

Fig. 1: Project location

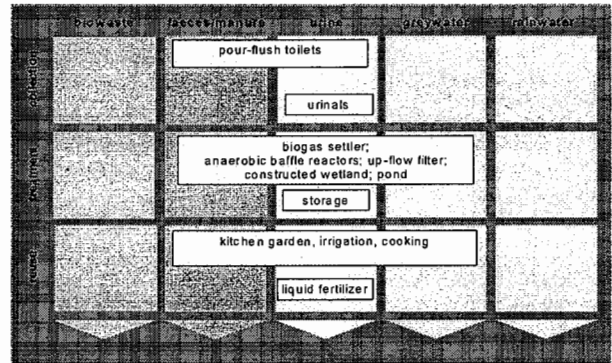


Fig. 2: Applied sanitation components in this project

1 General data

Type of project:

Decentralized Reuse-oriented Wastewater Management at Adarsh Vidyaprasarak Sanstha's College of Arts & Commerce

Project period:

Start of construction: April 2006

End of construction: June 2008

Start of operation: September 2008

Project scale:

Approx. 2,600 students attending Senior and Junior College and up to 800 people attending special programmes (such as wedding ceremonies) on about 20 occasions per year

Address of project location:

Adarsh Vidya Mandir, Kulgaon Badlapur Municipal Corporation - East, Maharashtra State, India, 421503

Planning institution:

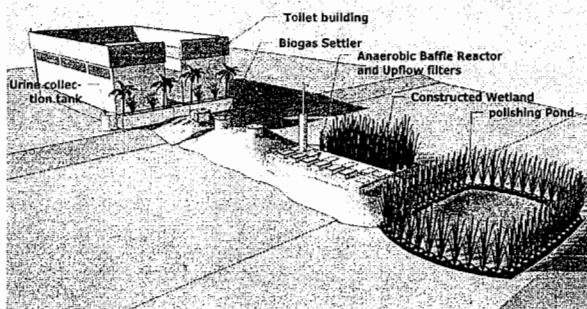
Ecosan Services Foundation (ESF), Seecon gmbh, Paradigm Environmental Strategies Ltd.

Executing institution:

Kulgaon Badlapur Municipal Council

Supporting agency:

EU-funded AsiaProEco II – project
GTZ-ecosan project



2 Objective and motivation of the project

Badlapur Municipal Council and the Board of "Adarsh Vidya Mandir School" decided to incorporate an ecologically sound sanitation concept at the "Adarsh Vidyaprasarak Sanstha's College of Arts & Commerce". The prime objective of the project is to meet the sanitation needs of the students and the people attending special programmes such as wedding ceremonies at the school premises, but also protects the environment and raises awareness amongst the students, about the importance of water and sanitation in promoting health and hygiene.

3 Location and conditions

"Adarsh Vidya Mandir School" is located in Badlapur town, in Maharashtra's Thane district, about 68 kms. from Mumbai, 34 kms. from Thane and 10 kms. from Ulhasnagar.

The school accommodates about 2,600 students attending Primary School, Secondary School, Junior College or the "Adarsh Vidyaprasarak Sanstha's College of Arts & Commerce".

The college building is located at the southern fringe of the school premises and doubles-up as Senior College in the morning and as a Junior College in the afternoon. The number of students attending Senior and Junior College is about 1,400 and 1,200 per day respectively.

4 Project history

This school project is a pilot project demonstrating alternative decentralized sanitation solutions to the Badlapur Municipality Council. The council plans to replicate the concept in other areas after evaluating the findings of decentralized reuse-oriented school sanitation project.

5 Technologies applied

A single-storied sanitation block having two independent enclosures for ladies and gents has been constructed next to the school building.

Each enclosure is equipped with 4 bucket-flush squatting-type toilets and 1 western-style cistern-flush pedestal (for the physically challenged). Waterless urinals are provided in the gents' toilet block; while the ladies' toilet block has an

increased number of toilets. Sufficient numbers of washbasins are provided in each toilet block.

