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PEOPLE-CENTRED APPROACHES TO WATER AND ENVIRONMENTAL SANITATION

Rural Piped Water Supply in Bangladesh: Myth or Reality

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Bangladesh achieved considerable progress in rural water supply since its independence in 1971. More than 97 percent of rural people have access to safe water within 150 meters. This scenario, in comparison to many other developing countries is excellent. The main source of safe water is ground water aquifer. At present, the average number of households per tube well varies from 2 to 5 (NAMIC, 2003 and 2004). This estimates considers both public and private tubewells. The number of private tube wells is a few times that of public tube wells indicating that the private sector plays a commendable role. The presence of arsenic in ground water overshadowed this success. The problem of arsenic contamination has become a matter of serious concern. It is estimated that about 29 million people are potentially at risk (Ahmed and Ahmed, 2002). Analysis of data on screening of tube wells shows that there are many villages where almost all water sources are arsenic contaminated. About 8000 villages have been found where arsenic contamination rate is 80% or more. It is an urgent need to provide safe water sources to those villages. Dug well, deep hand pump tube well, pond sand filter and rainwater harvesters are considered as alternative options for providing safe water. Arsenic removal technologies are also considered to treat arsenic contaminated water. All these alternative options are site specific and have some limitations. These alternative options cannot be considered absolute solutions. Removal technologies have also some limitations.Under such situation piped water supply using surface water or safe ground water in rural Bangladesh may be considered as long-term solution. Both government organizations and NGOs are now piloting more than 100 piped water supply schemes in the country. In this article, the author will try to explain prevailing situation in rural piped water systems and its prospect.

Government policy

Government has considered piped water supply system as a long-term solution. The government of Bangladesh organized an international conference on arsenic issue on January 14-16, 2002. The theme paper on alternative water supply options for arsenic affected areas of Bangladesh presented in that conference considered piped water supply is the ultimate goal of safe water supply to the consumer because: water can be delivered to the close proximity of the consumers, piped water is protected from external contamination, better quality control is possible and water of required quantity can be collected at ease (Ahmed and Ahmed, 2002).

Government of Bangladesh recently approved its arsenic policy and implementation plan. The policy opted piped water supply where it's feasible as alternative option to provide safe water supply. The mitigation plan also clearly says that the long-term goal should be to introduce piped water supply systems both in the rural and urban areas preferably based on surface water treatment. For the rural areas government shall facilitate testing and piloting of small-scale piped water supply systems based on improved dug well, pond sand filter or other surface water and safe ground water sources.

Cost

Usually piped water supply is very expensive and technically complicated. It demands very carefully designed system, which is economical in operation and maintenance. Tariff should be such that the system can be run in a financially viable manner to ensure funds available to operate and maintain the system. At the same time, tariff should be fixed at a level that each household is willing and able to pay it at their desired level of service. It's very difficult to design such a system if the density of population and number of targeted households are not high enough. In Bangladesh, it is an advantage that most of the villages are densely crowded.

People are used to have high level of services in water supply. On an average, there is one tube well for 2.5 households. As the emergence of arsenic in ground water changed the scenario, piped water supply appears to be a viable option to restore this level of service at a reasonable cost.

The figure -1 shows the costing of different options in use in rural Bangladesh (Vazquez, 2004). This figure is an outcome of joint exercise of Bangladesh Arsenic Mitigation Water Supply Project (BAMWSP) and World Bank. Analyses have been made to compare different available options including piped water supply. The vertical axis shows the Net Present Value (NPV) of each option providing same level of service. In calculating NPV, the capital cost required for installation plus the operational cost of each option has been considered.

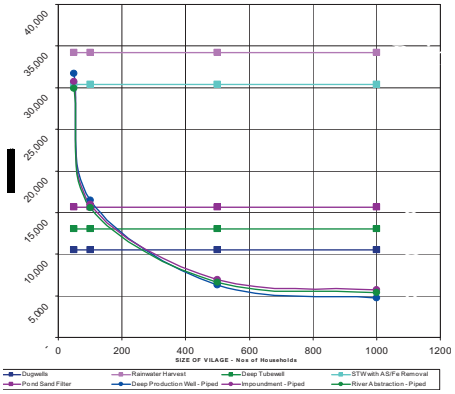

Figure 1. Net present values of different alternate options for Arsenic safe potable water supply

The rainwater harvesting seems to be most expensive option irrespective of sizes of villages. Arsenic removal technologies fitted with contaminated shallow hand pump tube well ranked second most expensive options. The graph shows that piped water supply is also very expensive but the cost per household decreases sharply with increasing number of households up to 500. However, the cost per household remains practically unchanged for villages having household more than 500.

