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Electronic Newsletter on DEWATS Information for Sustainable Sanitation

Volume 7
Issue 2

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<http://www.biosolids.org/>

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Test your knowledge...

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Prologue:

We present the March 2009 issue of e-Disha. This issue highlights the impact of our Project, our decentralisation efforts and our efforts to learn from our experiences. We have worked hard on the ground and now focus with renewed efforts with our Partners in disseminating what we have learnt. We thank you for your constant support and encouragement.

The Editorial Team would be pleased to receive feedback and suggestions. Contributions to the Newsletter are most welcome.

Picture of the month:



SHG members of East Devadhanam with their crops grown using treated wastewater

East Devadhanam is a peri-urban slum, located in Trichy, with a population of 2000. The CBS-DEWATS unit (toilet with treatment unit), was constructed in May 2005 with the goal of improving hygienic conditions of East Devadhanam. The DEWATS unit is operated and maintained by local self help groups [SHG]. The treated wastewater is reused for gardening and horticulture.

The previous years' wastewater monitoring data shows that treated wastewater parameters comply with the CPCB irrigation standards. The treated wastewater is reused for irrigation of an adjoining farm land growing pumpkins, ladies fingers and other vegetables. The DEWATS unit provides the opportunity for income generation to the SHG through the sale of these vegetables.

Project fact sheet:

DEWATS at BTH Sarovaram, Ernakulam

<http://www.borda-sa.org/modules/wfdownloads/visit.php?cid=6&lid=31>

Research on sanitation:

Reference may be made to "Improve Food Security - Combine Productive Sanitation, Conservation Agriculture and Water Harvesting", Seminar proceedings from the 2008 World Water Week

Click here to read more:

http://www.ecosanres.org/WWW2008_ImproveFoodSecurity.htm

DEWATS Elements:

Planted Gravel Filter Design:

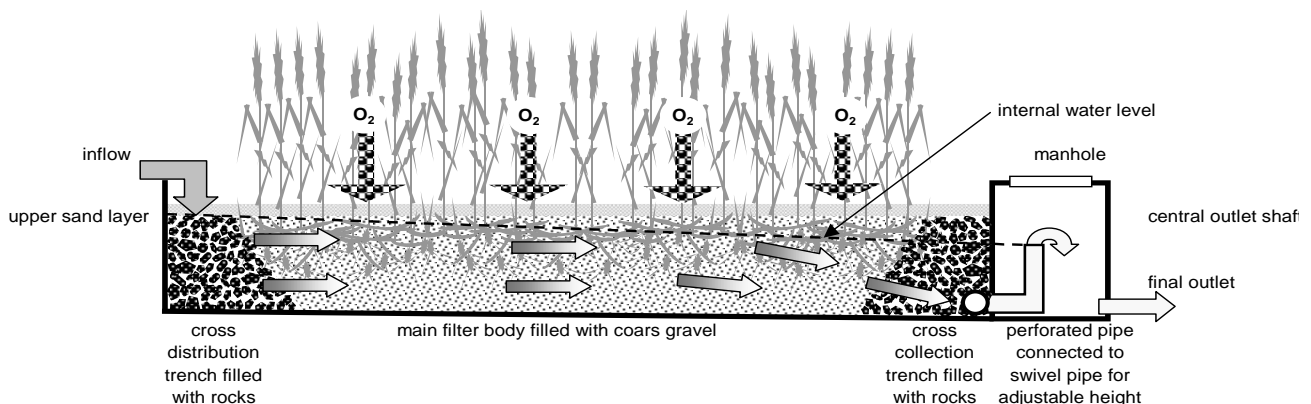
The planted gravel filter (PGF) is a tertiary treatment module in DEWATS. It is suitable for pre-settled or pre-treated wastewater with the Chemical Oxygen Demand (COD) not higher than 500 mg/l. It is designed to carry out biological conversion, physical filtration and chemical adsorption.

The PGF is a large and shallow filter bed with plants growing on the filter media. The dimensions of the PGF are based on the hydraulic or the organic loading as well as temperature and grain size of the filter medium. Finally, the desired effluent quality will then determine the hydraulic retention time (HRT), which in turn will determine the size of the PGF. The pore space determines the conductivity and the contact surface.

The filter material consists of graded gravel of sizes 6-12 mm or 8-16 mm. A rather flat slope ($\alpha < 45^\circ$) should join one-grain size to the other in order to obtain a larger connecting area. In case the length of the filter bed is more than 10 m, an intermediate channel for re-distribution of cross-flow should be provided. The depth of the filter bed should not be deeper than the depth to which plant roots can grow (30-60cm), as water will tend to flow faster below the dense cushion of roots.

