

Observation of Water Quality and Supply System in Dhaka City, Bangladesh

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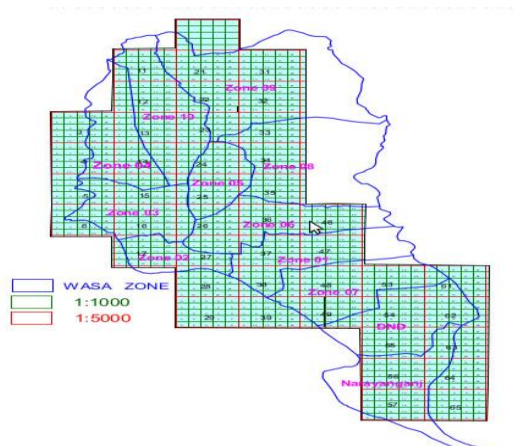
Abstract: For sustainable development, access to water is a basic human right and a crosscutting issue. Water resources have limitless magnitude including human survival, socio-economic stability and environmental sustainability. Dhaka city has been enduring from several problems related to water supply for urban dwellers. It is found that, the gaps between water supply and demand is huge, which is further enhanced by unprivileged management of water resources. From the current study, it is establish that about 64% city dwellers are not using the DWASA (Dhaka Water supply & sewerage authority) supply for drinking purpose due to bad smell. On the other hand, DWASA supplied water is using for drinking purpose about 36% of the consumers by boil. This paper will review the existing water supply scenario of Dhaka City and the roles of different service providers and stakeholders. The questioner survey covered responses from 100 households in our study area and also collected the sample of water for water quality exploration from different location of the study area.

Keywords: water supply, management, water quality, availability and accessibility.

I. Introduction

In the world, the 9th largest city Dhaka, the capital of Bangladesh is the most densely populated cities. It is situated in central Bangladesh at 23°42'0"N 90°22'30"E, on the eastern banks of the Buriganga River. It covers a total area 360 square kilometers (BBS, 1991, 2001 & 2011) and the city stands on the lower reaches of the Ganges Delta. For providing water to the urban dwellers of the fast-growing metropolitan Dhaka, Water Supply and Sewerage Authority (WASA) is a service oriented self-explanatory commercial organization in Bangladesh. It covers more than 360 sq. km service area with 13.5 million people with a production of almost 2110 million liters per day (DWASA, 2011). At present Dhaka WASA faces a number of contraventions like, transitioning to managing surface water instead of groundwater, unplanned city development and large investment funding. Dhaka WASA is divided into 11 geographic zones where Dhaka city organized with 10 zones and 1 in Narayanganj city for improving their operation, maintenance, and customer care. From the mean sea level, the elevation of Greater Dhaka is 2 to 13 meters above and most of the city areas are at elevation of 6 to 8 meters. The present situation of Dhaka city is that, most of the slum dwellers live in the unplanned area and they often do not have any sources of water supply in their slums.

For this reason they have to rely on a tube well, tap or a natural source like ponds, rivers, canals etc. to meet their needs. If the open surface water is not treated properly, that is not safe for directly drinking or even harmful for health.



Source: www.dwasa.org.bd

Fig.1: Water Supply Zone in Dhaka City

1.1 Objectives

The specific objectives of the study are:

- 1). Observation of water supply system in the study area by questionnaire survey.
- 2). Observation of water quality in the study area by laboratory tests.
- 3). Establish some recommendations for overcoming present problems.

1.2 Background

It is explicit that from the pair of decades, assessment of the water supply and sanitation system has been an indispensable part of environmental research. For improving the water supply and water quality among the urban and rural people lot of endeavor are made in the world and the process is still going on. For supplying water to the city dwellers DWASA is mostly dependent on ground water.

Table1. Water Supply System in Dhaka City

	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Deep Tube well	519	560	586	615	644
Water Treatment Plant	4	4	4	4	4
Water Production/Day	1880 MLD	1990 MLD	2150 MLD	2180 MLD	2420 MLD
Water Line	2600 km	2600 km	2800 km	3040 km	3040 km
Water Connection	2,74,368	2,86,911	3,02,132	3,10,314	3,25,717
Hydrant (active)	38	38	38	38	38
Roadside Tap	1643	1643	1643	1643	1643
Connection to Religious Institutions	1898	1898	1898	1898	1898

