Saving People from the Brunt of Salinity

The coastal communities of Bangladesh face multiple hazards which are getting more diverse and severe in the last few decades. Natural calamities like cyclones, storm surges, tornadoes, seawater encroachment in the eco-system and saline water intrusion in groundwater are the most common phenomena. The recent natural calamities caused unfavorable environment and hydrological situation much in these areas which destroyed the sweet water sources and accumulated severe impacts on the water resources especially in the south-west coast of Bangladesh. This has turned the areas vulnerable, depriving the people from their rights to safe & sweet water. But the fact is that, not only climate change but also some human induced activities like haphazard shrimp-cultivation, improper water resource management, and lack of suitable initiatives are also largely responsible for making the south-west coast of Bangladesh almost inundated with extreme intrusion of saline water.

Though the Government, development partners and NGOs are working and many projects have been undertaken; numerous researches have been conducted and many are going on to win the water crisis of coastal areas but expected result appears to be far reaching to establish the water-rights especially for the south-west coastal zone.

Vast arable lands and water bodies in coastal areas are in the grip of shrimp farming using saline water

Typical queue of water collection in the south-west coast

Coastal women's daily struggle for collecting sweet water

Finding a Feasible Option

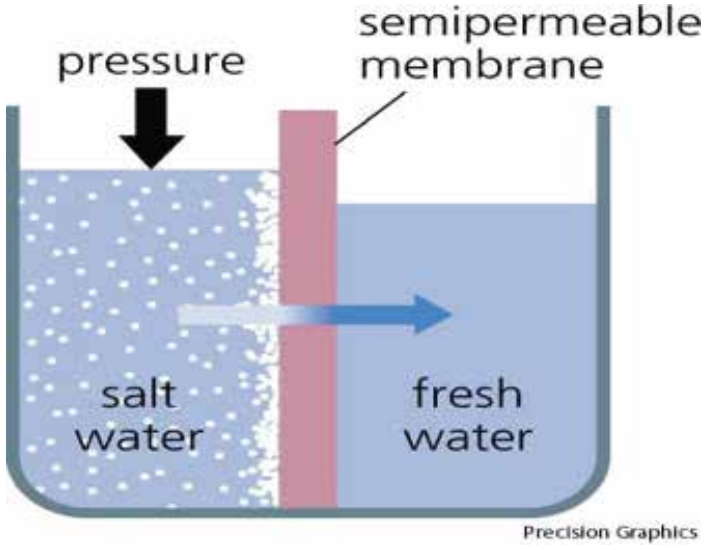
To ensure safe water supply in the coastal areas combating the salinity challenge, NGO Forum for Public Health has considered Reverse Osmosis as a context-specific and disaster-resilient desalination option. It requires considerably less energy to operate and is more attainable to the saline-prone coastal areas. NGO Forum has been promoting the Reverse Osmosis as a feasible technological option covering the extreme saline zone of the country. The exposed coastal zone under different hard-to-reach areas where salinity is the major threat to fetch safe drinking water is being covered by NGO Forum with the promotion of Reverse Osmosis. The Option is installed through sharing of cost & required land by the respective LGIs & the surrounding community in line with the relevant *National Policy*. However, to ensure its operation & management in smooth manner, a trained Caretaker is appointed under the authority of the respective Union Parishad. The Caretaker also collects a set amount of tariff as a means of O&M of the Option.

Reverse Osmosis − The Technology

Desalination by Reverse Osmosis requires the use of an osmotic membrane (allows water to pass through it at much higher rates than dissolved salts). Saline water can be drawn from a groundwater source using submersible pump as a power source of electricity. Typically, groundwater is preferred because it provides low turbidity-fed water requiring less pretreatment. Shallow groundwater of the coastal belt with moderate salinity concentration (EC 5000-6000 µS/cm) is used as raw water for desalinization plants. Osmotic membranes occur naturally in living organisms everywhere. The osmotic membrane also is referred to as a semi-permeable membrane because of its capability to allow some constituents to pass through it while holding back others. The osmosis phenomenon in nature is one where a dilute solution is transported across a semi-permeable membrane toward a concentrated solution on the other side.

Technical Distinctness

- Suitable for coastal areas where salinity concentration is high in both surface and groundwater;
- Environment-friendly and disaster-resilient water supply option;
- Suitable for long-term service in a community-managed approach;
- Requires comparatively less energy to operate;
- Initial investment is high but can cover more beneficiaries and in turn makes it cost-effective.



