



# **Anaerobic Baffled Reactor Operation & Maintenance**

Training for stakeholders in Adama, Ethiopia

commissioned by Lettinga Funds



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## Summary

In Adama, Ethiopia, a new toilet block was constructed together with an onsite treatment of wastewater via the anaerobic baffled reactor, within the ROSSA project. It was opted for a technology consisted of anaerobic baffled reactor (ABR) with a settling chamber, followed by a percolation pit.

ABR is a proven and robust technology that does not require electricity for its operation. However, in the context of Adama, it is a new technology and therefore requires special attention on knowledge transfer about its principles and operation and maintenance requirements.

The ROSSA project team identified several groups of stakeholders to be involved in operation and maintenance (O&M) of the newly constructed toilet block and the wastewater treatment technology. The LeAF team has developed training materials about the principles of the ABR technology and the operation and maintenance requirements. Two trainers employed at ASTU – Mr Kifle Misganaw Sintayehu and Mr Wubishet Asrat – were trained on the topic by LeAF staff. Members of the ROSSA team in Adama have invited key stakeholders for a two half-day training on ABR principles and O&M. The training was given by the trained trainers on 10 – 11 February 2016 in Amharic language (at the location in the vicinity to the ABR system). In total 21 participants followed the training; from the SME operating the toilets, the Municipality, ASTU and the ROSSA project members.

During the training, critical points in O&M were presented and discussed. A visit to the toilets and ABR treatment system took place as well. Part of the dissemination strategy of the training was to draft plans for sustainable operation and maintenance of the system.

The Municipality of Adama has plans to construct ABR technology for on-site treatment of the wastewater from toilets on more locations. Therefore ABR at the bus station can be used as a pilot for proper implementation of the technology and for organizing adequate O&M at other locations in Adama.

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## 1. Background

The project 'Resource Oriented Sanitation Services in Adama' – ROSSA project – had as an objective to increase sanitation coverage in the city of Adama. Special focus was on providing sanitation systems suitable for low-income inhabitants of Adama (districts of Kebele, 06, 07 and 08), develop innovative concepts for toilet construction, collection and transport, treatment and reuse of human excreta and organic waste – with an eye to local economic development – applicable in Adama and in other cities.

The ROSSA project aimed to demonstrate that with limited material, but with optimal human resources, the city can become a healthy place to live. By including public spaces such as the bus station and the market area, the number of people provided with improved sanitation will significantly increase.

Within the ROSSA project, toilets at the market area were renovated, while at the bus station a new toilet block was constructed together with an onsite treatment of wastewater via the anaerobic baffled reactor.

*ROSSA project  
(2012-2015) worked on  
innovative sanitation  
concepts in city of Adama  
[www.rossa-adama.com](http://www.rossa-adama.com)*

### 1.1 Bus station toilets

The city of Adama is known as a transport hub in Ethiopia. Thousands of people use the services of the bus station daily. In the vicinity of the entrance of the bus station, a block of toilets is situated, offering 3 toilets for female and 3 toilets for male visitors. These toilets are operated by a local SME which estimated around 600 visitors per day in total. Underneath the toilets is an unlined pit that needs to be emptied several times a week. The toilet block is the ownership of the Municipality of Adama, which made a contract with an SME to operate it. The current situation is unsatisfying from more perspectives: the SME does not make a profit due to the necessity for frequent emptying, toilets are not well maintained (Figure 1) and raw wastewater leaches to the ground water.



Figure 1. Images of the toilet block at the Adama bus station

## 1.2 Approach

After meetings with representatives of the Adama Municipality, the SME operating the toilets at the bus station, and the ROSSA project team – it was decided to construct, within the ROSSA project, a new toilet block with an onsite treatment – next to the currently existing toilets. It was opted for a technology consisted of anaerobic baffled reactor (ABR) with a settling chamber, followed by a percolation pit.

