Tunisia: (I) Sewage disposal, Lake Bizerte and (II) Sewage disposal, 6 + 2 locations in the Medjerda valley (Phase II)

Ex post evaluation report

OECD sector	1402000 / Sewage disposal	
BMZ project ID	**I** 199365644 – Sewage disposal (SD), Lake Bizerte **II** 199166075 – SD at 6 + 2 locations in the Medjerda valley (Ph. II)	
Project executing agency	OFFICE NATIONAL DE L'ASSAINISSEMENT (ONAS)	
Consultant	GKW/Pöyry	
Year of ex post evaluation report	**2009** **2009 (2009 random sample)**	
	Project appraisal (planned)	**Ex post evaluation (actual)**
Start of implementation	**I** Q3 1994 **II** Q3 1993	**I** Q2 1995 **II** Q3 1994
Period of implementation	**I** 40 months **II** 52 months	**I** 133 months **II** 116 months
Investment costs	**I** EUR 33.3 million **II** EUR 78.9 million	**I** EUR 29.4 million **II** EUR 53.4 million
Counterpart contribution	**I** EUR 13.3 million **II** EUR 25.0 million	**I** EUR 13.6 million **II** EUR 21.6 million
Financing, of which Financial Cooperation (FC) funds	**I** FC/G: EUR 20.0 million **II** FC/L: EUR 37.9 million	**I** FC/G: EUR 15.8 million **II** FC/G: EUR 31.8 million
Other institutions/donors involved	**I** + **II** Project executing agency	**I** + **II** Project executing agency
Performance rating	**I: 3** **II: 3**	
• Relevance	**I: 2** **II: 2**	
• Effectiveness	**I: 3** **II: 3**	
• Efficiency	**I: 3** **II: 3**	
• Overarching developmental impact	**I: 2** **II: 2**	
• Sustainability	**I: 3** **II: 3**	

Brief description, overall objective and project objectives with indicators

I: This project comprised the initial expansion of the sewage treatment plant (STP) west of Bizerte and the expansion and repair of the sewage collection systems in Bizerte, in Zarzouna (a suburb of Bizerte), and in the towns of Menzel Jemil and Menzel Abderrahman (in the Greater Bizerte area), the aim being to dispose of domestic sewage and commercial effluent in an environmentally sound manner (the project objective). This was designed to reduce health risks for the local population and to

protect water quality in Lake Bizerte, Lake Ichkeul and the Mediterranean Sea (the overall objective).
II: This project represented Phase II of the overall programme for sewage disposal in the Medjerda valley (covering 11 towns in total). It comprised the construction of sewage treatment plants (STPs) and the expansion of the sewage collection network in the eight towns of Djedeida, Tebourba, Bou Salem, Ghardimaou, Testour, Teboursouk, Gaâfour and Siliana. In addition, it provided for the proper disposal of household refuse from the four towns of Béja, Jendouba, Medjez el Bab and Siliana through the construction of secure landfill sites.

Project design

Under Project I, sewage disposal measures were carried out in Greater Bizerte (Grand Bizerte), an area extending beyond Bizerte city to include the suburb of Zarzouna and the districts of Menzel Abderrahman and Menzel Jemil. These measures comprised:

- Construction of domestic connections
- Expansion of the existing collection network through the construction of new main sewers and drains
- Construction of new sewers and pumping stations to transfer sewage to the new central treatment plant
- Construction of a bio-mechanical treatment plant and a compensating reservoir for the intermediate storage of treated sewage.
- Construction of a pumping station and a transfer pipeline to take the treated effluent from the intermediate reservoir to a backwater of the canal linking Lake Bizerte to the Mediterranean Sea. This storage reservoir and transfer system allows the constantly accumulating effluent to be carried into the lake at intervals, subject to favourable tidal currents.
- Construction and outfitting of two workshops and the supply of special equipment and vehicles for the maintenance of the sewerage system.

Initially, at project appraisal in 1993, Project II (SD at 6 + 2 locations in the Medjerda valley) covered sewage disposal in six towns: Bou Salem, Djedeida, Siliana, Tebourba, Teboursouk and Testour; the towns of Gaâfour and Ghardimaou were added in 1996. At each location, the sewage disposal measures comprised the construction of a bio-mechanical treatment works (eight in total) and the expansion of the sewerage system, including pumping stations and transfer pipelines. Sewerage facilities were also developed at Maâgoula, a district within Béja, and subsequently integrated into the town's sewer network.
Alongside the SD measures, the project included a refuse disposal component. A total of four domestic waste sites were built and equipped for Béja, Jendouba and Medjez el Bab (the three towns in Phase I of the overall project) and for the town of Siliana.

