Faecal Sludge Management in Toamasina Madagascar

Emptying-Transport-Treatment

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Initial Situation

Toamasina (2nd town)

- Pop. >300 000
- 14 000 m^3/year, 90% emptied (98% dumping without treatment)
- 76% manual service, 13% themselves, 1% mechanical,

Problems & Risks:

- Emptiers without protection
- Sludge dumped in yard ➔ *environmental contamination*

  decreasing living space

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Approach

Multi-actor: concertation between *Stakeholders*

Stakeholder	Role
Population	Latrine use and behavior change
Local authories: CUT	Political responsible of service delivery; owner treatment plant; office facilities
Private Emptying Service	Sludge removal, transport and treatment
Protos	Coordination & Monitoring, capacity building, technical know-how
Practica, SIA	Technical know-how, training, studies, start & follow up treatment
CNEAGR (water training centre)	Treatment plant management (experimental 17-18)
Donors: Belgian Government, Agence Eau Adour- Garonne	Funding

Action research - Evolution of Emptying Service

- 2012-13: Assessment, market study, action-research for solutions including lowest social class
- 2014: Creation first company, no continuation
- 2015: Creation actual company: CLEAN IMPACT
- Today: independent company:
  - 60 000 € external investment; 1 manager, 1 operation technician, 1 driver, 5 emptiers, 2 maintenance personnel

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Tested:

- Rickshaw service (<200l).
- Wheelcart /hand pump « gulper »: pits (0.5-1 m^3).
- Collection points for containers

Nowadays:

- Combination hand/mechanical pump and shovel
- Motor cultivator with trailer (1 T)
- Tractor
  - ✓ with trailer (5 T) / plastic drums (40l – 1 m^3)
  - ✓ Slurry tanker (4 m^3)
- 100.000 ar (28 USD)/ m^3 (minimum of 250 l)







Figures of emptying service

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Emptying service 2018

Total volume	681	m^3
Number of customers	433	customers
Population Served	12,611	persons
Days worked	249	days
Average daily 'production'	2,8	m^3/day
Average monthly 'production'	56.7	m^3/month
Average number of customers per month	36	customers
Average days worked per month	20.7	days
Price (min of 250 l)	100,000 / 28	Ar / USD

