

Water Supply Administration
For Better Management of Water Supply Services
Course (A) (B)
Regulatory Systems
on Ensuring Access to Quality Medicines

Country Reports

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*Water Supply Administration
For Better Management of Water Supply Services
Course (A)*

Country Reports

Japan International Corporation of Welfare Services (JICWELS)

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Water Supply Administration
For Better Management of Water Supply Services
Course (A)

EGYPT



INCEPTION REPORT (June 2019)

Country: *Egypt*

Name: *Nagy Mohamed Elsaed*

Position: *Water Operation and Maintenance of Upper Egypt Manager*

Organization: *Holding Company for Water and Wastewater*



Your Mission/Vision in Holding company for water & wastewater

Vision

Reach the level of the global industry in the management of drinking water and sewage companies in Egypt.

Mission

Management of drinking water and wastewater companies to provide their services in accordance with Egyptian standards on the basis of economic and sustainable development.



Holding Company for Water and Wastewater

Official Population No. for year 2017=94.7 million capita



248 cities

4766 villages



Holding Company for Water and Wastewater

Most of the population is allocated in only 5% of the total area of Egypt in the Delta and Nile Valley.

Water Resources (57.0 BCM/yr)

River Nile (55.5 BCM/yr)•

Groundwater (0.5 BCM/yr)•

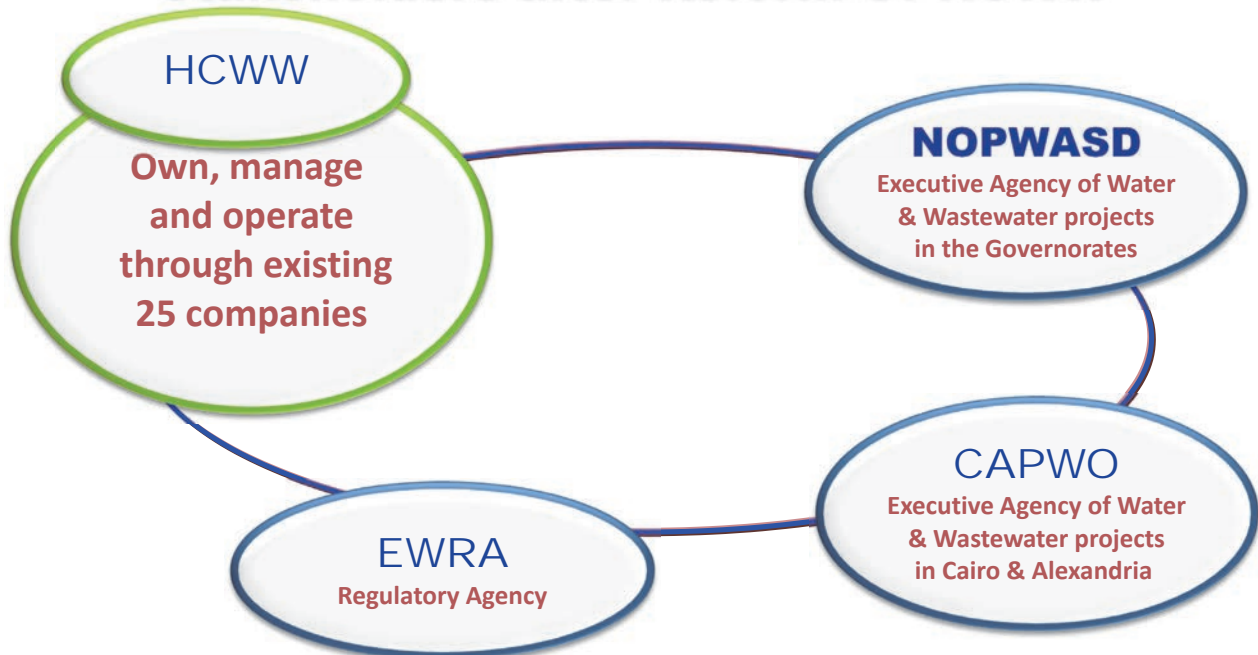
Rainfalls (1.0 BCM/yr)•





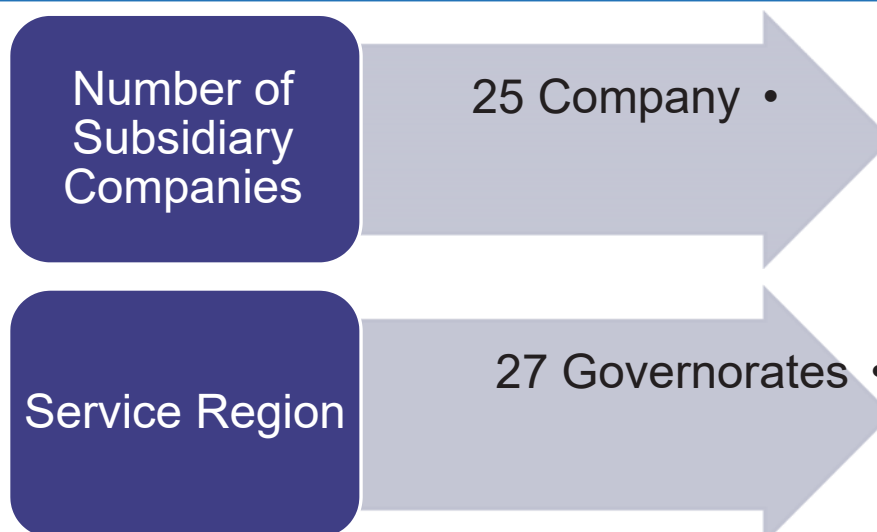
Holding Company for Water and Wastewater

Stakeholders after Reform Of HCWW

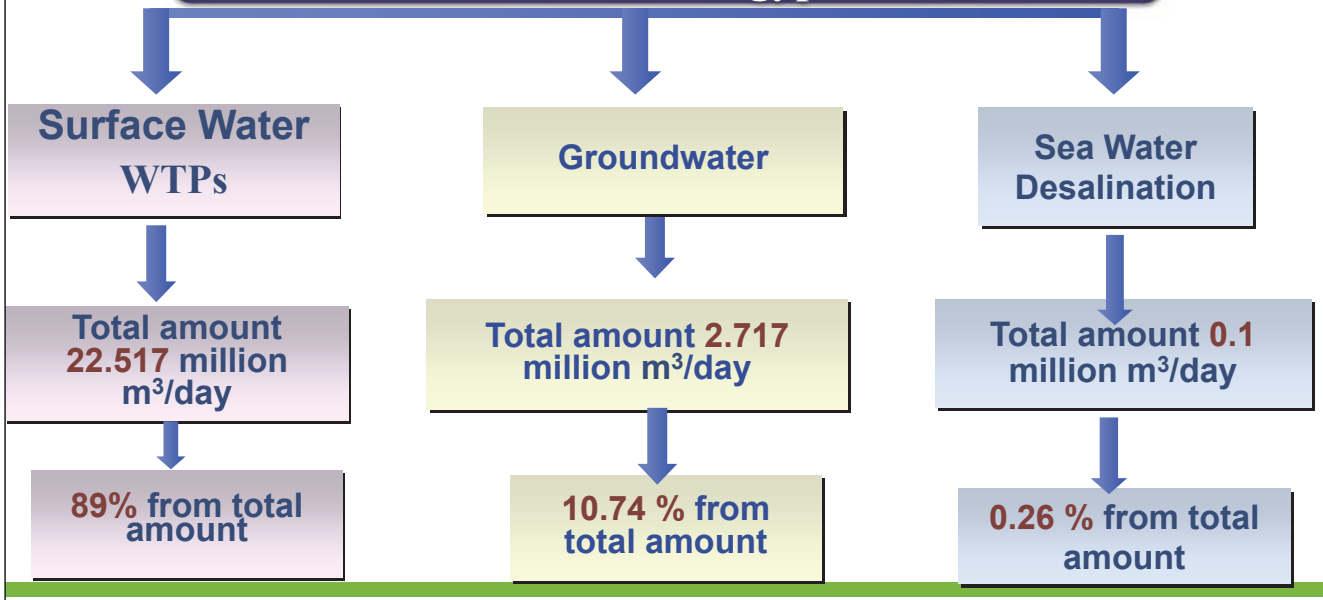


Holding Company for Water and Wastewater

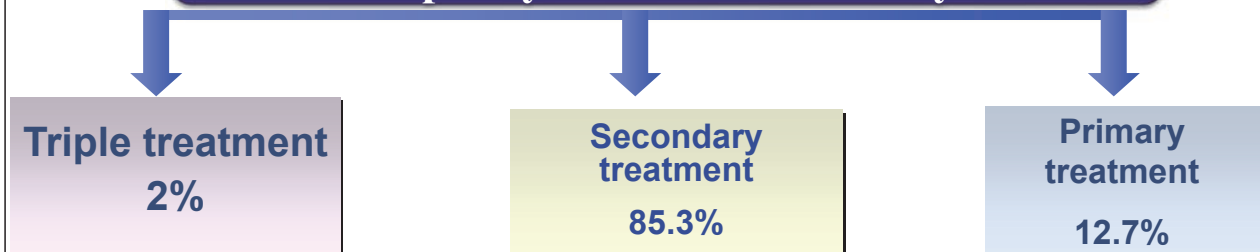
General Information About HCWW



Drinking Water Production from Different Sources in Egypt



Number of Wastewater 409 with total Design capacity 13.5 million m³/day



General Information About Water Sector In Egypt

Water Production
(Millions m³/day)

25.3

Number of Water
Treatment Plants

2715
227 Filtration + 830 Compact +
1610 Well Plants + 48
Desalination

Coverage Percentage

97%

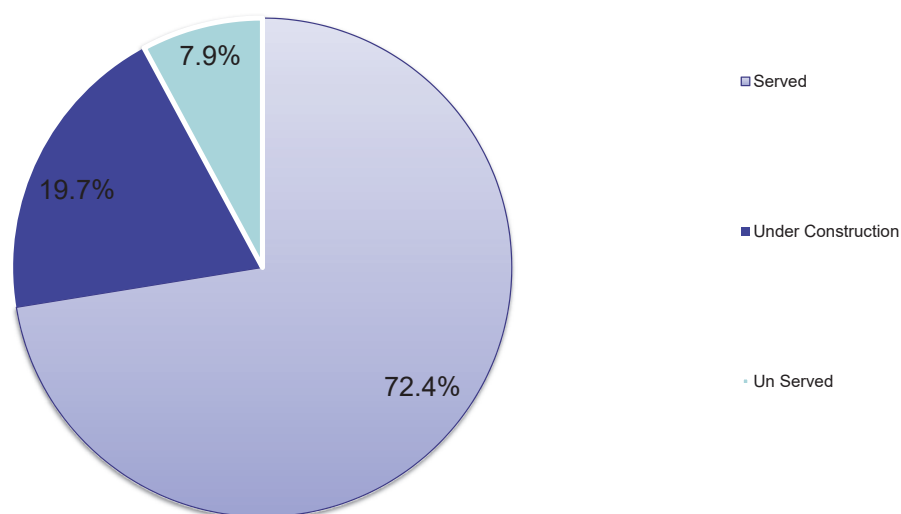
Water Distribution
Networks (km)

165000

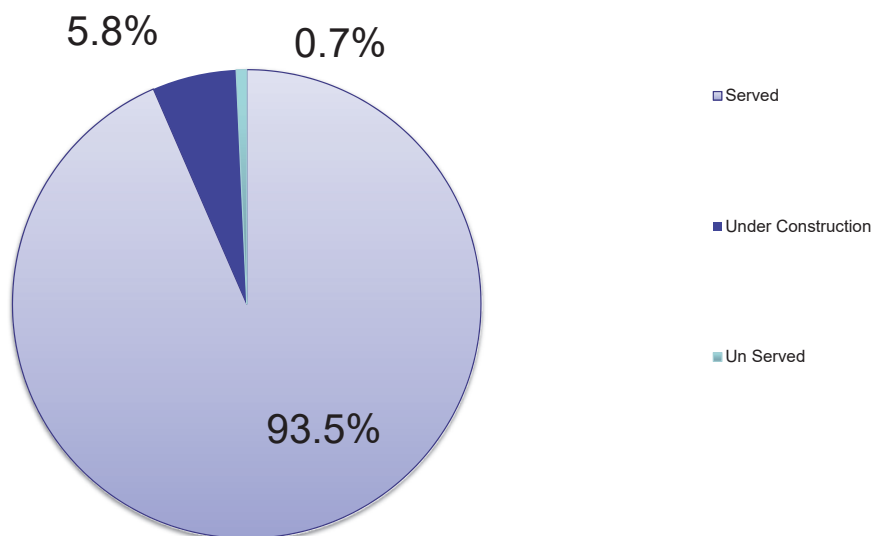
WasteWater
Networks (km)

52000

Urban Service ratio (According to No. of Cities)



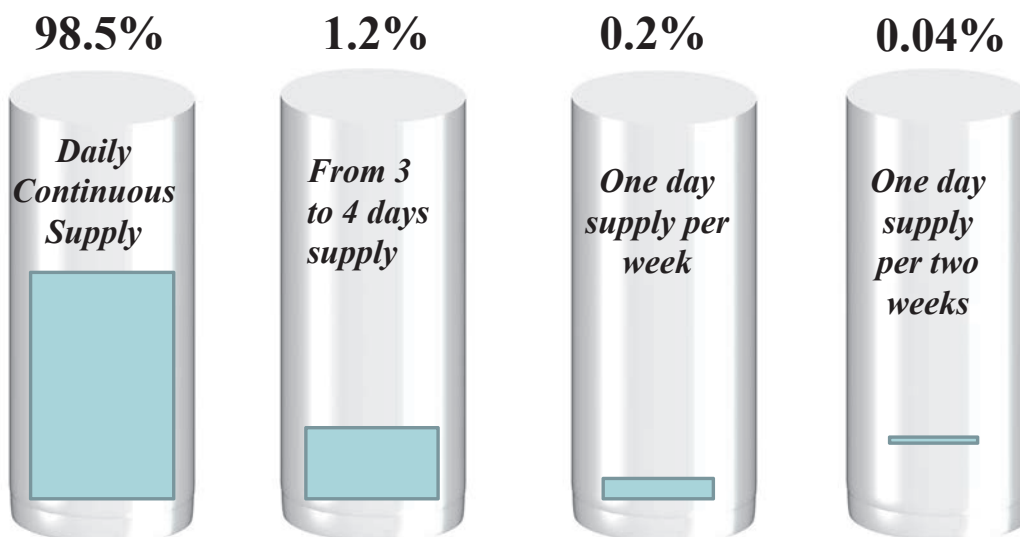
Urban Service ratio (According to Population)



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(2016)_Continuity of Water Supply -Water Networks

Measured by Population



Total Population for Water Networks =90Million Capita

2. Water Quality Control

□ Upgrading of Labs



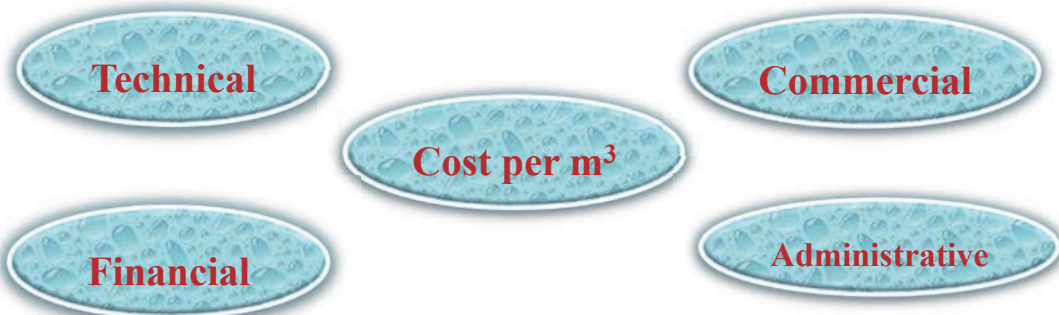
2005: 0 mobile lab 2012: 225 mobile labs
2005: 3 central labs 2012: 14 central labs
A Reference laboratory established for HCWW.



