Journal of Bangladesh Institute of Planners ISSN 2075-9363
Vol. 6, December 2013, pp. 1-12, © Bangladesh Institute of Planners

Political Ecology, Stress Analysis and Capital Investment in Water Sector: A Study of Khulna City

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Abstract

This study tried to find out the loopholes in water supply systems in Khulna city and carefully examined the proposed water supply projects taken by KWASA. It was found that the projects were associated with huge capital investments from government and international organizations. Projects taken were mostly technical in nature and exclude any kind of participations. Previous experiences suggest that this kind of projects are difficult to implement and faces mass resistance and judiciary complications. However, for the current projects, vulnerabilities of water sources on which these projects are taken, were overlooked or simply do not have any mechanism to protect those sources. Mayur river and 22 canals were grabbed, polluted and ignored. Ground water in Khulna city is also at risk due to increasing salinity, arsenic and presence of harmful substances. A political ecology analysis also depicts a poor coordination between concerned authorities. Amalgamation of these factors can lessen the effectiveness of the projects taken by KWASA. A more inclusive, small scale initiative is important to get benefits from these large scale projects. Demand management while increasing coverage of water supply is also crucial for a comprehensive water supply system.

Introduction

Sufficient clean water is essential to everyone's survival. Access to water is now recognized as the key issue in development, and therefore was high on the agenda of the World Summit on Sustainable Development in August 2002 in Johannesburg (UN, 2002). From the beginning of the 21st century, many people are facing formidable challenges to meet increasing demand for water. Fresh water crisis become more significant and authorities around the world find it difficult to meet water demands. Population increase in cities and urban area expansion contributes to water pollution and extinction of water bodies. Predictions and financial capacity often fails to keep the additional people under water coverage. Khulna is the third largest city of Bangladesh currently experiencing population influx due to rapid migration. It is considered as the south-western regional capital and ultimate destination of people from disaster prone coastal areas. Current city population is more than 1.47 million (ADB, 2011a), which was doubled in two decades. The city population would be 2.9 million in 2030 (ibid).

The study tried to explore how water supply problems are being dealt and attitudes towards fresh water use. The study also seeks to explore possible vulnerabilities of future water resources of Khulna city.

Study Methodology

The study was based on secondary materials. To obtain present status of water supply and future proposals, Reports from KWASA and ADB have been consulted. Urban and Rural Planning Department of Khulna University was a reliable sources of data in forms of dissertation, project reports on water supply system of Khulna city. KWASA had been preparing water supply master

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plan, was another source for planning proposals and reports. Khulna master plans were also consulted to review the past proposals and their current status and performance. Vulnerabilities of water sources were analyzed through journal papers. Organization's inefficiency and poor performance in water sector was discussed and analyzed by political ecology approach.

Water Supply and consumption pattern in Khulna city

Water demand in Khulna city is 150 MLD albeit KWASA can supply only 85 MLD (KWASA, 2010). Present water demand exceeds the Master plan projection (122 MLD in 2010) while the future demand is projected to be 160 MLD and 210 MLD in the year 2015 and 2020 respectively (KDA, 2001). From 2001 to 2010, water withdrawals and distribution was heavily dependent on shallow and deep hand pumps, in other words, on underground water sources. Alam et. Al, 2009 had shown that piped water coverage was 30% but overabundance population in last 5 years contributes in plummeting the percentage to 20.4% (KDA, 2012). ADB (2013) estimation was even lower (18%). Despite of master planning provision, no further works had been taken to extend the piped water coverage.

Table 1: Sources of water supply in Khulna City

Sources of water supply	Frequency (Households)	Percentage
Piped water supply	1738	20.4
Private/self-dug tube well	4344	51.0
Private/self-dug tube well	2408	28.3
Pond/well	22	0.3
Others	9	0.1
Total	8521	100.0

Source: KDA, 2012

Khulna city do not have any surface water sources due to mismanagement and lack of perceptive planning and regulation. Only about 0.4% city residence use surface water (e.g. ponds, canals) for non-potable uses. However, water consumption rate is higher in Khulna city. Daily water uses by households in Khulna city were found as high as 192 liter in the city core whereas it is much lower in urban fringe and municipality area, 112 liter (Alam et al, 2009).

