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Improvement of Water Supply Services in Dhaka City: Zonal Approach

By

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THE CONTEXT

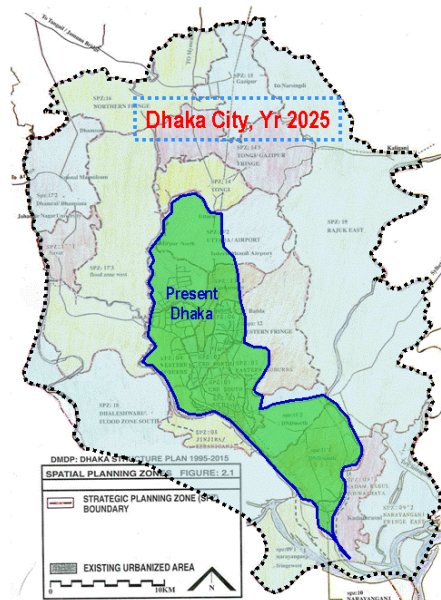
City Development

Over the last 3 decades, Dhaka has grown at a great pace. From a provincial capital it became the capital of independent Bangladesh in 1971. Dhaka became the nerve centre for the entire country. All activities related to economy, culture, politics, administration, education, health and society as a whole are centred around Dhaka. Dhaka has witnessed major growth in population over the last 3 decades, mainly due to migration from the country-side and townships. Population of the city has grown from about 1 million in 1971 to more than 12 million in 2005. In another 20 years, Dhaka will be among the 10 most densely populated mega cities of the world with about 20 million people.

The city area has also expanded. The total area of Dhaka, its satellite town Narayanganj and suburban areas (including Keraniganj, Tongi and Savar) is around 792 sq. km. Between 1990 and 2000, the built-up area has increased by around 46% (JICA Baseline Study, 2000). The city expansion occurred both horizontally and vertically.

City Expansion

Year	Population	Area (SqKm)
1991	7.3	250
1996	9.13	
2001	9.25	
2004	10.57	470
2010	13.6	
2015	16.6	
2025	24.25	> 1000



ISSUES

A. Water supply and demand

One of the main challenges for DWASA is to provide adequate and safe water for domestic, industrial and other uses in its jurisdiction in Dhaka city and Narayanganj. The present production from Deep Tube Wells (DTW) and Surface Water Treatment Plants (SWTP) is around 1,670 million litre per day (mld). Of the total supply, 82% is from groundwater. Already, the shortfall in supply against demand is around 500 mld. This gap is widening fast as water

demand increases with the increase in population, industrialisation and commercial activities in the city.

B. Unaccounted for Water

DWASA could reduce the Unaccounted for Water (UFW) from 57% in 2004 to around 40% in 2006. Unfortunately, further reduction of UFW is restricted due to two major reasons. Firstly, inadequate institutional capacity and authority of DWASA for comprehensive monitoring and control of pilferage. And secondly, the existing water distribution system (AC pipes) is in dilapidated condition in many areas causing major leakage from the system.

C. Water sources

The present sources of water supply to Dhaka city and Narayanganj is no longer sustainable. The ground water table of upper aquifer (< 170m depth), which is the main groundwater source, is declining at an alarming rate of about 3m/yr on an average. The deeper aquifer (>200m depth) is yet to be fully assessed. The other sources include the peripheral rivers of Dhaka. Due to indiscriminate discharge of untreated domestic waste water and industrial effluent to these rivers, the river water quality deteriorates significantly during the dry months (November to May). As a result these rivers are no more considered to be suitable as a source of water supply due to high pollution concentration.

For this reason, there is an urgent need to find alternate sources for Dhaka city water supply. Such probable source may include: exploiting the deeper aquifer (around >200m depth) and surface water sources from far-off major rivers like Padma, Meghna and Jamuna. It is also worthwhile to investigate exploitable potential of aquifers located in the vicinity of Dhaka city. For this, DWASA has engaged Institute of Water Modelling (IWM) to assess various available sources in terms of water availability and quality. IWM has submitted Draft Final Report (DFR) on Water Source Assessment in March 2006, which is under review.

D. The Service level

DWASA supplies water to the consumer through its extensive distribution system. There is over 2500 km of water distribution lines in DWASA jurisdiction. The entire distribution system is in a network connected to the DTWs and SWTPs. The Narayanganj area has a separate distribution network. DWASA maintains the system through its 7 Maintenance Operation Distribution Services (MODS) Zones. The present system is in dilapidated condition in many areas; as a result, it is hard to bring the system to the required pressure level for risk of increasing in leakage. Moreover, due to insufficient supply, compared to demand, the system cannot be pressurised and in most areas 24 hours water supply is not ensured. Billing and collection of water and sewerage bills is not yet computerised.

E. Tariffs and Revenue Collection

DWASA operates with the revenue earned from various utility services it provides. There is a tremendous scope for further development of DWASA to make it a more effective commercial entity and financially self-sufficient. In order to do so, DWASA needs to rationalise tariff rates and increase efficiency in revenue collection. Computerised billing system, 100% system metering and involvement of private sector and civil society in revenue collection and

rationalisation of tariff rates are the key to transparency, accountability and acceptability of all levels.

