

Ex post evaluation – Morocco

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Sector: 14022 - Sanitation and waste water management - large systems
Programme/Project: Sewerage Rural Centres II, BMZ No. 1998 65 957*
 Basic and advanced training measure BMZ No. 1930 02268
Implementing agency: Office National de l'électricité et de l'eau potable ONEE



Ex post evaluation report: 2016

		Investment (Planned)	Investment (Actual)	Basic & Adv. training (Planned)	Basic & Adv. training (Actual)
Investment costs (total)	EUR million	34.2	30.4	0.6	0.6
Counterpart contribution	EUR million	10.7	8.2	0.0	0.0
Financing	EUR million	23.5	22.2	0.6	0.6
of which BMZ funds	EUR million	23.5	22.2	0.6	0.6

*) Projects in the 2015 random sample

Summary: This project, designed as an open programme, was intended to improve sewage disposal in small and medium-sized towns in Morocco. The key measures in this context were the rehabilitation and expansion of the waste water networks in these cities, as well as the construction of water treatment plants in all locations. The cities involved were Essaouira, Errachidia, Sidi Mokhtar, Biougra and Tiznit. A basic and advanced training measure was also carried out.

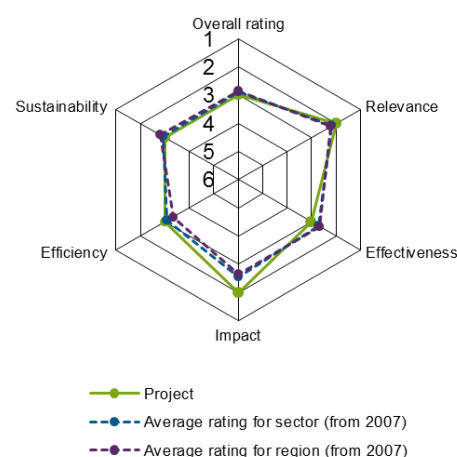
Objectives: The project objective was the collection and purification of waste water at the programme locations in a hygienic and ecologically sustainable manner, taking due consideration of the financial limitations of the municipalities. The overarching development policy objective was to contribute towards protecting regional water resources, as well as to reduce health risks for the population in the programme areas and downstream locations.

Target group: The direct target group is the population in the five selected programme locations. At the time of the project appraisal this comprised 212,000 people, rising to a figure of 271,000 at the time of the ex-post evaluation.

Overall rating: 3

Rationale: The waste water systems are in operation at all of the programme locations and are therefore currently having the desired effects to largely the expected degree; that said, the discharge values have not been reached at all locations. However, the state of maintenance at the facilities coupled with the fact they operate at a loss, and require the support of ongoing subsidies from the Moroccan government, result in a critical assessment of sustainability. Since the fees collected from users are insufficient, the project-executing agency ONEE will also remain reliant in the future on direct financial assistance from the Moroccan state.

Highlights: Although the costs were kept relatively low thanks to the use of simple technologies (lake sewage treatment plants), the counterpart contribution required from the municipalities (30 % of the investment amount) posed a severe financial challenge for them. The resulting debt service in some cases reached a quarter of the municipality's total budget over a period of ten years.



Rating according to DAC criteria

Overall rating: 3

Overall context

The communities formerly responsible for waste water disposal were technically and financially overwhelmed with this task. With ONEE, a performant public project-executing agency was built up with the aid of FC funds, technical advice, basic and advanced training measures, taking over waste water disposal in an increasing number of cities. Expanding its scope to the waste water sector, ONEE has been in a position since the start-up of the first waste water treatment plant (2003) to carry out its functions over and above water and electricity supply in a professional manner.

