

# Small-Scale Sanitation Challenges in the Nile Delta

**ESRISS – Egyptian-Swiss Research for Innovation in Sustainable Sanitation is a new SECO-funded research project at Sandec. It deals with the sanitation planning gap of Nile Delta villages facing challenges that are more organisational and institutional than technical. The five-year research project, in partnership with the Egyptian Holding Company for Water and Wastewater (HCWW), aims to connect local competence and experience in developing, implementing and monitoring an innovative decentralised sanitation system as a complement to the established centralised systems.**

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“Egypt is a gift from the Nile”. What was true at the time of Herodotus is still true today. The gift is becoming more precious as the country’s population grows: from 40 to 80 million people in 30 years, with one additional million every year. Pressure on water and land is enormous, and skilful management of both resources has become a burning national issue.

The Government of Egypt has taken a step forward towards future development by reforming the water and wastewater sector. In 2004, the Holding Company for Water and Wastewater (HCWW) with 23 subsidiary companies was founded to develop and implement a holistic policy, i. e. expansion of service delivery, introduction of the latest operation and maintenance technology and enhancement of private sector participation in activities other than its core fields.

In 2008, the World Bank launched the Integrated Sanitation and Sewerage Infrastructure Project (ISSIP) aiming at developing and implementing an integrated wastewater management approach for two canal command areas within the Nile Delta Governorates of Beheira, Gharbeya and Kafr El Sheikh (Photo 1). It introduced the “cluster approach” to maximise wastewater treatment coverage while minimising the cost per capita. Large wastewater treatment plants (WWTP) will be set up and gradually connect the main towns and villages situated at a distance of up to 5 km. These clusters can best be visualised as “stars” spread across the delta.

The Swiss State Secretariat for Economic Affairs (SECO) requested Eawag/Sandec to develop a parallel research component to ISSIP, which could provide coverage of villages and hamlets that cannot be connected to the clusters or to a traditional sewer and treatment system for the next few decades. This gave rise to the Egyp-

tian-Swiss Research for Innovations in Sustainable Sanitation (ESRISS), whose aim is to develop, monitor and validate innovative sanitation systems that can be scaled up at the end of the third year of the project.

## Conditions prevailing in the villages of the Nile Delta

The Nile Delta is a flat, green, intensively cultivated area with thousands of densely populated villages of mainly urban character, as most buildings are three to four storeys high (Photo 2). The region’s drinking water supply coverage is excellent and almost all households are supplied with tap water. Therefore, water consumption is relatively high, usually between 100 and 140 litres/capita/day. Yet, as worldwide experience shows, drinking water supply does not follow step with sanitation supply, i. e. most households still rely on traditional on-site sanitation systems, mainly infiltration pits locally called *bayaras* or *tranches*.

These on-site systems are often affected by a high water table, sometimes up to 1 m below ground, thereby causing infiltration of groundwater into the pits rather

than infiltration of wastewater into the ground. As a consequence, these pits have to be emptied regularly (up to 2–4 times a month) and frequently overflow. The contents, pumped out of the pits and transported by vacuum tanker trucks, are generally dumped into the nearest drain or canal.

In any event, the environment, be it the soil, groundwater or surface water, is highly contaminated. This situation is particularly dangerous as groundwater – and sometimes drain and canal water (illegally) – is used and reused for irrigation in a context where the resource is scarce.

## Challenges of past and present initiatives

Most treatment technologies have been tried and tested in Egypt. Egyptian Universities and Research Centres have also conducted and are still carrying out numerous research studies.

Different initiatives have been adopted to solve these problems, however, they all had to face a series of obstacles, such as primarily the unavailability of land in the delta region. Since land is both expensive and precious, it is extremely difficult to



Photo 1: A typical Nile Delta village in the Governorate of Kafr El Sheikh.



