

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
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Course (A)

AFGHANISTAN

Water Supply Administration
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BANGLADESH

“Water Supply Administration for Better Management of Water Supply Services(A)”(J1804149)

Presented by

MD.ARMAN SIDDIQUI

EXECUTIVE ENGINEER

KHULNA WATER SUPPLY PROJECT

KHULNA WASA

Country: Bangladesh

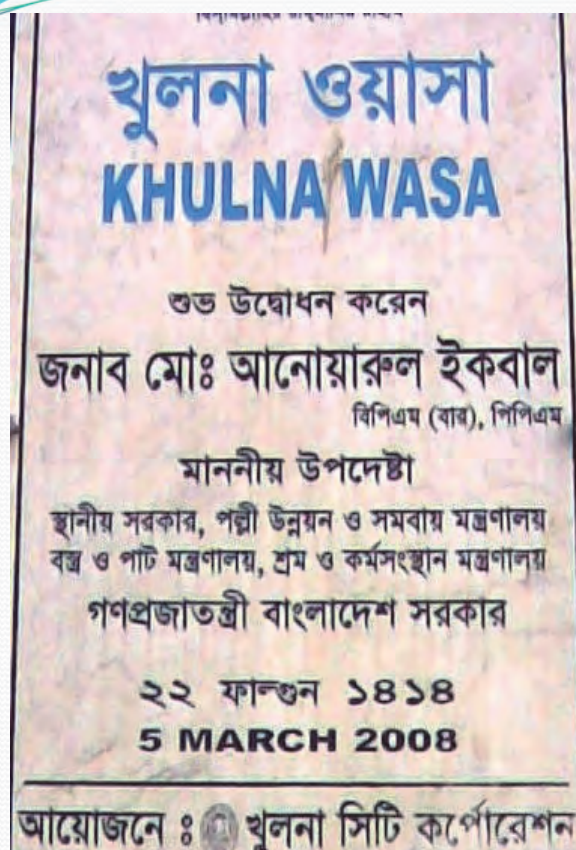


About Bangladesh:

Bangladesh is a south Asian Democratic country surrounded by India, Myanmar and Bay of Bengal. The population is 160 Million and the population density is 1266 person per square kilometer. Main source of income of our country is exporting garments, Tea, shrimps and other agricultural products. GDP per capita is 1602 USD (approximately). Though the majority of Bangladesh is Muslim concerning religion but there are some Hindus, Christians and Buddhists also.



BACKGROUND OF KHULNA WASA:



KWASA AT A GLANCE

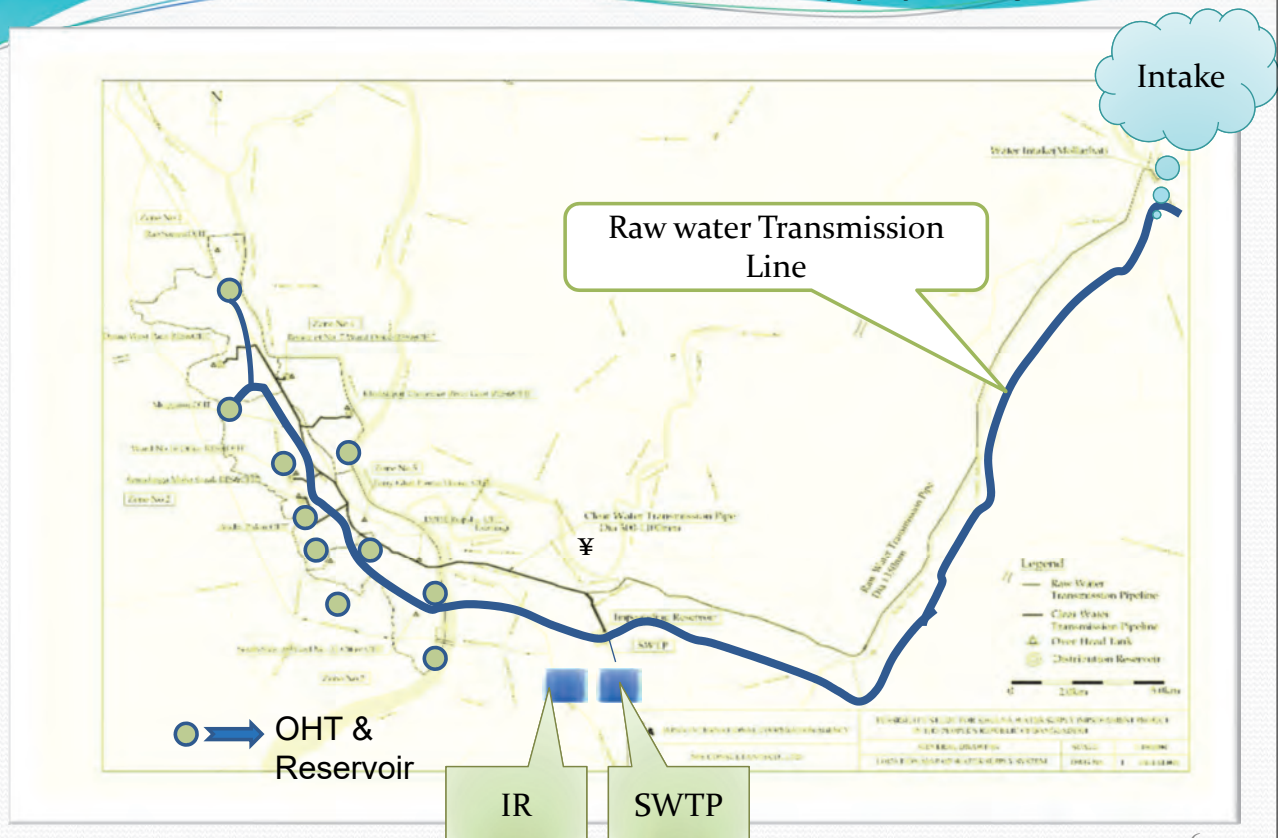
City Corporation Started	: December 10'1984
KWASA Established ; separated from City corporation	: March 02' 2008
Total area(KCC)	: 45.65 sq.km
Population	: 1.5 Million
Wards	: 31
Holding no	: 50312
Drains	: 545.70km
Daily Water Supply Demand in KWASA area	: 240 MLD
Daily Water Supply in KWASA area	: 110 MLD
Production Well (Housing pipe 14 inch x Blind pipe 6 inch) 300m	: 32 No
Mini Production Well(Housing pipe 8"X Blind pipe 4") 300m	: 42 No
½" Deep Hand Tube Well	: 3736 No
½" Shallow Tube Well	: 5526
Street Hydrant	: 503
Distribution Pipe Line	: 252 km
House Connection(1/2"~ 2")	: 21250 Nos. (Approx.)
Water Loss (NRW and Leakage)	: 22%
Officer & Staff	: 272 No

BACKGROUND OF KHULNA WASA



- ❖ Khulna, the third-largest city in Bangladesh, is located on the banks of the Bhairab (Rupsha) rivers in the southwest part of the country.
- ❖ To constantly seek ways to provide better service for our consumers and to reduce dependency from ground water. To cope with current insufficient supply and increasing demand, KWASA established in 02 March 2008. Moreover, to improve efficiency and reduce the operating cost as well as maintain Non Revenue Water (NRW) to a satisfactory level by ensuring the implementation of the projects effectively and timely.
- ❖ KWASA currently implementing a mega water supply project which is being used surface water by proper treatment; aided by JICA , ADB & GOB.

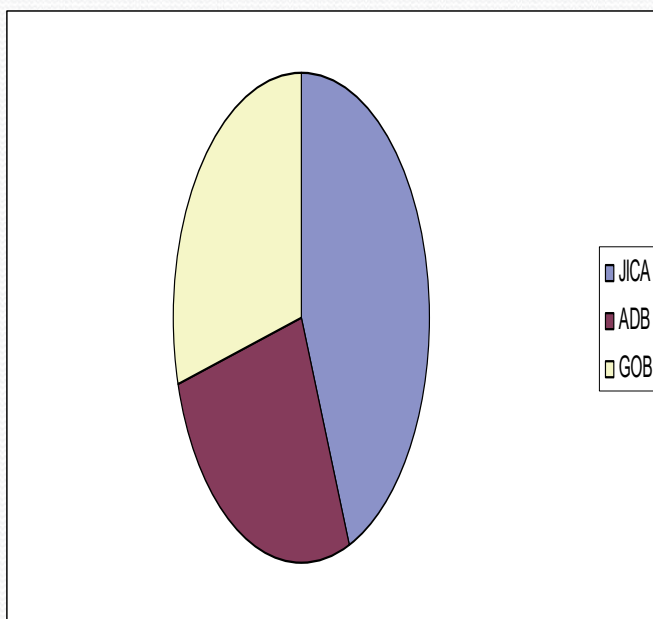
Overview of Khulna Water Supply Project



- **Main Components are: Construction of**

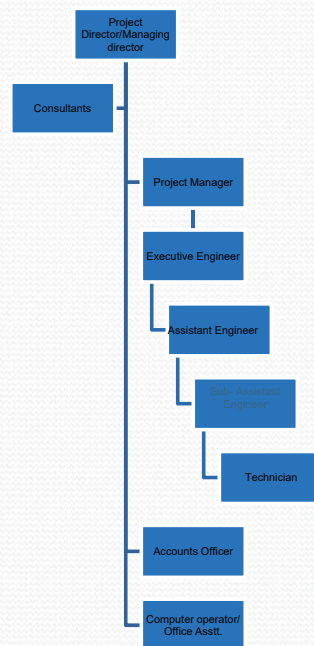
- i) 110 MLD river Intake Facility & 33 Km Raw Water Transmission Pipeline.**
- ii) 110 MLD Surface Water Treatment Plant & Impounding Reservoir.**
- iii) 36 Km Clear Water Transmission Main including River crossing.**
- iv) 10 number Overhead Tanks and 7 number Distribution reservoirs**
- v) 650 km distribution pipe line.**

Financial Source

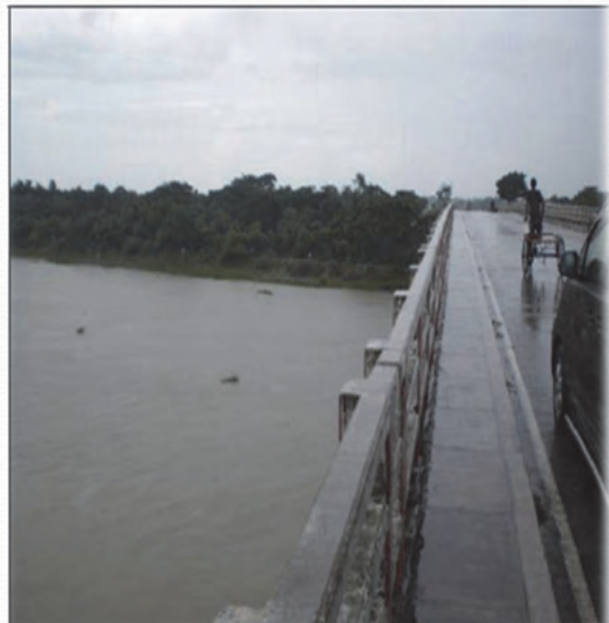


Name	Amount (mUSD)
JICA	183.44
ADB	74.83
GOB	107.20
Total	365.47

Responsible Agency PMU Of KWASA Supporting Body



INTAKE POINT MOLLAHAT



SWTP & IPR (CONSTRUCTION ONGOING) CAPACITY: 110 MLD



DUCTILE IRON CEMENT LINED PIPES (in the Stack Yard)



CURRENT SITUATION OF WATER RATES AND BILL COLLECTION SYSTEM:

The users who contributed the 99% of KWASA revenue was an aggregate of broadly four types of users, namely residential, industrial, social and commercial. Approximately, 12000 connections are already metered system out of 21250 connections. Water bill collect through banks, mobile payment system from the dwellers. The water rates in Khulna are summarized in the following table:

Connection Diameter (inch)	Flat rate tariff (Tk/month)
1/2"	64.80
3/4"	100.80
1"	288
1.5"	1728
2"	2880

CURRENT SITUATION



- ❖ KWASA has developed awareness among the consumer by JICA/ADB study and find out the illegal connection and initiated metering system.
- ❖ NRW was 37% in 2010 now which is reduced to 22%.
- ❖ Maintaining proper inspection of distribution pipe network to detect leakage.
- ❖ The effect of consumer senses is visible now. Every month illegal consumers are willingly coming to KWASA office to legalize their connection and hence reducing the NRW.

MONITORING SYSTEM

- Monitored by one stop services. Customer can complain by written or call to the specified number. Based on the customer complain, necessary action is taken to their service problem.

