

Capacity Strengthening in Sanitation – Benefits of a Research – Operator Collaboration

The National Utility of Water and Sanitation (ONEA) in Burkina Faso and the Department of Water and Sanitation in Developing Countries (Sandec) of the Swiss Federal Institute of Aquatic Science and Technology (Eawag) have struck a three-year collaboration to provide sustainable solutions and skills in the sanitation sector. The developed global approach evaluates existing infrastructure, identifies and fills gaps in operational capacity, local knowledge and institutional procedures for wastewater and faecal sludge management. Magalie Bassan¹, Mbaye Mbéguéré^{1,2}, Linda Strande-Gaulke¹

Introduction

In 1996, the National Utility of Water and Sanitation (ONEA) in Burkina Faso was one of the first West African National Utilities to adopt a National Sanitation Strategy, including faecal sludge (FS) management. This led in 2004 to the construction and operation of a sewer network, three pumping stations and waste stabilisation ponds (WSPs) in Ouagadougou. However, ONEA has had operational difficulties due to limited financial and human resources for operation and maintenance (O&M), poor design decisions and lack of technical capacity. ONEA is also responsible for the challenging task of organising effective FS management of 88 % of the population in Ouagadougou served by on-site systems. The need to strengthen its capacities is therefore a major factor for future success of its sanitation infrastructure.

The French Agency for Development (AFD) provided funding to establish a three-year partnership between ONEA and the Department of Water and Sanitation in Developing Countries (Sandec). The scientific collaboration to strengthen technical capacity covers design, construction, operation, and monitoring of planned faecal sludge treatment plants (FSTPs), monitoring and optimisation of sewer networks, WSPs, and agricultural water reclamation. This is a unique collaborative partnership, as it is built on ongoing dialogue between these two stakeholders. The ultimate goal is to implement sustainable solutions for FS and wastewater (WW) management by joint research on new technologies and concepts, assessment of the performance of what has previously been implemented and by applying the lessons learned from Sandec's previous experience.

Existing and planned collective sanitation infrastructure

WSPs in Ouagadougou were designed for 100 000 population equivalents [1], however, about 80 % of the influent is of industrial origin and the remainder from domestic sources. The treated effluent is used to irrigate a 10-ha agricultural area.

FS production in Ouagadougou is estimated at 500–1000 m³/day [2]. ONEA plans to construct two FSTPs with unplanted vertical-flow drying beds designed to treat 125 m³/day each. The effluent from the drying beds will be treated in the WSPs, and the dried sludge will be stored for six months following removal from the drying beds to ensure adequate pathogen reduction.

Areas of research focus

The following three key research areas will focus on identifying weaknesses, stakeholders and appropriate solutions:

1. Assessment of existing wastewater treatment options

A study conducted to evaluate design, treatment performance and monitoring procedure of the WSPs revealed degradation of the infrastructure as a result of inadequate consideration given to the local context during design studies including poor maintenance. Since laboratory analysis showed high influent and effluent variability, monitoring of the industrial wastewater quality and researching optimal pretreatment methods will be essential to ensure smooth operation of the WSPs. Photo 1 illustrates the monitoring activity at the WSP in Ouagadougou.



Photo 1: ONEA's chemist taking samples in the second anaerobic basin at the WSP in Ouagadougou, Burkina Faso.

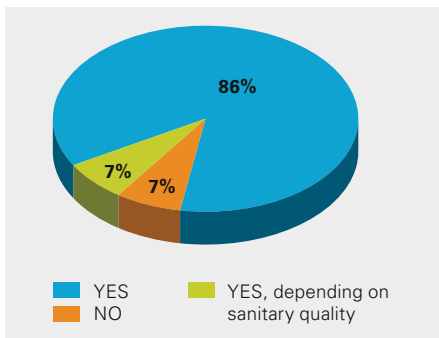


Figure 1: Willingness of cattle owners to use fodder plants cultivated on planted drying beds treating FS.

2. Filling knowledge gaps to achieve adequate FSM

Prior to designing the new FSTP, studies are currently being conducted to determine FS characteristics for the city of Ouagadougou. Analyses carried out during the dry season revealed limited FS production with a low solid matter content. Further studies are planned during the rainy season.