Exploring past and planning failures

Surface treatment plant, rehabilitation of water supply system and dual supply system was proposed (KDA, 2001). Treatment plant supposed to be implemented by the year 2005 and dual supply system within 2005-2010. However, none of them was implemented. Moreover, absence of proper maintenance and upgrading, existing services continued to deteriorate and shrink the coverage (Table 2). Authorities also failed to provide a long term sustainable solution for water sector. Almost all the projects proposed in Master plan were heavily dependent on central government, international of private funding. However neither central government nor international finance had come in implementation. Private initiatives or public-private partnership is still a new concept and yet to put into action.

Nevertheless, nothing was implemented so far except forming an independent agency for water & sewerage management and extending water supply coverage by extracting ground water. But supply water yet to serve more than two-third of the city's population.

Table 2: Change in water supply system over 10 years.

Description	2001 master plan data*	2010 Khulna WASA data**
Overhead Water Tank	5 Nos.	-
Production Tubewell	60 Nos.	109 Nos.
Deep Tubewell (Hand)	1850 Nos.	3736 Nos.
Shallow Tubewell (Hand)	3800 Nos.	5526 Nos.
Distribution Pipeline (75-300 mm Dia)	262 Km	227 Km

Source: *KDA, 2001 and **Islam, 2013

Political Ecology of water supply

Swyngedouw (1999), quoted in Heynen, Kaika and Swyngedouw (2006) argued that natural and ecological conditions operates together with social process. Urban conditions are made and remade though the political economic process (Heynen, Kaika and Swyngedouw, 2006). Thus, political processes involved in Khulna city water sector worth a review. Political ecology studies on water sectors reveal that shortage of water supply or crisis in sewer can not only be considered as technical malfunction, rather resultant of collective metabolisms (Southerland, 2002; Marvin and Medd, 2006). Smith and Ruiters (2006; 192) argued that weak and underdeveloped administrative mechanism led to conflict over access to municipal resources in global south. In Athens, Kaika (2006) have shown how a natural event created political transformations that led to adopting multi-million projects and consensus building in the water sector.

The first master plan for Khulna city was prepared in 1961 emphasizing installation and continuous expansion of piped network (KDA, 2001). However, the city water supply system was developed based on discretely located hand pumps and once established piped system was not expanded, rather coverage of piped network shirked (Table 2). Until 2008, KCC was the responsible organization for providing water services. Elected members were concerned about their political agendas and tried to convince people by providing services on a short time basis. Activities of City Corporation is highly influenced by central politics and politician's development thinking was shaped by their tenures. In the political system in Bangladesh, tendency exists in political parties to overthrow plans and programmes taken by previous authority. Therefore, both the central and local government were unwilling to take long-term sustainable measures.

Apart from the regular maintenance, all the development projects are planned and implemented under the guidance and funding from central government. These dependencies propelled City Corporation to take immediate measures to solve water crisis with the help from NGOs. Development projects, however selected and determined by political agenda. In 2007, the then central government approved a water supply project at the very end of their tenure to attract people in the election. City Corporation had to take prompt action to implement the project. However, the project was halted by the court case on the ground that Environmental Impact Assessment was done rapidly and missed some important aspects (BELA, 2009).

The creation of KWASA would not solve the problems of management. Rather it would be more challenging as the responsibilities of KCC, KDA and KWASA are conflicts within the same jurisdiction. KDA prepares city plans and approve building plans. It also provide housing through creation of new residential areas. KWASA prepares water supply and sewerage plans and collect water charges. On the other hand, KCC collects revenues and provide municipal services. Construction and maintenance of drainage is also under the jurisdiction of KCC.