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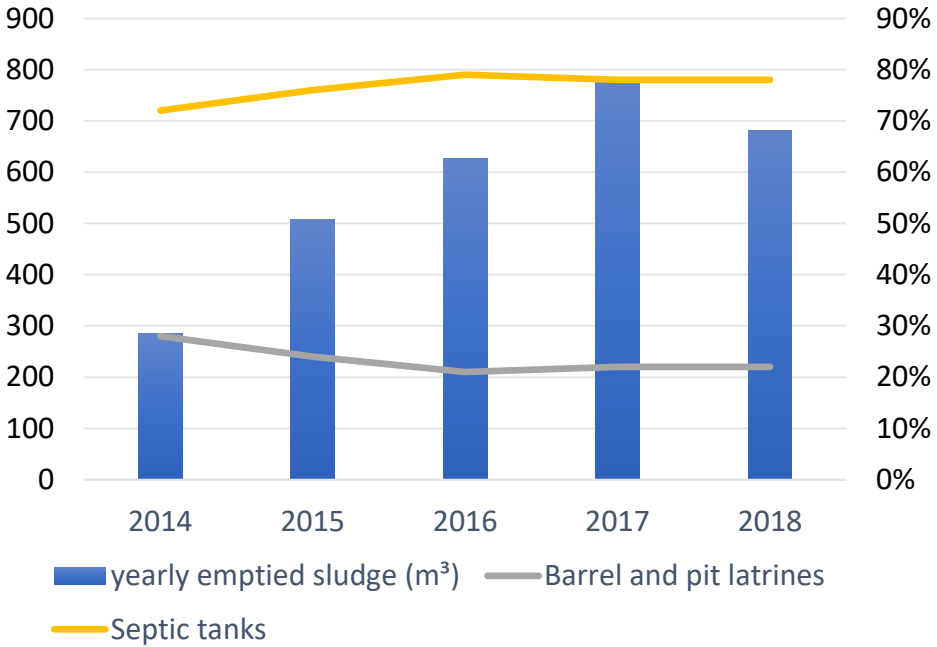
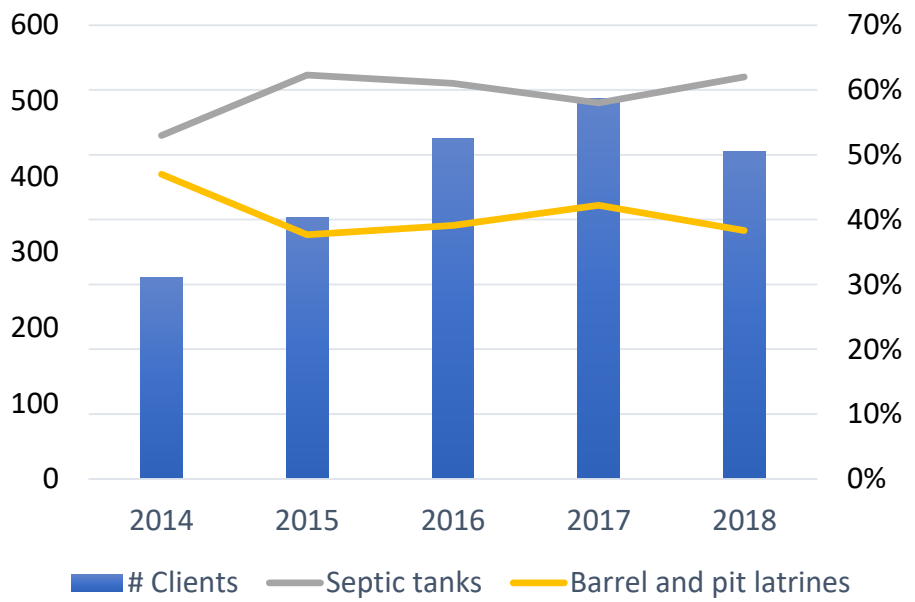
Annual vol & type of latrine