The sewage disposal works carried out in the eight towns of the Medjerda valley only deviated from the original plan in technical adaptations that were made to suit actual conditions. These modifications remained within the overall design concept, which otherwise remained unaltered.
The project executing agency was the Tunisian state authority with responsibility for sewerage, Office National de l'Assainissement (ONAS).
There were significant delays in the implementation schedule. Commissioning of the treatment plant at Bizerte was delayed by about a year beyond the planned date. Sections of the sewerage network were only completed in 2004, following a five-year delay. The eight treatment plants in the Medjerda valley were commissioned after delays of between two and six years.

Key results of the impact analysis and performance rating

The overall objectives stated above remain relevant; furthermore, sewage and waste disposal projects represent a focal point for development cooperation between

Germany and Tunisia. Given the assumed causal mechanisms, the project is suitably designed to make a noteworthy contribution to the resolution of one of the core problems in Tunisian development. As the only perennial river in Tunisia, the Medjerda has major importance for national water supply; it is significant not just for the project region itself, but also for supplies via long-distance pipeline to Tunis, the capital, and to the southern centres of Sousse and Sfax. Due to its limited exchange of water with the Mediterranean Sea, Lake Bizerte has an extremely sensitive ecosystem which merits protection and plays an important role for the region's fisheries, mussel farms and tourist industry. Relevance has been assessed at level 2.

The project goal indicators were achieved, but with some reservations: for both projects the indicators for connection rates and sewage volumes were mostly attained. Effluent quality was also achieved, with some qualifications. In contrast, the sludge disposal indicator is not being attained in either project. So far the volume of sludge being disposed of properly, other than on the treatment plants' own land, is negligible. Most of the sludge is temporarily stockpiled in the treatment plant grounds with no special precautions. In the refuse disposal element of the Medjerda valley project, indicators for waste volumes and connection rates are being achieved without difficulty; however, target standards for "proper disposal" — for example, with regard to leachate and landfill gas capture — are still not being achieved. While refuse from the towns is being taken to the four disposal sites, the surrounding villages continue to dispose of their rubbish in an uncontrolled fashion. Effectiveness has therefore been assessed at level 3.

Overall the projects have achieved an acceptable level of cost efficiency, with certain qualifications. Specific investment costs are running at around EUR 217 for Bizerte and an average of around EUR 308 for the eight treatment plants in the Medjerda valley, which compares favourably with regional standards. In both cases the investment costs turned out markedly less than envisaged at project appraisal (Lake Bizerte - EUR 3.9 million lower; Medjerda valley - EUR 9.5 million lower). However, the implementation period (ca. 1994-2009) was too long in the case of both projects. In the Medjerda valley project, treatment plant utilisation levels are clearly lower than expected. Population growth projections are the main reason for this: whereas it was assumed at project appraisal that the relatively high rate of growth (approx. 2.3% p.a.) would continue, many places today (e.g. Siliana) are actually seeing a decline in population. The actual utilisation rate has been measured at 35-65%; this is in part attributable to the measurement methodology which, to a certain extent, under-reports the level of utilisation. Due to the increase in sewerage charges under the water supply tariff (SONEDE), both projects are achieving excellent collection efficiency. This stands at 97% in Bizerte and at more than 95% in the Medjerda valley. With a sewage tariff averaging around EUR 0.22/m^3, ONAS achieves an overall operating cost recovery of only around 61% and therefore remains dependent upon state subsidies. Nonetheless, these are provided on a regular basis, as well as state grants for reinvestment. However, from example calculations based on individual assessments, the treatment plants that have been financed demonstrate full cost recovery. Efficiency has been assessed at level 3.

Sewage treatment in the project towns made a significant contribution to protecting the waters of the Medjerda and Lake Bizerte. At the time of project appraisal, all domestic sewage and most industrial effluent were released into the environment untreated. Uncontrolled accumulations of rubbish at the river's edge and at dams placed additional burdens on ground water and surface water. The construction of treatment plants and formal refuse dumps brought a radical improvement to the situation. It also seems likely that the health risks to the project area's population from waterborne diseases have been significantly reduced; alongside the contributions made by these two projects, this can also be attributed to improvements in both the standard of living and in general hygiene conditions. There remains a need for improvement with regard to industrial effluent. Some factories could not be connected to the sewer network due to insufficient capacity at the treatment plant (e.g. Bou Salem). In general, those

factories which do not discharge their effluent into the sewer network, but release it directly into the environment, do not adhere to the stipulated limitations. Even those factories which discharge to the sewer network do not completely satisfy the applicable limits (the indirect discharge regulations issued by ONAS). Programmes for industrial effluent which cannot be processed in public treatment plants do exist (notably FODEP, a programme funded by FC), but their implementation to date has proved to be rather tentative. ANPE, the environmental authority which is responsible for the control of industrial discharges, has so far had limited practical opportunity to enforce the legal requirements. The overarching developmental impact has been assessed at level 2.