Affordability

In 2001, Water and Sanitation Program of the World Bank conducted a study in rural Bangladesh to asses the willingness to pay for arsenic safe water (Ahmad et al, August 2003). The study analyzed factors that influence the demand for different alternative options and the preference of various household/community based arsenic mitigation technologies. The result of the study shows that the demand for piped water in arsenic affected areas increases with income and declines with an increase in the tariff of piped water supply. The matters of conveniences are considered as significant factors influencing household demand for piped water supply.

The Table-1 shows the estimated mean willingness to pay for piped water supply in the sample area. The study team examined and compared these values with existing piped water schemes and found that all these are higher than the actual costs for piped schemes. The study reveals that the piped water supply system seems to be viable in the country.

Table-1 Estimated mean willingness to pay for piped water supply (Ahmed et al, August, 2003).

	Public Stand Posts		Domestic Connections	
	O&M (Tk./month)	Capital Cost (Tk.)	O&M (Tk./month)	Capital Cost (Tk.)
All	51	960	87	1787
Poor	44	838	68	1401
Non-Poor	59	1119	112	2318

Water quality monitoring aspects

Since the detection of arsenic in ground water, water quality monitoring issues are getting more priority. All stakeholders including experts and government officials put emphasis on it. Department of Public Health Engineering (DPHE) in collaboration with World Health Organization is now developing water quality monitoring protocol. If the country goes for alternative options other than piped water supply to restore the service level as it was before the detection of arsenic, a large number of water sources are to be provided. Besides huge investment, this will entail elaborate mechanism for water quality monitoring. This will be costly, time consuming and very difficult to manage.

As water supply is a basic need for protection of public health, it is the government's responsibility to ensure easy access to safe water for its people. Each individual has the fundamental right to have an access to lifeline supply of safe water. Whoever may be the service provider, the government agencies, local government institutions, co-operatives, private sponsors either alone or in partnership with public agencies, the government can not deny its responsibility for monitoring the quality of supplied water and level of service provided to safe-guard public health. Because of limited resources, often government, especially in developing countries cannot pay proper attention to it. Simple, easy and cost-effective monitoring system may encourage the government in many developing countries to act in a positive way.

Piped water supply may offer such a simple and manageable monitoring mechanism, as it requires minimum number of monitoring points. Both the time and cost for monitoring will come down considerably. Monitoring mechanism will be less complex. Considering the water quality monitoring issue, piped water supply deserves high priority.

Existing and on-going rural piped water systems

Almost all rural piped water supply systems in Bangladesh are grant based. In general, communities are supposed to contribute 5 to 20 percent of construction cost. The rest are borne by the sponsoring organization. Tariff is fixed to cover operation and maintenance costs.

The DPHE, the national agency for water supply and sanitation has taken up 91 schemes under a cent percent government financed project. Few other schemes have been taken under UNICEF, DANIDA and UNDP assisted projects. These schemes are mainly focused to supply water for drinking and cooking purposes.

The schemes initiated through government's own resources are constructed by DPHE. Prior to construction, communities are consulted, mobilized and motivated to have a piped

water system. A users' group is formed. After commissioning the system this committee takes over the responsibility of operation and maintenance. Initially it was planned that the community will contribute 5-20 percent of the construction cost. In most of the cases till now, the community contributed 3-4% of the construction costs.

DPHE under UNICEF assisted action research project launched a piped water supply program with the help of a national NGO, BRAC (formerly known as Bangladesh Rural Advancement Committee). The NGO was given the full responsibility to implement the scheme. Villagers were motivated and mobilized in NGO spirit. Villagers formed users' committee and the responsibility of operation and maintenance was handed over to this committee. The committee has been functioning with continuous support from BRAC. The support also includes its micro-credit program.

