

Jordan: Waste Water Conveyor in Amman Al-Samra

Ex post evaluation report

OECD sector	1402000 / Water supply and sanitation – large systems	
BMZ project ID	1993 66 295	
Project executing agency	Water Authority of Jordan (WAJ)	
Consultant	Pöyry Environment GmbH; Mannheim/Germany (formerly known as GWK)	
Year of ex post evaluation report	2009	
	Project appraisal (planned)	Ex post evaluation (actual)
Start of implementation	Q2 1995	Q4 2009
Period of implementation	36 months	142 months
Investment costs	EUR 38.9 million	EUR 64.9 million
Counterpart contribution	EUR 8.5 million	EUR 19.5 million
Financing, of which FC funds	EUR 30.4 million	EUR 45.4 million
Other institutions/donors involved	./.	./.
Performance rating	2 (good)	
• Relevance	2 (good)	
• Effectiveness	2 (good)	
• Efficiency	3 (satisfactory)	
• Overarching developmental impact	2 (good)	
• Sustainability	2 (good)	

Brief description, overall objective and project objectives with indicators

The project proposed to build a waste water pre-treatment plant in Ain Ghazal (a suburb of Amman) and to rehabilitate and expand the existing waste water conveyor system between Amman and the Al-Samra treatment plant. By rehabilitating the existing pipe system and building a new parallel conveyor, the project increased the capacity of the waste water lines leading to the treatment plant from 2.1. to 5.7 cubic metres per second. The capacity of the rehabilitated and expanded pipe system is now sufficient to handle the dry weather flow up until 2020.

At the outset, the project's overall objective was to (i) reduce health risks and (ii) manage scarce water resources in a sustainable manner. Two overall objective indicators were defined, but not quantified – the hygienic properties of the drinking water and the amount of waste water used for agricultural purposes. However, the overall objective indicator that is related to the hygienic properties of the drinking water

may also be seen as a project objective indicator. Since it corresponds to the actual project objective indicator, it will not be used to track the overall objective.

The project objectives were to provide effective protection for the Ruseifa groundwater resources and to guarantee the availability of water from the King Talal reservoir for irrigation. These objectives were deemed to be achieved if three years after the commissioning of the facility, (i) the pre-treatment plant does not discharge any waste water to the Zarqa Wadi (i.e. the Ruseifa well protection zone), (ii) the quality of the King Talal reservoir water stays below 15 mg BOD₅/litre, subject to normal precipitation levels, and (iii) an adequate groundwater quality of the Ruseifa well protection zone is determined by tests where 80% of the samples taken are E.coli-free¹. From today's point of view, these indicators were chosen correctly. However, it was not possible for the project to directly influence the E.coli bacteria indicator, since it only covered waste water collection. This indicator was rather a function of the operating performance of treatment plants that were funded by other donors. Therefore, it will not be used to track the project objective.

Project design / major deviations from the original project planning and their main causes

The planned project measures included constructing a waste water pre-treatment plant in Ain Ghazal and a second waste water line from Amman to Al-Samra, and rehabilitating some of the existing waste water pipes from Amman to the Al-Samra treatment plant. At the proposal of the executing agency and the consultant, new plans were drawn up and implemented for the entire routing and sizing of the new line and the rehabilitation of the existing line. As a consequence, and since the amount of rehabilitation work turned out to be much larger than planned, project implementation was delayed by a total of seven and a half years and investment costs increased by 67%. But in spite of these changes and the cost increase, there was no reasonable alternative to these investments. By international comparison, the specific costs were acceptable, amounting to EUR 41 per beneficiary or EUR 950 per metre, which is quite moderate.

However, the pre-treatment plant in Ain Ghazal was never fully capable of performing its task (i.e. pre-treating Amman's municipal and sanitary sewage). On the one hand, the share of coarse particles and the ensuing increase in operational load had been underestimated, on the other, the treatment concept which, at a later stage, was planned and implemented at the Al-Samra plant resulted in smaller particle sizes than were permissible for the Ain Ghazal facility. This meant that a new screen had to be installed to meet stricter requirements, and today the old device which was funded by German Financial Cooperation (FC) is only used for the sanitary waste water. Even so, this item accounted for less than 5% of the overall investment costs.

Accompanying measures worth EUR 2.6 million to strengthen the role of the Water Authority of Jordan (WAJ) as an executing agency were abandoned without replacement, because operation of the project facility was to be handed over to the LEMA management and operating company, which was also responsible for Amman's water supply. At the time, this decision seemed reasonable, but in the run-up to the handover, it turned out that LEMA's resources were insufficient to ensure proper operations. As a temporary solution, the responsibility for operating the facility was transferred to the construction company of the waste water line under an operations and maintenance agreement worth EUR 1.6 million. On the whole, the difficulties were resolved in an appropriate manner.

¹ The E.coli pollution indicator had not yet been defined in the project appraisal report. It was specified at a later stage in the separate agreements.

All work packages of the project were carried out properly and in accordance with professional standards and were formally accepted by the executing agency without major complaints. At the time of ex-post evaluation, the facilities were in a good state of repair and fully operational. The defined performance targets of the various components of the facilities were reached. Therefore, it is fair to say that the project design has proven successful, and one may assume that the facilities will remain fully operational beyond their defined service life. At the planning and implementation stages,² the implemented measures were, in general, useful, adequate and appropriate to resolve the target issues. The construction of the new conveyor system was an essential part of a long-term master plan to ensure proper and appropriate waste water disposal in the larger Amman area.