Some Recent Pictures of ongoing Construction Work







Water Supply Administration
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BURKINA FASO



SUMMARY

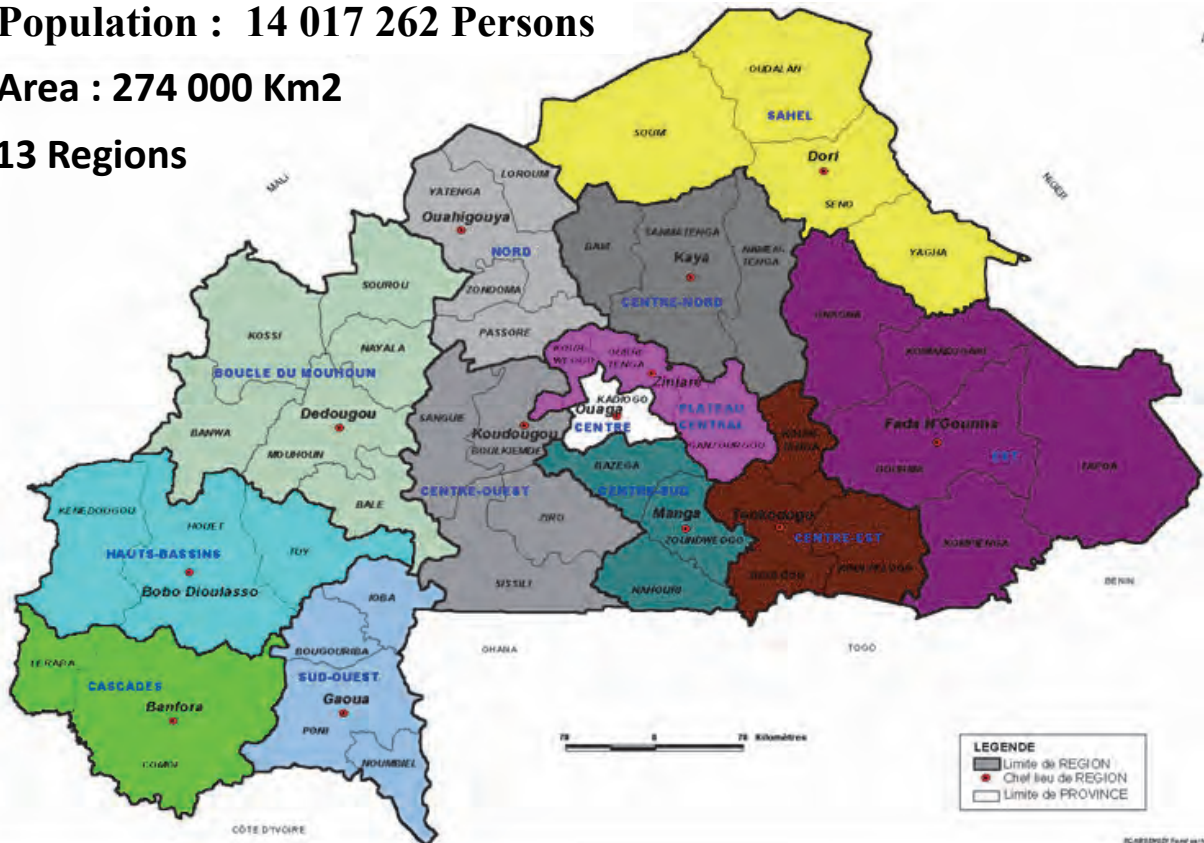
- ☞ GENERALTY
- ☞ WATER SUPPLY SERVICE LEVELS
- ☞ MANAGEMENT OF WATER SUPPLY SERVICES
- ☞ DIFFICULTIES IN THE WATER SECTOR
- ☞ CONCLUSION

GENERALITES

Population : 14 017 262 Persons

Area : 274 000 Km²

13 Regions



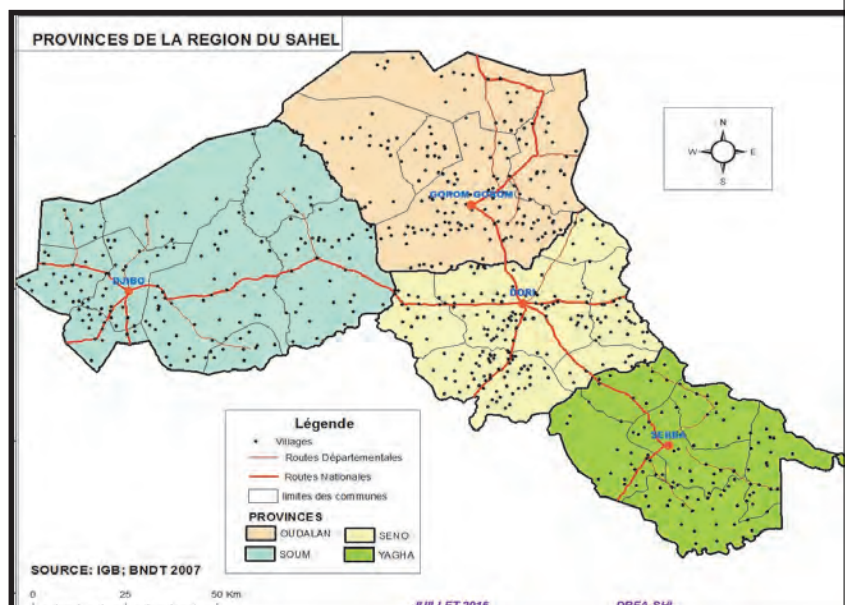
GENERALITES

It covers an area of 35,889 km².

The Sahel region borders on the north with the Republic of Mali; in the North-East with the Republic of Niger, in the South with the Center-North and East regions, in the West with the North region.

Four (04) provinces that are :

Oudalan (chief town: Gorom-Gorom),
Séno (chief town: Dori),
Soum (chief town: Djibo), and
Yagha (chief town: Sebba).



GENERALITES

The drinking water supply of the population of the Sahel is mainly based on drilling water (PMH) and drinking water supply systems (AEPS/PEA). The chief town of the region, Dori, is the only city that is supplied with water by a dam. The dam is called Yacouta, whose capacity is estimated at 1.2 million m³



WATER SUPPLY SERVICE LEVELS

STANDARDS AND CRITERIA

Settings	STANDARDS	
	Village	Town
Specific water consumption	20l/d/person	20l/d/person for water fountain 40 à 60 l/d/person for house connection
Distance	For PEM (Drilling), less than 1000 m from the center of the houses	For water fountain, less than 500 m from the center of the houses
Accessibility	1 PEM(Drilling) for 300 persons	1BP (water fountain) for 500 persons 1BP (house connection) for 10 persons

Sources : MAH, 2006

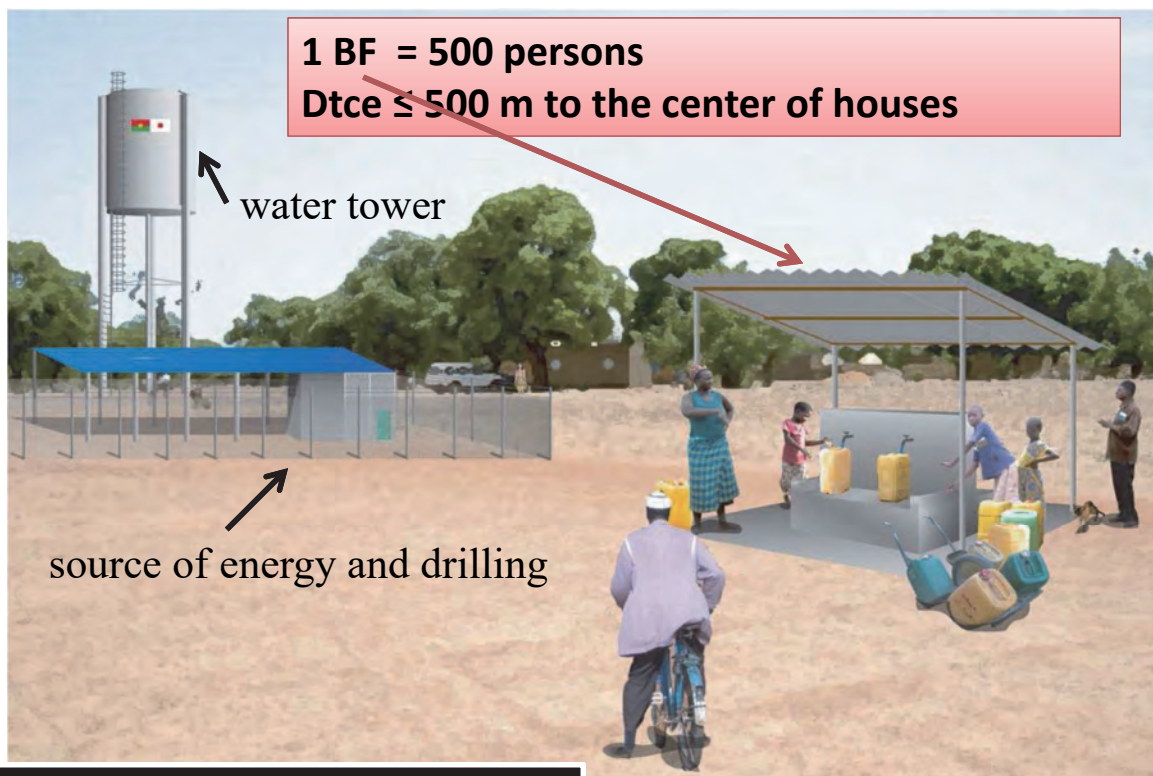
WATER SUPPLY SERVICE LEVELS

manual water pump



1PMH = 300 persons
Dtce \leq 1000 m to the center of houses

WATER SUPPLY SERVICE LEVELS



1 BF = 500 persons
Dtce \leq 500 m to the center of houses

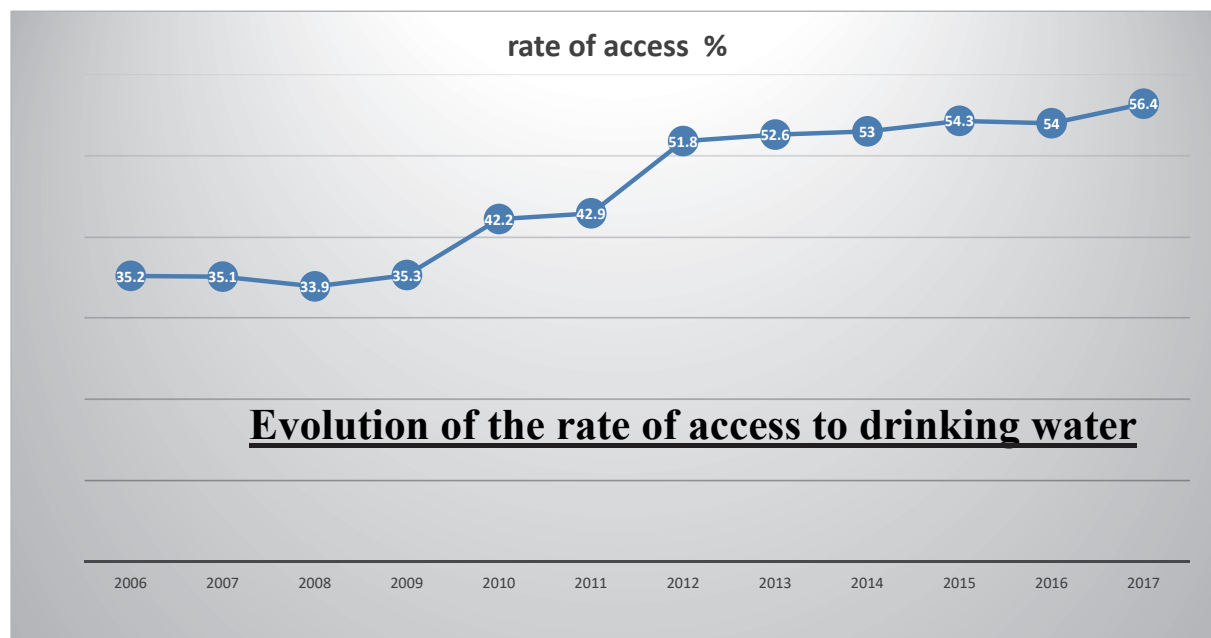
water tower

source of energy and drilling

Simplified Drinking Water Supply

WATER SUPPLY SERVICE LEVELS

Each year, the regional water and sanitation department organizes an inventory of all sources of drinking water. This calculates the rate of access to drinking water in the region



WATER SUPPLY SERVICE LEVELS

The rate of access to drinking water by province

Province	Population Projected 2017	Population served 2017	Population not served 2017	rate of access %
OUDALAN	254 097	128 465	125 632	50,6 %
SENO	331 463	203 184	128 279	61,3 %
SOUM	412 417	214 214	198 203	51,9 %
YAGHA	212 196	139 977	72 219	66,0 %
SAHEL (region)	1 210 173	685 840	524 333	54,3 %

Drinking water supply structures

Province	Number of Villages	Number of drilling	Rate functionality of PMH	Number of AEPS/PEA	Rate functionality d'AEPS/PEA
OUDALAN	165	761	85,9 %	13	69,23 %
SENO	195	1107	89,9 %	31	87,1 %
SOUM	210	1233	84,8 %	29	86,21 %
YAGHA	110	815	91,5 %	15	93,33 %
SAHEL (Region)	680	3916	87,9 %	88	85,23 %



