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Solar Pumping System for Drinking Water Supply

Bangladesh is the most vulnerable country to the global climate change in the world. The coastal areas of Bangladesh, especially the southwestern ones, have already started suffering severely from climate change effects. 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 accompanying strong tidal surges. Many areas were inundated with sea water of the Bay of Bengal, causing traditional ponds and other surface water bodies to become water logged (with highly saline sea-water) making these unsuitable for any form of human consumption.

Severe scarcity of drinking water is now prevailing 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 walking 2-3 km. People often have no other choice but to drink unsafe water or spend their limited financial resources for transporting or 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.

To address this crucial problem, SED started installing Solar Photovoltaic Pumping (PVP) Systems for drinking water supply in 2010. In 2010 and following years special funds were allocated for climate change adaptation activities by the German Federal Ministry for Economic Cooperation and Development (BMZ). In 2010, 12 units of solar–powered water pumps and filtration systems were installed. In 2011, additional 65 such systems were installed for which Comprehensive Disaster Management Programme (CDMP) of the Bangladesh Ministry of Disaster Management & Relief contributed pipelines and standpipe dispensers for 59 plants. Another 25 such plants were installed in 2012-13. Further 3 units are to be equipped with solar powered desalination systems. Groundwater sources are being used for 30 plants and surface water sources for 75 plants, amongst a total of 105 systems so far, resulting in a total capacity to supply more than 1.8 million liters of clean drinking water per day. More than 800,000 people benefit from clean drinking water from those installations.

Solar Water Pumping System in Coastal Area of Bangladesh

The groundwater source is used where potable (non-saline) water is available and in that 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 is cost-effective with high efficiency for removing turbidity and bacteria. PSF is usually installed near ponds that should not be used for washing and bathing purposes. The capacity of PSF is based on the availability of water throughout the year. The active involvement of the community for using and maintaining these systems demonstrates a high degree of acceptability and sustainability.

Drinking Water Collection by Boat in Sundarban Area

Each water supply system comprises of several components: (1) Filtration system (for pond water) (2) Solar pumping system (3) Distribution system. GIZ's advanced PSF system comprises of three horizontal successive set 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 to form flocks that settle at the bottom; therefore water can be filtered easily. An activated carbon bed is added to the last filter chamber. Activated carbon filtration can effectively reduce certain organic and chlorine compounds. It can also reduce the quantity of lead, dissolved radon and taste- and odor-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. Pipe lines are placed underground usually by the roadside to provide water to 'standpipe' dispensers/taps near community dwellings.

Individual Plant Management Committee (PMC) is formed for each plant that is responsible for overall management of the plant and for ensuring equal access of all beneficiary households to drinking water. Regular and periodic maintenance of the plant is taken care of by a caretaker appointed by PMC. All expenses including maintenance and salary of the caretaker are covered by the contributions of the beneficiary households.

Collecting Water at 'Standpipe' Dispenser

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