As these three organizations prepares and implemented their plans separately, co-ordination and congruence is hard to achieve. KDA might have a plan to create a new residential area in the place where KWASA do not have any proposals. On the other hand, how KWASA would expand the water supply services where the buildings don not have KDA approval? According to the World Bank "the institutional framework for urban planning administration and finance in Bangladesh provides a difficult environment within which urban development must take place. Present law assigns many functions related to planning and service delivery to more than one-agency. In practice, many functions are hardly performed at all and co-ordination for municipal administrations, slum upgrading, water supply, sanitation, drainage and environmental control" (KDA 2001).

In July this year, KCC announced budget totaling BDT 3350.5 million (GBP 30 million) for the 2013-14 fiscal year where proportion of internal revenue collecting and central government funding was 25% and 75% (The daily Sun, 26 July 2013). Budget for 2013-14 fiscal years was double of 2011-12 fiscal year budgets. Overdependence on central government for development projects turned to nothing but a project-shopping list hardly appeared to be an exercise in hard-headed decision-making. Though, theoretically an autonomous and elected body with comprehensive functions, KCC's actual authority is seriously curtailed. It's power of revenue generation and of expenditure decisions is 'severely circumscribed by detailed national Statutes and Orders and the absolute power of supervision and control of the concerned Ministry'.

The prevailing relationship among institutions is not that sort of congenial in terms of co-coordinating the delivery of services to the city dwellers. KCC like other metro government faces an overlap of responsibilities with national government and other urban local bodies. Inter-government and inter-authorities arrangement under which responsibilities are shared is weak and defused. Responsibilities and authorities are highly fragmented.

The complex relationships between and among these institutions and stakeholders make it difficult for efficient urban management. Creation of autonomous bodies with government control like KDA, KWASA marginalize the role of elected urban government like KCC in the field of urban governance. On the other hand, people do come up with argument that KCC as a municipal government cannot handle the big and growing canvas of municipal service and planning and also more importantly the expanding jurisdictional boundaries unbounded with spatial growth of the city. The study has been found that the community's attitudes in terms of administration of the local body are not satisfactory and people have little confidence on the confidence on the administration (GHK International, 2001).

Future plans: Critical observations

Proposed projects on water sector

Since its establishment, KWASA has been working in a USD 365 million project with ADB and JICA in developing surface water sources, reservoirs, treatment plants and extending piped network up to 600 km (ADB, 2011b). The project also comprises excavation of 22 canals, Mayur

River and other water bodies. Keeping possible climate change impacts on water sources in Khulna city, the project emphasized on surface water as main water source to avoid excessive groundwater abstraction. The project was expected to finish in 2016.

A considerable amount of money and project time has been diverted to build a impounding reservoir and move the water intake points further up to 4 km upstream of Mollarhat (Figure 1) to avoid saline water. About 16 hectors of land will be taken for the reservoir in which 10 hectors would be initially taken to reserve 0.77 million m^3 of water which believed to be adequate for 23 years (ADB, 2011b). Remaining land will be taken for further expansion of the reservoir.