MANAGEMENT OF WATER SUPPLY SERVICES

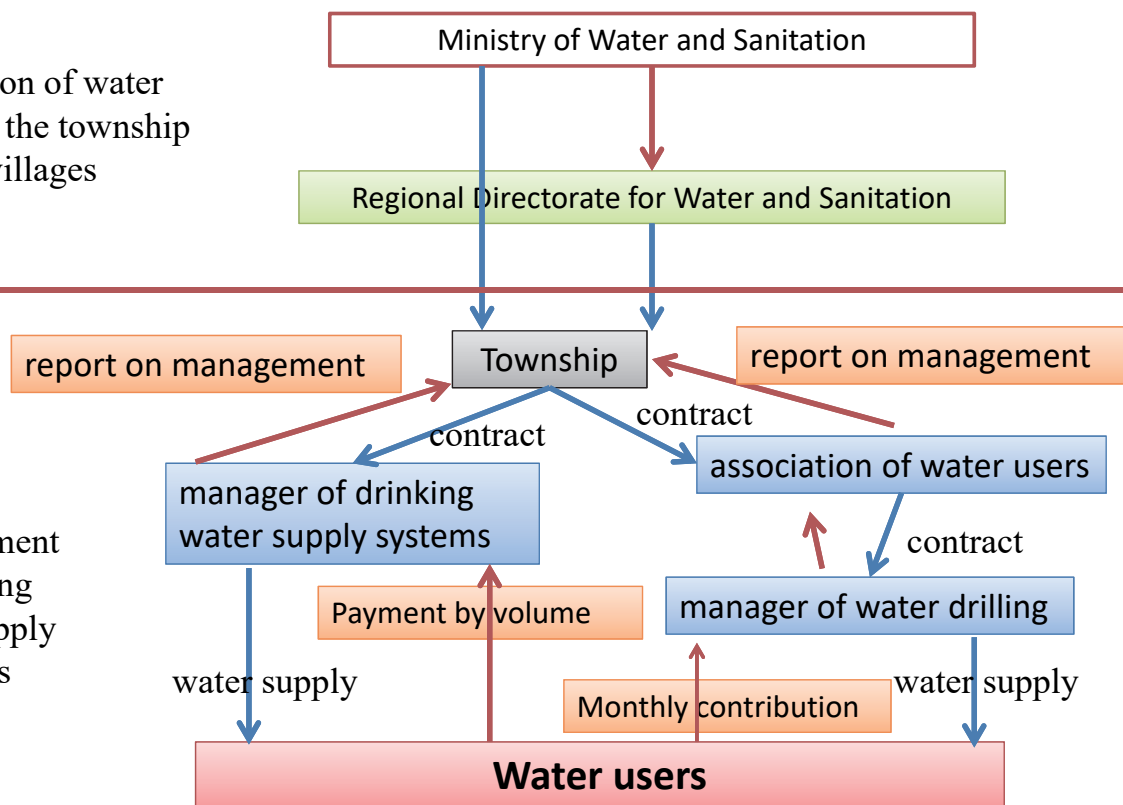
MANAGEMENT OF WATER SUPPLY SERVICES

- ☞ The powers and resources of the state are transferred to the municipalities in the field of drinking water and sanitation
- ☞ There is a reform of the management system of hydraulic infrastructure for drinking water supply in rural and urban areas

MANAGEMENT OF WATER SUPPLY SERVICES

Realization of water works in the township and the villages

Management of drinking water supply structures



DIFFICULTES RENCONTREES DANS LE SECTEUR DE L' AEPA

- ❖ The decrease in water resources linked to climate change;
- ❖ Lack of professionalism of municipal actors in the management of drinking water in general;
- ❖ Problem of maintenance of equipment of drinking water works;
- ❖ Problem of maintenance of water quality at the household level;



CONCLUSION

We expect from this training, knowledge and experience to be able to :

- ☞ Support municipalities to ensure their role as project owner in the field of water;
- ☞ Improve the system of monitoring and evaluation of water structures;
- ☞ Find a strategy for monitoring water quality;
- ☞ Generally ensure the sustainability of water works.

Water Supply Administration
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Course (A)

EGYPT

INCEPTION REPORT (JUNE 2018)

Presented by Eng /Amany Abdel Meguid Ahmed
The Holding Company for Water and Wastewater

Contents :



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General Information.

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Position Of Water Supply Services.

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Water Supply Services Level.

4

Management Of Water Quality.

5

Reduction OF Non-Revenue Water

6

Accounting System For Water Service

6

Most Recent Achievements in Water Service

Official Population No. for year 2017=94.7 million capita



248 cities

4766 villages



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

Water and Wastewater Sector reform in Egypt

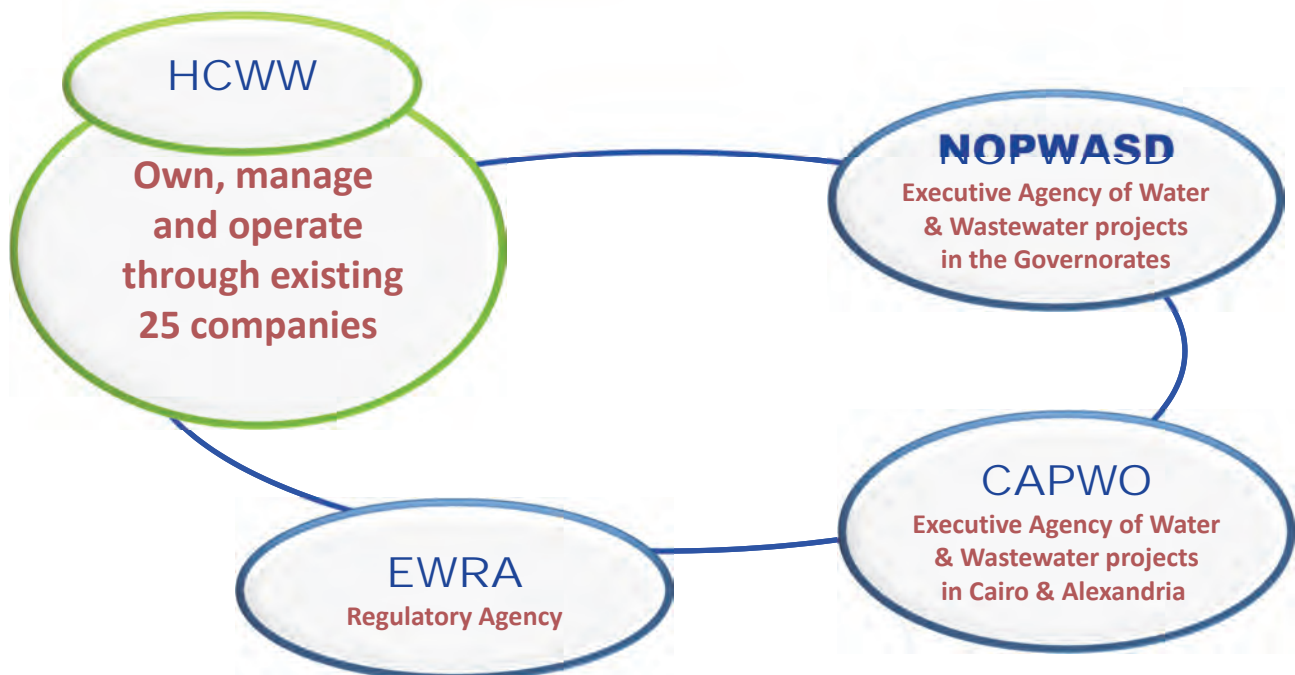
Establishment of the Holding Company by Presidential Decree no. 135 for the year 2004.

The transfer of the municipalities in Egypt into subsidiary companies of the Holding Company.



Holding Company for Water and Wastewater

Stakeholders after Reform Of HCWW



General Information About HCWW

Number of
Subsidiary
Companies

25 Company •

Service
Region

27 Governorates •

2-Position Of Water Supply Service

Drinking Water Production from Different Sources in Egypt

Surface Water
WTPs

Total amount **22.3**
million m³/day

88.143% from
total amount

Groundwater

Total amount **2.717**
million m³/day

10.739 % from
total amount

Sea Water
Desalination

Total amount **0.29**
million m³/day

1.1462 % from
total amount

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

**Triple treatment
2%**

**Secondary
treatment
85.3%**

**Primary
treatment
12.7%**

Position Of Water Supply Service

**Water Production
(Millions m³/day)**

25.5 (280 l/d/capita)

**Number of Water
Treatment Plants**

**2711
227 Filtration + 830 Compact +
1606 Well Plants + 48
Desalination**

**Water Distribution
Networks (km)**

165000

**Wastewater
Networks (km)**

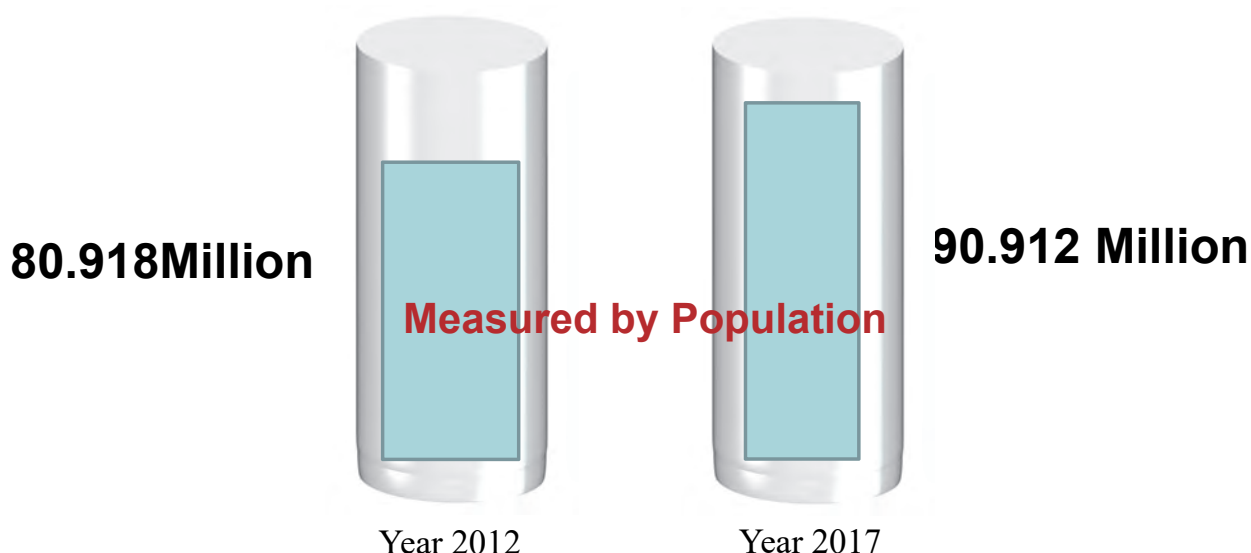
47700

Coverage Percentage

96%

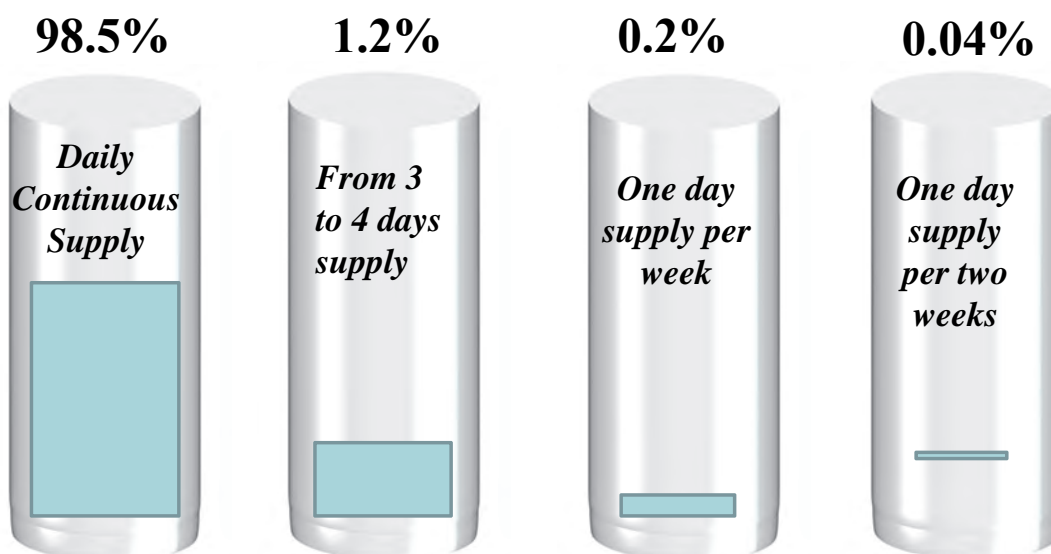
3- Water Supply Services Level.

SDG 6.1.1 population using safely managed drinking water services



Continuity of Water Supply - Water Networks (2017)

Measured by Population



Total Population for Water Networks = 90 Million Capita



4- Management Of Water Quality.

