

Yemen: Water loss reduction programme

Ex post evaluation report

OECD sector	14020 / Water supply and sanitation – large systems	
BMZ project ID	1995 66 266	
Project executing agencies	Water and Sanitation Local Corporations Al Mukalla and Taiz	
Consultant	CES Salzgitter GmbH	
Year of ex post evaluation	2008	
	Project appraisal (planned)	Ex post evaluation (actual)
Start of implementation	Q1 1996	Q1 1999
Period of implementation	24 months	36 months
Investment cost	EUR 8.2 million	EUR 7.7 million
Counterpart contribution	EUR 0.8 million	EUR 0.5 million
Financing, of which FC funds	EUR 7.7 million	EUR 7.3 million
Other institutions/donors involved	None	None
Performance rating	4	
• Relevance	2	
• Effectiveness	5	
• Efficiency	4	
• Overarching developmental impact	4	
• Sustainability	4	

Brief description, overall objective and project objectives with indicators

The project covered the replacement of parts of the dilapidated water supply network in the two programme towns of Taiz and Mukalla in order to limit water losses.

The overall project objective was to conserve groundwater resources and to reduce the risk to the target group caused by water-induced diseases. The reduction in the excess withdrawal of water in relation to regenerability or the decline in incidences of cholera, diarrhoea, typhoid, malaria, dengue fever, and eye and skin diseases were used as indicators.

The programme objective was to reduce the technical water losses over the long term in selected water supply networks and to ensure that the target group had a continuous supply and sufficient per capita consumption rates. The following indicators were defined:

- The people in Taiz connected to the central drinking water supply are provided with drinking water at least every ten days.
- The people in Mukalla connected to the central drinking water supply are provided with drinking water at least every day.
- A reduction in the water loss in Taiz of around 3,800 m³ a day.
- A reduction in the water loss in Mukalla of around 3,150 m³ a day.
- The per capita consumption is at least 50 l/cd to cover the water needed for drinking and cooking and for body hygiene.

The project target group comprised the generally disadvantaged and poor people in the inner-city areas of Taiz and Mukalla who are connected to the central water supply network. The target group in the narrower sense, the people in the rehabilitated areas, comprised around 100,000 people.

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

The programme, which was initially open to several locations, was restricted to the towns of Taiz and Mukalla as it became apparent during the technical planning stage that, given the poor state of the network, the funds available would only permit the rehabilitation of smaller areas than originally assumed. At project appraisal, the aim was to repair individual leaking system components in order to reduce the technical water losses and, if necessary, to replace them. Concrete measures in the project, which was designed as an open programme, were to be determined by the consultant in the technical planning stage. In Taiz and in Mukalla the consultant found that, given the bleak overall condition, this concept would not be feasible. A complete overhaul was therefore carried out in geographically limited areas. To this end, inner-city areas with particularly high losses and simultaneously a very high population density were selected in both towns. Owing to the high losses at that point, the house connections in those areas were also rehabilitated.

Given the financing volume, this change in the project design did not allow the maximum loss reduction to be achieved. In Mukalla 40% of the network was completely rehabilitated but in Taiz only 12%. The losses in the rehabilitated areas in Mukalla were reduced from 22% to 7.5% and in Taiz from 45% to 6%. Overall, the technical losses in the entire distribution network in Mukalla were thus reduced to around 16%. Because of the limited area of intervention and the high losses outside that area, the technical losses in Taiz remained high, at around 37%. The technical design of the measures was suitable for the purpose and problem. In Taiz, however, the limited volume of investment meant that it was not possible to achieve the project objectives to a sufficient extent.

From the ex post perspective, it would have been appropriate to concentrate on only one programme location. Moreover, in Taiz an attempt should have been made to include irrigated farming in the surrounding area in an integrated water resource management scheme. From today's perspective, it is impossible to assess whether an endeavour of that kind would have met with success.

Key results of the impact analysis and performance rating

The overall objectives were achieved only in part, with the target being achieved sufficiently overall in Mukalla but insufficiently in Taiz. The indicators of the achievement of the project objectives were largely not met at either location or were only to a minor extent an outcome of the project. Moreover, the expectations before the start of the project were unrealistic. The limited financial resources allowed only one part of the network to be actually rehabilitated in the two towns. Given the completely desolate state of the network, which rather than being partly rehabilitated needed to be rebuilt from scratch, it was not possible to achieve a greater loss reduction. However, this only became apparent during the design stage.