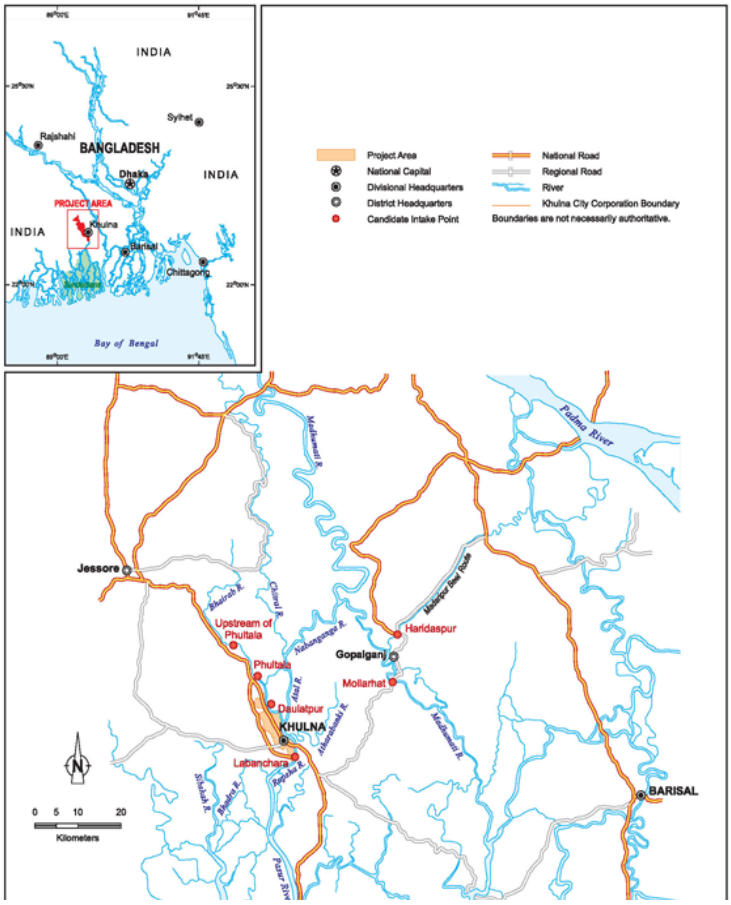

Figure 1: River system in Khulna city; Source: ADB, 2011b

Challenges of capital investments in Khulna city

According to the world water availability, withdrawals and stress status, Bangladesh is comparatively in a safe position. About 10 Litre per person water is renewing each year naturally which is highest in the world and the stress on fresh water will be minimal in 2025 (Revenga, 2000 and WBCSD, 2006). However, there are some certain matters that can alter the situation if the water system not planned carefully. In the west coast of India, ground water becomes excessively saline due to over extraction of ground water (WBCSD, 2006). Salinity in south-

western coast of Bangladesh is rising and goes on pick in dry season. The JICA founded surface reservoir project in Khulna did not consider the possible increase of salinity in groundwater of that locality (2011b).

Next point to be considered is administrative support, and coordination. The proposed reservoir and intake point located in different administrative boundary might disrupt the expected result due to weak coordination among the services providing agencies even at the city level. Responsibilities are distributed to different organizations (e.g. KDA prepare plans but KWASA providing services while KCC receives taxes) make the planning and implementation difficult to harmonize.

The total project package associated with a generous amount of money which can convert the water from a service and human right to a commodity which will need to purchase at a higher rate. Large scale project will also invite dissatisfaction and tension in the community over the fear of losing land and habitat. Litigation in planning projects also taken to regular court can halt the activities for a longer time. None of the big projects, either on water system or drainage could not be implemented in last ten years. Before the establishment of KWASA, Khulna City Corporation tried to install 40 deep tube well (in 152.4 meter depth) in ward no 1 with a central government funding of BDT 47 million (USD 0.6 million) to add near about 41 million litre water per day in the distribution system. However, the project was stopped in a court case in 2009 on the ground of inadequate EIA and protest from local people over fear of drying out pond and canals as about 0.2 million people's main income source is agriculture, plantation, poultry and pisciculture (BELA, 2009). The project still in the court room, struggling to find a way to get in the ground (The Daily Star, 8 February 2012).

Vairavamoorthy and Mansoor (2006) argued that water supplies in most developing countries are supply driven where shortage of supply embraces capital investment. These kinds of practices, as UN-HABITAT (1999), quoted in Vairavamoorthy and Mansoor, 2006:) concluded, create impediments on taking innovative approach for demand management. Al-Jayyousi (2003) argued that most of the water project in developing countries are supported from external sources and failed to sustain after withdrawal of aid.

Weaknesses of the current capital investment: water sources are at risk

The project put much emphasis on surface water sources e.g. mayor river, canals of Khulna city. A detailed analysis is thus required to assess the current conditions of these sources.

