EXISTING DEWATS IN NEPAL

SN	Location	Type	Year Built
1	Dhulikhel Hospital	Hospital	1997
2	Dallu, Private House	Domestic	1998
3	Kathmandu University	Institutional	2001
4	ENPHO	Institutional	2002
5	Malpi International School	Institutional	2002
6	Sushma Koirala Memorial Plastic & Reconstructive Surgery Hospital	Hospital	2002
7	Kapan Monastry	Institutional	2002
8	Private House at Dallu	Domestic	2002
9	Septage Treatment, Pokhara	Community	2003
10	Shuvatara School, Lamatar	Institutional	2004
11	Surya Tobacco	Industrial	2005
12	Private House, Bishal Nagar	Domestic	2005
13	Sunga, Thimi	Municipal	2006
14	Kirtipur Housing Community	Community	2006
15	Kusunti Housing Community	Community	2007
16	Ilam Polyclinic	Hospital	2007
17	Sano Khokana Community	Community	2008
18	Srikhandapur	Community	2008
19	Monastry in Pharping, Dakshinkali	Institutional	2009
20	Private House at Kirtipur	Domestic	2010
21	ICIMOD, Khumaltar	Institutional	2010
22	Ama Ghar, Bishankhu Narayan VDC, Godawari	Institutional	2011
23	Central Horticulture Centre, Kirtipur	Institutional	2011
24	Hotel Park Village, Pokhara	Institutional	2011
25	Nala, Ugrachandi VDC	Community	2011
26	Shree Satya Sai School, Tokha	Institutional	2014
27	Lumbini Medical College, Butwal	Institutional	2012
28	Shiddhartha Children & Women Hospital , Butwal	Institutional	2012
29	Gokarna Deshe village-1, Kathmandu	Community	2014
30	Gokarna Deshe village-2, Kathmandu	Community	2015

Future DEWATS projects opportunities in Nepal:

- Small to large scale community/municipality;
- Private houses;
- Institutions, Offices, Hospitals, Schools;
- SMEs, Hotels, Restaurants;

DEWATS IN NEPAL

Decentralised Wastewater Treatment System

Consortium for DEWATS Dissemination Society

BORDA Bremen Overseas Research and Development Association

UN HABITAT FOR A BETTER URBAN FUTURE

ENPHO Creating Eco Societies — Environment and Public Health Organisation

A simple and effective solution to improve sanitation in Nepal

The **Consortium for DEWATS Dissemination (CDD)** Society is a not-for-profit organisation which aims to promote and improve the social, economic and environmental conditions of the less privileged, disadvantaged and marginalised people in South Asia through the provision of decentralised basic needs services (DBNS). The Society works through its network of likeminded partners across India, Nepal and Pakistan.

Bremen Overseas Research & Development Association (BORDA) works with local partners to facilitate implementation of sustainable solutions for poverty alleviation and environmental protection.

Environment and Public Health Organisation (ENPHO) established in 1990 in Nepal as a service oriented NGO that contributes in sustainable community development by combining research and actions through the integrated programs in environment and public health. For over a decade, ENPHO has been promoting sustainable sanitation options such as DEWATS and ECOSAN toilets as well as hosting the Nepal Node for Sustainable Sanitation. ENPHO has been constructing and promoting DEWATS in Nepal since 1997. ENPHO has been a member of the CDD Society since 2008 and continues to work with BORDA, UN HABITAT and other organisations to improve sanitation in Nepal.

