

Ex post evaluation – Egypt

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Sector: Sanitation and wastewater management – large systems (CRS code: 14020)

Project: Kafr El Sheikh Wastewater Disposal (1994 65 550)*; complementary measure (CM) (2004 70 633)

Implementing agency: National Organization for Potable Water and Sanitary Drainage (NOPWASD) and Kafr El Sheikh Water and Sanitation Company (KWSC) after taking over facilities from NOPWASD



Ex post evaluation report: 2019

		Investment (Planned)	Investment (Actual)	CM (Planned)	CM (Actual)
Investment costs (total)	EUR million	110.00	81.15	2.00	3.09
Counterpart contribution	EUR million	69.10	48.25	0.00	0.00
Funding	EUR million	40.90	32.90	2.00	3.09
of which BMZ budget funds	EUR million	40.90	32.90	2.00	3.09

*) Random sample 2016

Summary: This is an open programme for wastewater disposal in up to 30 towns in the governorate of Kafr el Sheikh in the Nile Delta. It is divided into two phases, of which only phase 1 was implemented with 15 programme cities. Ten oxidation ditches, one treatment pond, wastewater collection systems (including 23,000 house connections, wastewater collectors, inspection shafts and 22 pumping stations) as well as 3 laboratories and workshops (and 11 smaller workshops and warehouses) were financed. As Egypt's central water authority, NOPWASD is responsible for constructing the sectoral infrastructure, and therefore acted as the implementation agency. As the regional water supplier, KWSC took over the operation and maintenance of the infrastructure that was completed. KWSC was therefore supported by a complementary measure (BMZ no. 2004 70 633) in setting up an operating and maintenance organisation and training key personnel.

Objectives: The overarching targets (impact) were: (1) to help reduce the health risk to the population of the governorate of Kafr El Sheikh affected directly and indirectly by the programme measures; (2) to help improve the environmental situation in the areas affected by the programme measures.

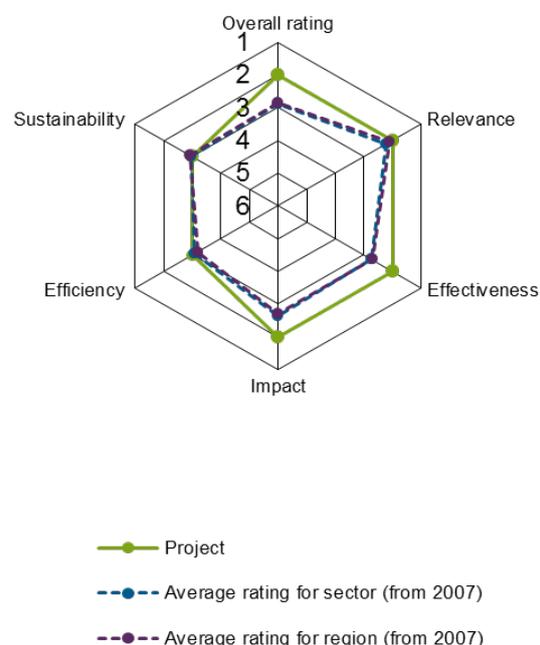
The module goals (outcome) were: (1) the proper disposal of wastewater in rural villages in Kafr El Sheikh governorate, selected according to priority criteria, and (2) the reduction of wastewater pollution in irrigation and drainage canals within the governorate through wastewater treatment.

Target group: The direct target group comprised the inhabitants of the villages benefiting from the measures. All users of the water whose cleanliness was improved in the course of the measure should benefit indirectly.

Overall rating: 2

Rationale: Constructing regulated wastewater disposal systems in the arid country of Egypt continues to be highly relevant. With the project in the governorate of Kafr El Sheikh, it has been possible to implement appropriate facilities and a competent operator structure in a sustainable manner. Technical and economic indicators have continued to develop positively since the final review. Deficiencies and shortcomings identified in the facilities have no serious negative impact on the degree to which the objectives have been achieved.

Highlights: The pilot project (rural mini-biogas plants) to reduce the input of increased organic loads, which was implemented on the executing agency's own initiative and with its own funds, shows the remarkable ownership of the current agency and its willingness to continue working on improving its performance. Also worthy of note is the very intensive complementary measure, which was carried out up to six years after commissioning and made a major contribution to the success of the project.