The system had clearly not been maintained satisfactorily for a long time. Owing to the good construction quality, the technical condition of the new systems appears good at present. The maintenance requirements are currently minor. In addition, decentralisation and the technical success of the project measures have visibly strengthened ownership at the two local water authorities. The shortage of financial capacities and the lack of training measures for the staff lead to expectations that maintenance, particularly in Taiz, will continue to be insufficient and that the state of the network will deteriorate considerably over the medium term. Maintenance practice remains remedial.

The water authority in Mukalla can today supply the target group with sufficient water. That is not possible in Taiz. Most of the water supply in the town is now organised via water tank trucks. Almost 40% of the population are no longer connected to the central supply network and the remainder are supplied with water only around once every three weeks.

The quality of the water supplied is still mediocre and, in particular because of the high level of salt content, cannot be described as drinking water. In the area in which the water authorities work, the water is chlorinated. However, health risks occur because of the quantitatively inadequate supply of water and the inappropriate use of water at private drinking water sales points and in private homes.

The measures benefited poor sections of the population because they contributed to supplying the target group with more water at favourable tariffs. The alternative means of drawing water from water tank trucks is around six to eight times more expensive than the average tariff. The burden placed on the population by the bills for the public water supply is comparatively low. In Taiz, in particular, the population would like to consume far more water at the current tariff. By increasing the volume of water available from the supply network, this project therefore helped to reduce the financial burden imposed on households by water consumption as now *ceteris paribus* less water needs to be purchased from private suppliers. However, the overall microeconomic assessment is dichotomous, as the tariffs are too low to finance preventive maintenance of the systems over the long term and because, owing to the limited investment funds particularly in Taiz, the positive economic impacts on the target group are small.

The main impact of the project was to conserve the water resources, in particular for the people living in Taiz and Mukalla. This positive impact was, however, far less than originally expected and was countered by increasing wastage of these resources at other points. The most obvious example in Mukalla is the watering of the green areas near the airport motorway; in Taiz it is the unchecked use for irrigation areas in the water supply source area. According to the information available, there has also been a minor reduction in health risks.

The avoidance of high opportunity costs for the target group and the improvement of the social services is indirectly poverty oriented, even if its effect is only limited. No direct participation by the target group in the project measures was planned.

We assume that the project had positive gender impacts. As the health risk has declined somewhat, there has probably been a decrease in the need to care for family members – a task carried out primarily by women.

The relevance of a water loss reduction programme is extremely high in a country such as Yemen, which has very little water. The project design was generally appropriate to enable the outcomes and impact to be achieved, albeit not to the extent envisaged. However, in Mukalla the use of drinking water to keep roadside verges green show that priorities are partly set differently in Yemen. Although the water sector policy aims to limit irrigated farming and to use technologies which save water, the national development plan continues to plan to extend it. That leads in Taiz, for example, to a misallocation of groundwater. This action relativises the relevance of simply reducing water losses without including the sectoral environment. Overall, we rate the relevance as good (subrating 2).

Measured in terms of the criteria applied to water loss reduction, the actual project objectives were achieved only in the rehabilitated parts of the towns and not for the entire network, for which they were formulated. At 30% and 47% they are not yet acceptable. A daily supply of water has been achieved in Mukalla. The main cause of this improvement in supply is that new water sources have been tapped. The contribution of the FC project to the achievement of the objective in Mukalla was limited and is relativised by the fact that drinking water is used for irrigation purposes (see above). The public supply network in Taiz had hardly been extended at all for 20 years because insufficient untreated water was available, which is why today only some 60% of the population is supplied via the central network. There has been some improvement in the supply to the people connected to the network since the project began but it is still completely insufficient. On average, each urban district in turn has water once every 23 days for 3 days. As the period without supply is too long for it to be covered by interim storage in the cramped housing conditions, almost all consumers connected to the network also have to rely on buying additional water from private water sellers. Overall, the contribution of the project to effectiveness is clearly insufficient (subrating 5).