□ Upgrading of Labs



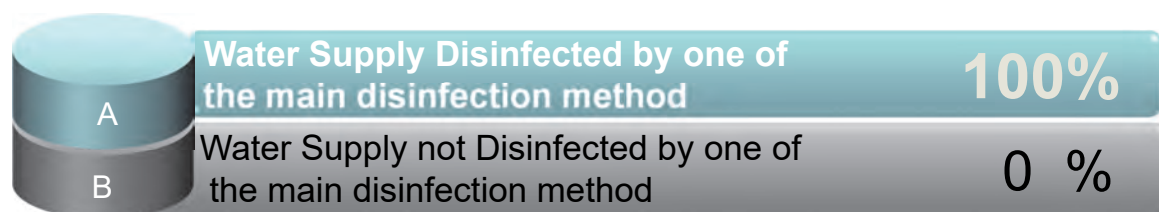
2005: 0 mobile lab 2012: 225 mobile labs 2017: 260 mobile labs
 2005: 3 central labs 2012: 14 central labs 2017: 14 central labs
 A Reference laboratory established for HCWW.
 No. Of Samples Taken At Yr.2017= 3 Million

13



SDG 6.1 safely managed drinking water services

Measured by Water Quality

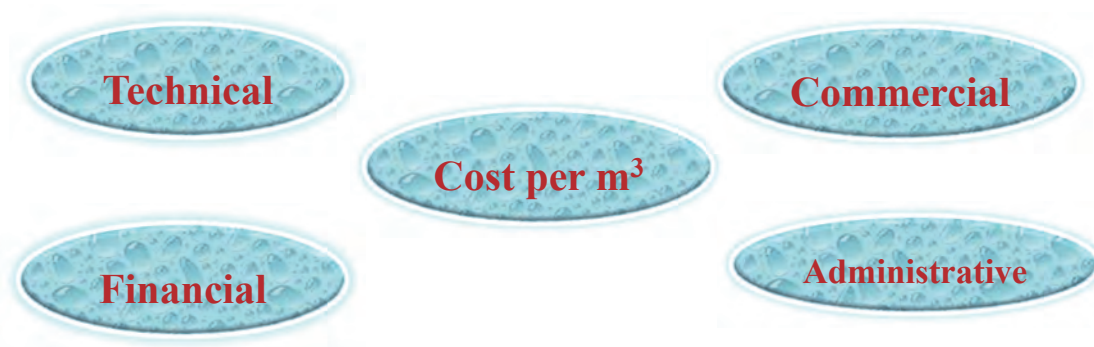




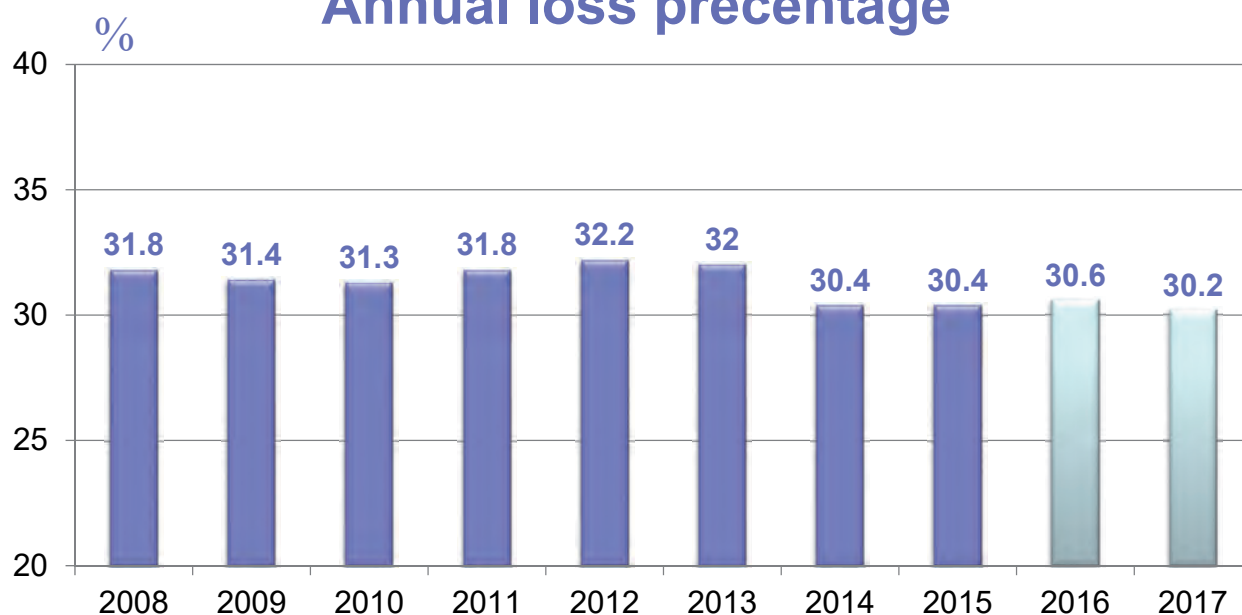
Performance Quality Control

□ Performance Indicator System

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



5- Reduction of Non-Revenue Water Annual loss precentage





Holding Company for Water and Wastewater

Real Loss Reduction Strategy Funded By USAID, KfW, JICA, EU, GIZ, ... etc by dividing Egypt to 10000 DMA

Company	District Metered Areas Data				
	No.	Networks Lengths Km	House Connections No.	Area Km2	Decrease in loss value %
Alex.	3	10	1510	1.3	24 to 18
Beherah	2	50	7652	13	41 to 31
Giza	7	43	6035	3.69	29 to 22
Cairo	4	195	6213	3.8	47 to 40
Sharqiah	12	112	14057	7	37 to 31
Bani Swief	3	73	8452	3.7	44 to 37
Luxor	1	4	854	0.2	37 to 34

6- Accounting System For Water Service

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

Segments m ³	Cost L.E (YR.2016/2017)	Cost L.E (YR.2018)
0-10	0.3	0.45
11-20	0.7	1.2
21-30	1.05	1.65
0-40	1.35	2.0
> 40	1.55	2.15

7- Most Recent Achievements in Water Service

A- Expansion Of Using Sea Water Desalination Plants According to master Plan Studies



Holding Company for Water and Wastewater

7- Most Recent Achievements in Water Service

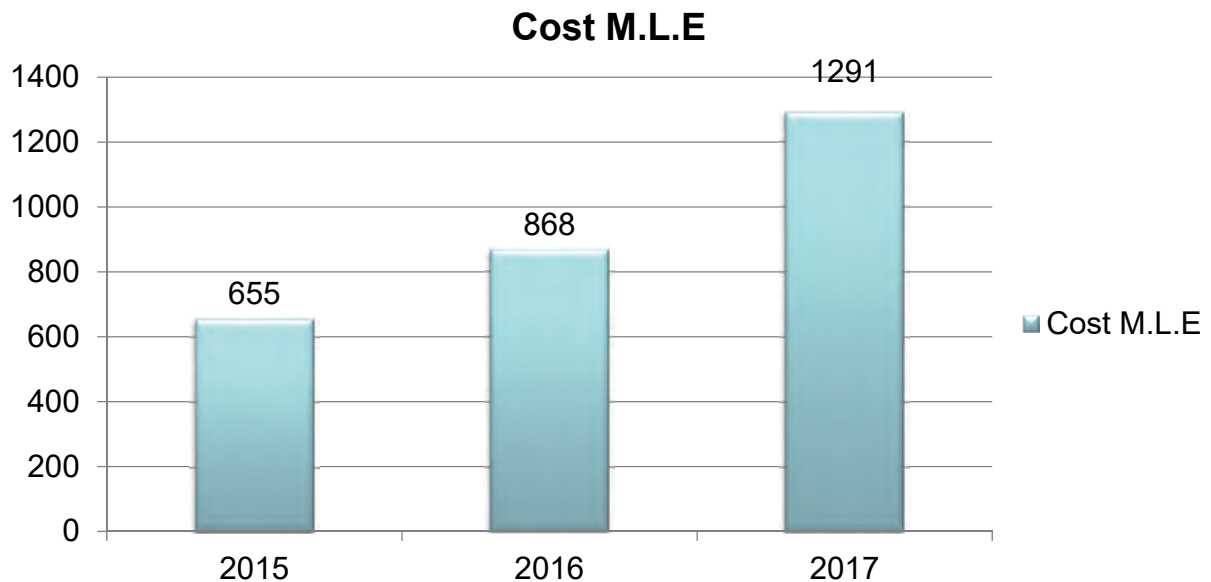
B- Replacement and Renovation Plans



- 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



Progress In Financing Rehabilitation Projects



7- Most Recent Achievements in Water Service

C- Applying Loss Reduction Strategy

**Cooperation with EU by dividing Egypt to 10,000
Isolated DMA With approximate Cost Of
11 Billion L.E**

Recent Challenges to Improvement of Water Supply Services

Firstly: Rationalization of water uses:-

- Reduce the leakage in water networks.
- Reduce the average water consumption to be 200 lit/cap/day.(280 lit/cap/day for the current).

Secondly: Development of Water Resources:-

- Expansion of dependence on Desalination.
- Dependence on Ground Water.
- Increase coverage of wastewater treatment plants to reuse the water in agriculture.
- Protecting Water Resources & Sheds.

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

ETHIOPIA



Water Supply Administration for Better Management of Water Supply Services Inception Report Presentation

Name: Worku Geda Bedada
Position: Branch Office Manager
Organization: AAWSA

CONTENT OF PRESENTATION

- 1. Outline of Water Supply Services**
- 2. Water Supply Service Levels**
- 3. Management of Water Quality**
- 4. Reduction of Non-Revenue Water**
- Accounting system of Water Supply Service**
- 6. Major Recent Achievements in Improvement of Water Supply Services/Management**
- 7. Recent Challenges to Improve Water Supply Services**

1. Outline of Water Supply Services

1.1. Legal Basis of Water Supply Services

- The Addis Ababa Water and Sewerage Authority (AAWSA) was established as an autonomous body by order No. 68/1971 issued on 26 February 1971, and re-established by Proclamation No. 10/1995 with more mandates and power as an autonomous Public Authority under Region 14.
- Recently, the Addis Ababa City Administration has launched BPR (Business Process Reengineering) undertaking for all municipal entities and sector bureaus in the City. In line with these undertakings AAWSA has also embarked in reengineering all business and operation areas of the organization.

1.2. Demarcation of Water Supply Services

- The scope and dimension of water supply planning and management in Ethiopia has changed rapidly in the last couple of years due to a number of realities.
- These changes are triggered by the rapid economic development, increase of population and resources limitation both physical and financial.
- As a consequence, the marginal costs of additional water supply have increased rapidly, while available financial resources are becoming comparatively scarce.
- Addis Ababa with around 3 Million population being by far the largest urban center in the Country has been affected by these changes as dramatically as the other smaller urban centers.
- AAWSA has boosted the capital investment for water supply and sewerage services to increase the water supply and develop the sewerage infrastructures in the City.

CONT.....

1.3. Main Actor of Water Supply Utilities

- The Main Actor of Water Supply Utilities in City Government is Addis Ababa Water and Sewerage Service Authority & Project Office under AAWSA.

1.4. Mission/Vision of Water Supply Utilities

Vision:-

- To line Addis Ababa among the best 5 African cities in water and sanitation services by the year 2020.

Mission:-

- To deliver sustainable and adequate potable water and liquid waste disposal services in line with the city's speedy development via working hand in hand with stake holders.

○

1.5. Your Mission/Vision in your organization

Vision:-

- To insure reliable services & to establish good governance at branch level.

Mission:-

- To deliver effective and efficient services for the customers at Branch level.

CONT.....

- Country:- ETHIOPIA
- Area : 1.127 Million km²
- Population : 102.4 Million
- Coverage Water Supply: 84 %
- City: ADDIS ABABA
- Service Area : 540 km²
- Population Served: 3 million

2. WATER SUPPLY SERVICE LEVELS

INDICATORS	2000	2018	Goals for 2025
Staff/1,000 connections	8	6.5	3.8
Production capacity (m ³ /day)	350,000	600,000	1,000,000
Water quality standards	As per WHO standard	As per WHO standard	As per WHO standard
Coverage area	52%	70%	85%
Supply duration (hour/day)	10	16	24
Supply pressure	0.2 bar	0.2 bar	0.2 bar
Number of connections	280,000	490,000	820,000
Population Served	1.8 Million	3 Million	4.3 Million
NRW	36%	40%	30%
Collection ratio	48%	70%	90%
Staff number	2,800	3,200	3,800

3. MANAGEMENT OF WATER QUALITY

3.1. Current Situation and Major Challenges/Problems

- The risk of pollution is increasing due to intermittent supply (water rationing) in many areas. Maybe more sampling points should be created in those areas and in the external (suburban) areas to get the risk under control.
- Water quality-related problems
 - Raw water problems
 - Turbidity problem due to soil erosion from the upstream of the reservoir.
 - Pollution problem due to pesticides used by farms around the reservoir.
 - Pollution of specific water line during breakage of lines

3.2. Current Actions against Those Challenges/Problems

- The supply water has WHO standard and this is controlled through water quality controlling standard. Sampling has been taken at different levels, at production, service reservoir and distribution level. Daily sampling and controlling is done at the check points.

3.3. Any Achievements

- The Quality & Leakage of Water problem are solved .



CONT.....

3.4. Water Quality Standards for Drinking Water

Water Quality data	Raw water	Finished water
Turbidity (degree)	300-1600 (NTU)	< 1NTU
Color (degree)	1500-4000 (TCU)	< 5TCU
pH	7.4 - 7.8	7.4 - 7.8
Hardness (ppm)	34	34
Iron (ppm)	0.2-0.4	< 0.01
Manganese (ppm)	0.033	0.008
Nitrate Nitrogen (ppm)	0.004	0.004
Others Phosphate (ppm)	0.15	0.15
Sulfate (ppm)	0.2	0.2



CON.....

3.5. Monitoring System or Plans for Safety of Drinking Water in Your Organization

- AAWSA is the only Monitoring body & responsible to plan & implement a safety of Drinking Water.

3.6. Implementation of Water Safety Plans* or Similar Efforts

- There is a responsible body which has well equipped Laboratory to implement Water Safety Plans.

4. REDUCTION OF NON-REVENUE WATER

Authorized consumption	Revenue water	Billed authorized consumption	
66,129,097 55.07%	65,992,597 54.95%	65,992,597 54.95%	118,260,000 m3 /year 54.95%
	Non-Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	43,800,000 m3 /year 20%
	54,095,795 40.05%	10,819,159 20%	
Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	26,280,000 m3 /year 12.08%
53,959,295 44.93%		14,512,365 12.08%	
		Physical losses (Leakage)	17,454,300 m3 /year 7.97%
		4,327,663 7.97%	

• Leakage Detection Measures

CONT.....

o **Leakage Detection Measures**

- Non revenue water detection is done by water loss inspection and control case team.
- Leakage control equipments are
 - Correlator
 - Ground microphone
 - listening stick
 - Pipe locator, metal detector, ultrasonic flow meter
- The work flow of leakage detection for water supply networks and as the assessing un reported leak by used Leakage control equipments for DMAs & Zonings
- The work flow of leakage repairs was reported & un reported leaks reported the team will repair the line and also by its own investigation in line and house to house connection the leak line was maintained.

o **Countermeasures for NRW**

- Identifying and modeling of the water supply system
- Supply area isolation and installation of bulk meters
- Exercising of water balance and prioritization of interventions
- Replacing aged customer connection lines
- Replacing aged distribution lines
- Replacing aged transmission lines
- Maintenance of reservoirs.

