german cooperation
DEUTSCHE ZUSAMMENARBEIT

Implemented by:
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

In cooperation with:

Solar Pumping System for Drinking Water Supply

Background

Bangladesh is one of the most climate vulnerable countries in the world. The coastal areas of Bangladesh, especially in the southwest, are suffering severely from the effects of climate change. Natural disasters such as cyclones and floods are occurring more frequently. During the last severe cyclones Sidr and Aila in 2007 and 2009 respectively, large areas of Bangladesh were flooded by strong tidal surges. Many areas were inundated with sea water, causing ponds and other water bodies to become logged with condensed saline sea water, making them unsuitable for human consumption. Additionally, due to climate induced salinity, severe scarcity of drinking water now prevails in the coastal areas of Bangladesh.

People, especially women and children, have to collect drinking water from distant sources spending an average of 4-5 hours a day and often need to walk 2-3 km. They often have no other choice but to drink unsafe water or spend their limited financial resources for transporting and purchasing drinking water. Due to drinking unsafe pond water, people frequently suffer from diarrhoea, dysentery, cholera, typhoid, worm infections and other waterborne diseases. By drinking saline water they suffer from hypertension, heart diseases, skin diseases, common cold, etc.

Our Approach

To address this crucial problem, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), through its Renewable Energy and Energy Efficiency Programme (REEEP), started installing Solar Photovoltaic Pumping (PVP) systems for drinking water supply in 2010. Sustainable and Renewable Energy Development Authority (SREDA) is REEEP's Bangladesh Government Counterpart.

Overall GIZ has supported the construction of 122 solar-powered facilities, partly in cooperation with the Comprehensive Disaster Management Programme (CDMP) of the Bangladesh Ministry of Disaster Management and Relief. Two of the sites are equipped with a desalination system. The capacity to pump andpurify up to 1.9 million litres of drinking water every day has been installed so far.

The systems draw water from surface ponds or under-ground sources and pump it into water tanks mounted on hurricane proofoverhead concrete platforms. From here a number of pipes lead to various water distribution points in the villages. Groundwater sources are being used for 30 plants, surface water sources for 90 plants, and desalination sources for two plants. Over-all about one million litres can be drawn from surface water sources and about 0.9 million litres can be drawn from groundwater sources.

The ground water source is used where potable (non-saline) water is available and in this case no filtration system is required, as it comes from deep aquifers. Pond Sand Filter (PSF) is a conventional and popular system for the treatment and cleaning of low-saline surface water to make it potable. It iscost-effective with high efficiency for removing turbidity and bacteria. PSF is usually installed near ponds that should not beused for washing and bathing purposes.

The capacity of PSF is based on the availability of water throughout the year. Moreover, the construction of similar plants, supported by the active involvement of the community for using and maintaining these systems demonstrates a high degree of acceptability and sustainability. Each water supply system comprises of several components: (1) filtration system (for pond water) (2) solar pumping system, and (3) distribution system. The advanced PSF system comprises of three horizontal successive sets of chambers. One typical filter chamber contains a layered graded sand bed and graded brick chips through which the water trickles.

Water from the pond is pumped into the first chamber from which it seeps into the filter bed in the next chamber. Potassium Aluminum Sulfate (locally available and known as 'Fitkari') solution is mixed with water in the second chamber. Fitkari has antiseptic and antibiotic properties. It can also clump negatively charged particles

Photos : Communities from cyclone affected coastal areas of Bangladesh collect water from solar powered drinking water pumps

to form flocks that settle at the bottom so that water can be filtered easily.

An activated carbon bed is added to the last filter chamber, which can effectively reduce certain organic and chlorine compounds. It can also reduce the quantity of lead, dissolved radon, taste and odour causing compounds. The accumulated filtered water is lifted to an overhead tank.

In case of groundwater systems, a submersible pump is dipped into the borehole for lifting water to an overhead tank. Food grade High Density Polyethylene (HDPE) pipe is used for gravity flow based water distribution system. Underground pipe lines are placed usually by the roadside to provide water to 'standpipe' dispensers/taps near community dwellings.

Individual Plant Management Committees (PMCs) are formed for each plant, which are responsible for overall management of the plant and for ensuring equal drinking water access for all beneficiary households. A caretaker appointed by the PMC conducts regular and periodic maintenance of the plants. All expenses including maintenance and salary of the caretaker are covered by the contributions of the beneficiary households.

The Way Forward

After successful piloting, REEEP's government counterpart SREDA is in the process of handing over all the pumps to the Department of Public Health Engineering (DPHE), the mandated local government agency for drinking water supply in rural areas. In addition, GIZ has initiated a project proposal for scaling up solar water drinking water pumps to be funded by the Green Climate Fund (GCF) and to be implemented by DPHE in cooperation with SREDA.

Published by
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices Bonn and Eschborn, Germany

Renewable Energy and Energy Efficiency Programme
PO Box 6091, Gulshan 1
Dhaka 1212, Bangladesh
T + 880 2 5506 8746-52
F + 880 2 5506 8753
giz-bangladesh@giz.de
www.giz.de/bangladesh

Author: Sajib Sen

Layout: Ananya Rubayat

As at: June 2017

GIZ is responsible for the content of this publication.

In cooperation with

On behalf of: Federal Ministry for Economic Cooperation and Development (BMZ)

Addresses of the BMZ offices

BMZ Bonn
Dahlmannstraße 4
53113 Bonn, Germany
T +49 (0)228 99 535-0
F +49 (0)228 99 535-3500

BMZ Berlin
Stresemannstraße 94
10963 Berlin, Germany
T +49 (0)30 18 535-0
F +49 (0)30 18 535-2501

poststelle@bmz.bund.de
www.bmz.de