Rating according to DAC criteria

Overall rating: 2

Ratings:

Relevance	2
Effectiveness	2
Efficiency	3
Impact	2
Sustainability	3

Relevance

The Kafr El Sheikh Wastewater disposal programme was intended to address a core problem of water resource management in Egypt, namely the unregulated disposal of wastewater in many parts of the country (particularly in rural areas). At the time of the project appraisal, only around 5% of the rural population lived in the vicinity of a public supply network. The wastewater disposal systems in urban regions in particular have already seen strong expansion (with connection rates of around 55%), and this has further increased the pressure to develop adequate disposal systems in rural areas as well. Furthermore, although an arid country, irrigation farming is hugely important in Egypt, so high priority is given to the treatment of municipal wastewater and the protection of water as a resource. The programme's chosen approach – including the personnel support measures – adequately addressed the core problem, as the establishment of an adequate wastewater disposal system (outcome) makes an effective contribution to reducing health hazards and improving the environmental situation (impact). The theory of change thus is plausible, even though some problems not targeted by the project remain (e.g. fragmented institutional responsibilities, low tariffs).

The development of water resource management continues to be highly relevant, since it is foreseeable that high population growth and the effects of climate change will significantly exacerbate the core problems in the future. Egyptian-German DC is therefore based on integrated water resource management today, and includes the subsectors of residential water management, irrigation farming and waste management within the drinking water, water management and wastewater/waste disposal priority area. Other donors, such as the World Bank and the EBRD, also make substantial contributions to the Egyptian water sector. FC is working together with the AFD and the EIB on a total of 71 projects in four neighbouring governorates of Kafr El Sheikh to support the further expansion of the water and wastewater sector in rural regions; this marks the first phase of the Improved Water and Wastewater Services (IWSP) programme in the Nile Delta. The IWSP programme involves intensive donor harmonisation and a second phase is currently in preparation.

The Egyptian administration which is responsible for the water sector also attaches great importance to the further expansion of regulated wastewater disposal, particularly in rural areas. The government has approved a budget of EGP 60 billion (around EUR 2.9 billion) to finance the counterpart contribution for donor-financed projects, with the aim of increasing the connection rate in rural areas from the current 29% to 60%.

Relevance rating: 2

Effectiveness

The project objectives defined during the project appraisal, as measured against the following indicators which were amended for the purposes of the evaluation, are only partially achieved. With the exception of indicator 2 (discharge values exceeded in one of the 11 treatment plants), the objectives at the outcome level were achieved. This includes the objectives defined as part of the personnel support measures (see table below: achievement of project objectives at the outcome level).

The 11 wastewater treatment plants, 22 pumping stations and the sewage network were handed over to the operator KWSC by the project-executing agency National Organisation for Potable Water and Sanitary Drainage (NOPWASD) after 2012, after more or less being implemented in full – despite various shortcomings in the treatment plants which can be attributed to design flaws or construction defects. These could not be rectified until KWSC had taken over the plants, and to date only some have been remedied (e.g. incorrect hydraulic design of an inlet flow meter). KWSC itself has an appropriate organisational structure which guarantees the proper technical operation of the plants – this was confirmed on the ground after visiting four of the locations. In contrast to the situation during the final review in 2012, when several wastewater treatment plants and pumping stations had been outsourced to external contractors, all installations are now fully operated and maintained by KWSC personnel. The four wastewater treatment plants visited during the mission were adequately equipped in terms of personnel and technology; the personnel were technically knowledgeable and motivated and the plants were in a good overall condition in their tenth year of operation despite existing – but not serious – maintenance deficiencies. The only exceptions were the flow rate meters at all 11 wastewater treatment plants, which were no longer functional. Maintenance work is carried out regularly using software developed with the support of USAID; this is documented and monitored by the head office. Two different approaches are used: each plant has a small maintenance budget (“petty cash”) for minor maintenance work. Larger maintenance work such as corrosion protection, on the other hand, is paid for from an annual maintenance budget. Overall it can be assumed (from a technical perspective) that the plants will continue to operate sustainably in the future. This is made all the more evident by the fact that two of the 11 treatment plants have already been certified by TSM Egypt (Technical Sustainable Maintenance), a programme supported by GIZ and DWA (German Association for Water, Wastewater and Waste). KWSC is currently in the process of arranging TSM certification for all the treatment plants it operates.

All treatment plants comply with the statutory discharge values, with the exception of the treatment plant in Abu Ghanimah. In this case, NOPWASD connected additional villages to the treatment plant without checking the plant’s performance capacity. The plant is now struggling with four times the water volume it was designed to handle, and is therefore unable to meet the required discharge values.

