

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

Country Reports

Japan International Corporation of Welfare Services (JICWELS)

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Water Supply Administration
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Course (B)

BANGLADESH

Welcome

Reports on Present Situation of Water Supply Service

Presented by
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Chittagong Water supply &
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Chittagong Water Supply and Sewerage Authority Bangladesh

Bangladesh



Position of water supply services

- Chittagong is the Second largest city, Main Port city and commercial capital of Bangladesh
- Its importance as a port and trading centre goes back to the 9th century
- The area of Chittagong City Corporation is 155 square kilometers.
- Present population is 3.2 million. Projected population by 2025 is 4.1 million and by 2030 is 4.6 million (According to JICA Preparatory Survey of KWSP 2 in 2012)

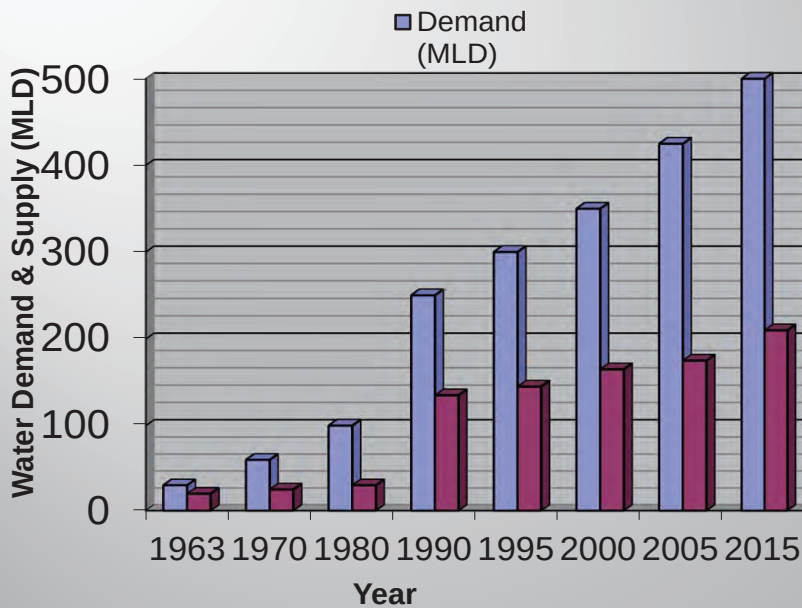


Despite its importance Chittagong has been suffering from shortage of water

- Water supply capacity 210 MLD(including surface WTP and Ground deep tube wells)
- Demand of the city is 500 MLD.
- The **Demand Supply gap** of water in Chittagong is widened rapidly due to population growth and expansion of industrial and commercial activities.



Past & Present Demand & Supply



Supply can not catch up the increasing demand



Water Supply Service Levels

- Surface water treatment plant 1 no. capacity 90 MLD.
- Iron removal plant 1 no capacity 68 MLD for treating water for high iron concentrated water from deep tube wells.
- Total pipe length is 684 km mostly DI,PVC,MS and AC
- Aging pipes causes leakages and contaminate water thus increase NRW.



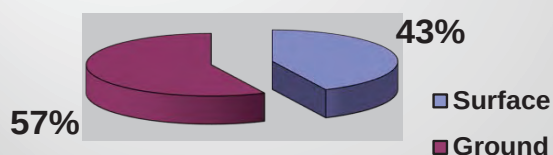
Summary of Existing Facilities

Facility	Quantity	Capacity
Surface WTP (Mohara WTP)	1 nos.	90 MLD
Ground WTP (Kalurghat IRP)	1 nos.	68 MLD
Deep Wells	96 nos.	120 MLD
Pipeline	684 km	-
Service Connections	62255 nos.	-

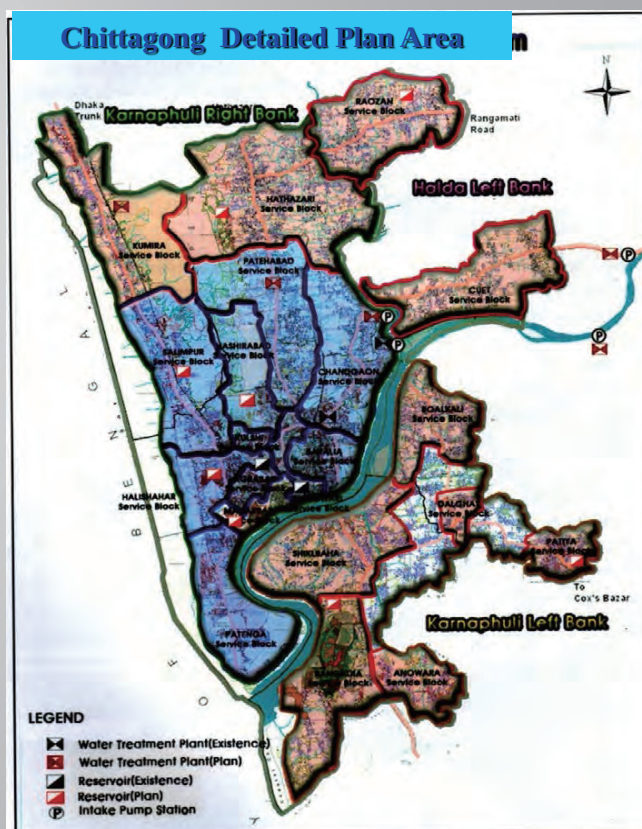
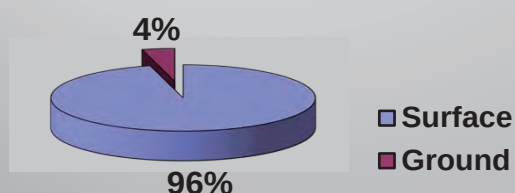


Water source

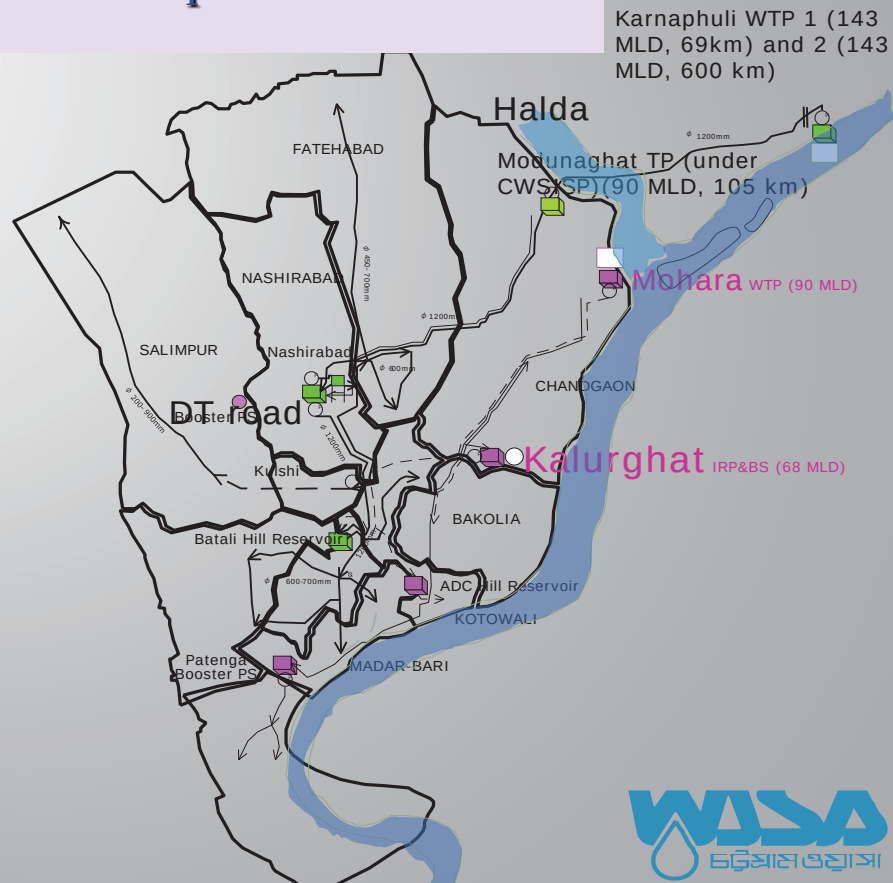
Present water source Sharing



Future water source Sharing



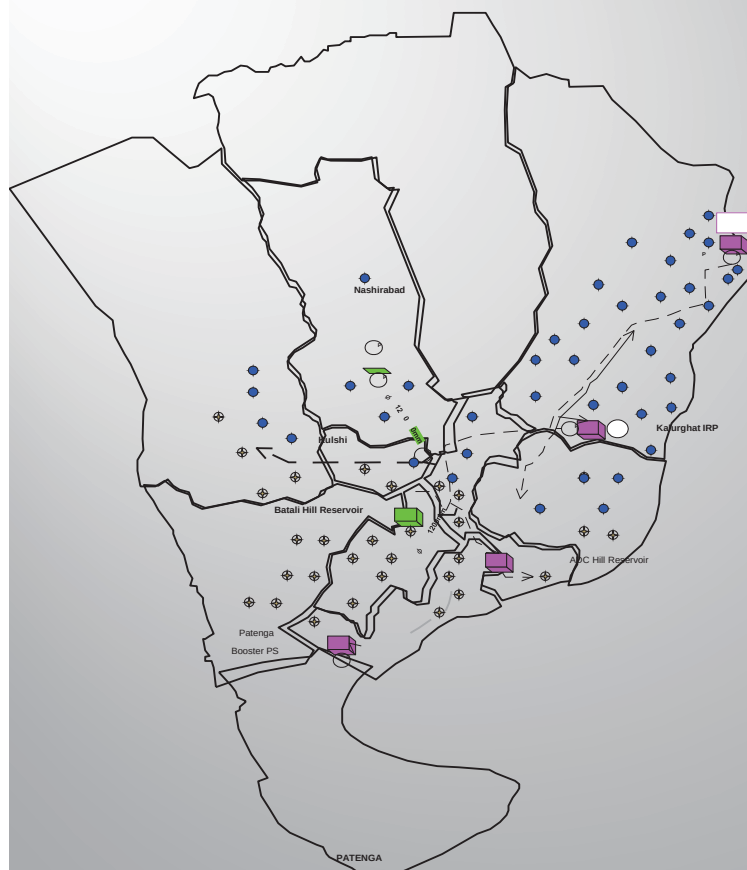
Surface water source & Pipeline Network



Management of water quality

- To supply safe drinking water CWASA has a laboratory and qualified man power. water is tested to observe different parameters before supplying to city dwellers.
- Have iron removal plant to remove iron deriving water from deep tube wells.
- During salinity intrusion in surface WTP, Ground water is mixed with the surface water to reduce the chloride level of supplied water.

Ground water Condition in Chittagong



- ❑ Contains high iron concentration (2~8 mg/l)
- ❑ Wells strainer and the gravel pack clogged with iron bacteria
- ❑ South-west area of the city ground water contains Chloride
- ❑ Ground water level in the city center has been declining
- ❑ Many household and industries have constructed their own deep tube wells



Water Quality Inspection

Chittagong Water Supply & Sewerage Authority Water quality Management Plan

Water examination at the Tap

Water Quality Examination at the
Treatment Plant

Water sources Quality Examination
at the intake point (River)



Water
Quality is
tested at
80 sites
every
month

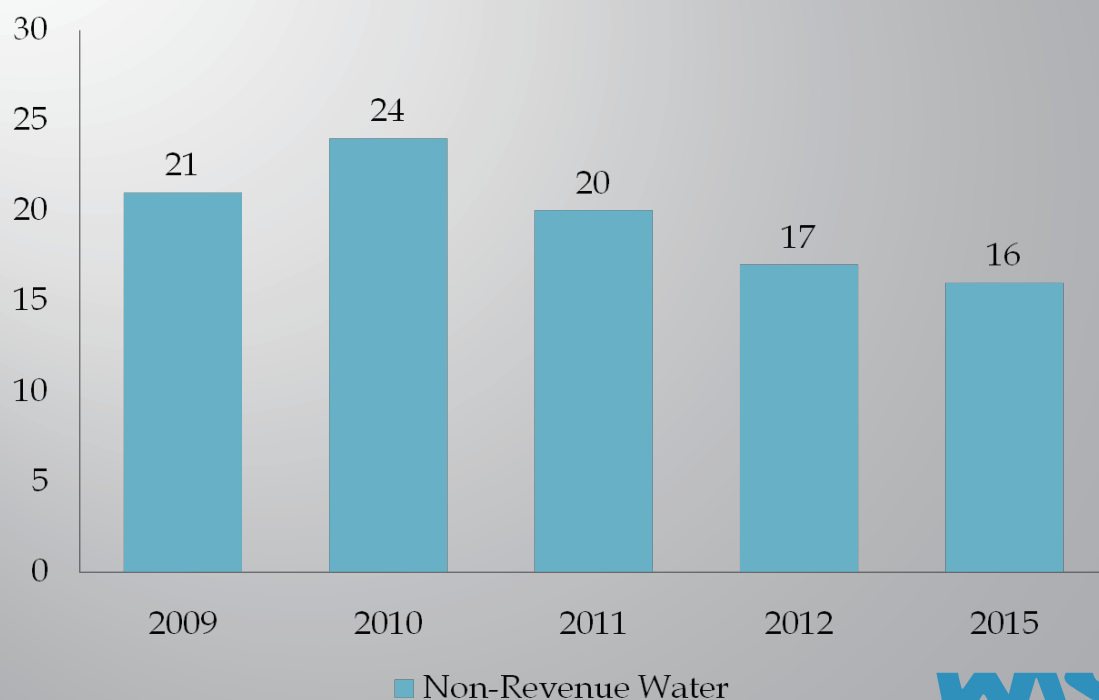


Reduction of Non-Revenue Water

- CWASA is reducing a significant amount of NRW in last couple of Years
- Project for Advancing Non Revenue Water Reduction Initiative (PANI-2) and CWASA are working together to reduce NRW.
- Under Japanese Experts CWASA Engineers are doing on-job training on Leak detection , GIS Mapping and preparing Customer database.
- Under the Project model Area is selected and survey work is carrying on .



REDUCTION OF NON-REVENUE WATER



Reduction of Non revenue water

To reduce the NRW CWASA has taken initiatives

- Hands on Training of Plumbers (like leakage repair, service connections, meter replacement) through PANI (Project for Advancement Non Revenue Water Reduction Initiative) funded by JICA.
- Gradually replacing the old pipes through different projects like Karnaphuli Water Supply Project (KWSP) Phase 1 & 2 funded by JICA and Chittagong Water Supply Improvement and Sanitation Project (CWSISP) funded by World Bank.



- Mass Media Advertisement for public awareness to Reduce, Reuse, and Recycle of water.
- School campaigning for awareness building of water usage.
- Formulate day/night vigilance team to locate leaks during night time pressure, illegal connections.



Communication with other Stake Holders



Major recent achievements in improvement of water supply services

- Mohara Water Treatment Plant and kaloorghat Iron Removal Plant Rehabilitation Project has been completed by JDCF (Japan Debt Cancellation Fund). new machinery has been installed and the plant is running smoothly.
- Under TA (Technical Assistance) Project funded by JICA named PANI (Project for Advancement Non-Revenue Water Reduction Initiative) new meters has been installed, Updating GIS (Geographical Information system), Conducting Training for Plumbers.
- Two major projects are going on under assistance of JICA fund named karnaphuli water supply project (KWSP) phase 1 & 2. Phase 1 is nearly completed and going to under operation by December 2016.



RECENT CHALLENGES TO IMPROVEMENT OF WATER SUPPLY SYSTEM

- To meet up the gap between Water Demand and Supply.
- When new projects connect with existing network old pipes breakdown due to increased pressure.
- Administer water supply system management regarding engineering, administration and commercial due to lack of skilled and competent personnel; when coming mega projects like phase 1 & 2.



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

CAMBODIA

For

All Nominees << by 17th August (Wed), 2016 >>

Attachment1 Inception Report

(1) What is “Inception Report”?

All nominees are required to submit “Inception Report” with Application Form to the respective countries’ JICA offices (or Embassies of Japan). This report will be used as one of the applicants’ screening materials.

(2) Why do we need “Inception Report”?

The role of “Inception Report” is to share the present issues of water supply administration related to participants’ organization with other participants and lecturers. Moreover, “Inception Report” is supposed to assist Course Organizer, Implementing Partner and other lecturers to know about the details of participants’ professional careers, present challenges and expectation toward the program.

(3) Contents of “Inception Report”

“Inception Report” should be typewritten in English on A4 size paper. It is highly recommended to include graphs, figures and maps in your report.

Contents include the following 9 topics about the individual water supply utility, national or local government which the nominee belongs to. Please make sure to describe the contents based on the 9 topics:

- 1. Position 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**
- 8. Expectations toward Japan**
- 9. Expectations toward the Program**

1. Position of Water Supply Services

1-1. Legal Basis of Water Supply Services

We are acting on the regulations issued by the ministry and we are waiting for water law which is being drafted by JICA experts.

1-2. Demarcation of Water Supply Services

According to the MOU between MIH and MRD, the urban water supply utilities are under the authority of Ministry of Industry & Handicraft, and the rural water supply is

under the authority of Ministry of Rural Development.

1-3. Main Actor of Water Supply Utilities

The main actor of water supply utilities is Department of Portable Water Supply under the Ministry of Industry & Handicraft.

1-4. Mission/Vision of Water Supply Utilities

The Mission is to supply safe water with affordable price and sustainable.

The Vision is to supply good quality water to all the people in the service area
24/7.

1-5. Your Mission/Vision in your organization

My vision is to have all the houses in the service area connected to our pipe line and the collection rate is 100%.

My missions are:

- To get more customers to connect to our pipe line
- To make sure the collection rate is high
- To make sure the NRW for commercial part is low.

2. Water Supply Service Levels

2-1. Main Performance Indicators (PI)

Coverage area	1 Districts 4 Communes 12 Villages
Population Served	44,000
Collection ratio	97.32%
Production capacity	8,000m3/day
Supply duration	24hr/day
Supply pressure	6-13
Non-Revenue Water	12.89%
Water quality	Good
Staff number	50
Number of connections	8,800
Staff/1,000 connections	5.68people/1,000connections

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

There are 4 types of indicators that we are using:

1. General information
 2. Operation indicators
 3. Quality indicators and
 4. Economic indicators.
-

3. Management of Water Quality

3-1. Current Situation and Major Challenges/Problems

There are 2 sources of water supply. One is that we produce by ourselves and the other is that we buy from ANCO Company. The quality of the water that we produced is according to the National Standard, while ANCO is not. While the water from our factory combine with the water from ANCO it results in non-chlorine at the pipe-end.

3-2. Current Actions against Those Challenges/Problems

We sent our technician to work in ANCO Company so he can control the quality of the water from ANCO factory.

3-3. Any Achievements

The problem is solved.

3-4. Water Quality Standards for Drinking Water

There is a National Quality Standards for Drinking Water that was approved on 14 July 2015 by Senior Minister of MIH.

3-5. Monitoring System or Plans for Safety of Drinking Water in Your Organization / Regulatory Body / Independent Institution /Others

We follow the Water Supply Monitoring System which was approved by the Ministry.

3-6. Implementation of Water Safety Plans* or Similar Efforts

(* Water Safety Plans: refer to the following URL and review before participating in the Course, the Chapter 4 "Water Safety Plans" of the "Guidelines for drinking-water quality, third edition"

URL: http://www.who.int/water_sanitation_health/dwg/gdwg3_4.pdf)

We have many teams that take responsibility for the safety of the water such as:

- The pumping station team: look after the Prek Tub Lake to prevent people from throwing rubbish near or into the water.
- The factory team: responsible for controlling the quality of the water before send it out.
- The pip maintaining team: responsible for cleaning the pipe and check for leakage.

4. Reduction of Non-Revenue Water

4-1. Current Situation and Major Challenges/Problems

There are some problems with the NRW:

- High pressure results in a lot of water loss while leaking
- Inaccuracy meters (out-of-date meters)
- Responsiveness of the leakage detector team

4-2. Current Actions against Those Challenges/Problems

We have developed some actions such as:

- Reform the leakage detector team
- Make plan to change the out-of-date meters

4-3. Any Achievements

- The NRW is reducing

4-4. Constitution of NRW (If you have the data, please fill in the table)

Authorized consumption	Revenue water	Billed authorized consumption	4,427,448m3 /year 87.11%
	Non-Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	5,378m3 /year 0.1%
Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	152,485m3 /year 3%
		Physical losses (Leakage)	492,173m3 /year 9.68%

4-4. Situations about Leakage Detection Measures (DMA etc.)

- No DMA zones
- Don't have exact calculation

5. Accounting system of Water Supply Service

5-1. Water Tariff in your Organization

We have block tariff:

- From 0-7 m³ 1,500 Riel
- From 8-15 m³ 1,800 Riel
- From 16 up 2,000 Riel

5-2. Balance Sheet of your Organization

5-3. Profit and Loss Statement of your Organization

(* [Public Utilities] (1) Profit and Loss Account

- Profit: 1,506,849,780.94 Riel

(2) Capital Income and Expenditures of your Organization)

(* You can check the case of Tokyo in the chapter 4 "Financial System and Future Financial Management" of this file.

URL: http://www.waterprofessionals.metro.tokyo.jp/pdf/wst_02.pdf)

6. Major Recent Achievements in Improvement of Water Supply

Services/Management

- We expanded our service area to a new district called Steung Hav.
- During summer we don't have the water shortage problem.
- We are installing new main pipes from Kbal Chhay, so that during summer we will have enough water to supply.

7. Recent Challenges to Improvement of Water Supply Services

- We need more budgets to build a new factory in the new area.
- We need more budgets to restore the Prek Tub lake
- Need more experts in water system

8. Expectations toward Japan

8-1. Expectations toward Japanese Government and JICA

- We hope to get more supports from the Japanese side such as financial support and technical support.

8-2. Expectations toward Japanese Water Utilities

- We hope to get good practices from the Japanese Water Utilities that can apply here in the Sihanouk Province Water Supply Authority.

8-3. Expectations toward Japanese Private Companies

- We hope to cooperate with those companies in the future for new technologies.
-

9. Expectations toward the Program.

(Any comments and requests are appreciated.)

I expect to get more knowledge about the calculation of the infrastructure such as, how to calculate the pipe to install for this much population, how big is the factory for serving this amount of people. Also I hope to get the solution to solve the NRW problem in my utility too.

END.

Attachment3

Present Situation of the Water Supply Service

(1) What is “Present Situation of the Water Supply Service”?

The accepted applicants are expected to formulate and submit their short report about “Present Situation of the Water Supply Service” (Annex 3) as the detailed information for “Water Supply Service Levels”(Chapter2 of your Inception Report).

The result of this short report is supposed to assist Course Organizer, Implementing Partner and other lecturers to know about the details of participants' professional careers, present challenges.

(2) Submission of “Present Situation of the Water Supply Service”

The deadline of the Present Situation of the Water Supply Service: October 7th, 2016. Please submit together with updated Inception Report Presentation to the following e-mail address: tictee@jica.go.jp

A. General Information

1. Please describe the current situation of **water resources** in your organization by mentioning the following topics.

1.1 The geographical background (The proportion of forest, residential land, river, etc.)

N/A

1.2 The precipitation per one month and/or one year. Please attach the last 10 years data.

N/A

1.3 The type of available water resources and those situations

- Groundwater: high iron and the cost to treat the water is high.
- Prek Tup Lake (current source): not enough water, dried out during summer.
- Hun Sen Reservoir: a bit far (approximately 23km from the city) and can't provide enough water (need to reform).
- Ou Chomna Reservoir: about 17km from the city and can't provide enough water (need too reform).
- Kbal Chhay Dam: belongs to a private company, got enough water.

1.4 The intake water volume per one day, per one year

The amount per day is approximately 4,700 m³/day, and per one year is approximately 1,642,500 m³/year.

1.5 The type of water resources for the future

The future available water resource should be the seawater.

2. Please describe the current situation of **water supply services** in my city by mentioning the following topics.
 - (1) The population ratio to be served and not to be served drinking water
The population who has access to portable water is 68.66% and doesn't have access to portable water is 31.34%.
 - (2) Proportion of consumers with 24 hours supply, average number of hours per day of water availability to most people.
100% of our consumers get 24 hours supply.
 - (3) Does the distribution water use for the potable water directly?
yes.
 - (4) Non revenue water (NRW)
2015=12.89%

3. Please describe the current situation of **Private Sector Participation** in your country by mentioning the following topics.
 - (1) The status of Private Sector Investment and its area (e.g. Water resource development, Water treatment, Water distribution, Organization management, Bill collection, leakage repair, etc.)
 - (2) The current situation of involvement of national government in water supply services (e.g. Water rates, Personnel employment, O/M budgeting, Capital investment, etc.)

B. Related Figures

Instructions for completing the form

1. All information provided should be for the fiscal year 2014 or most recent data if 2014 year's data is unavailable (please indicate the year of the data available).
2. For all financial information, please specify in the local currency with equivalent US dollars.
3. When a value is zero, please enter '0'.

I. Service Area

- 1 Size of Utility's area of Responsibility: (936 sq. km)
- 2 Size of Utility's present service area: (642 sq. km)
- 3 Population of Utility's area of responsibility: (90,220 habitants)
- 4 Population of Utility's present service area: (72,540 habitants)
- 5 Population served by the Utility with piped water supply: (57,285 habitants)
- 6 Number of towns served with piped water: (1 district and 1 city)

II. Water Consumption & Production

- 1 Volume of water produced by the Utility: (1.7 million m³ / year)
- 2 Volume of water bought in bulk from other utility / company: (3.38

million m³ / year)

3 Volume of water metered: (4.4 million m³ / year)

4 Estimated un-metered consumption: (0.1 % of metered consumption)

III. Water Supply System Performance

1 Number of customers who received intermittent supply: (305 connections)

2 Typical duration of supply (planned and unplanned supply interruptions): (1 hours / day)

3 Typical mains water pressure in your pipe network: (6-13bars meters)

4 Number of water pipe breaks in the distribution network: (242 # / year)

5 Required number of tests of treated water for residual chlorine: (everyday # / year)

6 Number of tests of treated water for residual chlorine carried out: (everyday # / year)

7 Number of tests of treated water for residual chlorine passed: (80% passed # / year)

IV. Staff

1 Who does the work in your company: (please tick relevant boxes)

☒ permanent staff . salaried Government employees

☒ permanent staff . with contract

☐ casual / part-time . contract staff

☐ casual / part-time . wages

☐ contracted out to outside company / agency

2 Number of FTE* staff in the company: ***please specify how many in each category***

Corporate Services (Management, Admin, Finance, Technical, etc.)	Water Supply (O&M, Customer Services, Support Services, etc)	Other non water supply (e.g. wastewater, drainage, environment services)	TOTAL
0	0	0	0

* FTE = Full Time Equivalent staff (i.e. convert part-time and casual staff to equivalent full time staff)

V. Customers

1 Number of new customers connected to water supply system during the year:
(1,224 # / year)

2 Number of customer complaints recorded during the year: (17 # / year)

3 Typically* what is the fixed water supply charge / month? ***Please specify how much in each category***

Domestic (Households)	Non Domestic (Industrial, commercial, Institutional, other)	Bulk water sales	AVERAGE of all categories
1,000 Riel (0.25US\$)	1,000 Riel (0.25US\$)		1,000 Riel (0.25US\$)

4 Typically* what is the water tariff for metered consumption? ***Please specify how much in each category***

Tariff Block	Domestic			Non Domestic			Bulk water sales		
	From	To	Cost/m ³	From	To	Cost/m ³	From	To	Cost/m ³
1.	0	7	0.375 US\$	0	7	0.375 US\$	0		
2.	8	15	0.45 US\$	8	15	0.45 US\$			
3.**	16	Up	0.5 US\$	16	Up	0.5 US\$			

Notes:

* Where the Water Utility supplies multiple towns each with their own water charge schedules, please specify the typical tariff schedule nominally for the principal town supplied by the company

** Where there are more than 3 blocks in the tariff schedule please specify the approximate average tariff rates for consumptions above tariff block 2.



Department of Potable Water Supply

WATER SUPPLY ADMINISTRATION FOR BETTER MANAGEMENT OF WATER SUPPLY SERVICES



COUNTRY REPORTS

- | | |
|-----------------|-------------------------------------|
| 1. Country | : Cambodia |
| 2. Name | : Pok Chann |
| 3. Position | : Head of Planning Office |
| 4. Organization | : Ministry of Industry & Handicraft |

Whole Country

- | | | | |
|-----------------------|---|--------------|------------------|
| Area | : | 181,035 | km ² |
| Population | : | 14,7 Million | Habitants (2013) |
| Coverage Water Supply | : | 83% | (2015) |

Selected Water Supply System/City:

- | | | |
|-------------------|---|------------------|
| Service Area | : | km ² |
| Population Served | : | 550,000 Families |

Cambodia Water Sector

Ministries Responsible for Water:

Ministry of Water Resources Management and Meteorology – water resources management

Ministry of Environment – water environment

Ministry of Industry and Handicraft – urban water supply

Ministry of Rural Development – rural water supply

Ministry of Public Works and Transport – drainage

Ministry of Industry & Handicraft is responsible for management, policies preparation, national strategy planning for development of urban water supply sectors in Cambodia.



