Ex post evaluation – Yemen

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Sector: Water supply – large systems (CRS code: 14020)
Project: (A) Water Sector Emergency Support Programme, BMZ No. 2011 67 048*, (B) Expansion of Ibb Treatment Plant, BMZ No. 1999 65 328*, (C) PTP Small-Scale Project in Al Shehr – Emergency Sanitation Measures, BMZ No. 2003 66 393*
Implementing agency: (A) KfW direct contribution, (B) National Water and Sanitation Authority (NWSA), (C) Local Corporation Hadhramaut (local utility)

Ex post evaluation report: 2019

All figures in EUR million (for details see report)	Total (Planned)	Total (Actual)
Investment costs (total)	15.4	15.8
Counterpart contribution	0.9	0.0
Financing	14.5	15.8
of which BMZ budget funds	14.5	15.8

*) Random sample 2019

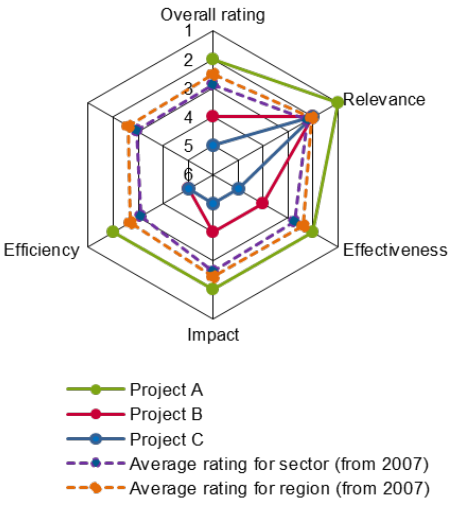
Summary: The Water Sector Emergency Support Programme (project A) was launched in the wake of the political crisis that broke out in Yemen in 2011. The project financed urgently needed equipment, spare parts and repairs to maintain the drinking water supply in a total of 29 towns and cities in Yemen. The implementation was carried out as a rapid response project with a direct KfW contribution. Under project B, the capacity of the sewage treatment plant of the city of Ibb was to be expanded due to the strong population growth, while project C was to eliminate urgent sewage-related problems in the town of Al Shehr by improving the sewage collection and constructing a lake sewage treatment plant. Following extremely lengthy planning and award procedures, both projects (B and C) had to be terminated in 2017 after the conflict intensified (2015), even before physical measures had been implemented.

Objectives: The objective at **outcome level** for project A was to help keep the municipal water utilities operating. In project B, it was the environmentally friendly and healthy treatment of the wastewater generated in the sewer network. Project C aimed to secure the drinking water supply for the population and improve the sanitation through appropriate wastewater disposal. At the **impact level**, the projects were aimed at: preventing epidemics and minimising water-induced diseases (A), helping protect the well field below the sewage treatment plant and reducing health hazards for the population downstream (B), and reducing the environmental and health risks stemming from wastewater disposal (C).

Overall ratings: 2, 4, 5 (projects A, B, C)

Rationale: The emergency crisis programme was specifically geared to the needs of the project locations, and despite the difficult overall conditions, it was implemented efficiently. It can be assumed that the procurement and repair measures were able to eliminate supply bottlenecks and thus improve the living conditions of the population in the project cities – at least temporarily.

Highlights: In particular, the award procedures for consulting and construction services for projects B and C (project appraisals in 2000 and 2003 respectively) led to considerable delays, and meant no physical measures had been implemented by the time the project was discontinued in 2017.



Rating according to DAC criteria

Overall ratings: 2, 4, 5 (projects A, B, C)

Ratings:

Relevance	1, 2, 2
Effectiveness	2, 4, 5
Efficiency	2, 5, 5
Impact	2, 4, 5
Sustainability	-, -, -

Basic notes

This evaluation summarises three projects in the water supply and wastewater disposal sector. For ease of reading, the projects will hereinafter be referred to as follows:

Project A: BMZ No. 2011 67 048 Water Sector Emergency Support Program

Project B: BMZ No. 1999 65 328 Expansion of Ibb Wastewater Treatment Plant

Project C: BMZ No. 2003 66 393 PTP Small-Scale Project in Al Shehr – Emergency Sanitation Measures

Project A was completed in 2016 after the almost complete disbursement of the FC funds. Projects B and C were terminated prior to the implementation of the first physical measures as a result of the worsening crisis in Yemen. The lack of implemented measures means only the DAC criterion of relevance and to some extent the efficiency criterion can be considered in greater detail for the terminated projects. Project A was implemented as a rapid response procedure in the form of a direct contribution from KfW and did not set out to achieve sustainable structural effects. In this respect, the project – which primarily involved procurement and repair measures – was not assessed in terms of its sustainability, despite the possibility that this might have provided a basis for follow-up projects.