Prospects and Maintenance Issues

- The overall cost has been calculated BDT 0.31 per litre excluding infrastructure cost;
- The membrane media requires replacement after certain period depending on the salinity concentration in raw water;
- Ensuring LGI's contribution through cost-sharing established its ownership and increased the technology's life-cycle.
- Ensuring community's ownership through cost sharing and monthly tariff for O&M has also enhanced sustainability of the Option.

Walking Miles for Collecting Sweet Water

The villagers of Perikhali union under Rampal upazila in Bagerhat district are walking 3 to 4 kms path for collecting sweet drinking water from a Reverse Osmosis (RO) Desalination Plant. This RO that is now their only option for availing saline and turbidity-free sweet water. Men and women from at least 5 to 6 villages were coming to Shingarbuniya village where the Plant is located. Prior to this facility, the villagers used to drink and use highly salinity-affected pond water. Abdul Hannan of Ranjaypur village under ward no. 5 of Perikhali union had no other options but to use saline water of a nearby pond. Skin infections, indigestion and stomach cramps were his daily companions. His family members also more or less suffered from such illnesses. A certain portion of his earning was regularly spent for treating these illnesses. When Abdul Hannan came to know about the desalination plant in Shingarbuniya village, he went there for himself to know about the details of the technology and its service. Since then, he walks 4 kms distance to collect safe water in regular basis. Abdul Hannan describes the benefits saying, "I don't have any stomach cramps now. Also, all of my family members are physically well. We are drinking this saline-free sweet water regularly." Similar stories can be heard from different villages under the entire union. People are crossing miles to avail safe and sweet water at a very cheap rate. The Reverse Osmosis Desalination Plant was installed in November 2013 in collaboration with the Perikhali Union Parishad and with the financial support of Swiss Agency for Development and Cooperation- SDC. It initially brought benefit to 250 households of three villages- Shingarbuniya, Ranjaypur and Aariyadanga. Later, people from other distant villages also started collecting water from the Plant as it was the only safe and sweet water option available to them. The Plant has a capacity of supplying 750 litres of water every hour. The service charge is claimed BDT. 0.31/litre. The total cost of the Plant was BDT. 12,09,996 of which Perikhali Union Parishad shared BDT. 50,000 and the community made a contribution by providing 2 decimals of land for establishing the Plant.

Acknowledgement from GoB and Development Partners

Dr. Nomita Halder ndc, PS-2 to the Honorable Prime Minister inspected the Desalination Plant with Reverse Osmosis Technology promoted by NGO Forum jointly with Perikhali Union Parishad in Rampal, Bagerhat on 28 December 2014 as part of an official visit. The Visit acknowledged the feasibility of the Technology installed with the support of Swiss Agency for Development & Cooperation - SDC that has a capacity of treating 750 litres/hr and can treat saline water of 46,000 mg/1 Chloride. It was appreciated that the Technology is supporting more than 300 poor and disadvantaged HHs in getting salinity, iron, TDS, hardness and manganese-free water.

A 15-member high level convoy consisting members of International Development Cooperation related Swiss Advisory Commission visited Bangladesh from 11 to 18 November 2014. The objective of the Visit was to experience the potentialities and challenges in the development field of Bangladesh. The International Development Cooperation related Swiss Advisory Commission is an important consultative institution of Switzerland. The Commission renders advice to the Ministry of Foreign Affairs and the Ministry of Finance in relation to international development cooperation. Swiss Parliamentarians, academics, business men and NGO representatives were in the visiting team. During the Visit, the Convoy visited the Reverse Osmosis Desalination Plant in Perikhali union and exchanged opinions with civil society members, local partners, and community people. The Convoy of Swiss Advisory Commission expressed a positive notion regarding the effcacy of the high-tech option in the geophysical, socio-economic and environmental contexts of the region.

Scope of Scaling-up

Reverse Osmosis is a relatively expensive way of removing salinity for ensuring access to safe drinking water. However, estimated life-cycle of the Reverse Osmosis proves its financial viability. NGO Forum's 4-year experience & learning has confirmed that the Reverse Osmosis appears to be a feasible facility, manageable by the UP & the respective community. It is a proven case which is managed by community people in self-sustaining manner. It has been found as a feasible option centering several factors including availability & efficiency of salinity removal, operating techniques and maintenance, replacement cost of materials and environmental impact of the waste water. User groups are satisfied with the quality and quantity of water in the highly sweet water-stressed coastal zone. The decision-makers in the Government and sector experts & professionals have also found the Option feasible to be scaled-up.

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