A flow chart of the implemented wastewater management scheme is depicted in Fig 3.

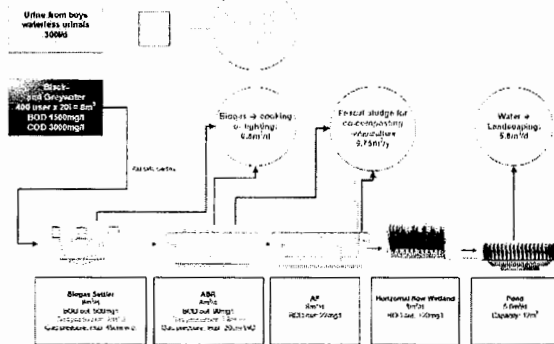


Fig 3: Flow chart of wastewater management scheme (source: N. Zimmermann)

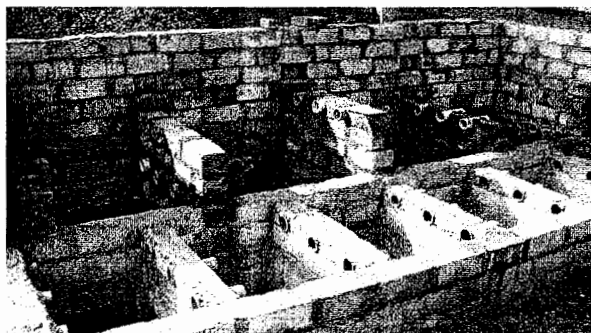


Fig 5: Construction of ABR and UF(photo: N. Zimmermann)

Blackwater along with greywater from the washbasins is discharged to a "biogas settler" where solids are retained and subjected to anaerobic decomposition

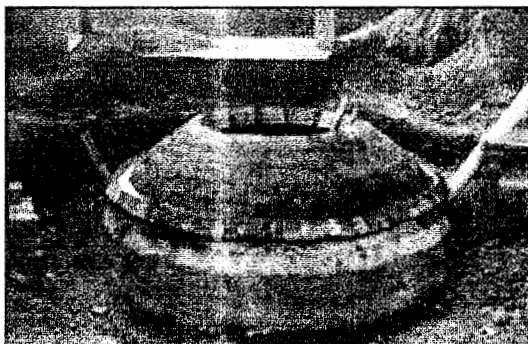
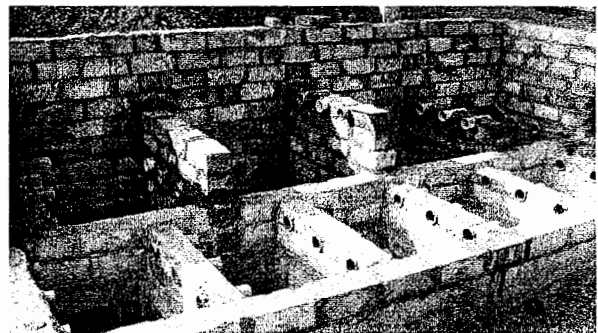


Fig 4: Biogas settler (under construction) (photo: N. Zimmermann)



Fig 6: Polishing cum storage pond(photo: J. Heeb)



The biogas settler effluent is drained by gravity flow to an Anaerobic Baffled Reactor (ABR) and Up-flow Filter (UF) for further anaerobic treatment.

Post treatment of the UF effluent happens in a small-scale horizontal flow constructed wetland (HFCW). The final stage of the treatment concept is a pond that doubles-up as storage tank.

Waterless urinals with membrane stretch traps that are especially adopted to fit Indian urinals are provided in the gents' compartment for the source-separate collection of urine, which is drained into a collection tank outside the toilet block. The tank is provided with a fail-safe overflow emptying to the anaerobic treatment plant.

Treated water and urine will be used in a yet to be established kitchen garden. Sludge drying beds will be constructed for dewatering the sludge from the biogas settler, baffled reactor and up-flow filter.