Source: Annual Development Report, 2012-13, Dhaka WASA

Table2. Water Deficit of Dhaka City in Different Years

Year	Population (Million)	Water Demand(MLD)	Water Supply(MLD)	Deficit%
2000	9.50	1550	1130	25
2002	10.50	1680	1300	23
2003	11.00	1760	1400	20
2010	12.27	2485	1500	40
2020	18.04	3680	1500	59

Source: www.dwasa.org.bd

1.3 Basic requirement for drinking water standards

It is important to match some fundamental requirements for drinking water which are supplying to the dwellers and the authority should inquire it before supply. Requirements may be:-

- ✓ Water which supply to the consumers should not have an impermissible temperature.
- ✓ Water should be absolutely free from pathogenic microorganisms which can reason of disease.
- ✓ Water to be aesthetically winsome and categorically clear.
- ✓ Water should not be saline which can be created salty taste.
- ✓ The compounds which are harmful for health should be absence.

For developing water quality standards the World Health Organization (WHO) had been working from initial. Drinking water standards first published in 1958 by World Health Organization and were revised in 1963, 1968 and 1971. Based on the WHO 1971 International Drinking Water Standards, Bangladesh developed the first water quality standards in 1976.

Table3. Drinking Water Standard.

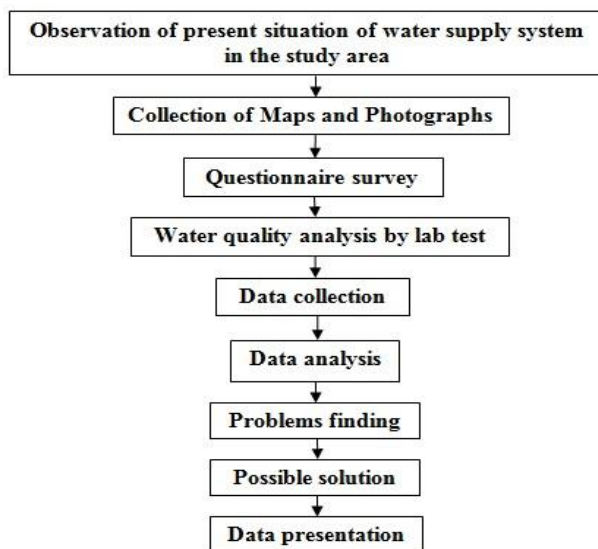
Water Quality Parameters	Units	Bangladesh Standards	WHO Standards,1993
p ^H	6.5-8.5
Arsenic	mg/l	0.05	0.01
Hardness	mg/l	200-500
Turbidity	NTU	10	5
Iron	mg/l	0.3-1.0	0.3

Source: Ahmed and Rahman, 2000

II. Methodology

Methodology is the systematic, theoretical analysis of the methods applied to a field of study. It constructs the theoretical analysis of the body of methods and principles connected with a branch of knowledge.

Typically, it encloses idea such as theoretical model, phases and quantitative or qualitative techniques. A methodology is not a formula but a set of practices.



2.1 Collection of Maps and Photographs

For observing the overall situation of water supply system of the study area Lot of photographs and Maps were collected from different sources. Some of these photographs have been collected directly from field survey and others from internet website.

2.2 Questionnaire survey and Informal Interview

To find out inherent problems of city dwellers due to water supply system in Dhaka city and its associate impact on city life, a field survey as questionnaire survey, informal interview and open discussions has been conducted with the authorities of different concerned organizations, experts and people living in the study area of Dhaka city.

Table4. Questioner Survey Report

Question	Total Survey Households 100		
	Good	Better	Bad
What do you think about the present situation of water supply system?	49%	36%	15%
Do you find any bad smell in supply water?	Yes		No
	69%		31%
Do you drink supply water directly?	Yes		No
	36%		64%
What process are you following to purify supply water?	Filter	Medicine	Boil
	23%	13%	64%
Have you suffered from any water born diseases in last six month?	Yes		No
	57%		43%
What time during a day usually water supply is interrupted?	Morning	Evening	Night
	42%	51%	7%
In summer season do you face any problem in water supply system?	Yes	No	Sometimes
	71%	8%	21%

2.3 Water Quality Analysis

For observing supply water quality, water sample was collected from a selected area of Dhaka city (MODS ZONE #10). After collection of water sample, different experiment was conducted in a laboratory for determining the drinking water parameter.

Table 5. Lab Test Results of Supply Water in the Study Area.