- “100% of urban population to have access to safe, affordable and sustainable water supply by 2025” (90% from piped water and 10% from other sources).
- The coverage rate of piped water supply in urban areas increased from 68.5% in 2012 to 83% in 2015.
- Over the same period the number of urban households having access to safe water supply increased from 400, 181 to 550,000 families.

PERFORMANCE ACTIVITIES, 2015

Public and Private Waterworks: 25

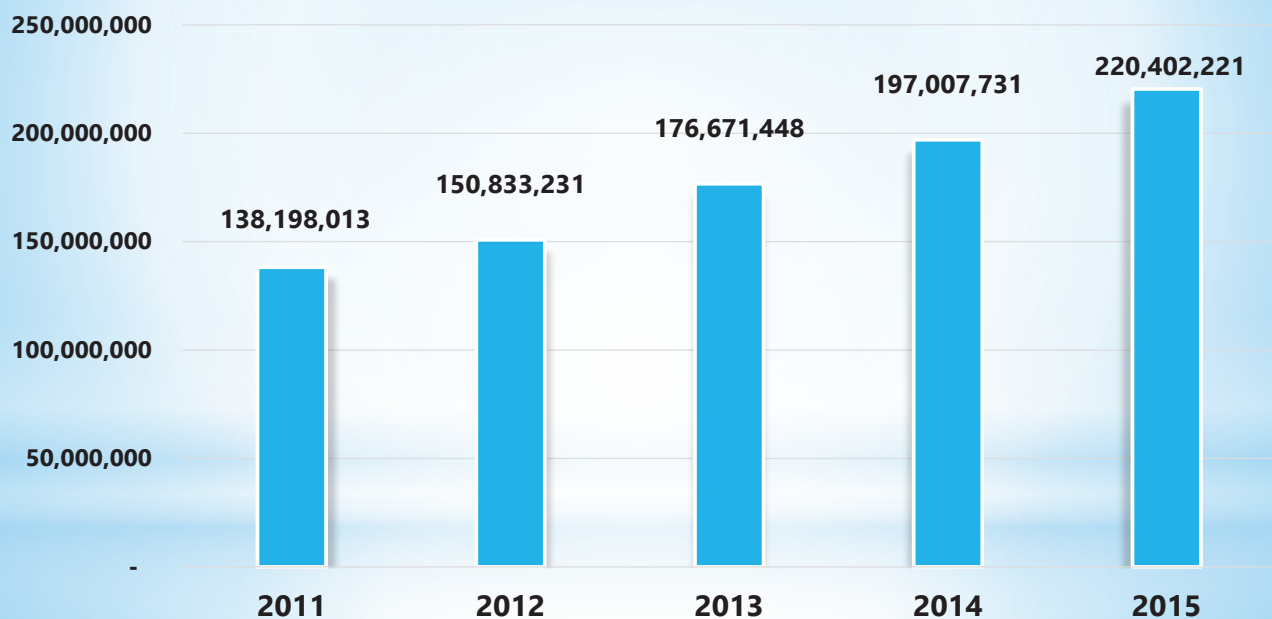
- Public Waterworks : 15
- Autonomous : 02 (PPWSA, SRWSA)
- Private Waterworks : 10 (Provincial Towns)
- Private Operators : 180



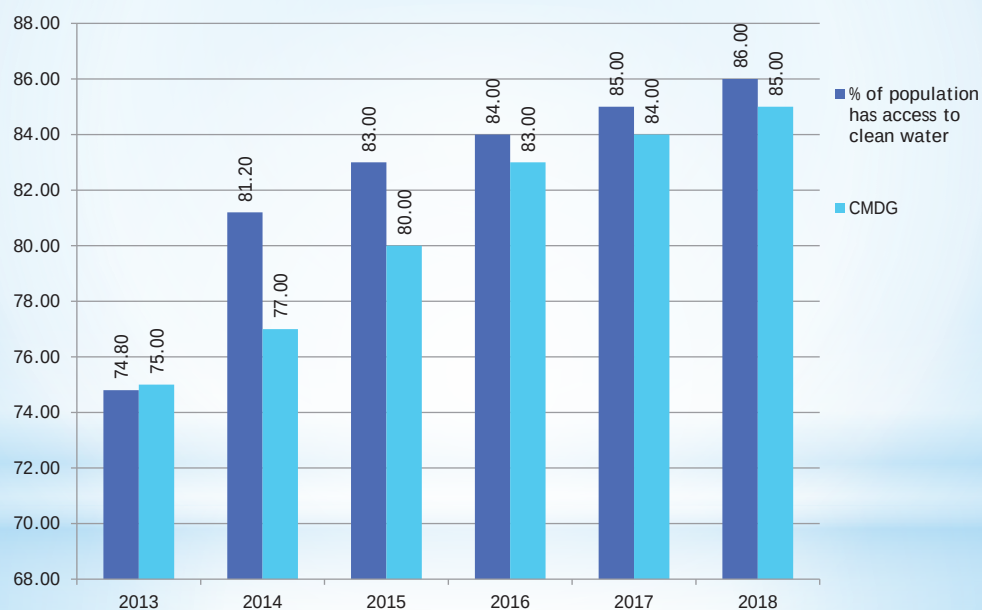
Description	2014	2015	Rate (m ³)	Rate (%)
PPWSA	149,557,507m ³	161,623,637 m ³	12,066,130 m ³	8.06%
SRWSA	4,342,164 m ³	4,794,513 m ³	452,349 m ³	10.41%
Public Waterworks	17,657,810 m ³	19,956,623 m ³	2,298,813 m ³	13.01%
Private Operators	25,450,250 m ³	34,027,448 m ³	8,577,198 m ³	33.70%
Total	197,007,731 m ³	220,402,221 m ³	223,394,490 m ³	16.29%

WATER PRODUCTION IN CAMBODIA

Water Production (m3)

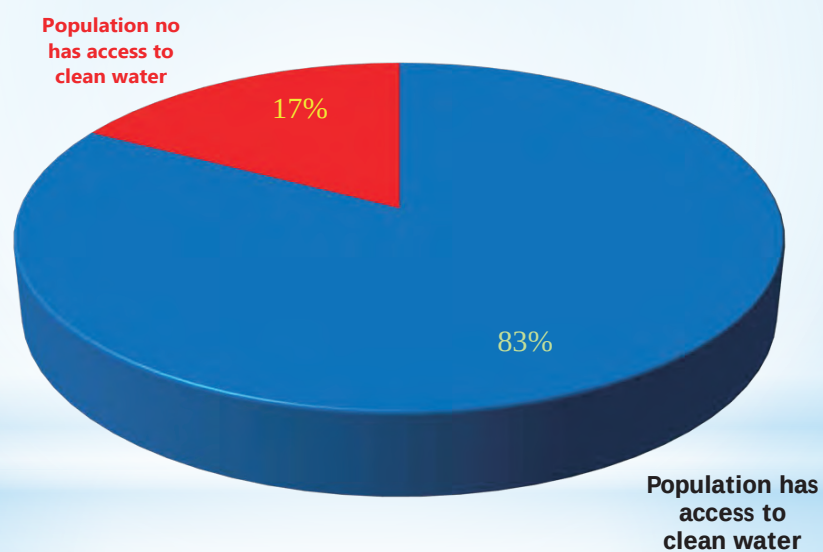


POPULATION HAS ACCESS TO SAFE WATER

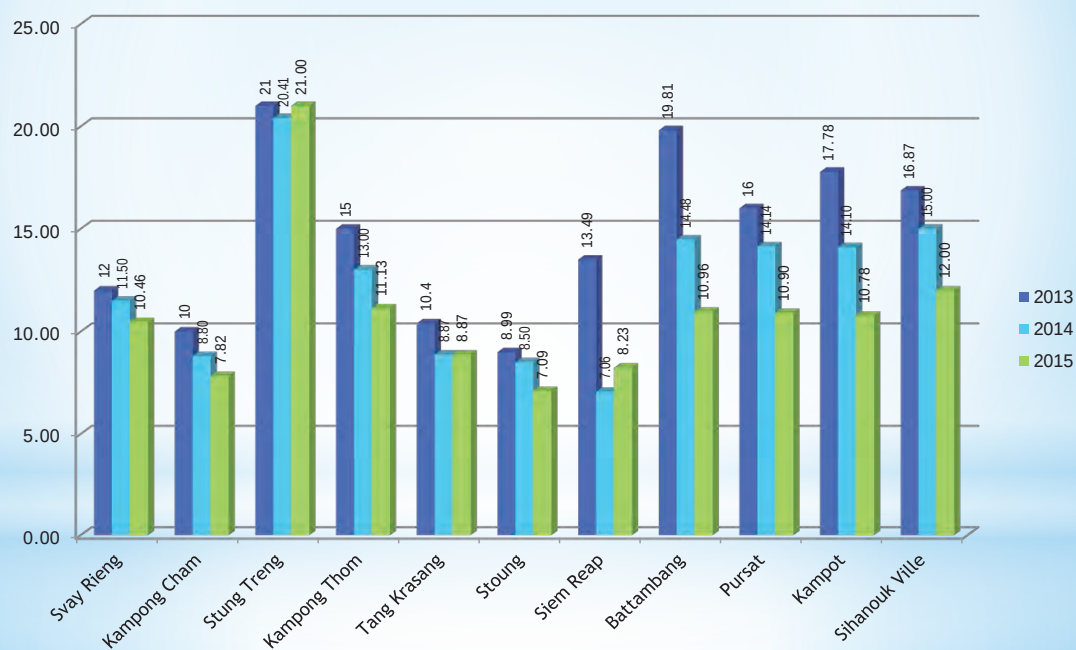


COVERAGE RATE FOR URBAN WATER SUPPLY 2015

Year 2015



NONE-REVENUE-WATER (NRW)



WATER SUPPLY SERVICES

Description	Sihanoukville	Kampot	Svay Rieng	Kg. Cham	Monduliri	Stung Treng	Tangkrasang	Kampong Thom	Stoung	Battambang	Pursat
No. of Staff	50	36	24	41	13	21	9	29	14	71	36
No. of family in services area	15,328	9,545	8,251	16,400	4,265	5,243	3,442	11,185	3,029	31,490	11,862
Production Capacity(m3/day)	15,600	6,050	3,250	8,730	480	2,450	500	4,230	930	13,430	5,200
No. of Connection	9,498	6,173	3,310	8,422	1,110	2,562	1,205	4,741	2,357	15,584	7,260
Supply Duration (h)	24	24	24	24	24	24	24	24	24	24	24
Coverage Area(%)	49%(2015)	56%	31%	41%	-	43%	29%	38%	69%	35%	55%
	62%	65%	40%	51%	26%	49%	35%	42%	78%	49%	61%
Staff/1000 Connection	5.26	5.83	7.25	4.87	11.71	8.20	7.47	6.12	5.94	4.56	4.96
NRW (%)	12.4(2015)	10.78	10.00	7.81	15.00	20.83	6.52	10.99	7.14	10.93	11.18
	10.00	10.00	9.00	10.49	10.00	20.14	6.50	9.00	6.00	13.34	10.00
Collection Ratio	98.08	100.00	91.00	100.00	100.00	100.00	100.00	93.00	100.00	99.00	100.00
Average/month/connection	46.96	28.57	29.36	33.73	12.67	23.29	11.86	24.59	11.17	24.14	20.61
Tariff	1,915.00	1,400.00	1,200.00	887.00	1,900.00	1,500.00	1,500.00	1,500.00	1,800.00	1,500.00	1,600.00

URBAN WATER SECTOR CHALLENGES

1. Incomplete legal and regulatory framework
2. There is no enacted law for the management of the urban water supply (Drafted)
3. Lack of master plan and long term investment plan
4. Lack of staff at central level
5. Outdated and dilapidated water production and distribution systems
6. Weak operational performance and limited human resources
7. Lack of government funding for rehabilitation and the development of new water supply infrastructure in underserved areas
8. The sector remains largely dependent on contributions from development partners
9. The investment climate is not yet ready for domestic commercial banks to be actively involved in lending to private water operators.

BASIC OF LEGAL DOCUMENTS

1. National Policy on Urban Water and Sanitation
2. National Quality Standards for Drinking Water
3. Licensing on editing procedures for the suspension and revocation allow exploitation of water supply
4. Cambodia Water Law (Drafted)...



PROJECT IMPLEMENTATION

no	Name of Project	Donors	Type	Others
1	Capacity Building Project Phase III (8 PWWs)	JICA	Grant Aid	On-Going (2012-2017)
2	The Project for Expansion on Water Supply Systems in Battambang and Kampong Cham	JICA	Grant Aid	Inauguration on 21 July 2016 Kampong Cham -12,650m ³ /day -បណ្តាញ 57 k.m Battambang -24,200m ³ /day -Networks: 64.8 K.m
3	The Project for Expansion on Water Supply Systems in Siem Reap	JICA	Loan	Under Selection Consultant (2012-2019)
4	The Project for Expansion on Water	JICA	Grant Aid	Under

PROJECT IMPLEMENTATION (Cont)

No	Project Name	Donors	Type	Others
5	Water Supply Project in Mondulkiri 	Japan	Grant Aid	Inauguration on 25 Apr 2016 -2000 m3/day -Network: 26.3 K.m
6	TA on The Method on Water Tariff Calculation	WSP/WB	Grant Aid	Finished(July, 2015)
7	The Project on Water Supplier Monitoring Systems	WSP/WB	Grant Aid	Finished (June, 2016)
8	Water Law Project	JICA	Grant Aid	Drafted

PROJECT IMPLEMENTATION (Cont)

No	Project Name	Donors	Type	Others
9	Urban Water Supply and Sanitation Project 	ADB	Loan	Under Selection Consultant (2014-2019)
10	TA- Updating National Water Quality Standard 	WHO	Grant Aid	Approved on 2015
11	Water Safety Plan 	WHO	Grand Aid	Finished (June,2016)

Attachment1 Inception Report

1. Position of Water Supply Services

1-1. Legal Basis of Water Supply Services

(What kind of laws and regulations are Water Supply Services based on?)

Legal basis of water supply services is Water Laws. Water laws and regulations being drafted by JICA experts.

1-2. Demarcation of Water Supply Services

(Which ministry is in charge of what kind of field of water?)

According to MOU between Ministry of Industry & Handicraft (MIH) and Ministry of Rural Development (MRD), urban water supply under responsibility by MIH, rural water supply under responsibility by MRD.

1-3. Main Actor of Water Supply Utilities

(e.g. In Japan, most water utilities are public bureau under local government.)

The main actor of water supply utilities is mentioned that public waterworks and private water operators are under responsibility by Department of Potable Water Supply (DPWS)/MIH.

1-4. Mission/Vision of Water Supply Utilities

The Mission/Vision of Water Supply Utilities are providing safe, affordable and sustainable water supply for urban population.

1-5. Your Mission/Vision in your organization

My mission/vision in the Department of Potable Water Supply (DPWS) as below:

- To prepare the policy, strategy and national development plan of the water supply sector;
- To inspect, monitor and evaluate the implementation of the policy, strategy, development plan of the water supply sector and updating;
- To facilitate and prepare action plan of the water supply sector;
- To manage and collect information and data to organize clean water statistics at the capital-provinces;
- To manage, collect information and data of water sources;
- To manage, collect information, data and inventory of the public water supply;
- To manage, collect information and data of private water supply;
- To manage and monitor the implementation and progress of the public water supply;
- To manage information technology work related to the water supply sector;
- To provide consultation and training on the management and business operations;

- To resolve any dispute in business operations and use of public clean water;
- To prepare an evaluation and progress report of the water supply sector.

2. Water Supply Service Levels

2-1. Main Performance Indicators (PI)

Coverage area	(sq. km)
Population Served	
Collection ratio	(%)
Production capacity	(m3/day)
Supply duration	(hr/day)
Supply pressure	
Non-Revenue Water	(%)
Water quality	
Staff number	
Number of connections	
Staff/1,000 connections	(people/1,000connections)

WATER SUPPLY SERVICES IN CAMBODIA											
Description	Sihanoukville	Kampot	Svay Rieng	Kg. Cham	Monduliri	Stung Treng	Tangkrasang	Kampong Thom	Sloung	Battambang	Pursat
No. of Staff	50	36	24	41	13	21	9	29	14	71	36
No. of family in services area	15,328	9,545	8,251	16,400	4,265	5,243	3,442	11,185	3,029	31,490	11,862
Production Capacity(m3/day)	15,600	6,050	3,250	8,730	480	2,450	500	4,230	930	13,430	5,200
No. of Connection	9,498	6,173	3,310	8,422	1,110	2,562	1,205	4,741	2,357	15,584	7,260
Supply Duration (h)	24	24	24	24	24	24	24	24	24	24	24
Coverage Area(%)	49%(2015)	56%	31%	41%	-	43%	29%	38%	69%	35%	55%
	62%	65%	40%	51%	26%	49%	35%	42%	78%	49%	61%
Staff/1000 Connection	5.26	5.83	7.25	4.87	11.71	8.20	7.47	6.12	5.94	4.56	4.96
NRW (%)	12.4(2015)	10.78	10.00	7.81	15.00	20.83	6.52	10.99	7.14	10.93	11.18
	10.00	10.00	9.00	10.49	10.00	20.14	6.50	9.00	6.00	13.34	10.00
Collection Ratio	98.08	100.00	91.00	100.00	100.00	100.00	100.00	93.00	100.00	99.00	100.00
Average/month/connection	46.96	28.57	29.36	33.73	12.67	23.29	11.86	24.59	11.17	24.14	20.61
Tariff	1,915.00	1,400.00	1,200.00	887.00	1,900.00	1,500.00	1,500.00	1,500.00	1,800.00	1,500.00	1,600.00
Total Income (Million Riel)	10,146	2,976	1,456	3,021	844	1,088	303	2,234	654	7,856	2,938
Total Expenditures (Million Riel)	8,894	2,438	1,293	3,363	909	958	281	1,747	513	7,467	2,401
Net Profit (Million Riel)	1,252	538	163	(342)	(65)	130	22	488	141	389	537

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

Public waterworks has been monitored by 4 main performance indicators:

1. General information
2. Operation indicators
3. Quality indicators and
4. Economic indicators.

3. Management of Water Quality

3-1. Current Situation and Major Challenges/Problems

The urban water sector is facing some significant challenges, which include:

- Incomplete legal and regulatory framework. There is no enacted law for the management of the urban water supply.
- Lack of a national level Master Plan and long term investment plan.
- Lack of staff at central level to adequately manage and exercise oversight of the public waterworks.
- Outdated and dilapidated water production and distribution systems.
- Weak operational performance and limited human resources.
- Lack of government funding for rehabilitation and the development of new water supply infrastructure in underserved areas.
- The sector remains largely dependent on contributions from development partners.
- The investment climate is not yet ready for domestic commercial banks to be actively involved in lending to private water operators.

3-2. Current Actions against Those Challenges/Problems

The key actions against to the challenges:

- Develop a legal framework for urban water supply
- Promote decentralization and de-concentration in the urban water supply sector
- Transfer full autonomy for service delivery to all provincial waterworks
- Increase sector financing
- Improve sector performance and access to safe, affordable and sustainable water supplies
- Improve water source protection and enforcement of regulations.

3-3. Any Achievements

- Water laws and regulations being drafted by JICA experts.
- Get support from development partners
- Private sector participation
- Human resources has been improved by organizing theory trainings and On-Job-Training (OJT)
- Set up SOP

3-4. Water Quality Standards for Drinking Water

National Quality Standards for Drinking Water has approved on 14 July 2015 by Senior Minister of MIH. This work aims to strengthen the control of water

quality standards in the field of urban drinking water for public health protection policy.

3-5. Monitoring System or Plans for Safety of Drinking Water in Your Organization / Regulatory Body / Independent Institution /Others

Capacity Building and Establishment of Monitoring System for Water Operators in Cambodia (WSMS) supported by WB/WSP/(JICA) has installed at Department of Potable Water Supply (DPWS). The system data has such indicators below:

- Profile Data of Operators
- Reporting Data of Operators
 1. Quarterly Report Data
 2. Annual Report Data
 3. Water Quality Test Report Data

3-6. Implementation of Water Safety Plans* or Similar Efforts

(* Water Safety Plans: refer to the following URL and review before participating in the Course, the Chapter 4 "Water Safety Plans" of the "Guidelines for drinking-water quality, third edition"

URL: http://www.who.int/water_sanitation_health/dwg/gdwg3_4.pdf)

Water Safety Plan Program has approved on 14 July 2015 by Senior Minister of MIH. Water Safety Plan is a cycle of activities for the prevention and control of major risk to public health that may arise in the water supply system.

4. Reduction of Non-Revenue Water

4-1. Current Situation and Major Challenges/Problems

- Outdated and dilapidated water production and distribution systems
- Weak operational performance and limited human resources
- Lack of government funding for rehabilitation and the development of new water supply infrastructure in underserved areas.
- Main pipes and distribution pipes are dilapidated
- Pipes and fitting no qualities
- Performance works without technical specification
- Lack of water pressures management
- Lack of proper action on maintenance and repair
- No setting up water leakage program.

4-2. Current Actions against Those Challenges/Problems

- Old pipes replacements (main pipes and HH connection)
- Use of pipes and fitting with proper quality
- Organize theory trainings and On-Job-Training (OJT) on Water Leakage Detection
- Set up SOP
- Water pressure management (daytime/night)
- Repair water leakage on time
- Maintain program for networks and pipes flushing

4-3. Any Achievements

Water supply in the urban areas has increased remarkably, particularly in the 5th mandate of government.

- Cover rate of the water supply systems in urban areas increased from 68.5% in 2012 to over 83% in 2015, measured in the number of families who receive clean water, up from 400,181 families to more than 550,000 households.
- The percentages of NRW remarkably reduced from 16% in 2012 to 11% in 2015.

4-4. Constitution of NRW (If you have the data, please fill in the table)

Authorized consumption	Revenue water	Billed authorized consumption	(m3 /year) (%)
	Non-Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	(m3 /year) (%)
Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	(m3 /year) (%)
		Physical losses (Leakage)	(m3 /year) (%)

4-4. Situations about Leakage Detection Measures (DMA etc.)

- Weak operational performance and limited human resources
- Main pipes and distribution pipes are dilapidated
- Pipes and fitting no qualities
- Most of public waterworks lack of leakage detection measures (No DMA)

5. Accounting system of Water Supply Service

5-1. Water Tariff in your Organization

5-2. Balance Sheet of your Organization

5-3. Profit and Loss Statement of your Organization

(*[Public Utilities] (1) Profit and Loss Account

(2) Capital Income and Expenditures of your Organization)

(* You can check the case of Tokyo in the chapter 4 "Financial System and Future Financial Management" of this file.

URL: http://www.waterprofessionals.metro.tokyo.jp/pdf/wst_02.pdf)

6. Major Recent Achievements in Improvement of Water Supply

Services/Management

- The Royal Government of Cambodia (RGC) is committed to the development of the water supply sector. The Royal Government of Cambodia has set the outlook for the water sector are: "Every urban population access to clean water, good quality, affordable and sustainable by 2025".
- Get support from development partners
- Private sector participation
- Human resources has been improved by organizing theory trainings and On-Job-Training (OJT)
- Set up SOP

7. Recent Challenges to Improvement of Water Supply Services

The urban water sector is facing some significant challenges, which include:

- Incomplete legal and regulatory framework. There is no enacted law for the management of the urban water supply.
- Weak operational performance and limited human resources.
- Lack of government funding for rehabilitation and the development of new water supply infrastructure in underserved areas.
- The sector remains largely dependent on contributions from development partners.
- The investment climate is not yet ready for domestic commercial banks to be actively involved in lending to private water operators.

8. Expectations toward Japan

8-1. Expectations toward Japanese Government and JICA

Getting more supports and closely builds good cooperation between RGC and

Japanese Government and JICA

8-2. Expectations toward Japanese Water Utilities

Capacity building, training planning, sharing experiences.

8-3. Expectations toward Japanese Private Companies

Getting more information related to water sectors.

9. Expectations toward the Program.

(Any comments and requests are appreciated.)

The mission of DPWS is undertake for policies, strategies, principles and legal standard papers, technical matters, clean water production and supply, to evaluation and progress report preparation related to the water sector. Therefore, the training and dialogue program from Government of Japan is very crucial for DPWS' Officers.

Promote capacity development and power delegation to sub-national level on guidance on urban water supply businesses and investments in the downtowns which are not in the coverage of the national development plan.

Develop quality human resource with appropriate quantity to respond to the need the urban water supply sector development

The trainings related to improve and develop water sectors is to fit to the strategic goal of urban water supply is to achieve the Millennium Development Goal that at least 85% of people living in urban areas have access to water supply by 2018, and 100% of people living in urban areas will have access to quality, affordable, and sustainable clean water by 2025.

END.

Water Supply Administration for Better Management of Water Supply Services

Inception Report Presentation

- 1. Country: Cambodia**
- 2. Name : Than Chansovana**
- 3. Position: Deputy Chief Business Division**
- 4. Organization: Sihanouk Province Water Supply Authority**



Table of Contents:

- 1. Position 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**



General Country Profile: Background

- ❁ Cambodia is a country in the South-East Asia nation.
- ❁ The main drive of economy in the country are: garment industry, agriculture, and tourism.
- ❁ The per capita is 1,200\$.
- ❁ The main religion of the country is Buddhism.
- ❁ There are 24 provinces and a capital city.
- ❁ About 60% of the population are farmers

Whole Country:

Area : 181,035 km²
Population : 15 millions Habitants
Coverage Water Supply: 83 %

Selected Water Supply System/City:

Service Area : 936 km² (estimated)
Population Served: 57.285 thousand



1. Position of Water Supply Services

- ❁ We are acting on the regulations issued by the ministry and we are waiting for water law which is being drafted by JICA experts.
- ❁ According to the MOU between MIH and MRD, the urban water supply utilities are under the authority of Ministry of Industry & Handicraft, and the rural water supply is under the authority of Ministry of Rural Development.
- ❁ The main actor of water supply utilities is Department of Portable Water Supply under the Ministry of Industry & Handicraft.



1. Position of Water Supply Services (Cont'd)

★Sihanouk Province Water Supply Authority:

- ✿ Our mission is to supply safe water with affordable price and sustainable.
- ✿ Our vision is to supply good quality water to all the people in the service area 24/7.
- ✿ My vision is to have all the houses in the service area connected to our pipe line and the collection rate is 100%.
- ✿ My missions are:
 - ✿ To get more customers to connect to our pipe line
 - ✿ To make sure the collection rate is high
 - ✿ To make sure the NRW for commercial part is low.



2. Water Supply Service Levels

INDICATORS	2005	2015	Goals for 2025
Staff/1,000 connections	N/A	5.68	4
Production capacity (m3/day)	8,000	8,000	8,00
Water quality	National Standard	National Standard	National Standard
Coverage area	68%	80%	100%
Supply duration (hr/day)	24	24	24
Supply pressure	6-13 bars	6-13 bars	6-13 bars
Number of connections	2,799	8,800	18,000
NRW	28%	12.79%	8%
Collection ratio	N/A	97.32%	99.9%
Staff number	N/A	50	72



3. Management of Water Quality

- ❁ There are 2 sources of water supply. One is that we produce by ourselves and the other is that we buy from ANCO Company.
- ❁ The problem is when the water combine from the 2 sources, there is no chlorine at the end of the pipe line.
- ❁ To solve the problem we sent our technician to work in ANCO Company. As the result, the problem has been solved.



3. Management of Water Quality (Cont'd)

- ❁ There is a National Quality Standards for Drinking Water that was approved on 14 July 2015 by Senior Minister of MIH.
- ❁ We follow the Water Supply Monitoring System which was approved by the Ministry.
- ❁ We have many teams that take responsibility for the safety of the water such as:
 - ❁ The pumping station team: look after the Prek Tub Lake to prevent people from throwing rubbish near or into the water.
 - ❁ The factory team: responsible for controlling the quality of the water before send it out.
 - ❁ The pip maintaining team: responsible for cleaning the pipe and check for leakage.