Through the project measures only 41% (Mukalla) or 28% (Taiz) of the expected savings in water loss volumes were achieved. Owing to the poor state of the pipes in the two towns, which only became apparent during the implementation stage, the design had to be changed from spot improvements throughout the network to a complete rehabilitation of some sections. As a result, despite the considerable reduction in losses in the rehabilitated areas, the cost per cubic metre of water saved was overall far higher than assumed and, because of the low water tariffs, not even half that cost is covered by sales revenue. With regard to allocation efficiency, there is a considerable deficit in both towns owing, among other things, to the household tariffs, which are kept low for political reasons (despite the fact that even the poorer people could afford to pay). It is therefore more profitable for the local corporation in Mukalla to water the green areas along the road to the airport than to ensure that the citizens have an uninterrupted water supply in their homes and businesses. In Taiz the situation is even more problematic as in that town not even the running costs are covered and there has been an overall increase in water losses despite the critical resource situation and the technical achievements of the project in sub-sections. However, the basic developmental benefit of the loss reduction is high as it meant that far more expensive production procedures such as seawater desalination could be delayed. Overall, we rate the efficiency as unsatisfactory (subrating 4).

From today's perspective, the overarching developmental impact of the project is at the level of the impact on health and the environment. To a limited extent we assess the outcome positively. According to the health services, despite some statistical uncertainty the health situation with regard to water-related diseases in both towns has tended to improve since the project began. Although water consumption at the two locations exceeds the renewable resources, the project contributed to conserving the natural resources compared with the situation without a project.

Although the excessive use of natural resources increased further as a result of the population increase because the project made only limited contributions to its reduction, the fairly good supply situation which exists because of the new springs means that there is less incentive to tap further long-term sources in Mukalla than before the start of the project. Overall, we assess the overarching developmental efficacy as slightly insufficient (Stufe 4).

In evaluating sustainability, account needs to be taken of the fact that the partners in Yemen probably need to be given assurance that the current operation of the two in the LCs will be maintained – if necessary also by ongoing subsidies. Given the good construction quality, the measures to reduce losses will continue to have an effect for several years to come. In Taiz a major part of the distribution network is also being rehabilitated as part of a World Bank project. However, owing to the framework conditions described above, it is to be expected that a shortfall in tariff revenues will lead to maintenance and repair work being neglected and the network in Taiz – as in the past – will then deteriorate over the medium term. In Mukalla, owing to the better financial situation and the continuation of the loss reduction programme through counterpart contributions, sustainability must be rated more favourably. However, at both locations a sizeable portion of the potentially positive developmental impact (as is already visible today) can be expected to be nullified by the negative framework conditions. A major improvement in those framework conditions cannot be realistically expected in the foreseeable future. For this reason we rate sustainability as insufficient (subrating 4).

Taking the individual ratings into consideration, the project is rated overall as unsatisfactory (rating 4). The decisive factor for this rating is the low rate of achievement of the project objective and the consequently only minor impact on the environment and health.

General conclusions and recommendations

Future projects should be financially equipped to allow full rehabilitation work to be carried out at individual locations. This increases the significance of the project but can also boost sustainability. For example, steps needed to strengthen sustainability such as tariff increases can be achieved more readily if there are clear improvements for the people.

At least for local executing agencies, investment measures should be linked to the implementation of measures to strengthen the executing agencies in order to boost the positive impact on operation.

Where there are competing demands for the use of water resources, such between irrigated farming and the urban water supply, this aspect should be taken into account during project planning.

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:

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| 1 | Very good outcome that clearly exceeds expectations |
| 2 | Good outcome fully in line with expectations and without any significant shortcomings |
| 3 | Satisfactory outcome – project falls short of expectations but the positive results dominate |
| 4 | Unsatisfactory outcome – significantly below expectations, with negative results dominating despite discernible positive results |
| 5 | Clearly inadequate outcome – 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 meets the level 3 criteria.

The overall evaluation on the six-point scale is derived from a weighting of the five individual criteria which is appropriate for the specific project in question. A rating of 1 to 3 in the overall evaluation indicates a “successful project”, while a rating of 4 to 6 indicates an “unsuccessful” project. Account also needs to be taken of the fact that, as a rule, a project is only given a developmentally “successful” rating if the achievement of the project objective (effectiveness) and the impact at the level of the overall objective (“overarching developmental impact”) as well as sustainability are assessed at least as “satisfactory” (subrating 3).