Key results of the impact analysis and performance rating

Today, the protection of scarce drinking water resources continues to be a central challenge for Jordan's socio-economic development. This also includes treating waste water and using it as a substitute for drinking water in irrigation. The objectives pursued by the project correspond to the priorities of the Jordanian government and the strategic priority areas of the German government. The objective indicator targets that were derived from the sector strategy and set forth in the action plan have only partially been reached so far. Other crucial requirements that are yet to be met include reducing (persistently high) water losses more effectively, increasing the cost coverage ratios (by raising water rates and enhancing energy efficiency measures) and expanding and tapping the potential of treated waste water reuse. The FC-funded facilities are properly operated and maintained. It is fair to assume that this can also be guaranteed in the medium term once responsibility has been transferred to a private operator.

As far as the individual cost and revenue situation is concerned, estimated revenues from the waste water fees paid by private households are adequate to cover the variable operating costs of the waste water system. However, they are far from sufficient on a full cost basis.

Current waste water fee levels amount to approximately 1.2% of the disposable income of poor Amman households. This is well below the expenditure share of 7% for drinking and waste water which the WAJ and the Jordanian water ministry regard as acceptable. This example shows that even if the FC investment were to lead to a rate hike, it would still be tolerable for the poorer strata of the Jordanian population.

The main objective of the project was to promote environmental protection and resource preservation, and it was able to fulfil the expectations it had raised. The project's gender-specific impact was expected to be low as there was relatively little direct contact with the target groups. Therefore, the project did not offer any potential to promote gender equality. The same is true for poverty reduction. As regards sustainable operation of the project facilities, we consider it positive that the FC project may now be run under a private operator model.

The significance of environmental protection, waste water treatment and the reuse of treated waste water for agricultural purposes has increased since the project was launched (due to population growth and a water balance that is deteriorating in view of persistent overexploitation of renewable natural drinking water resources). These issues continue to be priorities of both the population and the political decision-makers. This is also borne out by both the German-Jordanian Water sector strategy paper and the Jordanian SSP "Water for Life 2008-2022", which was coordinated with the

² At the time, it was not possible to foresee the modification which became necessary in order to adapt the pre-treatment facility in Ain Ghazal (cf. 3.06) to the operating concept of the Al-Samra treatment plant. Even so, this measure had a mildly negative impact on the project's efficiency.

international donor community. The action chain was based on the assumption that waste water disposal schemes need to meet resource conservation and sanitary standards in order to protect scarce drinking water resources, provide a substitute for them, help safeguard both surface water and groundwater and reduce health hazards. In factual terms, this assumption was correct. The measures were appropriate to produce the envisioned results. The project made a contribution to Millennium Development Goal 7 (ensuring environmental sustainability and reversing losses of environmental resources). It was not adversely impacted by other policy fields. In view of that, the relevance of the project is rated as good (sub-rating 2).

The project was largely successful in reaching its project objectives, i.e. to make sure that no waste water from the municipal sewerage system would be discharged into the upper course of the Zarqa Wadi and that the King Talal reservoir would continue to provide water for agricultural purposes. Therefore, the effectiveness of the project is rated as good (sub-rating 2).

There was no reasonable alternative to the investment measures to resolve one of Jordan's most urgent development issues. Specific investment costs were acceptable, amounting to EUR 41 per beneficiary or EUR 950 per metre, which is quite moderate. However, they were approximately 67% higher than the original estimate. When the Al-Samra treatment plant came on stream, the FC-funded pre-treatment facility in Ain Gazal had to be modified. This has now led to a situation where only the sanitary waste water facility is continuously operating (cf. 3.06). In view of the adjustments that had to be made in terms of plant usage, the investment efficiency of this project component is less than optimal even though its share in the overall investment package was less than 5%. At the current levels of waste water fees for private households and of collection efficiency, the costs of running and maintaining the facility are covered from revenues (which amount to 129% of operating costs), but on a full cost basis, revenues are not sufficient yet (amounting only to 36%, cf. 6.01 and annexe 9). Therefore, the efficiency of the project is rated as satisfactory (sub-rating 3).

The project helps safeguard scarce drinking water resources by protecting threatened groundwater that is crucial for drinking water supplies and by substituting treated waste water for drinking water to supply irrigation schemes. The use of treated waste water for irrigation has been on the increase and helps counter the effects of the ongoing exploitation of regenerative drinking water reserves. The positive impact on the health situation in the project region appears plausible, as a larger volume of treated waste water has been used for agricultural purposes and health risks that result from contaminated drinking water have been reduced. The project also has an important socioeconomic dimension arising from the dichotomy of using scarce water resources either for human consumption or for irrigation. In that respect, it helps defuse conflicts between various user groups and interests. The overarching developmental impact of the project is rated as good (sub-rating 2).

The sustainability of the project measures will be ensured by ongoing support from the international donor community and by the commitment of the competent political institutions to promoting private-sector cooperations. The potential to optimise operations and revenue streams has not been fully tapped yet. By outsourcing services and cooperating with the private sector (Miyahuna, pre-treatment in Ain Ghazal and Al-Samra waste water treatment plant), the project's efficiency may be increased further, but cost-intensive systems may also aggravate the cost pressure. As water fees do not yet guarantee (full) cost coverage, the WAJ's financial dependency on government and donor funds continues. The sustainability of the project is rated as good (sub-rating 2).

The overall performance of the project is rated as good (rating 2).

General conclusions and recommendations

None.

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).