The overall sustainability of the two projects can be considered satisfactory. The treatment plants are operating properly, preventative maintenance and servicing plans are in place for all equipment, and, for the most part, are also being followed. Furthermore, most of the problems outlined earlier (utilisation of treated sludge, dumping, treatment of industrial discharges, management of household waste sites) are also recognised by ONAS. The solutions to these problems are available, or – as with the utilisation of treated sludge in agriculture and the transfer of refuse site management to ANGED – are already being trialled or implemented. Nevertheless, even now, 6-9 years after the facilities were commissioned, no immediate solutions to overall problems are yet evident in a number of areas (most notably with regard to industrial discharges). The route developed by ONAS and ANGED toward a model of private operation for treatment plants and refuse sites is deemed positive in principal, since the businesses involved certainly seem to possess a good level of expertise and management capacity, and consistently use incentives to optimise cost efficiency. However, in the case of the operating agreement covering the treatment plant and sewer network in Bizerte, it was established that the tariff per cubic metre of sewage, assuming effective operation, was insufficient to cover energy costs. This failure to cover operational costs constitutes a weakness with regard to the cost effectiveness of ONAS in the long term. Failure to change the tariff creates wrong incentives, especially considering Tunisia's scarce water resources. Nevertheless, it can be assumed that state subsidies will continue to compensate ONAS' negative balance sheet in the years to come. Sustainability has been assessed at level 3.

Jointly, the two projects have been assessed at level 3 (satisfactory developmental impact. Relevance and Overarching Developmental Impact scored well, whereas lower ratings were achieved in Effectiveness (due to problems with treated sludge and industrial discharges) and Efficiency (due to oversizing/cost recovery rate).

Details on performance assessment can be found in the technical information sheet „Criteria and rating system in ex post evaluation reports on German bilateral FCs" (14 September 2006).

General conclusions and recommendations

Treated sludge disposal should be considered – as is standard planning practice nowadays – in the early stages of SD projects; routes for sludge disposal should be identified with due regard for the statutory provisions and options applicable to the region, and selected according to a defined set of criteria (cost efficiency/environmental). Where disposal programmes include the reuse of treated sludge (agriculture, thermal), the risks in terms of take-off quantities, continuity and reliability should be evaluated and alternatives planned wherever necessary. Sludge processing (stabilisation and drying) at the treatment plants should be oriented toward sludge disposal.

To provide effective water protection in partner countries, the complex problem of industrial effluent must be addressed at the same time as the issue of domestic sewage. The disposal of industrial effluent is more expensive than the disposal of domestic sewage, not only in terms of technical resources, but also in organisational terms. The volume and quality of industrial effluent, the existing public sewerage infrastructure and the relevant regulations on indirect discharge will determine whether

a factory is allowed to release effluent (after pre-treatment where necessary) into the public sewer network, or must itself pay for the infrastructure required and the operation of the relevant facilities. Issues of responsibility, operational organisation, project financing, effective sanctions for non-compliance, but equally the creation of incentives for investment, all have relevance here. The latter could be achieved through business consultancy and process analysis; these could contribute to the implementation of production and recycling procedures that would save resources. For example, FC could become active in the area of carefully targeted and demand-oriented environmental finance funds, with TC supporting the development of effective regulatory authorities in parallel.

The projected requirement determines the size, the scope and the positioning of the project measures planned. In order to predict this as accurately as possible, trends in population and industry should be estimated differently, according to region. This should ensure consideration is given to socio-cultural changes, migration, structural economic changes (agriculture, tourism) and changes in national and global markets (in this case, the textile industry).

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

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

1 Very good rating that clearly exceeds expectations

2 Good rating fully in line with expectations and without any significant shortcomings

3 Satisfactory rating – project falls short of expectations but the positive results dominate

4 Unsatisfactory rating – significantly below expectations, with negative results dominating despite discernible positive results

5 Clearly inadequate rating – despite some positive partial results the negative results clearly dominate

6 The project has no positive results or the situation has actually deteriorated

A rating of 1 to 3 is a positive assessment and indicates a successful project while a rating of 4 to 6 is a negative assessment and indicates a project which has no sufficiently positive results.

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 an improvement is very unlikely. 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. A rating of 1 to 3 indicates a “successful” project while a rating of 4 to 6 indicates an “unsuccessful” project. In using (with a project-specific weighting) the five key factors to form an overall rating, it should be noted that a project can generally only be considered developmentally “successful” if the achievement of the project objective (“effectiveness”), the impact on the overall objective (“overarching developmental impact”) and the sustainability are considered at least “satisfactory” (rating 3).