Condition of Surface water

After the injunction from court about the deep groundwater extraction in Phultala of ward no 1, KWASA, with the help of ADB and JICA, is planning for collecting water from Mayur river, a sub-stream from Rupsha river at the west end of the city. Using Mayur River and other 22 canals of the city as a fresh water reservoir is one of the major plans of KWASA.

Khulna city Corporation is now implementing a river side recreational open space near Gallamari, one of the entry points to city. However, this project being halted recently over fund crisis. The project required relocation of local people and reclaim land from land grabbers which increases project cost over time. Moreover this project did not include any excavation plan in the river which is necessary to covert this river as a reservoir.

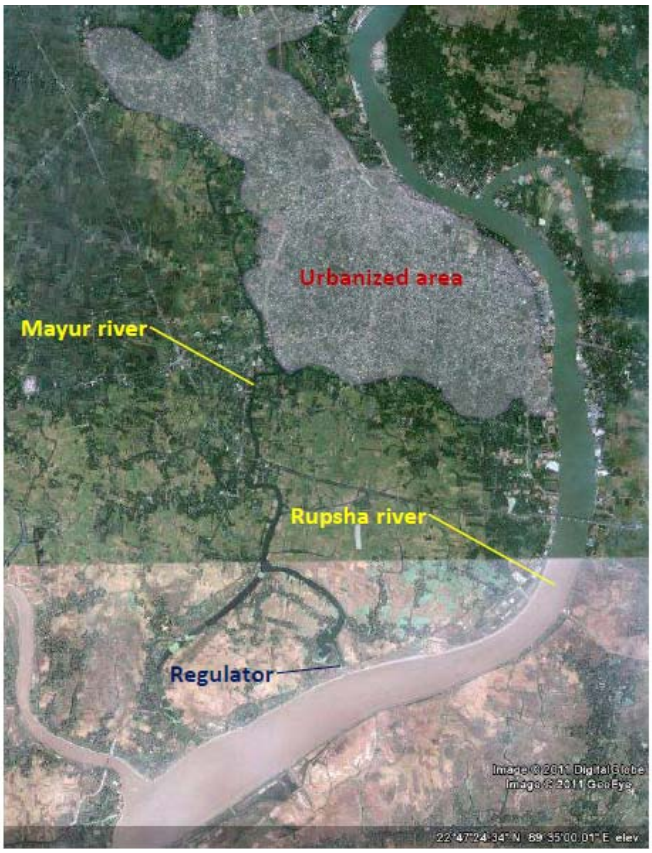

Figure 2: City area and surrounded river system; Source: Khan, 2011

KWASA, 3 years after the initiation of the ADB funded project, still in the proposal stage to reclaim Mayur River and use it as a water source. Meanwhile, lack of administrative attention makes the river as a disposal place for solid and liquid waste. A wholesale market was established along the west bank of the river, frequently throwing wastes directly to the water. Most of the makeshift structure grabs the river. On the opposite of the market, some permanent structures also grab the river. On the east bank, a slum is located, also a treat for the river water.

Figure 3: Solid and liquid waste in Mayur River
Source: Khan, 2011

Figure 4: Riverside Encroachment

Moreover, a study shows that the chemical composition of Mayur River is become unusable (Khan, 2011). There are 22 drainage canals in the KCC area which directly discharge wastewater into the Mayur River. Besides, clinical wastes and wastewater are also directly discharged into the Mayur river system. During the dry season, the water quality exceeds the recommended limits, leaving mostly unsuitable for any use (Kumar et. al. 2011).

Under the prevailing situation, it can be understood that dependency on Mayur River and canals of the city will not be possible to implement without working on proper drainage channel and drainage system and strict planning intervention to protect water bodies. The concept of open water reservoir at a large scale is still unfamiliar in Bangladesh and requires commitment from the community as well as from the authority. The alignment of the river in the picture shows that the area is built up and compact in the areas where the reservoir have been proposed. The river flow also hampered by sluice gate and fishing activities at the upstream.