3. Performance Quality Control

□ Performance Indicator System

- 63 indicators used to measure and analyze performance of water and wastewater operations on a quarterly basis covering five areas:



4. Technical Support

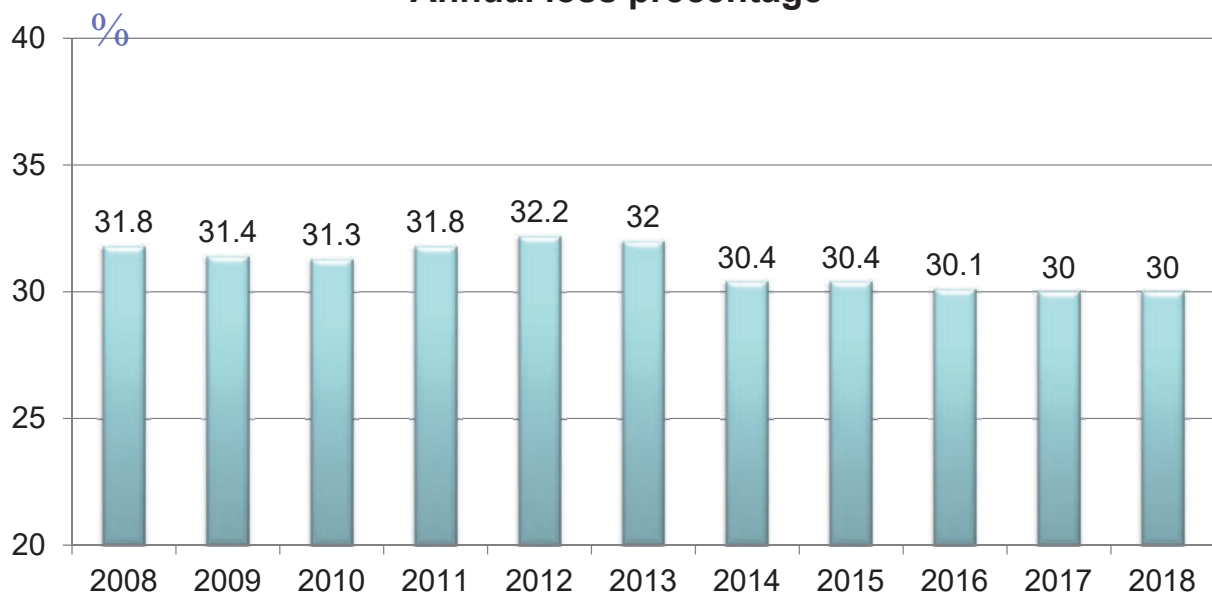
□ Replacement and Renovation



- Replacement and Renovation program for W&WW networks
- Integrated plan to address old pipes and valves
- Allocation annual budget of 2 billion LE for rehabilitation projects

Reduction of Non-Revenue Water

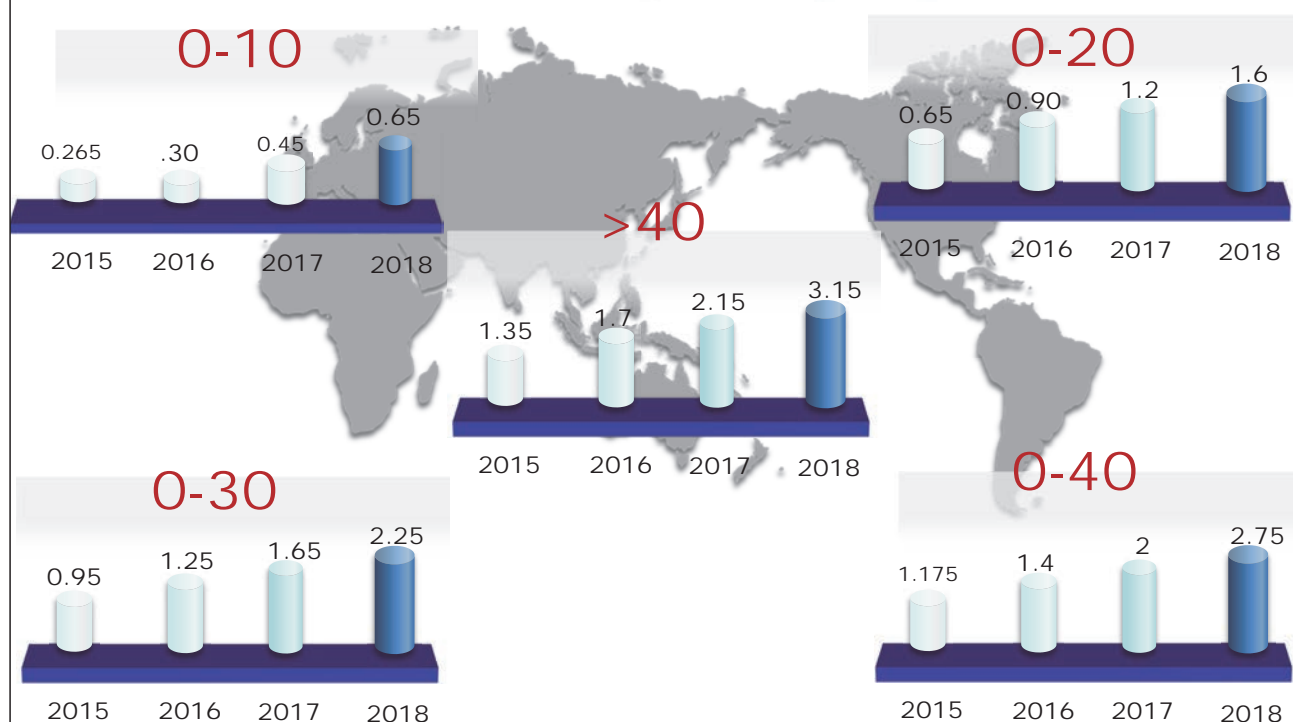
Annual loss percentage



Real Loss Reduction Strategy Funded By USAID, KfW, JICA, EU, GIZ, ... etc

Company	District Metered Areas Data				
	No.	Networks Lengths Km	House Connections No.	Area Km2	Loss %
Alex.	3	10	1510	1.3	18
Beherah	2	50	7652	13	31
Giza	7	43	6035	3.69	22
Cairo	4	195	6213	3.8	40
Sharqiah	12	112	14057	7	31
Bani Swief	3	73	8452	3.7	37
Luxor	1	4	854	0.2	34

Different tariff with different segments of consumption (L.E)



Success Story in Water Supply Services

- Preparing and implementing applied research plans for the Holding Company in cooperation with other sectors.
- To explore the possibility of applying new technologies in the field of drinking water treatment, sewage and water reuse, as well as reducing waste and rationalizing water consumption in cooperation with universities and research centers.
- Contribute to the research of some technical issues emergency to know the reasons and work to resolve.
- Preparation for all activities of the Scientific Committee of the Holding Company.
- Organization and participation in international and local conferences and exhibitions.
- Organizing workshops on important issues related to the aspects of the production and distribution of drinking water and rationalization of its use, as well as the drainage system, industrial drainage and water reuse.
- Coordination with research and development departments of subsidiaries during the development and implementation of the research plan.
- Evaluation is conducted in a transparent and effective manner

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Recent Challenges to Improvement of Water Supply Services

- * River bank filtration Technology (RBF) was first transferred to Egypt in cooperation with the University of Dresden and the Suez Canal University.
- * To explore the possibility of applying new technologies in the field of drinking water treatment, sewage and water reuse, as well as reducing waste and rationalizing water consumption in cooperation with universities and research centers.
- * Contribute to the research of some technical issues emergency to know the reasons and work to resolve.
- * Preparation and preparation for all activities of the Scientific Committee of the Holding Company. Organization and participation in international and local conferences and exhibitions.
- * Organizing workshops on important issues related to the aspects of the production and distribution of drinking water and rationalization of its use, as well as the drainage system, industrial drainage and water reuse.
- * Coordination with research and development departments of subsidiaries during the development and implementation of the research plan.
- Evaluation is conducted in a transparent and effective manner.

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Holding Company for Water and Wastewater

Thank you



Water Supply Administration
For Better Management of Water Supply Services
Course (A)

ETHIOPIA

Bahir Dar Water Supply and Sewerage Service

Inception Report
Country: Ethiopia
Name: Yirga Alemu Azene

Presentation Contents

1. Outline of Water Supply Services
2. Water Supply Service Levels
3. Management of Water Quality
4. Reduction of Non-Revenue Water
5. Water Tariff
6. Major Recent Achievements in Improvement of Water Supply Services
7. Recent Challenges to Improve Water Supply Services
8. Expectations towards Japan

1. Outline of Water Supply Services

1-1. Legal Basis of Water Supply Services

- * The Ethiopian Water Resource Management Policy (EWRMP) developed in 1999 by the Ministry of Water Resources, currently the Ministry of Water, Irrigation and Energy (MoWIE), aimed to promote the development of adequate management of water resources in Ethiopia to contribute to the accelerated economic growth of the country.
- * The Ministry of Water, Irrigation and Energy (MoWIE) is responsible for water policy, coordination and monitoring of water supply services.
- * The Bahir Dar City Water Supply and Sewerage Service is mandated to provide water supply, sewerage and fecal sludge management services.

1-1. Legal Basis of Water Supply Services

- * The Bahir Dar Water Supply and Sewerage Service has been organized as public service provider through Amhara Regional State proclamation number 188/2003.
- * According to the proclamation, the Utility is mainly accountable to the Water Board. In line with the national water policy urban water utilities have become autonomous.
- * The town Water Board is established by the regional proclamation and its members are assigned by the Amhara Regional State.
- * The town water board has been established to provide local oversight of utilities operations. The utility is also responsible to the Amhara Regional State Water, Irrigation and Energy Development Bureau primarily regarding technical and project implementation issues.

1-2. Demarcation of Water Supply Services

- * Ministry of Water, Irrigation and Energy is nationally responsible for drinking water supply, irrigation and hydropower.
- * Ministry of Agriculture is also responsible for small scale irrigation development and agricultural water management.

1-3. Main Actor of Water Supply Utilities

- * The main actor for drinking water supply at city level is the City Water Supply and Sewerage Service. It is a sole public operator under the City Administration.
- * Drinking water supply in Ethiopia decentralized and managed by the lowest local government.

1-4. Mission/Vision of Bahir Dar Water Supply Utility

Mission

- * To supply clean and uninterrupted piped water in house and shared connection for the people of Bahir Dar City with efficient and equitable service delivery system that are acceptable by the community

Vision

- * To see people residing in Bahir Dar City and its environs are to become healthy and productive by supplying clean and sufficient water.

1-5. My Mission/Vision in My Organization

My Mission

- * To transform the current rudimentary performance of Bahir Dar Water Supply and Sewerage Service to best performing utility.

My Vision

- * To see in 2025 Bahir Dar Water Supply and Sewerage Service as a model water utility in East Africa.

2. Water Supply Service Levels

2-1. Main Performance Indicators (PI)

Indicator	Unit	Result	Remark
Coverage area	Km ²	160	
Population Served	people	329,760	
Water Service Coverage	%	68	Intermittent water supply condition
Production capacity	m ³ /day	35,000	
Collection ratio	%	75	
O&M coverage ratio	%	97	
Non-Revenue Water	%	40	Bulk metering frequently malfunctioning Aged customer meters
Supply duration	Hours/day	13	
Supply pressure	meters		
Staff productivity	Staff /1000 connection	9.6	
Water quality	%	84	
Staff number	number	431	64 of them are outsourced personnel
Number of connections	number	44,807	
Average Consumption	liters/capita/day	51	

2-2. Any Monitoring by Performance Indicators (PI)

- * Rather than sending data of PI to the Ministry of Water, Irrigation and Energy, there is no formal or official monitoring of PI.

3. Management of Water Quality

3-1. Current Situation and Major Challenges/Problems

- * All water quality analysis results show that the physio-chemical properties of the water sources in the area are in general within the acceptable limits as set by the ministry of water resources for drinking water supplies.
- * Chlorination is performed by adding calcium hypochlorite to service reservoirs but not in a scheduled and planned way.
- * The dosing system is not working, meaning that chlorine is added manually, creating erratic concentration of residual chlorine in the distribution system (Figure 15).
- * Customers just near to the service reservoir are complaining about the excess residual chlorine and nearly zero concentration is reported in areas located away from the storage reservoir.

Figure 1. Chlorine manual dosing tank and Storage reservoir for three springs



3-2. Current Actions against Those Challenges/Problems

- * The BWSSS has its own laboratory to perform water quality tests including physio-chemical and biological test (Table 1). These tests are carried out on a daily basis and around 6 to 7 samples are tested at different sampling points and times. The laboratory is equipped with 2 laboratory technicians and 1 water quality specialist.

Table 1. Parameters/tests used to assess water quality.

Type	Parameter/test
Physio-chemical	pH, Temperature, Odour, Taste, Total Dissolved Solids, Conductivity, Turbidity, Fluoride, Alkalinity, Aluminium, Ammonia, Ammonium, Hardness, Copper, Iron, Nitrate, Nitrite, Potassium, Sulphide, Sulphate, Zinc, Free chlorine
Bacteriological	Total Coliform

Management of Water Quality

3-3. Any Achievements

- * Employing, Training and assigning of water quality dosing operators for disinfection of each water schemes

3-4. Water Quality Standards for Drinking Water

- * We use Ethiopian Standard of water quality set by the Ministry of Water, Irrigation and Energy.

3-5. Monitoring System or Plans for Safety of Drinking Water

- * There is no independent regulatory body, but the Ministry of Water, Irrigation and Energy and Ministry of Health sometimes accidental monitoring of water quality

3-6. Implementation of Water Safety Plans

- * There is no well-defined and comprehensive water safety plan of the utility except the daily follow up and testing of water quality.

4. Reduction of Non-Revenue Water

4.1 Current Situation and Major Challenges/Problems

- * Customer consumption metered and read monthly.
- * 40% of NRW
- * No strategy for managing NRW
- * Difficulty in measurement of water into supply due to bulk meters frequent failure
- * No DMAs

4.2 Current Actions against Those Challenges/Problems

- * Some actions are taken to reduce commercial and physical losses. Maintain of pipe leakage, replacement of non-functional meters, and timely reading of customers water meter.

4.3 Constitution of NRW

- * The level of NRW is high and reported to be about 40%.
- * Bahir Dar does not have a company-wide top-down water balance audit, whereas a break down between real and apparent losses is neither quantified nor qualified.

5. Water Tariff

5.1 Existing Water Tariff for All Customer Types

m ³	Public Fountain	0-5	5.1-10	10.1-25	Above 25.1
Ethiopian Birr for 1 m ³	2.36	2.90	4.40	6.10	8.20

The average tariff is relatively low, which is equal to 6.07 Birr/m³ (0.21 USD/m³)

New Water Tariff Proposed That Expects the Regional Cabinet Approval

Band in m ³		Public Fountain	Private Customers	Commercial Customers	Public Institutions
1	0-5	5	5	8	8
2	5.1-10	-	7	10	9
3	10.1-25	-	9	12	11
4	Above 25.1	-	11	15	13

5.2 Balance Sheet of BWSSS

Balance Sheet	July 7, 2015 in ETB
Total Current Assets	52,928,001.06
Total Property and Equipment	32,292,281.63
Total Other Assets	1,000,000.00
Total Assets	ETB 86,220,282.69
Total Liabilities	7,404,019.11
Total Capital	78,816,263.58
Total Liabilities & Capital	ETB 86,220,282.69

5.3 Profit and Loss Statement of BWSSS

Income Statement	For the Twelve Months Ending July 7, 2015, in ETB (1 USD = 28)
Total Revenue	50,096,428.67
Total Cost of Sales	31,976,294.13
Gross Profit	18,120,134.54
Total Expense	20,034,759.72
Net Income	(\$1,914,625.18)

6. Major Recent Achievements in Improvement of Water Supply Services

- * Four additional new boreholes with 100 liters per second capacity were dug and functional
- * Replacement of three frequently mal-functional surface pumps with a new one
- * Eight years financial auditing of the utility completed by external Auditor
- * In the year 2018 five thousand new customers are connected and get access to water

7. Recent Challenges to Improve Water Supply Services

- * Shortage of Water Supply
- * High demand of water for non-domestic uses
- * High non-revenue water
- * Aged pipes and meters
- * Frequent failure of electromechanical equipment
- * Frequent power interruption
- * Shortage of funds to expand the water supply coverage

8. Expectations toward Japan

Expectations toward Japanese Government and JICA

- * Technical knowhow and awareness
- * International relationship to share experience
- * Technical and budget support

Expectations toward Japanese Water Utilities

- * Current operation and maintenance of water supply
- * Automation of water supply systems
- * Tools and techniques for reduction of non-revenue water
- * Modern utility accounting system
- * Water quality assurance

8. Expectations toward Japan

Expectations toward Japanese Private Companies

- * Private sector participation in water utilities
- * Free support of private sector to the utility

Expectations toward the Program.