4. Reduction of Non-Revenue Water 1

- Constitution of Non-revenue Water (If you have the data, please fill in the table)

System input volume	Authorized consumption	Revenue water	Billed authorized consumption	4,427,448 m ³ /year (87.11%)
		Non Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	5,378 m ³ /year (0.1%)
	Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	152,485 m ³ /year (3%)
			Real losses (Leakage)	492,173 m ³ /year (9.68%)

4. Reduction of Non-Revenue Water 2

- There are some problems with the NRW:
 - High pressure results in a lot of water loss while leaking
 - Inaccuracy meters (out-of-date meters)
 - Responsiveness of the leakage detector team
- We have developed some actions such as:
 - Reform the leakage detector team
 - Make plan to change the out-of-date meters
- Situations about Leakage Detection Measures
 - No DMA zones
 - Don't have exact calculation



5. Accounting system of Water Supply Service

- ✿ We have block tariff:

✿ From 0-7 m3	1,500 Riel	(0.375 US\$)
✿ From 8-15 m3	1,800 Riel	(0.45 US\$)
✿ From 16 up	2,000 Riel	(0.5 US\$)

- ✿ Profit and Loss Account

✿ Profit: 1,506,849,780.94 Riel	(376,712.44 US\$)
---------------------------------	-------------------



6. Major Recent Achievement in Improvement of Water Supply Services/Management

- ✿ We expanded our service area to a new district called Steung Hav.
- ✿ During summer we don't have the water shortage problem.
- ✿ We are installing new main pipes from Kbal Chhay, so that during summer we will have enough water to supply.



7. Recent Challenges to Improvement of Water Supply Services

- ✿ We need more budgets to build a new factory in the new area.
- ✿ We need more budgets to restore the Prek Tub Lake.
- ✿ Need more experts in water system.



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

INDONESIA

**Towards 100% Safe Access to Water Supply
WATER SUPPLY SERVICE EXCELLENT FOR THE
FUTURE GENERATIONS**



ERICK VICTORIAN TO

**MINISTRY OF PUBLIC WORKS AND HOUSING
REPUBLIC OF INDONESIA**

1

Indonesia



17,508 islands

255,5 million populations

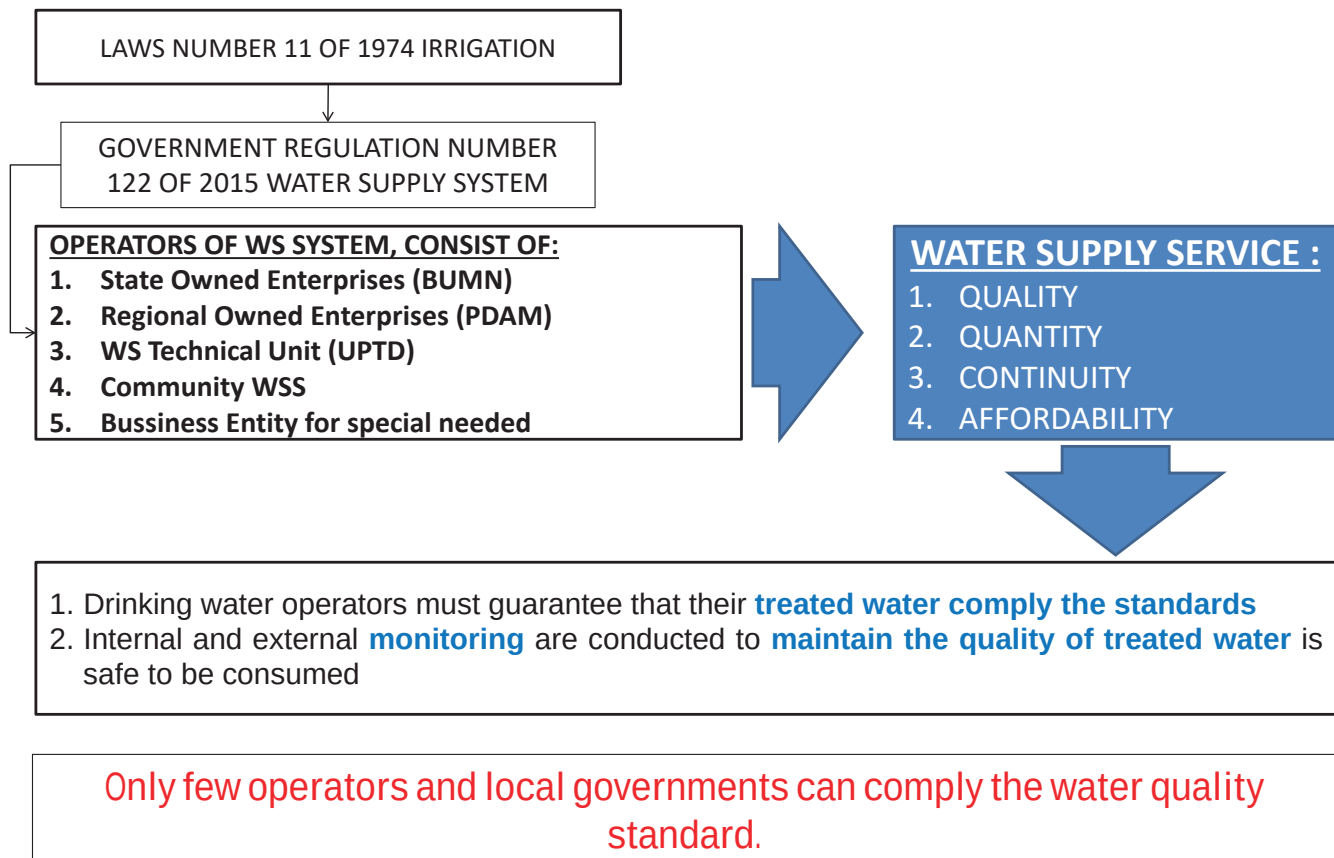
4,92 % economic growth

total area 5,020,606 km²

5248 km from the western-tip,
Sabang to the eastern-tip
Merauke

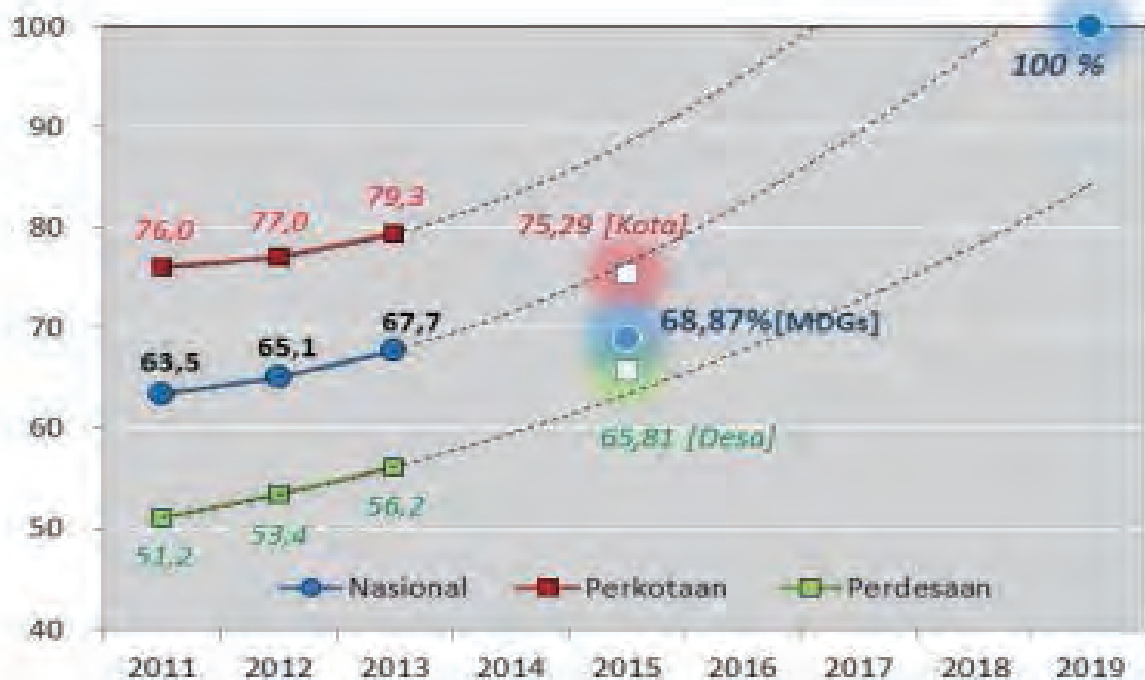
34 Provinces, 507 Cities/
Regencies

1. Position of water supply services



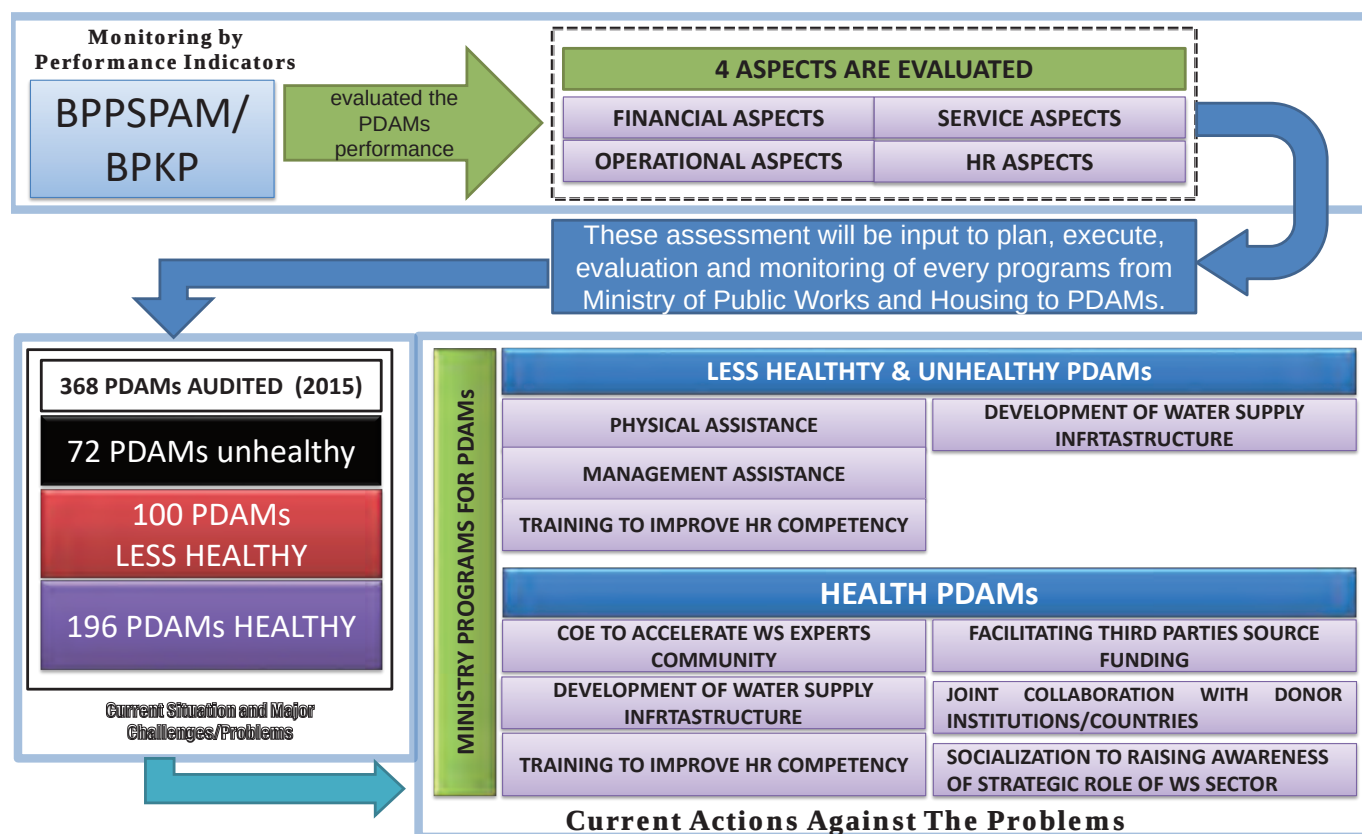
3

2. Water Supply Service Levels



MDG's target is relatively achievable. Urban WSD has exceeded the target. To achieve 100% target, improvement of safe access to water supply in both urban and rural areas needs to be accelerated.

3. Water Supply Service Review

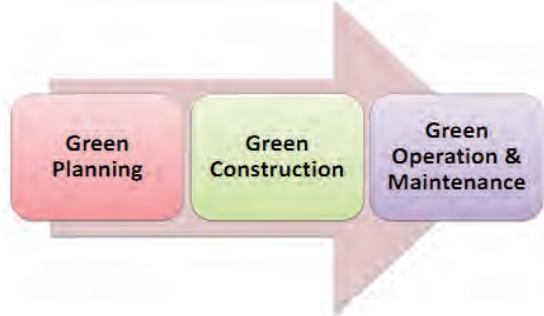


4. National Policy Water supply towards 100%access by 2019



6. Major Recent Achievement in Improvement of Water Supply Services/Management

1. Environmental Friendly Construction



2. Minimizing Chemical Usage in WTP Process

WTP Kota Banjar



- Capacity: 50 L/s
- Beneficiary: 20,000 people (4,000 HC)
- Advantage: chemical usage is minimized ('Go Green')

WTP Mandangin



- Capacity: 5 L/s
- Beneficiary: 300 HH
- Advantage: Sea water treatment for scarce water area

3. Green WTP

Green WTP follows "green concept" in building and planning the layout of WTP.

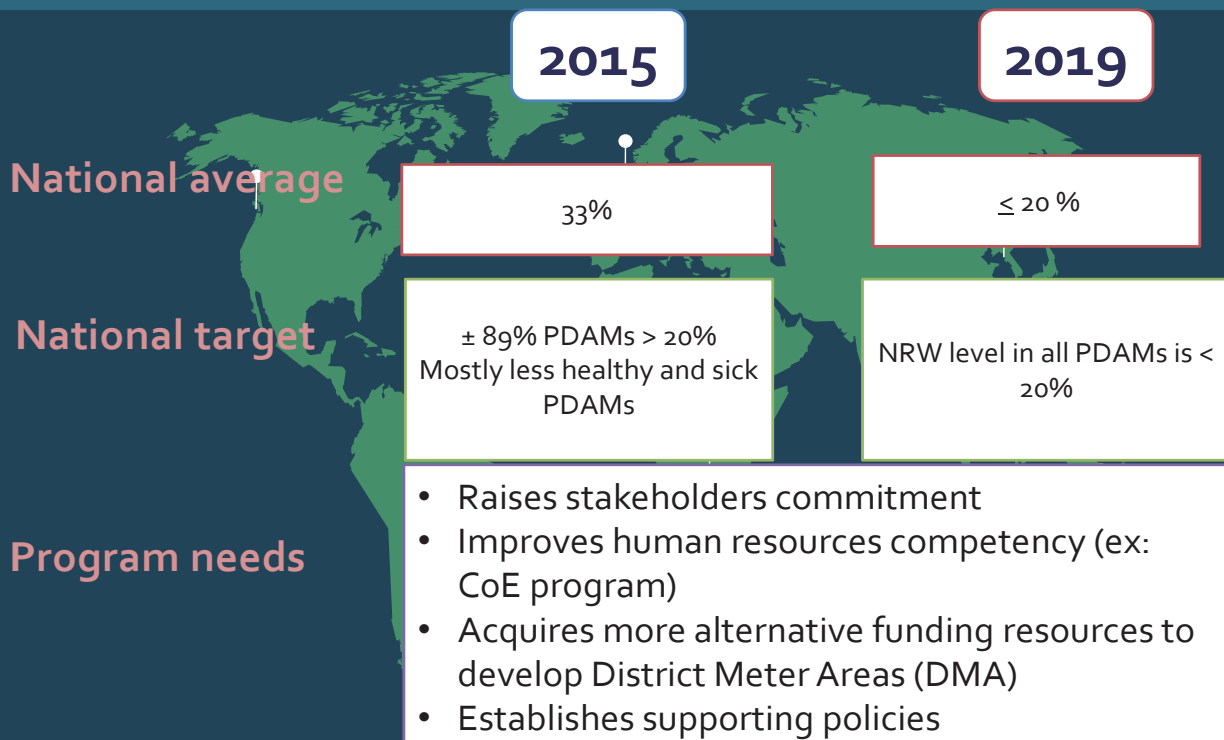


WTP Penet, cap. 300 L/s, to support Regional Sarbagita WSS in Bali.

WTP Regional Metro Bandung, cap. 350 L/s, to support Regional Metro Bandung WSS in West Java

7

7. Reducing NRW Level



Road Map for comprehensive programs

8. Implementation of Water Safety Plans

1. Ministry of Public Works, Ministry of Health and Ministry of National Planning has **socialized Water Security Plan models** in Indonesia.
2. In practice, **water operators (PDAMs) is still weak in identification and management of risk.** Water Safety Plan is presumed as **end of pipe approach** rather than anticipatory problem.
3. Only **few PDAMs** have shown **full commitment** and reliable resources to apply Water Safety Plan for instance PDAM Malang and PDAM Banjarmasin.
4. Most of PDAMs have not implemented Water Safety Plan concept as well as **lack of resources** to apply it. These **challenges** come from lack of understanding of WSP concept, lack of commitment from top management, lack of competency of human resources and lack of funding.
5. Ministry of Public Works as responsible ministry to supervise and assist PDAMs will establish Ministry of Public Works Regulations to **oblige** water operators preferably PDAMs to apply Water Safety Plan.



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

IRAQ

Inception Report Presentation

Country : Iraq /Baghdad

Name : Rafid abdulateef

Position : Head of water department

Organization : AL-Mansuor Municipality

Iraq – Republic Of Iraq

- ▣ It's a country in western of Asia

- ▣ **Iraqi borders**

from the west **Syria & Jordan**

from north **turkey**

from east **Iran**

from south **Saudi Arabia**

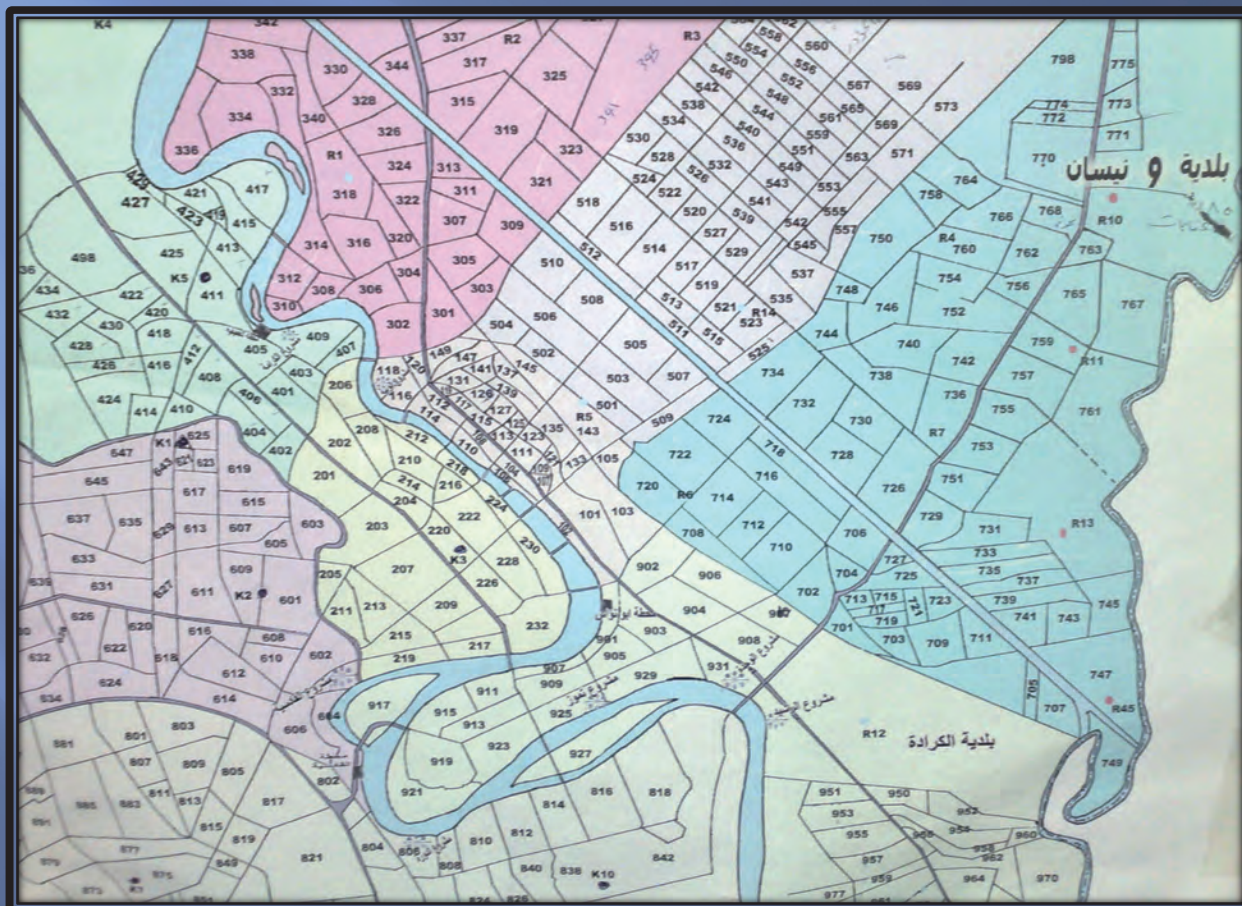
- ▣ The capital city is BAGHDAD its in the center east of the country .
- ▣ Two major rivers in Iraq (**Tigris & Euphrates**) run through the center of Iraq from the north to the south .
- population of Iraq is : 32,000,000 persons



- ▣ Iraq is located between latitudes (29 and 38 N) and longitudes (39 and 49 E)
- ▣ The area of Iraq is (438,317) km²
- ▣ The most of Iraq has a hot and arid , summer temperatures average above 40 C° - 48 C° and in winter temperatures average its between 15 - 2 C° in maximum .

The Water Projects

- ▣ The design capacity in all water projects = 4.176.000m³/day
- ▣ The actual capacity in all water projects = 3.598.038m³/day
- ▣ The causes extinction WTP and old.



The capacity of WTP in Baghdad

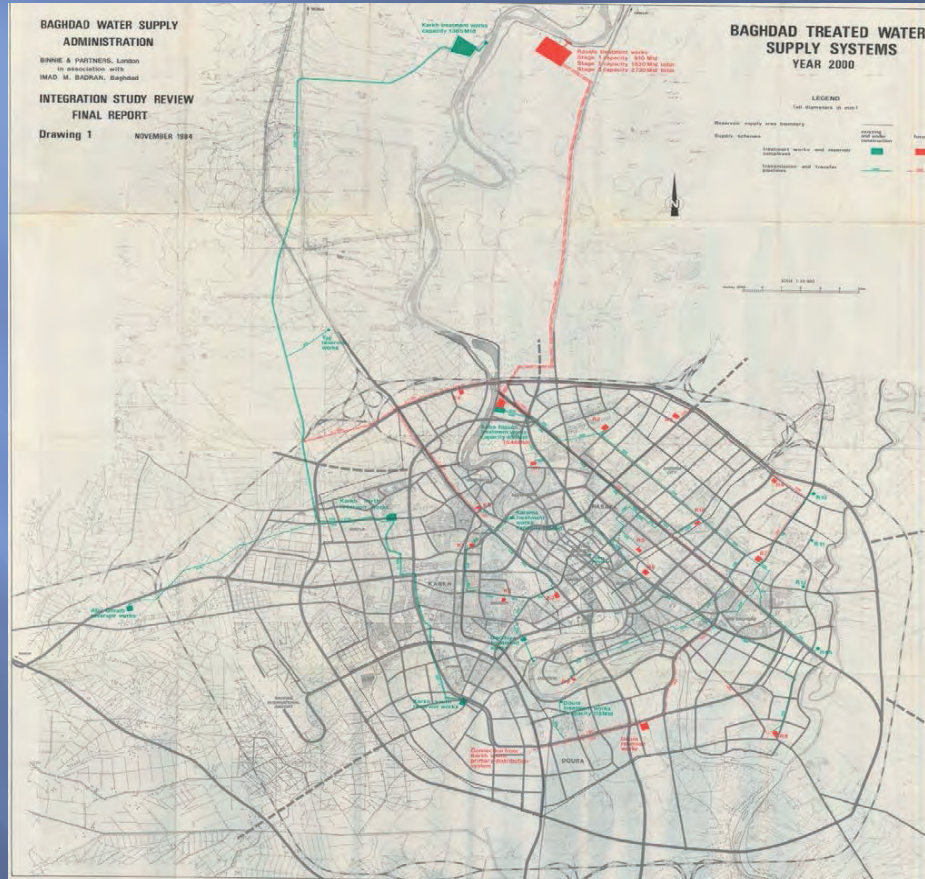
No	Name of Project	Capacity (design) 1000m ³ /day	Capacity (actual) 1000 m ³ /day
1	Karkh	1250	1150
2	Sharq Dijla	680	575
3	Karama	210	155
4	Qadisia	135	90
5	Dora	112	100
6	Wathbe	108	76
7	Wehda	72	72
8	Rashed	68	45
9	Sader	96	95
10	Jadeeria	58	45
11	Rusafa	910	820
	Total	3699	3223

Storage Tanks

No	Name	Capacity 1000 m3
1	North Storage Tank	600
2	South Storage Tank	300
3	Abu Kreab	50
4	Tajee	50

Raw Water Staion

No	Nam	Capacity 1000m3/day
1	Kanat	432
2	Etifia	80
3	Abu noas	260
4	Zafarnia	75
5	Jaderia	164
6	Ksra	4



1-Position of water supply services

1-1 Water supply services based on laws and Regulations specialist of Baghdad water authority .

1-2 Mayoralty of Baghdad is the institution providing services in the field of water .

1-3 Baghdad water authority is the main representative for the processing of water subsidiary of the municipality of Baghdad under central government control

1-4 The mission of the Baghdad's Water Authority :

- A. produce and pump potable water through networks to the people
- B. pump raw water to raw water network for irrigation
- C. maintains existing water networks
- D. design new water network
- E. planning for future demands

1-5 Complete works of pure water network renewal and cancellation of all old pipes

My mission in the organization is :

- To guide the operation in the plant to withdrawal water from the water supply and delivery it to the water treatment plants.
- Monitoring on maintenance of pumps and related equipments to ensure the plant is working with full capacity without any obstructions
- All water treatment plants have laboratory making tests on the samples of water to make sure the drinking water specifications are subjected to Iraqi standard for drinking water so we noticed that the average values of CCME WQIs (range from 37 to 42) indicate that water quality for drinking uses can be rated as poor in all site this may reflect the Discharge of pollutants to a water resource system from domestic sewers, storm water discharges, industrial wastes discharges, and other sources, all of which may be untreated, can have significant effects of both short term and long term duration on the quality of a river system.

2. Water Supply Service levels

Main Performance Indicators

Coverage area	4.5	(sq.km)
Population Served	5 950 000	
Collection ratio	77	(%)
Production capacity	4 167 000	(m ³ /day)
Supply duration	24	(hr/day)
Supply pressure		2 bar
Non-Revenue Water	30	(%)
Water quality		good
Staff number		2400
Number of connection	600 000	

3. Management of Water quality

3-1 In addition to the major projects for the production of water and there are units for the production of water to effected areas and the presence of health facility areas illegally and water networks reconstructed by 8% and the presence of illegally connecting to that houses .

3-2 The current Actions against those challenges :

- complete the Ruafa water project and running at full capacity .
- Complete renewall of pure water network .
- complete expansions old project .
- Fastening illegal pipes and the work of general candle stead .

3-3 Achievement labour :

- The operati
- on of the first phase of the Rusafa water project.
- it was renovated 80% of the water network .
- complete expansions of akarama , al qadisiyu, alwathba

3-4 Water supply service standards /Performance Indicators

Water treatment plants issued the Customer Service Standards to meet the requirements of the Water Supply (Safety and Reliability) Act 2008.

These performance indicators will be used to measure our performance each year and will be reviewed and publicly reported against annually.

Quality of Water Supply		
Parameter	ADWG &/or regulation Value	Target
E . coli	Nil detected	Nil
Free Chlorine	0.3 - 2 mg/l	4 mg/l
Minimum water pressure expectation at boundary	65 meters	65 meters
turbidity	0.2 -3 PPm	5 PPm

4. Reduction of non-revenue water

The amount of Revenue & Non Revenue water in Baghdad table

System input volume	Authorized consumption	Revenue water	Billed authorized consumption	1.052.352.000 m ³ /year (70 %)
			Unbilled authorized consumption (ex. fire fighting, cleaning)	75.168.000 m ³ /year (5 %)
	Water losses	Non Revenue Water (NRW)	Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	225.504.000 m ³ /year (15 %)
			Real losses (Leakage)	150.336.000 m ³ /year (10 %)

Non Revenue Ratio

- ▣ The Non revenue water to be determined approximately 30% .
- ▣ Total population in services area approximately = 7,000,000 person.

Subscription and Fee

- ▣ Number of subscriptions = 600000
Until Oct. 2015
- ▣ The illegal connection = 50000

- ▣ **Non-revenue Water Management (Leakage Contro)**
- ▣ Implementation Department, Rusafa Networks Section, Karkh Networks Section.
- ▣ No. of Personnel: 60

- ▣ **Leakage Detection Work System:**
- ▣ The Section of Non Revenue Water Not been developed yet, Only Fixed The Leakage Appear on the surface.