The evaluated project was based on the predecessor programme "Sewerage Rural Centres I" (APC I, BMZ no. 1996 66 264) and continued the work of this programme to some extent. The project, which was designed as an open programme, comprised measures in five locations, with a small number of measures which had already been planned (Sidi Mokhtar) or started (Errachidia) within the scope of APC I. The origin of the waste water project lies in the "Drinking water supply to rural regions" programme (BMZ. No. 1988 66 329), where the drinking water supply was improved in 40 communities. It was determined in many places that major investments were needed to protect drinking water resources: these were made in the programmes APC I-III. A basic and advanced training measure (BMZ No. AF 2000 226), which also constitutes part of the evaluation, was carried out to train the ONEE employees

Relevance

Due to the strong dependence on irrigated agriculture, which accounts for approximately 90% of national water consumption, the protection of over-exploited water resources is of particular importance in Morocco. The dwindling resources (880m³/inhabitant/year)¹ are increasingly being contaminated by agricultural fertilisers and pesticides, as well as by residual domestic and industrial waste water. Moreover, the use of treated waste water for irrigation allows for an increase in the available volume of water, with the result that agricultural potential which remains untapped due to lack of water can be utilised.

Furthermore, orderly waste water disposal and treatment has an immediate positive impact on the health of the target population. This population is put at risk from the discharge of untreated waste water into surface water, agricultural irrigation with raw sewage (which is officially banned), the above-ground disposal of greywater in poorer neighbourhoods that are not connected to the sewer, and the discharge of untreated waste water into the surroundings of populated areas. The project design was appropriate for the framework conditions and was generally capable of addressing the problems brought up in the selected locations. However, the design does not address the problem of the unlawful discharge of highly contaminated waste water into the sewage networks, which negatively affects the efficacy of waste water treatment plants and can hinder the achievement of legal standards in relation to treated waste water. The solutions to these problems are not so much to be found in more complicated and expensive infrastructure, but in better monitoring and sanction options for supervisory authorities.

The waste water sector today remains a priority area of DC with Morocco and an essential building block for the further development of the country. The implementation of the Plan National d'Assainissement was the subject of active and intensive donor coordination, led for a long time by German DC.

Relevance rating: 2

Effectiveness

The project objectives defined during the programme proposal (PP), as measured against the following indicators, which were amended for the purposes of evaluation, are only partially achieved. With the exception of indicator 1 (population), which rather reflects the development of the planning parameters, the

¹ Aquastat/FAO 2013

other indicators as well as the currently selected target level appear to be appropriate, apart from the discharge values of the waste water treatment plants (indicator 3). Originally, the discharge values were determined on the basis of the treatment stages (I, II or III) designed for the respective waste water treatment plant and in accordance with general empirical values; nationally applicable legal limits were only introduced in Morocco in 2006 and thus after the programme appraisal. The target level is changed for the purposes of evaluation, with the result that, for treatment plants with treatment stages I and II, i.e. for the disputed pond technologies (anaerobic sedimentation basin as stage I and facultative, mixed anaerobic-aerobic sedimentation basin as stage II), the legal limit of 120mg/l BOD5 should be achieved consistently, as opposed to the 250mg/l for stage I and 90mg/l for stage II as anticipated at the appraisal. In connection with the pond technology, stage III represents a low load, i.e. large-volume, predominantly aerobic fining basin. On the other hand, the additional investment expenditure for this treatment stage justifies a target level greater than the statutory limit, and thus, in the case of stage III waste water treatment plants, the original target of 40mg BOD5/l remains unchanged throughout the entire process.

Furthermore, the indicators were expanded to include indicator 5, which is designed to reflect the cost recovery ratio of waste water disposal.

Indicator	2010 target at PA	Ex post evaluation
(1) Total inhabitants across all programme locations	292,000	271,000
(2) SD connection rate	50-90% depending on location	69%-98%, achieved in all locations
(3) Discharge value of waste water treatment plants*	Tiznit: <40mg BOD5/l other locations: <120mg BOD5/l in line with legal requirements	Tiznit: 55mg BOD5/l Essaouira: 105mg BOD5/l Errachidia: 108 mg BOD5/l Biougra: 145 mg BOD5/l Sidi Mokhtar: 190 mg BOD5/l
(4) Average capacity utilisation of waste water treatment plants (waste water volumes and polluting load)	At least 60%	72%-125%, achieved in all locations
(5) ONEE cost recovery (added for EPE, average values for 2013/2014)	100% of operating costs (from tariff revenues)	Tiznit**: 90% Essaouira: 101% Errachidia: 71% Biougra: 59% Sidi Mokhtar: 63%

*) The discharge limits specified refer to 24h composite samples and not — as is the case in Germany, for example — to the stricter regulation of the eligible sample. The law also allows for these limits to be exceeded in individual cases.