- * I expect that the training and experience sharing of water utilities will give to us the courage and strength to improve our performance.

Water Supply Administration
For Better Management of Water Supply Services
Course (A)

JORDAN

Water Supply Administration for Better Management of Water Supply Services (A)

- 1. Country : Hashemite Kingdom of Jordan**
- 2. Name : AL- AMAYREH Rabe'a**
- 3. Position : Head of Water Resources Department**
- 4. Organization: Ministry of Water and Irrigation**
Water Authority / Tafileh Water Administration

Content:

- Overview
- Outline of water supply services in Tafileh water management
- Success Story in Tafileh water management
- Recent Challenges to Improvement of Water Supply Service

Hashemite Kingdom of Jordan



Overview

- Jordan is considered to be one of the four poorest countries worldwide in water resources.
- The annual rainfall range between 50-800 mm.
- Available water resources per capita is very low at a level of 80 L/capita/day.

Outline of water supply services in Tafileh water management

Tafila Governorate

Tafila Governorate is located in southern Jordan and is one of twelve governorates in Jordan.

The water resource of Tafileh is groundwater wells located in Al- Hasa and Zubda areas.

Water is managed by the Tafileh Water Department of the Water Authority, Ministry of Water and Irrigation



Water supply system

Tafila Governorate

1) Al-Hasa Water Treatment Project

Al- Hasa 9 wells with a capacity of 100 cubic meters per well per hour

Three stations raise the capacity of 1200 cubic meters per hour

The Ain Al- Bayda reservoir is equipped with a capacity of 5,000 cubic meters and

Al- Ais reservoir capacity of 2000 cubic meters

2) Zubda wells

well Zubda 7	35 m ³ / h
well Zubda 8	20 m ³ / hour
well Zubda 12	27 m ³ / hour
well Zubda 14	55 m ³ / hour
well Zubda 18	<u>50 m³ / h</u>
Total 177 m ³ / h	

3) Al Hasa area

Al Hasa Well Balad 38 m³ / h

New Al- Hasa Well: 06 m³ / h

The tank is equipped with a capacity of 2000 m³

4) Jurf Area

New shelf: 58 m³ / h

Provides a tank of capacity of 500 m³ and with a lift station is supplied network

Outline of water supply services in Tafileh water management

- Whole Country: 89213 km²
- Area : 2209 km²
- Population :96500 Habitants
- Coverage Water Supply: 98 %
- Your Water Supply System/City:
- Service Area : 667 km²
- Population Served: 94570

Outline of water supply services in Tafileh water management

INDICATORS	2006 or 2007	2016 or 2017	Goals for 2025
Staff/1,000 connections	23.26	14.84	10
Production capacity (m3/day)	9500	24204	32000
Water quality	Jordan Institution for Standards and Metrology	Jordan Institution for Standards and Metrology	Jordan Institution for Standards and Metrology
Coverage area	90%	97%	98%
Supply duration (hr/day)	9	9	24
Supply pressure	5 bar	6 bars	2.5 bars
Number of connections	12293	17587	23600
NRW	45%	60%	35%
Collection ratio	48%	99.9%	99.9%
Staff number	286	261	200

Outline of water supply services in Tafileh water management

Existing Water Tariffs (USD/m³) (USD = JD 0.7)

INDICATORS			Quarterly consumption segments / m ³
Fixed amount	Water / cubic meter	Sewage / cubic meters	
6.285714286	2.14285143	0.985714286	The minimum is 0-18 m ³
10.85714286	0.107142857	.0065714286	36-19
13.21428571	0.571428571	0.328571429	54-37
13.21428571	1.021428571	0.542857143	55-72
16.07142857	1.067142857	0.571428571	73-90
16.07142857	1.642857143	0.942857143	91-126
16.07142857	2.057142857	1.385714286	127-144
16.07142857	2.4	1.385714286	145-Up
			Quarterly consumption segments / m ³
Fixed amount	Water / cubic meter	Sewage / cubic meters	
8.571428571	11.14285714	6.9	The minimum is 0-6/ m
11.14285714	1.857142857	1.235714286	Up 6 m ³
Water bill = fixed amount + ((Quantity of consumption per slice * (price of water slide + slide price of sewage)) * Multiplication factor The multiplication coefficient = 1 for all segments refers to the input output of the fuel			

Outline of water supply services in Tafileh water management

INDICATORS	
Cost of water supply production (USD/m3)	3.57
Water production amount (m3/day)	24204
Supply amount from WTP	0
Sales water amount (m3/day): Measured water amount by water meter at household in total	9681.6
Total population in the administrative area	94570
Served population	97%
Target NRW (%)	35%

Success Story of your Water Supply Services

One of the success stories in the province of Tafila is the rehabilitation of a water network in the southern region funded by the Japanese people representative of JICA Which contributed to the maintenance of pressure in the water network and the reduction of technical water losses





Recent Challenges to Improvement of Water Supply Service

The challenges facing the water sector in Jordan are twofold:

First: securing alternative sources of water through desalinating the waters of the Red Sea and extending a transmission line from the south of the Kingdom to the north

Second:
the high cost of running the electricity bill, which is a burden on the budget of the institution



Thank for your attention

Water Supply Administration
For Better Management of Water Supply Services
Course (A)

MALAWI

Water Supply Administration for Better Management of Water Supply Services (A) Inception Report Presentation

1. Country: MALAWI

2. Name: BOOKER WAYA

3. Position: PROJECTS MANAGER

4. Organization: BLANTYRE WATER BOARD



Booker Waya- Blantyre Water Board- Malawi

1

PRESENTATION OUTLINE

1. Outline of Water Supply Services of your Organization

2. Success Story of your Water Supply Services

3. Recent Challenges to Improvement of Water Supply Services

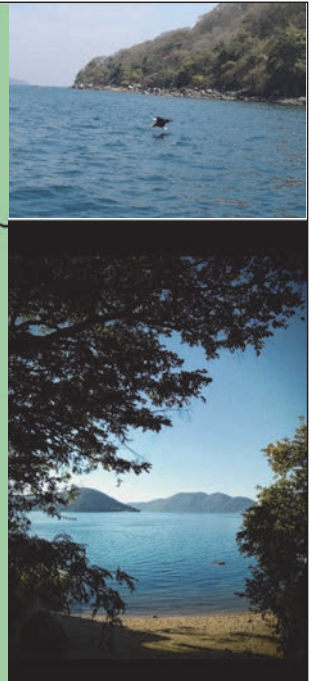


Booker Waya- Blantyre Water Board- Malawi

2

LOCATION OF MALAWI

- MALAWI is located in South East Africa.
- It is bordered by Zambia (northwest), Tanzania (northeast), Mozambique (east, south & west).
- Blantyre Water Board is in the Southern Region in Blantyre City.



3

1. Outline of Water Supply Services of Blantyre Water Board

- Blantyre Water Board (BWB) was established in 1929.
- Supplies to Blantyre City & surrounding areas.
- It is under the Ministry of Agriculture, Irrigation and Water Development.
- It currently produces 101 MLD against demand of 123 MLD.
- Non-revenue water (NRW) is at 34%.

WATER SUPPLY COVERAGE

Malawi:

Area : 118,000 km²
 Population : 17.6 million Habitants
 Coverage Water Supply : 80 %

Blantyre Water Board:

Service Area : 850 km²
 Population Served : 1.2 million



Booker Waya- Blantyre Water Board- Malawi

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1. Outline of Water Supply Services of Blantyre Water Board

1. Shire River Source- Walkers Ferry Raw Water Pumping Station – 45 km from Blantyre



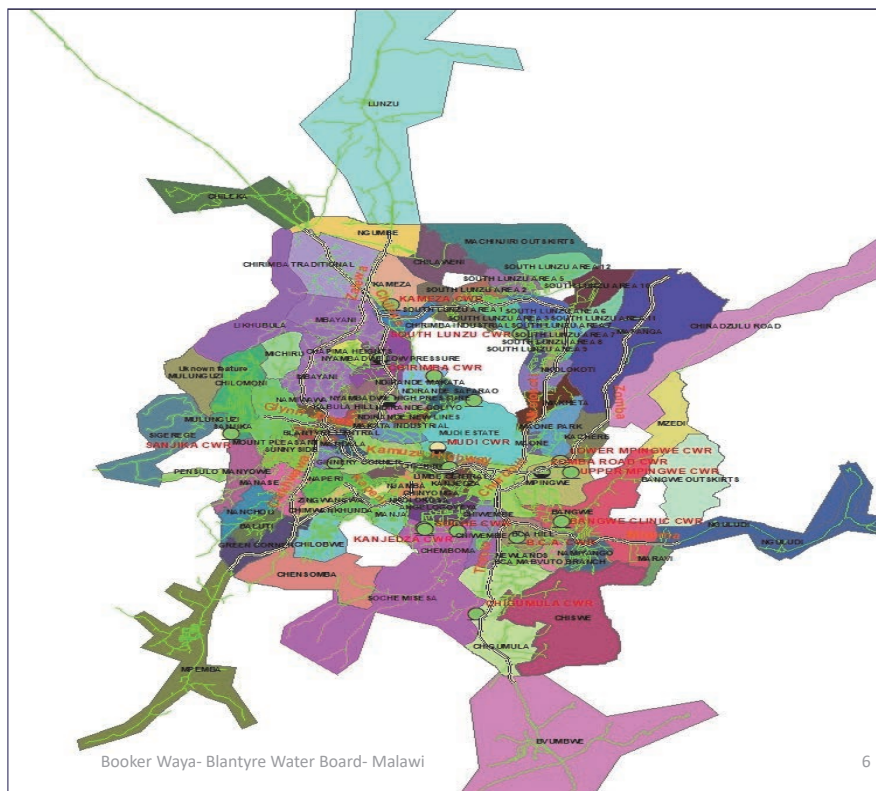
2. Mudi River Dam Source- within Blantyre City.



Booker Waya- Blantyre Water Board- Malawi

5

BWB SUPPLY AREA



Booker Waya- Blantyre Water Board- Malawi

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1. Outline of Water Supply Services of Blantyre Water Board

INDICATORS	2018	2019	2025
Staff/1000 connections	12	11	6
Production capacity (m3/d)	101,000	101,000	200,000
Water quality	WHO & Malawi Stds	WHO & Malawi Stds	WHO & Malawi Stds
Coverage area (%)	84	85	95
Supply duration (hr/day)	18	18	23
Supply pressure (bar)	2.0	2.0	2.0
Number of connections	49,000	55,000	105,000
Non-revenue water	39	34	20
Collection Ratio (%)	84	85	99
Staff number	583	583	600



Booker Waya- Blantyre Water Board- Malawi

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2. Success Story of BWB Water Supply Services

1. Increased water production

- ☐ With funding from the EXIM Bank of India (USD 23.5 million), BWB as developed a new water source increasing production from **101,000** to **121,000** m³/day.
- ☐ EXIM Bank of India has confirmed additional funds to increase production further by an additional **40,000** m³/day by 2023.



Booker Waya- Blantyre Water Board- Malawi

8

New Water Source from Likhubula River-55 km away from Blantyre City



Booker Waya- Blantyre Water Board- Malawi

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2. Success Story of BWB Water Supply Services

2. Reduced Non-Revenue Water from 39% to 34 %

BWB implemented a number of activities to reduce non-revenue water from 39% to 34 % in one year through:

- ☐ Pipe replacement and pipe lowering – 50 km in one year;
- ☐ Installation of pre-paid water meters- 10,000 out of 55,000 meters;
- ☐ On-spot/ Instant billing- currently targeting 18,000 customers and to be rolled out in July 2019;
- ☐ Installation of bulk meters and control valves;
- ☐ Water Audit with technical assistance from JICA volunteers.



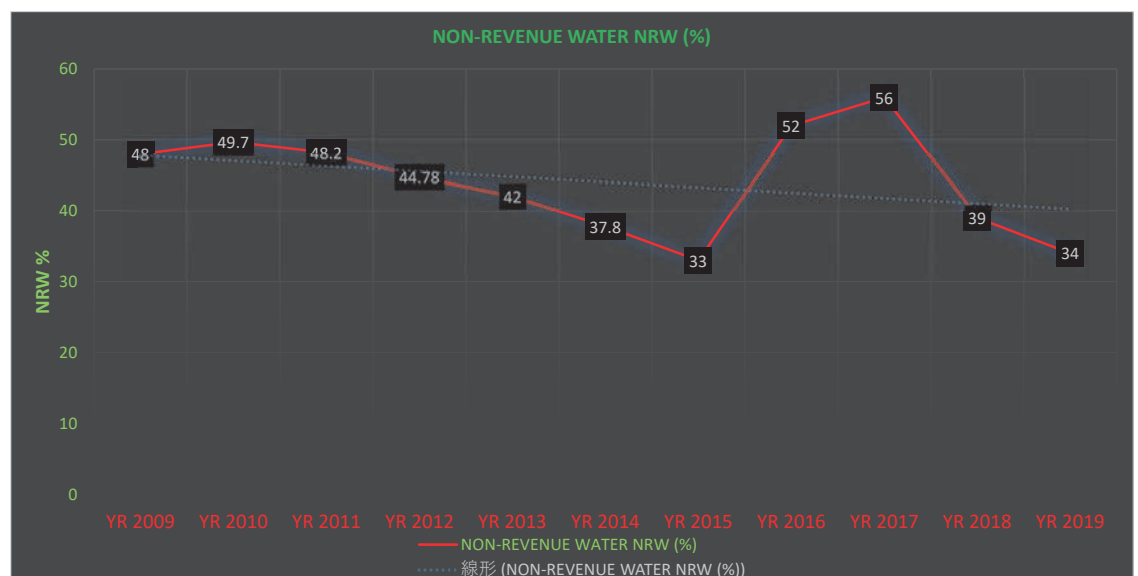
Booker Waya- Blantyre Water Board- Malawi

10

Non-Revenue water reduction activities



Non-Revenue Water Trend for BWB



Booker Waya- Blantyre Water Board- Malawi

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2. Success Story of BWB Water Supply Services

3. Reclamation of Mudi Catchment

Mudi Dam and part of catchment

- ☐ The Mudi catchment was heavily degraded between 1994 and 2014.
- ☐ Water quality deteriorated- expensive treatment.
- ☐ Reclamation happened in 2015.
- ☐ Over **57,000** trees planted in 2018/19 FY.



Booker Waya- Blantyre Water Board- Malawi

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3. Recent Challenges to Improvement of Water Supply Services

Despite improvements being made in water supply services, BWB continues to face the following challenges:

- ☐ Non-revenue water still high (34%) compared to regional average of 25%;
- ☐ High electricity costs- USD 1.3 million/month against revenue of USD 2.1 million;
- ☐ Low collection ratio for customers under post-paid metering system.