and type of clients



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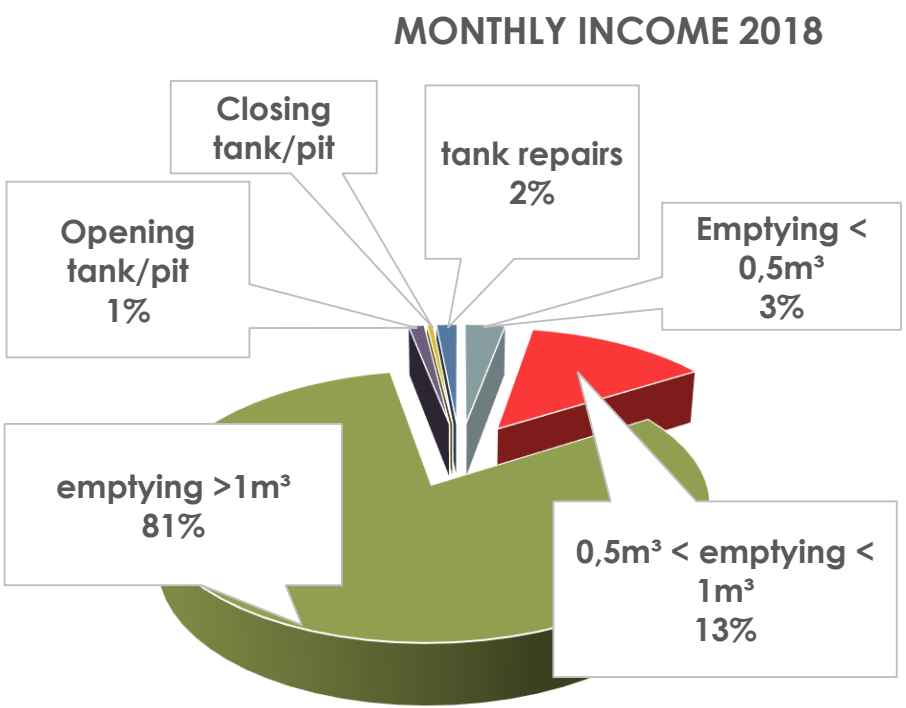
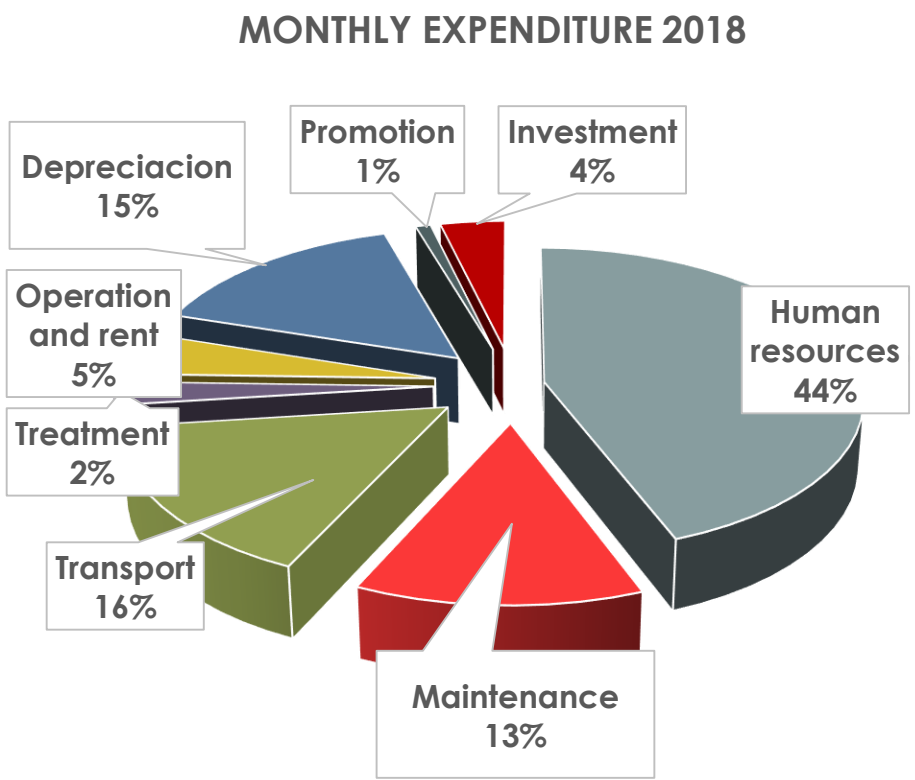
Income (month)

Category	Amount (USD)
Emptying <0.5m³	45
0.5m³ < emptying < 1m³	206
Emptying >1m³	1,276
Opening tank/pit	18
Closing tank/pit	7
Tank repairs	23
TOTAL	1,575



Expenditure (month) & profit

MONTHLY EXPENDITURE	
Category	Amount (USD)
Human resources	675
Maintenance	193
Transport	248
Treatment	37
Operation & rent	69
Depreciation	235
Promotion	13
Investment	57
Total	**1,528**