- ▣ **Measures for Illegal Use:**
 - ▣ Impose fines on transgressors of drinking water network as show below:
- | <i>Diameter of the hole</i> | <i>Amount of the fine</i> |
|-----------------------------|---------------------------|
| ▣ 12 mm | 42\$ |
| ▣ 18mm | 63\$ |
| ▣ 25mm | 84\$ |
| ▣ 37mm | 190\$ |
| ▣ 50mm | 338\$ |
| ▣ 75mm and more | 422\$ |

The claim amounts of water consumed with retrospective effect from the date 1/ January/ 2003

problems Currently Faced:

▣ *On the subject of Non Revenue Water:*

1. Lack of control on discharge and pressure water.
2. There are large numbers of transgressors on water network system.
3. Difficulty using the leakage detection devices cause a low pressure in water pipes networks and we can using in the night because the noise disappearance
4. The meters installed in houses a few and large numbers of them do not work properly causing the difficulty of knowing consumption per person.
5. Require construct reinforcement concrete chambers on the feeding pipes to get Pressure and Discharge data.

On going counter measures, Projects,..

- ▣ Impose fines on transgressors of drinking water network and the claim amounts of water consumed with retrospective effect from the date 1/ January/ 2003.
- ▣ Rehabilitation the projects.
- ▣ The completion and operation of the Rusafa water project second phase
- ▣ Renewal water pipes networks.
- ▣ Control on water pipes networks by installing flow meter and pressure water devices.
- ▣ Leakages detection.

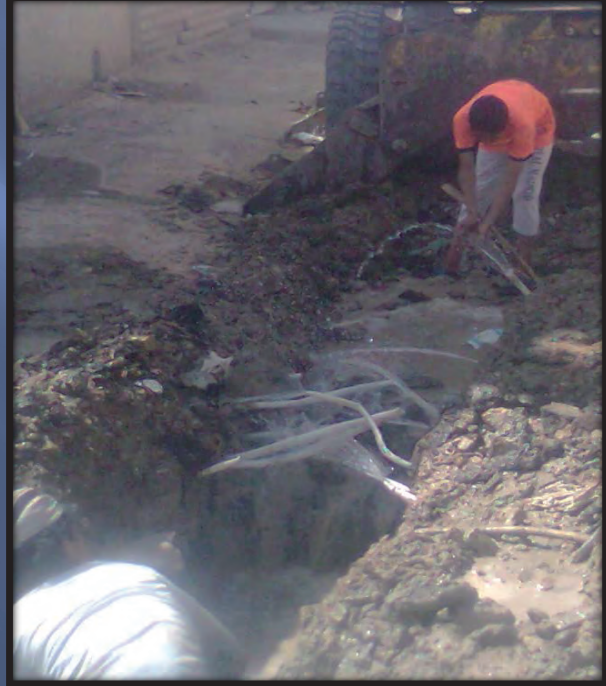
The major Problems

I will focus on two points are more important now

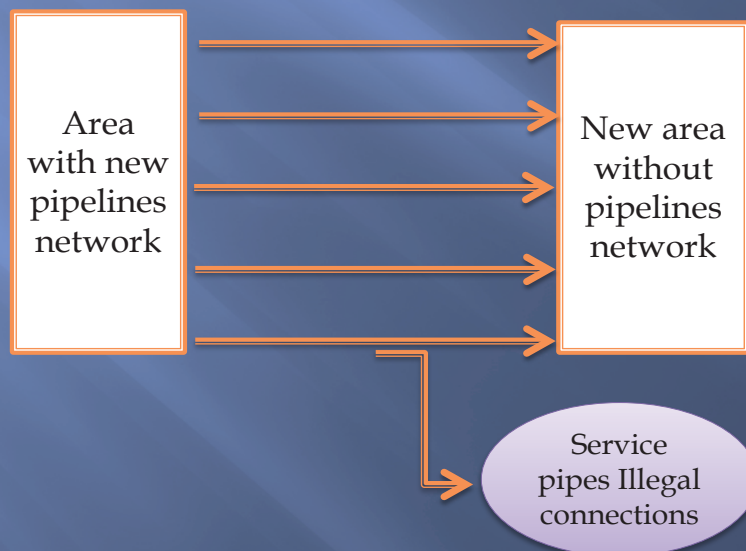
1- Illegal connections

2- leakage in pipelines

1- Illegal connections



- ▣ We have a big number of illegal connections rated in 15% from all of users in city of Baghdad unregistered in data base and without pay to water .
- ▣ Some of them extend to a long distance of more than (100)m , and causes broken service pipes also leads to big leakage . This connections as shown :



2- leakages in old pipelines

The length of water distribution network in Baghdad more than 7000 km . Was renewed 80% of this network until now . Remaining 20% old pipelines

- we have leakage in this old pipes .
- some pipes are broken because of another institutions work (electricity , sewage , roads works... ets) .

solutions

1- For illegal connections.

- Search house after house for illegal users .
- Impose heavy fines .
- Disconnect illegal connections .

2-For leakage in pipelines .

- Renewal the remainder of old pipelines .
- Repair visible leakage .
- Repair leakage under ground .

Future Plan (for the next 5 years)

1- For illegal connections

- Increase tariff of water collection.(now 5% of the cost of production per cubic meter)
- Increase fines ratio of 50% of current fines .
- Registration all of illegal connections in the data base of billing system .
- Install meters to them .
- Issue billing of collecting water fees for these illegal users . To pay for water

2-For prevention leakage

- Establishment a NON-REVENUE water section In implementation department with 10 staff .
- Training staff in our institute to detecting leakages .
- Processing this section with the necessary equipments for leakage detection .

Target values

After that we can achieve our target by reducing (NRW) ratio from **35%** to **12%** ... as follow :

- ▣ Illegal connection from **15%** to **5%**
- ▣ Leakage in pipelines form **15%** to **5%**
- ▣ Other **5%** to **2%**

Request support:

Request support from JICA and waterworks in Nagoya to:

- ▣ Joining JICA'S projects or program as resources person like a lecture or a consultant.
- ▣ Improvement institution, system.
- ▣ Improvement management in institutions.

3. Water Tariff

The water tariff in Iraq is very cheap. its approximately 7 diners for each cubic meter of drinking water which doesn't cover the price for supplied water

6. Major recent achievement in improvement of water supply services/management

- ▣ Was completed several projects in the field of treatment of water scarcity in the Rusafa we are opening the first phase amounting to 910,000m³ / day of water Rusafa great station during this summer to contribute to address fully and will begin the second phase of 1290.000 m³ / day to provide the necessary water for every consumer in Baghdad to 2030

Recent Challenges to improvement of eater Supply Services

- decrease in the amount of water supplied to consumers because of the lack of spare parts at production units which usually causes stoppage of production plants.
- The absence of updated drawing and (flow & pressure) measurements on the primary and distribution networks resulting in heavy reliance on the experience of operating staff.
- Water quality control is facing difficulties due to lack of modern laboratories, equipment, instrumentation, computers, culture growing media, chemicals, etc.
- Illegal connections & leakage in pipelines.

7. Expectation for the Japanese private companies & Water Supply Utilities

- ▣ I hope that the Japanese companies to visit Baghdad and help:
- ▣ 1. good training technical staff for maintenance projects
- ▣ 2-provision of spare parts for electrical and mechanical equipment
- ▣ 3-develop the water tariff system
- ▣ 4-- introduction of modern systems in the operation of stations and water network .

BWA Target :

- Expects to provide 4,130 km³/day at 2015
- Completion of Rusafa water treatment plant (2260 km³/d) with its trunk pipelines (approx. 200 km long)
- Restructuring potable networks to solve the problem of pipes leakage to reduce UFW.
- Construction of new raw water network to supply the green areas and garden with raw water and prevent the use of treated potable water.
- Rehabilitation of the existing plants, boosting stations, reservoirs, on yearly basis to sustain the annual production efficiency.

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

LAOS

Attachment 2

Water Supply Administration for Better Management of Water Supply Services

Inception Report Presentation

1. Country: **Lao PDR**
2. Name: **Mr. Ladda Philavong**
3. Position: **Head of Planning & Inventory Section.**
4. Organization: **Luang Prabang Water Supply State-owned Enterprise.**



Inception Report Presentation

- Each applicant is kindly requested to make presentation of Inception Report (M/S Power Point file with **less than 15 slides**) which cover the following 7 topics about the individual water supply company/public water supply authority to which the participant belongs.
- Presentation time: **15 minutes including Q/A**
- 7 topics:
 - 1. Position 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



General Country Profile: Background



- ❁ The Lao People's Democratic Republic (Lao PDR) was established in December 1975. Consist of 17 Provinces and one Capital.
- ❁ Lao PDR is a land rock country bordering Myanmar, Cambodia, China, Thailand, and Vietnam.
- ❁ Joined the Association of South East Asian Nations (ASEAN) in 1997, the World Trade Organization (WTO) in 2013 and the ASEAN Economic Community (AEC) in 2015.



Whole Country: Lao PDR

Area : 236,800 km²

Population : 6,806,000 Habitants

Coverage Water Supply: 67%

Selected Water Supply System/City: LuangPrabang Province

Service Area : 2,500 km²

Provincial Population: 284,000 people.

Population Served: 95,678 people

1. Position of Water Supply Services



- ❁ The Water Supply State-Owned Enterprise Luang Prabang was established on 01 January 1997 under the Business Law No 03/94 dated 18 July 1994 (before called branch of Lao Water Supply State-Owned Enterprise) .
- ❁ The Luang Prabang Province is located in central of Northern of the Lao PDR, was formed Lao capital from the 14th to the 16th century the town became the capital of the powerful kingdom of Lane Xang (Lao PDR).
- ❁ The city has been well known for its ancient history with numerous of both natural and historical sites of temples and monasteries in Southeast Asia. The ancient town of Luang Prabang was finally registered as the official World Heritage Site by UNESCO since 1995.



2. Water Supply Service Levels

Please fill in variation of the indicators below based on your situation!

(Example)

INDICATORS	2004 or 2005	2014 or 2015	Goals for 2025
Staff/1,000 connections	6.8	5.5	4
Production capacity (m3/day)	16,500	35,000	52,000
Water quality	None	WHO Guidelines	WHO Guidelines
Coverage area	26.5%	53.2%	85%
Supply duration (hr/day)	24	24	24
Supply pressure	No data	1 bars	1 bars
Number of connections	6,911	19,831	40,942
NRW	25%	23.9%	20%
Collection ratio	48%	53.18%	90%
Staff number	65	110	160



3. Management of Water Quality

Table 3 Monitoring requirements for Nam Papa systems

Parameter	Unit	Permissible limit	Exceptions	Monitoring Frequency			Parameter	Unit	Permissible limit	Exceptions	Monitoring Frequency		
				Weekly	Monthly	Yearly					Weekly	Monthly	Yearly
Microbial													
E. coli ¹⁾	Units / 100 mL	0			✓		Lead (Pb)	mg/l	<0.01				✓
							Manganese (Mn)	mg/l	<0.1				✓
							Mercury (Hg)	mg/l	<0.006				✓
Chemical							Nitrate (NO ₃) ²⁾	mg/l	<50			✓	
Aluminium (Al)	mg/l	<0.2	There is no exception if aluminium-based coagulants are used		✓		Nitrite (NO ₂) ²⁾	mg/l	<3		✓		
Arsenic (As)	mg/l	<0.01	There is no exception if source is groundwater			✓	Sodium (Na)	mg/l	<200				✓
Chloride Cl ⁻	mg/l	<250				✓	Sulfate ion (SO ₄ ²⁻)	mg/l	<250				✓
Chlorine Cl ₂ (free residual)	mg/l	0.1 – 2	There is no exception if chlorine is used for disinfection	✓			Zinc (Zn)	mg/l	<3				✓
							Taste		Acceptable		✓		
Physical													
Copper (Cu)	mg/l	<2	There is no exception if copper pipe work is used			✓	Colour	TCU	<5			✓	
							pH		6.5-8.5		✓		
							Conductivity	uS/cm	<1000				✓
Cyanide (Cn)	mg/l	<0.5	There is no exception if source is surface water and catchment includes gold mining / processing			✓	Turbidity	NTU	<5		✓		
							Total hardness as CaCO ₃	mg/l	<300				✓
Fluoride (F)	mg/l	<1.5	There is no exception if source is groundwater or fluoride is added to water in the treatment process			✓	Note: 1) An acceptable alternative to E Colli is thermotolerant coliform bacteria.						
Iron (Fe)	mg/l	<0.3				✓	2) Combined nitrate plus nitrite: The sum of the ratios of the concentrations detected of each to its permissible limit must not exceed 1.						

Note: 1) An acceptable alternative to *E. Coli* is thermotolerant coliform bacteria.

2) Combined nitrate plus nitrite: The sum of the ratios of the concentrations detected of each to its permissible limit must not exceed 1.

Water quality standard of all water supply state enterprise need to follow the Minister's Decision of Health no 561/MoH date 27/2/2014 in the part IV, article 8-12.

Checking and monitoring points in service areas with 4 parameters: CL₂, Turbidity, PH, Color

Table 5 Minimum number of sampling sites required

Kilometres (km) of distribution pipeline	Minimum number of sampling sites to be established as a function of distribution pipeline length
<10 km	2 sites per 1 km of pipeline
10-100 km	5 sites per 20 km of pipeline, plus 20 sites
>100-500 km	5 sites per 50 km of pipeline, plus 35 sites
>500 km	5 sites per 100 km of pipeline, plus 60 sites

4. Reduction of Non-Revenue Water 1

- Constitution of Non-revenue Water (If you have the data, please fill in the table)

System input volume	Authorized consumption	Revenue water	Billed authorized consumption	7,408,839 m ³ /year (76.09%)
		Non Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	7,960 m ³ /year (0.08%)
	Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	2,319,923 m ³ /year (%)
			Real losses (Leakage)	None data m ³ /year (%)

4. Reduction of Non-Revenue Water 2



- No DMA yet and a bit high water leakage.
- Water demand is higher than supply.
- JICA experts teach us for make plan and take action in prevention Non-Revenue Water as doing minimum night flow, service pipe information improvement, master meter improvement, renewal and improvement of water meter installation place, planned water leakage inspection, repair framework improvement, water pressure management, and aging pipe renewal.



5. Accounting system of Water Supply Service

Financial Plan(2014-2020) of Long Term Plan (Dollar)										
第2期中期計画 (2014~2020) 第2期中の財政収支見通し										
HEAD		2012 (RESULT)	2013 (RESULT)	2014 (RESULT)	2015 (RESULT)	2016 (PLAN)	2017 (PLAN)	2018 (PLAN)	2019 (PLAN)	2020 (PLAN)
					US\$ RATE → 8047	(1,000 dollar)				(1,000 dollar)
Profit & Loss	Gross	1,825	2,090	2,879	3,299	4,040	4,316	4,590	4,840	4,949
	Income (water supply)	1,528	1,880	2,658	2,936	3,505	3,755	4,001	4,221	4,298
	Income (the others)	297	210	221	363	535	561	589	619	650
	Expenditure	1,791	2,001	2,449	2,745	2,998	3,247	3,288	3,290	3,325
	Operation & Maintenance	1,136	1,290	1,278	1,566	1,755	1,793	1,813	1,842	1,873
	(Personnel cost of O&M Expenditure)	955	433	511	606	817	833	850	867	884
	Payment for the bulk water supplier	0	0	287	486	931	959	988	1,017	1,048
	Depreciation	522	627	1,048	1,021	1,119	1,208	1,233	1,257	1,282
	Interest	133	84	123	158	124	256	242	191	170
	Balance	35	89	143	68	111	109	315	532	575
Capital	Amount of Tax	24	76	109	47	77	76	220	370	400
	Profit	11	13	35	21	34	33	96	162	175
	Income (resource)	118	8	276	514	1,231	0	0	0	0
	Loan(from Government or Bank)	0	0	0	355	1,083	0	0	0	0
	Income (the others)	118	8	276	159	148	0	0	0	0
	Expenditure for capital investment	643	622	1,231	524	2,973	3,819	2,481	2,801	2,116
	Construction Facilities etc	493	474	1,032	325	2,774	3,512	2,174	2,620	1,926
	Repayment of loan	210	148	199	199	199	307	307	181	190
	Expenditure (the others)	0	0	0	0	0	0	0	0	0
	Balance	(525)	(614)	(955)	(10)	(1,742)	(3,819)	(2,481)	(2,801)	(2,116)
Found	Depreciation	522	627	1,048	1,021	1,119	1,208	1,233	1,257	1,282
	Profit	11	13	35	21	34	33	96	162	175
	Amount	533	640	1,083	1,042	1,153	1,241	1,329	1,419	1,457
	Balance of resource (This year)	8	26	128	1,032	(588)	(2,578)	(1,152)	(1,382)	(658)
Found carried forward		1,850	1,877	2,005	3,037	2,448	(130)	(1,282)	(2,664)	(3,323)
Loan balance		1,011	883	918	719	1,604	1,351	1,098	2,085	1,929

This table is show the enterprise financial statement as the results of the year 2012 to 2015 and forecasting for 2016 to 2020.

This model you can find profit & loss, balance of capital and some important data as loan balance and etc...



6. Major Recent Achievement in Improvement of Water Supply Services/Management

- Good chance that has been selected from JICA to one of three pilot projects in the Capacity Development Project for Improvement of Management Ability of Water Supply Authority (MaWaSU).
- To collect and manage important data and transfer data into annual report, do short-mid-long term plan, using data into monitoring goals by performance indicators in water supply guideline.
- Improvement services, do customer survey and establish call center, do water supply class room that is awareness the children understand how clear water come from and try to save it.
- clear our goals and our staff can involve and chair ideas for the enterprise development by On the Job Training (OJT) thought 3 main ideas: Safe, Stable and Sustainable as Japanese system.



7. Recent Challenges to Improvement of Water Supply Services

- ❁ We are following the demand (supply lower than demand) we cannot expansion and supply clear water to our customers with standard pressure in 24 hrs.
- ❁ In the province, only 6 service areas have water supply system and 13 service areas have not water supply system.
- ❁ Human resource development in water work or enterprise is not good system.
- ❁ Lack of staff is good at water work technical and management.
- ❁ Due to low-income country, we are insufficient fund to develop our people and facilities.



Thank you

Luangprabang city is World Heritage Site

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

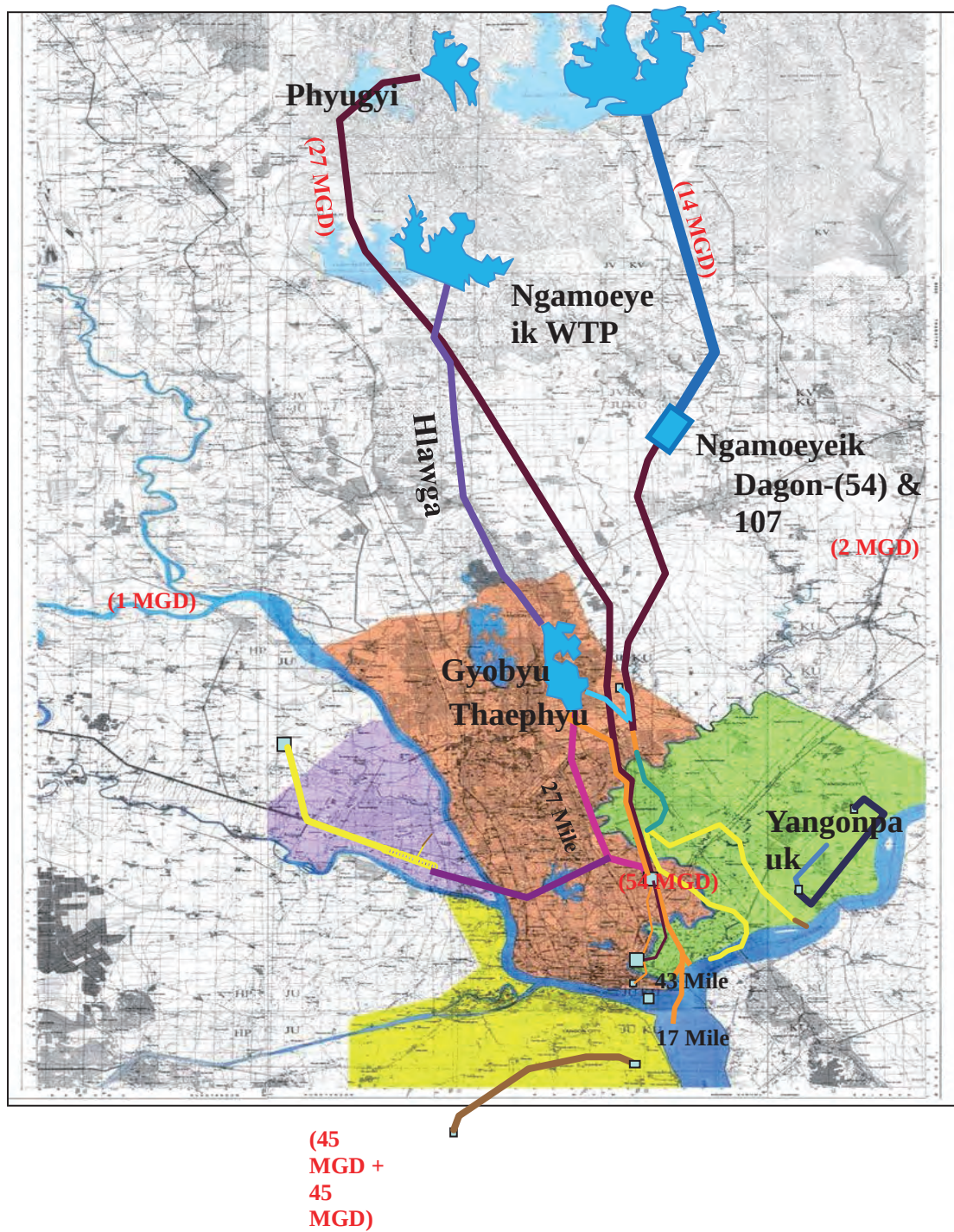
MYANMAR

A. General Information

(1) The current situation of water resources in Yangon City.

1.1 The geographical background (The proportion of forest, residential land, river, etc.)

Hlaing River, Bago river, Yangon River



1.2 Average annual rainfall

Average annual rainfall=2700mm

1.3 The type of available water resources and those situations

Current water supply sources are classified as surface water source stored in reservoirs, tube wells from groundwater, and others. Now, we have new Kokkowa project taking from river source.

1.4 The intake water volume per one day, per one year

The current water capacity is 931,636 m³/day (201 MGD). The present water sources are mainly reservoirs of Gyobu, Phugyi, Hlawga and Ngamoeyeik distribute 840,908m³/day(185MGD). YCDC has 425 tube well pumps with maximum yield amount of 72,727 m³/day(16 MGD).

1.5 The type of water resources for the future

In future, we will use river source for water supply service.

(2) The current situation of water supply services in our country

2.1 The population ratio to be served and not to be served drinking water

The population of Yangon city is developed by 1,250,000 between 1998 and 2011 with the corresponding growth rate of 2.58%. During the period of 11 years, the water supply service population increased by 480,000 (1,920,000 -1,440,000). This shows that about 45,000 service population increased in yearly. According to the census for the whole country Myanmar in 2014, the population of Yangon is adopted about 5.2 million. The estimated served population for drinking water is about 1.7 million at present.

2.2 Proportion of consumers with 24 hours supply, average number of hours per day of water availability to most people

The service hours varies widely between 24 hours and 6 hours a day depending on areas. Average supply duration is estimated as 8 hours per day.

(3) Does the distribution water use for the potable water directly?

Yes, nearly 50% of distribution water use for the potable water directly.

(4) Non revenue water (NRW)

The NRW ratio is 66%.

(5) Private Sector Participation in our country.

5.1 The status of Private Sector Investment and its area (e.g. Water resource development, Water treatment, Water distribution, Organization management, Bill collection, leakage repair, etc.)

No private sector participation. All of staffs are government employees.

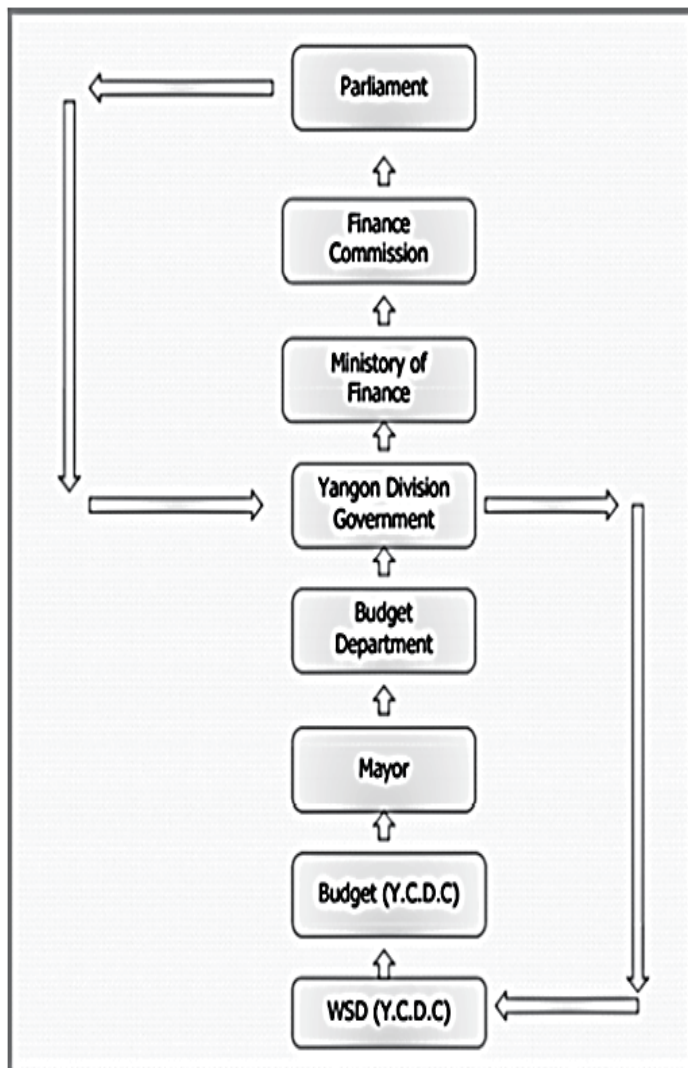
5.2 The current situation of involvement of national government in water supply services (e.g. Water rates, Personnel employment, O/M budgeting, Capital investment, etc.)

The present water tariff rate is collected 2012-2013 Financial Year, according to the permission of Yangon Regional Government

Current Water Tariff Structure

Category	Flat Rate (Ks/month)	Metered Rate(Ks/m ³)
Religious(temple, mosque, Church, pagoda).	Free	Doesn't apply
Households (domestic I)	1875	88
Households(domestic II)	3000	88
Government	-	88
Commercial/industry	-	110
Foreign (Commercial)	-	880
Foreign (Household)	-	440
Foreign (Hotel, Motel, Inn, ...)	-	880

5.3 The Budget Permission from Parliament, Union Government, Regional Government to YCDC's Budget Department.



(5) Related Figures

Instructions for completing the form

1. All information provided should be for the fiscal year 2014 or most recent data if 2014 year's data is unavailable (please indicate the year of the data available).
2. For all financial information, please specify in the local currency with equivalent US dollars.
3. When a value is zero, please enter '0'.

I. Service Area

- 1 Size of Utility's area of Responsibility: (730 sq. km)
- 2 Population of Utility's area of responsibility: (5.2 million)
- 3 Population of Utility's present service area:(1.8 million)
- 4 Number of towns served with piped water: (30)

II. Water Consumption & Production

- 1 Volume of water produced by the Utility: (931,636 m³/day) (34 million m³ / year)
- 2 Volume of water bought in bulk from other utility / company: (0 million m³ / year)
- 3 Volume of water metered: (11.56 million m³ / year)
- 4 Estimated un-metered consumption: (14 % of metered consumption)

III. Water Supply System Performance

- 1 Number of customers who received intermittent supply is no record.
- 2 Typical duration of supply (planned and unplanned supply interruptions): (8 hours / day)
- 3 We are now preparing for Chlorine facility.

IV. Staff

- 1 Who does the work in your company: (please tick relevant boxes)
 - ☒ permanent staff . salaried Government employees
 - ☐ permanent staff . with contract
 - ☐ casual / part-time . contract staff
 - ☐ casual / part-time . wages
 - ☐ contracted out to outside company / agency

2 Number of staff in our organization:

Corporate Services (Management, Admin, Finance, Technical, etc.)	Water Supply (O&M, Customer Services, Support Services, etc)	Other non water supply (e.g. wastewater, drainage, environment services)	TOTAL
134 staffs	1882 staffs	149 staffs	2165 staffs

We have no part time staff.

