



Non-revenue Water Management in **PAKISTAN**

Engr. Shahid Shoail - CDA Islamabad

Engr. Jawed Shamim - KW&SB Karachi

Engr. Fida Hussain - WASA Gujranwala

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Utilities Background



Karachi Water & Sewerage Board (KW&SB)

- KW&SB is the largest water utility of Pakistan, supplying 650 MDG water to around 20 million citizens of the mega coastal city Karachi.
- River Indus is main source, located around 150 Km away from the city. The second water source is the Hub Dam, supply from which is dependent on rains in its catchment area.
- It has around 11000 Km long bulk transmission and distribution system., 8 filter plants and 150 pumping stations.
- It has 1.05 million registered consumers only 30-40% of them pay the monthly water bill.
- 45% of the city comprises of slums and shanty settlements most of which are not on KW&SB's billing net. It makes major contribution in NRW.
- Billing is done on the basis of fixed tariff based on the size of plot/apartment.
- Around 2600 Meters are installed on the bulk water connections or the Industrial /commercial consumers.
- KW&SB has a workforce of around 13000.



Capital Development Authority (CDA) Islamabad

- Established in 1960, and provides water, sewerage and drainage services to about 0.4 million out of 0.9 million population through 1400 km long distribution network.
- It produces 110 million m³ water by using surface/dams (from 28 km treatment plant) and ground sources (280 tubewells).
- Billing & collection efficiencies are 100% & 99% respectively, with avg. annual revenue of over PKR 850 million.
- Total water & sewerage connections = 140,000; Water availability @ 7 hrs/day; total staff = 1350 (staffing ratio is 10) with 40 professionals.
- No metering, 2 water treatment and 4 wastewater treatment plants.

Water & Sanitation Agency (WASA) Gujranwala

- Established in 1997 and provides water, sewerage and drainage services.
- Serving about 32% population out of 1.7 million to over 30,000 consumers (*without metering*) through 372 km pipe network extracting from groundwater.
- Avg. water availability is 14 hrs through more than 50 tube wells.
- WASA produces 91.8 million m³ annually with annual unit cost of PKR 0.11/m³.
- Billing & collection efficiencies are 25% & 40% respectively, with avg. annual revenue of over PKR 277 million.
- Total staff is 638 with 25 professionals only, having staffing ratio 05

Status of NRW and Water Loss Reduction



KW&SB

- Due to huge gap between demand and supply, KW&SB supplies water intermittently with low pressure. Under these circumstances domestic water metering is not possible.
- In absence of metering it is not possible to report the actual NRW % age. However, NRW in Karachi is around 30-35%.
- The factors contributing to this high NRW are: theft of water from the canals, High numbers of illegal connections due to mushroom growth of slums in the city , Decade old PRCC and asbestos cement pipe network with leaking joints, faulty house connections, Illegal water business through hydrants, low budgetary allocations for leak repairing works.
- A project of water loss reduction was executed around 20 years back which brought significant improvement in the project area. However, not much work has been done in KW&SB on water loss reduction after execution of that project, mainly due to financial constraints.



CDA Islamabad

- The main factors of NRW (32 %) are:
 - Non-availability of meters
 - System leakage
 - lack of most updated equipment & tools

WASA Gujranwala

- NRW is high (about 60%) because of:
 - No metering, water theft, leakage,
 - Outdated infrastructure, lack of latest tools/techniques, capacity issues, illegal connections, lack of resources etc.
- Efforts are being made to minimize the water loss by controlling various factors within the available resources and techniques.