ABR is a proven and robust technology that does not require electricity for its operation. However, in the context of Adama, it is a new technology and therefore requires special attention on knowledge transfer about its principles and operation and maintenance requirements. For sufficiently covering the knowledge transfer aspects related to the introduction of the new technology in Adama, LeAF and Dr Assefa – a representative of Adama Science and Technology University – have previously applied for co-financing at the Lettinga Foundation.

## 2. Trainings on ABR operation and maintenance

The ROSSA project team identified several groups of stakeholders to be involved in operation and maintenance of the newly constructed toilet block and the wastewater treatment technology (Figure 2).

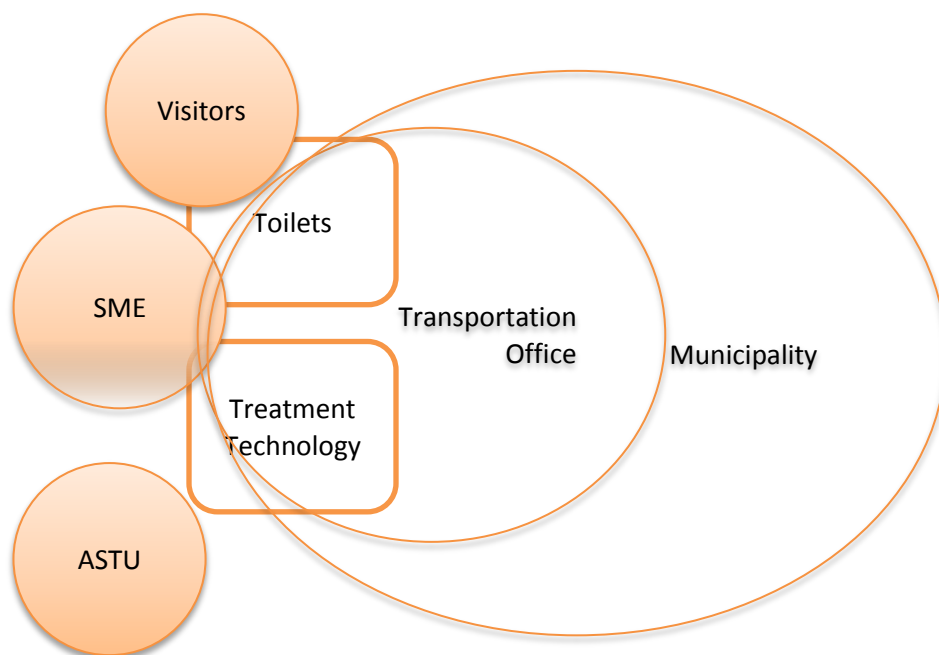


Figure 2. Stakeholders in Operation and Maintenance of the toilets and wastewater treatment technology at the bus station in Adama

Adama Science and Technology University (ASTU) – one of the ROSSA project partners – was identified as an important stakeholder. Though ASTU is not involved in the operation and maintenance (O&M) of the toilets and treatment directly, their role as a knowledge institution is seen as crucial for sustainable implementation of the technology. Employees of the SME may change and new trainings about the principles of the technology and O&M may be periodically required and could be offered by ASTU.

### 2.1 Training of trainers

The LeAF team has developed training materials about the principles of the ABR technology and the operation and maintenance requirements. Two trainers employed at ASTU – Mr Kifle Misganaw Sintayehu and Mr Wubishet Asrat – were trained on the topic by LeAF staff Dr Grietje Zeeman and Ms Darja Kragić Kok.

## 2.2 Training of stakeholders

Members of the ROSSA team in Adama have invited key stakeholders for a two half-day training on ABR principles and O&M. The training was given on 10 – 11 February 2016 in Amharic language (in the vicinity to the ABR system). In total 21 participants followed the training; from the SME operating the toilets, the Municipality, ASTU and the ROSSA project members.



Figure 3. Opening of the training by Dr Assefa, ASTU

During the training, critical points in O&M were presented and discussed. A visit to the toilets and ABR treatment system took place as well (Figure 4).



