Jordan: Water Supply in Wadi Mousa

Ex-post evaluation

OECD sector	14020 – Social infrastructure	
BMZ project ID	1998 65 007	
Project-executing agency	Water Authority Jordan (WAJ)	
Consultant	Camp Dresse McKee / Associated Consulting Engineers (ACE)	
Year of ex-post evaluation	**2005**	
	Project appraisal (planned)	**Ex-post evaluation (actual)**
Start of implementation	Q2 1998	Q2 1998
Period of implementation	21 months	30 months
Investment costs	EUR 11.6 million	EUR 11.3 million
Counterpart contribution	EUR 5.6 million	EUR 5.5 million
Financing, of which Financial Cooperation (FC) funds	EUR 4.3 million	EUR 4.3 million
Other institutions/donors involved	EUR 1.7 million	EUR 1.5 million
Performance rating	3	
• Significance / relevance	3	
• Effectiveness	3	
• Efficiency	4	

Brief Description, Overall Objective and Project Objectives with Indicators

The purpose of the project was to expand the capacities of and to rehabilitate the existing water supply facilities serving the villages of Wadi Mousa, Taiba, B'Doul and Beida as well as several smaller villages (region of Petra National Park / Wadi Mousa). The overall objective was to contribute to the economic development of the project region by reviving tourism. The project objectives were to contribute to sufficient and continuous water supply in the project area, to reduce technical water losses and to lower the amount of repair and maintenance work to be performed by the project-executing agency. Indicators of achievement of these objectives were: constant availability of qualitatively safe drinking water (24-hour supply), a reduction in total losses within the drinking water network in the project area from over 50% to a maximum of 32% with a share of technical losses that is far below 20%, and a decrease in the number of pipe bursts to no more than 5 per day on average.

Project Design / Major Deviations from the original Project Planning and their main Causes

The aim of the water supply component of the overall project 'Wadi Mousa Water Supply and Wastewater Project' was to completely restructure the water supply system in the village of Wadi Mousa and the surrounding villages. The largest section of the drinking water network that was in place when the project began had been installed in the mid-1960s and in the late 1970s and was

then successively expanded without being planned by hydraulic engineers. The project design was elaborated by Jordanian Government in the early 1990s with assistance from US-Aid. The design placed the project under a support programme for sustainable tourism development in Petra National Park and aimed to improve the water management situation in the project area.

The FC-funded component comprised the construction of six production wells, two pumping stations, four water tanks and the rehabilitation of a preexisting pumping station and various transmission pipes. In addition, the project-executing agency financed the expansion of local distribution networks via French support. The project was complemented by financing from the US for wastewater disposal in the project area that included a wastewater treatment plant.

The work was carried out according to the planning requirements without any major modifications.

However, the consulting services originally proposed and promised by US-Aid to provide further training in the area of water supply to staff members were not performed. Although this did not hinder the technical operation, it did prevent any discernible administrative and/or financial efficiency-enhancing measures from being introduced thus far by the WAJ in the Wadi Mousa area.

Key Results of the Impact Analysis and Performance Rating

A major problem was the rate of total losses in the drinking water network – which were estimated at far more than 50% when the project began in 1996 – and the resultant undersupply of the population with water. In terms of the production quantity, the share of technical losses was estimated at 40%. In 2004 the total losses amounted to some 44%. Thus, the project reduced the total losses and the systems' technical vulnerability to only a partial extent.

However, the figures for 2004 clearly show that in the summer months not only consumption does remain at a steadily high level, but especially water production also rises disproportionately. The discrepancy between the quantities indicated by the domestic water meters (consumption) and the bulk water meters (production) are up to 50%, indicating a high level of illegal water extraction. In contrast, the discrepancy between the metered consumption and production falls to below 15% in the winter months. The level attained in the winter months is an indication of a noticeable, sustainable reduction in the technical losses affecting the drinking water network, which are far below the target of 20% stated in the project appraisal report. Therefore, today the non-technical losses are the main problem.

The supply bottlenecks, which used to arise mainly in the months of May/June and September/October (peak tourist season), ceased to exist once the project work was completed (expansion of capacities and reduction in technical losses). Random customer surveys indicate that since the start of operation about 3 years ago, water supply is now reliable 24 hours a day. This makes Wadi Mousa one of the areas in Jordan with the best water supply.

The water quality in the new well field Wadi Jithitha and in the already operating well field of Qua'a is reportedly good and meets WHO guidelines, both at the point where it is fed into the network and at final consumption points. Owing to the geographical location of the well fields, human activity poses little risk for potential groundwater contamination.