Owing to the critical safety situation in Yemen, the evaluation was conducted as a desk audit using the available documents and supplementary information.

General conditions and classification of the project

Regardless of the serious conflict that has dominated the country since 2015, the water supply situation in Yemen is critical. The country's extremely scarce water resources are being pushed to their limits by strong population growth (from around 8 million inhabitants in 1980 to around 27 million today), with the result that the availability of renewable water resources per capita and per year has fallen from 250m³ to around 78m³ over the same period (far below the definition of absolute water scarcity, which sits at 500m³). The problem is further exacerbated by the sharp increase in migration towards urban centres as a result of the conflict. In these centres in particular, it is feared that local water resources will soon be exhausted as a result of their extensive over-exploitation.

Projects B and C targeted the wastewater sector in the city of Ibb and the town of Al Shehr. Project B (project appraisal: 2000) is a supplementary measure to the FC project "Water Supply and Wastewater Disposal in the City of Ibb" (BMZ No. 1979 65 551) completed in 1995, with the aim of aligning wastewater treatment capacity with the now sharp population growth of this city in the southwest of the country. One of the project's aims was to prevent the contamination of groundwater resources as a result of inadequately treated wastewater. The project design of project C (project appraisal: 2003) was aimed specifically at the local wastewater problem in the coastal town of Al Shehr. Insufficient drainage and lack of wastewater treatment were identified as core problems during the appraisal. The discharge of untreated wastewater into the sea posed considerable health risks, particularly for local fishermen as well as for broader sections of the population, owing to contamination of the food chain and the accumulation of wastewater within urban areas.

The political crisis which erupted in 2011 and the resulting unrest gave rise to the emergency programme evaluated here (project A, appraisal: 2011). In 2015, however, this crisis led to the armed conflict that has continued to this day, with even more serious consequences for the supply situation in Yemen. The problems which existed as far back as 2011 (such as a lack of spare parts and fuel shortages) have worsened at the national level, and targeted attacks on water supply facilities have also been reported on both sides of the conflict. What is more, the intensification of the conflict led to the termination of projects B and C in 2017. As a result of the difficult and protracted tender procedure, no measures had been implemented for either of the two projects up to this point.

Breakdown of total costs (only for 3 or more projects/phases)

EUR million	Project A (Planned)	Project A (Actual)	Project B (Planned)	Project B (Actual)	Project C (Planned)	Project C (Actual)
Investment costs	10.0	14.9	2.4*	0.6	3.0	0.3
Counterpart contribution	-	-	0.4	0.0	0.5	0.0
Funding	10.0	14.9	2.0*	0.6	2.5	0.3
of which BMZ budget funds	10.0	14.9	2.0*	0.6	2.5	0.3

*) The total costs have since been adjusted to EUR 15.4 million and the BMZ funds increased to a total of EUR 9.6 million.

Relevance

Project A (Water Sector Emergency Support Program)

The core problem of Yemen's insufficient water supply was acute even prior to the outbreak of the conflict (2011). Although renewable resources of over 100m³ per capita and per year mean water availability in the country was significantly higher at the beginning of the 2000s than it is today, even then this value reflected extreme water scarcity in absolute terms. The situation was further affected by the overuse of these very limited resources by farming (over 90% of water extraction), institutional weaknesses in the water sector and considerable deficits in the supply infrastructure, with high water losses and inadequate access of the public to hygienically safe drinking water (<50%). Yemen's insufficient supply of drinking water was further exacerbated after 2011 following the outbreak of the political crisis. In particular, the operation of the supply system pumps was no longer sufficiently reliable due to power failures and fuel shortages, leading to frequent interruptions in supply. Consequently, as a result of customers failing to make their payments, the revenues brought in by utility companies declined to such an extent that they no longer had sufficient financial resources to procure spare parts or implement repairs. This resulted in longer interruptions in the drinking water supply, which forced the affected population to consume water from unsafe sources.