5. ACCOUNTING SYSTEM OF WATER SUPPLY SERVICE

- o AAWSA measures the quantity of water production and supply to customers.
- o All subscribed customers are metered at this time. Every month nearly 95 percent of all customers meter have been reading.
- o Currently there are three type of customer. List of them are:-
 - Domestic Customers
 - Non-domestic customers
 - And Public fountain
- o The tariff rate is different for each of customers' type.

5.1. Water Tariff in our Organization.

Tariff Block	Monthly water Consumption	Tariff in birr/m ³	Remark
Block 1	0 – 7 m ³	1.75/ m ³	The tariff structure for both domestic and non-domestic customers are the same. The only difference is the calculation. The tariff calculation for domestic is progressive but for non-domestic the quantity of water consumed multiply by tariff rate up on which the maximum quantity of water falls.
Block2	8 – 20 m ³	3.80/ m ³	
Block 3	21 – 40 m ³	4.75/ m ³	
Block 4	41 – 100 m ³	5.95/ m ³	
Block 5	101 – 300 m ³	7.45/ m ³	
Block 6	301 – 500 m ³	9.30/ m ³	
Block 7	>501 m ³	11.60/ m ³	

5.2. BALANCE SHEET OF YOUR ORGANIZATION

Budget of the Year	1,791,420,000 (USD \$)
Expenses	62,211,487.65
Operation related costs	33,178,092.45
Salaries and related benefits	10,844,135
Electricity	9,542,969.75
Chemicals	3,414,342.85
Repairs & maintenance	4,636,038.65
New connections	3,816,864.65
Sludge Operation Fuel and Lubricants	1,406,210.5
Sewerage Treatment cost	541,749.55
Other operating expenses	923,741.45
Non operational costs	29,033,395.25
Depreciation	26,732,062.75
Provision for bad debt	1,571,343.20
Other non operational expenses	729,989.3
Net gain (deficit) from operation	16,355,672.1
Income	78,497,980.55
Water sales	59,032,440.65
Other water income	2,669,877.1
Sewerage Revenue	13,509,651.95
Sludge Revenue	2,924,853.45
Non operational income	360,957.4
Public toilet commission	0

5.3. PROFIT AND LOSS STATEMENT OF YOUR ORGANIZATION

- The income from water sales is major part of financial source to the organization.
- The following major challenges are existed in AAWSA:-
 - The limitation to timely prepare financial statements and submit for external audit,
 - AAWSA is unable to meet its financial goals and targets it has set in the business plan,
 - Fixed asset management is not done properly. Asset values maintained at organization are not compatible with the asset value in the financial records,
 - There is no well-organized system to integrate the capital fund account to AAWSA's overall finance.
- The capital budget of the Organization fully covered by the City Government.
- The production cost of Water & running cost of the Organization has covered from sailing tariffs of Water, i.e. the income is not enough to cover the expenses of the organization.
- AAWSA also stands as Non-Profit Organization to provide potable drinking Water & reachable Services for low income residences of The City. It is highly difficult to balance the profit & the loss of the Organization.

6. MAJOR RECENT ACHIEVEMENTS IN IMPROVEMENT OF WATER SUPPLY SERVICES/MANAGEMENT

- AAWSA achieved the following goals:-
 - The daily water production rate increased from 301,000 m³/day in 2010 to 600,000 m³/day in 2018
 - Improved the water supply service delivery system by implementing business processing reengineering and balanced score card
 - Improve water meter reading efficiency to 95 percent
 - Launching long term strategic plan for non-revenue reduction project
- Addis Ababa water and sewerage authority takes major measurements to improve water supply services:- for example
 - Construction of surface water source (Gerbi and sivilu dam)
 - Waste and river water recycling for construction purpose
 - Change old GS pipe (aged pips) to HDPE pipe
 - Proper water shift or making shift program and effective and equal distribution for customers
 - Using district meter(bulk meter) area or use technique to reduce water loses
 - Minimizing physical or technical loses and non-physical loses(commercial loses)
 - Distribute water by truck for the customers who had a shortage of water
 - Minimizing water and forcing high water consumers to dig their own ground water

7. RECENT CHALLENGES TO IMPROVE WATER SUPPLY SERVICES

- The major recent challenges to improvement of water supply services are:-
 - The major portion of the existing water supply network is very much aged and needs extensive work and capital to renew it,
 - Now a day the Addis Ababa City is expanding horizontally as well as vertically dramatically, hence the socio-economic development of the city is much more faster than the growth of the water supply development,
 - The rate of NRW is high, 40%, that exposed the water supply service to be poor since the NRW in other side could cause the water contamination,
 - Lack of application of appropriate technology in operational activity,
 - The water supply coverage is below the demand for water of the people. This case suppressed the satisfaction of the customers.
 - Lack of competent personnel to cop up the prevailing challenges in water supply service,



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

MALAWI

Water Supply Administration for Better Management of Water Supply Services

Inception Report Presentation

Name: Dalitso Goddia
Position : Supply Manager
Organization: Blantyre Water Board - Malawi

2

Presentation Outline

1. Outline of Water Supply Services
2. Water Supply Service Levels
3. Management of Water Quality
4. Reduction of Non-Revenue Water
5. Accounting system of Water Supply Service
6. Major Recent Achievements in Improvement of Water Supply Services
7. Recent Challenges to Improvement of Water Supply Services

Outline of Water Supply Services

- Legal Basis of Water Supply Services

Water resources act No. 2 of 2013

National Water Policy

- Demarcation of Water Supply Services

Main Actor of Water Supply Utilities : Ministry of Agriculture, Irrigation and Water Development

Others include: National Water Resources Board, Water Utilities (e.g. Blantyre Water Board)

Outline of Water Supply Services (C'ntd)

- Mission/Vision of Water Supply Utilities : To provide sustainable access to safe and sufficient water, sanitation services in an efficient, effective and sustainable manner.
- Your Mission/Vision of Blantyre Water Board: To provide reliable and affordable water supply services to customers whilst effectively contributing to the development of the national economy and sustenance of the environment

Outline of Water Supply Services (C'ntd)

Whole Country:

Area : 118,484 km²

Population : 19.16 Million

Coverage Water Supply: 75 %

Selected Water Supply System/City:

Service Area : 273 km²

Population Served: 850,000 Thousand

Water Supply Service Levels

INDICATORS	2000	2018	Goals for 2025
Staff/1,000 connections	15	6	5
Production capacity (m ³ /day)	65,000	96,000	150,000
Water quality standards	None	None	None
Coverage area	50%	85%	100%
Supply duration (hour/day)	16	18	24
Supply pressure	0.2 bar	0.5	1.0
Number of connections	30,000	42,000	50,000
Population Served	600,000	849,499	1,500,000
NRW	48%	43%	28%
Collection ratio	48%	50%	85%
Staff number	480	558	700

Management of Water Quality

- **Current Situation and Major Challenges/Problems**
 - I. High levels of turbidity especially during the rainy season due to high siltation propelled by cutting down of trees around the catchment area
 - II. Lack of drinking water safety plan in the organization
- **Current Actions against Those Challenges/Problems**
 - I. An intensive tree planting exercise around the catchment area of our water sources has been put in place and is in effective
 - II. The Water Safety Plan is being formulated so that by 1st July 2018, it should be in effect
- **Water Quality Standards for Drinking Water**
 - I. National Standards also referred to as Standards for Drinking Water MS214
The Board also uses World Health Organizations Guidelines for Drinking Water.

Management of Water Quality

- **Monitoring System or Plans for Safety of Drinking Water in Your Organization / Regulatory Body / Independent Institution /Others**
 - Regulatory Body : Malawi Bureau of Standard
 - Independent Institutions: Consumer Association of Malawi (CAMA).
- **Implementation of Water Safety Plans or Similar Efforts**
 - Blantyre Water Board is currently in the process of formulating a comprehensive risk assessment and risk management approach that encompasses all steps in water supply from catchment to consumer in accordance with the strict guidelines of World Health Organization. The formulation process is in its final stages and expected to be in effect by 1st July 2018, which is the next financial year.

Reduction of Non-Revenue Water

System input volume	Authorized consumption	Revenue water	Billed authorized consumption	15,692,445 (m³/year)
		Non Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	56.7 (%) 120,085 (m³/year)
	Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	0.4 (%) 9,784,920 (m³/year)
			Real losses (Leakage)	35.4 (%) 2,070,280 (m³/year)

Reduction of Non-Revenue Water (C'ntd)

- Leakage Detection Measures
DMAs, Pressure loggers, Correlators, Ultrasonic flow-meters
- Countermeasures for NRW
 - I. Revision of by-laws on penalties for illegal connection fees
 - II. Pipe replacement of aged pipes

Accounting System of Water Supply Services

- Water Tariffs (BWB)

As of the 2017 to 2018 Financial Year

DESCRIPTION (Per cubic metre)	COST (US\$)
Communal Water Points	0.03
Domestic purposes	0.53
Supplied to Institutions	1.24
Supplied for Commercial purposes	1.57
Supplied for Industrial purposes	2.28

Accounting System of Water Supply Services (C'ntd)

- Balance Sheet (BWB)

Item Description	Assets (US\$)	Liabilities (US\$)	Equity & Reserves (US\$)
Current	4,497,450	12,942,254	
Non-Current	37,568,962	24,743,015	
			4,381,142
Totals	42,066,411	37,685,269	4,381,142

Accounting System of Water Supply Services (C'ntd)

- Profit & Loss statement (BWB)

Item Description	Income (US\$)	Expenses (US\$)
Revenue from Sales	13,581,325	
Other Income	1,056,700	
Deferred tax on revaluation Surplus	2,080,976	
Income tax credit	272,050	
Operational Cost		9,176,988
Selling & Distribution Administration & Finance		5,030,897
Totals	16,719,001	14,207,885

Major Recent Achievement in improvement of water supply services

- New water source: The board has managed to secure funds in form of a loan from India to construct new treatment plant from a new identified water source in Mulanje district which will be producing approximately 20,000m³/day, supplementing to the already existing production of 96,000m³/day. The project is currently in progress and is expected to be completed by 2019.
- Capitalization of ground water use in form of boreholes: The board has also increased number of borehole pumping stations in the outskirts of the center of the city to supplement to the ever degrading and depleting surface water sources

Recent challenges of Water Supply Services

- The pipe infrastructure is old and deteriorating, leading to frequent pipe bursts and numerous water leakages which are contributing towards intermittent water supply to city residents and Non-Revenue Water
- The main water source of Blantyre Water Board is Shire River which is 35KM away from Blantyre City and the total dynamic head is around 870 metres hence heavy duty pumps and motors are used resulting in higher electricity costs (Current monthly bills US\$ 840,000).
- Catchment degradation around our main water sources which has resulted in increased runoff, flash flooding, reduced infiltration, erosion and consequently siltation of the water sources and hence reduced storage capacity.

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

PALESTINE



Knowledge Co-Creation Program



Water Supply Administration for Better Management Of Water Supply Services

No. J18 – 04149/ ID. 1684472

Inception Report Presentation

- ✿ Country : State Of Palestine.
- ✿ Name : Aed Alnabi Zaydoun Mohammed Salem
- ✿ Professional: Dr. Electro-Mechanical Engineering
- ✿ Position : Manager of Workshop and Maintenance
- ✿ Organization : Palestinian Water Authority.
- ✿ Department : West Bank Water Department

2018

1

1. Outline of Water Supply Services

1:1 West Bank Water Department (WBWD) :

Background:

- * WBWD was a branch of the Jordanian natural resources authority.
- * In the year 1966 a branch was established in Jerusalem.
- * After June of the year 1967, the Israeli occupation and as result of a military order made by a military ruler, the name of the department was changed from natural resources authority to WBWD and assigning an Israeli officer to look after it.
- * In 1996, Control over WBWD was relinquished by Israel to the Palestinian National Authority.
- * WBWD is a governmental institution ,producing, purchasing and distributing potable water for the Palestinian communities in affordable price and insure good quantities of water with high quality.



1:2 Authority of The WBWD:

- (1). The Water Department has regional authority for monitoring, implementing and inspection on the water resources in the west bank as well as maintenance of water pipe networks.
- (2). Reading of water meters of cities and regional councils and the issuance of notes regarding consumed water by these cities and regional councils.
- (3). Preparation of detailed plans, specifications and tenders to implement different water projects for these cities and regional councils. Also complete monitoring over these projects.
- (4). Giving assistance regarding water issues for semi-governmental establishments and the rest of the municipalities, in addition to providing consultancy services.
- (5). Working on permissions issuance for water projects, water reservoirs, wells and main pipelines in all parts in the West Bank.



1:3 Country Profile :

(1). Boundaries of Palestine:

- West: The Mediterranean Sea.
- East: Kingdom of Jordan.
- North: Lebanon & Syria.
- South: Egypt.

(2). Area of Palestine:

- The historical area of Palestine about 27,009 Km².

(3). Capital of Palestine:

- Jerusalem which became known as Al-Quds.
- Divided into East and West after 1967 war.

(4). Time Zone:

- G.M.T+2 hours (in winter) G.M.T+3 hours (in summer).

(5). Climate of Palestine :

- A Mediterranean climate.
 - (a). Summer (hot and dry).
 - (b). Winter (cold and rainy).