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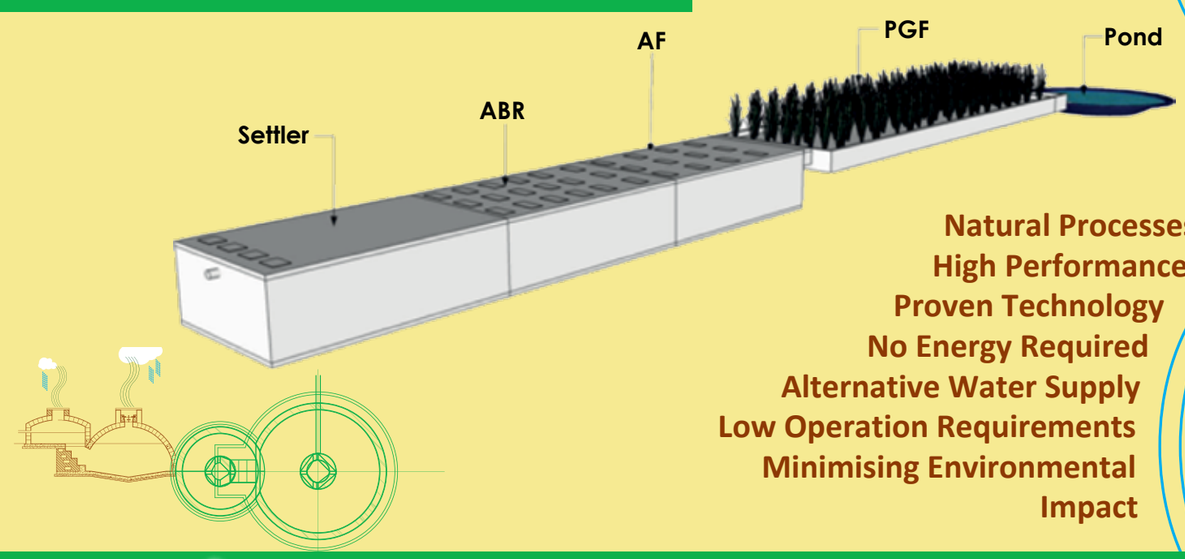


Natural Processes
High Performance
Proven Technology
No Energy Required
Alternative Water Supply
Low Operation Requirements
Minimising Environmental Impact

ENPHO Creating Eco Societies — Environment and Public Health Organisation

what is dewats?

Decentralised Wastewater System (DEWATS) can be described as a low maintenance treatment system, treating small volumes of wastewater for resue or discharge within National Standards. DEWATS generally treats domestic wastewater originating from individual or groups of dwellings, businesses or institutions that are located in close proximity to each other and the DEWATS site.

Unlike conventional wastewater treatment plants, DEWATS promotes technologies that use natural processes and are simples in operation and maintenance. In DEWATS, natural treatment processes are achieved through methods that make use of physical principles combined with biological activities of microorganisms. Bacteria colonies in the treatment devices are generated from microbial populations that occur naturally in the wastewater.

The size of a DEWATS can range from individual onsite systems that serve one household or institution; to shared facilities that serve up to ten households or public/community facilities serving up to 2000 households. Since the distance between the point of origin and treatment of wastewater is small, elaborate collection systems and pumping equipment is avoided thereby reducing costs. This also allows for easier reuse of treated water which again makes the whole system cost efficient.

NEPAL DISCHARGE STANDARDS FOR TREATED WASTEWATER

Nepal Population and Environment, 2003

Parameter	Limit		Parameter	Limit
BOD_5	50mg/L		TSS	50 mg/L
COD	250mg/L		pH	5.5-9.0
NH_4	50mg/L		Oil & Grease	10mg/L

modules of dewats

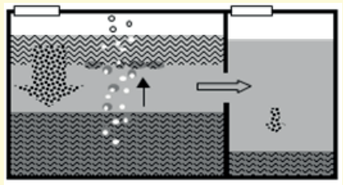
There are many phases in a wastewater treatment system, dependent on volume, type and quality of wastewater, and the discharge quality requirements. The DEWATS modules commonly used by ENPHO, to meet the Nepal Wastewater Discharge Standards are as follows:

