



Faecal Sludge Management in Toamasina, Madagascar and Bamako, Mali

Experiences of Protos



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Cover photo : Emptying service - Toamasina - Madagascar © Dries Moorthamers

1. Introduction, context, operations

For many years Protos has been working with local authorities, strategic partner organisations and communities in developing countries to end open air defecation while promoting basic sanitation. As a result, many households use latrines. In urban areas this resulted in a new challenge, because while latrine pits fill up, emptying services are non-existent or poorly organised. Protos then stepped in to set up and strengthen these services, working with both local authorities and private operators. For some time, faecal sludge was merely dumped without any treatment. Currently, steps are taken to develop treatment plants using various technological solutions and so the whole faecal sludge management chain can be covered. Protos' experiences are most extensive in Toamasina (or Tamatave), Madagascar, and developing in Bamako, Mali, where we only recently started with faecal sludge management.

Toamasina is the second largest city in Madagascar with an estimated population of 300,000. Sanitation without a sewer system is predominant: 97% of households use latrines (38% septic tanks, 62% single pits). 97% of the sludge was manually and unhygienically drained by informal operators to be buried in the yards. This practice generates health risks: 60% of households use hand pumps, the groundwater table is high, and the city is regularly affected by floods, with the spread of faecal contamination germs as a result. The sludge is very concentrated because of the sandy soil (average concentration of 100 g solid particles per litre). The objective was to establish a sustainable faecal sludge management pilot operation adapted to this context.



Basic emptying services in Toamasina.

In the district of **Bamako**, capital of Mali with 2.2 million inhabitants, 98.5% of the population resorts to an autonomous sanitation, e.g. household latrines. This translates into a production of faecal sludge of about 200,000 m³/year. For latrine emptying and sludge transport, Bamako relies mainly on private, mechanical and/or manual emptying workers, a large part of whom work in the informal sector. Theoretically the sludge collection services and treatment are the responsibility of the local authorities. At District level, the DSUVA (Direction of Urban Services for Roads and Sanitation) should take care of emptying according to the legal framework. But it faces problems due to the lack of human and financial resources, which does not allow it to ensure its missions. This context has favoured the emergence of a dynamic private sector.



Basic emptying services in Bamako.

Collect and transport

In 2014 in **Toamasina**, the service design was based on an initial assessment and a market study. The start-up of a small company to collect and transport the sludge received support to optimise its technical, commercial and financial results. Based on monitoring tools they arrived at the current configuration of 3 permanent employees and 4 to 6 day labourers. The company has been equipped in a progressive way to be able to answer technically and economically to all types of customers: simple tools, manual and motorised pumps, storage cans (50 l), a motorcycle cultivator with trailer (1 ton), a tractor and trailer of 5 tons. The company became financially autonomous quite quickly and has progressed steadily in its volume of business. It now provides an affordable service for 500 families/year with 750 m³ of sludge drained, evacuated and treated. The alternative emptying techniques developed make it possible to comply with health and safety standards while reaching middle-class or even poor households that could not be served by conventional sludge collection trucks. The price for emptying 1 m³ is 23 euro, which represents 2% of annual income per capita of the customer.



Improved emptying services having access in popular quarters in Toamasina.

As mentioned above, in **Bamako** sludge is collected and transported by a variety of mostly informal operators. Sludge discharged today is mostly dumped untreated in the vicinity of the city or dumped directly into the Niger River, or into gullies and rainwater gutters. The only currently functional wastewater treatment plant is in the Sotuba industrial area, a lagoon system designed to treat industrial water only. Since May 2014 Protos and its partners are implementing the “ACASIA-MYP-Bamako” Programme, which aims at operating a sanitation sector that is socially viable, economically profitable and also respectful of the environment, in 9 peripheral districts of ‘communes I and IV’ of Bamako District (300,000 inhabitants)¹. Protos’ approach includes community engagement and building trust with the government, raising public awareness while addressing issues raised by key stakeholders such as local government bodies.

One element to improve the emptying services was the creation of a call centre¹, housed at the town hall. Customers can receive information and advice about different operators, types of emptying services, and prices. This helps them to take an informed decision on which service suits them best. The call centre became only recently operational and no comprehensive feedback is available yet. A smartphone app was developed as well as a monitoring tool. On the one hand it helps service operators to plan their route in their intervention area and thus optimise costs, and to monitor their teams. On the other hand, it allows authorities and partners to supervise quality, costs and reach of the emptying service. Besides some technical hiccups, it is perceived by operators and their employees as a control mechanism and therefore encounters some resistance. Action is undertaken to change this perception emphasising that it helps improving operations and income.

1/ www.protos.ngo/en/publicaties/videos/alternative-draining-service-bamako

2/ www.protos.ngo/en/publicaties/videos/allo-vidange-call-center-emptying-service-bamako



A disposal service at work in Bamako.

Treatment

The treatment plant in **Toamasina** is situated 12 km from the city centre on land provided and owned by the city council. The plant consists of 6 humification beds of 280 m² planted with local macrophyte species and is designed to treat 120 T/year (100 m³/month of 100 g solid particles per litre of sludge) and is functioning today at 60% of its capacity. The beds are fed by sludge brought by the emptying company. A team of a gardener and two guards ensure the daily operations at the plant and the person in charge of the plant ensures the monitoring and the programming of the dumping schedule in relation to the conditions of the plants and the humification. The cost to treat 1 m³ sludge is 3 euro. The station has been running for 3 years now, including the start-up period and later the normal operation. In 2018 more than 60 cm of humus were produced in the beds and one bed has been cured. Sludge dumping is done manually, at doses and frequencies depending on the season. There are visual indicators (density, height, colour of macrophytes, humus status, presence of worms ...) that show performance of the treatment plant.