Booker Waya- Blantyre Water Board- Malawi

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Expectations from the Program

- Extensive equipment in the management of non-revenue water;
- To provide practical solutions to water supply administration challenges;
- To come up with practical action plans learned from the program for implementation at Blantyre Water Board;
- Learn from Japanese experience on water supply management.



Booker Waya- Blantyre Water Board- Malawi

15

Water Supply Administration
For Better Management of Water Supply Services
Course (A)

NIGERIA

Water Supply Administration for Better Management of Water Supply Services (A) Inception Report Presentation

1. Country: NIGERIA
2. Name: KAREEM Titilola Ganiat.
3. Position: Regional Business Manager (South East)
4. Organization: Lagos Water Corporation.

1. Outline of Water Supply Services of your Organization

- ▶ Body sentence of the profile / Background
- ▶ Lagos is the economic capital of Nigeria. It is a coastal state, the smallest; geographically located in the south western part of the country bounded by a stretch of the Atlantic ocean.

S/N	WATERWORKS	DATE COMMISSION	CAPACITY (m ³ /day)
1	Iju Waterworks	1910	202,500
2	Isashi Waterworks	1976	18,000
3	Adiyan Waterworks	1991	315,000
4	51 Mini and Micro Waterworks	Various	409,500
	TOTAL		945,000
	Akute raw water Intake Pumping Station for Iju and Adiyan waterworks	1991	

LAGOS STATE:

Area : 3,577 km²

Population : over 22million inhabitants

Water Supply System Metropolitan Lagos:

Service Area : 1,144 km²

Population Served: 6.4million

Coverage Water Supply: 33.3%

1. Outline of Water Supply Services of your Organization

INDICATORS	2006 or 2007	2016 or 2017	Goals for 2025
Staff/1,000 connections	7.6	7.4	2.5
Production capacity (m ³ /day)	945,000	945,000	1,260,000 Adiyan 2 of 315,000 under construction
Water quality	WHO	WHO/Nigerian Standard Guidelines	Nigerian standard for drinking water quality Guidelines
Coverage area	20%	33%	65%
Supply duration (hr/day)	6	18	24
Supply pressure	0.1 bar	1 bars	3 bars
Number of connections	157,400	185,000	485,000 (Adiyan ph. 2 300,000 conn. Expected)
NRW	80%	60%	40%
Collection ratio	38%	69%	80%
Staff number	1200	1376	1200

Challenges. State of affairs of operations

- ▶ Poor and Epileptic Public Power supply
 - ▶ Low water production. Unhappy Customers. Poor Revenue leading to debt accumulation and constant disconnections.
- ▶ Poor operational and maintenance procedures.
 - ▶ Poor maintenance of water production system at the waterworks and mini/micro waterworks.
- ▶ Aged and unserviceable pipe network without adequate records.
 - ▶ Operation of the pipe network is difficult.
 - ▶ Replacement due to age becomes difficult to determine.
 - ▶ Obsolete pipes due for change are not easily identified.
 - ▶ Loss of pipe or untraceable network.
- ▶ Low revenue generation.
 - ▶ Insufficient treatment inputs.
 - ▶ Irregular water supply.
 - ▶ Aggrieved customers requesting voluntary removal from service.
 - ▶ Promotion of alternative water supply which is environmentally unfriendly.
- ▶ Poor supervision and implementation of waterworks rehabilitation works.

ACTIONS TAKEN TO MITIGATE CHALLENGES

- ▶ Government provided the Independent Power Project (IPP) by Private Sector dedicated to power the combined 115 MGD of Major Water Works. This has provided reliable and constant power supply to this water works
- ▶ Under recently concluded Multilateral Agencies funded Rehabilitation and Expansion Programs:
 - ▶ Standard locally manufactured treatment chemicals were procured.
 - ▶ Treatment plants were Rehabilitated.
 - ▶ New Mini water treatment plants were built to increase water output.
 - ▶ Distribution pipe network were rehabilitated, old ones replaced with Ductile iron, Upvc and HDPE pipes.
 - ▶ Additional network of pipes with additional customers were also added to areas previously served by long poorly maintained service pipes.
 - ▶ Metering of Water supply facilities, Nodal points Selected Distribution pipes and Customers Service pipes.
 - ▶ Setting up and equipping Network Intelligence team for active Leak Detection and repair
 - ▶ Human Resources Study leading to Decentralized management for effective and quality monitoring and trainings.
 - ▶ Enumeration and Tariff Studies were carried out.
 - ▶ Setting up of Help desk for customer complaints resolution.
 - ▶ Improving the water quality by monitoring of distribution network pipes against intrusion and water wastages.
- ▶ Provision of chemical reagents to the laboratory for laboratory analysis on quality monitoring
- ▶ Setting up customers' electronic platform for effective management of customer complaints response and management

Success Story.

- ▶ Under the last World Bank assisted water supply
 - ▶ Over 23,000 thousand prepaid and mechanical meters have been installed.
 - ▶ About 200km of additional pipeline reticulation were added to replace old weak pipeline and additional service connections.
 - ▶ Timely identification of faulty meters, leakages and illegal connections.
- ▶ Decentralization of management and some level of autonomy to the Regional offices.
- ▶ Recent changes in Water supply Service Management strategy from focus of supply to downstream demand based strategy.
 - ▶ Aggressive reduction of Non revenue Water program has led to the followings:
 - ▶ Installation of meters at water works to capture bulk water produced from the treatment plant
 - ▶ Installation of Nodal and Zonal meters to measure flow into areas and districts.
 - ▶ Installation of Bulk meters on commercial and large water consumers.
 - ▶ Installation of electronic prepaid customer household meters as well as mechanical postpaid meters are ongoing. So far over 23,000 has been installed. Metering installation is still ongoing.
- ▶ The corporation has a GIS system and asset management system, which incorporates the pipeline network and appurtenances and the waterworks.

Recent Challenges to Improvement of Water Supply Services

- Rapid Urbanization and increase in population
- Rapid urbanization and increase in population has placed a lot of stress on the little available water
- Low Cost Recovery
 - Inability to meet energy cost. Irregular water supply, Inability to meet water production input costs (treatment chemicals, maintenances, operational expenses, salaries etc.), Unhappy customers, staff low in morale etc.
- High non-revenue water.
 - High flat rate billing. Customers disputing or refusing to pay as a result of intermittent water supply.
 - Low metering coverage .
 - Leakages and burst due to aging pipeline infrastructure
 - losses as a result of long service pipes.
 - losses within the treatment plants due to aging infrastructure.
- Low technical expertise to manage and maintain electronic meter and software.
- Water theft through meter bypass and illegal connections.

**THANK YOU
FOR
YOUR ATTENTION**

Water Supply Administration
For Better Management of Water Supply Services
Course (A)

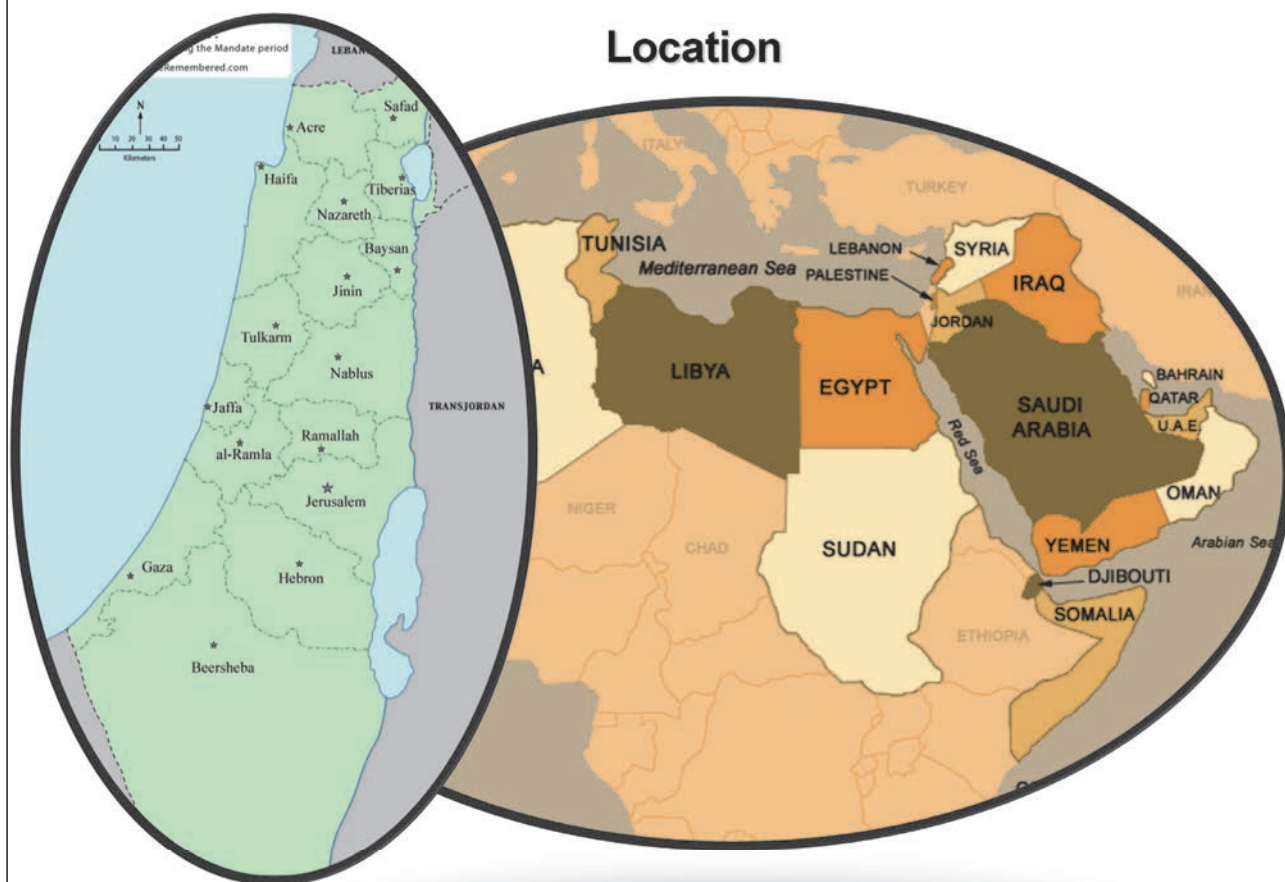
PALESTINE

Water Supply Administration for Better Management of Water Supply Services (A) Inception Report Presentation

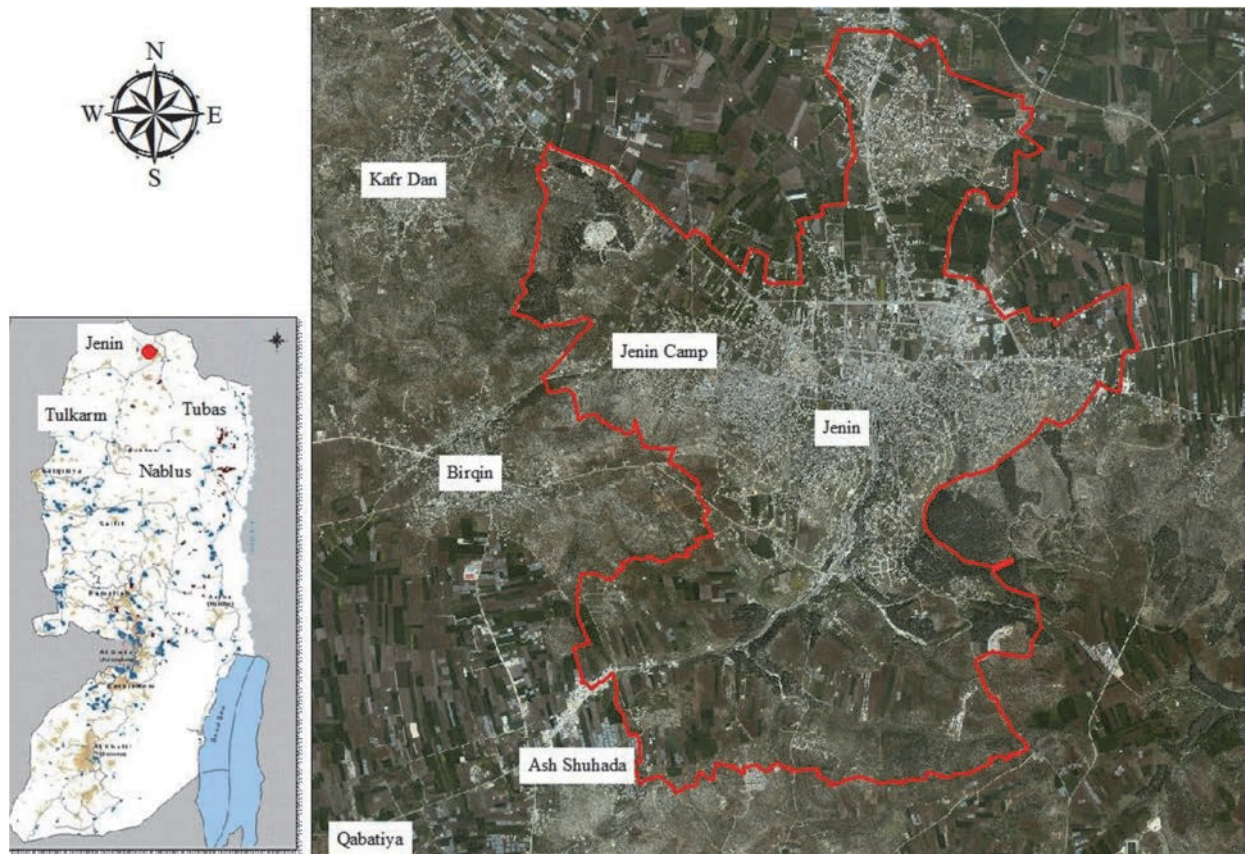
1. Country: Palestine
2. Name: Khairia Souqia
3. Position: Water Engineer / Studies and projects section
4. Organization: Jenin Municipality/ Water and Wastewater Department

1

Location



2



Introduction of Water Supply System of Jenin Municipality

- Jenin is currently supplied with water from 3 municipal wells, 3 private wells and 3 WBWD connections. There are **4 storage reservoirs** with a total **capacity of 5,720 m³**. The total **network length is about 160 km** without the house connections. The total number of **water meters is 10,200 and the approximate number of house connections about 7,000.**
- Jenin Municipality recognizes the importance of efficiently and effectively managing the water supply network as well as the central role that NRW plays in the technical and commercial activities.

Whole Country:

Area : 6220 km²

Population : 4.7 million Habitants

Coverage Water Supply: 81 %

Water Supply System/City:

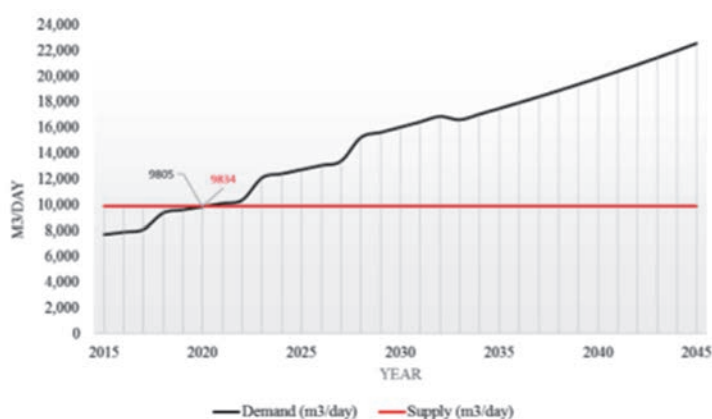
Service Area : 22 km²

Population Served: 66 thousand

Current Water Supply System of Jenin Municipality

- Service Coverages around 90% of the **total built-up areas**
- Network total length = **160 km of steel and galvanized steel pipes**
- **Dimeters** rang between 0.5 inch and 14 inch
- **15%** of the distribution System is **less than 2 inch** Diameter
- Main Transmission lines = 20 km / around 85% less than 15 years old
- Main distribution pipes = 35 km / around 75% less than 15 years old
- Distribution pipes = 95 km / around 70% less than 15 years old
- Total water quantity = **7666 m3/day**
- 75 l/c.day domestic

Water Supply and Demand



No Countermeasures

Increasing amount of supplied water

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Demand*	7,666	7,856	8,069	9,316	9,558	9,805	10,059	10,319	12,048	12,360	12,680
Potential Supply	9,834	9,834	9,834	9,834	9,834	9,834	9,834	9,834	9,834	9,834	9,834
Deficit/ Excess	2,168	1,978	1,765	518	276	29	-225	-485	-2,214	-2,526	-2,846
Additional Need in the year	0	0	0	0	0	0	225	260	1,728	312	320
Accumulated Need	0	0	0	0	0	0	225	485	2,214	2,526	2,846

Water Network



Water Quality Control

1. Daily samples for each working source, pumping stations and water tank to test residual chlorine and total coliforms. In case of any contamination, additional samples shall be taken and tested from the same sampling point.
2. At least three samples from each supply zone to test residual chlorine and total coliforms shall be taken and tested. In case of any contamination, additional samples shall be taken and tested from the same sampling point.
3. If subsequent testing for total coliform indicates positive results (i.e. contamination), the sample will be tested for fecal coliform. If fecal coliform is detected, measures shall be taken to track and address the cause of pollution and fix.
4. Monthly Samples from each Source to test physical and chemical parameters as per PWA standard (PS41-2005)
5. The tests results shall be archived in soft and hard format and issued in form of daily and monthly reports for better follow up and monitoring.