The cross-section area of the inlet zone should be determined according to the conductivity of the filter material to ensure hydraulic flow. Reliable and equitable distribution of wastewater is assured by various mechanisms over the full width of the inlet zone. For equally distributed reception at the outlet side, a trench filled with rocks of 50-100mm diameter is provided. This forms the collection trench. A perforated pipe that is connected to the outlet pipe lies below the strip of rocks. The height of this outlet is adjustable through a swivel arm fixed to the flexible elbow of the outlet. The height can be adjusted according to the flow of wastewater for effective treatment. For smaller flow, the elbow position is lower and for larger flow, higher. The bottom slope from inlet to outlet should be maintained at least at 1 % to ensure flow velocity and related conductivity.

A well-designed PGF will obtain a BOD reduction of 75-90% and pathogen removal of over 95%.



Planted gravel filter

Wastewater Analysis:

Ammonium Cell Test

For the determination of nitrate in the range 1-50mg/L $\text{NO}_3\text{-N}$

I. Preparation

- Replace the black screw cap of the reagent bottle NH4-1K with the blue dose-metering cap.
- Check the ammonium content. Samples containing >80 mg/l $\text{NH}_4\text{-N}$ (103 mg/l NH_4^+) must be diluted with distilled water.
- The pH range of the sample is 4-13; the pH range of the measurement solution is 11.5-11.8.
- The temperature of the pretreated sample should be $20\text{-}30^\circ\text{C}$.

II. Procedure

Follow the stepwise procedure as depicted on the relevant information card in the Spectrophotometer.

1. Ammonium 0.01-2.0 mg/l $\text{NH}_4\text{-N}$
2. Ammonium 0.2-8.0 mg/l $\text{NH}_4\text{-N}$
3. Ammonium 0.5-16.0 mg/l $\text{NH}_4\text{-N}$
4. Ammonium 4.0-800 mg/l $\text{NH}_4\text{-N}$



Important

- ☞ Wastewater analysis should begin immediately after sampling
- ☞ If ammonium concentrations exceed 5000 mg/l, other reaction products are formed and false low readings are obtained. In such cases, the sample should be diluted and a plausibility check conducted.

Interview:

Highlights of the DEWATS at the Spastics Society, Chennai
Interview with Mr. Dominik Hock, Technical Advisor & Regional Manager, CDD RCO-Chennai



Pic 1.: Spastic Society, Chennai



Pic 2.: Spastic Society, Chennai

Short background of project

Spastics Society Tamil Nadu (SPASTN) has requested CDD-RCO Chennai to design a DEWATS unit for their campus to ensure the reuse of treated wastewater for irrigation purposes as well as for flushing the toilet system. SPASTN aims at improving the sewage system even if it is already connected to the municipal treatment sewer line.

01. What is the source and quantity of wastewater proposed to be treated?

SPASTN is constituted of several buildings and other units, on its campus. Whereas the entire amount of water used per day is around 25 m^3 , SPASTN requires CDD-RCO to design a treatment system for about $10 \text{ m}^3/\text{d}$ of wastewater. The wastewater source is mainly from toilet usage as well as effluents from the kitchen and the canteen.

02. Which of the DEWATS modules are to be incorporated in the treatment unit and why?

As the quantity of water is less and there are times of infrequent usage it is planned that the DEWATS unit will be designed with a settler followed by an anaerobic part existing of baffled reactor and anaerobic filter and a planted gravel unit at the end of the unit.

03. Will the treated effluent be re-used and if so, for what?

Yes, the idea of constructing a DEWATS unit at SPASTN Campus is to reuse the treated effluent for irrigation purposes as well as, if possible, for flushing the toilet system. To reflush a toilet system with treated water, the effluent quality, however, should be high enough (BOD: $\sim 5 \text{ mg/l}$) to avoid further complications.

Further information about Spastics Society Tamil Nadu can be taken from webpage, www.spastn.org

Events:

- Upcoming workshop on “Simplification of DEWATS Design”, 4th to 6th March, 2009

This Workshop is being organised with the object of discussing simplification options for DEWATS design and implementation across the BORDA Network. The expected participants are key staff members from South Asia, South East Asia and SADC region.

The 3-day session will start with an Introductory Session and a collection of current practices for DEWATS design and implementation that will bring out the possibilities for simplification options. This will be followed by an analysis and short listing of the most rewarding simplification options. The Workshop will be conducted using video conferencing facilities bringing remote participants together through a common platform.

The expected outcome from this Workshop is a practical list of simplification potentials for DEWATS based on the experience of practitioners.

Interesting Link:

<http://www.biosolids.org//>

The National Biosolids Partnership

A nonprofit alliance formed in 1997 with the National Association of Clean Water Agencies (NACWA) (formerly Association of Metropolitan Sewerage Agencies), Water Environment Federation (WEF), and U.S. Environmental Protection Agency (EPA), NBP aims to advance environmentally sound and accepted bio-solid management practices.

Quiz - Test your knowledge on Sanitation:

Q. What percentage of the world population does not have access to a toilet or a latrine?

Hint: youthink.worldbank.org/ issues