How to implement a sound monitoring system for sludge treatment?

The experience of Solidarités International and Veolia Foundation in Sittwe, Myanmar

Alberto ACQUISTAPACE, Marine RICAU, SOLIDARITES INTERNATIONAL
Elettra BALBONI, Romain VERCHERE, VEOLIA FOUNDATION

Context of intervention

- First intervention in Sittwe Township in 2013
- Sludge Treatment System (STS) put into operation in March 2014
- 97,000 Rohingya beneficiaries living in 12 camps and using 4,000 latrines in 2018
- Processing of around 30-40 m^3 of latrine sludge per day

Monitoring objectives

The Sludge Treatment Site (STS) treats faecal sludge, but only a monitoring process can determine to which extent.

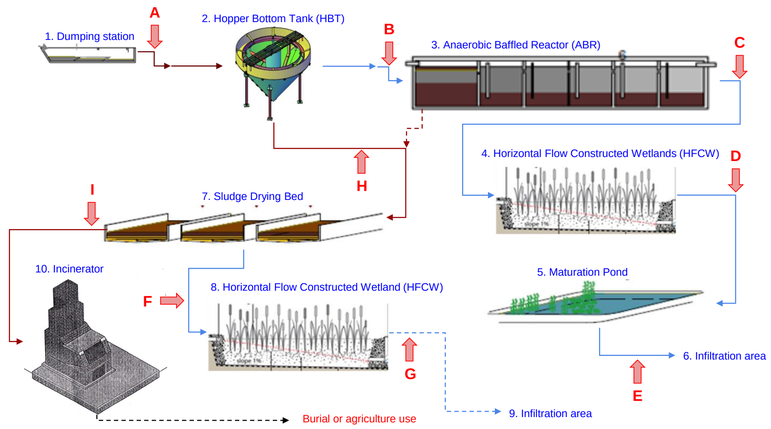
Moreover, monitoring is useful to:
- Adapt operational tasks;
- Check if treatment outputs can be reutilised in agriculture;
- Verify treatment module sizes and resize them if needed.

Monitoring costs

In orange: initial laboratory set-up costs
In green: recurrent costs for 3 months

Item	Cost
Construction	1,062 EUR
Furniture	400 EUR
Equipment	3,310 EUR
Reagents	1,633 EUR
PPE	59 EUR
Other consumables	79 EUR
Paris-Sittwe transportation of dangerous reagents	2,500 EUR
Total	**9,042 EUR**

Process flow diagram and frequency of parameters monitoring



Item	TS (g/L)	TSS (mg/L)	COD (mg/L)	NH4 (mg/L)	NO3 (mg/L)	P (mg/L)	E. Coli
Inlet HBT (A)	TUE THU SAT						
Outlet solid HBT (H)	TUE THU SAT						
Liquid outlet HBT (B)	TUE THU SAT		1/week	1/week	1/week	1/month	
Outlet ABR (C)			2/month	2/month	2/month		
Inlet maturation pond (D)			2/month	2/month	2/month		
STS outlet (E)		1/week	2/month				1/week
STS outlet filtered (E)			1/week	1/week	1/week	1/month	
Wetland In (F)			2/month	2/month	2/month		
Wetland Out (G)		1/week	1/week	1/week	1/week		1/week
Sludge (I)	1/drying cycle						

Lessons learnt

- Monitoring is paramount to **verify theoretical treatment models**;
- As the STS is influenced by weather variations, input quality and quantity fluctuations, and characterised by long retention times, only a **long historical dataset can verify its functionality and efficiency**;
- Monitoring procedures must be based on international protocols, but then simplified and **adapted to the local available laboratory equipment, HR capacities and availability of electricity**;
- **Testing the lab equipment in situ** before starting the training was useful to prepare training documentations, calibrate the equipment and better set up the laboratory;
- **Step-by-step analysis protocols** tailored on the laboratory and **illustrated** with images was useful to systematise procedures and to overcome language barriers;
- **Anticipating the supply of laboratory reagents** and avoiding air transport can largely reduce costs, especially for dangerous substances such as sulphuric acid used to measure COD;
- It is necessary, as early as the drafting of the monitoring plan, to identify **local waste disposal options** for laboratory consumables;
- **Long term funds and HR engagement** are compulsory to put in place a sustainable monitoring system.

Conclusions

As SI was mostly used to spot check faecal sludge treatment with the support of external laboratories, setting up an internal monitoring laboratory was time consuming and required external resources. Yet, it was necessary to **model treatment processes** in order to improve operational procedures and to adapt the STS to new influxes of raw sludge without external expertise.

In the future, the model may also be used to improve **treatment efficiency**, and, subsequently, the quality of the effluents.

Moreover, monitoring faecal sludge treatment can be a first step to define **specific biochemical standards** for sludge disposal into the environment in humanitarian contexts.

Thanks to the lessons drawn from the STS experience in Sittwe, SI wants to rapidly systematise the monitoring of faecal sludge treatment in all the countries in which it operates.

Organisation of the joint mission by Solidarités International / Veolia Foundation to set-up the monitoring system