Problems operating individual plants, on the other hand, are caused by the introduction of increased organic loads from stable waste (essentially liquid manure), which overloads the biological stages. To avoid illegal discharges such as these, the executing agency has now implemented a pilot project, which can be considered positive (see “Sustainability”). No unintended side effects of operation in the form of unusually strong odours were identified on site.

The complementary measure (personnel support measure), which was launched on commissioning the treatment plants in 2007 and ran – with some interruptions – for a period of around six years, has made a clear contribution to the high level of technical expertise among key personnel at KWSC. The Training of Trainers (ToT) concept introduced as part of the personnel support measure was continued and further developed by the management at KWSC even after the end of the consultant’s assignment: in 2012, KWSC used its own resources to set up a training centre at its headquarters in Kafr El Sheikh, which is regularly used to conduct training.

The achievement of the project objectives at the outcome level can be summarised as follows:

Indicator	Status PA, target PA	Ex post evaluation
(1) Collection of wastewater from at least 2/3 of the connectable population living in supplied settlements, and taking said wastewater to centralised treatment plants	Target value: 66% of residents in project communities	77%
(2) 24-hour composite sample exceeds discharge value of 60mg/l BOD ₅ only in exceptional cases (max. twice per month).	Target value: concentration >60mg/l BOD ₅ max. twice per month	Achieved in 10 of the 11 treatment plants

(3) In terms of organisation and personnel the newly established training capabilities can continue the training measures in line with demand and quality requirements.	(added during the evaluation)	Achieved. 35 trainers are currently undergoing training at KWSC. 540 KWSC employees were trained in 37 courses during 2017.
(4) Cost recovery ratio for wastewater disposal at KWSC	(added during the evaluation)	71%
(5) Average capacity utilisation of wastewater treatment plants and pumping stations	(added during the evaluation)	Missing quantity measurements mean no concrete value can be determined, but capacity utilisation is acceptable to good according to statements made by operating personnel (estimation of pump station run times).

Effectiveness rating: 2

Efficiency

The implementation concept stipulated that NOPWASD was to be responsible for the planning and construction of investment measures and that the plants were to be handed over to the operator (KWSC) after completion. This split (which was unavoidable in the Egyptian context at the time of the project appraisal) later proved to be disadvantageous and contributed (among other factors) to a significant, 14-year delay in the project implementation. In addition to a change of contractor and the associated delays, this was due in particular to the late acceptance / takeover of the plants by KWSC, which was only prepared to do so after NOPWASD had completely remedied the defects. At the same time, given the financing capacity of the executing agency NOPWASD and the lack of experience at that time of KWSC, which would later become operator, the use of comparatively simple and low-maintenance wastewater treatment technology was an appropriate choice for ensuring efficient and cost-effective operation. At an average of around EUR 70 per population equivalent, the specific investment costs were at the lower end of the normal range for such treatment plants.

During the field mission, it was discovered that the treated wastewater volumes were not being recorded because of defective measuring instruments. As a result, a key performance indicator for operation is missing, one necessary for monitoring operation as well as operating costs, among other things. Despite the various – though not particularly serious – deficits in relation to operation, the scope and design of the investment measures have proved their worth in principle. It is clear from the reports and log-books consulted that the plants are operated without any major disruptions, let alone downtimes, and that the target discharge values are achieved (with just one single exception). The capacity utilisation of the plants can be assessed as good, with values ranging from around 50% to almost 100% at the four sites visited (estimate based on pump station run times). The technical operation of the facilities, considered satisfactory and sustainable overall, also contributed to the positive development of the economic indicators (see section on Sustainability).

The collection rate for the user fees collected along with the water charges can be described as very good, producing figures of 95%. According to KWSC, this is the highest value among all “Affiliated Companies” of the HCWW.

The training measures implemented as part of the CM were well matched to the needs of both KWSC and the local operating personnel; despite the increase, the costs appear to be reasonable. On a critical point, however, it must be noted that the significant delay in project implementation meant the complementary measure had to be extended several times, resulting in additional costs of around EUR 1 million. Ultimate-

ly, though, the success of the complementary measures justifies these additional costs, which are considered of minor importance in relation to the overall investment.