***) Excluding initial connection fees (non-recurring effect).

The population grew slightly more slowly than predicted at the programme appraisal, but the required minimum utilisation of the installed capacities was nevertheless achieved at all locations.

The modified objectives with respect to the discharge limits were achieved in just two of the five locations (Essaouira and Errachidia), were just missed in two locations (Tiznit and Biougra) and were clearly missed in one location (Sidi Mokhtar). It is clear that the discharge values show a very close correlation with at times very high BOD5 values measured at the sewage inflow. The BOD5 loads were reduced by 62%-76% in all plants as a matter of course and thus initially verify the generally good functioning of the

plants. The achievement of the discharge values therefore depends crucially on the quality of the waste water flowing through the sewage system. It should be noted that the ONEE obviously has little effective influence on the quality of the waste water introduced into the sewage system. In Sidi Mokhtar, for example, waste water from olive oil production is introduced into the sewage networks from time to time, despite this being prohibited and without there being any effective sanction options available to ONEE.

Undesirable side effects in the form of unusually strong odours could not be found locally.

The basic and advanced training measure has obviously helped to ensure that key personnel in the regional centres also have a very good theoretical knowledge. This applies equally to the management level, right down to the level of technical management in towns. In-depth knowledge is sometimes lacking with regard to handling the relevant measurement values for the waste water treatment plants and the optimisation initiatives derived from the informed analysis. Generally, there is room for improvement in terms of forward-looking and economically motivated action within the context of the daily operation of the plants: the root cause of this is likely to be found at the organisational level. The training centre in Rabat is generally in an excellent, presentable condition and offers a variety of training options. It is positive to note that even the external companies to which the ONEE delegates the daily operation of the plants are trained and certified.

Despite the only partially achieved objectives with respect to the waste water treatment plant discharge values and the coverage of operating costs from current tariff revenues, it should be noted that a significant improvement has been achieved in the waste water situation in relation to the ex-ante status, and that – with the exception of programme locations of Sidi Mokhtar and Biougra – waste water disposal is now in line with the national legal requirements.

Effectiveness rating: 3

Efficiency

Even at the project appraisal, the scheduled implementation period of three years was already considered too optimistic. There were a number of factors that contributed to this period being extended to almost 10 years. These included the low levels of waste water disposal experience of the project-executing agency and the local engineering office responsible for planning, organisational and personnel changes within the ONEE and problems in raising the required financial contribution of 30% of the investment amount on the part of the municipalities. The total projected costs cannot be compared in a meaningful way with the actual costs due to the investment location not yet having been conclusively determined at the time of planning. The investment costs required for each user newly connected to the sewage system amount to approximately EUR 200 (per capita). If these are apportioned over the entire connected population in the locations, the specific investment amounts total EUR 108. Both values are generally appropriate in view of the measures implemented and the good execution quality established. The proportion of consulting costs, which make up only around 8% of the overall investment costs, appears to be rather low.

The comparatively simple and low-maintenance pond technology chosen represents a suitable choice with respect to the financing capacity of municipalities and the ONEE. Only in Sidi Mokhtar – where the legal limits (discharge values) were exceeded – does it appear potentially necessary to implement a further treatment stage or a technical ventilation process in order to improve waste water quality. At the same time, it should be noted that the Moroccan implementation regulations do not appear to provide for any explicit sanctions in the case of limit violations.

It was found in the course of the visits to four of the five waste water treatment plants that some of the data relevant for efficient operational management was not available, partly due to defective measuring instruments (e.g. all flow meters at the treatment plants), and partly due to the centralisation of all business data at the level of the regional or provincial headquarters.

In light of the particular importance of the waste water sector in protecting Moroccan water resources, the increase in water resources, in particular for the purposes of irrigation, and improving the health situation, also appear to justify the investments financed under the FC project from the point of view of allocation efficiency.