6 Design information

In order to keep water consumption low, specially designed squatting pans (so called "rural" or "pour-flush" pans) made of ceramic that require a little amount of water for flushing the excreta have been installed and no water taps are provided inside the cubicles. The toilet users have to fetch water for cleansing and flushing with a bucket (approx. 5 litres) from a central tank that is located inside the enclosure. Daily total wastewater production (blackwater plus greywater) is estimated to be about 8.0 m³ (i.e. 8,000 litres).

The hemispherical shaped biogas settler provides a volume of approx. 21 m³ at an inner diameter of 1.25 m.

The anaerobic baffled reactor volume is approx. 12.0 m³. The reactor comprises 6 compartments of 2.0 m³ each and

provides for 1.5 days hydraulic retention time at a wastewater production of 8 m³/d).

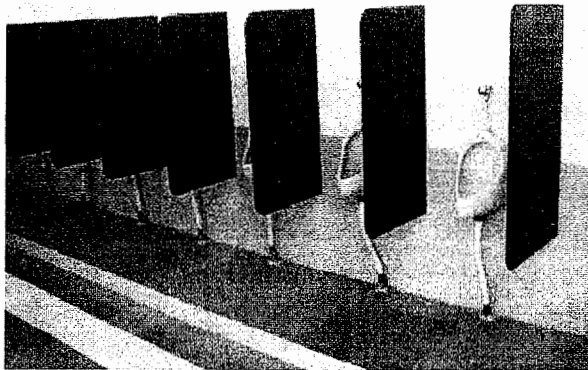


Fig 7: Waterless urinals for boys (photo: N. Zimmermann)

Table 2: Costs of treatment system

Component	Costs [INR]
Biogas settler	120,000
Baffled Reactor	120,000
Up-flow filter	120,000
Constructed wetland	50,000
Pond	40,000
Total	450,000

The anaerobic up-flow filter volume is approx. 14.6 m³. The up-flow filter comprises of 4 compartments of approx. 3.6 m³ each. The height of the filter media (gravel of 40 mm diameter) is 0.75 m.

Length and width of the horizontal flow constructed wetland is 6.00 m by 3.00 m. Main filter media is fine gravel with a grain size of 4 – 8 mm. Height of filter media (at inlet) is approx. 0.70 m. Saturated water depth is approx. 0.60 m. The pond has an effective volume of 12 m³ at a maximum depth of about 1.20 m. (Fig 8 and 9)

7 Type and level of reuse

Although the toilet block and treatment system is in operation since end of November 2008, the reuse part is not yet fully established. For the time being only the final effluent, which is collected and stored in the polishing pond, is reused for irrigation purposes.

Within the next weeks/months the remaining activities will be finished to allow also for the reuse of biogas and hygienized urine.

- The produced biogas (from biogas settler and the anaerobic baffled reactor) will be used either for cooking or lighting purposes.
- The collected urine is being stored and reused for gardening purpose within the school campus (especially on the yet to be established kitchen garden). The quantity of urine generated is much more than being reused. Thus, the surplus amount apart from the stored urine is being diverted to treatment system.
- The dried sludge from the biogas settler, baffled reactor and up-flow filter will be applied as soil amendment within the school premises for agricultural/gardening purposes.

8 Further project components

Students attending environmental classes will be involved in

Table 1: Treatment system characteristics

Component	Approx. Volume [m3]
Biogas settler	21.0
Baffled reactor	12.0
Up-flow filter	14.6
Constructed wetland	12.6
Pond	12.0

the monitoring of the treatment system and practise the reuse of recycles in the kitchen garden.

Next to the decentralized treatment system an exhibition hall has been constructed, the permanent posters on ecologically sound sanitation concepts are exhibited..

9 Costs and economics

The costs for establishing the above mentioned treatment scheme are summarized in Table .

10 Operation and maintenance

For O&M of the toilet block and reuse of the recycles caretakers cum resource managers (1 female and 1 male person) are hired.

Students will support the resource managers in their daily work (e.g. application of nutrients, gardening activities, etc.).