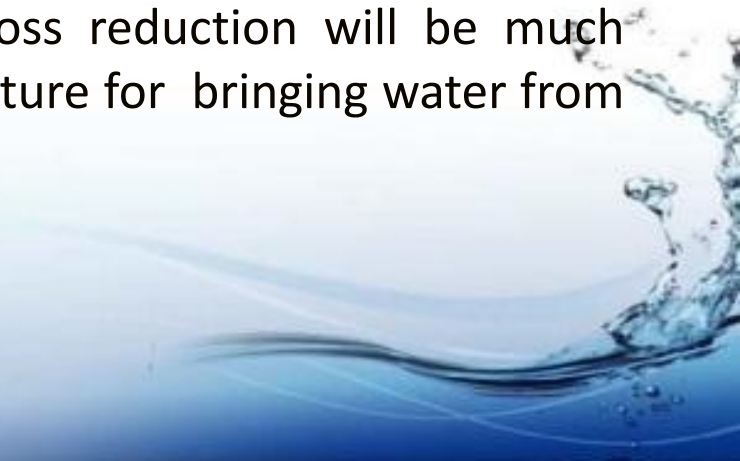


Future Goals Related to NRW and Water Loss Reduction



KW&SB

- In view of the huge gap between demand and supply KW&SB has plans to reduce NRW to acceptable limits by capturing the unregistered consumers and controlling the theft of water.
- The only financially viable water source for Karachi is around 150 km away from the city. The infrastructure development and O&M cost is therefore very high in our case. Flows in the River Indus are also depleting at a fast rate. Under these circumstances it is highly advocated that more stress must be given on NRW reduction. It is believed that the cost of conserving water through water loss reduction will be much lower than the cost of laying huge infrastructure for bringing water from 150 km away source.



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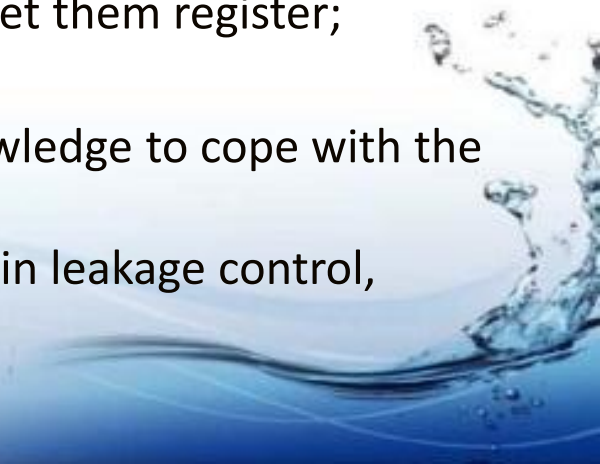
The key goals are to:

- Manage the Non-revenue water through latest available techniques, and
- Increase the revenue to make the CDA sustainable with respect to services provision.
- Make CDA water wing profitable by managing NRW
- Ensure the installation of meters by getting approval from the authority.

WASA Gujranwala

The key goal are to:

- Improve revenue by detecting illegal connections and get them register;
- Installation of water meters within next two years.;
- Equip the professionals with latest techniques and knowledge to cope with the NRW;
- Get WASA out of financial crises through improvement in leakage control, plans for replacing outdated pipes etc.

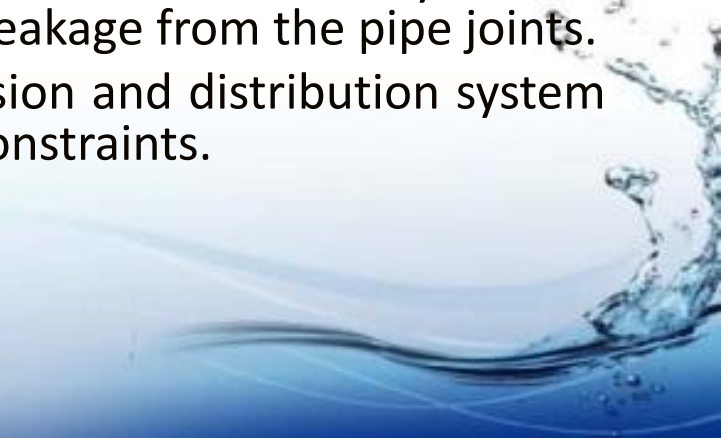


Efforts of the Utility to Reduce NRW and Water Loss Reduction



KW&SB

- In the recent past not much work has been done on NRW reduction mainly due to financial constraints. However, a project for installing water meters on the main water lines was initiated by KW&SB but the work is held up due to some contractual issues.
- Recently an operation against illegal hydrants stealing water from KW&SB's lines and selling it through water through water tankers has been launched and is still going on.
- For water loss reduction a scheme for replacement of leaking domestic water connections is also under consideration.
- Switched over from AC pipe to HDPE pipe in the distribution system. It has fusion butt joints which eradicate water leakage from the pipe joints.
- There are many visible leaks in the transmission and distribution system which couldn't be repaired due to financial constraints.