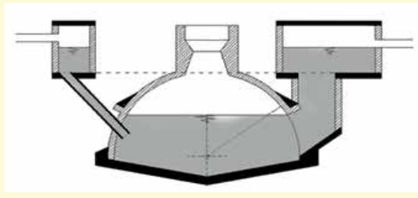
SETTLER

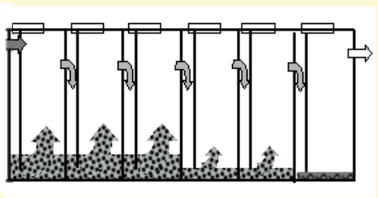
Settler & Sedimentation Tank is the primary treatment phase that is designed to retain all settleable solids and allow only dissolved and suspended solids to discharge. The tank consists of 2-3 compartments and as part of a DEWATS retains the wastewater for 1.5-2 hours. The system requires the built up sludge to be removed every 1-3 years. Average BOD removal efficiency is 25-40%.

BIOGAS

Biogas Settler is another type of primary sedimentation tank that allows for the collection and use of Biogas generated due to the decomposition (digestion) of the settled organic particles. Similar to a septic tank, all dissolved and suspended particles pass untreated through the system after 12-24 hours retention time. In Nepal, fixed dome digesters are recommended and can also be fed with organic kitchen, animal or garden waste. Average BOD removal efficiency is 25-40%.







SETTLER

BIOGAS

ABR

HOUSEHOLD SCALE PRIVATE HOUSEC

Location: Private House, Kathmandu
Year Constructed: 2002
Construction Cost: NRs 75,220
Design Flow: 4 people, 250L/d greywater
Treatment System: Settler, Vertical Wetland, Reuse.
Ave Removal Efficiency: 98% `BOD, 93% COD (Ave 1998-2000)

OMMUNITY SCALE SUNGA TREATMENT PLANT

Location: Madhyapur Thimi Municipality;
Year Constructed: 2005
Construction Cost: NRs 21 lakhs
Design Flow: 100m^3/d from 1000 users;
Purpose: Reduce pollution of river and provide an example of community scale wastewater treatment;
Treatment System: Screen, Grit Chamber, Settling Tank, ABR, Horizontal and Vertical Reed Beds, Sludge Drying Bed

Quality Achieved:
2006: 30mg/L BOD
50mg/L COD
Ave. Removal Efficiency:
2006-7: 90% BOD,
90% COD

ABR/AF

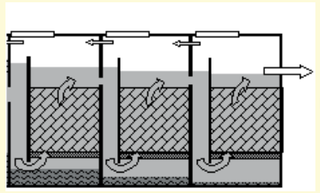
Anaerobic Baffle Reactor is a secondary treatment phase, often directly connected to the settler and is the main treatment phase in DEWATS. Suspended and dissolved solids in the wastewater undergo anaerobic degradation due to contact with an active sludge blanket on the bottom of each chamber.
Anaerobic Filters (AF) are additional chambers packed with filter media and can provide further treatment following the ABR. Average BOD removal efficiency is 75-85% in ABR and 75-90% in AF.

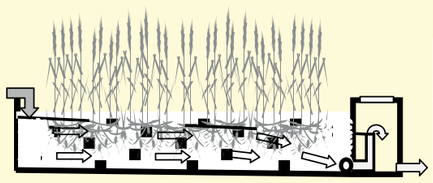
CONSTRUCTED WETLAND

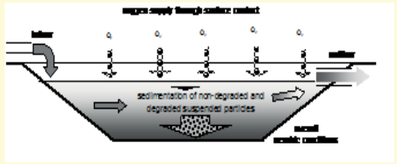
Constructed Wetland is the secondary or tertiary treatment phase and cleans the wastewater by biological conversion, physical filtration and chemical adsorption. The filter is a shallow tank filled with graded gravel or pebbles and commonly planted with Canas Indica, Reed Juncas and Phragmites. The normal depth of the filter media is 60 cm and the water flows beneath the surface Average BOD removal efficiency is 50-60%.

POND

Polishing pond is the final treatment phase and allows for oxygen enrichment and elimination of pathogens through solar radiation. Floating aquatic plants can help control growth and make it pleasant landscape feature. Wastewater is retained in this unit for one day and ponds are generally less than 1m deep.







AF

CONSTRUCTED WETLAND

POND