DPHE has also initiated mini piped water supply schemes in arsenic affected villages under DANIDA assisted water supply program in coastal belt areas. In this program, piped water schemes are designed to provide water for drinking and cooking purposes. The community is involved from the beginning i.e., starting from needs assessment. The community has to share 10 percent of the capital costs. User groups have been formed in all proposed schemes. People have shown keen interest and are paying their contribution to the capital cost. These schemes are now under implementation.

The DPHE is implementing a sub-project named Community Water Supply and Sanitation Program (CWSSP) under UNDP assisted Sustainable Environment Management Program (SEMP). This program is implementing few simple piped water schemes in the rural area. Schemes under the first batch are for demonstration to create demand. No contribution from the community has been collected. However, communities have to pay 10% of total cost for demand-based schemes under second batch. Down payment is to be made by communities for two-third of the contribution. Rest of the amount is to be paid in installments over a year. Though constructions for demonstration phase are done by local DPHE, communities are responsible for construction of demand-based schemes. Operation and maintenance is the responsibility of the community. Community members decide whether they use piped water for drinking and cooking purposes or for all domestic purposes.

Rural Development Academy (RDA), Bogra, a government funded autonomous institution is also implementing piped water supply schemes under its own action research program. In this program, villagers are motivated and mobilized with meetings with the community leaders and elites of the village to form users' committee. The villagers have to share 10 % capital cost. The responsibility of operation and maintenance vests on this committee. This RDA approach differs with other DPHE/NGO schemes in one important aspect. RDA promotes use of water not only for domestic and small commercial purposes, also for irrigation. Virtually consumers do not need to pay for domestic uses.

Different studies show that high rate of withdrawal of ground water may induce mobilization and transport of arsenic in ground water and may contaminate aquifers safe at present. The RDA approaches for both irrigation and domestic supply from safe aquifer causes withdrawal of huge quantity of ground water and thus imposes high-risk of future arsenic contamination of safe ground water.

The NGO Forum for drinking water and sanitation, an apex body of NGOs working for the water supply sectors is also implementing few piped water supply systems in collaboration with its partner NGOs. SDC through its project Watsan Partnership Project (WPP) piloted one piped water supply scheme in collaboration with the Water and sanitation Program of World Bank. Asia Arsenic Network, a Japan based NGO is implementing one piped water scheme. This scheme is using surface water.

All above-mentioned schemes are mainly grant based. Involvement of private sector is limited to only design and construction on contract basis in some cases. The capital costs are mainly borne by the government or donors like DANIDA, UNICEF. Participation of private sector with capital investment is not yet tested in the country. DPHE under its World Bank assisted project, Bangladesh Arsenic Mitigation Water Supply Project (BAMWSP) and Social Development Foundation (A government owned foundation) with the assistance of World Bank are now going to pilot the involvement of private sectors to invest partially in rural piped system.

BAMWSP approach will support private sponsors' (including NGOs, private companies, co-operatives and Community based organizations) proposals to build and operate piped water supply systems in villages having more than 200 households. The project will pay the cost for feasibility study and project preparation to selected sponsors. If the feasibility study report is found acceptable and the scheme proposes provisions to serve poor people in a practical manner, BAMWSP will provide matching fund. The project's financing would be in the form of matching grants of up to 50% of capital costs, the sponsor finances 50% from its own equity, local bank loans and community participations. 40% of matching fund will be provided in installments after achieving pre-determined milestones and the rest 10% will be in the form of success bonus payable after successful operation of the schemes for at least three months.

Conclusion

Only few schemes already have been commissioned. Most of the piped water supply schemes are under the process of either implementation or planning. This is not the proper time to conclude any thing. However, it can be said that both the government and the community are very much willing to install piped water supply system. NGOs and donors are also very much keen to pilot piped water schemes in rural villages. A favorable environment exists for piped system. Piped water supply in rural Bangladesh is no longer a myth now; rather this is the demand of the time.

The DPHE has few laboratories with modern equipments

through out the country. Besides DPHE, there are several laboratories managed by universities, research organizations etc. These laboratories are quite capable of taking care of water quality monitoring issues. Considering water quality monitoring issues, scale up of rural piped water supply program is not a big problem.

However, careful evaluation of all these pilots are needed to develop technically feasible, environmentally sound and financially viable methodologies and approaches prior to scale up. At this stage, it cannot be told that rural piped water supply schemes are fully successful, but it can be stated that the proposition of rural piped water supply reveals a potential option to address the water supply problem in Bangladesh.

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