(6). Language:

- Arabic : Official Language.
- English : Large percentage of the population.

(7). Population:

- West Bank : Area (5572 Km²) , Population (2.9 M).
- Gaza Strip : Area (0367 Km²) , Population (1.8 M).



1:4 My Mission in my organization :

Manager Department of Maintenance and Workshops Center Building, including Operation and maintenance well stations well stations with Distribution System.

My Actual Job :

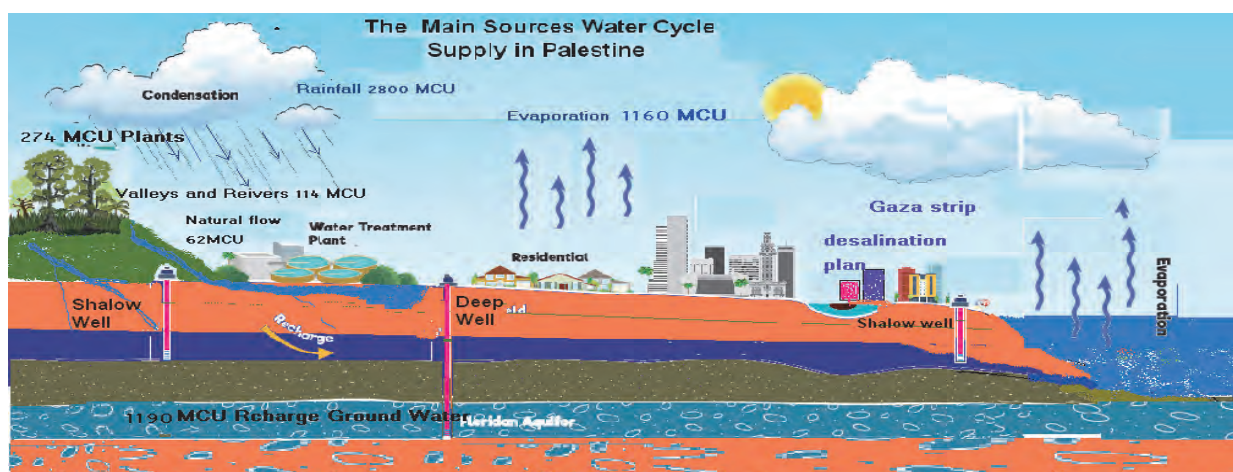
- Manage, organize and control an efficient maintenance department including the management of Technicians related there divisions at structure this department. Make need coordination with others departments and supports stations managers in the field including general maintenance and installation issues.
- Technical project management and engineering design review, Preparing technical specifications and tender assessment including related duties



2 Water Supply Services Levels

2:1 Water Resources in Palestine:

Rainfall is the main source of water In Palestine



The estimated amount of rainfall in the season is about 2800 million cups and distrusted as following:

- 1- 1700 million cups are lost in evaporation, or 60.71% of the rainfall.
- 2- There are (114) million cups in rivers and valleys, (4%).
- 3- There are 62 million cups of runoff by Natural flow , representing 2.2%.
- 4- There are 650 million cups that go to groundwater,
- 5- The difference between fallen and distributed water is absorbed by trees, plants and rain fed crops and is 274 million m3.



2.2 Surface water resources:

2.2.1 Jordan River:

Historically, water flow of 1400 MCM/y, currently is about 50 MCM/y, most of it is untreated wastewater
Palestinians use 0 MCM since 1967 and without accessibility. Under Israel Control

2.2.2 Wades:

The long-term average annual flow of flood water in the West Bank is about 53 M/y and 11 MCM/y in Gaza.

Constraints of harvesting: High costs, no permits from Israel and no practical Experience.

2.2.3 Seawater desalination Plant In Gaza

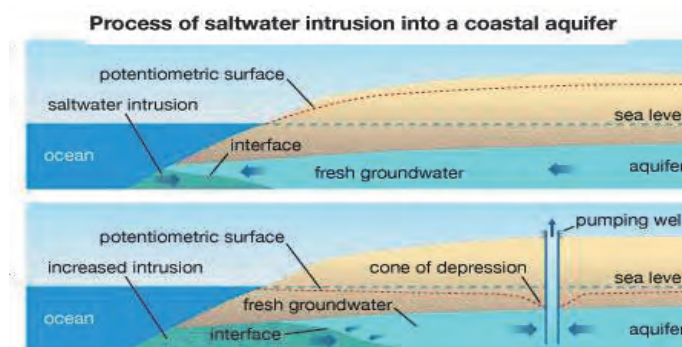
Under the Management of funding from donor countries, two stage, first stage capacity of desalination water 55MCM/y, cost project 665M\$, arranged scheduled operation date at 2022

2.2.4 Groundwater resources:

The ground water resources in Palestine consist of two main Aquifers:

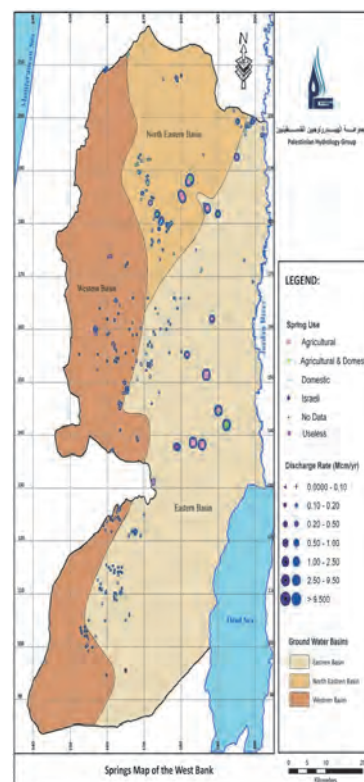
2.2.4.1 Coastal Aquifer

- a- Which lies underneath the Mediterranean seashore in Israel and Gaza Between Rafah and Mount Carmel.
- b-It has an estimated water potential of approximately 450 MCM per year, the Approximate area of the entire aquifer is 2200 km², with 400 km² beneath Gaza
- c- The 96.4 % of Gaza Water is not suitable for drinking purposes. However More than 95% of the Gaza aquifer is brackish or saline water



2.2.4.2. Mountain Aquifer:

Basin	Annual Yield (MCM)	Actual Utilization MCM	
		(Israelis)	Palestinians
Western	362 - 400	411	031
North-eastern	100 - 145	103	020
Eastern	145 - 185	150	055
Sub-total		664	106
Coastal	430 - 460	433	198 *
Total	1037 - 1190	1097	304



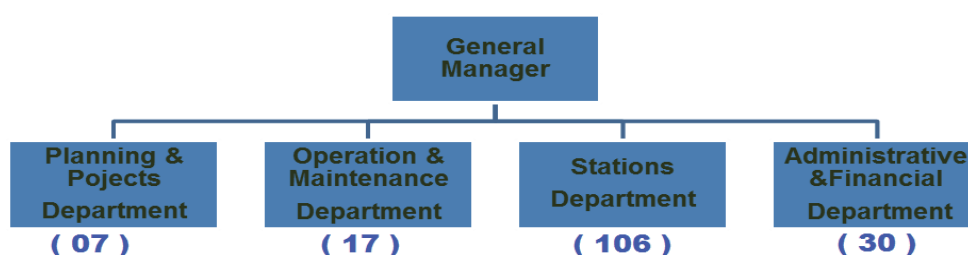
3 Water Supply Services levels:

3.1 Background:

Over 90% of Palestinian water resources are controlled and exploited by Israel, while only 10% are allocated for Palestinian use, this has enabled Israel to engineer a situation of artificial water shortage in the occupied Palestinian territory.

However, some indicators such as the collection efficiency and non-revenue water figures reported are not fully reflective of the performance of the WBWD due to the lack civil and security jurisdiction in Area C where many supply mains and supply points are located.

3.2 Structural Organization of WBWD



3.3 Management Bulk Water Services

The WBWD, the bulk water provider in the West Bank, distributes water to about 220 service providers in the West Bank.

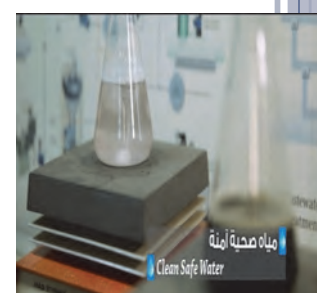
Service Area:

1. Size of Utility's area of responsibility at normal conditions: (5572 km²).
2. Size of Utility's present service area: Approx. (70 %) (3,900 km²).
3. Population of Utility's area of responsibility at normal conditions: (2,9 M) capita

3.4 Management Of Water Quality :

The following table shows the performance indicators relating to water quality. (Unit: %)

No.	Key Performance Indicators	2012	2017	Unit
01.	Samples (in the main supply lines) containing free chlorine residual (CR).	100.00	93.43	%
02.	Samples (taken at source) free from total coli form contamination.	80.00	100.00	%
03.	Samples (taken at source) free from fecal coli form contamination.	98.00	100.00	%
04.	Samples (in the main supply lines) free from total coli form contamination.	95.83	100.00	%
5.	Samples (in the main supply lines) free from fecal coli form contamination.	100.00	100.00	%
6.	Microbiological tests carried out.	3.56	56.00	%



3:5 Figures and Statistics:

Table 1: Selected Indicators for Water Statistics in Palestine (1) (2009 -2017) :

(Unit: million m3)

Indicator	2009	2010	2011	2012	2013	2014	2015	2016	2017
Annual Available Water Quantity (2)	315.2	331.1	323.9	349.2	365.7	342.7	365.3	363.6	
Annual Pumped Quantity from Groundwater Wells (3)	227.2	244.0	245.5	253.3	262.9	246.3	250.5	251.6	
Annual Discharge of Springs Water (4)	30.6	26.8	21.4	39.3	39.5	28.2	40.7	29.0	
Desalinated Drinking Water (5)	-	-	-	-	-	4.7	3.9	3.9	
Annual Quantity of Water Purchased from Israeli Water Company (Mekerot) (6)	57.4	60.3	57.0	56.6	63.3	63.5	70.2	79.1	



4. Reduction of Non-Revenue Water (NRW) :

* NRW is a water which is supplied (produced and purchased) but not paid for due to : technical losses (leakage) ,Not billed water, illegal connections, Poor water meter performance and Inaccurate reading and accounting of metered flows.

* Palestine is a special case in the region because of political and security situation.

* In Palestine control over the different areas is not directly the responsibility of the PA forces, and that leads to inability to reach many areas which are under Israeli control to make rehabilitation and stop illegal connections.

• Despite all the obstacles, PWA makes all efforts to improve water situation and reducing non revenue water by all means available (rehabilitations projects, flow monitoring , installing new pipelines with different diameters ,..... etc).

• The West Bank Water Department and the Palestinian Water Authority have helped municipalities, local councils and villages (Service Providers Systems) to solve the problem of NRW by directing relevant projects, as well as providing technical expertise from equipment, as well as training in maintenance and operation

* Percentage of NRW (2007 – 2017) : (Unit: %)

2007	2008	2009	2010	2011	2012	2013	2014	2015	2017
10.61	14.26	12.18	18.94	12.78	11.34	12.58	14.99	13.85	10



West Bank Water Department (WBWD)

Non-Revenue Water by Volume for the Year Ended December 31, 2017



Districts	Produced (m³)	Net Purchased (m³)	Supplied (m³)	Net Sold (m³)	Losses (m³)	Losses (%)
Hebron	8,146,188	18,976,531	27,122,719	20,796,402	6,326,317	23%
Bethlehem	2,721,212	7,751,339	10,472,551	10,224,690	247,861	2%
Jerusalem	1,115,523	4,539,383	5,654,906	5,444,369	210,537	4%
Ramallah	0	18,918,738	18,918,738	18,206,754	711,984	4%
Salfit	0	3,280,224	3,280,224	3,108,990	171,234	5%
Nablus	2,145,727	4,432,527	6,578,254	5,989,307	588,947	9%
Tubas	1,653,974	0	1,653,974	1,692,870	-38,896	-2%
Qalqilya	0	1,657,624	1,657,624	890,618	767,006	46%
Jericho	0	2,989,122	2,989,122	2,599,393	389,729	13%
Jenin	3,341,188	2,977,126	6,318,314	6,343,559	-25,245	0%
Tulkarm	0	527,946	527,946	527,946	0	0%
Bardalah	0	6,573,549	6,573,549	6,573,549	0	0%
Grand Total	19,123,812	72,624,109	91,747,921	82,398,447	9,349,474	10%



4:1 Reduction of Non-Revenue Water WBWD : (01/01/2017– 31/12/2017)

System Input Water 91,747,921 m3/year (100%)	Produced 19,123,812 m3/year (20.84%) Purchased 72,624,109 m3/year (79.15%)	Authorized consumption 82,938,447 m3/year (90.39%)	Revenue Water (90.39%)	Billed authorized consumption	71,345,624 m3 /year (86.0%)
		Water losses 9,349,474 m3/year (9.6%)	Non Revenue Water (NRW) (9.6%)	Unbilled authorized consumption	140,242.11 m3 /year (0.15 %)
				Apparent losses (Unauthorized) consumption	920,923,12 m3 /year (9.45 %)
				Real losses (Leakage)	3,246,339 m3 /year (3.85 %)



