone Town (**Figure 2-21**).



Source: Structure Plan Report, Department of Land, MLWEE

Figure 2-21 Malawi Rd. Pilot NMT Corridor Plan

- Proposed Schedule

Table 2-21 Malawi Rd. Pilot NMT Corridor Plan Schedule (Draft)

Year	2014	2015	2016	2017-18
Item	Planning	Detailed design	Procurement	Development/ construction

Source: Structure Plan Report, Department of Land, MLWEE

2.2.6 Other Development Plans

Table 2-22 lists the other development plans in Urban West Region mentioned in the interviews with the Department of Land, MLWEE. Of the total 7 development plans, 3 are included in the Action Plan of the Urban Development Plan. 2 of the remaining 4 plans have not yet received approval for implementation.

Only "Fumba Town Development" was able to provide detailed information other than the planned area. The outline is shown in **Table 2-23**.

Table 2-22 Other Development Plans

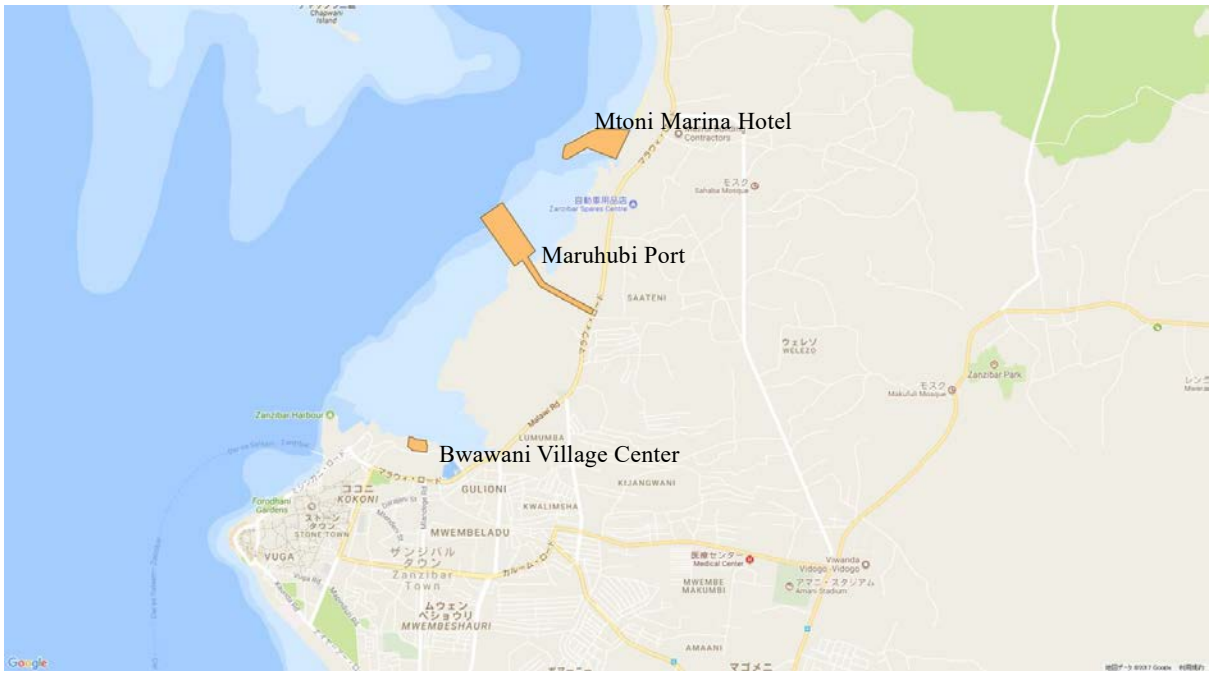
No	Project Name	Relation with UDP	Notes
1	Mbweni Building Estate		Development area: 6.4ha
2	Maruhubi Port		Development area:15.5ha
3	Ng'ambo Tuikayo (Zanzibar City Center)	Action plan 3	
4	Fumba Town Development	Action plan 8	
5	Mtoni Marina Hotel		Development area:2.3ha (Not approved)
6	Bwawani Village Center		Development area: 11.79ha (Not approved)
7	Darajani Corridor	Action plan 4	

Source: MLWEE

Table 2-23 Outline of Fumba Town Development Project

Item	Details
Project cost	120 Million USD
Number of houses/ businesses	Phase 1: 1,076, Total: approx. 3,200
Implementation period	Jan. 2016 – Jan. 2021

Source: CPS Limited, Fumba Town Development



Source: Planning and Project Management, Water Development Department, ZAWA (Background: Google Map)

Figure 2-22 Location of Development Plan (1)

Source: Planning and Project Management, Water Development Department, ZAWA (Background: Google Map)

Figure 2-23 Location of Development Plan (2)