CDA Islamabad

- ❑ Plan to:
 - Managing NRW by taking it as key performance benchmarking indicator;
 - Planning to install water meters at all the connections and block meters for urban slums;
 - Focusing on active repair of leaks and bursts;
 - Replace the old tube wells to improve their efficiency and water production

WASA Gujranwala

- Continuous monitoring and reduction in physical losses through mapping, flow pressure control, and supply timings;
- Planning to replace old pipes to avoid leakage;
- A task force has been constituted for detection of illegal connections;
- Awareness campaign for water conservation;
- Intends to install water meters;
- Reducing the commercial losses i.e. improving billing efficiency, controlling water theft etc.

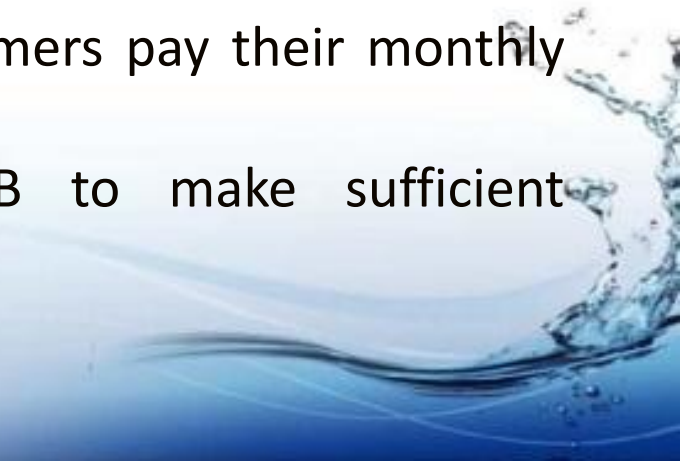


Challenges of the Utility in Addressing NRW



KW&SB

- Absence of water meters on the transmission and distribution system is the biggest issue as in absence of meters we can neither measure nor control the NRW.
- Outlived distribution network mostly comprising of AC (Asbestos Cement pipe) with leaking rubber ring joints.
- 45% of the city comprises of the slums. Most of them are not on KW&SB's billing net. Those who have been registered do not pay their bills as most of them believe that water should be provided free of cost.
- Poor collection efficiency. Only 30% consumers pay their monthly bills.
- Poor financial health restricting KW&SB to make sufficient provisions for maintenance works.



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- Leakage
- Inefficient maintenance of pipe network
- Customer complaints
- Financial losses
- No water audit

WASA Gujranwala

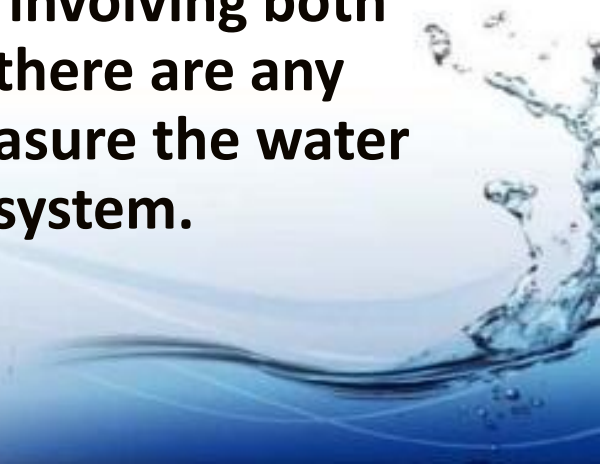
- High leakage
- Outlived pipe network (that need to be replaced)
- Insufficient capacity of Tubewells
- WASA is under staff and lack of capacity
- Lack of latest techniques and tools to detect leakage
- Very low water tariff
- No water audit



Knowledge and Capacity Needs to Improve NRW for Pakistani utilities



- **We would like to learn the latest and cheapest technology for measuring devices and plugging the leaking joints.**
- **We would also like to know the legislation for controlling the theft of water.**
- **We would like to be educated and enhance our capacity in tracing the invisible water leakages and illegal water connections.**
- **Installation of measuring devices on such a vast system comprising of round 5000 km is a big task involving both funds and time. We would like to learn if there are any short cuts and low cost procedures to measure the water flow in the transmission and distribution system.**





THANK YOU