Photo 3: Wastewater and sludge pumped out of the traditional on-site facilities are dumped into the nearest canals or drains.

acquire land for effective low-cost treatment, such as waste stabilisation ponds or constructed wetlands. At the same time, costs have to remain low and the required skills available locally. In such a setting, the communities would have to guarantee and cover most of the investment and daily O&M costs of the system.

Moreover, the common practice of dumping animal manure in the sewer systems has led to regular failures due to overloads in the treatment plants. Stormwater is also frequently drained into the existing sewers for lack of alternatives (Photo 3).

Yet, most challenges are institutional and organisational, as it is easier to build and manage a few large treatment plants than hundreds of small, decentralised facilities. There is a lack of innovative management interfaces linking the communities as beneficiaries to the water and wastewater companies in charge of O&M of the treatment plants. This leads to failure in the event of major breakdowns.

Laws and regulations also do not side with small-scale sanitation, as codes of practice leave little space for innovation, and the established effluent standards are as high for small as for large treatment units. In other words, it endorses a policy of "everything or nothing", although primary treatment for all would significantly alleviate the environmental burden. Besides, current water tariffs are very low and do not ensure cost-recovery for wastewater treatment, thereby hindering rapid expansion of the service. Work at the policy level is currently being conducted to improve this framework.

Legal and regulatory framework, institutional arrangements, skills and capacities, financial arrangements, socio-cultural acceptance, and government support are the main challenges faced by ESRISS in its quest to establish an enabling environment [1]. Therefore, improving a supporting and enabling environment is essential for future success.

### Connecting with the right people

ESRISS's key activity is to link up with local experts and establish a platform for small-scale sanitation to overcome institutional barriers. Many projects have failed because one of the components of the enabling environment was missing. Most of these projects could have succeeded with a better involvement of the potential stakeholders. In parallel, many projects



Photo 2: The Nile Delta – flat, green, intensively cultivated, with thousands of densely populated villages.

remained at the pilot stage. In this case, ESRISS can contribute to insert and implement them into complete full-scale systems.

The project started with an inventory of small-scale sanitation initiatives in the country, identifying success and failure factors, gaps and missing data. Studies are planned to collect the latter, especially at village level: assessment of sanitation practices, characterisation of wastewater, sludge and manure, and analysis of their flows. Money fluxes within the sanitation business (on-site emptying infrastructure, transport, emptier charges, taxes) will be assessed to decide if and how they can be reorganised in a system where emptiers would bring their loads to determined treatment points.

The project will subsequently assemble pieces of the puzzle of the "Egyptian sanitation initiatives", combining competence and expertise from various institutions to set up a complete, compact, low-cost, as well as easy to operate and maintain treatment "system". "System" in this context comprises sustainable financial and institutional mechanisms, including roles and responsibilities, questions of ownership, contracts, rules and regulations, as well as procedures in the event of service default. The potential synergies with the existing centralised sewer systems will also be investigated and give rise to several scenarios, sewer or unsewered and compared in a cost-benefit analysis.

While working on organisational and institutional challenges, careful stakeholder analysis, involvement and collaboration with other projects currently conducted in the country will contribute to improving the enabling environment towards more favourable implementation conditions and, above all, to an "institutionalisation" of the approach.

One or two scenarios will be selected for implementation by the local partners at the end of the 1<sup>st</sup> year of the project. During the following two years, implementation and monitoring will be conducted at full-scale in one or two hamlets (locally called *ezbas*). Once validated, they will pave the way to a large-scale replication in the remaining thousands of settlements in the Nile Delta.

[1] Lüthi, C. et al. (2011): Sustainable Sanitation for Cities – A framework for action. Papiroz Publishing House, Rijswijk, The Netherlands, 164 p.

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 We would like to thank all our Egyptian partners and colleagues for their support and openness during the first months of the project.  
 The project is funded by the Swiss State Secretariat for Economic Affairs (SECO). ([www.sandec.ch/esriss](http://www.sandec.ch/esriss))  
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