V. Customers

Number of new customers connected to water supply system during the year:

(Average 5200 connections / month)(Data from Jan To March 2016)

Attachment 2
Inception Report Presentation
Water Supply Administration for Better
Management of Water Supply
Services(B)

1.Country: The Republic of Union of Myanmar

2.Name: Mr. Aung Moe Kyaw

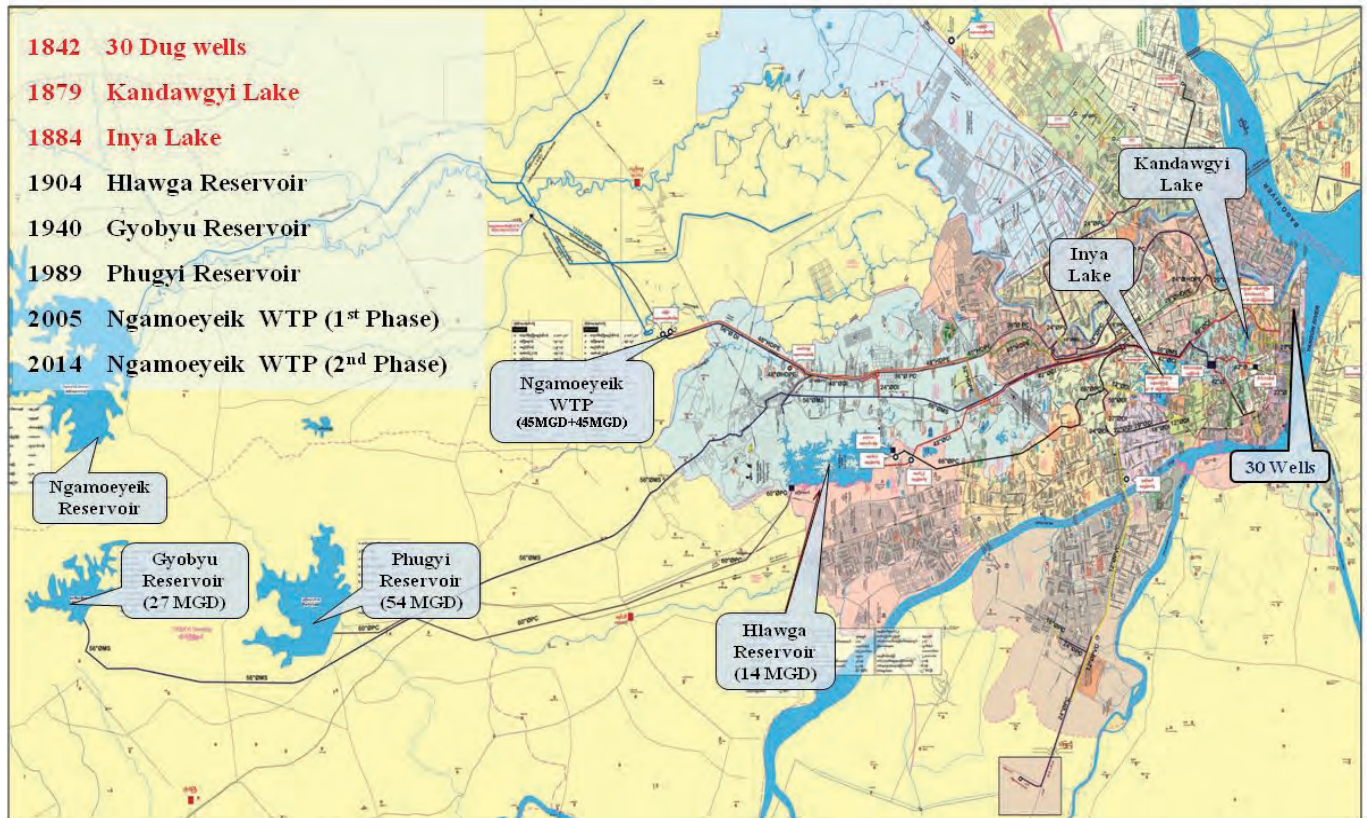
3.Position: Sub Assistant Engineer

4.Organization: Engineering Department
(Water and Sanitation)
Yangon City Development Committee

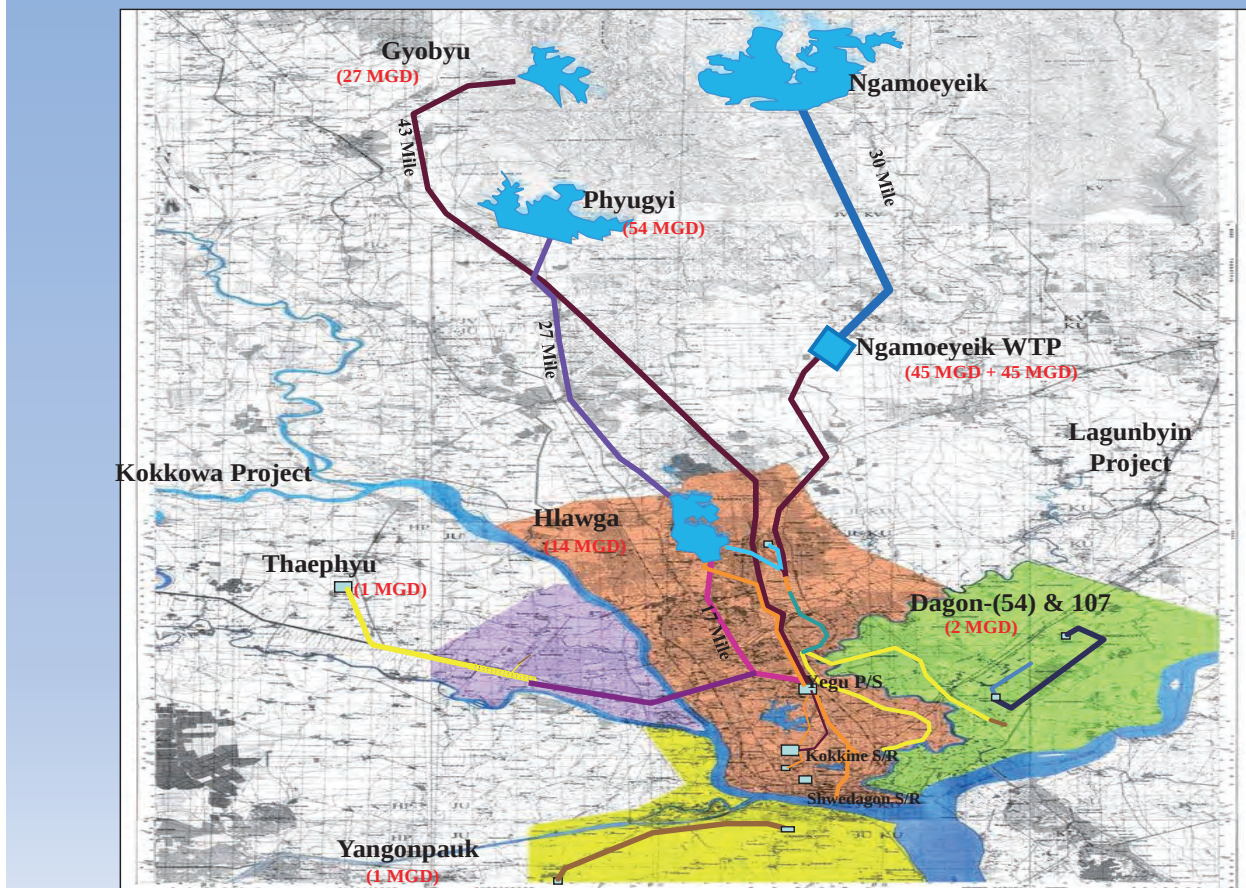
Topics

1. Position 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 Services
6. Major Recent Achievements in Improvement of
Water Supply Services
7. Recent Challenges to Improvement of Water
Supply Services

1. Position of Water Supply Services



2. Water Supply Service Levels(1)



2. Water Supply Service Levels(2)

Hlawga Reservoir	14 MGD(63,637m ³ /day)
Gyobyu Reservoir	27 MGD(122,727m ³ /day)
Phugyi Reservoir	54 MGD(245,454m ³ /day)
Ngamoeyeik water Treatment plant	90 MGD(409,090m ³ /day)
Tube Wells (425 Nos.)	16 MGD(72,727m ³ /day)
Total	201 MGD(913,636m³/day)

Surface Water

90 %

Ground Water

10%

Ongoing Projects

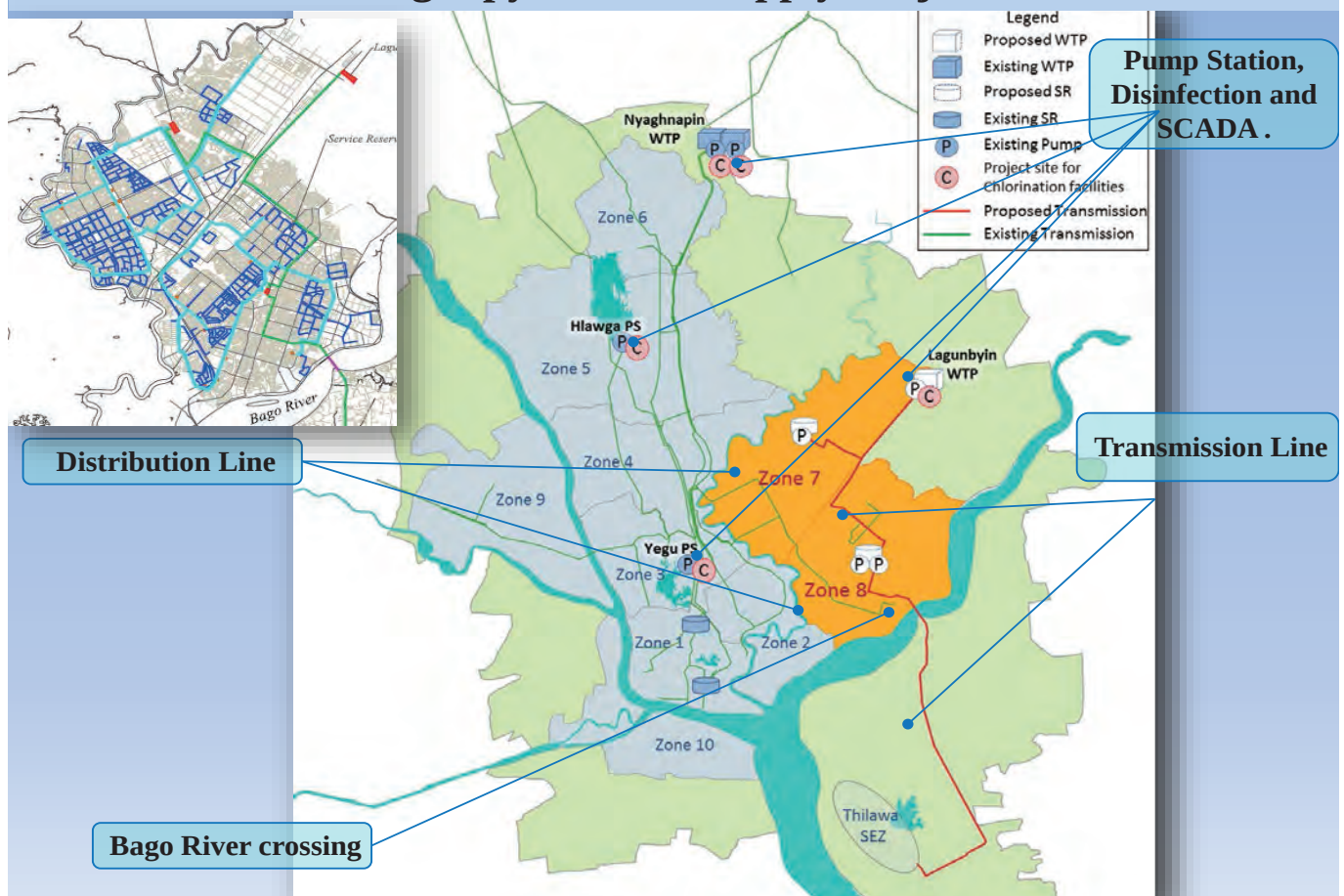
Lagunpyin Project 40 MGD

Total Population 5.0 Million

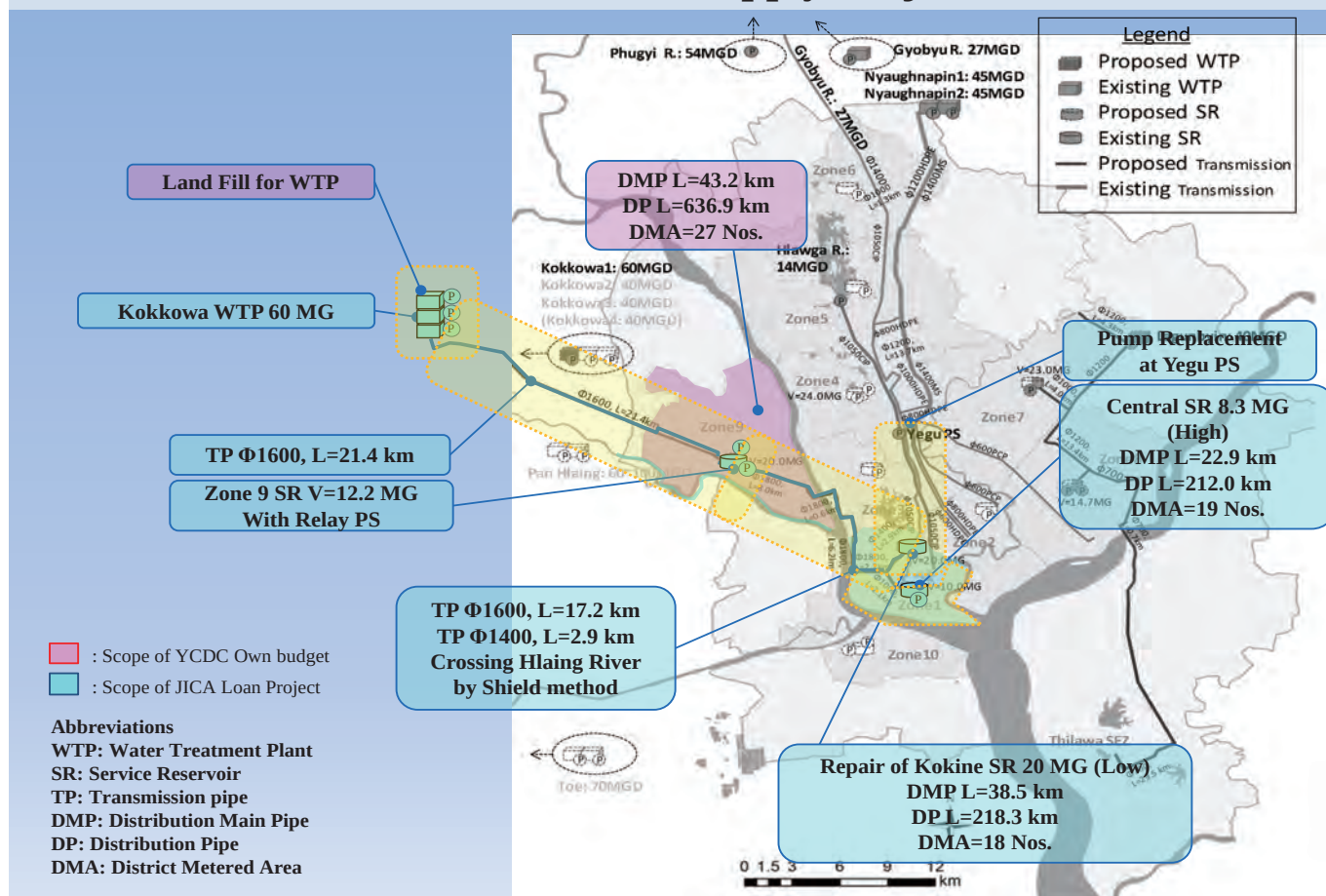
Kokkowa River Project 60 MGD
(First Phase)

Service Population 1.8 Million

Lagunpyin Water Supply Project



Kokkowa Water Supply Project



2. Water Supply Service Levels(3)

Master Plan Target for 2040

Performance Indicators (PIs)	Target Year						
	2013	2018	2020	2025	2030	2035	2040
Non-revenue water (%)	66	51	46	35	26	20	15
Leakage rate (%)	50	37	33	25	18	13	10
Demand coverage (%)	35	45	50	60	65	70	80
Served population (million)	1.8	2.6	3.0	4.1	5.1	6.2	8.0
Water consumption (gpcd)	30	30	30	35	35	35	40
Avg. Supply Pressure (bar)	0.75			> 1.5			
Avg. Supply duration (hour)	8hrs.			24hrs.			
Water quality	Potable	Drinkable					

3. Management of Water Quality (1)

New Monitoring Plan (Monitoring Points And Frequency)

Category		Location	Number of location	Sampling frequency	Number of sample/month
Supply source of YCDC piped water	Reservoir	GyoPhyu R, Phugyi R, Hlawga R (Analysis in laboratory)	3	monthly	3
	Tube well (Main water source)	Yangonpauk, Thaephyu, South Dagon54, South Dagon107	45	Monthly	45
	Raw water P/S	Aungtagon P/S	1	Monthly	1
Waterworks facility	Nyaunghnapin WTP	Nyaunghnapin WTP Raw water	1	Monthly	1
		Nyaunghnapin WTP Treated water	2	Weekly	8
	Pumping Station	Yegu Pumping Station	2	weekly	8
	Tube well	33 TS (308Tube wells)	308	Every 4 months	77
Consumer	Tap	1 sampling point / Township	27	Every 4 months	8
		Few points in Township	4	Daily	-- By TS staff
Baseline survey of future water source	River water	Lagunpyin creek, Kokkowa river	3	Monthly	3
Total number of sample					154

Monthly work volume = 154

Now we use this monitoring plan as water quality monitoring plan

Progress For Water Quality Parameters

No	Measurable Parameters	Units	WHO Guidelines Standard	Standard value of MNDWQS
1	Total Coliform	MPN/100ml	0	0 in 100 ml
2	Fecal Coliform	MPN/100ml	0	0 in 100ml
3	Taste	mg/l		No Objectionable Taste
4	Odor	mg/l		No Objectionable Odor
5	Color	TCU	15	15
6	Turbidity	NTU	5	5
7	Arsenic	mg/l	0.05	0.05
8	Lead	mg/l	0.01	0.01
9	Nitrate	mg/l	50	50
10	Manganese	mg/l	0.5	0.4

Progress For Water Quality Parameters

No	Measurable Parameters	Units	WHO Guidelines Standard	Standard value of MNDWQS
11	Chloride	mg/l	250	250
12	Hardness	mg/l	500	500
13	Iron	mg/l	0.3	1
14	pH	mg/l	6.5-8.5	6.5-8.5
15	Sulphate	mg/l	250	250
16	Total Dissolved Solids(TDS)	mg/l	1000	1000
17	Calcium	NTU	200	200
18	Magnesium	TCU	150	150
19	Nitrite	mg/l	3	3
20	Ammonia Nitrogen	mg/l	1.5	1.5

Progress For Water Quality Parameters

No	Measurable Parameters	Units	WHO Guidelines Standard	Standard value of MNDWQS
21	Electrical Conductivity	μS/cm	-	1500
22	Total Alkalinity	mg/l	250	30-250
23	Salinity	psu	0.5	0-0.5
24	Zinc	mg/l	-	3
25	Residual Chlorine	mg /l	0.2 (minimum)	-

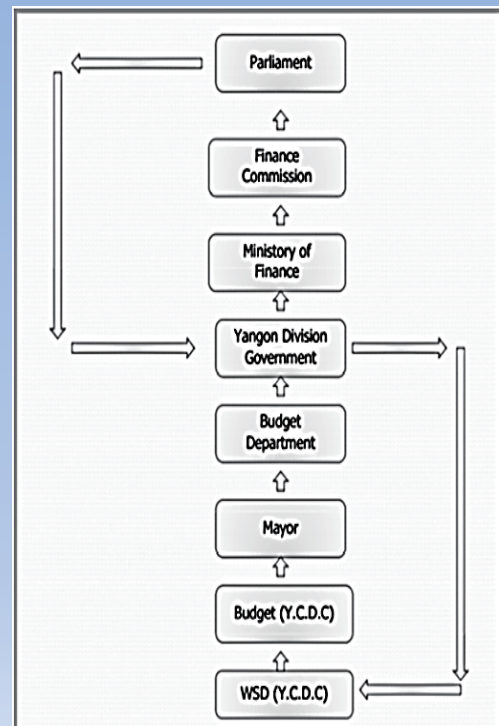
4. Reduction of Non-Revenue Water

COMPONENTS OF NRW

Non-Revenue Water	Unbilled Authorized Consumption	Such as Pipeline Flushing, Fire Fighting, Utility Use		
	Water Losses	Real (Physical) Losses	Leakage on Transmission and/or Distribution Mains	
			Leakage on Service Connections up to Customers' Meters	
			Leakage and Overflows at Utility's Storage Tanks	
	Water Losses	Apparent (Administrative) Losses	Unauthorized Consumption	Illegal Connection
				Meter by-Pass
				Meter Tampering
		Apparent (Administrative) Losses	Metering Inaccuracies	Under-Registration
				False Reading
				Data Handling Errors

5. Accounting System of Water Supply Services(1)

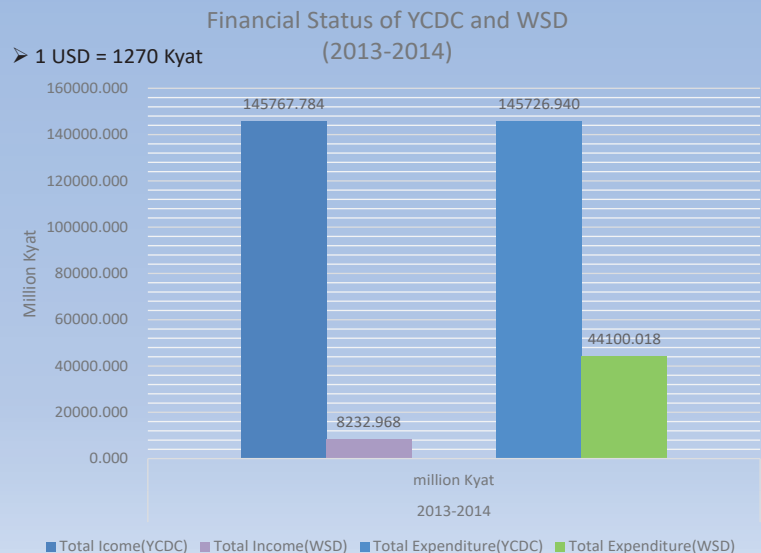
- Started implemented **Union Fund** since 2011 October 1.
- Government Accounting System
- Single Entry
- Non Profit and Loss (Account + Balance Sheet)



5. Accounting System of Water Supply Services(2)

- Water supply account is included in the general account of YCDC and using the government account system

- We don't have anything profit & Loss Account and Balance Sheet.
- We can't make the depreciation account effectively.



5. Accounting System of Water Supply Services(3)

- The present **water tariff rate** is collected according to the permission of Yangon Regional Government.
- Present Rate Started to collect in **2012-2013** Financial Year.

➤ 1 USD = 1270 Kyat

Type	Customer	2001	2002	2005	2006	2012	2013	2014	2015	Unit
Metered	Household	6.6 (Kyat)				88 (Kyat)			88 (Kyat)	Kyat / ml
	Commercial	29.7 (Kyat)		77 (Kyat)		110 (Kyat)			110 (Kyat)	Kyat / ml
	Construction	29.7 (Kyat)		77 (Kyat)		110 (Kyat)			110 (Kyat)	Kyat / ml
	Department Building	4.4 (Kyat)		55 (Kyat)		88 (Kyat)			88 (Kyat)	Kyat / ml
	Factory	4.4 (Kyat)		77 (Kyat)		110 (Kyat)			110 (Kyat)	Kyat / ml
FE	Household	0.44 (US\$)				440 (Kyat)			440 (Kyat)	Kyat / ml
	Commercial	0.88 (US\$)				880 (Kyat)			880 (Kyat)	Kyat / ml
Flat	Household Ordinary	120 (Kyat)		1125 (Kyat)		1800 (Kyat)			1800 (Kyat)	Kyat / month
	High class			1875 (Kyat)		3000 (Kyat)			3000 (Kyat)	Kyat / month
	Commercial	135 (Kyat)		1575 ~ 57068 (Kyat)		2250 ~ 81525 (Kyat)				Kyat / month
	Household	25 (US\$)								US\$ / month
	Commercial	35~ (US\$)								US\$ / month
	Hotel, Motel, inn, etc	1440 (US\$)				27000 (Kyat)			27000 (Kyat)	Kyat / month
FE	Hotel, Motel, inn, etc	0.5 (US\$)								US\$ / guest / day
	Construction	83.6 (Kyat)		155 (Kyat)		217 (Kyat)			309.6 (Kyat)	Kyat / sq-m

5. Accounting System of Water Supply Services(4)

• Situation of Finance

- Water tariff rate is lower than costs and lower than other countries.
- So, income not equal Expenditure.
- The deficit has been getting bigger.

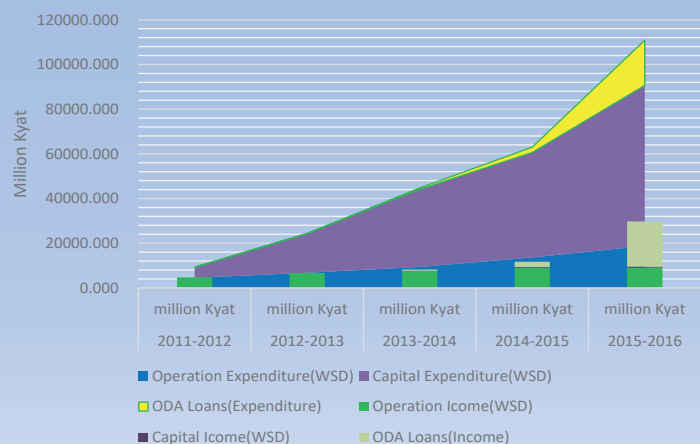
• Situation of Billing and Collection

- We cannot collect the water tariff fully.
- We cannot protect the non-revenue water.

- In Yangon, can distribute only portable water.

➤ 1 USD = 1270 Kyat

Progress of Income and Expenditure in WSD



6. Major Recent Achievements in Improvement of Water Supply Services

- Our organization implemented new sections, such as water treatment section, HR section, Design section, Planning section, NRW section, Customer service, Public relationship section and Transmission Pipe section according to suggestion of Technical Assistant (TA) Team from JICA.
- Now we are preparing to install the flow meter at every reservoirs and pumping station outlets, with the aids of JICA TA teams. After that we can monitoring the amount of water to distribute to customers.

7. Recent Challenges to Improvement of Water Supply Services

- We Need more treated water for customer because we have only water treatment plant (Nga Moe Yeik) 90 MGD (409,090m³/day).
- We need more DMA Project to reduce NRW Ratio.

THANK YOU FOR YOUR ATTENTION!

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

NEPAL

Attachment 2

Water Supply Administration for Better Management of Water Supply Services

Inception Report Presentation

1. Country: NEPAL
2. Name: CHANDRA K C
3. Position: Regional Director
4. Organization: MWSS



General Country Profile: Background

- Least Developed country with high poverty rate
- Struggling to cope with development needs with political instability, insurgency and EQ destruction of the recent past
- In a transition phase in every area Including water supply

Whole Country:

Area : 147,181 km²
Population : 26,494,501 Habitants (2011)
Coverage Water Supply: 84 % (Basic)

Selected Water Supply System/City:

Service Area : 124 km²
Population Served: 48 thousand



1. Position of Water Supply Services

- Predominantly, water supply in Nepal is basic level supply
- Effort is made to improve the service level to higher
- This presentation contains an example of small town trying to evolve water supply service to a better level



2. Water Supply Service Levels

(Performance Indicators of a small scheme)

INDICATORS	2005	2015	Goals for 2025
Staff/1,000 connections	10	3.18	2.81
Production capacity (m3/day)	4,000	6,400	8,400
Water quality	None	WHO Guidelines	WHO Guidelines
Coverage area	50%	80%	90%
Supply duration (hr/day)	8	18	24
Supply pressure	0.5 bar	0.5 -2.0 bars	2.5 bars
Number of connections	3000	8900	16,000
NRW	44%	36%	20%
Collection ratio	80%	95%	98%
Staff number	6	28	45



3. Management of Water Quality

(Water Safety Plans)

Formation of water safety plan sub-committee, October 14, 2009. & re-formed in 12 Sept. 2013.