Figure 4. Participants of the training discussing ABR system with the trainer Mr Kifle (right)

In facilitated group discussions, participants presented their plans for implementation of sustainable O&M and responsibilities of different stakeholders (Figure 5).



**GROUP 3**

	Responsibility	Frequency	Indicator
1) Clean and good con'n	- Microenterprise - Users	- Before and after each service	- Visual inspection - small
2) Safety	- Microenterprise - Users	- daily	- .. .. - .. ..
3) Maintenance	- Micro - Transport office - Municipality	- daily - monthly - monthly	- .. .. - .. .. - .. ..
4) De-sludging	- Micro	- 6-12 months	- inspection
5) Ongoing monitoring	- Management team	- monthly	- inspection
6) Technical assistant	- Municipality - ASTU - Municipality	- quarterly	- .. .. - .. ..
7) Training	- .. ..	- 6 months	- .. ..
8) Meetings	- Municipality - Supportive - SME - Transport office - ASTU	- monthly	- .. ..
9) Finance	- Municipality - ASTU - Transport office	- yearly	- .. ..

Figure 5. Example of the result of group work discussions with responsibilities of the different stakeholders in O&M of the bus station ABR

In the Annex 1 slides of presentations can be found, while the list of participants can be found in the Annex 2. Annex 3 shows a financial overview of the activity.

### 3. Evaluation, dissemination & follow up

The evaluation showed that all participants were overall positive and satisfied with the training. Part of the dissemination strategy of the training was to draft plans for sustainable operation and maintenance of the system. Whenever possible, the training aimed at turning the idea of dissemination into one of real participation of trainees, as for sustainability and success of the project, ownership and sharing responsibility between stakeholders is seen as a key. Funders of the training – LeF funds and ROSSA project were clearly indicated in training materials and subsequent reports (Figure 6).

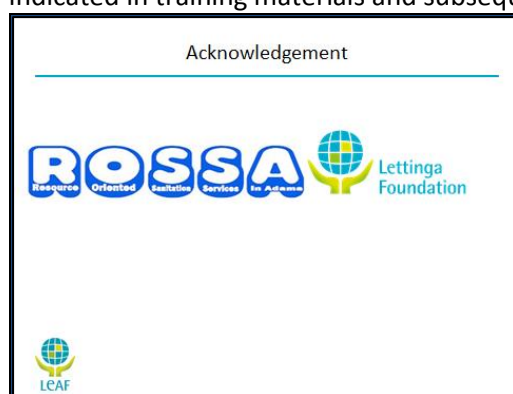


Figure 6. Slide at the beginning of each presentation acknowledging sponsors of training

#### *Manual*

The feedback session revealed that there is the need for a clear manual on O&M of the ABR system. At the moment of writing this report (August 2016), a draft manual was co-developed by LeAF and Mr Kifle from ASTU, and shared for final revisions.

#### *Instructions for users*

The need for clear instructions on toilet use was also identified during the training. The change of practices of users is needed. It is common practice that users throw solid waste into the toilets connected to cesspits, which is strictly forbidden at the toilets connected to the ABR system as debris can cause clogging. For easier conveying this message to the users, LeAF has worked with local artist who developed signs to be hanged in the toilets (Figure 7).



Figure 7. Conveying the message to the visitors on proper waste handling in the toilets

#### *Involvement of the transportation office*

The transportation office (TO) located at the bus station is identified as a stakeholder responsible to check the proper operation of the toilets and the ABR system. However, members of the TO could not join the training due to other meetings taking place at the same time as our training. This implies that it should be well communicated by other Departments of the Municipality who were present on the importance of proper monitoring of the system.

#### *ABR technology at more locations*

The Municipality of Adama has plans to construct ABR technology for on-site treatment of the wastewater from toilets on more locations. Therefore ABR at the bus station can be used as a pilot for proper implementation of the technology and for organizing adequate O&M at other locations in Adama.