The expansion of the extraction capacities has brought about a significant rise in the quantity of drinking water that is available, yet this result is oversized by the actual development of tourism. Following the revival of the Intifada, the terrorist attacks on September 11, 2001 and the beginning of the war in Iraq, between 2001 and 2003 the number of tourists visiting Petra decreased drastically. These figures began to recover in 2004 and nearly reached their 1998 level. This positive trend continued in early 2005, for which the existing - functioning – infrastructure was a key precondition for travel agents. Thus, the project was able to fulfill an essential precondition for the recovery of tourism in the area.

Once the project was completed, the water supply company in Wadi Mousa became one of only a few in Jordan that offer 24-hour supply, and the current connection rate has remained constant at nearly 100%. The needs of both the local population and tourists are thus met. The unaccounted for water (UFW) is approx. 44% and thus still above the target of 32% which is overly generous from today's point of view. The technical losses range between 10% and 15% (project objective: maximum of 20%). In contrast, the maximum number of pipe bursts per day matches the target. Thus, overall the project achieved the objectives only partially, and in terms of its **effectiveness** in sustainably solving the problem it earns the **sub-rating 3**.

The overall objective of the project, to contribute to economic development in the project region, was achieved to some extend, as illustrated by the progressive revival of tourism with its noticeable, positive structural effects for the local economy: The extraction capacities available at the beginning of the project would have been insufficient to cover today's peak loads for the local population and the tourists, even if technical losses would have been eliminated. Therefore, the rehabilitation and expansion activities were appropriate for eliminating the supply bottlenecks in peak times. Yet, due to slow population growth and slow growth of tourism, the target group being supplied with water is smaller than projected. The project played a **significant** and **relevant** role in solving the problems, albeit with several restrictions, as a result of which the project is assigned the **sub-rating 3** in these areas.

The recovery rate for dynamic operating costs is nearly 100%. The operator remains dependent on subsidies from headquarters for any reinvestments that it undertakes. Owing to the extensive overcapacities that have been created, the specific investment costs are higher than planned, yet they could be covered and borne by the consumers if an appropriate tariff policy that aims for full cost coverage were introduced. Due to these overcapacities and to the low rate of coverage of the operating costs, we assign the project's **efficiency** the **sub-rating 4.**

Overall we consider the project relevant with sufficient developmental effectiveness (rating 3).

General Conclusions and Recommendations

- To make it easier for urban water supply projects to aim for efficiency and to facilitate the efficient control of operations later on, when FC starts preparing community rehabilitation and expansion projects but at the latest when such projects are launched, simple databases that can be analyzed locally ought to be introduced for registering important operational data that can be transferred during the course of project implementation to (more longer-term) integrated, IT-based operational control systems (geographic information system, customer information, monitoring of relevant operational data). In this way those responsible for operation on the local level would have access to the control information they need and would also be able to conduct their own analyses and develop their own problem-solving strategies.

- Especially in areas where water is scarce, data on the use of this resource ought to be collected throughout the implementation of the project and, if possible or necessary, it should be monitored, evaluated and controlled via an integrated resource management system.

- Institutional support for the local operating units and central planning and/or supervisory units for the purpose of establishing preventive maintenance and systematic analyses of losses including the installation of the corresponding measuring equipment (if possible, at the beginning of the project in order to gather and evaluate specific operational data) and of reducing administrative losses/illegal use should also be introduced in every project where these types of problems arise and corresponding systems are not yet in place.

Legend

Developmentally successful: Ratings 1 to 3	
Rating 1	Very high or high degree of developmental effectiveness
Rating 2	Satisfactory degree of developmental effectiveness:
Rating 3	Overall sufficient degree of developmental effectiveness
Developmental failures: Ratings 4 to 6	
Rating 4	Overall slightly insufficient degree of developmental effectiveness
Rating 5	Clearly insufficient degree of developmental effectiveness
Rating 6	The project is a total failure

Criteria for the Evaluation of Project Success

The evaluation of the "developmental effectiveness" of a project and its classification during the ex-post evaluation into one of the various levels of success described in more detail below concentrate on the following fundamental questions:

- Are the project objectives reached to a sufficient degree (aspect of project **effectiveness**)?
- Does the project generate sufficient significant developmental effects (project **relevance** and **significance** measured by the achievement of the overall development-policy objective defined beforehand and its effects in political, institutional, socio-economic and socio-cultural as well as ecological terms)?
- Are the funds/expenses that were and are being employed/incurred to reach the objectives appropriate and how can the project's microeconomic and macroeconomic impact be measured (aspect of **efficiency** of the project design)?
- To the extent that undesired (side) effects occur, are these tolerable?

We do not treat **sustainability**, a key aspect to consider for project evaluation, as a separate category of evaluation but instead as a cross-cutting element of all four fundamental questions on project success. A project is sustainable if the project-executing agency and/or the target group is/are able to continue to use the project facilities that have been built for a period of time that is, overall, adequate in economic terms, or to carry on with the project activities on their own and generate positive results after the financial, organizational and/or technical support has come to an end.