- Total members in WSP sub-committee = 21 nos.comparising representatives from Municipality, Hospital, Schools, Civil Society, Political etc.
- Water safety plan applied in October 14, 2009



Activities under Water Safety Plan

- Water Sample Taking at Private Tap for Bacteria Checking



6

4. Reduction of Non-Revenue Water 1

- Constitution of Non-revenue Water (If you have the data, please fill in the table)

System input volume 6400	Authorized consumption 4110	Revenue water 4090	Billed authorized consumption 4090	1,492,850 m ³ /year (64%)
		Non Revenue Water (NRW) 2310	Unbilled authorized consumption (ex. fire fighting, cleaning) 20	7300 m ³ /year (0.31%)
	Water losses 2290		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies) 1799	656,635m ³ /year (28.1%)
			Real losses (Leakage)	179,215m ³ /year

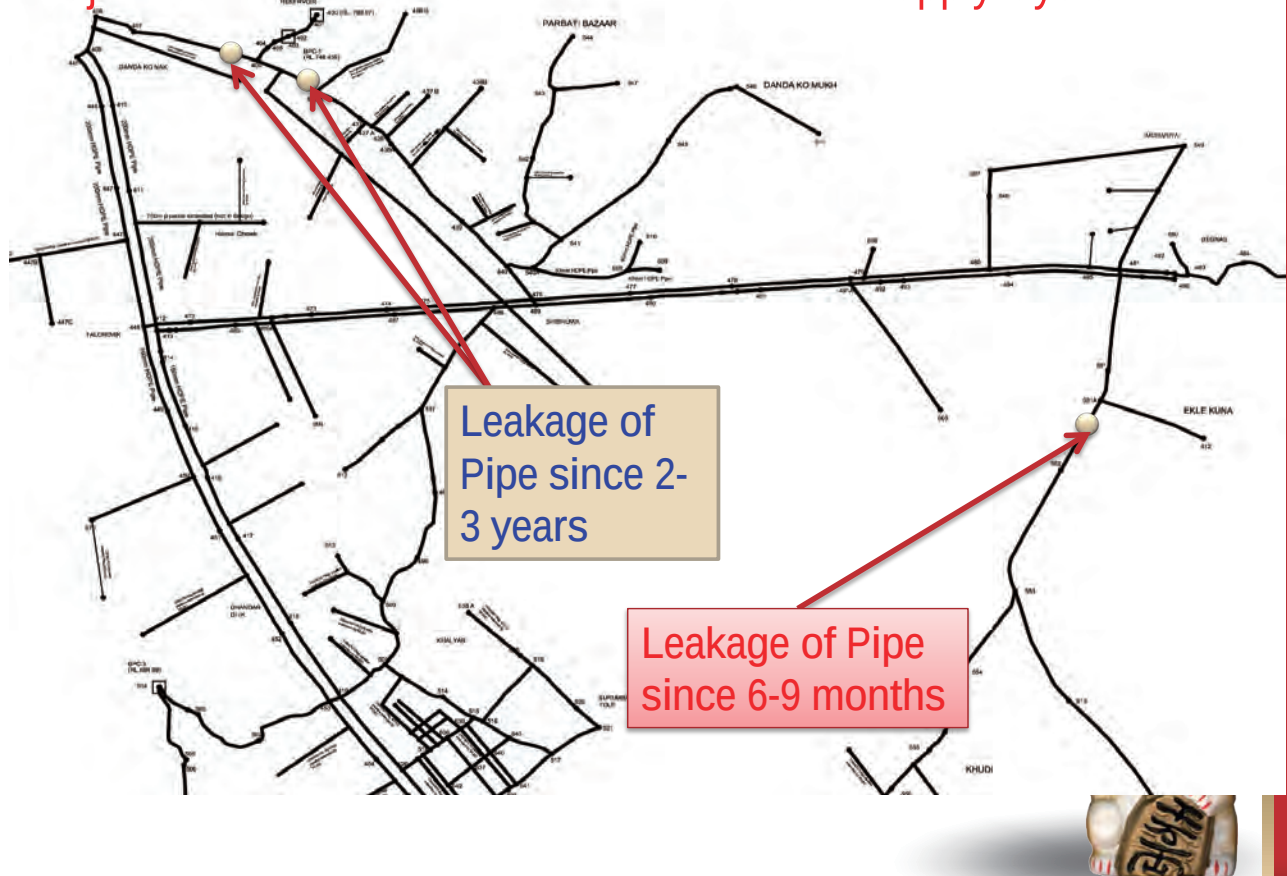
4. Reduction of Non-Revenue Water 2

Area of concern:

- No data of input supply volume and consumption.
- No knowledge of NRW.
- No recorded data of leakages & breakages of pipe.
- No idea about leak detection methods.



3 Major Leaks Detected at Dandakonak Water Supply System



More Leaks Detected in the Network



Achievements

- Bulk Meter Installed After Filter



- Bulk Meter Installed in Inlet and Outlet of All RVT



5. Accounting system of Water Supply Service

- ❁ Out sourcing of bill payment adopted.
- ❁ Online bill payment adopted
- ❁ Meter Reading posting through mobile app.



Financial Data About Water Utility :

- Project Cost (2005) : Rs. 25,20,17,186
- Nepal Government Contribution : Rs. 12,74,39,710
- Users Committee : Rs. 12,45,77,476
- Annual Total O&M Cost (2015) : Rs. 1,72,54,649
- Annual Water Tariff Collected (2015) : Rs. 3,30,15,938
- Annual Billings (2015) : Rs. 3,45,85,396



Financial Data About Water Utility :

- Total Loan of TDF : Rs. 8,27,21,096
- Loan Paid to TDF : Rs. 8,10,19,098
- Loan to be Paid to TDF: RS. 3,19,28,516
- Total Income of FY 2015 : Rs. 5,49,23,920
- Total Expenses of 2015 : Rs. 4,51,88,068



6. Major Recent Achievement in Improvement of Water Supply Services/Management

- ❖ The problem of NRW is realized and work towards reduction of NRW is initiated.
- ❖ Future development plan is in place.
- ❖ The utility is making profit.
- ❖ The utility is trying to adopt new technology.
- ❖ Some work is going on for WQ improvement.



7. Recent Challenges to Improvement of Water Supply Services

- ❖ Difficult to maintain equal pressure in all clusters.
- ❖ Road expansion work damages distribution pipeline frequently.
- ❖ Frequent breakage of HDPE pipe.
- ❖ Lack of proper instrument & manpower in water testing lab.
- ❖ Difficult to maintain **FRC** at end points of taps.
- ❖ Huge NRW.
- ❖ Resource constraints for development and expansion.



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

PAKISTAN



PRESENTATION ON INCEPTION REPORT AND WATER SUPPLY SYSTEM

WASA-LAHORE



SYNOPSIS OF PRESENTATION

- ❖ INTRODUCTION TO WASA, LAHORE
- ❖ DESCRIPTIVE MAP OF PAKISTAN, LAHORE & WASA JURISDICTION
- ❖ MISSION IN WATER UTILITY
- ❖ CURRENT SITUATION AND CHALLENGES
- ❖ WATER QUALITY STANDARDS IMPLEMENTED AT WASA LAHORE
- ❖ NON REVENUE WATER
- ❖ ACCOUNTING MECHANISM OF WATER SUPPLY SYSTEM
- ❖ PROPOSED TARGETS

INTRODUCTION TO WASA LAHORE

- Before 1967 With Lahore Municipal Corporation
- 1967 - 1976 Water Wing, Lahore Improvement Trust.
- 1976- **WASA (LDA)** Created as Agency of LDA under LDA Act -1975. Chairman - LDA (Chief Executive of the Province)
- 2001- District Nazim notified as Chairman, LDA Governing Body reconstituted.
- 2013- Ordinance 2013 - Chief Executive of the Province is Notified as Chairman LDA.

FUNCTIONS (As per Act)

- A. Develop, operate and maintain water supply, sewerage and drainage systems within the service area of the Water and Sanitation Agency to be established under section 10(2) of this Act. (Section 6 (2-iii))
- B. The Agency established under sub section (2) shall perform all functions and exercise all powers of the Authority with regard to water supply, sewerage and drainage with power to collect rates, fees and charges for water supply, sewerage and drainage. (Section-10 (3))

VISION

- WASA Lahore is committed for provision of efficient and cost effective services of water, sewerage and drainage as per its mandate.

- As such, WASA Lahore vision is to become a quality service providing utility, meeting consumers' expectations through dedicated employees committed to excellence.

INTRODUCTION & RESPONSIBILITIES OF WASA, LAHORE

There are four Provinces in Pakistan (Punjab, Sindh, Baluchistan & Khyber Pakhtunkhwa). Punjab is the biggest Province of Pakistan according to Population. Lahore is the capital city of Punjab with approximate population of 12 Millions.

Water & Sanitation Agency (WASA) Lahore is responsible for the provision of safe drinking water to the citizens of Lahore and its disposal in its jurisdiction area. It is the Agency of Lahore Development Authority (LDA)

According to Local Government Act 2013, the functions of provision of Water Supply and the responsibility of Local Government as per clause 87 of Chapter IX of Local Government Act which is reproduced as under:-

Provide, manage, operate, maintain and improve the municipal infrastructure and services, including...

1. Water Supply and control and development of water sources

2. Sewerage and sewage treatment and disposal

3. Storm water drainage

WASA LAHORE.

- **Lahore WASA**, the 2nd largest Water utility of Pakistan, operating in the area of more than 350-Sq.Km. (Total district area 1772 Sq. Km) through 5826-Km Water Supply and about 4000-Km Sewerage Network with the Sanctioned Budget Strength of 8,770 (Existing 5,655).

➤ **Total Population: (WASA Area)** **7.000 M**

Water Supply

➤ **Source of Water** **Ground Water**

➤ **Ground Water** **100%**

➤ **Waste Water Treatment Plant** **Nil**

➤ **Tubewells:** **517**

➤ **Arsenic Removal Plants** **270 (WASA) + 125 (CDGL)**

➤ **Arsenic Removal Plants** **129 (under const/tendering)**

➤ **Water Production:** **2.00 MCM/day**

➤ **Water Connections:** **650,000**

➤ **Water Supply Network:** **5826 km (75% AC Pipes)**

➤ **Storm Water Drains:** **481 Km (Primary, secondary and Tertiary)**

➤ **Disposal / Lift Stations** **13/95 No's (Pumping Capacity 3508 Cfs)**

➤ **Budget 2016-17** **Resources 18,773 (ADP 8,402 Million)**

➤ **Expenditure (Est.)** **18,848 Million**

➤ **Govt. Assistance** **Bail Out Package 2200 Million + PCGIP 725 Million + Monsoon Grant 425 Million = Total 3350 Million**

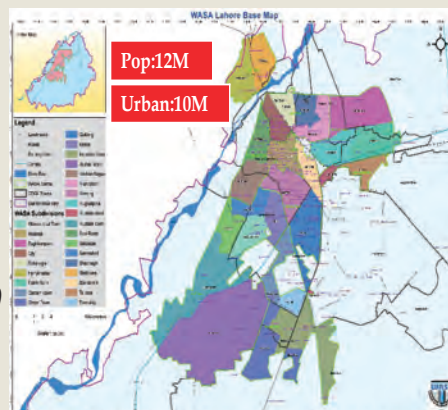
➤ **Own source Revenue** **Water / Sewerage Collection 3879 + UIP Tax 1400 Million = 5279 Million**

➤ **Sanctioned Strength** **8,770 No's**

➤ **Water Production cost** **Rs. 59 / 1000 Glns**

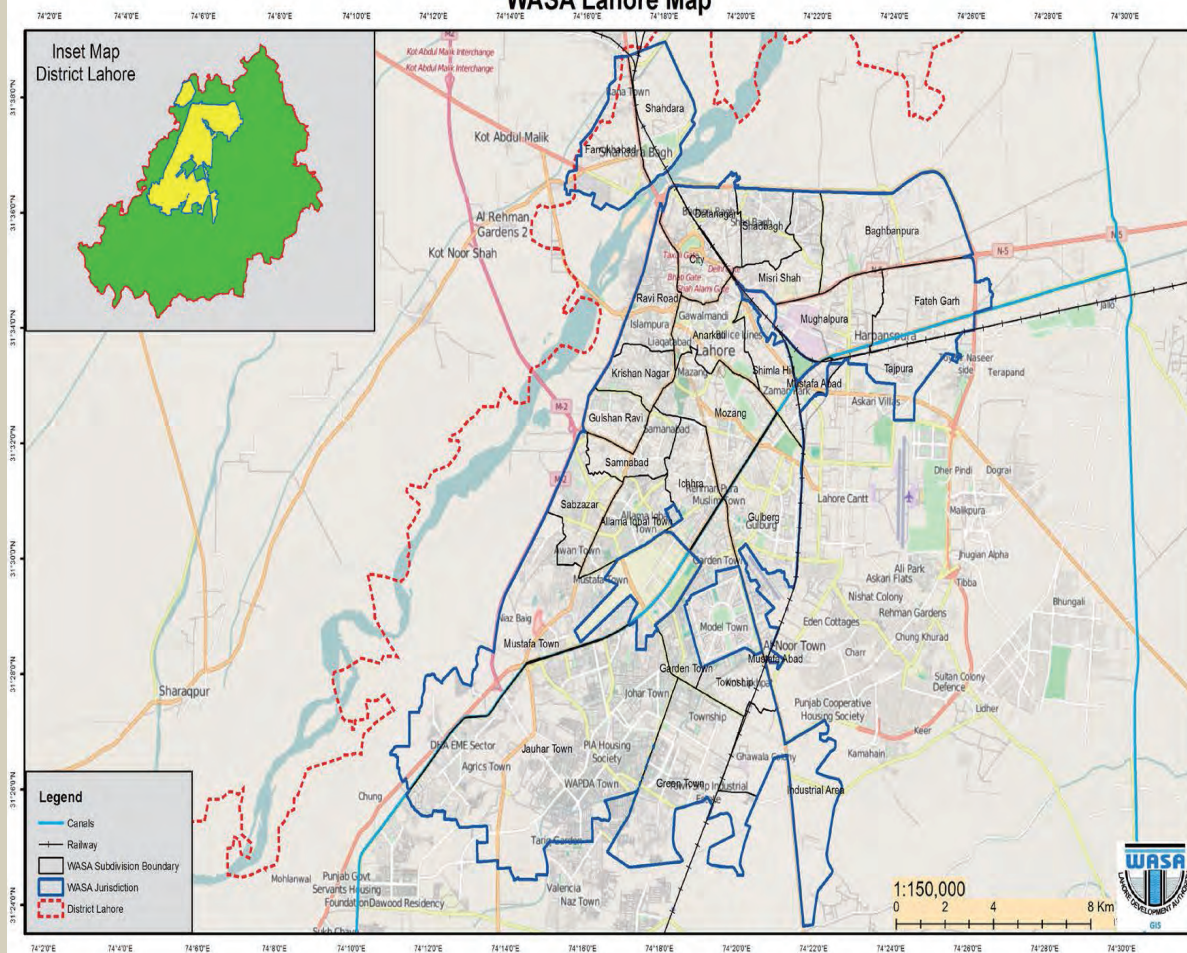
➤ **Sale Cost** **Rs. 22 / 1000 Glns**

➤ **Professional to Staff Ratio** **3% as compared to more than 20% in good utilities (in case of ISKI it is 28%)**





WASA Lahore Map



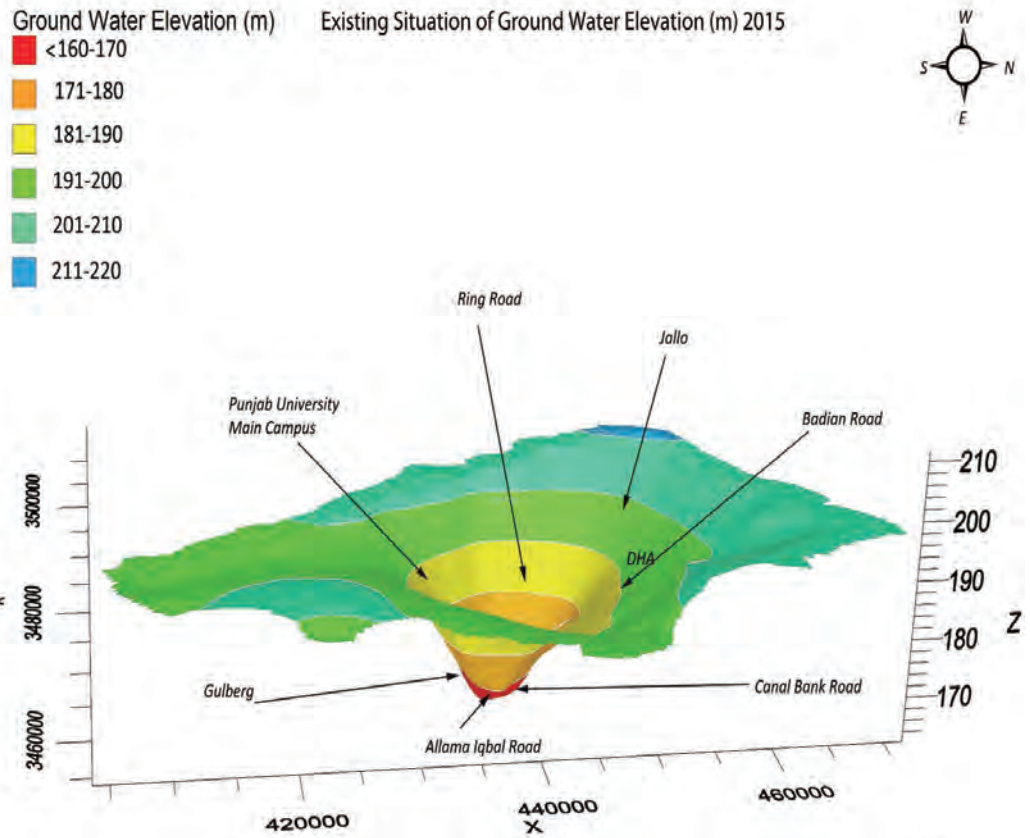
MISSION IN WATER UTILITY

- WASA Lahore is committed to the efficient and cost effective management of water, sewerage and drainage services in Lahore to the satisfaction of citizens, Government and other stakeholders.
- As such, WASA Lahore vision is to become a quality service providing utility, meeting consumers' expectations through dedicated employees committed to excellence.

EXPANDING NEED FOR WATER PRODUCTION

- Drinking water for Lahore is 100% based on ground water extracted by pumping.
- By the year 2040, the demand would increase to **1395.59 MCM/Yr**
- Further mining of the aquifer is not advised
- The existing arrangements are inadequate to sustain water demands
- New sources of water supply are necessary for development
- A new arrangement is required under Master Planning to meet the supply-demand gap

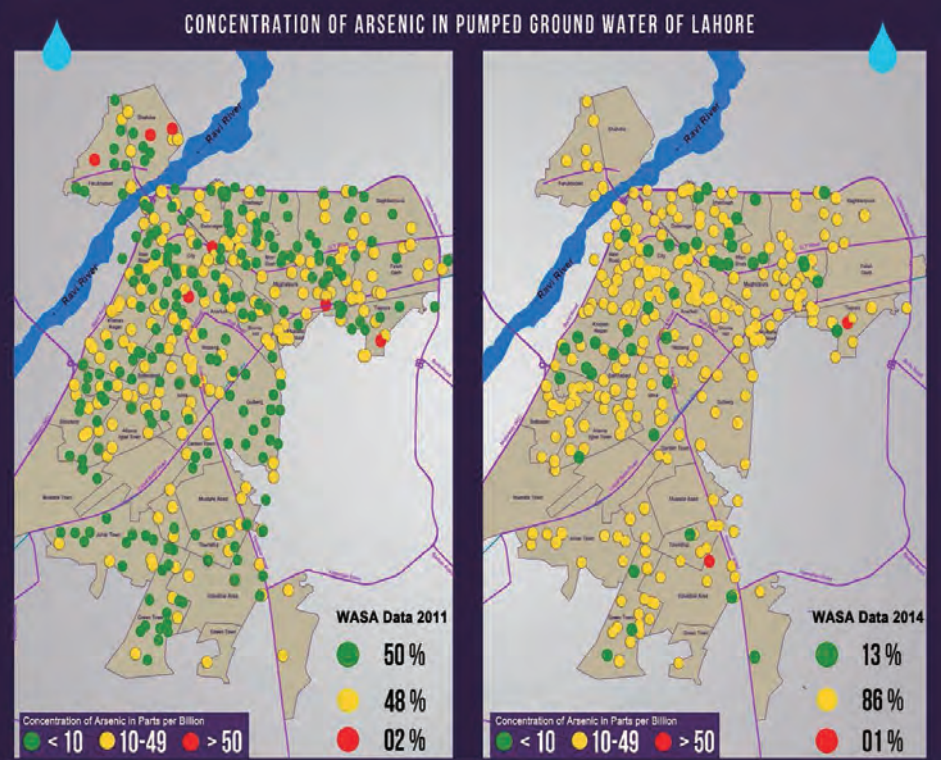
Cone of Depression



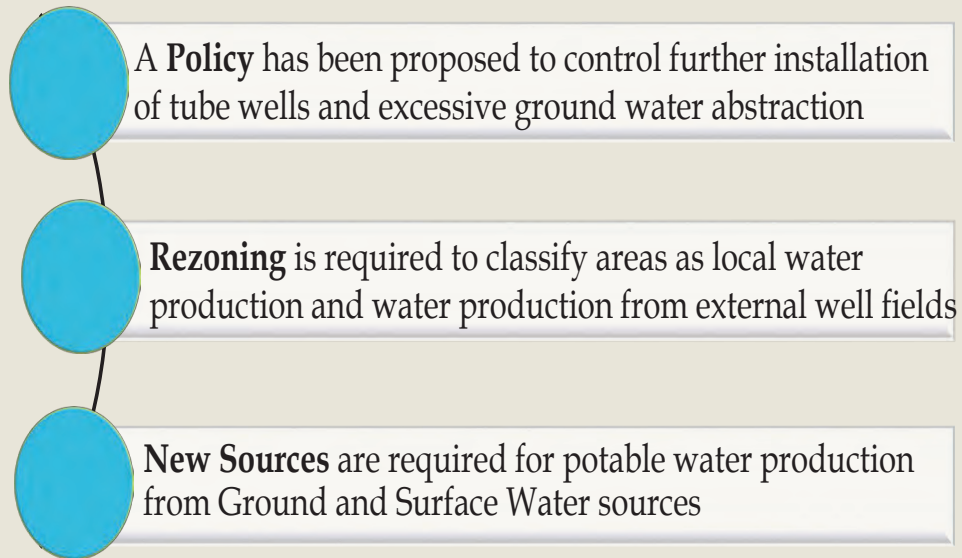
Unabated abstraction by existing large number of tube wells has created a cone of ground water depression

INCREASED CONTAMINATION

ARSENIC PROFILE

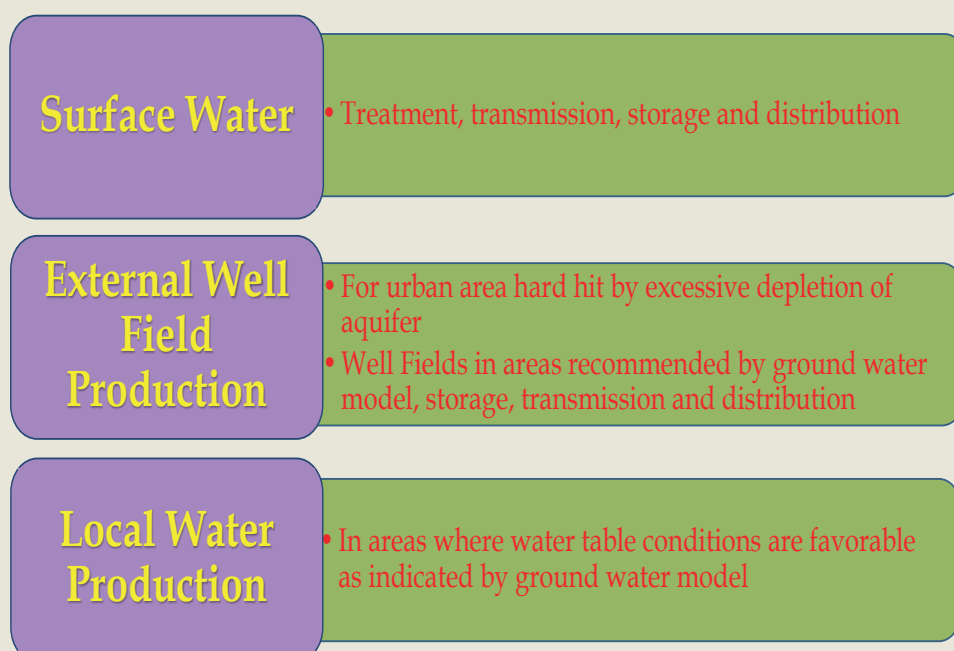


PROPOSED SCOPE OF INTERVENTIONS



15

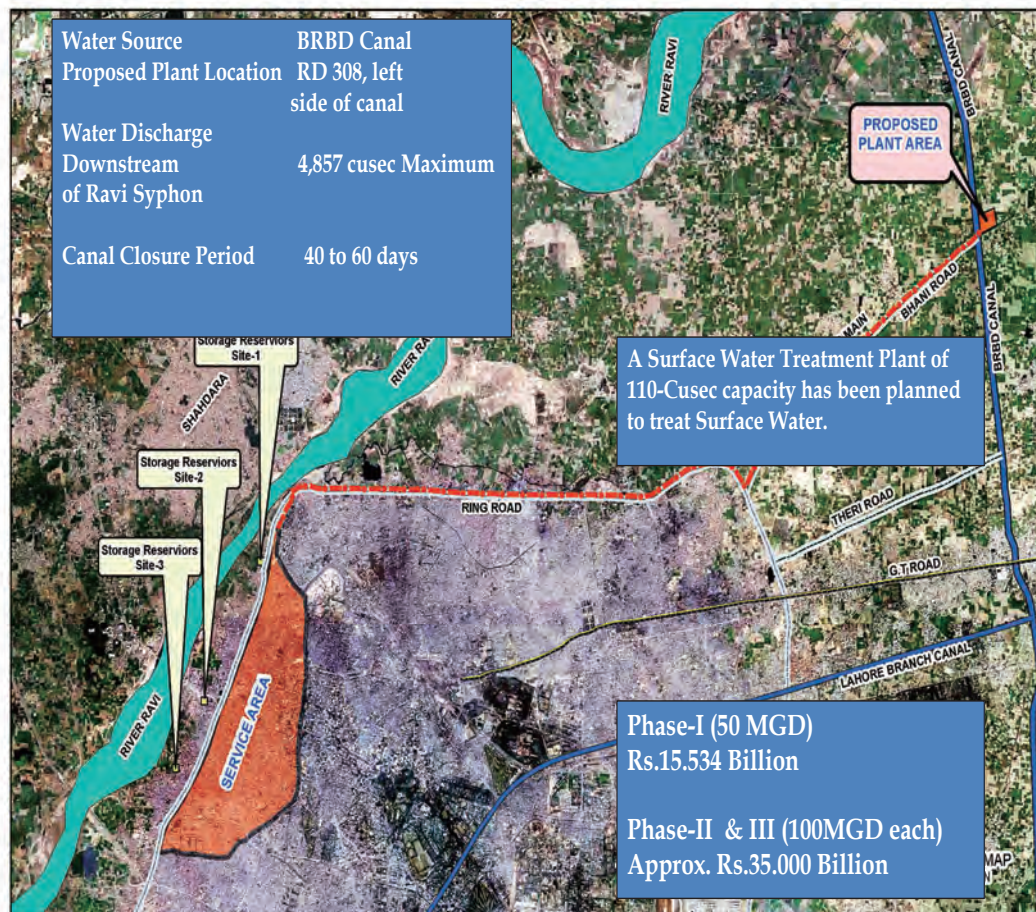
POSSIBLE SOURCES FOR POTABLE WATER PRODUCTION



16

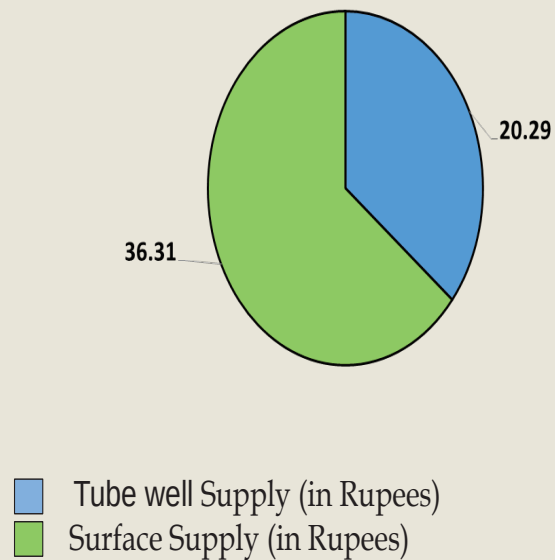
COMPARATIVE ANALYSIS OF WATER PRODUCTION FROM SURFACE WATER SOURCE

17



COST OF WATER PRODUCTION FROM SURFACE & GROUND WATER SUPPLIES

Cost Of Water Production per 1000 Gallons



19

WATER QUALITY ACHIEVEMENTS & CHALLENGES

ACHIEVEMENTS

- According to WHO sampling frequency, WASA Lahore made sampling grid for all subdivisions so we can easily assess water quality and can get comparison of different areas of Lahore easily.
- An Integrated Development Asset Management Plan has been prepared under the (Disbursement Linked Indicator) DLI-1 of Punjab Cities Governance Improvement Project (PCGIP) funded by World Bank.
- Old pipelines are being replaced in the phases.
- Filtration plants are being installed to remove arsenic and microbiological contamination.
- To distinct water pipe lines, we use 18% hypochlorite solution on our sources and we monitor residual chlorine.

