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Every Drop Counts: managing a mega city water crisis

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The crisis

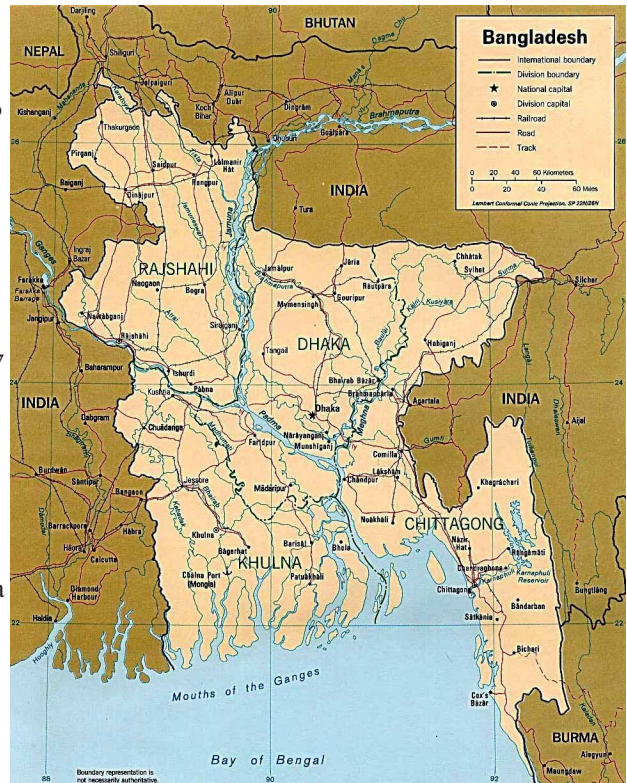
The Ancient Manner of Coleridge was stranded in the deep sea, sighing for a drop of fresh water that would save his life. Who could think that centuries later, standing at the doorstep of the 21st century, humanity would be facing the same crisis and that too in the middle of a modern city? The people of Dhaka are too familiar with the dried up water taps and long lines with pitchers and buckets in front of a water tanker. Water is one commodity that no living thing can do without.

Early in the 20th century, Dhaka was a sleepy little provincial town with a population of only about 90 thousand. However, after the birth of Pakistan in 1947 and designation of Dhaka as the capital of East Pakistan, the city began to grow at a fast rate. By 1951, the population of Dhaka grew to about 276,000, increasing nearly three times in 50 years. The current population of Dhaka is about eight million, representing a nearly 30-fold increase of population since 1951. This can truly be described as a population explosion for the capital city. It is projected that by the year 2010, the city will join the Mega City club, boasting a population of over 10 million.

This runaway population implies increasing demands for basic city services — the most important one being the demand for a safe and reliable water supply. Currently this growing demand is being met primarily by pumping water from the aquifers under the city. However, the groundwater reserve is rapidly declining and the progress in tapping surface water sources has been very slow. In other words, the looming threat of a serious water crisis in the city is becoming a real one with each passing day.

DWASA

To address the need for safe water and sanitation, Dhaka Water Supply and Sewerage Authority (DWASA) was set up in 1963 (before independence it was called EPWASA). Since then, DWASA has grown considerably in size and capacity. Currently, from a network of some 237 deep tubewells and the water treatment plants at Chandnighat, Goadlyle and Sonakanda, DWASA produces over 0.9 Mm³ of water per day and serves some four million people through its piped water supply system.



DWASA at a glance

Facility/service	Quantity
Deep tubewell	237
Water production	0.93 Mm ³ /day
Treatment plant	3
Water lines	1610 km
Connections	171,855
Overhead tanks	38
Roadside tap	1643

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The ever-growing deficit

Despite significant expansion of the service area of DWASA since 1990, the gap between the demand and the supply of water is likely to grow in the future. The chart below shows how these figures are likely to change in the coming decades.

Box 2: Demand and supply (Mm³ per day)

Year	Demand	Supply	Deficit
1990	1.67	0.51	1.16
1996	2.07	0.81	1.26
2000	2.62	0.95	1.67
2010	3.33	1.40	1.93
2020	4.60	1.85	2.75

In making the projections above, it was assumed that the per capita water use in Dhaka would reach 220 liters/day in 2020. In 1990, this was 150 liters/day and currently it is about 180 liters/day.