By providing spare parts and working capital, the project aimed to prevent the health hazards caused by a limited supply of drinking water in urban centres. This results chain also appears to rest on sound logic from today's perspective. The procedure chosen (applications for required goods by local suppliers and reviewed by the implementation consultant) enabled the existing deficits to be addressed in a targeted manner in an effort to improve or restore the supply. Improving the supply (outcome) was intended to reduce the health risks resulting from the population consuming contaminated drinking water (impact); this appears plausible in view of the emergency measures financed, at least for a limited period. The concern expressed in the project appraisal report regarding the outbreak of epidemics turned out to be justified, as tragically demonstrated by the cholera outbreak in several Yemeni centres between 2016 and 2018, which saw over 2,300 deaths and more than 600,000 infected.

The relevance of the approach is enhanced against the background of Yemen's inefficient health system, which makes the treatment of waterborne diseases and the containment of epidemics much more difficult. The project design also provided for the support of other donors/institutions running drinking water disinfection programmes in Yemen, in particular by supplying the appropriate equipment.

From today's perspective the relevance of the project is rated very high, despite the time-limited impact potential of the measures conceived as transitional aid.

Project B: Expansion of wastewater treatment plant in Ibb

The project is closely linked with the Water Supply and Wastewater Disposal in the City of Ibb project (BMZ No. 1979 65 551[1]) which, among other measures, expanded the wastewater disposal for an estimated 24,500 inhabitants between 1987 and 1995, with a planning horizon encompassing 65,000 inhabitants. At the time of the project appraisal for project B (1999), however, the total population of Ibb had increased around fivefold (124,000 inhabitants); this led to a significant overload of the wastewater treatment plant constructed under the previous project, with a pollutant load that exceeded the planning parameters by more than 100%. As a result, the wastewater in the treatment plant could no longer be adequately treated and it posed a risk to the groundwater sources located downstream of the treatment plant. The discharge of untreated wastewater from households not connected to the network posed an additional risk to groundwater.

At the initiative of the Yemen Ministry of Water and Environment, FC subsequently reviewed expanding the capacity of the wastewater treatment plant, and confirmed this as a matter of urgency. The expansion was planned with a target horizon of 2010 (190,000 inhabitants). Although the need to expand the sewerage network was recognised at the project appraisal, the limited funds allocated to the project meant that the expansion of the wastewater treatment plant was prioritised, particularly as this was also intended to allow for the potential treatment of wastewater collected locally from unconnected households.

The core problem – the endangerment of groundwater resources by wastewater that had not been treated, or that had been treated inadequately – was addressed to some extent by the proposed measures. Expanding the wastewater treatment plant would have allowed the wastewater collected within the sewage system to be treated properly (outcome) and eliminated the resulting potential risk to groundwater resources – and ultimately the risk to health of the city's residents (impact). The results chain appears to rest on sound logic in this respect. However, even if a certain proportion of the wastewater collected locally had been disposed of via the wastewater treatment plant, there would still have been a risk of contamination from untreated wastewater from unconnected households. To fully address the core problem, it would therefore have been necessary to expand the sewerage network. Nevertheless, prioritising measures in view of the limited project funds appears appropriate from today's perspective.

Project C: Small-scale project in Al Shehr – emergency sanitation measures

The impetus for this FC project was provided by the hygienically inadequate disposal of wastewater in the coastal town of Al Shehr (around 70,000 inhabitants at the PA). In particular, wastewater from the densely populated old town (around 20,000 inhabitants) was being discharged untreated into the Arabian Sea, polluting the sea and the nearby beaches. The local fishing industry, which was also using polluted sections of the beachfront as trading points for catch, posed considerable health hazards too – particularly for the fishermen who were in direct contact with the polluted water. The sale of fishing catch also markedly increased the hazard potential as the risk of contamination via the food chain thus extended even beyond the city limits. Additional potential hazards were posed by the insufficient drainage of wastewater within some parts of the old town. Households not connected to the central sewerage system often used poorly maintained septic tanks, resulting in puddles of raw sewage within the urban area which were made worse by damaged/clogged collection pipes. According to local health statistics, waterborne infections subsequently accounted for more than half of all reported cases of disease in adults, and for more than three-quarters of cases in children.