▲ ▼ Treatment plant (humification beds planted with macrophytes) in Toamasina with produced humus.



Initially, the programme in **Bamako** included the construction of two large “lagoon”-type treatment plants in the rural municipalities of Mountougoula and Mandé, which were recommended by the Bamako Master Plan for Urban Planning, validated by the Council of Ministers in 2011, to house such infrastructures. These two plants would have treated approximately 70 m³/d each. Unfortunately, the sites recommended by the Master Plan were not available for this project, because of poor land management (fragmentation and sale of land, unchecked occupation of parcels, etc.). This resulted in a serious blockage in the programme and almost caused its termination. However, thanks to the strong partnership that binds Protos and ‘Commune I’ (built on years of support for municipal ownership), a parcel of about 0.5 ha has been made available to the programme in the district of Doumazana-Nafadji. This necessitated a major revision of the “faecal sludge treatment” component of the programme, since the different nature of the terrain (from 5 ha per site to 0.5 ha in total, from the rural to the urban context) obliged us to move towards a decentralised waste water treatment system (DEWATS) and to recommend an intensive treatment by a digestion-anaerobic-methanation type (instead of an extensive treatment). The treatment capacity has fallen from 140 m³/d originally planned to approximately 16m³/d in the current plan. The construction of this treatment plant will start soon.



Scheme of the digestion-anaerobic-methanation treatment plant in Bamako.

2. Lessons learned, perspectives

Lessons learned

Toamasina:

The experience has shown that it is possible to develop a small local business to provide an improved sludge collection service in a large city: the demand increases and emanates from

the most modest population group (43% of customers have small latrines less than $<1\text{m}^3$ and this represents the less well-off class). The company's profits are still modest, but the increase in demand allows a positive evolution of the company. This could be further enhanced by the establishment of a favourable institutional and regulatory framework for emptying and treatment services by national and local authorities.

SERVICE de VIDANGE

MANADIO GABONE

ZAKAN'NY REHETRA

- Haingampiasa
- Manaja tontolo iainana
- Tsy mifidy karazana WC
- Afaka miditra lalana tery

FANDEVENAN-TAY AN-DAKORO

FOMBA RATSY FA IALAO

antsoy 033 89 350 48
Voirie - Bd Augagneur

Logo: **Afa-ny 100%**

Logos: Ville de Tamatave, Protos, PRACTICA FOUNDATION

Publicity for emptying company in Toamasina.

Bamako:

The non-existence of functional faecal sludge treatment plants in Bamako demonstrates the limited national government interest in these matters. The problems to obtain land for the treatment plant, aggravated by authorities having other priorities show that absence of urban planning in general, and land rights and titles in particular, are serious obstacles to sanitation (and especially to faecal sludge management). Communal involvement having local ownership (since the sanitation sector is transferred to the Communal level) can provide solutions and compensate for the inactivity at the national government. However, achieving SDG 6.2 (adequate and equitable sanitation for all) is only possible with the full and serious involvement and commitment of the national government, formalised by a real transfer of resources and skills to the Communes and an effective partnership with the private sector and civil society.

In absence of a sewer system, the importance and relevance of DEWATS instead of centralised or semi-centralised systems is very obvious. In the Malian urban context DEWATS is preferred, since it is feasible on small areas and with relatively modest investments.

Perspectives

Toamasina:

There is a progressive evolution of the company foreseen with an increase of emptying volume and with the diversification of services, notably the construction of latrines.

The humus, as an endproduct of the treatment, can be commercialised in agriculture.

However, physical, chemical and biological analysis of the manure needs to be done first.

Bamako:

Activities will continue improving emptying and transport services with further professionalisation of the private operators. Once the treatment plant is operational, its management needs to be carefully accompanied to ensure it serves as an example of successful and safe faecal sludge treatment.

This lone plant cannot absorb all the faecal sludge from the whole of Bamako and local government will need to assign more dumping sites while providing a regulatory framework to reduce health and environmental hazards.



The call centre in Bamako : optimising the encounter between offer and demand.

3. Financial, technical, and methodological support and partnership

- Belgian Directorate General for Development Cooperation and Humanitarian Assistance
- European Union
- Flemish Government
- Flemish Partnership Water for Development
- VIA Water / Aqua for All, The Netherlands
- Practica Foundation, The Netherlands
- Aquafin, Belgium
- BORDA, Germany
- Agence de l'Eau Adour-Garonne, France
- Syndicat des Eaux d'Île de France, France
- Ville de Tamatave, Madagascar
- Centre National de l'Eau, de l'Assainissement et du Génie Rural, Madagascar
- Ville de Bamako, Mali

4. Further reading

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Protos-WTA (July 2013). Etude de marché pour la mise en place d'un service de vidange amélioré, accessible et durable à Toamasina. Madagascar

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Segretain A. (July 2017). Effluents liquides et solides pour l'agriculture à la sortie du site de traitement de boues de vidange par Protos. BORDA, Mali







Protos ngo
Flamingostraat 36
B - 9000 Gent
00 32 9 235 25 10
info@protos.ngo
www.protos.ngo

Text:

Harald van der Hoek, Protos, Ghent, Belgium
Francesca Rossi, Protos, Antananarivo, Madagascar
Fabrizio de Georgio Ferrari Trecate, Protos, Bamako, Mali

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