In light of the particular importance of the wastewater sector in protecting Egyptian water resources, the foreseeable increase in water demand (in particular for irrigation purposes) and the improvements in the health situation appear to justify the investments financed under the FC project from the point of view of allocation efficiency too.

Efficiency rating: 3

Impact

The set programme objective was to “help reduce the health hazards for the population affected both directly and indirectly by the programme measures and help improve the environmental situation in the areas supported by the programme measures.” No specific indicators were defined here, but it was assumed that achieving the project objectives at the outcome level would also result in the achievement of the programme objective.

No useable baseline data on the health situation in the programme area was available at the time of the project appraisal, and as such it was only possible to assess the targeted health impacts in terms of plausibility. With regard to the reduction of health hazards, data available from a 2018 study conducted in the village of Al Zafaran (5,500 inhabitants) in the project area by the Directorate of Health Affairs and Consumer Protection shows a significant reduction in the number of waterborne diseases. For example, despite continued population growth, between 2010 and 2017 the incidences of typhoid fever and diarrhoea fell from 29 to 20 and from 162 to 145 cases respectively. The incidence of cholera mentioned in the PP is no longer being monitored, although other factors may have played a role both here and in the overall reduction in waterborne diseases.

Data from a surface water analysis also conducted by the Directorate of Health Affairs and Consumer Protection shows an improvement in water quality in the wastewater systems located within the project area, as compared to areas in Kafr El Sheikh, where centralised wastewater management has not yet been implemented (an average of 8.5mg/l BOD₅ in regions where wastewater management has been implemented, compared to 27mg/l BOD₅ in regions without centralised wastewater management). Although the available data was only collected for a comparatively small section of the project area, it can be assumed that the project impacts achieved will also have been achieved to a similar extent in the other project locations.

It can equally be assumed that the proportion of households connected to a wastewater treatment plant will continue to rise in the future. Of the fifteen villages which were to be connected in project phase 2 (ultimately not implemented), ten have now been connected to a wastewater treatment plant. This was achieved in part by means of connecting to wastewater treatment plants financed in phase 1, and in part by connecting to wastewater treatment plants financed by the World Bank/EBRD or by NOPWASD itself.

The developmental impacts achieved are due primarily to the fact that the level of experience of the operator KWSC has increased over time and they now have a largely professional management team. KWSC is now also directly involved as a project-executing agency in current EBRD and EIB programmes to implement investment projects. The support and further strengthening of the operator KWSC – which can now serve as a model for the water sector across Egypt (see TSM certification above) – plays an important role in the further development of the water/wastewater sector in the governorate of Kafr El Sheikh.

Impact rating: 2

Sustainability

The sustainable operation of wastewater disposal facilities (sewerage systems with pumping stations and treatment plants) appears to be largely guaranteed from a technical standpoint. After almost ten years in operation, all the inspected plants are operational with maintenance conditions ranging from satisfactory to good in some cases. It was found, however, that some smaller technical components (flow rate meters, for example) were out of order – with this having been the case for several months in some instances – as

a result of lengthy procurement processes combined with tight maintenance budgets. These tight maintenance budgets are associated with the (still) insufficient recovery of operating costs for wastewater disposal.

To address the widespread problem throughout the Nile Delta of stable waste being discharged into the public sewerage network, KWSC utilised its own financial resources (from its research and development budget) to conduct a pilot project in which two farmers were equipped with a mini biogas plant. Instead of disposing of the stable waste illegally, it now undergoes anaerobic fermentation and the biogas produced is used for cooking with gas burners. The farmers save money, while the operator (KWSC) benefits from the reduced load or overload on the wastewater treatment plants.

As a result of the satisfactory and sustainable operation, as well as the significant increase in the collection rate in connection with the recently implemented – and in some cases significant – tariff increases, KWSC's cost recovery ratio for wastewater disposal has increased from 31% at the time of the final review to now 71%. Further tariff adjustments are in the pipeline and it is anticipated that full operating cost recovery will be achieved by the end of 2020.

According to the KWSC management, the current cost shortfall is compensated by regular financial support / subsidies from HCWW on the one hand, and by the crediting or waiving of energy costs (by far the largest cost factor) by the energy supplier on the other. KWSC assumes that this will continue to be the case until the full recovery of operating costs is achieved.

