Factsheet on Decentralized Wastewater Treatment Systems (DEWATS) **3**

DEWATS FOR ENPHO

Baneshwor, Kathmandu, NEPAL

Project Background

Environment and Public Health Organization (ENPHO) constructed an on-site DEWATS system in 2002 to demonstrate the reed bed wastewater treatment technology it has pioneered and promoted across Nepal.

The system demonstrates application of DEWATS in an office complex in central Kathmandu and it is effective in minimising impact of wastewater disposal on the environment (particularly from the laboratory) and providing water to the office for flushing and cleaning, which is a valuable resource considering the scarcity of water supply in Kathmandu Valley.

Kind of Project	DEWATS-SME (Institutional)
Funding Agency	ENPHO (Private)
Implementing Agency	ENPHO
Construction Period	2002
Construction Cost	NRs. 40,000 (US$ 513)

Purpose

- To treat the wastewater generated from the office building and laboratory so as to minimize the environmental impact of contaminants on nearby waterways.
- To provide a sustainable water supply through wastewater reuse for all non-potable requirements within the building as well as cleaning vehicles, gardening and other outside requirements.
- To demonstrate the benefits and compact size of DEWATS in urban areas as an educational tool to all visitors to the office.

System in Brief

A small scale system comprising of multiple settling tanks and one vertical flow constructed wetland. The natural terrain allows the system to flow by gravity.

- Brick septic tank
- Two PVC settling tanks in series
- Vertical flow constructed wetland
- Collection chamber for reuse
- Rainwater harvesting

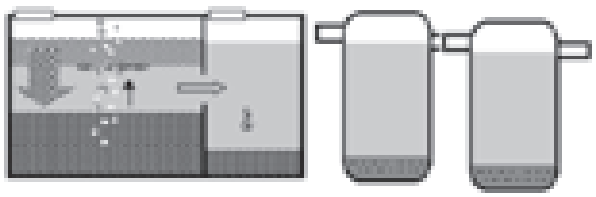
Salient Features

No. Treatment Plants	1
Source	Combined laboratory and domestic wastewater
Design Capacity	0.7m^3/d
No. Users	7 equivalent population based on 45 staff
Peak flow	1.1m^3/d
Influent Quality	BOD 310mg/L
(2010)	COD 583mg/L
Effluent Quality	BOD 5mg/L
(2010)	COD 55mg/L
Efficiency	98% BOD, 91% COD

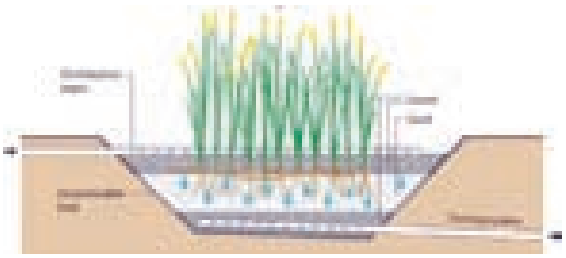
Modules Adopted

Settling Tank - 3 Units	
No. Tanks	3 in series
Settler Volume	First 2m^3, others 0.5m^3
Area Construction	First 2m^2, other 0.6m^2
Planted Gravel Filter: 1 Vertical Reed Bed	
Surface Area	15.5m^2
Depth	0.9m
Filter Material	Coarse sand & gravel
Plants Used	*Phragmites karka,* Canna, *Ginger Flower*
Built Up Area	18m^2

Typical Drawing of Components



Settling Tanks



Vertical Wetland

Operation and Maintenance

Regular maintenance works comprise of removal of unwanted vegetation from the beds and cleaning of the inlet system. The removal of unwanted vegetation is carried out monthly along with the general cleaning works by ENPHO staff. Vegetation is harvested twice a year. The sludge from the settling tank is generally de-sludged at an interval. The sludge is removed by tanker and disposed off-site.

Due to clogging on the surface of the bed, the top layer of the bed was removed and filled with coarse sand in 2005.

The operation and maintenance costs are reported to be negligible and carried out by existing staff. Recycling of waste water and rainwater harvesting saves around NRs 4000 per month otherwise spent in buying water.

Reuse Options

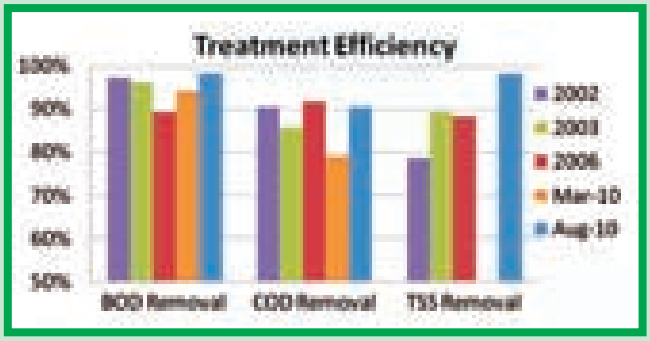
The treated wastewater is reused for various purposes at the site including toilet flushing, washing cars, cleaning and gardening. Due to the variability of the quality of wastewater discharged from the laboratory it is preferred to minimise the reuse options in direct contact with public.
Rainwater is collected and supplemented by the municipal supply to meet the other indoor water requirements at the office. This water is treated using a biosand filter, SODIS and chlorination for drinking water supply.

Monitoring Results

The reed bed system at ENPHO has been monitored regularly since 2002 with the most recent monitoring in July 2010. The summary of the 2010 results is shown in table below and the system efficiency since construction is shown in the graph.

Parameters	Influent	Effluent	% change
pH	2.8	6.2	NA
TP (mg/L)	3.6	2.4	33%
TN (mg/L)	50.1	20.4	59%
TSS (mg/L)	250	12	95%
BOD5 (mg/L)	310	5	98%
COD (mg/L)	583	55	91%
DO (mg/L)	1.8	1	44%

Data from 2010



Site Photos

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