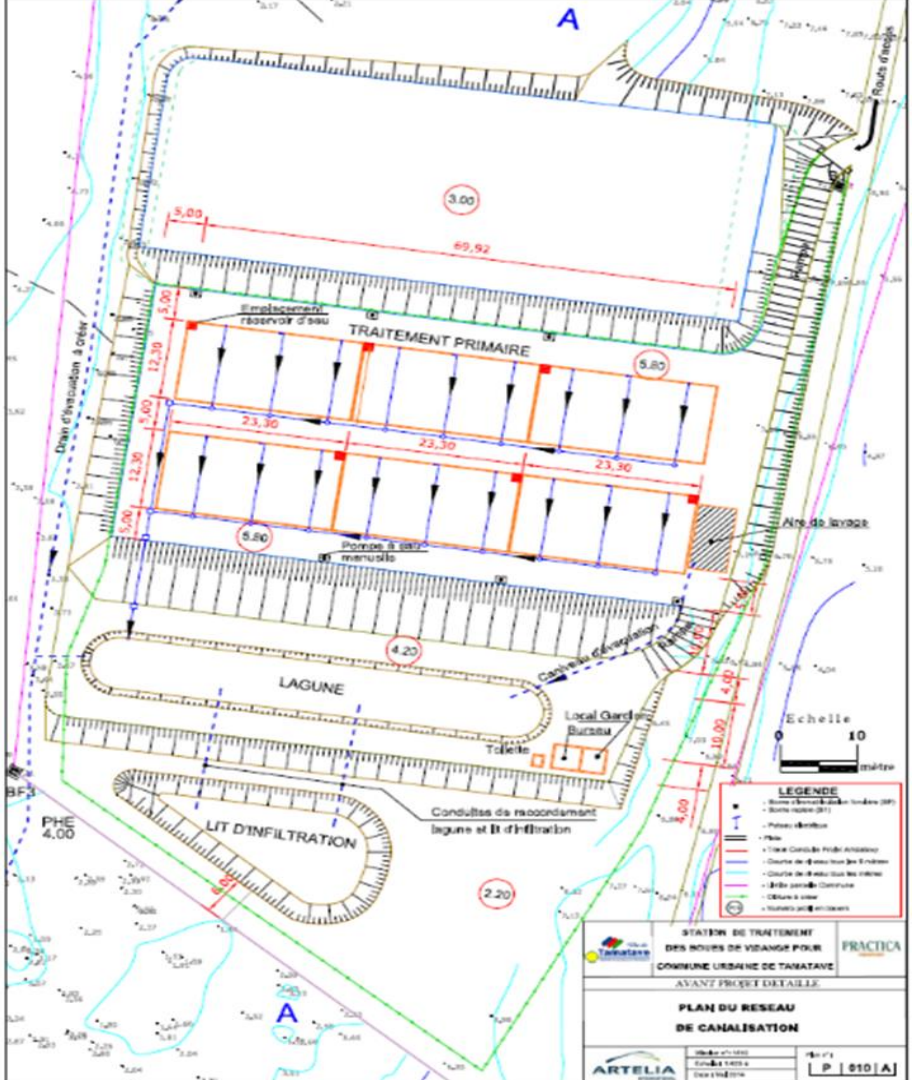


Profit margin: 3%

Treatment

Planted Humification Beds

- 12 km from town center
- S = 1720 m^2 ; 6 beds
- Q= 1000 m^3/yr (100 T TS/yr)
- Sludge from septic tanks, from barrel and pit latrine: highly concentrated sludge (100 g TS/L)
- *"Echinocloa"* and *Phragmite Australis*
- Management supported by visual indicators (plant health)
- $inv = 270,000 USD
- $ttmt ≈ 3.1 USD/$m^3$ (33 USD/ T TS treated)



Operation cycles

Short cycle: unloading and drying (5m3 every 5 days)



Long cycle: 3-4 years accumulation of sludge → max height (90 cm) → emptying of bed → restart




Results

- 1st humification beds in Madagascar, 3rd year functioning
- Process documented and adapted to local conditions (humid climate)
- Operational difficulties managed (drought, sludge concentration,…)
- 1 500 m3 of sludge (100 g TS/L) treated
- First 30 m3 of humus produced (C/N = 10)
- Disinfection is 85% average on all layers of humus (after 2 years)/volume reduction 82-87%

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Conclusions / Learned lessons / Challenges

Emptying service

- Market exists (all latrine types) but challenge to develop the service
  - Necessary management capacities out of reach?
  - Regulation failing / lack of means local government
  - Extra investment needed (emptying and treatment)
- Local context very challenging
- Subsidy for lowest social class (most difficult and most expensive to serve) needed;
- Initial investment constraint for small start-ups / low benefits

Treatment

- Management costs and necessary competences are low but to be developed (specific profession).
- Acceptance of local government and potential users of bio solids to be developed

Simple chain but specialized coaching necessary for development and transfer of capacity (startup phase)

In partnership with:

Ville de Tamatave
Capitale Economique de Madagascar

CNEAGR

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Thank you!

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