The project aim was to mitigate the existing environmental and health risks through a series of measures taken from a project still to be assessed at a later stage,[2] and which were given priority due to their urgency. Wastewater pumping stations and a lake sewage treatment plant were constructed in an effort to restore the functionality of the existing collection systems and ensure that the collected wastewater was properly treated (outcome). The aim was to mitigate the environmental and health impacts described by reducing the number of wastewater puddles within the city and preventing the sea and beaches from becoming polluted with untreated wastewater (impact). The results chain also appears to rest on sound – albeit incomplete – logic from today's perspective. Certain causes of stagnating wastewater in urban areas – such as the inadequate maintenance or emptying of decentralised collection systems – were not ad-

[1] Overall rating of 3 in 2001

[2] Water Supply and Wastewater Disposal in Provincial Towns II (BMZ No. 2002 65 553)

dressed by the emergency measures. This approach is understandable, however, if we consider that these measures merely represent the early stages of a more comprehensive programme. The relevance is rated as good.

Had it been possible to implement them, projects B and C would also have been particularly important under the circumstances. The limited efficiency of the health services means the treatment of waterborne illnesses was (and continues to be) difficult, as was the implementation of measures to counteract the risk of epidemics.

Relevance ratings: 1, 2, 2 (projects A, B, C)

Effectiveness

Project A (Water Sector Emergency Support Program)

The project objective of the emergency programme was to contribute to maintaining the operation of municipal utility companies so they could guarantee a minimum and safe drinking water supply (including wastewater disposal, where available). At the same time, households not connected to the treatment facilities would be supplied with adequate equipment and funds to disinfect water at the household level.

From today's perspective this relatively modest and somewhat vague project aim appears realistic, as the limited funds were to be used to support supply systems in around 30 towns. Setting absolute or relative supply targets as success criteria for the project would not have made sense given the scope and nature of the measures, especially since, from today's point of view, the ongoing armed conflict has seen the prevailing supply conditions continue to deteriorate significantly during the implementation period.

The decision not to define project objective indicators is also considered appropriate from today's perspective. Given the limited scope of the project, it is also not feasible to use the development of the supply situation in the country – for which only incomplete information is available in any case – as an indication of project success. Reliable data relating to the supply situation in the individual project towns could, at best, provide an indication of project success – but only if this could be compared to the state of supply at the time of the project appraisal (2011) and the impact of the purchased goods could be derived from this comparison. This approach is not appropriate either given the open procurement process and the lack of any meaningful description of the baseline situation in any of the locations. In addition, the conflict may have had a stronger impact on the supply parameters than the project measures themselves, and would consequently distort the results.

It is therefore likely that the most suitable method for assessing project success is to evaluate the purchased technical equipment and spare parts in terms of their urgency for the maintenance of public utilities as well as with regard to their proper commissioning.

Looking at the list of purchases, it is clear that this primarily comprises equipment (diesel generators, fuel backing pumps, well pumps) which is fundamentally important for the operation of municipal supply systems and which is typically required to a greater extent during crisis situations. In addition, the chosen procurement method broadly ensured that purchases were in line with the given urgent need. To this end, the municipal utility companies were asked to register their needs centrally.[3] Requests had to be submitted in a standardised form and were critically reviewed by the implementation consultant to ensure they were technically appropriate (also during on-site visits).

Larger suppliers with competent personnel generally carried out the work required to commission the procured equipment themselves. Smaller utility companies were able to benefit from the offer to have installation and repair works carried out with the help of third-party suppliers, and had access to funding for this within the framework of the emergency programme.

Given the intensive and critical monitoring of the procurement programme by the implementation consultant, it can be assumed that the purchased equipment was in line with technical requirements and was

[3] All in all, the project saw the purchase and/or renovation of 113 diesel generators, 64 water feed pumps, 222 well pumps and the associated electromechanical equipment, 96 wastewater pumps, 485 bulk water meters, 43,930 domestic water meters and 9 chlorine dosing systems. In addition, 8 major drinking water and sanitation pumping stations were renovated, and purchases were made for the WASH programme of the WHO.

commissioned correctly. Following the implementation of the measures, the availability and affordability of fuel (the price of which has risen sharply as a result of the conflict) to operate the generators may have been a decisive factor for the utility companies. No information on this point was available at the time of the EPE.

Under the premise of fuel availability – or assuming that using the available fuel to maintain the water supply was given appropriate priority – it can be assumed from today's perspective that the intended contribution to maintaining operations in the 29 centres was achieved. The effectiveness of project A is therefore rated good.