4:2 System Water Balance of Rameen Village

System Input Volume 83,992 m3/year Error Margin [+/-]: 5.0%	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption 42,704 m3/year	Revenue Water
		42,704 m3/year	Billed Unmetered Consumption 0 m3/year	42,704 m3/year
	45,224 m3/year Error Margin [+/-]: 0.7%	Unbilled Authorized Consumption	Unbilled Metered Consumption 840 m3/year	Non-Revenue Water 41,288 m3/year Error Margin [+/-]: 10.2%
		2,520 m3/year Error Margin [+/-]: 13.3%	Unbilled Unmetered Consumption 1,680 m3/year Error Margin [+/-]: 20.0%	
	Water Losses 38,768 m3/year Error Margin [+/-]: 10.9%	Commercial Losses 29,040 m3/year Error Margin [+/-]: 5.4%	Unauthorized Consumption 5,019 m3/year Error Margin [+/-]: 20.0%	
			Customer Meter Inaccuracies and Data Handling Errors 24,021 m3/year Error Margin [+/-]: 5.0%	
		Physical Losses 9,728 m3/year Error Margin [+/-]: 46.2%		

Assessment of Non-Revenue Water and Development of NRW Reduction Plan and Targets for Rameen Village - Tulkarm

Final Report

Table 11 Proposed leak detection Equipment





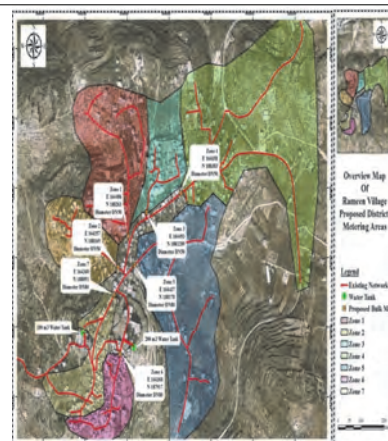
No.	Equipment	Quantity	Picture
1	Pipe Locator For detecting steel pipes and cables with depth measurement with high accuracy	1 set	
2	Manhole cover locator for locating buried valve steel covers under pavements	1 set	
3	Acoustic Leak Detector For detecting water leak using leak noise	1 set	
4	Pressure Loggers For pressure, measurements and logging (used for hydraulic model calibration and water loss studies)	5 set	



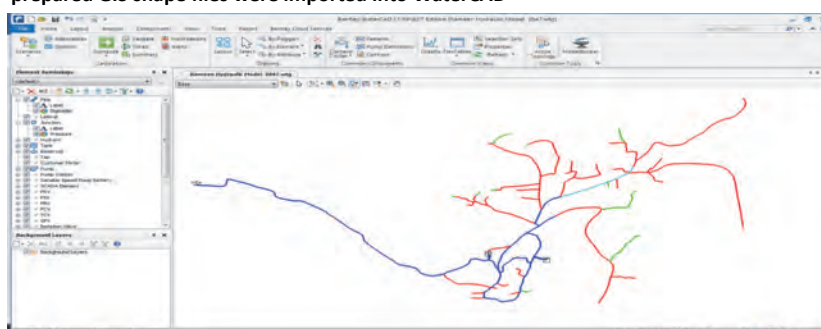
Table 7 Water Meters Accuracy Test Results – Test Bench

Test Mode	Total test volume (liter)	Test Flow rate (liter /hour)	Monitoring Volumetric Meter (liters)	Tested Velocity Meter (liters)	Accuracy %
Q1 Minimum flow	10	10	10	0	0 %
Q2 Flow	20	100	20	10	50%
Qn Nominal flow	1000	1500	1000	1000	100 %



Water supply system in Rameen is continuous supply with roof top tanks; therefore, the house connections run at minimum flow velocity in most of time.

prepared GIS shape files were imported into WaterCAD



4:3 factors contributing and influencing at Non-Revenue Water in WBWD.

4.3.1 Operation and Maintenance relationship at Non-Revenue 2

An inadequate technical skills, poor operations and maintenance, poor workmanship and poor material during construction of water networks

- 1- The lack of qualified technical staff
- 2- Bureaucracy and delay on the procedures of changing the counters if the meter is available in the stores, and at best, a period of two days to a week, If are not available, the procedures will be extended to long periods that could be extended months.
- 3- Long Required time of change The meter in the department reaches from 7 to 12 meters per month.
- 4- Weak technical management in monitoring the installation and maintenance of meters.
- 5- Do not take meter readings periodically for technical reasons or security or not follow up.
- 6- There is no details technical data archived (assessment) about the meters, pipes, fittings including installation, breakdown, reading. The management computerize inter of technical is not sufficient works.
- 7- The GIS and SCADA are not efficient work. In order to achieve maintenance demands. And the use of modern systems in the introduction of data on lines and numbers
- 8- The poor quality materials or poor contractors implemented projects



4:3:2 Requirements to improve to Maintenance of water meters in WBWD

The length of time a leak is allowed to run affects the volume of physical losses, so repairs should be completed as soon as possible once a leak is detected. Repair quality also has an effect on whether the repair is sustained. Key issues to consider when formulating a repair policy include:

- Efficient organization and procedures from the initial alert through to the repair itself
- Availability of equipment and materials
- Sufficient funding
- Appropriate standards for materials and workmanship
- Committed management and staffs and used integrated programs CMMS, SCADA, GIS and hydraulic analysis.
- Good quality of service connections—service connections are often the 'weakest link'

4:3:3 Energy Consumption in Water System

The amount of energy consumed is directly associated with increased pressure and flow in the pipe system

4.3.4 Challenge Reduction of NRW:

Reduction of NRW requires proven solutions, tools, knowledge and expertise to successfully achieve an optimized distribution system and increased revenue.

The overall goal is to reduce NRW, which will provide a significant improvement in the economy of the utility companies, achieving direct cost savings and increase revenue through additional water sales.



5. Water Tariff In WBWD:(01/01/2015 To 31/12/2015)

* Source Of Water in WBWD:

- The main sources of drinking water in the West Bank Water Department are :

(a). 19 production wells managed by WBWD : Cost Per m3 : (0.565 \$).

(b). Purchased water from the (Israeli) Water Companies, Mekorot and Hagihon.

- The following table shows water tariff in WBWD : (1\$ = 3.8 NIS)

No.	Source Of Water	Category (million m3)	Cost price WBWD (USD)	Selling price To Customers (USD)
01.	Mekorot	1.0 – 46.160 > 46.160	0.753 0.949	0.684
02.	Mekorot (Bardalah)	-	0.139	0.108
03.	Hagihon	-	1.299	0.815
04.	WBWD wells	-	0.565	0.684



6. Water Supply Service Standards / Performance Indicators.

* A performance monitoring system for water and wastewater services is essential for improving the quality of services.

* Key performance indicators (KPIs) offer a sound and internationally accepted form of measure of service quality and allow for transparent and objective comparisons between different providers.

* Key performance indicators (KPIs) of WBWD :

A. Technical Indicators :



No.	Key Performance Indicators	2012	2013	2017	Unit
04.	Non-Revenue water (NRW)	11.34	12.59	10	%

No.	Key Performance Indicators	2012	2015	2017
05.	Number of flow meters	300	320	540
06	Number Remotely Reading Flow Meter	0	45	127



B. Financial Indicators :

No.	Key Performance Indicators	2012	2016	Unit
01.	Working Ratio.	1.26	1.47	No.
02.	Collection efficiency.	62.35	31.60	%
03.	Operating costs per m3 of water sold.	0.821	0.968	USD
3.1.	Personnel costs per m3 of water sold.	0.031	0.034	USD
3.2.	Water purchase costs per m3 of water sold.	0.605	0.747	USD
3.3.	Energy costs per m3 of water sold.	0.128	0.132	USD
3.4.	Other operating costs per m3 of water sold.	0.057	0.055	USD

C. Water Quality Indicators :

Kindly See 6 KPIs in Slide No.9, Management Of Water Quality.

D. Other :

No.	Key Performance Indicators	2012	2016	Unit
12.	Staff Productivity Index	0.58	0.62	No.



7. Management of Water Supply Service on a Self-Supporting Basis :

- * WBWD is a governmental institution, therefore, the source of its own budget is the Palestinian Ministry of finance.
- * The cost of purchasing and producing drinking water in the West Bank are expensive.
- * The Palestinian government is supporting the price of water in Palestine.
- * WBWD is the bulk water supplier for water service providers, and it supplies water at a fixed rate of 0.684 \$/m3 which is less than its cost .
- * Operating costs per cubic meter of water sold is high compared to a selling price, added to that, operational costs of the water department of the Israeli civil administration are carried onto the WBWD.
- * WBWD reported a major decline in collection efficiency to a low of 31.6% for 2013 compared to 62.35% for 2012. This decline is due to lack of commitment from water service providers in paying water bills.
- * Low collection efficiency, high non-revenue water, insufficient revenues, combined with the additional contested charges have placed the WBWD in a poor financial state.



8. Major Recent Achievement In Improvement of Water Supply Services / Management (PART1):

2007	INDICATORS	2017
160,000	Production capacity m3/d	251384
WHO Guidelines	Water quality	WHO Guidelines
85 %	Coverage area (Customers)	97 %
13 - 24 hr/d	Supply duration	16 - 24 hr/d
10 – 25 bar	Supply pressure	10 - 25 bar
371	Number of Bulk connections	361
11 %	NRW	10%
31 %	Collection ratio	58%
106	Staff number	238

- WBWD is the bulk water provider in the West Bank.



9. Major Recent Achievement In Improvement of Water Supply Services / Management(PART 2):

- * Despite of the obstacles and difficulties faced due to the Israeli occupation and almost complete control over water resources which are mainly the right of the Palestinian side.
- * PWA has worked on the development of water sector in Palestine in all ways and means available in collaboration with partners and friends in the donor countries, municipalities and the services councils.
- * During the past few years, PWA has implemented several development projects in the infrastructure of the water sector in the communities and villages that suffer from a lack of sanitation and drinking water sources.
- * Those projects have contributed to alleviating the suffering of the citizens and improve the standard of living in those areas.
- * The following table shows an example for some of those projects in the west bank:



10. Expectation for the Japanese Private Companies and Water Supply Utilities.

- * Japan was the first non-Western country to successfully modernize its society and industrialize its economy.
- * We are looking for acquaint of accumulated Japanese private companies experiences on water supply administration and technologies.
- * Capacity building on administration, management, operation and maintenance.
- * Gaining more experience in supply of safe, stable quantities of drinking water for many more people in my country.
- * Supporting our country with all recent technologies in management of water supply services.
- * Providing training programs in water utilities development.



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: MUKIZA ANACLET

Position: Branch Manager

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 : 84%
- Urban drinking water coverage : 92 %
- Rural drinking water coverage : 76 %

3

Water supply services in WASAC Ltd

	2014-2015	2015- 2016	2016- 2017
Staff/1000	5/1000	5/1000	5/1000
Production capacity(m3/day)	41,061,229	43,558,705	45,253,292
Water Quality	WHO	WHO	WHO
Coverage area	74%	82%	84%
Supply duration	14-16 h	14-16 h	14-16 h
Supply pressure	2-6 bars	2-6 bars	2-6 bars
Number of connection	156,618	172,747	189,642
NRW	38%	35.7%	37%
Collection ration		59	59
Staff number	834	793	820

4

Success story of Water Supply Services

- WASAC treats and distributes clean water Countrywide to supply water to all populations especially those in urban habitats.
- 3,512,250 residents of 13 urban areas including Kigali City are the population targeted for clean water services
- WASAC manages 23 treatment plants which provides clean water (74.4 m³ per day) through 7,781,477m of pipes to reach 191,684 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
Digitizing Life

*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 LTD is implementing Water Prepayment Services.

This service consists of the following:

Prepayment between WASAC Ltd and Customer who prefer to pay Bills in advance. Customers on this prepayment system will sign an agreement with WASAC Ltd 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.