11 Practical experience and lessons learnt

The lesson learnt in this project is involvement of students and teachers ie. direct beneficiaries of the project is very important to keep sustainability and better utilization of the project. .

12 Sustainability assessment and long-term impacts

With regards to long-term impacts of the project, the main expected impact of the project is improved sanitation, demonstration of substitution of LPG by biogas, and the safe reuse of the treated water for irrigation purposes.

Table 3 depicts a preliminary assessment of the five sustainability criteria for sanitation of this project.

Table 3: Qualitative indication of sustainability of system

Sustainability criteria:	collection and transport			treatment			transport and reuse		
	+	o	-	+	o	-	+	o	-
• health and hygiene	X			X			X		
• environmental and natural resources		X		X			X		
• technology and operation	X			X			X		
• finance and economics		X			X			X	
• socio-cultural and institutional		X			X			X	

13 Available documents and references

This project has received 'National Urban Water Awards (NUWA)', 2009 in Special Category by Ministry of Urban Development, Government of India by the hands of Honorable President of India Smt. Pratibha Devisingh Patil.

14 Institutions, organisations and contact persons

Project owner:

Kulgaon Badlapur Municipal Council opp. Badlapur Railway Station Badlapur(e)
Tal-Ambernath
Dist-Thane, Maharashtra, India
phone: +91-(0)251-2690397
email: rampatkar@gmail.com
web: <http://www.kbmcinfo.com>

Technical planning/implementation

Ecosan Services Foundation (ESF)
"Vishwa Chandra", 1002/42 Rajendra Nagar, Pune – 411030, Maharashtra, India
phone: +91-(0)20-64000736
fax: +91-(0)20-24530061
email: ecosan@ecosanservices.org
web: <http://www.ecosanservices.org>

Design of treatment system

Paradigm Environmental Strategies Pvt. Ltd.
No. 432, Shreyas, 1st Floor, Hind Cross, 11th Main HAL IInd Stage, Bangalore – 560038
Telefax: 25214480
e-mail: info@ecoparadigm.com

Technical consultancy:

seecon gmbh
Bahnhofstraße 2, 6110 Wolhusen, Switzerland
phone: +41-(0)79-3666850
email: johannes.heeb@seecon.ch
email: martin.wafler@seecon.ch
web: <http://www.seecon.ch>

Supplier:

SHITAL CERAMICS WORKS

103, Suyojan, Milan Park Society, near Swastik Cross Road, Navrangpura, Ahmedabad - 380009, Gujarat India
phone: +91-(0)79-26561560
phone: +91-(0)79-26469356
fax: +91-(0)79-26402123
email: shitalcera@rediffmail.com

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH
ecosan program
P.O. Box 5180
65760 Eschborn, Germany
phone: +49-(0)6196-794420
fax: +49-(0)6196-797458
email: ecosan@gtz.de
web: <http://www.gtz.de/ecosan>

Case study of SuSanA projects

Decentralized Wastewater Mgmt at Adarsh College Badlapur, Maharashtra, India

SuSanA 2008

Authors: Nanchoz Zimmermann, Martin Wafler, Pradnya Thakur

Editing and reviewing: Pradnya Thakur, RS Arun Kumar

© Sustainable Sanitation Alliance

All SuSanA materials are freely available following the open-source concept for capacity development and non-profit use, so long as proper acknowledgement of the source is made when used. Users should always give credit in citations to the original author, source and copyright holder.



Fig 8: Side view of the treatment system

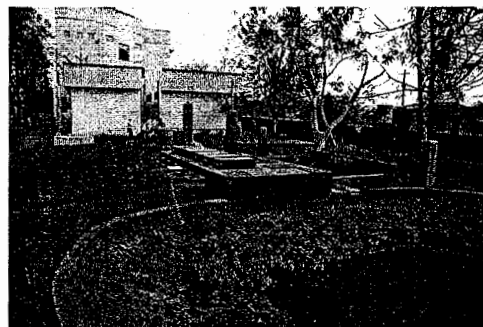


Fig 9: View of entire treatment system with toilet block