Projects B and C:

No measures were implemented, i.e. no result was achieved at the outcome level. On the other hand, aside from the consulting costs during the planning and award phase, no costs were incurred.

Effectiveness ratings: 2, 4, 5 (projects A, B, C)

Efficiency

Project A – Water Sector Emergency Support Program

The project implementation took around four and a half years in total, which was considerably longer than the one and a half years originally planned. In addition to the relatively long preparatory phase (review and prioritisation of the applications by MWE and consultants), these delays were primarily due to a later increase in funding (from EUR 10 million to EUR 15 million), the approval processes which this required, and a subsequent round of tenders with 13 additional contracts. Particularly in view of the continuing unrest and the precarious security situation during the implementation period, the approach and results appear to be efficient.

Prioritising measures which could be implemented quickly (in particular the procurement of equipment and spare parts available at short notice) ("phase 1") and then carrying out more comprehensive or more protracted procurements later on ("phase 2") may also have increased the efficiency. This made it possible, right at the beginning of the programme, to resolve the bottlenecks which could be remedied quickly.

The misuse of resources – always a latent risk in procurement programmes – was to be avoided by extensive control measures. For example, the handover and installation of larger batches was monitored by staff of the implementation consultant.

From today's perspective, the efficiency is assessed as good.

Projects B and C:

No measures were implemented. However, it should be noted that both projects were assessed for a lengthy period prior to the outbreak of the crisis (2011) and that other factors contributed to the considerable delays. Therefore, the efficiency of these projects in the period prior to the project termination must also be viewed critically. In the case of project B, the project appraisal took place in December 2000, but it was not possible to successfully tender the construction services in cooperation with the project-executing agency within the 10-year period preceding the start of the crisis. This also applies to project C, which was conceived as an emergency measure. The project appraisal was completed at the end of 2003, and yet no construction measures were carried out prior to the project's termination following years of negotiations on the implementation consultant's contract, as well as a number of subsequently withdrawn tenders for the construction work.

Efficiency ratings: 2, 5, 5 (projects A, B, C)

Impact

Project A (Water Sector Emergency Support Program)

In the locations impacted by the immediate programme, a total of around 1.7 million people benefited from an improved water supply. Given the baseline situation as described in the "Relevance" section, it is plausible that immediate positive health effects for the target group were achieved by restoring and/or secur-

ing the drinking water supply. Within the context of the prevalent waterborne diseases, the potential (and later real) threat of epidemics and the limited availability of healthcare services, this relationship appears to be even more direct and compelling than in traditional drinking water projects under normal conditions.

It should be noted that the towns which would ultimately benefit from the measures were pre-selected by the MWE. Although the consultant commissioned by the FC confirmed the individual usefulness of the proposed measures, it is no longer possible from today's perspective to determine the criteria used in the pre-selection of the project towns, or to determine whether urgency/need represented a crucial factor in this decision. Following the intensification of the conflict from 2015 onwards, a significant proportion of the selected towns in the western part of the country now find themselves under the control of the Houthi movement. This suggests that the selection of locations at least did not exacerbate the conflict, since it is clear that no region was unduly favoured.

In addition, a smaller portion of the project funds (around 3.5%) was used to support the WASH[4] programme in Yemen as part of a cooperation arrangement with the World Health Organization (WHO). This programme involved equipping 50 healthcare facilities in conflict areas with water disinfection equipment and supplies to reduce the health risks posed to patients and staff by contaminated water. It is also assumed this component had an immediate positive effect on the health of the programme beneficiaries.

The impact is therefore still assessed as good.

Projects B and C:

No measures were implemented.

Impact ratings: 2, 4, 5 (projects A, B, C)

Sustainability

Project A (Water Sector Emergency Support Program)

The project was explicitly designed as an emergency measure with no sustainability objective as this would have been unrealistic given the crisis situation, the nature of the emergency measures and the interrupted sector dialogue. The sustainability criterion was therefore not included as part of the project evaluation. Ultimately, however, the procurements contributed to the sustainability of the supply facilities at the respective locations. At the same time, the improved supply contributes to stabilising tariff revenues and thus to the continued operation of the utility companies.

As a result of the worsening crisis, it was no longer possible to implement the monitoring and maintenance phase suggested by the MWE, which specifically provided for maintenance contracts for the procured equipment.

Projects B and C:

No measures were implemented.

Sustainability ratings: -, -, -

[4] Water, Sanitation and Hygiene

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).