WATER QUALITY MONITORING PROTOCOLS AND PROCEDURES

- WASA laboratory follows WHO guidelines/protocols of Drinking water for water quality monitoring
- WHO guidelines and PSQCA drinking water standards are followed for drinking water quality monitoring
- APHA (American public health association), AWWA (American water work association) and WEF (World Environment Federation) standard methods are used to test water samples

DRINKING WATER QUALITY STANDARDS

Sr No.	Substance or Characteristics	Current PHED Maximum Limit	WHO Guidelines	NEQS	Indian Standards (Acceptable- Marginal)
1	Taste & Odour	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
2	Colour	50 TCU	15 TCU	15 TCU	5-25
3	Turbidity	25 NTU	50NTU	5NTU	2.5-10
4	pH	6.5 to 9.2	6.5 to 9.2	6.5 to 8.5	7-8.5,6.5-9.2
5	Total Dissolved Solids	1500mg/l	1000mg/l	1000mg/l	500-1500
6	Copper (as Cu)	1.5mg/l	1.5mg/l	2mg/l	0.05-1.5
7	Iron (as Fe)	1.0mg/l	0.3 mg/l	No Standard in NSDWQ	0.1-0.1
8	Magnesium (as Mg)	150mg/l	150mg/l	No Standard in NSDWQ	30-150
9	Manganese (Mn)	0.5mg/l	0.5mg/l	0.5mg/l	0.05-0.5
10	Sulphate (SO ₄)	400mg/l	500mg/l	No Standard in NSDWQ	200-400
11	Zinc	15mg/l	0.01-0.05	5mg/l	5-15
12	Total Hardness CaCO ₃	500mg/l	500mg/l	500mg/l	200-600
13	Calcium (Ca)	200mg/l	75 -200 mg/l	No Standard in NSDWQ	75-200
14	Chloride	600mg/l	250mg/l	250mg/l	200-1000
15	Arsenic	50ppb	10 ppb	NSDWQ-50ppb Stricter standard chosen due to health hazards	0.05-0.05
16	Cadmium	0.01mg/l	0.003mg/l	NSDWQ-0.01mg/l Stricter standard chosen due to health hazards	0.01-0.01
17	Fluoride	1.5mg/l	1.5mg/l	1.5mg/l	1-1.5
18	Chromium	0.05mg/l	0.05mg/l .	0.05mg/l	0.05-0.05
19	Nitrate (NO ₃)	45mg/l	50mg/l	50mg/l	45-45
20	Nitrite (NO ₂)	3mg/l	3mg/l	3mg/l	-
21	Lead	0.05mg/l	0.01mg/l	NSDWQ-0.05mg/l Stricter standard chosen due to health hazards	0.1-0.1
22	Potassium	-	-	12mg/l (PCRWR)	-
23	Sodium	-	-	200mg/l (PCRWR)	-
24	Total Alkalinity	-	-	-	-
25	Carbonate	-	-	-	-
26	Bicarbonate	-	-	-	-

WASA LABORATORY TESTING CAPACITY

Sr. No.	PARAMETERS	INSTRUMENT AND APPARATUS	WHO GUIDELINES VALUES MIN. & MAX. IN PPM	PSQCSA
1.	p.H	Hanna pH Meter	7.0 - 9.2	6.5 - 8.5
2.	Turbidity	Turbidity Meter	0 - 5 NTU	-
3.	TDS	TDS Meter	0-1000	Up to 1500
4.	Total Hardness	Titration Method	-	20-500
5.	Calcium	Titration Method	-	75-200
6.	Magnesium	Titration Method	-	50-150
7.	Potassium	Flame photometer	-	-
8.	Sodium	Flame photometer	-	-
9.	Total Alkalinity	Titration Method	-	Up to 500
10.	Bicarbonate	Titration Method	30 - 150	Up to 500
11.	Carbonate	Titration Method		
12.	Chlorides	Titration Method	250	250
13.	Nitrates NO3	Kits Method	0.01	10
14.	Nitrates NO2	Kits Method	0 - 45	0.020
15.	Sulfate	Titration method	200 - 500	500
16.	Fluoride	Kit Method	1.5 mg/l	1.5 mg/l
17.	Coliform	Filtration Membrane Method	0	0

WATER QUALITY STANDARDS (PHED RECOMMENDED)

Cont.

Sr No.	Substance or Characteristics	Current PHED Maximum Limit	Proposed PHED Maximum Permissible Limit	Rationale
1	Taste & Odour	Unobjectionable	Unobjectionable (NSDWQ)	
2	Colour	50 TCU	15 TCU (NSDWQ)	
3	Turbidity	25 NTU	5NTU (NSDWQ)	
4	pH	6.5 to 9.2	6.5 to 8.5 (NSDWQ)	
5	Total Dissolved Solids	1500mg/l	1000mg/l (NSDWQ)	
6	Copper (as Cu)	1.5mg/l	2mg/l (NSDWQ)	
7	Iron (as Fe)	1.0mg/l	0.3 mg/l (WHO 2011)	No Standard in NSDWQ
8	Magnesium (as Mg)	150mg/l	150mg/l (WHO 2011)	No Standard in NSDWQ
9	Manganese (Mn)	0.5mg/l	0.5mg/l (NSDWQ)	
10	Sulphate (SO ₄)	400mg/l	250mg/l (PCRWR)	No Standard in NSDWQ
11	Zinc	15mg/l	5mg/l (NSDWQ)	
12	Total Hardness CaCO ₃	500mg/l	500mg/l (NSDWQ)	
13	Calcium (Ca)	200mg/l	75mg/l (PCRWR)	No Standard in NSDWQ
14	Chloride	600mg/l	250mg/l (NSDWQ)	No Standard in NSDWQ
15	Arsenic	50ppb	10 ppb (WHO 2011)	NSDWQ-50ppb Stricter standard chosen due to health hazards
16	Cadmium	0.01mg/l	0.003mg/l (WHO 2011)	NSDWQ-0.01mg/l Stricter standard chosen due to health hazards
17	Fluoride	1.5mg/l	1.5mg/l (NSDWQ)	
18	Chromium	0.05mg/l	0.05mg/l (NSDWQ)	

WATER QUALITY STANDARDS (PHED RECOMMENDED)

Sr No.	Substance or Characteristics	Current PHED Maximum Limit	Proposed PHED Maximum Permissible Limit	Rationale
19	Nitrate (NO ₃)	45mg/l	50mg/l (NSDWQ)	
20	Nitrite (NO ₂)	3mg/l	3mg/l (NSDWQ)	
21	Lead	0.05mg/l	0.01mg/l WHO 2011)	NSDWQ-0.05mg/l Stricter standard chosen due to health hazards
22	Potassium		12mg/l (PCRWR)	
23	Sodium		200mg/l (PCRWR)	
24	Total Coliform	0	0 (NSDWQ)	
25	Fecal Coliform	0	0 (NSDWQ)	
26	E.Coli	Absent	Absent (NSDWQ)	
27	Carbonate	NGVS	NGVS	
28	Bicarbonate	NGVS	NGVS	
29	Nickel	0.02mg/l	0.02mg/l (NSDWQ)	

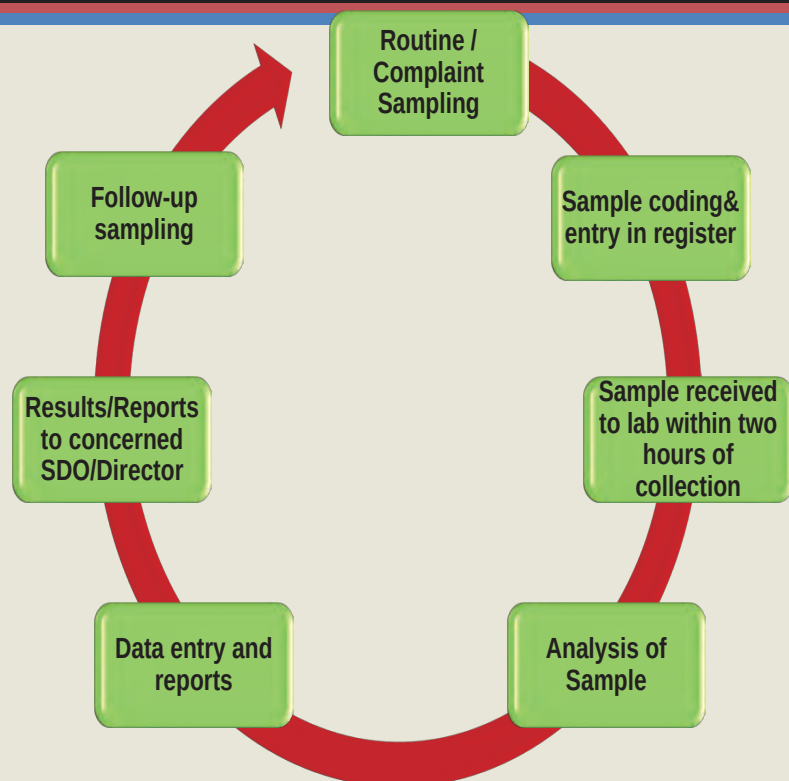
GROUND WATER MONITORING FOR ARSENIC

Arsenic and heavy metals in ground water of Lahore

To monitor arsenic and heavy metals in ground water of Lahore, WASA seeks the services of other laboratories i.e Institute of Chemistry, Punjab University, UET, PCSIR, PCRWR etc.



Monitoring System or Plans for Safety of Drinking Water



Sampling Points as per *WHO* Guidelines

WHO RECOMMENDATION

DAILY SAMPLING PARAMETERS FOR DISTRIBUTION NETWORK

(PHYSICAL APPEARANCE, PH, TURBITIDY, TDS, RASIDUL CHLORINE AND FAECAL COLIFORM)

WEEKLY AND ANNUALLY MONITORING PARAMETRES

(SELECTION OF PARAMETERS DEPENDS ON LOCAL WATER QUALITY OF EACH AREA AND ITS RECOMMENDED TWICE A YEAR/SOURCE FOR BACTERIOLOGICAL PARAMETERS AND ONCE A YEAR FOR CHEMICAL PARAMETERS.

CHEMICAL PARAMETERS (TOTAL HARDENESSS, TOTAL CATION, TOTAL ANION, RADIOACTIVE ELEMETS, HEAVY METALS AND ARSENIC)

WASA PRACTICE

➤ MONITORING PARAMETERS OF ROUTINE SAMPLING/DAILY SAMPLING

(PHYSICAL APPEARANCE, PH, TURBITIDY, TDS, RASIDUL CHLORINE AND E. COLIFORM)

FOLLOWUP SAMPLING → IN CASE OF UNFIT SAMPLES

➤ FOLLOWUP SAMPLING IS EXERCISED AND SAMPLES ARE COLLECTED FROM SAME SAMPLING POINTS AFTER NECESSARY ACTIONS.

NOTE: E.COLI IS MORE NUMEROUS AND MOST SPECIFIC BACTERIAL INDICATOR OF FAECAL POLLUTION FROM HUMAN AND ANIMAL (WHO 2011). THAT'S WHY WE CHOOSE E.COLI TEST.

ANNUAL INSPECTION

➤ 18 PARAMETERS ARE TESTED FOR GROUND WATER SOURCE TO MONITOR QUALITY OF GROUND WATER SOURCES AND DISTRIBUTION SYSTEM

MONITORING RULES & SAMPLING FREQUENCY RECOMMENDED BY WHO GUIDELINE

Regarding samples to be collected from the distribution system, whether the water has been subjected to treatment or not, the following maximum intervals between successive samplings and minimum numbers of samples to be examined in each month are proposed:

Population Served	Maximum interval between successive samplings	Maximum number of samples to be taken from entire distribution system
Up to 20 000	One month	One sample per 5000 of population per month
20 001-50 000	Two weeks	
50 001-100 000	Four Weeks	
More than 100 000	One day	One sample per 10 000 of population per month

WHO RECOMMENDED SAMPLING FREQUENCY

Total WASA Served population = 7 million

WHO recommended water samples = (1/10000) per month

Sampling frequency per month = 770

Sampling frequency per day = 30-35

Sr. No.	Subdivisions	Subdivision population	Area in Sq. km	Population Density per Sq. km	No. of Sampling Points
1	Allama Iqbal Town	152984	6.516449812	23476.59	18
2	Anarkali	201694	6.614322005	30493.53	25
3	Baghbanpura	407506	15.37030746	26512.55	49
4	City	207812	5.337530819	38934.11	27
5	Datanagar	206807	4.438195262	46597.09	26
6	Farrukhabad	224929	8.73015197	25764.61	27
7	Fatehgarh	202454	10.43974665	19392.62	24
8	Garden Town	92601	6.221448045	14884.16	11
9	Green Town	231107	13.33015824	17337.15	27
10	Gulberg	191115	13.14128993	14543.09	24
11	Ichhra	280946	6.272277288	44791.71	40
12	Industrial Area	346034	19.52122883	17726.04	42
13	Johar Town	118436	12.69232046	9331.31	17
14	Krishan Nagar	437767	8.103714674	54020.53	53

Sr. No.	Subdivisions	Subdivision population	Area in Sq. km	Population Density per Sq. km	No. of Sampling Points
15	Misri Shah	348353	6.477883732	53775.74	42
16	Mozang	188713	10.47308667	18018.85	24
17	Mughalpura	262193	8.708352116	30108.22	34
18	Mustafa Abad	79609	1.709469291	46569.42	15
19	Mustafa Town	185324	14.36234878	12903.46	22
20	Ravi Road	442862	6.294033963	70362.19	53
21	Sabzazar	152534	6.295317447	24229.76	20
22	Samnabad	183615	4.789778296	38334.76	26
23	Shadbagh	243529	5.11425857	47617.65	36
24	Shahdara	218692	7.895440686	27698.52	17
25	Shimla Hill	147704	4.996497425	29561.51	20
26	Tajpura	190297	5.16178762	36866.49	31
27	Township	151151	3.666820278	41221.27	20
	Total	6996768	350	27379.77	

MAJOR CHALLENGES & ACTIONS

WASA is facing 3 main challenges:

Establishment of WASA Lab as per International Standards

Provision of Testing facilities for heavy metals and arsenic in WASA Lab.

Provision of Testing facilities for sewage in WASA Lab.

Actions against These Challenges:

PC-I for Establishment of new Lab as per standards has been approved by Govt. of the Punjab and for provision of funds its Summary for The Chief Minister has also been initiated.

NON-REVENUE WATER

REDUCTION IN NON-REVENUE WATER

Currently Non Revenue Water of WASA Lahore is approximately 40%. To reduce NRW WASA Lahore is making many efforts which are elaborated as under:-

WASA Revenue Directorate as well as Operation Directorates are detecting illegal and misused connections on regular basis

Under DLI-4 of PCGIP, an android based consumer survey is ready to commence to find out illegal and misused connections and to validate existing connections.

Phase-wise installation of Bulk Flow Meters at Tubewells is under process. Under Phase-I, 107 No. Bulk Flow Meters have been installed.

Installation of consumer water meters. For this purpose HUD&PHE Department, Govt. of the Punjab is planning to procure domestic water meters in phasing for all WASA's in Punjab.

WASA has replaced 550 Km old/outlived and deeper water supply lines under Gastro-II Package.

ACHIEVEMENTS

➤ Non Revenue Water

- 58,451 Misused & Illegal connections detected and were put into billing net. This resulted in an increase of Rs. 177 Million Per Annum.

➤ Increase in Revenue

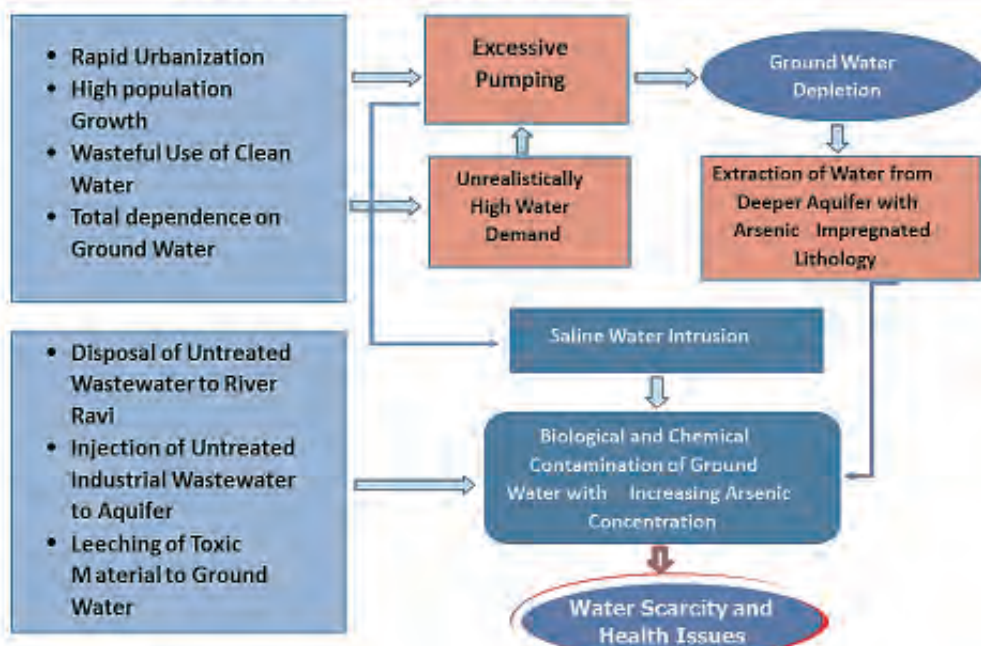
- Revenue of Water and Sewerage Sales of the Year 2010-11 from Rs. 2086.50 Million was increased to Rs. 3102.46 Million in the year 2015-16.

➤ O&M Efficiency Improvement and Energy Saving

- On 737 WASA installation 575 Electricity Meters were out of order and were replaced.
- Energy Audit of All TWs to be completed by May 17.
- Energy Saving from Oct-12 to May-16: Rs. 4265 Million.

CHALLENGES FOR IMPROVEMENT OF WATER SUPPLY SYSTEM

IDENTIFICATION OF ISSUES

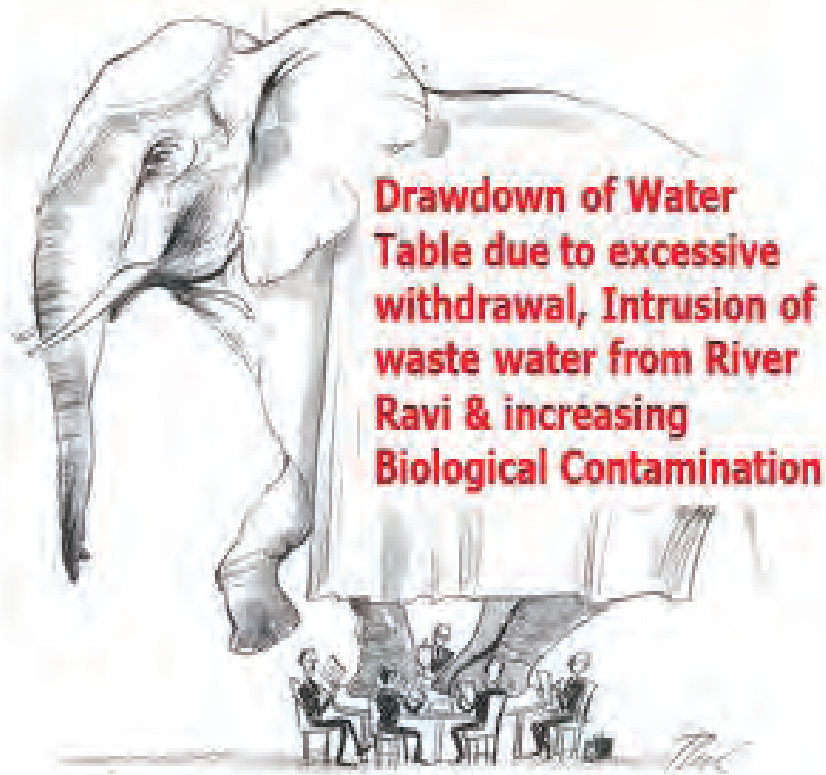


The Aquifer System is stressed Due To....

1. Continuous decline in water level due to **excessive pumping**.
2. Deterioration of **Water Quality** due to presence of excessive Total Dissolved Solid (TDS) at certain depths.
3. Intrusion of **Polluted Water from River Ravi** – upper layers being polluted due to discharge of un-treated Waste Water into the River Ravi.
4. **Arsenic Contamination in Ground Water**.
5. Mixing of sweet and saline water layers in the unconfined system – **possibility of brackish water** from Raiwind.
6. **Reduction in recharge of Ground Water**. Reduction in fresh water recharge from the river-course.
Continuous reduction in available land for recharge due to industrialization and urbanization.

Proposed Targets

- Construction of **Surface Water Treatment** Plant, Half of the Tubewells will be closed.
- **Construction of Seven (07) Waste Water Treatment Plants** – River Ravi free of Waste Water.
- **24/7 Water Supply System**.
- Android based Consumer Survey will be completed in 2016-17 Nos. of **Water Connections One Million Target by 2026**.
- **Non Revenue Water (NRW) will be reduced below 25% Level**.
- SCADA System on all WASA installation by end of **June 2017**.
- Replacement of all existing AC Pipes with HDPE Pipes (**Target: June 2026**).
- Customer's Feedback Survey will be conducted in **2019, 2022** and then **2025** (Partially through Android Consumer Survey also).



"the greatest Challenge being faced by Lahore WASA"

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

SRI LANKA

Attachment3

Present Situation of the Water Supply Service

(1) What is “Present Situation of the Water Supply Service”?

The accepted applicants are expected to formulate and submit their short report about “Present Situation of the Water Supply Service” (Annex 3) as the detailed information for “Water Supply Service Levels”(Chapter2 of your Inception Report).

The result of this short report is supposed to assist Course Organizer, Implementing Partner and other lecturers to know about the details of participants' professional careers, present challenges.

(2) Submission of “Present Situation of the Water Supply Service”

I. Service Area

- 1 Size of Utility's area of Responsibility: (65610 sq. km)
- 2 Size of Utility's present service area: (sq. km)
- 3 Population of Utility's area of responsibility: (21 million)
- 4 Population of Utility's present service area: (9.87million)
- 5 Population served by the Utility with piped water supply: (7.5 million)
- 6 Number of towns served with piped water: (274)

II. Infrastructure Description

- 1 Source of raw water *(please tick relevant boxes)*
 - ☐ bulk water from another utility / company
 - ☒ storage reservoir / impoundment
 - ☒ direct river abstraction
 - ☒ groundwater–
 - ☐ other, please specify _____
- 2 What are the main methods of treatment used? *(please tick relevant boxes)*
 - ☐ none
 - ☒ disinfection
 - ☒ filtration
 - ☒ flocculation and sedimentation
 - ☒ aeration
 - ☐ desalination–
 - ☐ other, please specify _____
- 3 Capacity of production systems: (1.83 million m³ / day)
- 4 Length of water distribution network: (38000 km)
- 5 Capacity of storage in network (m³)

6 Piped water supply connections: ***please specify how many in each category***

Domestic (Households)	Non Domestic (Industrial, commercial, Institutional, other)	TOTAL
1,883,000	142,000	2,025,000

- 7 Number of connections with operating water meters: (km)
- 8 Typical length of service connection from water main to water meter: (5 meters)

III. Water Consumption & Production

- 1 Volume of water produced by the Utility: (600 million m³ / year)
- 2 Volume of water bought in bulk from other utility / company: (0 million m³ / year)
- 3 Volume of water metered: (600 million m³ / year)
- 4 Estimated un-metered consumption: (0 % of metered consumption)
- 5 Estimate of average meter inaccuracy at typical flows rates: (1 to 2 % of metered consumption)
- 6 Volume of water billed / sold: ***please specify how much (million m³ / year) in each category***

Domestic (Households)	Non Domestic (Industrial, commercial, Institutional, other)	Bulk water sales	TOTAL
558	42	small	600

IV. Water Supply System Performance

- 1 Number of customers who received intermittent supply:
(connections)
- 2 Typical duration of supply (planned and unplanned supply interruptions):
(hours / day)
- 3 Typical mains water pressure in your pipe network: (6 meters)
- 4 Number of water pipe breaks in the distribution network: (# / year)
- 5 Required number of tests of treated water for residual chlorine: (# / year)
- 6 Number of tests of treated water for residual chlorine carried out: (# / year)
- 7 Number of tests of treated water for residual chlorine passed: (# / year)

V. Staff

- 1 Who does the work in your company: (please tick relevant boxes)
- ☒ permanent staff . salaried Government employees
- ☒ permanent staff . with contract
- ☒ casual / part-time . contract staff
- ☒ casual / part-time . wages
- ☒ contracted out to outside company / agency
- ☐ other, please specify—

- 2 Number of FTE* staff in the company: ***please specify how many in each category***

Corporate Services (Management, Admin, Finance, Technical, etc.)	Water Supply (O&M, Customer Services, Support Services, etc)	Other non water supply (e.g. wastewater, drainage, environment services)	TOTAL

* FTE = Full Time Equivalent staff (i.e. convert part-time and casual staff to equivalent

full time staff)

VI. Customers

1 Number of new customers connected to water supply system during the year:
(2015 is 121723 / year)

2 Number of customer complaints recorded during the year: (# / year)

3 Means by which customer can make a recorded complaint (***please tick relevant-boxes***)

☒ in person

☒ by telephone

☒ by email

☒ by letter

☐ other method, please specify

4 How does the Utility find out the views of its customers? (***please tick relevant-boxes***)

☒ from customer interactions (letters, telephone calls, enquiry counter, etc.)

☒ by responding to customer complaints

☒ from customer surveys, questionnaires, etc.

☐ by market research

☐ other method

5 Typically* what is the connection charge for new customers? ***Please specify how much in each category***

Domestic (Household s)	Non Domestic (Industrial, commercial, Institutional, other)	Bulk water sales	AVERAGE of all categories
Rs17000(115 USD for 20mm Connection and Rs24000(162 USD)for 25 mm connection	Varies according to Quantity and length	Varies according to Quantity and length	

6 Typically* what is the fixed water supply charge / month? ***Please specify how much in each category***

Domestic (Household s)	Non Domestic (Industrial, commercial, Institutional, other)	Bulk water sales	AVERAGE of all categories
Rs50 to 1600 USD(0.33 to 10.8)	Rs275 to 110000 USD(2 to 777)	Rs275 to 110000 USD(2 to 777)	Rs200 to 73866 USD(1.35 to 500)

7 Typically* what is the water tariff for metered consumption? ***Please specify how much in each category***

Tariff Block	Domestic	Non Domestic	Bulk water sales						
	From	To	Cost/m ³	From	To	Cost/m ³	From	To	Cost/m ³
1.	0			0			0		
2.									
3.**									

Notes:

* Where the Water Utility supplies multiple towns each with their own water charge schedules, please specify the typical tariff schedule nominally for the principal town supplied by the company

** Where there are more than 3 blocks in the tariff schedule please specify the approximate average tariff rates for consumptions above tariff block 2.

8 What would be the monthly water bill for a household consuming 6 m³ of water / month? ()

VII. Questionnaire on Major Constraints in Water Supply Sector

The constraint factors listed may prevent the participant's sector from accelerated development. Mark the appropriate boxes so that they will show whether these factors represent a very severe, severe or moderate impediment to the overall development of the entire sector. Constraints are usually inter-related. Also, constraints ranking is subjective and will vary depending on the agency that makes the evaluation. However, it may be possible to determine the relative importance among them.

Please indicate with the mark (✓) for the situation of major constraints in the table below.

Constraints	Rating of constraints		
	Very Severe	Severe	Moderate
1. Lack of definite government policy for the sector		✓	
2. Funding limitations	✓		
3. Inadequate or Outmoded legal framework			✓
4. Inappropriate institutional framework		✓	

5. Inadequate water resources		√	
6. Insufficient knowledge of water resources			√
7. Inadequate cost-recovery framework	√		
8. In sufficiency of trained personnel			√
(1) Professional			√
(2) Sub-professional			√
9. Lack of planning and design criteria			√
10. Inappropriate technology		√	
11. Intermittent water service		√	
12. Operation and maintenance			√
13. Logistics		√	
14. Import restrictions			√
15. Non-involvement of communities			√
16. Insufficient health education efforts			√
17. Others (specify):			

The deadline of the Present Situation of the Water Supply Service: **October 7th, 2016**. Please submit together with updated **Inception Report Presentation** to the following e-mail address: tictree@jica.go.jp

A. General Information

1. Please describe the current situation of water resources in your country (in your organization) by mentioning the following topics.