The existing laboratory equipment are in good shape and no additional equipment are required in the short term and calibration is only needed.

Water Quality Control

- How the water is treated?
 - By adding Chlorine with a concentration of 12%.
- How JM monitors and tests water quality?
 - Through necessary tests (Chemical, Physical and Biological).
- Where the samples are taken, how many samples, and how often?
 - Samples are taken from wells and water distribution network
 - 18 samples per week (Biological Tests)
 - Chemical Test: every for months.
 - Physical Test: every month.

Water Quality Control: Sample

Chemical



السلطة الوطنية الفلسطينية
Palestinian National Authority
وزارة الحكم المحلي
Ministry of Local Government
بلدية جنين
Jenin Municipality



التاريخ ٢٠١٩/٢/١٥ م

١ بند السجلات:

Parameter	Unit	Result	WHO Guideline Value
Electrical conductivity	µs		---
Solids (total dissolved)	mg/L		1000
Turbidity	NTU		5
PH	---		6.5-8.5
Dissolved O2	mg/L		---

Parameter	Unit	Result	WHO Guideline Value
Faecal coliform	Number/100 ml		0
Total coliform	Number/100 ml		0

Parameter	Unit	Result	WHO Guideline Value
Barium	mg/L		2
Fluoride	mg/L		1.5
Manganese	mg/L		0.4
Iron, ferrous	mg/L		0.3
Sulfate	mg/L		400
Copper	mg/L		20
Aluminum	mg/L		0.2
Sulfide	mg/L		---
Molybdenum, molybdate	mg/L		0.07
Zinc	mg/L		5
Phosphorus, reactive	mg/L		---
Silver	mg/L		0.01
Hydrazine	mg/L		---
Chloride	mg/L		250
Hardness	mg/L as CaCO3		500
Iodine	mg/L		---
Cobalt	mg/L		---
Nitrate	mg/L as (NO3)		50
Nitrite	mg/L as (NO2)		3

Parameter	Unit	Result	WHO Guideline Value
Barium	mg/L		2
Fluoride	mg/L		1.5
Manganese	mg/L		0.4
Iron, ferrous	mg/L		0.3
Sulfate	mg/L		400
Copper	mg/L		20
Aluminum	mg/L		0.2
Sulfide	mg/L		---
Molybdenum, molybdate	mg/L		0.07
Zinc	mg/L		5
Phosphorus, reactive	mg/L		---
Silver	mg/L		0.01
Hydrazine	mg/L		---
Chloride	mg/L		250
Hardness	mg/L as CaCO3		500
Iodine	mg/L		---
Cobalt	mg/L		---
Nitrate	mg/L as (NO3)		50
Nitrite	mg/L as (NO2)		3

Biological

Parameter	Unit	Result	WHO Guideline Value
Faecal coliform	Number/100 ml		0
Total coliform	Number/100 ml		0

Physical

Parameter	Unit	Result	WHO Guideline Value
Electrical conductivity	µs		---
Solids (total dissolved)	mg/L		1000
Turbidity	NTU		5
PH	---		6.5-8.5
Dissolved O2	mg/L		---

1. Outline of Water Supply Services of Jenin Municipality

❖ Legal Basis of Water Supply Services:

The laws and regulations for water supply system are formulated from Palestinian Water Authority.

❖ Demarcation of Water Supply Services

The ministry which is in charge of water supply in Palestine is Palestinian Water Authority.

❖ Main Actors of Water Supply Utilities

1. Mekerot. (Israel)
2. PWA.
3. Municipal wells and Private sector.

1. Outline of Water Supply Services of Jenin Municipality

❖ Mission and Vision

Water and Wastewater Department mission:

Supply water, connect customers to the wastewater network, ensure an equal water distribution for all customers, water resources and WWTP management and rehabilitation, extend, and maintain the water and wastewater networks.

WWD Vision: Customer satisfaction toward water and wastewater department services.

1. Outline of Water Supply Services


INDICATORS	2006 or 2007	2016 or 2017	Goals for 2025
Production capacity (m3/day)	6300	8644	10000
Water quality	WHO Guidelines	WHO Guidelines	WHO Guidelines
Coverage area	70%	65%	85%
Supply duration (hr/day)	6	8-10	12-14
Supply pressure	7 bar	11 bars	4 bars
Number of connections	6720	10200	15000
NRW	43.8%	54%	25%
Collection ratio	53%	39%	90%
Staff number	28	35	120

13

Sample of Water Bill **in Jenin Municipality**

Jenin Municipality Water and Sewerage Dept.

Jenin - Nazareth St. - Industrial Circle
Tel: 0423602023, Fax: 0423602024
Website: www.emunicipal.pn/jenin
Email: waterdept@yahoo.com



بلدية جنين دائرة المياه والصرف الصحي

عن شارع ناصرة - دور الصناعية
هاتف: 0423602023 فاكس: 0423602024
الموقع الإلكتروني: www.emunicipal.pn/jenin
البريد الإلكتروني: waterdept@yahoo.com
البريد الفوري: 0423602023

(Original)

رقسم الفاتورة:	10143451
رقسم الفاتورة - تسهيرو:	كشور اول
تاريخ الفاتورة:	31-12-2018
آخر موعد الدفع الفاتورة:	15-01-2019

فاتورة مياه
Water Invoice

(أصلية)

رقم الاشتراك:	W6964
رقم المواطن:	0014032570

اسم المشترك:

العنوان:

رقم العقيدة:

نيل جلال خضر تميم - مياه - 32570

حي شرقى - ش الهسايين - 7

00001 7 285

مبلغ الاستهلاك

36

كمية الاستهلاك

القراءة السابقة

2107

القراءة الحالية

2143

مبلغ الفاتورة

6.20

0.00

0.00

0.00

18.40

180.44

مصاريف شبكة المياه

غرامة تأخير

مقررات

بذل فرق الاستهلاك

مصاريف صيانة

مبلغ الفاتورة الحالية

تاريخ القراءة الحالية:

03-12-2018

04-11-2018

مبلغ الاشتراك:

من 0 إلى 34.34

من 51 إلى 999999.9

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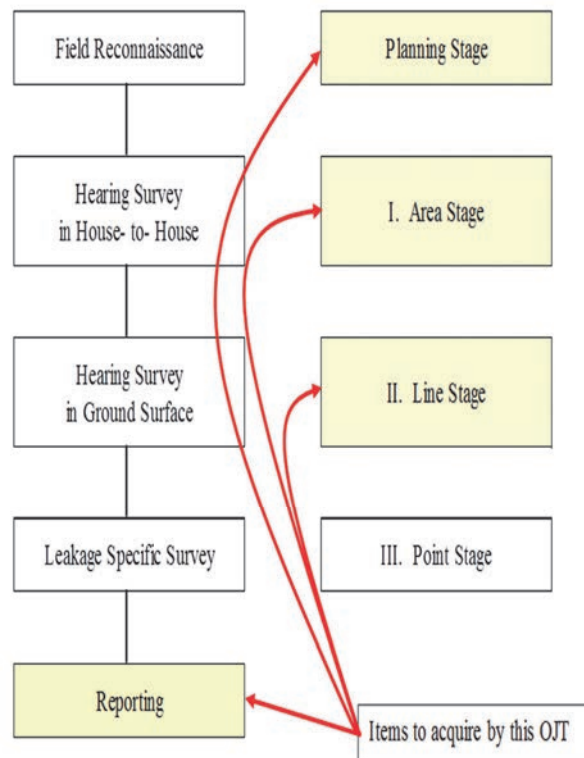
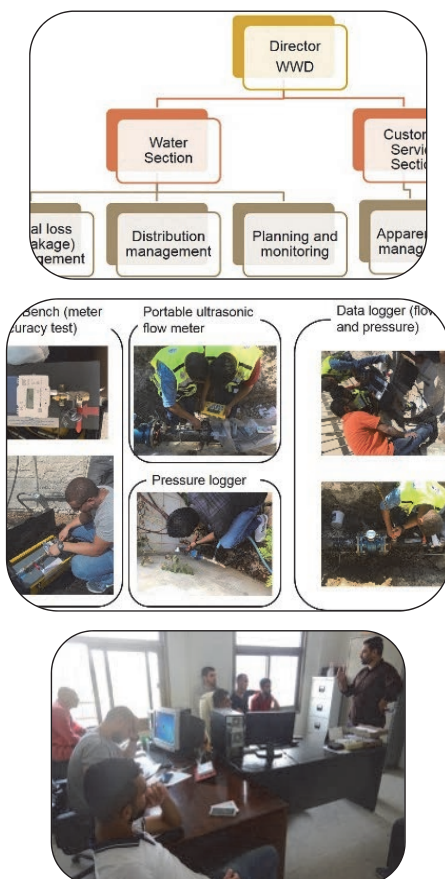
مبلغ الاشتراك:

من 0 إلى 34.3

2. Success Story of Water Supply Services

1. Increasing the amount of supplied water.
2. Increasing the bill collection ratio within 3 months in some areas from an average of 30% to 70%.
3. Adopting prepaid water meter in order to increase bill collection ratio and reduce NRW ratio.
4. Rehabilitating some sections in the network to reduce the losses.
5. Capacity building for Water and wastewater department staff, including on job training for the technicians.
6. Implementing advanced technology in Leak detection.

15





Area
Stage



Line
Stage

Leak Detection and Repairing

Potential leakage
locations (GIS)

After measuring
initial NRW ratio,
digging, identifying
leakage and repair



Samples of Technical Training for Staff

S. N.	Training Subjects	Off-the-Job Training	On-the-Job Training	Level	Remarks
1	Underground leak detection equipment	√	√	Basic	
2	Underground leak detection survey		√	Basic	
3	Pipe and metal locating tools		√	Basic	
4	Leak repair and pipe connection methods	√	√	Basic	
5	Flow and pressure measurement, data logging, download and analysis	√	√	Intermediate	
6	Preventive maintenance of water network, pipes and valves	√		Basic	
7	Introduction to IWA water balance, NRW components, and NRW calculation method	√		Intermediate	
8	NRW countermeasures	√		Basic	
9	Distribution zoning and DMA management, pressure management	√		Intermediate	
10	Performance indicators	√		Advance	Engineers & senior technicians
11	Network hydraulics	√		Advance	Engineers & senior technicians
12	Customer metering	√		Basic	

3. Key Issues and Challenges to Improvement of Water Supply Services

Key Issues

Capacity Building: to formulate plan for water service management of Jenin Municipality.

NRW reduction team capacity of Jenin Municipality to be strengthened.

Bill collection of Jenin Municipality is low and shall be increased.

3. Recent Challenges to Improvement of Water Supply Services

Issues / Problems		Countermeasures	Expected outcomes	Progress
Water supply condition is not satisfactory	Irregular supply schedule	<ul style="list-style-type: none"> Fix supply schedule rationally based on pump and reservoir capacity 	<ul style="list-style-type: none"> Will have a fixed supply schedule Reduced inconvenience to customers due to irregular supply 	<ul style="list-style-type: none"> JM is to prepare and announce a supply schedule
	Highly uneven pressure and supply duration	<ul style="list-style-type: none"> Identify constraints Suggest improvement needs such as new pumps and pipe change with the help of suitable hydraulic mode 	<ul style="list-style-type: none"> Water distribution will be more equitable Pressure variation will be less 	<ul style="list-style-type: none"> Main constraints (inadequate reservoir size, only one pump, and pump head much higher than required) identified Hydraulic model of PA1 prepared and used to identify suitable pump specification and pipe change need JM is in the process of procuring two new pumps Replacement of pipe will follow

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Challenges

Sustainability of organizing the NRW teams.

Increase the water supply hours

Stop the depts and increase the collection ratio

Secure the fund for infrastructure project for rehabilitating the water NW

Water Supply Administration
For Better Management of Water Supply Services
Course (A)

RWANDA

Water Supply Administration for Better Management of Water Supply Services

Country: RWANDA

Name: NDAGIJIMANA Joseph

Position: Water Supply Engineer

Organization: Water and Sanitation Corporation
Limited (WASAC Ltd)



1

Country Overview



Rwanda is located in the great lakes region of East Africa. Its Neighbouring countries are Uganda in the North, Tanzania in the East, Burundi in the South and Democratic Republic of the Congo in the West. The country covers an area of 26,338 Km² and an estimated population of 12 million people, with an annual population growth rate of 3 %.

2

National targets

The water Sector is committed to reaching ambitious targets in water supply and sanitation, with the vision to attain 100% service coverage by 2020. Water supply and sanitation services are critical drivers for social and economic development, poverty reduction and public health. To achieve these targets, the Sector needs to increase drinking water access of 4% every year.