Zone Name	pH	BOD (ppm)	COD (ppm)	Arsenic	Hardness (ppm)	Turbidity (NTU)	Iron (ppm)
S1 (Mirpur-1)	7.8	5	26	0	45	0	0
S2 (Mirpur-14)	7.7	4	38	0	27	0	0
S3 (Shewrapara)	7.2	6	10	0	27	0	0

2.4 Data Analysis and Presentation

All the collected data from lab test and questioner survey both has been analyzed by using some statistical computer software like, Microsoft Excel, Microsoft Word etc. At last the analyzed data have been compacted and presented as tables, graphs and maps and putted in the report.

2.5 System Loss in Dhaka WASA

Mainly system loss are done by wastage and illegal water connection, for that reasons the DWASA supply cannot attain the 100%. During field survey, it was seen that some landowners keep up dual connection illegally and they sell extra water to the poorest people at a high rate. they are collecting water from the main line by convencing some corrupted person of the supply authority or without permission. In the financial year 2008-2009 shown that, almost 41 percent system loss was regarded come to an acceptable limit. From the past experience, present Government has taken many implantation for minimize the system loss in water supply. By this growing effort of the DWASA officials, the system loss is softly reducing.

Table 6. Year Wise System Loss of Water.

Financial Year	System Loss, Percentage(%)
2008-2009	41
2009-2010	36
2010-2011	32
2011-2012	26
2012-2013	24
2013-2014	23

Source: DWASA

2.6 Role of Donors to Improve the Water Supply System

There are many donors who have already taken many initiatives for improving the water supply system management of Dhaka Water Supply and Sewerage Authority (DWASA) for better service by donates Grants and Loans. For this work bilateral and multilateral donors are involved. The Danish International Development Assistance (DIDA) and the Swedish International Development Agency (SIDA) are take into account the funding to develop the intake and doubling the capacity of the existing surface water treatment plant (SWTP) at Saidabad and decreasing system loss. The World Bank has introduced to assist DWASA for water supply and sanitation services to low-income communities and performance improvement plan. To provide water supply and sanitation services to low-income group communities, World Bank has been maintaining a close coordination with Asian Development Bank (ADB). For slum development program the Department for International Development (DFID) has shown their self-interest to work with DWASA.

III. Recommendation

Overall water supply situation of DWASA and individual situation of the study area pursue some existing and future crisis that need to be trace instantly. This study has enunciated following recommendation for concern authorities as rub can be diminished in both short and long duration for the study area.

- i) Service tanks should be clean regularly for ensuring potable water supply to the consumer.
- ii) For ensuring safety issue pipe line can be placed under 5 to 6 feet from the surface.
- iii) A workable administrative group can be generated for ensuring accurate use of water, to consider customer's objections.
- iv) Can be created some effective rules and penalize system for the illegal connection.
- v) Prepaid billing system can be made for low revenue loss and to improve the availability to the poor.
- vi) The households who still have no piped connection can be influenced about rainwater harvesting to assure supply of drinking water.

- vii) For improving the quality and efficiency of surface water treatment plants (SWTPs) should be made new technology and more found.
- viii) Can be conscious to the people concerning “right to water” and the reduction of the abuse of water by accurate awareness exploration through print and electronic media.

IV. Conclusion

Dhaka city dwellers are facing many basic problems, where water supply has appeared as the most critical exposure. More than 87% of the supplied water in Dhaka city is being extracted from groundwater. Such comprehensive obedience raises a very high depletion rate of groundwater table. Dhaka city has been facing an acute declination in groundwater table. Within last seven years the groundwater table lowers down more than 20 meters at a rate of 2.81 meter per year (m/y). Observing the subsisting rate, the study forecast that the groundwater table will go down to 120 meters by 2050. Our discovering concerning drinking water supply conceive that majority of the Dhaka city dwellers are entirely or to an extent hugely contented with the water supply. When it comes to ingress, the survey shows that in the registered areas water connections are more or less available, but in slum area, they still managed by the unceremonious channels, which suspect that there is a great scope of development in this area by DWASA. In spite of coverage, the observations about water quality supplied by WASA are not directly drinkable. Most of the people are trying to apply different mechanisms for water purification, but there is an extensive disparity in slums and non-slums. As most of the households in the slums are poor and purification is not a cost effective process that’s why majority of population in this area drinks straight from tap water without purification. For this reason different water borne diseases are rising in the city. If quality of water is improved, it is possible to decrease significantly health hazards of consumers.

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