1.1 The geographical background

It has a total area of 65,610 km², with 64,740 km² of land and 870 km² of water. Its coastline is 1,340 km long. Sri Lanka's climate includes tropical monsoons: the northeast monsoon (December to March), and the southwest monsoon (June to October). Its terrain is mostly low, flat to rolling plain, with mountains in the south-central interior. The highest point is Pidurutalagala at 2,524.13 m. The land use pattern is

Arable land: 13.96%

Permanent crops: 15.24%

Other: 70.8%

Forests at one time covered nearly the entire island, but by the late 20th century lands classified as forests and forest reserves covered only one-fifth of the land.

Sri Lanka's rivers start from the Central Highlands and flow in a radial pattern toward the sea. Most of these rivers are short. There are 16 principal rivers longer than 100 kilometers in length, with twelve of them carrying about 75% of the mean river discharge in the entire country. The longest rivers are the Mahaweli Ganga (335 km)

and the Aruvi Aru (170 km). In the highlands, river courses are frequently broken by discontinuities in the terrain, and where they encounter escarpments, numerous waterfalls and rapids have eroded a passage.

[\(The proportion of forest, residential land, river, etc.\)](#)

[1.2 The precipitation per one month and/or one year. Please attach the last 10 years data.](#)

The mountains and the southwestern part of the country, known as the "wet zone," receive ample rainfall (an annual average of 2500 millimeters). Most of the southeast, east, and northern parts of the country comprise the "dry zone, which receives between 1200 and 1900 mm of rain annually. Much of the rain in these areas falls from October to January; during the rest of the year there is very little precipitation. The arid northwest and southeast coasts receive the least amount of rain—600 to 1200 mm per year—concentrated within the short period of the winter monsoon. The rainfall pattern is influenced by the monsoon winds of the Indian Ocean and Bay of Bengal and is marked by four seasons. The first is from mid-May to October, when winds originate in the southwest, bringing moisture from the Indian Ocean. When these winds encounter the slopes of the Central Highlands, they unload heavy rains on the mountain slopes and the southwestern sector of the island

[1.3 The type of available water resources and those situations](#)

The available water resources of the Sri Lanka are Surface water and Ground water. Surface water is extracted from Rivers and artificial lakes which were built from ancient time to date.

Total annual surface run-off of the rivers of the Island is around 50 billion cum. A considerable proportion of this is already utilized, particularly for irrigation and hydro-power, and what escapes to the sea is less than 30 billion cum

Ground water available in most of the areas and are being used for domestic and other uses. High yield aquifers are available in some areas and used for water supply schemes. Due to pollution of the above resources it has become scarce resource.

[1.4 The intake water volume per one day, per one year](#)

One day approximately 2.0 million cubic meters of raw water is abstracted from intakes.

[1.5 The type of water resources for the future](#)

As most of the available surface and ground water resources are becoming shrinking for the future it may be required to use rain water harvesting, desalination and recycling some extent.

[2. Please describe the current situation of **water supply services** in your country by mentioning the following topics.](#)

[\(1\) The population ratio to be served and not to be served drinking water](#)

Population ratio covered up to now is 46% and plan to connect 60% by year 2020

[\(2\) Proportion of consumers with 24 hours supply, average number of hours per day of water availability to most people](#)

About 25% consumers has 24 hours supply. 40% of consumers has 15-24 hours supply. Others has variable supply hrs from 2 to 24 hrs.

[\(3\) Does the distribution water use for the potable water directly?](#)

Yes

[\(4\) Non revenue water \(NRW\)](#)

NRW country average is around 26%

3. Please describe the current situation of Private Sector Participation in your country by mentioning the following topics.

(1) The status of Private Sector Investment and its area (e.g. Water resource development, Water treatment, Water distribution, Organization management, Bill collection, leakage repair, etc.)

Private sector participation is encouraging for the water sector. At present leakage repair, giving water connections, Billing and collection are carried out using private sector participation some extent. Further most of the construction and supply and installation works are carried out by private sector.

(2) The current situation of involvement of national government in water supply services (e.g. Water rates, Personnel employment, O/M budgeting, Capital investment, etc.)

The National Water Supply and Drainage Board the national agency responsible for the water supply is a Government institution. Water rates, personnel employment and capital investment is controlled by the national government. O&M budgeting is carried out by the institution.

B. Related Figures

Instructions for completing the form

1. All information provided should be for the fiscal year 2014 or most recent data if 2014 year's data is unavailable (please indicate the year of the data available).

2. For all financial information, please specify in the local currency with equivalent US dollars.

3. When a value is zero, please enter '0'.

I. Service Area

1 Size of Utility's area of Responsibility: (65610 sq. km)

2 Size of Utility's present service area: (sq. km)

3 Population of Utility's area of responsibility: (21 million)

4 Population of Utility's present service area: ()

5 Population served by the Utility with piped water supply: (8.08 million)

6 Number of towns served with piped water: (274)

II. Water Consumption & Production

1 Volume of water produced by the Utility: (549.7 million m³ / year)

2 Volume of water bought in bulk from other utility / company: (0 million m³ / year)

3 Volume of water metered: (436.7 million m³ / year)

4 Estimated un-metered consumption: (1-2 % of metered consumption)

III. Water Supply System Performance

1 Number of customers who received intermittent supply: (approximately 1.5 million connections)

2 Typical duration of supply (planned and unplanned supply interruptions): (15 to 24 hours / day is typical)

3 Typical mains water pressure in your pipe network: (6 meters)

4 Number of water pipe breaks in the distribution network: (# / year)

5 Required number of tests of treated water for residual chlorine: (# / year)

6 Number of tests of treated water for residual chlorine carried out: (# / year)

7 Number of tests of treated water for residual chlorine passed: (# / year)

IV. Staff

1 Who does the work in your company: (please tick relevant boxes)

- ☒ permanent staff . salaried Government employees
☒ permanent staff . with contract
☒ casual / part-time . contract staff
☐ casual / part-time . wages
☒ contracted out to outside company / agency

2 Number of FTE* staff in the company: ***please specify how many in each category***

<u>Corporate Services</u> (Management, Admin, Finance, Technical, etc.)	<u>Water Supply</u> (O&M, Customer Services, Support Services, etc)	<u>Other non water supply</u> (e.g. wastewater, drainage, environment services)	<u>TOTAL</u>
4000	5945	300	10245

* FTE = Full Time Equivalent staff (i.e. convert part-time and casual staff to equivalent full time staff)

V. Customers

1 Number of new customers connected to water supply system during the year:

(2015 is 121783/ year)

2 Number of customer complaints recorded during the year: (# / year)

3 Typically* what is the fixed water supply charge / month? ***Please specify how much in each category***

<u>Domestic</u> (Households)	<u>Non Domestic</u> (Industrial, commercial, Institutional, other)	<u>Bulk water sales</u>	<u>AVERAGE of all categories</u>
Rs 50 to 1600(0.33 to 10.5USD)	Rs 290 to 115000(2to 777 USD)		

4 Typically* what is the water tariff for metered consumption? ***Please specify how much in each category***

Main in each category									
<u>Tariff Block</u>	<u>Domestic</u>		<u>Non Domestic</u>				<u>Bulk water sales</u>		
	<u>From</u>	<u>To</u>	<u>Cost/m³</u>	<u>From</u>	<u>To</u>	<u>Cost/m³</u>	<u>From</u>	<u>To</u>	<u>Cost/m³</u>

<u>1.</u>	<u>0</u>	5	12Rs(0.08 USD)	<u>0</u>	Any value	40Rs(0.27USD) and 65(0.44USD)	<u>0</u>	Any value	17Rs(0.09USD)
<u>2.</u>	6	10	16Rs(0.12 USD)						
<u>3.*</u>	11		105Rs(0.7 USD)						

Notes:

* Where the Water Utility supplies multiple towns each with their own water charge schedules, please specify the typical tariff schedule nominally for the principal town supplied by the company

** Where there are more than 3 blocks in the tariff schedule please specify the approximate average tariff rates for consumptions above tariff block 2.

Attachment3

Present Situation of the Water Supply Service

I. Service Area

- 1 Size of Utility's area of Responsibility: (65610 sq. km)
- 2 Size of Utility's present service area: (sq. km)
- 3 Population of Utility's area of responsibility: (21 million)
- 4 Population of Utility's present service area: (9.87million)
- 5 Population served by the Utility with piped water supply: (7.5 million)
- 6 Number of towns served with piped water: (274)

II. Infrastructure Description

- 1 Source of raw water (*please tick relevant boxes*)
 - ☐ bulk water from another utility / company
 - ☒ storage reservoir / impoundment
 - ☒ direct river abstraction
 - ☒ groundwater–
 - ☐ other, please specify _____
- 2 What are the main methods of treatment used? (*please tick relevant boxes*)
 - ☐ none
 - ☒ disinfection
 - ☒ filtration
 - ☒ flocculation and sedimentation
 - ☒ aeration
 - ☐ desalination–
 - ☐ other, please specify _____
- 3 Capacity of production systems: (1.83 million m³ / day)
- 4 Length of water distribution network: (38000 km)
- 5 Capacity of storage in network (m³)

6 Piped water supply connections: ***please specify how many in each category***

Domestic (Households)	Non Domestic (Industrial, commercial, Institutional, other)	TOTAL
1,883,000	142,000	2,025,000

- 7 Number of connections with operating water meters: (km)
- 8 Typical length of service connection from water main to water meter: (5 meters)

III. Water Consumption & Production

- 1 Volume of water produced by the Utility: (600 million m³ / year)
- 2 Volume of water bought in bulk from other utility / company: (0 million m³ / year)
- 3 Volume of water metered: (600 million m³ / year)
- 4 Estimated un-metered consumption: (0 % of metered consumption)
- 5 Estimate of average meter inaccuracy at typical flows rates: (1 to 2 % of metered consumption)
- 6 Volume of water billed / sold: ***please specify how much (million m³ / year) in each category***

Domestic (Households)	Non Domestic (Industrial, commercial, Institutional, other)	Bulk water sales	TOTAL
558	42	small	600

IV. Water Supply System Performance

- 1 Number of customers who received intermittent supply: (connections)

- 2 Typical duration of supply (planned and unplanned supply interruptions):
(hours / day)
- 3 Typical mains water pressure in your pipe network: (6 meters)
- 4 Number of water pipe breaks in the distribution network: (# / year)
- 5 Required number of tests of treated water for residual chlorine: (# / year)
- 6 Number of tests of treated water for residual chlorine carried out: (# / year)
- 7 Number of tests of treated water for residual chlorine passed: (# / year)

V. Staff

- 1 Who does the work in your company: (please tick relevant boxes)

- ☒ permanent staff . salaried Government employees
☒ permanent staff . with contract
☒ casual / part-time . contract staff
☒ casual / part-time . wages
☒ contracted out to outside company / agency
☐ other, please specify—

- 2 Number of FTE* staff in the company: ***please specify how many in each category***

Corporate Services (Management, Admin, Finance, Technical, etc.)	Water Supply (O&M, Customer Services, Support Services, etc)	Other non water supply (e.g. wastewater, drainage, environment services)	TOTAL

* FTE = Full Time Equivalent staff (i.e. convert part-time and casual staff to equivalent full time staff)

VI. Customers

- 1 Number of new customers connected to water supply system during the year: (2015 is 121723 / year)

- 2 Number of customer complaints recorded during the year: (# / year)

- 3 Means by which customer can make a recorded complaint (***please tick relevant-boxes***)

- ☒ in person
☒ by telephone
☒ by email
☒ by letter
☐ other method, please specify

- 4 How does the Utility find out the views of its customers? (***please tick relevant boxes***)

- ☒ from customer interactions (letters, telephone calls, enquiry counter, etc.)
☒ by responding to customer complaints
☒ from customer surveys, questionnaires, etc.
☐ by market research
☐ other method

- 5 Typically* what is the connection charge for new customers? ***Please specify how much in each category***

Domestic (Household s)	Non Domestic (Industrial, commercial, Institutional, other)	Bulk water sales	AVERAGE of all categories
Rs17000(115 USD for 20mm Connection and Rs24000(162 USD)for 25 mm connection	Varies according to Quantity and length	Varies according to Quantity and length	

6 Typically* what is the fixed water supply charge / month? **Please specify how much in each category**

Domestic (Household s)	Non Domestic (Industrial, commercial, Institutional, other)	Bulk water sales	AVERAGE of all categories
Rs50 to 1600 USD(0.33 to 10.8)	Rs275 to 110000 USD(2 to 777)	Rs275 to 110000 USD(2 to 777)	Rs200 to 73866 USD(1.35 to 500)

7 Typically* what is the water tariff for metered consumption? **Please specify how much in each category**

Tariff Block	Do mest ic	Non Dome stic	Bulk water sales						
	Fro m	To	Cost/ m ³	Fro m	T o	Cost/ m ³	Fr om	To	Cost/ m ³
1.	0			0			0		
2.									
3.**									

Notes:

* Where the Water Utility supplies multiple towns each with their own water charge schedules, please specify the typical tariff schedule nominally for the principal town supplied by the company

** Where there are more than 3 blocks in the tariff schedule please specify the approximate average tariff rates for consumptions above tariff block 2.

8 What would be the monthly water bill for a household consuming 6 m3 of water / month? ()

VII. Questionnaire on Major Constraints in Water Supply Sector

The constraint factors listed may prevent the participant's sector from accelerated development. Mark the appropriate boxes so that they will show whether these factors represent a very severe, severe or moderate impediment to the overall development of the entire sector. Constraints are usually inter-related. Also, constraints ranking is subjective and will vary depending on the agency that makes the evaluation. However, it may be possible to determine the relative importance among them.

Please indicate with the mark (✓) for the situation of major constraints in the table below.

Constraints	Rating of constraints		
	Very Severe	Severe	Moderate
1. Lack of definite government policy for the sector		√	
2. Funding limitations	√		
3. Inadequate or Outmoded legal framework			√
4. Inappropriate institutional framework		√	
5. Inadequate water resources		√	
6. Insufficient knowledge of water resources			√
7. Inadequate cost-recovery framework	√		
8. In sufficiency of trained personnel			√
(1) Professional			√
(2) Sub-professional			√
9. Lack of planning and design criteria			√
10. Inappropriate technology		√	
11. Intermittent water service		√	
12. Operation and maintenance			√
13. Logistics		√	
14. Import restrictions			√
15. Non-involvement of communities			√
16. Insufficient health education efforts			√
17. Others (specify):			

A. General Information

1. Please describe the current situation of **water resources in your country (in your organization) by mentioning the following topics.**

1.1 The geographical background

It has a total area of 65,610 km², with 64,740 km² of land and 870 km² of water. Its coastline is 1,340 km long. Sri Lanka's climate includes tropical monsoons: the northeast monsoon (December to March), and the southwest monsoon (June to October). Its terrain is mostly low, flat to rolling plain, with mountains in the south-central interior. The highest point is Pidurutalagala at 2,524.13 m. The land use pattern is

Arable land: 13.96%

Permanent crops: 15.24%

Other: 70.8%

Forests at one time covered nearly the entire island, but by the late 20th century lands

classified as forests and forest reserves covered only one-fifth of the land. Sri Lanka's rivers start from the Central Highlands and flow in a radial pattern toward the sea. Most of these rivers are short. There are 16 principal rivers longer than 100 kilometers in length, with twelve of them carrying about 75% of the mean river discharge in the entire country. The longest rivers are the Mahaweli Ganga (335 km) and the Aruvi Aru (170 km). In the highlands, river courses are frequently broken by discontinuities in the terrain, and where they encounter escarpments, numerous waterfalls and rapids have eroded a passage.

(The proportion of forest, residential land, river, etc.)

1.2 The precipitation per one month and/or one year. Please attach the last 10 years data.

The mountains and the southwestern part of the country, known as the "wet zone," receive ample rainfall (an annual average of 2500 millimeters). Most of the southeast, east, and northern parts of the country comprise the "dry zone, which receives between 1200 and 1900 mm of rain annually. Much of the rain in these areas falls from October to January; during the rest of the year there is very little precipitation. The arid northwest and southeast coasts receive the least amount of rain—600 to 1200 mm per year—concentrated within the short period of the winter monsoon. The rainfall pattern is influenced by the monsoon winds of the Indian Ocean and Bay of Bengal and is marked by four seasons. The first is from mid-May to October, when winds originate in the southwest, bringing moisture from the Indian Ocean. When these winds encounter the slopes of the Central Highlands, they unload heavy rains on the mountain slopes and the southwestern sector of the island

1.3 The type of available water resources and those situations

The available water resources of the Sri Lanka are Surface water and Ground water. Surface water is extracted from Rivers and artificial lakes which were built from ancient time to date.

Total annual surface run-off of the rivers of the Island is around 50 billion cum. A considerable proportion of this is already utilized, particularly for irrigation and hydro-power, and what escapes to the sea is less than 30 billion cum

Ground water available in most of the areas and are being used for domestic and other uses. High yield aquifers are available in some areas and used for water supply schemes. Due to pollution of the above resources it has become scarce resource.

1.4 The intake water volume per one day, per one year

One day approximately 2.0 million cubic meters of raw water is abstracted from intakes.

1.5 The type of water resources for the future

As most of the available surface and ground water resources are becoming shrinking for the future it may be required to use rain water harvesting, desalination and recycling some extent.

2. Please describe the current situation of **water supply services** in your country by mentioning the following topics.

(1) The population ratio to be served and not to be served drinking water

Population ratio covered up to now is 46% and plan to connect 60% by year 2020

(2) Proportion of consumers with 24 hours supply, average number of hours per day of water availability to most people

About 25% consumers has 24 hours supply. 40% of consumers has 15-24 hours supply. Others has variable supply hrs from 2 to 24 hrs.

(3) Does the distribution water use for the potable water directly?

Yes

(4) Non revenue water (NRW)

NRW country average is around 26%

3. Please describe the current situation of Private Sector Participation in your country by mentioning the following topics.

(1) The status of Private Sector Investment and its area (e.g. Water resource development, Water treatment, Water distribution, Organization management, Bill collection, leakage repair, etc.)

Private sector participation is encouraging for the water sector. At present leakage repair, giving water connections, Billing and collection are carried out using private sector participation some extent. Further most of the construction and supply and installation works are carried out by private sector.

(2) The current situation of involvement of national government in water supply services (e.g. Water rates, Personnel employment, O/M budgeting, Capital investment, etc.)

The National Water Supply and Drainage Board the national agency responsible for the water supply is a Government institution. Water rates, personnel employment and capital investment is controlled by the national government. O&M budgeting is carried out by the institution.

B. Related Figures

Instructions for completing the form

1. All information provided should be for the fiscal year 2014 or most recent data if 2014 year's data is unavailable (please indicate the year of the data available).
2. For all financial information, please specify in the local currency with equivalent US dollars.
3. When a value is zero, please enter '0'.

I. Service Area

- 1 Size of Utility's area of Responsibility: (65610 sq. km)
- 2 Size of Utility's present service area: (sq. km)
- 3 Population of Utility's area of responsibility: (21 million)
- 4 Population of Utility's present service area: ()
- 5 Population served by the Utility with piped water supply: (8.08 million)
- 6 Number of towns served with piped water: (274)

II. Water Consumption & Production

- 1 Volume of water produced by the Utility: (549.7 million m³ / year)
- 2 Volume of water bought in bulk from other utility / company: (0 million m³ / year)
- 3 Volume of water metered: (436.7 million m³ / year)
- 4 Estimated un-metered consumption: (1-2 % of metered consumption)

III. Water Supply System Performance

- 1 Number of customers who received intermittent supply: (approximately 1.5 million connections)
- 2 Typical duration of supply (planned and unplanned supply interruptions): (15 to 24 hours / day is typical)
- 3 Typical mains water pressure in your pipe network: (6 meters)
- 4 Number of water pipe breaks in the distribution network: (# / year)
- 5 Required number of tests of treated water for residual chlorine: (# / year)
- 6 Number of tests of treated water for residual chlorine carried out: (# / year)
- 7 Number of tests of treated water for residual chlorine passed: (# / year)

IV. Staff

1 Who does the work in your company: (please tick relevant boxes)

- ☒ permanent staff . salaried Government employees
☒ permanent staff . with contract
☒ casual / part-time . contract staff
☐ casual / part-time . wages
☒ contracted out to outside company / agency

2 Number of FTE* staff in the company: ***please specify how many in each category***

<u>Corporate Services</u> (Management, Admin, Finance, Technical, etc.)	<u>Water Supply</u> (O&M, Customer Services, Support Services, etc)	<u>Other non water supply</u> (e.g. wastewater, drainage, environment services)	<u>TOTAL</u>
4000	5945	300	10245

* FTE = Full Time Equivalent staff (i.e. convert part-time and casual staff to equivalent full time staff)

V. Customers

1 Number of new customers connected to water supply system during the year:
(2015 is 121783/ year)

2 Number of customer complaints recorded during the year: (# / year)

3 Typically* what is the fixed water supply charge / month? ***Please specify how much in each category***

<u>Domestic</u> (Households)	<u>Non Domestic</u> (Industrial, commercial, Institutional, other)	<u>Bulk water sales</u>	<u>AVERAGE of all categories</u>
Rs 50 to 1600(0.33 to 10.5USD)	Rs 290 to 115000(2to 777 USD)		

4 Typically* what is the water tariff for metered consumption? ***Please specify how much in each category***

<u>Tariff Block</u>	<u>Domestic</u>		<u>Non Domestic</u>			<u>Bulk water sales</u>			
	<u>From</u>	<u>To</u>	<u>Cost/m³</u>	<u>From</u>	<u>To</u>	<u>Cost/m³</u>	<u>From</u>	<u>To</u>	<u>Cost/m³</u>
1.	0	5	12Rs(0.08 USD)	0	Any value	40Rs(0.27USD) and 65(0.44USD)	0	Any value	17Rs(0.09USD)
2.	6	10	16Rs(0.12 USD)						
3.**	11		105Rs(0.7 USD)						

Notes:

* Where the Water Utility supplies multiple towns each with their own water charge schedules, please specify the typical tariff schedule nominally for the principal town supplied by the company

** Where there are more than 3 blocks in the tariff schedule please specify the approximate average tariff rates for consumptions above tariff block 2.

Water Supply Administration for Better Management of Water Supply Services

Inception Report Presentation

- 1. Country:** Sri Lanka
- 2. Name:** Kaluarachchi Watte Premasiri
- 3. Position:** Deputy General Manager (Production-Western)
- 4. Organization:** National Water Supply and Drainage Board



Inception Report Presentation

- Each applicant is kindly requested to make presentation of Inception Report (M/S Power Point file with **less than 15 slides**) which cover the following 7 topics about the individual water supply company/public water supply authority to which the participant belongs.
- Presentation time: **15 minutes including Q/A**
- **7 topics:**
 - 1. Position 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



General Country Profile: Background

• Body sentence of the profile / Background

Sri Lanka lies on the Indian Plate, a major tectonic plate that was formerly part of the Indo-Australian Plate. It is in the Indian Ocean southwest of the Bay of Bengal, between latitudes 5° and 10° N, and longitudes 79° and 82° E. Sri Lanka is separated from the Indian Sub Continent by the Gulf of Mannar and Palk Strait.

Whole Country:

Area : 65610 km²

Population : 20,845,000 Habitants

Coverage Water Supply: 45.0 %

Selected Water Supply System/City: Colombo District(Capital City)

Service Area : 699 km²

Population Served: 1.7 million



1. Position of Water Supply Services

- The Government Agency National Water Supply and Drainage Board(NWS&DB) is Responsible for Urban water Supply. For administration purposes it has divided into 12 Regional Support Centers(RSC)
- Rural Water Supply Department is responsible for Rural water supply.(Supply is mainly through CBOO)
- The safe water coverage is 86% for the country.
- Pipe Born water availability is 46%
- Number of water connections given in the country by NWS&DB is around 2.025 millions.
- Service is provided through 274 water treatment plants(117 No's Full treatment, plants,71 No's Partial treatment, plants,86 No's only chlorination)
- Total pipe length is 38,338km
- Daily average supply is around 18-24 hours in the Western Province and some provinces, however some provinces it is less than 18-24 hours.



2. Water Supply Service Levels

Please fill in variation of the indicators below based on your situation!

INDICATORS	2004 or 2005	2014 or 2015	Goals for 2025
Staff/1,000 connections	4.0	3.4	3.0
Production capacity (m3/day)	505,000	550,000	790,000
Water quality	Sri Lankan Standard 614:1985	Sri Lankan Standard 614:1985	Sri Lankan Standard 614:2013
Coverage area	50%	80%	100%
Supply duration (hr/day)	18-24	18-24	18-24
Supply pressure	0.6 bar	0.6 bars	0.6bars
Number of connections	300,000	430,980	650,000
NRW	40%	34%	18%
Collection ratio	99%	99.9%	99.9%
Staff number	1250	1450	1500



3. Management of Water Quality

- Continuous water quality monitoring programs are in operation in all intakes, Treatment plants and distribution systems by NWS&DB and third parties
- Sri Lankan Standards are formulated for Raw Water and Drinking Water
- Catchment protection programs are in operation
- Pipe Line flushing programs are organized appropriately
- Laboratory accreditation programs are in progress
- Water Safety Plans have been Prepared and in operation some treatment plants and others are in preparation
- Monthly meetings the water quality data reviewed and appropriate actions are taken if adverse quality reports available
- To maintain water quality technical assistance is provided for Rural Water Supply Schemes maintained by CBOO.
- Training programs arranged for the staff involved for water quality management including chemists
- ISO 9000 quality standards available for several plants.



4. Reduction of Non-Revenue Water 1

- Constitution of Non-revenue Water (If you have the data, please fill in the table) For the Western Central Regional Support center (Colombo District)

System input volume 198.3 million cum	Authorized consumption	Revenue water 129,9 million cum	Billed authorized consumption	129.9 Mm ³ /year (65.5 %)
		Non Revenue Water (NRW) 68.8 million cum	Unbilled authorized consumption (ex. fire fighting, cleaning)	xx m ³ /year (%)
	Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	xx m ³ /year (%)
			Real losses (Leakage)	xx m ³ /year (%)

4. Reduction of Non-Revenue Water 1

- Constitution of Non-revenue Water (If you have the data, please fill in the table) For the Entire Country

System input volume for the Year 2015 600 million cum	Authorized consumption	Revenue water 437M cum	Billed authorized consumption	437M m³ /year (72.8%)
		Non Revenue Water (NRW) 163M cum	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 (%)

4. Reduction of Non-Revenue Water 2

- ✿ NRW has given priority in O&M Programs such as quick repair of leaks, detection of illegal connections, replacement of defective meters, leak detection programs etc.
- ✿ Colombo city a Program already started to replace very old leaky pipes of more than 70 years old.
- ✿ There is a program to giving new connections using Poly Ethylene Pipes to reduce service leaks.
- ✿ Bi weekly meeting is being conducted with all operational managers to review NRW situation in Western province(including Colombo District) by General Manager.
- ✿ Training programs arranged to all staff concerned.
- ✿ Some services has been outsourced such as Leak repair and meter reading
- ✿ Awareness programs, Disconnections and legal actions against defaulters of bill payments are in operation
- ✿ Night surveys are done to identify leaks.



5. Accounting system of Water Supply Service

- ✿ All the connections are metered and meter readings are taking manually monthly.
- ✿ Bills issued monthly
- ✿ Consumers have provided facilities to bill payments for collecting centers, Banks or online.
- ✿ Reminders are sending to consumers are not paying bills with long outstanding dues.
- ✿ Commercial section is closely monitoring the system.
- ✿ Disconnection program and legal actions are imposed on payment defaulters.



6. Major Recent Achievement in Improvement of Water Supply Services/Management

- ❁ For Colombo city(capital city) and suburbs improvements several projects commenced. This includes rehabilitation of Labugama and Kaltuwawa treatment plants. These plants are commenced in year 1880 and 1960.
- ❁ A project is scheduled to be commenced shortly to enhance the performance of energy utilization of Ambatale Water Treatment plant which is supplying water to Colombo city and suburbs.
- ❁ A project is scheduled to be commenced shortly to replace a section of very old cast iron pipes(age more than 100years) of diameter ranging from 500mm to 600mm supply water to Colombo city.
- ❁ Web based systems are commencing gradually for system control.(including Human Resources/stores/water quality monitoring/billing/financial activities etc.
- ❁ Obtaining ISO 9001 certificates/productivity certificates/laboratory accreditations/green productivity certificates etc.



7. Recent Challenges to Improvement of Water Supply Services

- ❁ Maintaining service level to present customers extending the service to un-served population
- ❁ The main challenges are insufficient water availabilities, inadequate technical capacities in the production, transmission and distribution systems caused by various factors.
- ❁ Ageing of water supply infrastructure and problems connected with rehabilitation.
- ❁ Many water supply schemes have reached their upper operational marginal capacities and it restricts the services to consumers.
- ❁ Associated problems with adverse weather conditions
- ❁ Scarcity of surface water resources to provide water at reasonable cost
- ❁ Land acquisition and pipe laying issues in Highways.
- ❁ Difficulties of attending some leaks and repairs quickly due to various reasons.
- ❁ Difficulties of attending some Electrical and Mechanical repairs quickly due to various reasons.