• Current Status

- National drinking water coverage : 87.4%
- Urban drinking water coverage : 95.8%
- Rural drinking water coverage : 85.4 %

Water supply services in WASAC Ltd

	2015-2016	2016- 2017	2017- 2018
Staff/1000	5/1000	5/1000	5/1000
Production capacity(m3/Year)	43,558,705	45,253,292	48,079,315
Water Quality	WHO	WHO	WHO
Coverage area	82%	84%	87.4%
Supply duration	14-16 h	14-16 h	22-23h
Supply pressure	2-6 bars	2-6 bars	4-6 bars
Number of connection	172,747	189,642	214,122
NRW	35.7%	37%	38.9%
Collection ration	59	59	97%
Staff number	793	820	1364

Success story of Water Supply Services

- WASAC treats and distributes clean water Countrywide to supply water to all populations especially those in urban habitats.
- 3,917,873 residents of 13 urban areas including Kigali City are the population targeted for clean water services
- WASAC manages 22 treatment plants which provides clean water (127,636m³ per day) through 11,490,000m of pipes to reach 192,301 Its water supply connections which supply various categories of users (Households, Industries, Publics services, ...)
- WASAC systems combines a new and an old network (some of pipes are old from colonial period) which are the main cause of leakages influencing the gap between the supplied and the billed quantity of water

5

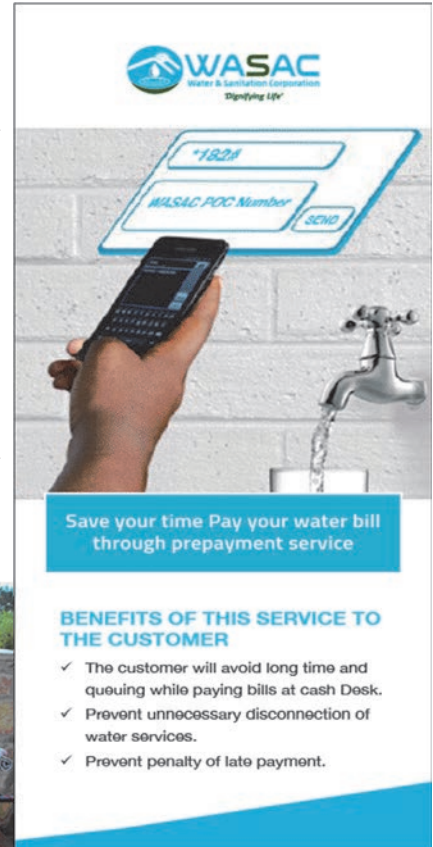
Success story of Water Supply Services(cont'd)

- WASAC faces regularly water losses due to water leakage in the network, and fraudulent connections.
- Water registered for billing compared to quantity supplied to networks is an indicator of distribution efficiency
- New pipes have been laid and old pipes rehabilitated.
- Provision of meter to every client has been made so that each meter could be read and fraud reduced.
- Many development partners supporting the water supply and sanitation sub sector. These include Vitens Evidens International, JICA, Water for People, UNICEF, WHO, World Vision, Humburg Wasser

6

Water Rates And Bill Collection System

- The WASAC bills are issued on the basis of actual readings recorded from the meter by our Meter Readers.
- All water services are billed monthly. Customers can settle their bills at the WASAC bank accounts indicated on their bills or by using a mobile phone.
- All WASAC bills for water supply, meter rent, repair works and any other services are payable before the deadline indicated on the bill

WASAC
Water & Sanitation Corporation
Empowering UPR

*182#
WASAC POC Number
SEND

Save your time Pay your water bill through prepayment service

BENEFITS OF THIS SERVICE TO THE CUSTOMER

- ✓ The customer will avoid long time and queuing while paying bills at cash Desk.
- ✓ Prevent unnecessary disconnection of water services.
- ✓ Prevent penalty of late payment.

Water Prepayment Service

In a bid to promote good service delivery and revenue collection, the Management of WASAC is implementing Water Prepayment Services.

This service consists of the following:

Prepayment between WASAC and Customer who prefer to pay Bills in advance. Customers on this prepayment system will sign an agreement with WASAC to pay for their water bills according to the previous average consumption of six months or one year depending on the choice of the customer.

Customer Category	Block Consumption per month	Applied Tarif FRW (VAT exclusive)
Public Tap	Flat RATE PER m ³	323
Residential	0-5m ³	340
	6-20m ³	720
	21-50m ³	845
	Above 50m ³	877
	0-50m ³	877
	Above 50m ³	895
Industries	Flat rate per m ³	736

- The water supplied by WASAC is treated according to the international standards and it benefits of a regular control at water treatment plants and distribution network
- In order to meet current water standards, specific water purification steps are taken that include: Physical and chemical treatment; and Laboratory analysis to assure the water quality.
- After these steps have been taken and it is ascertained that the water is safe, it is then distributed.



Supplied City, Town or Center		Name of water treatment plant	Date of installation/extension	Installed capacity (m3/day)	Average of water Production/May-2017
Kigali City	Nyarugenge, Kicukiro, Gasabo	Kimisagara WTP	1981/1988	24,000	24,367
		Nzove WTP	2003/2009/2016/2017	50,000	37,641
		Karenge WTP	2008	15,000	15,578
Southern	HUYE	Kadahokwa WTP	1982/2005 /2015	8,500	5,833
	MUHANGA	Gihuma WTP	1987/2015	4,320	3,990
	NYANZA & RUHANGO	Mpanga WTP/CU	1984/2006/2014	3,840	1,471
	NYANZA & RUHANGO	Mpanga WTP / LV WATSAN	2017	5,040	1,786
	NYAMAGABE	Gisuma WTP	1987/2005	1,200	1,331
Western	RUBAVU	Gihira WTP	1987	8,640	8,409
	RUSIZI	Cyunyu WTP	1987	1,300	494
	KARONGI	Kanyabusage WTP	1986	850	975
Northern	MUSANZE	Mutobo WTP	1987/1994	12,500	6,155
	GICUMBI	Nyamabuye WTP	1988	1500	1,012
	RWAMAGANA	Muhazi WTP	1986/2004/2014	3,960	1,299
Eastern	RWAMAGANA	Muhazi WTP / LV WATSAN	2017	2,800	791
	BUGESERA	Ngenda WTP/CU	1998/2014	4,840	3,140
	NGOMA	Rwasaburo WTP	1986	1000	847
	NYAGATARE	Cyondo	1982/2014/2015	5,000	2,843
	NYAGATARE	Gihengeri	1982/2016	3,500	1,572
	NYAGATARE	Tovu	1982/2012/2015	1,200	112
	NYAGATARE	LV WATSAN	2017	2,400	400
Total				161,390	120,045

WTP	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Total
Kimisagara	848,713	856,098	820,218	849,267	860,740	901,218	871,931	664,398	713,424	684,263	695,110	710,494	9,475,3
Karenga	449,170	456,025	437,283	471,964	452,826	480,526	474,393	431,306	472,602	443,537	483,853	415,521	5,469,0
NZOVE	1,299,524	1,314,653	1,164,050	1,010,617	1,115,244	1,190,776	1,226,246	1,096,184	1,248,052	1,160,034	1,291,772	1,351,999	14,469,2
Kadahokwa	124,208	118,920	136,640	145,835	174,394	138,220	175,230	153,900	153,495	153,448	159,265	172,919	1,806,4
Gihira	287,343	280,816	264,667	269,630	275,790	294,669	290,636	267,809	283,105	241,699	277,297	285,039	3,318,4
Mutobo	211,900	219,590	201,430	213,040	214,900	216,350	206,200	191,240	212,810	194,110	199,920	207,470	2,488,9
Gihuma	93,064	82,048	72,821	85,781	80,987	81,673	79,216	77,677	80,225	83,135	90,735	95,066	1,002,4
Cyonyu	115,309	115,947	103,662	97,064	88,961	94,519	90,172	88,647	105,623	96,287	100,543	110,156	1,206,8
Gisuma	43,172	41,636	39,043	42,276	38,828	41,960	41,482	38,644	43,186	42,194	42,630	45,716	500,7
Mpanga	117,915	108,114	107,051	98,905	97,847	100,236	93,563	88,981	94,491	89,281	98,193	90,613	1,185,1
Muhazi	131,605	129,435	123,053	138,767	126,007	134,787	135,749	123,406	128,735	114,427	121,798	132,131	1,539,9
Rwasaburo	42,415	48,302	45,046	44,612	44,188	46,691	48,062	45,032	44,213	44,633	52,102	60,342	565,6
Kanyabusage	37,135	36,044	37,144	38,013	36,837	37,809	36,640	33,568	37,671	36,798	37,234	38,456	443,3
Nyamabuye	50,420	49,800	48,365	47,822	47,593	50,500	49,185	44,299	43,798	43,069	45,593	53,047	573,4
Nyagatare	241,829	231,422	172,491	169,695	171,698	189,153	206,109	202,401	200,236	162,323	186,415	221,019	2,354,7
Ngenda	107,275	105,225	99,174	104,149	102,978	105,789	99,509	99,341	105,765	109,455	110,318	109,162	1,258,1
Kibonabose	12,340	12,210	11,440	12,450	12,620	13,030	13,320	12,070	13,390	12,893	13,180	12,910	151,8
Gashyuha	22,485	22,452	25,384	16,528	23,049	28,492	21,241	17,782	23,036	22,395	23,347	22,727	268,9
Total	4,235,821	4,228,737	3,908,961	3,856,414	3,965,487	4,146,398	4,158,884	3,676,685	4,003,857	3,733,981	4,029,304	4,134,787	48,079,3

1. Water losses of any nature which has many consequences from finances resources to environment wastage
2. Inappropriate technology in water supply services
3. Lack of funds for large scale projects implementation
4. Non revenue Water is still high

Authorized consumption	Revenue water	Billed authorized consumption	27,960,613 m3/year 61.1%
	Non-Revenue Water (NRW)	Unbilled authorized consumption (ex. firefighting, cleaning)	1,783,360.5 m3/year (3.9%)
Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	4,572,719.1 m3/year (10%)
		Physical losses (Leakage)	11,431,797.759 m3/year (25%)

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Strategies for NRW Reduction

1. Put in place a team of leak detection
2. Localization of leakage on pipeline system using instrument from JICA team in RWANDA.
3. Maximise gravity water supply
4. Permanent pressure monitoring
5. Network zoning for water balance (under execution)
6. Digitalization of water network

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THANK YOU FOR YOUR ATTENTION

MURAKOZE

Water Supply Administration
For Better Management of Water Supply Services
Course (A)

SUDAN



Republic of Sudan

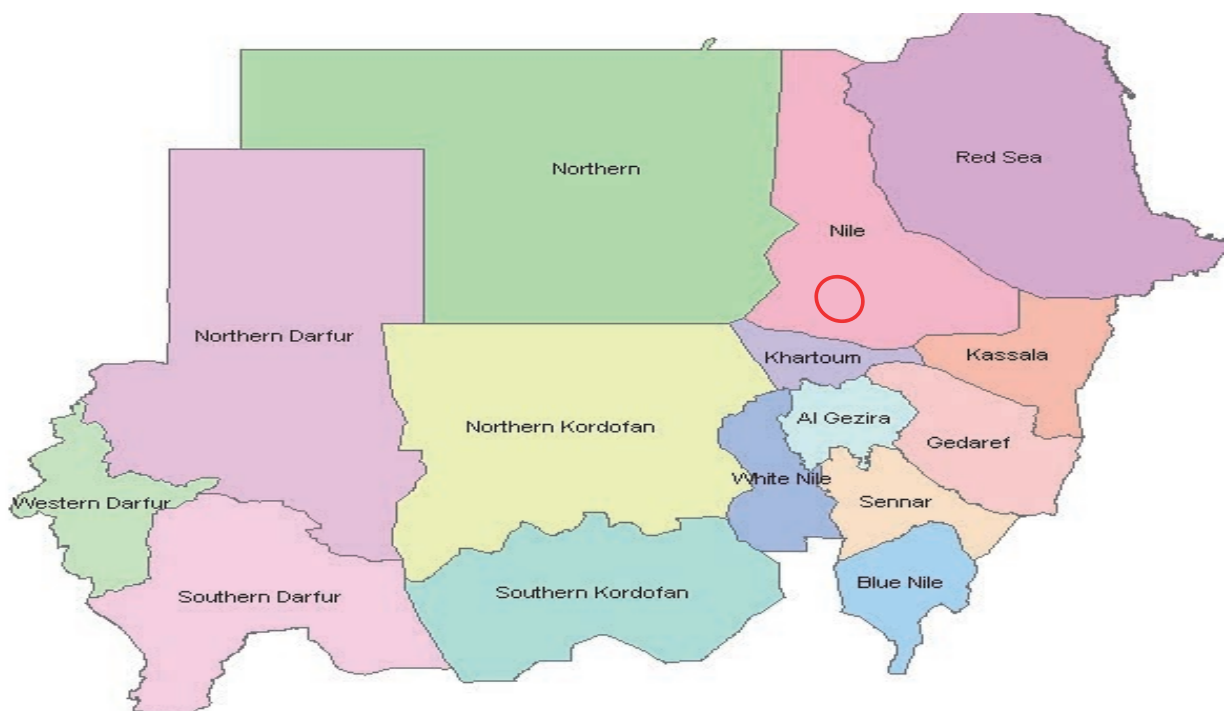
Water Supply Administration for Better Management of Water Supply Services

Inception Report Presentation

Name : IZELDIN ELSAMANI ABDALLA ELSHEIKH

Organization: Drinking water and Sanitation Unit
DWSU

Map of Sudan States



The mission of my Organization (DWSU)

- Management to State Water Corporations
- Feasibility studied, plan, Design and construction, supervision to water Projects in all Country.
- Procurement and supply water State Corporations with all water inputs (materials, equipment, and chemical....etc.).
- Capacity Building of water Staff in country.
- Monitoring and Evaluation of water services in all States.
- Construction Supervision of water projects in all states.
- Monitoring and Evaluation of water facilities and their managing system in all country.

Present Mission/Vision

- The DWSU is under the umbrella of the ministry of water resources and electricity while the state water corporations are the main actor at the state level and they are working under the state government
- The vision of DWSU that the water access is the main factor for national peace .
- The mission of the DWSU is, all Sudanese have the right to access to adequate, affordable and sustainable safe water supply, and the improvement of water standard for public health and the environment.
- My vision equity in sharing water
- My mission to rise the water staff skills to utilize the water resources.

Basic Information of Shandi town

Coverage area	36 (sq.km)
Population Served	110,000
Collection ratio	40%
Production capacity	6000 (m ³ /day)
Supply duration	20 (hr./day)
Supply pressure	8 bars
Non-Revenue	35%
Water quality	Good
Staff number	30
Number connections	of 14,450
Staff/1,000 connections	2

Management of water Quality

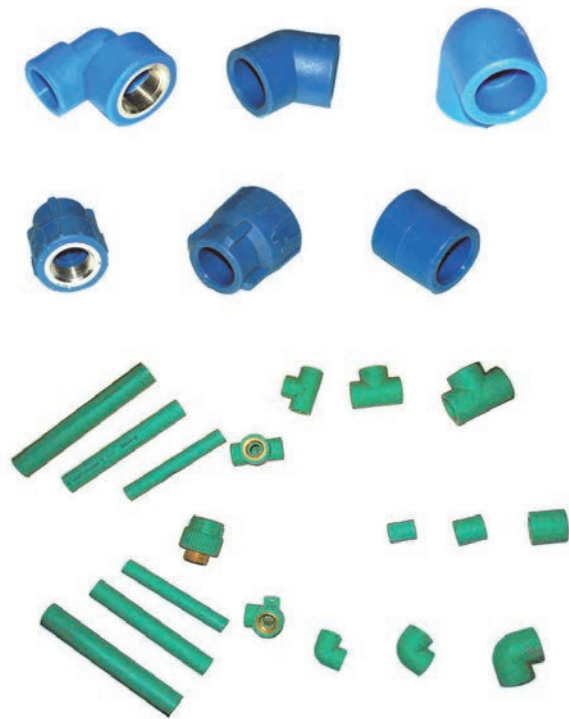
- For surface water, we used to deal with major factors (turbidity, TDS and algae)
- Despite we do not have a serious industrial pollution in the Nile sometimes it happens out-break of some diseases. The absence of alarming systems in water treatment plants implies a gap in our plan to deliver safe water. There is only one central laboratory for water analysis in the Khartoum state as federal lab. No one in the other states, and we do not have a reliable ones.
- By the efforts of some international organization (UNICEF provided many equipment & JICA established a training laboratory in DWSU) we provided some states by the necessary equipment.