<i>Tariff</i>	<i>FRW/m³</i>	<i>TVA</i>	<i>TTC</i>	<i>TTC+VAT</i>
Water Tap	323	0.18	58.1	381
0-5	323	0.18	58.1	381
6-20	331	0.18	59.6	391
21-50	413	0.18	74.3	487
51-100	736	0.18	132	868
>101	847	0.18	152	999
Factories	736	0.18	132	868

- 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

Monthly Production



WTP	17-Jul	17-Aug	17-Sep	17-Oct	17-Nov	17-Dec
Kimisagara	848,713	856,098	820,218	849,267	860,740	901,218
Karenge	449,170	456,025	437,283	471,964	452,826	480,626
NZOVE	1,299,524	1,314,653	1,164,050	1,010,617	1,115,244	1,190,776
Kadahokwa	130,208	118,920	136,640	145,835	174,394	138,220
Gihira	287,343	280,816	264,667	269,630	275,790	294,669
Mutobo	211,900	219,590	201,430	213,040	214,900	216,350
Gihuma	93,064	82,048	72,821	85,781	80,987	81,673
Cyunyu	115,309	115,947	103,662	97,064	88,961	94,519
Gisuma	43,172	41,636	39,043	42,276	38,828	41,960
Mpanga	117,915	108,114	107,051	98,905	97,847	100,236
Muhazi	131,605	129,435	123,053	138,767	126,007	134,787
Rwasaburo	42,415	48,302	45,046	44,612	44,188	46,691
Kanyabusage	37,135	36,044	37,144	38,013	36,837	37,809
Nyamabuye	50,420	49,800	48,365	47,822	47,593	50,500
Nyagatare	241,829	231,422	172,491	169,695	171,698	189,153
Ngenda	107,275	105,225	99,174	104,149	102,978	105,789
Kibonabose	12,340	12,210	11,440	12,450	12,620	13,030
Gashyuha	22,485	22,452	25,384	16,528	23,049	28,492
Total	4,241,821	4,228,737	3,908,962	3,856,414	3,965,487	4,146,498

13

BIGGEST CHALLENGES FACED



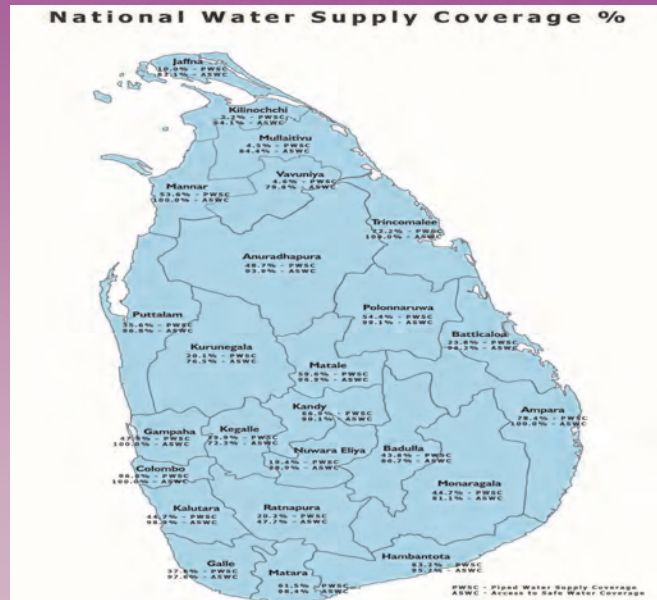
1. Water losses of any nature which has many consequences from finances resources to environment wastage
2. Inappropriate technology in water supply services
3. Lack of funds for large scale projects implementation
4. Non revenue Water is still high

14

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

SRI LANKA

AYUBOWAN



WATER SUPPLY ADMINISTRATION FOR BETTER MANAGEMENT OF WATER SUPPLY SERVICES

INCEPTION REPORT PRESENTATION

Name : M. S. Bandara
Position : Senior Programme Director
Organization : Ministry of City Planning and Water Supply
Sri Lanka

COUNTRY REPORT PRESENTATION

Outline:

- Outline of Water Supply Services
- Water Supply Service Levels
- Management of Water Quality
- Reduction of Non – Revenue Water
- Accounting system of Water Supply Service
- Major Recent Achievements in Improvement of Water Supply Services
- Recent Challenges to Improvement of Water Supply Services

Outline of Water Supply Services

❖ Legal Basis of Water Supply Services

The following Act and Policies are legal framework for the Water Supply Services in Sri Lanka.

1. National Water Supply & Drainage Board Act 1975
2. National Policy for Rural Water Supply & Sanitation Sectors – 2001
3. National Rain Water Harvesting Policy 2005
4. National Policy on Drinking Water 2010

Demarcation of Water Supply Services

Ministry	Mandate
Ministry of City Planning & Water Supply	Subject Ministry WASH, for Sector policy, coordinating budget allocation, monitoring and review of progress
Ministry of Mahaweli Development & Environment	Manage the environment and natural resources of the country under the National Environmental Act.

1.3 Main Actors of Water Supply Services

Institution	Mandate
National Water Supply & Drainage Board	Implementation of water supply and sanitation schemes, maintenance of the same and offering satisfactory service to the consumers.
Department of National Community Water Supply	Provision of pure and adequate drinking water and basic health facilities for all rural people of Sri Lanka with the participation of them.
Plantations' Human Development Trust (PHDT)	Government Agency established for welfare of the plantation workers. Responsible for channeling funding for water and sanitation to the plantation sector.
Civil Societies	Play an important role in reaching the marginalized communities where the government delivery system was not effective.

1.4 Vision/Mission of water Supply Utilities

Institution	Vision	Mission
Ministry of City Planning & Water Supply	Planed cities, Safe Drinking Water and Improved Sanitation for all	Providing people with favorable living conditions through sustainable city planning, safe drinking water supply and improved sanitation facilities while ensuring the protection of the living environment and water resources
National Water Supply & Drainage Board	To be the most prestigious utility organization in Sri Lanka through technological and service excellence.	Serve the nation by providing sustainable water & sanitation solutions ensuring total user satisfaction.

Water Supply Service Levels

INDICATORS	2005	2018	Goals for 2025
Staff/1,000 connections	8.8	4.66	2.8
Production capacity (m ³ /day)	1,049,315	1,859,937	
Water quality - % of samples passing Bacteriological tests	N. A.	99.26	100
Coverage %	30	40	65
Supply duration (hour/ day)	24 x 3	24x5	24x7
Supply pressure	1.5 bar	2.0 bar	3.0 bar
Number of connections	907,622	2,219,172	4,123,216
Population Served	3,176,677	7,767,102	14,431,256
NRW (%)	33.8	25.24	18.4
Collection ratio	0.75	1	1
Staff number	6,500	10,400	10,400

Management of Water Quality

3.1 Current Situation and Major Challenges/ Problems

Water Quality Issues in Sri Lanka

- ❖ Hardness
- ❖ Industrial Waste
- ❖ Fluoride
- ❖ Domestic Waste
- ❖ Iron
- ❖ Agro fertilizers
- ❖ Manganese
- ❖ Pesticides and herbicides
- ❖ Algae

Water Related Health Impact

- ❖ Dental and Skeleton fluorosis
- ❖ Cholera, Dysentery and Typhoid
- ❖ Cancers (From THM, NO₃, etc)
- ❖ Unknown Chronic Kidney Disease (CKDU)

3.2 Current Actions against those challenges/problems

Assist Establishment of a Framework for Safe Water

- Institutionalize Water Safety Plans for all service providers including CBO run schemes and build capacity for preparation and implementation of Water Supply Project
- Capacity building of service providers to implement Water Supply Project
- Establish and orient district WQSS committee on the regulatory role (TORs to introduce functions)
- Implementation and maintenance of Database and Dissemination of information

3.4 WATER QUALITY STANDARDS FOR DRINKING WATER

× Physical – Organoleptic requirement

PARAMETER	REQUIREMENT
Colour, Hazen Units, (max,)	15
Odour	Unobjectionable
Taste	Unobjectionable
Turbidity, (NTU) (Nephelometric Turbidity Units), (max.)	2
pH at 25°C +_2°C	6.5 to 8.5

02. Chemical requirement

Aluminium (as Al) (mg/l)	0.2
Ammonia; Free Ammonia (as NH ₃) (mg/l) Albuminoid Ammonia (mg/l)	0.06 0.15
Anionic detergents (as MBAS (Methylene Blue Active Substances) (mg/l)	0.2
Calcium (as Ca) (mg/l)	100
Chloride (as Cl ⁻) (mg/l)	250
Chemical Oxygen Demand (COD) (mg/l)	10
Copper (as Cu) (mg/l)	1.0
Fluoride (as F) (mg/l)	1.0
Free residual Chlorine (mg/l)	1
Iron (as Fe) (mg/l)*	0.3
Manganese (as Mn) (mg/l)*	0.1
Magnesium (as Mg) (mg/l)**	30
Nitrate (as NO ₃ ⁻) (mg/l)	50
Nitrite (as NO ₂ ⁻) (mg/l)	3
Nickel (as Ni) (mg/l)	0.02
Oil and grease (mg/l)	0.2
Phenolic compounds (as C ₆ H ₅ OH) (mg/l)	0.001
Sodium (as Na) (mg/l)	200
Sulphate (as SO ₄ ²⁻) (mg/l)**	250
Total alkalinity (as CaCO ₃) (mg/l)	200
Total dissolved solids (mg/l), (max.)	500
Total hardness (as CaCO ₃) (mg/l)	250
Total Phosphates (as PO ₄ ³⁻) (mg/l)	2.0
Zinc (as Zn) (mg/l)	3.0
Arsenic (as As) (mg/l)	0.01
Cadmium (as Cd) (mg/l)	0.003
Chromium (as Cr) (mg/l)	0.05
Cyanide (as CN ⁻) (mg/l)	0.05
Lead (as Pb) (mg/l)	0.01
Mercury (as Hg) (mg/l)	0.001
Selenium (as Se) (mg/l)	0.01

03. BACTERIOLOGICAL REQUIREMENT

Treatment works and piped distribution system	
E. Coli/ 100ml or thermo tolerant coliform/ 100ml	Not detected
Total Coliforms/ 100ml	I. Shall not exceed 3 in any 100ml sample II. Not detected in any two consecutive samples

3.5 Monitoring System or Plans for Safety of Drinking Water in your Organization/Regulatory Body/ Independent Institution/ Others

Water Quality Monitoring

- ❖ Public water bodies are monitored by different interest group to:
 - Ascertain changes in water quality (source water for drinking)
 - Identify water quality problems
 - Gather information for pollution assessment and prevention.

- ❖ Public water bodies in Sri Lanka are monitored by:
 - Research organizations
 - National Water Supply & Drainage Board
 - Central Environmental Authority

3.6 Implementation of Water Safety Plans or similar Efforts

Proposed Activities for 2018 – 2020

- Construction of erosion controlling and soil conservation barriers in sensitive catchments causing high turbidity in source water.
- Tree plantation and improvement of riparian vegetation as tree barriers in removing pollutants from raw water.
- Construction of household toilet facility in the most sensitive catchments areas, vulnerable for high level of biological contamination.
- Construction of wastewater treatment facility for controlling effluents from cattle farming.
- Improving natural wetlands for controlling discrete pollution.

Reduction of Non - Revenue Water

System input volume	Authorized Consumption	Revenue water	Billed authorized consumption (Year 2017)	507,552,000 m³/ year
		Non Revenue water (NRW)	Unbilled authorized consumption (ex: fire fighting, cleaning)	Xx m³/ year (%)
	Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	Xx m³/ year (%)
			Real losses (Leakage)	Xx m³/ year (%)

Accounting System of Water Supply Services

Water Tariff in your Organization

No. of units	Usage Charge Rs./ Unit	Monthly Service Charge Rs.
00-05	8.00	50.00
06-10	11.00	65.00
11-15	20.00	70.00
16-20	40.00	80.00
21-25	58.00	100.00
26-30	88.00	200.00
31-40	105.00	400.00
41-50	120.00	650.00
51-75	130.00	1,000.00
Over 75	140.00	1,600.00

Balance Sheet in your Organization

	Budget Rs.	Actual 2015 Rs.	Actual 2014 Rs.
Revenue	20,875,923,000	19,884,021,370	18,710,049,680
Cost of Sales	(13,779,185,419)	(12,314,954,106)	(11,325,829,471)
Gross Profit	7,096,737,581	7,269,067,264	7,384,220,209
Other operating income and gains	2,064,670,000	1,665,908,597	1,390,066,559
Administrative Expenses	(8,247,865,581)	(8,571,562,031)	(5,985,331,888)
Other operating Expenses	(500,000,000)	(463,870,115)	(334,370,432)
Operating Profit/ (Loss)	413,542,000	(100,456,285)	2,454,584,449
Finance Income	100,000,000	1,186,119,227	213,239,303
Finance Cost	(1,700,000,000)	(1,736,845)	(1,242,530,161)
Profit/ (Loss) before tax	(1,186,458,000)	1,083,926,097	1,425,293,591
Provision for Income Taxation	(60,000,000)	(53,881,978)	(53,113,301)
Profit/ (Loss) for the year	(1,246,458,000)	1,030,044,119	1,372,180,290
Other Comprehensive Income for the year,			
Actuarial Loss on Defined Benefit Obligation.	-	(1,979,658,769)	
Revaluation surplus	-	-	53,710,538
	-	(1,979,658,769)	-
Total Comprehensive Income for the year	(1,246,458,000)	(949,614,650)	1,425,890,828

Major Recent Achievement in Improvement of Water Supply Services

	Indicator	2014	2015	2016	2017
1.	Safe Drinking Water Coverage	84.6%	86%	87.8%	89.3%
2.	Percentage of Pipe Borne Water Coverage	44.3%	45.9%	47.7%	49.2%
3.	Percentage of Pipe Borne Water Coverage (NWS&DB)	33.4%	35.2%	37.1%	38.7%
4.	Percentage of Non - Revenue Water for whole Island	28.54%	27.3%	25.55%	25.24%
5.	Percentage of Non- Revenue Water in Colombo City	46.62%	46.16%	45.72%	43.3%

Recent Challenges of Water Supply Services

- Regional disparities in accessing safe drinking water.
- Serving for CKDU affected areas with safe drinking water facilities.
- Maintaining better quality in water sources, water intakes and CBO managed schemes.
- High rate if Non -Revenue Water (NRW).
- Growing demand for reliable pipe borne water service than the institutional capacity.
- Delivering higher levels of service with sustainable sources and systems at affordable costs.
- Create conducive environment to attract private sector investment into water sector.
- Maintaining cost reflective tariff system for pipe borne water supply services.

出典：平成 30 年度 JICA 課題別研修カントリーレポート

- 平成 30 年度 JICA 課題別研修「水道管理行政（A）」
- 平成 30 年度 JICA 集団研修「水道管理行政（B）」
- 平成 30 年度 JICA 課題別研修「薬事行政」

Japan International Corporation of Welfare Services (JICWELS) was established with the sanction of the Minister for Health, Labour and Welfare in July 1983 and implements international technical cooperation programmes with purpose of contributing to the promotion of health and social welfare activities in the friendly nations.

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公益社団法人国際厚生事業団（JICWELS）は、国際的な保健・福祉分野の国際協力に貢献することを目的として、1983 年（昭和 58 年）7 月 7 日に厚生省（現厚生労働省）から社団法人の認可を受け設立されました。開発途上国の行政官研修や WHO フェローの受入れ、調査企画や研究開発並びに情報の交換及び広報活動など、海外諸国との国際交流活動を推進しています。

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