In the context discussed above, DWASA has taken a number of initiatives for improvement of Water Supply Services in Dhaka. These are:

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| A. Development of GIS based MIS, Network Analysis and System Metering including Zone Demarcation | Funded by DWASA |
| B. Assessment and Monitoring of Water Supply Sources for Dhaka City | Funded by DWASA |
| C. Dhaka Water Supply Project | Proposed to be funded by Asian Development Bank |

A. Development of GIS based MIS, Network Analysis and System Metering including Zone Demarcation Funded by DWASA

This includes computerising all data and information regarding water supply, stormwater drainage and sewerage system. A water distribution network model has been developed for network analysis and planning. System metering would be carried out in a pilot area of Dhaka and reconciled with the consumer level meter readings. Dhaka would be divided into a number of zones according to water use and supply situation for improving supply and demand management and revenue collection.

B. Assessment and Monitoring of Water Supply Sources for Dhaka City Funded by DWASA

Under this task, various sources of water for Dhaka city have been investigated. These include: (i) the upper and deeper aquifers of Dhaka, (ii) Deeper aquifer of adjacent area of Dhaka in Singair Upozila, (iii) the peripheral rivers of Dhaka and (iv) the larger river, Meghan, Padma and Jamuna River. The sources have been investigated in terms of long-term water availability and quality.

C. Proposed Dhaka Water Supply Project Funded by Asian Development Bank

The main purpose of the proposed project is to develop methodologies to improve safe water supplies and to develop effective and sustainable management of the network. The expected project components are:

- the investigation, design and implementation of water source developments;
- improvement in coverage and service levels through distribution rehabilitation and expansion, and
- improvements in operational efficiency through institutional development and improved management of Dhaka WASA.

ZONAL APPROACH IN IMPROVEMENT OF WATER SUPPLY SERVICES

A main feature of the strategy for the development of water supply in Dhaka is the adoption of a zonal approach for improvements in water supply system. Under this approach, a hydraulically isolated pilot zone has been picked up where strong resources are concentrated to quickly raise the water supply service levels and management to an acceptable level so as to demonstrate that the new approach can work.

Objectives are to ensure 24 hour piped and metered water to all people in one zone, reduction of non-revenue water (NRW) to less than 20% of production, improvement in collection efficiency of bills to more than 90%, equitable water use and good service level, involve civil society in rehab, O&M of scheme & revenue collection, and based on the experience in the pilot area, develop a replication modality under zonal approach to achieve 24 hours pressurized system in the whole Dhaka service area. The strategy required a team effort by major stakeholders to enact the necessary management reforms of Dhaka WASA based on a structured organization development.

The **pilot area**, called **Manikdi**, is located in north Dhaka. The pilot area can be hydraulically isolated from the rest of the network to form a '**Water District**' where adequate 24 hr water supply of acceptable quality can be ensured for 100% of the population and 100% collection of water charges can be ensured with civil society involvement.

Interventions Made in Manikdi Pilot Area are as follows:

- ✚ Rehabilitation of two tube wells and extension of distribution pipelines replacing the temporary PVC pipes being illegally used by the consumers;
- ✚ Systematic leak detection and repair in the system and at house hold (HH level)
- ✚ 100% taps in houses
- ✚ Replacement of valves and flow meters
- ✚ Identification and legalization of unregistered users
- ✚ Identification and rectification of faulty meters and installation of meters to ensure 100% metered functioning connections
- ✚ Community awareness and participation
 - ❖ Reporting of leaks, low pressure, intermittent supply at HH and System levels
 - ❖ Installation of valves to avoid overflow at storage tanks
 - ❖ Achievement: 24 hr. water supply with the required pressure, 100% customers billed and revenue collected on time through community representatives and civil society

Water Supply System in Maniki at a Glance

- ~1 km² service area;
- ~7 km water distribution pipes;
- 1,700 metered connections
- 35,000 people connected to WASA;
- 2 DTWs pumping water into the network;
- 6,700 m³ water pumped per day (~200 L/C/D);
- Approximately 0.5 Million Taka (US\$ 7000) billed per month, equivalent to 3,200 m³ water per day (~100 L/C/D) (UFW 52%);
- Collection efficiency approximately 80% so about 2,500 m³ water is paid for per day, or 38% of produced water (non-revenue water 62%).

Impact Evaluation Before and After Application of Zonal Approach in Pilot Area

			Before	After
1	Geographical area	km ²	0.25	0.25
2	Population served by WASA	no	6700	9000
3	Lenght of distribution network pipes	km	2.52	4.52
4	Lenght of spaghetti lines	km	2	0
5	Average hours of supply	hours	10	24
6	Pressure in system	m	< 0.5	5 to 10
7	Average consumption per capita	L/c/d	187	100
8	Connections	no	400	400
9	Un-metered connections	no	146	0
10	Non functioning meters	no	27	0
11	Connections bypassing meter	no	28	0
12	Connections without stop cock	no	141	0
13	Connections with underground tank	no	163	163
14	Connections without ball valve	no	109	0
15	Use of suction pump	%	35	0
16	Visible leaks	no	87	0
17	Estimated administrative losses	%	15	5
18	Calculated technical losses	%	59.6	20
19	Revenue collection efficiency	%	68	95
20	Connections underbilled	%	30	0
21	Connections overbilled	%	5	0
22	Community involved in billing	Y/N	N	Y
23	Consumers satisfied with service	%	10	95

Based on the lessons learned from the zonal approach, DWASA plans to replicate and improve water services in all other zones of Dhaka, with the financial support from the Asian Development Bank.