Length of Pipelines by Material

Material type	Length /km
ASB	2245.463
DIC	183.915
FRP	0.152
GRP	0.024
HDPE	2774.966
LDBE	6.473
HPD	0.110
LDPE	6.473
PE	1.459
ST	2.101
UPVC	2398.014
FIB	4.481



PPR Fitting – WSAM PIPES CO LTD



Reduction of Non-Revenue Water

The Non-Revenue water one of majors problems in the water supply field and the following issues affect to decrease the problem

- The leakage in the pipe networks as mentioned before we don't have a monitoring systems or leakage dictation technology depending on visual inspection which it may delay the maintenance process in result more leakage, the unavailability of fittings and equipment also delay the process
- The unregistered consumers and illegal connections
- Most of institutions, ministry and military areas don't paying their bills which considered as non- revenue water

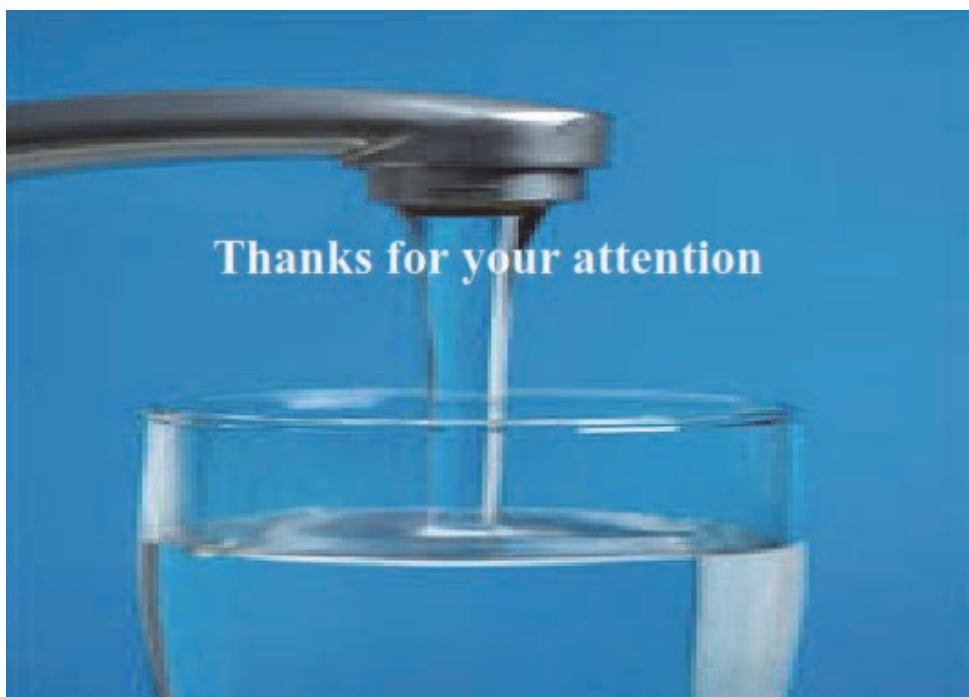
- Some actions obtained to reduce the non-revenue for example the state of Khartoum added ten pounds to the monthly bill to be use in pipe networks replacement; the monthly bill should be paid with prepaid electricity bill, although in some areas no prepaid electricity meters.
- Any consumer supplied through pipe 4 inches or more should have prepaid water meter.

Water Tariff System

- Approving the flat rate pricing system depending on the classification of the area (pipe size)
- collecting the bills through the electricity corporation take over the role of the accounting system of water supply services.

▪We expected from the government of Japan and JICA technical support by providing us equipment and machines related to water supply and mentoring system to utilize our supply system. In the same time with Japanese utilities can involve in training programs to rise the skills of our staff

▪The Japanese private companies have opportunity to invest in this field due to availability of water resources and the need to more water supply systems.



Water Supply Administration
For Better Management of Water Supply Services
Course (A)

TANZANIA

**THE UNITED REPUBLIC OF TANZANIA
ZANZIBAR REVOLUTIONARY GOVERNMENT**

**Inception Report Presentation:
Water Supply Administration for Better
Management of Water Supply Services (A)**

PRESENTED BY

HAWA ABDALLA OMAR
ASSISTANT CUSTOMERS BILLING

ZANZIBAR WATER AUTHORITY (ZAWA)
MINISTRY OF LANDS, HOUSING, WATER AND
ENVIRONMENT
ZANZIBAR – TANZANIA.

3 topics:

- **1. Outline of Water Supply Services of My Organization**
- **2. Success Story of My Water Supply Services**
- **3. Recent Challenges to Improvement of Water Supply Services**

Picture of my country



Zanzibar and Pemba



Whole Country:

Area : 2461 km²

Population : 1.3 million Habitants

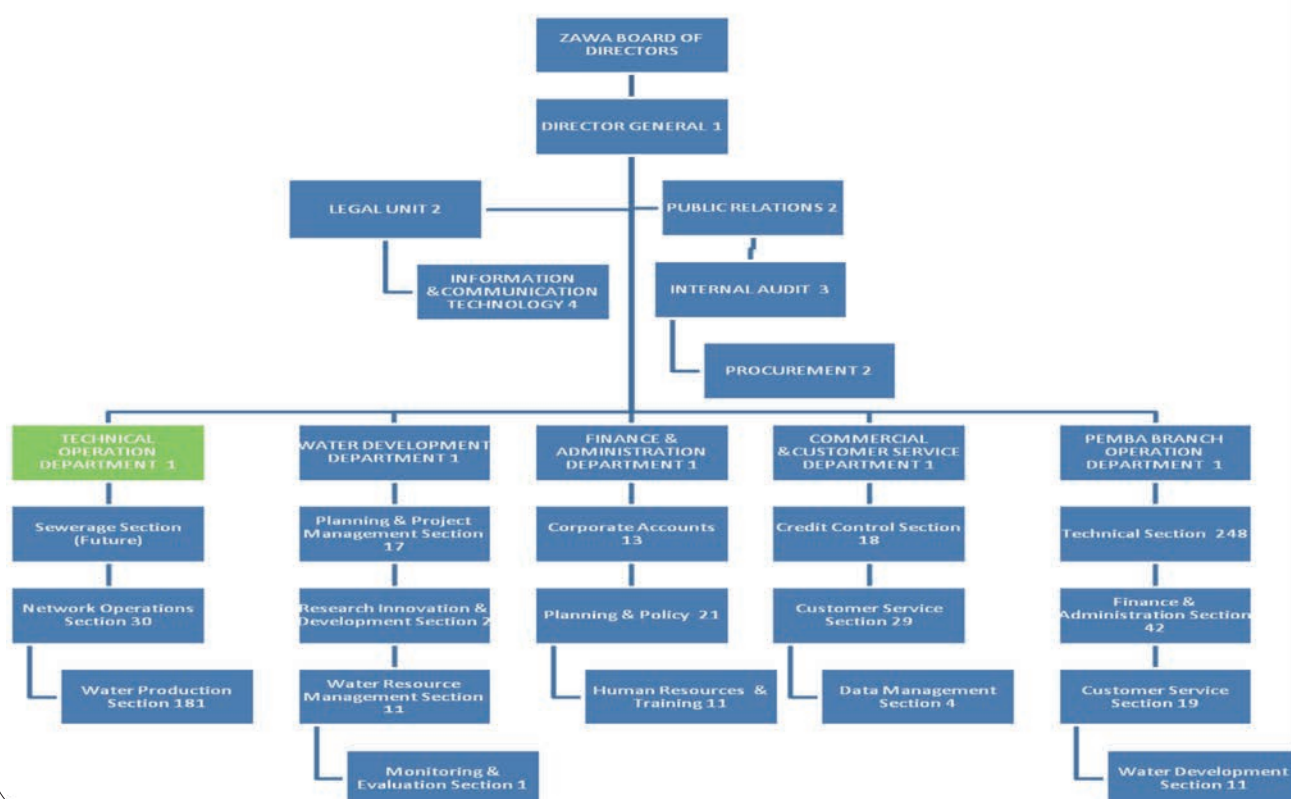
Coverage Water Supply: 87.5 %

Water Supply System/City:

Service Area : 77.8 km²

Population Served: 1,579,873 million/ thousand

ORGANIZATION STRUCTURE OF ZANZIBAR WATER AUTHORITY



Water Supply Services of my Organization

INDICATORS	2006 or 2007	2016 or 2017	Goals for 2025
Staff/1,000 connections	11	6	3
Production capacity (m3/day)	895,900	107,865.29	1,145,583.3
Water quality	None	WHO and Country standard	WHO and Country standard
Coverage area	65%	74%	90%
Supply duration (hr/day)	24hrs/Rationing	24hrs/Rationing	24/7hrs
Supply pressure	2bar	4 bar	5bar
Number of connections	33,900	50,040	132,110
NRW	85.2%	63 %	35 %
Collection ratio	20%	65%	80%
Staff number	630	585	500

Success Story of Water Supply Services (ZAWA)

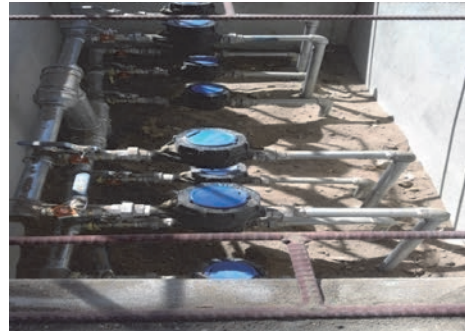
- **Improved water and sanitation services**

- Exchange old pipes in order to get pure water without losses.
- We need to rehabilitate of pipes network in order to reduce water losses and to increase water pressure.



- **Improve meter accuracy**

- Meter right sizing *Applied*- Continuous
- Replaced all faulty meters*Done* – Quarterly
- Meter testing and calibration*Done* On demand
- Starting Main ford at pilot area (Makadara) - Continuous



Success Story of Water Supply Services (ZAWA)

- We start to use mobile services for the payment of water(POS)



- Elevated tank have capacity one for 1000cm³ and second one 2000cm³



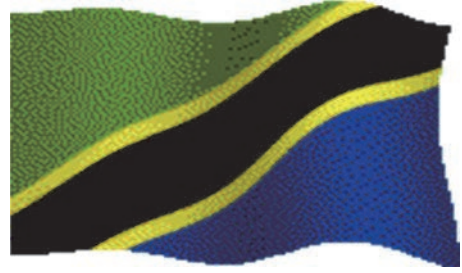
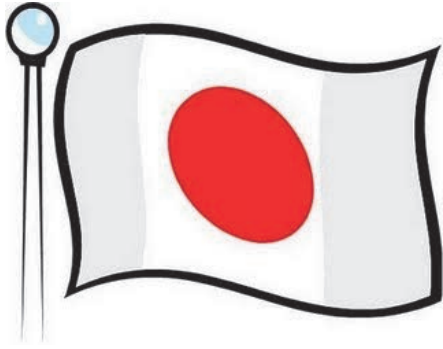
Success Story of Water Supply Services (ZAWA)

- Starting to use new tariff in 2016

Years back we were use the old tariff which is too small so that our revenue also was too small, when we start to use new tariff its improved our revenue.

Recent Challenges to Improvement of Water Supply Services

- We need to rehabilitate of pipes network in order to reduce water losses and to increase water pressure.



THANK YOU FOR YOUR ATTENTION

Water Supply Administration
For Better Management of Water Supply Services
Course (A)

TUNISIA



Country Report : TUNISIA



- Program:

Water Supply Administration for Better Management of Water Supply Services (A)

Presented by: SLITI IMEN
Position: ENGINEER HEAD OF
DEPARTEMENT

JUNE 23 /2019 TO JULY 06 2/019



TUNISIA



Country: TUNISIA

Location	North Africa
From Japan	11,200 km
Area	162,155 km ²
Population	11,551,000 persons
Coverage Water Supply	86,4%

Water Supply System:

Coverage Area : 54 154 Km

Population Served: 2,884,958



1. THE WATER SUPPLY SYSTEM

The **State** plays a fundamental role in water resources management, mainly in surface water development and in the exploitation of deep groundwater.

So **the ministry of Agriculture** is the supervisory authority organizing the various bodies responsible for water management :

CRDA (Regional commissions to agricultural development) : ensures the preservation of natural resources, the watershed management, the realization of hydraulic equipment...

GDA (Water User Associations) : manages irrigated lands and responsible for the maintenance of the irrigation network and the distribution of water to their members

SECADENORD : ensures the monitoring of the Medjerda Canal (the unique river in Tunisia) and the infrastructures of water supply

SONEDE : the only company in the country to provide potable water



1. THE WATER SUPPLY SYTEM

The National Water Distribution Utility was created
on the 2nd of July 1968.

It is under the supervision of the Ministry of Agriculture.

It is a public compamy.

It was created to ensure :

- Water production: production, treatment and transport,
- Water distribution: management and maintenance of drinking water network and equipment and management of customers,
- Development: studies, works and supply.

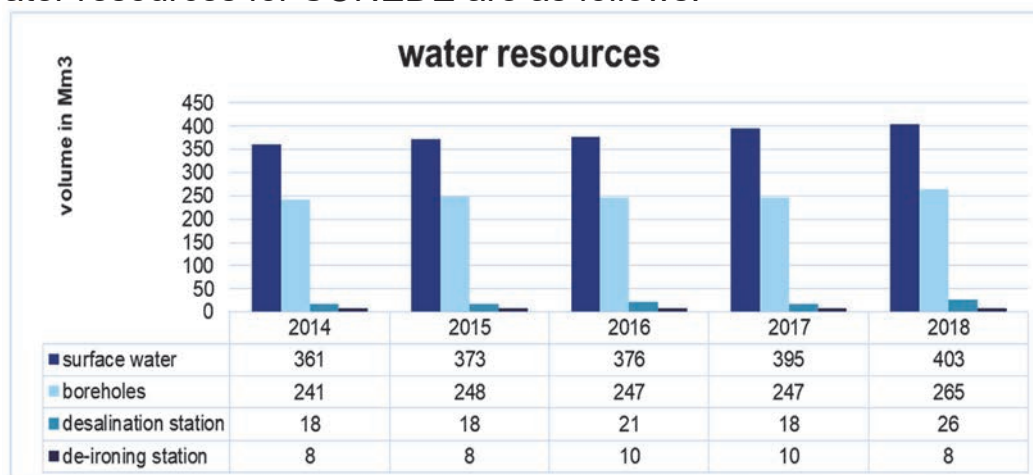


1. THE WATER SUPPLY SYSTEM

WATER RESOURCES

The use of water in Tunisia is divided as follows:

- 83% of the resources used are for agriculture.
- 17% of the resources are used for drinking water for uses: domestic, industrial, tourist
- Water resources for SONEDE are as follows:



1. THE WATER SUPPLY SYSTEM

❖ Performance Indicators (PI)

INDICATORS	2007	2017	Goals for 2025
Production capacity (m ³ /day)	1 259 444,5 m ³ /day	1 869 505,5 m ³ /day	2 453 583,3 m ³ /day
Water quality	THE TUNISIAN STANDARD NT.09.14	THE TUNISIAN STANDARD NT.09.14	THE TUNISIAN STANDARD NT.09.14
Coverage area	43 520 Km	54 154 Km	70 400 Km
Supply duration (hr/day)	24 hours	24 hours	24 hours
Supply pressure	1,5 bar to 4 bar	1,5 bar to 4 bar	1,5 bar to 4 bar
Number of connections	81 566	91 773	105 000
NRW	33,6%	25,8%	14,9%
Collection ratio	81,4%	84,6%	87,7%
Staff number	6851	6409	7000



2. Better management of water supply

Natural phenomena:
(sechresse, floods, the
drawdown of the water table)



the water quality management
system

the increase of the demand of water

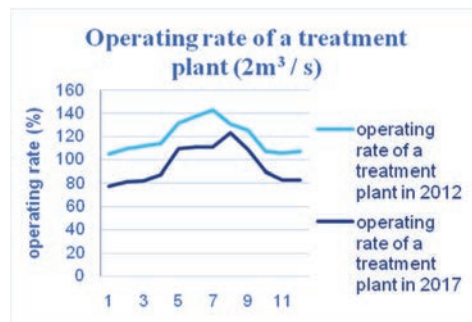


2. Better management of water supply

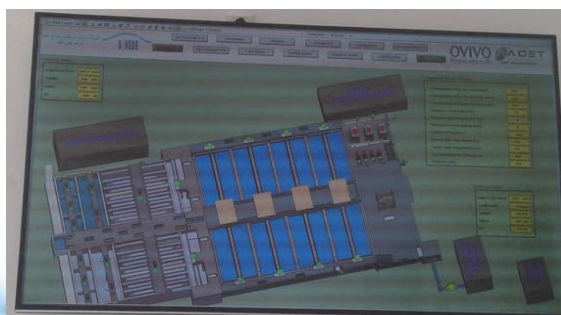
2.1 Water supply services

In the capital of tunisia:

- 2012: Achieve of the treatment plant at a flow rate $2\text{m}^3 / \text{s}$



- 2018: Achieve extending treatment plant at a rate of $1\text{m}^3 / \text{s}$ for a total flow rate of $3\text{m}^3 / \text{s}$.