Figure 5: Built up areas along the Rupsha-Vhairab and Mayur River; Source: Author

Furthermore, construction of Ganges Barrage in Indian side reduces water flow in main river systems and increase salinity (Ahsan, 2012). Barrages controls by India to all of the tributaries to the Ganges divert about 60% of river flow (Pender, 2008). By the 5th largest dam in the world, average monthly flow by to Bangladesh was reduced by 86% (ibid).

Ground water quality

Research on ground water quality on six wards of Khulna city (ward no 14, 15 16, 17, 18 and 19) has been done by collecting sample ground water for eight months (July 10 to February 2011) by Adhikary et. al. (2011). Within the study period, 57% sample exceeds ECR (1997) permissible limits (600-1000) µS/cm. The conductivity of GW in various wards is nearly same from July 2010 to December 2010 and it tends to increase at the very beginning of January 2011.

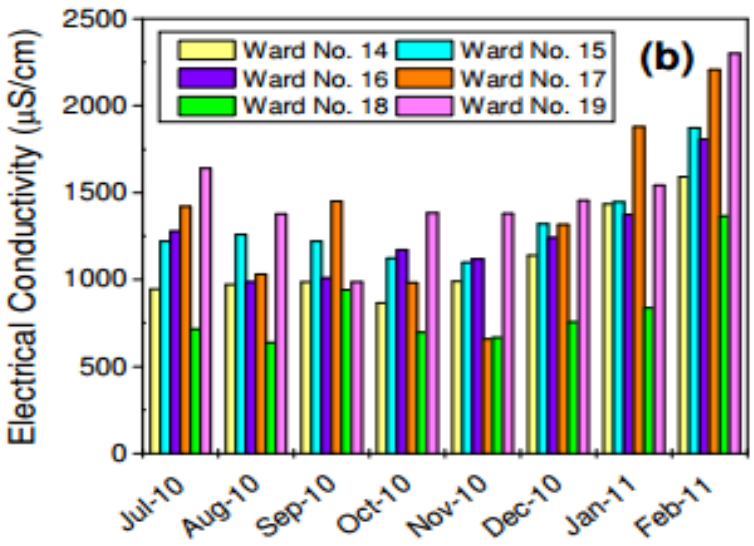

Figure 6: Electrical conductivity in the study area and other sites; Source: Adhikary et. al. 2011

The seasonal variation of salinity in the KCC area reveals that salinity has been started to increase gradually from November due to recharge of aquifers by saline water and in the month of February, it has been increased to a high value in all wards. Colours of water within the samples vary within the range of 2 to 74 pt. co. During the study period, almost all water samples exceed the permissible limits (15 pt. co) of GW colour in accordance with WHO (2006) allowable limit (Adhikary, Elahi and Hossain, 2012).

Climatic impact

Bangladesh is a signatory to United Nations Framework Convention to Climate Change (UNFCCC). Bangladesh is one of the very few countries that are going to be affected severely (Pender, 2008). Storm surge, salinity, sea level rise are the likely disasters that would affect human life. A subjective ranking of key climate change impacts and vulnerabilities for Bangladesh identifies water and coastal resources as being of the highest priority in terms of certainty, urgency, and severity of impact, as well as the importance of the resources being affected (Salauddin and Ashikuzzaman, 2011). These studies portray the vulnerabilities despite having lowest contribution in carbon emissions. The country is also incapable in reversing the situation.

Conclusion

Though KWASA's plan for increasing water coverage and adoption of new water sources are expected to be effective in providing better services for the city people, implementing challenges are manifold. Consideration of demographic attributes along with existing qualitative and quantitative assessment of water supply services illustrates that the surface and ground water resources are vulnerable. Furthermore, organizational coordination and perspicacious responses were prerequisite for successful implementation of the projects. Concerned authorities should also put emphasis on demand management side to have a strong grip on water consumption. An effective water supply system would be achievable only when properly mechanized demands

management approaches are in action. Inclusion of civil society, consumer and other stakeholder in water section planning and implementation is very crucial.

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