3. Ensuring valorisation of by-products from FS treatment

A study assessing farmers' working conditions and productivity was conducted on the agricultural area next to the WSPs. Interviews revealed that many farmers abandon the area due to poor water quality and very low production rates. This was confirmed by SAR (Sodium Absorption Ratio), which exceeded the maximum threshold value for irrigation [3].

Modification of the drying beds to planted drying beds is currently being evaluated. A study was conducted to assess optimal plants for FS planted drying beds and their market potential as fodder plants, which is highest during the dry season. Their acceptance as fodder plants by cattle owners is graphically depicted in Fig. 1. *Sporobolus pyramidalis* and *Echinochloa pyramidalis* are the two plant species selected for further evaluation in the planted drying beds.

Strengthening collaborative capacity and optimisation measures

The stakeholders involved in the project include ONEA's staff, FS emptying and transport entrepreneurs, but also local universities, ministries, municipalities, the local press, AFD, and NGOs. Several workshops organised with ONEA address topics such as results obtained and recommendations pertaining to needs analyses, research studies and adequate institutional

framework definition for FS management. The workshops and meetings with entrepreneurs led to official draft policies defining the tasks and responsibilities of the stakeholders.

The analyses identified a lack of human resources (HR), of specific knowledge on management projects and existing infrastructure, and measures to ensure institutional efficiency and capitalisation, including material and equipment for O&M and monitoring. To meet these needs, ONEA and Sandec are jointly collaborating to define quality assurance plans.

The uninterrupted flow of communication between ONEA and Sandec throughout project implementation has created a very strong collaborative exchange and trusting environment between ONEA, Sandec and the FS emptying entrepreneurs.

Sustainable sanitation planning and management perspectives and issues

Important benefits and lessons learned from the collaborative partnership approach include:

- Concrete solutions and research results have enhanced Sandec's knowledge, dissemination strategies and future approaches.
- Acknowledgment and awareness of internal strengths and weaknesses of ONEA's sanitation approach and management.
- Development of sustainable plans and approaches for technical and institutional management of sanitation infrastructure.
- Increased lab capacity of ONEA to monitor WSPs, sewer networks and future FSTPs.
- Capitalisation of fundamental understanding of processes allowing ONEA to design, implement and operate the future sanitation infrastructure.
- Improvement of the financial balance of sanitation activities through valorisation potential of fodder and dried sludge.
- Global and holistic understanding of parameters and issues on FS and WW management relating to all stakeholders involved.
- Collaborative approach to sanitation solutions transferable to other locations and institutions.

Monitoring and optimising processes will be key components of the ongoing project activities to ensure ONEA's contin-

ued status as a sanitation leader in West Africa. The benefits of integrating ONEA and Sandec's collaboration into policy, technical procedures and development of quality plans confirm the need for holistic and collaborative approaches to finding sanitation solutions. Beyond the concrete solutions developed during the project, this type of collaborative approach can be readily transferred to other countries and sectors.

- [1] Dodane, P.-H., Makboon, J., and Torrens, A. (2006): Assistance à la mise en place de l'exploitation du lagunage de la ville de Ouagadougou. CEMAGREF, p. 87.
- [2] Koanda, H. (2006): Vers un assainissement urbain durable en Afrique subsaharienne: Approche innovante de planification de la gestion des boues de vidange. Ecole Polytechnique Fédérale de Lausanne: PhD Thesis, Lausanne, 351 p.
- [3] Sou, Y.M. (2009): Recyclage des eaux usées en irrigation: potentiel fertilisant, risques sanitaires et impacts sur la qualité des sols. Ecole Polytechnique Fédérale de Lausanne: PhD Thesis, Lausanne, 178 p.

¹ Eawag/Sandec, Switzerland

² Office National de l'Assainissement du Sénégal, Cité TP SOM, n° 4, Hann, BP 13428, Dakar, Senegal

The present activities and research programme are supported by the French Development Agency (AFD), the Swiss Agency for Development and Cooperation (SDC) and Eawag. The authors would like to thank ONEA and the FS emptying and transport entrepreneurs for an excellent collaboration. Commitment of the following students, who conducted research on this project, is gratefully acknowledged: Ousmane Ouédraogo, Shurstine Somé and Soumaïla Sodrè. We are also grateful to Halidou Koanda and Tétouehaki Tchonda for their unparalleled contribution to the project.

Contact: magalie.bassan@eawag.ch