2. Better management of water supply

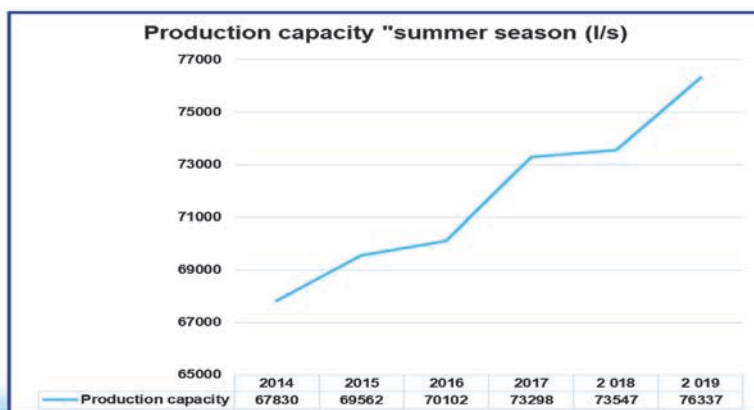
In south Tunisian:

- 2018: Achieve of the seawater desalination plant DJERBA of flow rate 50000 m³ / day extensible to 75000 m³ / day
- 2021: Achieve of the seawater desalination plant ZARAT of flow rate 50000 m³ / day extensible to 75000 m³ / day
- 2022: Achieve of the seawater desalination plant SFAX of flow rate 100000 m³ / day

In centre Tunisian:

- 2023: Achieve of the seawater desalination plant SOUSSE of flow rate 50 000 m³ / day

Among the short-term actions:

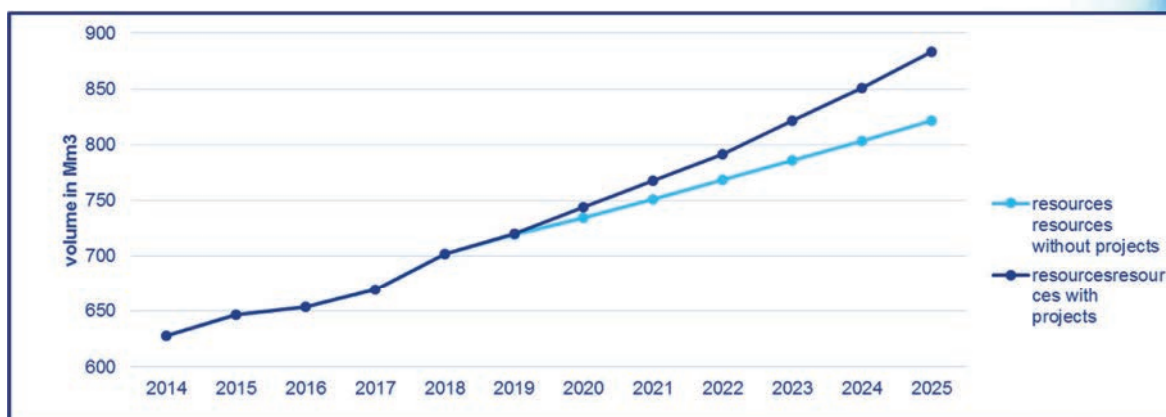


2. Better management of water supply

2.2.FUTUR PROJECT

Reorganization and addition of new water supply transfer systems to strengthen resources

- ❑ The creation of a large dam of 28 Mm³ of water named "KALAA with a new treatment plant
- ❑ The creation of a processing complex of flow rate 2m³ / s named "BJEWA »





2. Better management of water supply

In addition to the management and monitoring of the water supply system, there is another important approach to water resource management :

- ❖ Strengthening water resources through the search for new convention;
- ❖ Resources and saving the existing ones;
- ❖ Reuse of wastewater;
- ❖ Desalination of water Salmon;



3. WATER QUALITY MANAGEMENT SYSTEM

3.1. IMPROVING THE PRODUCTION SYSTEM

The strategy for improving a system of production and distribution in accordance with ISO standards:

SONEDE began a quality initiative which is based on ISO 14001 and 9001: 2015 for desalination plants Djerba, Zarzis.

- ❖ 2018: SONEDE took the ISO 14001 and 9001 certificates for desalination plants Djerba and Zarzis





3. WATER QUALITY MANAGEMENT SYSTEM

❖ TSM-ARAB (a first pilot project in the Middle East and North Africa) the drinking water treatment plant located was awarded in 2015.
SONEDE took the first certificate (certificate of sustainable technical management of Arab water services)



3. WATER QUALITY MANAGEMENT SYSTEM

3.2. water quality management system

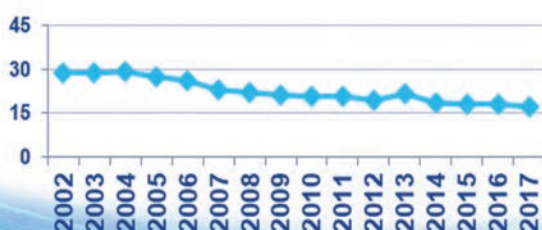
Effect of climatic conditions (drought and flood Reduction of water table following the droughts) on the quality of water (change of organoleptic parameters: flavor, turbidity, salinity)

Instability of water quality in the geological aquifer of central and southern Tunisia (need for specific chemical treatment or desalination)

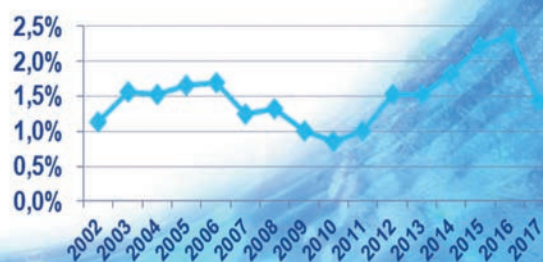
Change in water quality at the distribution network level is affected by the aging of the pipes (chemical and biological reaction: biomass formation and physics)

No control of the disinfection system with bleach (sodium hypochlorite) at the points of distribution (tank, tarpaulin ...) hence the variation in the rate of unsuitable cases.

Number of withdrawals per 1000 subscribers



% of unsuitable cases





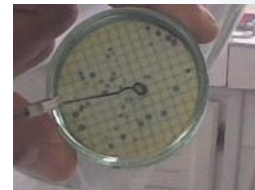
3.WATER QUALITY MANAGEMENT SYSTEM

SONEDE has the necessary infrastructure to ensure, by itself, the control of the physicochemical and bacteriological quality of the Production until Distribution.

Indeed she has:

- of a Central Laboratory in Tunis
- of 2 Regional Laboratories in Sousse and Sfax
- laboratories located at each treatment and desalination plant.

- ❖ The number of samples analyzed by central laboratory is:
- ❖ 50 000 samples per year for bacteriological analyzes.
- ❖ 2 000 samples for physico-chemical analysis.



- ❖ The Ministry of Public Health controls the water by bacteriological analysis (30000 samples per year) according to a convention established between SONED and the Ministry of Public Health)
- ❖ In the laboratories located at each treatment stations, the control of the quality of water is done daily by:
 - physicochemical parameters analysis (trubidity, salinity, pH, T, TAC ...)
 - the JAR-TEST technique to optimize the doses of alumina sulphate and polymer used for the clarification of surface water.



3.WATER QUALITY MANAGEMENT SYSTEM



❖ Water quality standards for drinking water :

This standard is a revision of NT 09.14 (1983), relating to the quality of drinking water. It sets the limits and references for the quality of water intended for drinking as well as the types of analyzes and the sampling programs to ensure. This standard is inspired by international standards, in particular directives from the European community, and WHO recommendations.



3.WATER QUALITY MANAGEMENT SYSTEM

An analysis sheet was carried out in the central water quality control laboratory dated 18/03/19 according to standard NT09.14 (2013)

toxic minerals Settings							
Antimony	Sb	ug / l	3.18	3.02	3.01	3.51	20
Arsenic	Ar	ug / l	0.56	0.48	0.65	<0.17	10
Barium	Ba	ug / l	0,065	0.064	0,065	0,065	0,7
Cadmium	Cd	mg / l	0.23	<0.17	0.21	0.22	5
Chromium	Cr	ug / l	<1	<1	<1	<1	50
Mercury	Hg	ug / l	<0.050	<0.050	<0.050	<0.050	1
Nickel	Ni	ug / l	<1	<1	<1	<1	70
Lead	Pb	ug / l	<3	<3	<3	<3	25
Selenium	Se	ug / l	3.85	4.28	4.14	3.85	10



3.WATER QUALITY MANAGEMENT SYSTEM

3.3. FUTUR PROJECT

Implementation of an information management system: (LIMS software: standard for managing laboratory information): this is a web application intended for the management of laboratory analysis and quality control some water.

This app should cover the following features:

- parameterization of analyzes and sampling program according to the standard
- management of the sampling program
- analysis management

SONEDE has taken the initiative to relaunch the redeployment of accreditation from the central laboratory in accordance with ISO 17025.



Conclusion

Thanks to the adoption of rational and modern management of its water resources to the use of water policies and innovative reforms in the water sector, Tunisia, despite the scarcity of its water resource, has been able :

- to develop water resources in a sustainable manner,
- to assure food security
- to improve the quality of life



Unfortunately, many problems exist :

- The water demand will continue to increase as the population and socio-economic conditions improved

ご清聴ありがとうございました



El Jem



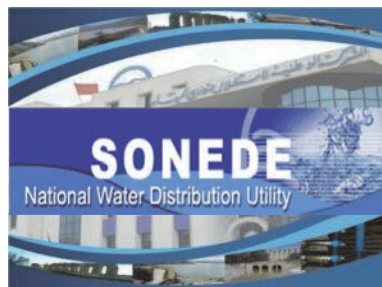
Hammamet



Tozeur



Carthage



SONEDE

National Water Distribution Utility



Jerba



Sousse



Tabarka



Tataouine

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*Water Supply Administration
For Better Management of Water Supply Services
Course (A)*

ZAMBIA



Inception Report Presentation

Water Supply Administration for Better Management of Water Supply Services (A)

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Outline of Presentation

1. Outline of Water Supply Services
2. Water Supply Service Levels
3. Management of Water Quality
4. Non-Revenue Water
5. Achievements
6. Challenges
7. Expectations Towards Japan

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2. Water Supply Service Levels

INDICATORS	2016	2018	5 Years Strategic Goals 2020
Staff/1,000 connections	10	8	7
Production capacity (m3/Year)	7.5 Million m3	10,2 Million m3	17.7 Million m3
Water quality	96%	95%	99%
Coverage area	60%	63%	73%
Supply duration (hr/day)	15 hrs	15.5 hrs	19 hrs
Number of connections	14,088	16,250	18,082
NRW	72%	62%	45%
Collection ratio	78%	81%	95%
Staff number	142	152	160

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3. Management of Water Quality

Overall water quality compliance for the period under review with regards to compliance to standard/minimum required number of tests was at **96.7%** above the Nwasco threshold (95%).

The company uses ground and surface water as a source of drinking water. Sesheke, Kalabo, Senanga, Katima and Mwandi uses surface whereas Mongu, Kaoma, Shang'ombo, Namushakende, Limulunga, Lukulu and Muoyo uses ground water. Treatment plants in the districts/stations that use surface water were designed in such a way that some stages in the water treatment process or stages were skipped at the time they were constructed. The treatment only has two main stages which is Filtration and disinfection.

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3. Management of Water Quality

Parameter	National Standard	Current Compliance %
Bacteriological (MPN/100ml)	0	99.4
Residual Chlorine (mg/l)	0.2-0.5	96.3
pH	6.5-8.0	99.6
Turbidity (N.T.U)	5	99.6
Color (TCU)	15	99.6
Electrical Conductivity (E.C)- (Other Physiochemical)	2300	100
Total Dissolved Solids (TDS)- (Other Physiochemical)	1000	100

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3. Management of Water Quality

Monitoring System of Plans for Safety of Drinking Water these are as follows:

- Restocking of HTH Chlorine in the districts/stations
- Routing water quality sampling and testing for Bacteriological, Chemical and physical parameters.
- Sealing of leaking pipes in the distribution system.
- Corrective measures/actions on tests failing to meet the standards with 48hours.
- Fencing of all water sources and storage tanks premises.

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4. Non-Revenue water

The Government of the Republic of Zambia through the Ministry of Water Development, Sanitation and Environmental Protection constituted the Non- Revenue Water National Technical Task Force (NRW-NTTF) in 2015 to systematically address the problem of high NRW across the water sector by ensuring that all CUs were guided and provided with tools and resources necessary for the reduction of NRW to or below the NWASCO benchmark of 25%.

The CU through the Government republic of Zambia has secured a loan from the AfDB to overhaul the water network system in Mongu, Sesheke, Kaoma and Senenga. This will greatly reduce the NRW in these districts resulting in a decrease in the national NRW.

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4. Non-Revenue water

S/N	DISTRICT	SUPPLIED (m3)	BILLED (m3)	NRW (m3)	% NRW
01	MONGU	4,057,064	1,183,075	2,873,989	71
02	SESHEKE	1,068,680	408,989	659,691	62
03	SENANGA	598,393	384,485	213,908	36
04	KAOMA	860,583	421,250	439,333	51
05	KALABO	457,237	170,747	286,490	63
06	LUKULU	424,784	189,165	235,619	55
07	LIMULUNGA	322,814	111,454	211,360	65
08	NAMUSHAKENDE	72,574	28,796	43,778	60
09	KATIMA	149,857	75,672	74,185	50
10	MWANDI	186,985	82,476	104,509	56
11	SHANGOMBO	187,799	76,484	111,315	59
12	MUOYO	200,276	36,338	163,938	82
13	MANDANGA	158,893	50,761	108,132	68
	CORPORATE	8,745,938	3,219,692	5,526,246	60

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5. Achievements

- ❑ WWSC had been operating without a board of directors since 2016. On 10th October 2018, an eight member board of directors was appointed by the Ministry. Thereafter, the ministry organized a training for the Board members and Management in Corporate Governance training with Dynamic Concepts in February 2019 which was inclined to the water sector in Zambia.
- ❑ Development of the Mid-term business plan on NRW reduction with the supervision from the JICA experts.

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5. Achievements Cont'd

- ❑ Planned Maintenance Management System for all equipment is in place.
- ❑ Installation of a 55Kw motor with a 250m³/h pump in Sesheke.
- ❑ Sealed leaking tanks in Kalabo, Falkland (Kaoma), Imwiko, St. Johns and Boma (Mongu).
- ❑ Installation of 15 Bulk meters on all abstraction points in Mongu and installation of 2460 Domestic meters through out the province.
- ❑ Mapping of all the District on to the Geographical Information System.

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6. Challenges

- ☐ Old dilapidated infrastructure. This results into regular cost of maintenance/repair. Most tanks, pipes and machinery loose a lot of water before repair causing very high NRW.
- ☐ Majority of the customers are domestic that have a low water tariff structure. Few commercial and Industries with high tariff structure in the Province have resorted into own water sources since the company cannot increase hours of supply and coverage due to low Capital Investment.
- ☐ Electricity supply is unstable and in adequate, this causes a lot of investment into power surge protections and physical monitoring of machinery.
- ☐ High staff turn over in management positions.

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7. Expectations Towards Japan

- ☐ Effective management system which enables economical production and distribution of water.
- ☐ Fundamentals of water quality analysis and treatment (Theory of chlorination and other treatments).
- ☐ Non-revenue water reduction techniques.
- ☐ Waste water Treatment and Management.
- ☐ Financial and management analysis in the water system.

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Photo on NRW and Dilapidated Infrastructure



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Photo on replacing of Dilapidated AC pipe replaced with uPVC



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出典：2019 年度 JICA 課題別研修カントリーレポート

- 2019 年度 JICA 課題別研修「水道管理行政（A）」
- 2019 年度 JICA 課題別研修「水道管理行政（B）」
- 2019 年度 JICA 課題別研修「薬事行政」

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