It was also assumed that the current system loss of about 40 percent would drop to 20 percent in 2010 and to only 10 percent in 2020. These estimates are optimistic because it will require fixing most of the old and leaky water mains as well as correcting all the institutional leakage (illegal connection and incorrect billing). As a result, the deficit estimates for the years 2010 and 2020 are definitely conservative ones.

Box 3: System loss in some cities (1996)

City	Systems loss
Lahore	40%
Calcutta	50%
Colombo	35%
Katmandu	40%
Bangkok	38%
Manila	44%

The BIG Project

Due to the rapidly growing population, increasing per capita consumption and expansion of service areas of DWASA, the demand for domestic water will increase to 4.6 Mm³/day in the year 2020. To meet this huge demand, a big water supply project, namely the Saidabad Water Treatment Plant, has been initiated by DWASA. The project will be implemented in four phases, each with a design capacity of 225 ML/day. The implementation of the first phase began in 1997 although the progress has been very slow so far. According to some officials of DWASA, Phase I may not be completed before 2003. At this rate, completion of the entire project may take another 10-15 years. Upon completion, the treatment plant is expected to supply 0.9 Mm³ of water from the Sitalakhya River every day. This project will effectively double the amount of water currently supplied by DWASA.

Despite such ambitious efforts, the water deficit will still continue to rise from 1.26 Mm³/day in 1996 to 2.75 Mm³/day in 2020. On a positive note it can be said that although the absolute amount of deficit is expected to increase, its share relative to the water demand will shrink. In 1990, only 30 percent of the water demand was met by DWASA, which will improve to about 40 percent in 2020.

Can we pump more groundwater?

Currently, about 95 percent of the water supplied by DWASA comes from groundwater through 276 deep tubewells. This is serving only about 65 percent of the domestic demand at 180 lpcd. To meet 100 percent of the demand, DWASA needs some 350 deep tubewells. This level of groundwater development, however, is not hydrologically feasible because the aquifer under the city receives little recharge due to paving of the ground surface. Filling up of the natural lakes and ponds, and encroachment of open spaces within the city has made this problem even worse. Water levels in monitoring wells indicate that the groundwater level has fallen by more than 20 m in the last decade alone. This has not only reduced the productivity of the wells

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but also increased the cost of water extraction. In fact, some experts believe that the city cannot continue mining its groundwater for very long. Unless the aquifer is artificially recharged, many of the deep tubewells may go dry in the near future.

The efficiency gain

As the saying goes, there is a silver lining to every dark cloud. The current level of system loss (40 percent) is an indication of serious inefficiency in the water distribution system of DWASA. However, identification of this problem should give DWASA a head start. DWASA should immediately begin to identify the areas where most of the system loss is occurring, particularly due to leakage. Necessary actions should then follow to repair or replace the leaky water mains as appropriate. Eliminating the institutional loss will be more difficult. For this, innovative options such as leasing the billing and collection system to a private company or a cooperative is already being tried out with encouraging results.

How much water can be saved this way? The answer of course depends on the extent of loss reduction. Let's assume that DWASA's estimate of 10 percent system loss by 2020 is achievable. Then even at a production level of 1 Mm³/day, the annual savings will be about 110 Mm³ of water. At a rate of 300 liters per day, which is much higher than the current per capita consumption of about 180 liters per day, it will still serve 1 million additional individuals. Alternately, these savings will be equivalent to having a fifth unit of the Saidabad Treatment Plant, implemented for free (or at a small cost compared to the other units). This definitely seems to be a goal worth pursuing.