All assets financed as part of the project were transferred by NOPWASD to KWSC free of charge. For operations to be sustainable from an economic point of view – at least where the technical useful life of the plants is concerned – the full recovery of operating costs appears to be sufficient. There has been significant progress in this area in the past, not least due to the much more professional management of KWSC. The funds currently pledged by donors for the investments now carried out by KWSC as the project-executing agency are also passed on to KWSC via central government (Ministry of Housing). KWSC's annual financial statements as at 30 June 2017 show assets (buildings and fixed assets) of EGP 985 million (EUR 47 million) with depreciation of over EGP 93.5 million (EUR 4.5 million). Despite a positive net cash flow of EGP 72 million (EUR 3.5 million), a loss of more than EGP 140 million (EUR 6.7 million) was reported as at 30 June 2017; KWSC is therefore still dependent upon financial compensation and/or support from central government both to cover its operating costs (on a pro-rata basis) and to cover its future investments. Against this background, it cannot be assumed that KWSC is presently operating in a financially sustainable manner, nor can it be assumed that this will be the case in the medium term. If the current practice of transferring long-term assets (investments in networks and wastewater treatment plants) to KWSC free of charge were to change, then the goal of full cost recovery would become a key objective for the commercially sustainable operation of KWSC, because only full cost recovery (i.e. coverage of operating costs and investment in fixed assets) would ensure that KWSC operates in a commercially sustainable manner. The durability of the positive project impacts described above depends mainly on the sustainable economic operation of KWSC (in addition to the continued technical availability of the plants). This is largely determined by the amount of water and wastewater tariffs, which are set at the central government level by HCWW. The agreements recently reached with the IMF in relation to reducing subsidies – which also set (in some cases significant) tariff increases for water and wastewater – along with the further increases agreed suggest that this will continue to have a positive impact on the economic sustainability of KWSC. However, retarding effects must also be taken into account here, as the subsidisation of energy prices in Egypt to date will also be discontinued. Since energy costs account for the largest share of KWSC's operating costs, this will tend to have a negative impact on KWSC's operating cost recovery rate.

Finally, and on a positive note with regard to sustainable operation, wastewater sludge disposal is clearly a non-issue. At the four wastewater treatment plants visited, the operators reported that all sludge produced is sold to local farmers as fertiliser; according to information provided by the KWSC, this is also the case at the seven other wastewater treatment plants.

Sustainability rating: 3

Notes on the methods used to evaluate project success (project rating)

Projects are evaluated on a six-point scale, the criteria being **relevance, effectiveness, efficiency** and **overarching developmental impact**. The ratings are also used to arrive at a **final assessment** of a project's overall developmental efficacy. The scale is as follows:

Level 1	Very good result that clearly exceeds expectations
Level 2	Good result, fully in line with expectations and without any significant shortcomings
Level 3	Satisfactory result – project falls short of expectations but the positive results dominate
Level 4	Unsatisfactory result – significantly below expectations, with negative results dominating despite discernible positive results
Level 5	Clearly inadequate result – despite some positive partial results, the negative results clearly dominate
Level 6	The project has no impact or the situation has actually deteriorated

Rating levels 1-3 denote a positive assessment or successful project while rating levels 4-6 denote a negative assessment.

Sustainability is evaluated according to the following four-point scale:

Sustainability level 1 (very good sustainability): The developmental efficacy of the project (positive to date) is very likely to continue undiminished or even increase.

Sustainability level 2 (good sustainability): The developmental efficacy of the project (positive to date) is very likely to decline only minimally but remain positive overall. (This is what can normally be expected).

Sustainability level 3 (satisfactory sustainability): The developmental efficacy of the project (positive to date) is very likely to decline significantly but remain positive overall. This rating is also assigned if the sustainability of a project is considered inadequate up to the time of the ex post evaluation but is very likely to evolve positively so that the project will ultimately achieve positive developmental efficacy.

Sustainability level 4 (inadequate sustainability): The developmental efficacy of the project is inadequate up to the time of the ex post evaluation and is very unlikely to improve. This rating is also assigned if the sustainability that has been positively evaluated to date is very likely to deteriorate severely and no longer meet the level 3 criteria.

The **overall rating** on the six-point scale is compiled from a weighting of all five individual criteria as appropriate to the project in question. Rating levels 1-3 of the overall rating denote a "successful" project while rating levels 4-6 denote an "unsuccessful" project. It should be noted that a project can generally be considered developmentally "successful" only if the achievement of the project objective ("effectiveness"), the impact on the overall objective ("overarching developmental impact") and the sustainability are rated at least "satisfactory" (level 3).