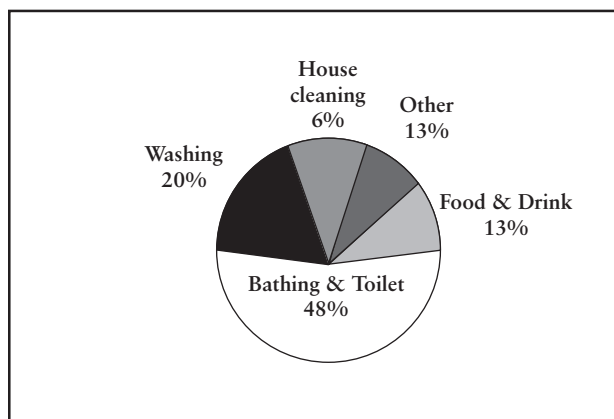
Let the "price" magic work

We can also approach the issue from the demand side of the story. The most effective type of demand management can be achieved by charging the consumers a fair price for each unit of water consumed.

Initially, when the resource is plentiful and the consumer base is small, a simple flat fee system may work fine, as it is easier and less expensive to implement. But when the resource becomes very scarce, as is the case in Dhaka, a proportional full-cost pricing should be introduced to ensure efficient use of water.

Currently 75 percent of the legal water connections of Dhaka are metered and the remaining 25 percent are charged monthly flat fees. Clearly, there is some room for improvement in this area. The more difficult job is to identify the illegal users who are enjoying a free ride or paying small bribes to a group of corrupt DWASA officials. Bringing this group under the metering scheme is likely to make a significant positive impact on the system loss figure of DWASA.

In fact, many of the illegal connections are in the slum areas where 30 to 40 percent of the city population lives. Independent studies conducted in Bangladesh and elsewhere have consistently found that the slum dwellers sometimes pay 2 to 5 times more for drinking water compared to the people with legal access to the water supply system. Thus, extending legal connections to the slums will not only reduce water loss but also reduce the prevailing inequity in terms of access to safe water in the city.



We can make a difference!

The most overlooked aspect of water management is the fact that individual users can significantly contribute to reducing water demand by conserving water at households. The relative amounts of water used for various domestic purposes are shown in the figure at left.

It can be seen that almost half of the total water consumption is going for bathing and toilet. The next significant use is for washing that includes laundry and dish washing. Clearly these are the areas where significant savings can be made.

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For example, cutting down the use of the bathtub, taking fewer long showers and using smaller tanks for flushing the toilet can help save a lot of water. For example, one-time use of a conventional toilet flush may cost 23 liters of water. The newer, more water efficient tanks use only about 6 liters, which means a savings of over 70 percent! A 20 percent reduction of water usage for bathing and toilet can save nearly 0.2 Mm³ of water a day — enough to serve an additional 1 million people at a high daily consumption rate of 200 liters. With a rapidly growing population, the savings will be much higher in the future.

Making way for innovations

Recently, a number of organizations such as BUET, NSU, DWASA and NGO Forum, have started to explore the possibility of harvesting rainwater and using this for household purposes.

The water quality tests carried out at DWASA indicate that the rainwater quality is suitable for drinking except for the first few minutes of shower. Experiments at BUET indicate that Dhaka receives sufficient rain to satisfy the drinking water need of an average family for six months. However, a large enough storage tank has to be constructed first.

Rainwater can be used for bathroom and toilet without any treatment (minimal filtering). Given the impending water crisis, a law should be enacted requiring all new buildings to have a rainwater collection and use system.

In the long run, additional water treatment facilities will have to be set up in the western part of the city. For example, the Turag River may be used to supply water to the residents of Uttara. In short, the situation is not hopeless. However, we have to plan ahead.

Let people participate

Historically, DWASA had a reactive rather than a proactive policy towards dealing with the growing water demand. This was because of the resource limitations and the low administrative priority given to this very important organization. Things have changed in recent years and DWASA is now looking at longer-term sustainable sources of water. The citizens of Dhaka must help DWASA by conserving as much water as possible. They must also pay the fair price for water. The very high level of “system loss” is a loss to all of us as ultimately, the legal clients end up paying for the unauthorized ones. DWASA should think of a more participatory management approach where citizens’ action groups, NGOs and interested private organizations – all will participate in the decision making process. A better solution would be to gradually convert DWASA into a limited company where interested people and organizations can have a stake. This will enforce accountability and promote efficiency - the two most important features of any successful organization.

We know what the problems are and what short and long term options we have. It is time that we start taking actions immediately because for Dhaka, every drop counts!