The measures implemented within the framework of the basic and advanced training measures were well matched to the needs in the investment locations, and the costs appear to be reasonable.

All of the waste water disposal plants, as measured by the reported rate revenues, operate at a loss, which can be offset only partially by the proceeds from the supply of drinking water. The overly low tariffs are a known problem in Morocco, and the political price of an extremely unpopular increase in the tariffs is high. Nevertheless, the government decided to implement a gradual tariff increase from 2014 onwards. This is not nearly enough to cover operating costs, yet it should be seen as a positive sign. Furthermore, the ONEE remains reliant on regular subsidies from the national budget which were reliable in the past. This applies all the more so, since the ONEE – at the instruction of the state – is required to an increasing extent to build and operate financially unprofitable waste water disposal facilities, as well as the equally loss-making water supply in smaller communities.

The collection rate for the user fees collected along with the water charges is good.

Efficiency rating: 3

Impact

Owing to a lack of usable baseline data, it is uncertain whether the targeted health impacts of the project were actually achieved, however, these were clearly confirmed by the community representatives. This applies primarily to the neighbourhoods in Biougra, Sidi Mokhtar and Tiznit which were not connected to the sewage system before the project implementation, and where greywater was previously disposed of above-ground in some instances. What is more, in Tiznit, collected raw sewage was discharged in a disorderly manner in the vicinity of the communities before the construction of the new plant, thus resulting in catastrophic hygienic conditions. Other positive health effects resulted from the elimination of agricultural irrigation using untreated waste water (Tiznit).

In addition, the further development of the sanitation sector – in particular the strengthening of the project-executing agency ONEE in this area – plays an important role in the further development of the arid country: on the one hand, ground water resources are protected from becoming contaminated with raw sewage and on the other, the availability of treated waste water for irrigation purposes has a positive impact on agriculture and tourism. Reuse is not yet practised in the locations visited. However, in Tiznit, where appropriate additional investments were also undertaken by a user community, the irrigation of agricultural land with treated waste water is set to come in the near future. Plans are underway in Essaouira to use the treated waste water to irrigate a golf course; the requisite investments, which are set to come from a private investor, have not yet been completed, however.

The community representatives of the three smaller locations (Tiznit, Biougra and Sidi Mokhtar) also highlighted the significant impact that improved waste water disposal will have on further urban development, as the improved cleanliness and quality of life will counter depopulation trends to larger cities. At the same time, however, it must be noted that the counterpart financial contribution raised by the municipalities (30% of the overall investment) heavily restricted the economic flexibility of these towns, especially in the cases of Essaouira and Tiznit. These municipalities each have to pay out 20-25% of their annual budgets for debt servicing for this counterpart contribution over a period of ten years. Accordingly, fewer funds were available for spending in other areas within the remit of the municipalities (education, health, etc.). In recent years, however, these financial contributions have been taken over to an increasing extent by the central government (Ministry of the Interior).

Impact rating: 2

Sustainability

Initially, the sustainable operation of waste water disposal facilities (sewage systems with pumping stations and treatment plants) appears to be largely guaranteed from a technical standpoint. All inspected plants remain in operation after seven to nine years of operation, and most are in a satisfactory condition as regards maintenance (with the exception of Essaouira, see below). It was however noted that many smaller technical components (flowmeters, for example) were out of order, with this having been the case

for several months in some instances. The main reasons for this seem to be lengthy procurement processes within the ONEE in conjunction with tight maintenance budgets.

In the case of the waste water treatment plant in Essaouira, extensive renovation measures are already necessary only seven years after the start-up of operations, partly because subcomponents were not tailored to the specific conditions of the site (in particular the salty, corrosive air and the influence of unsurfaced shifting dunes). Operation is not jeopardised by this in the medium-term, as the renovation is already scheduled and the requisite funds are available.

The tight maintenance budgets mentioned above are linked to the insufficient coverage of the operating costs of waste water disposal. With the exception of Essaouira, operating costs are not covered by the tariff revenues from waste water disposal. The wholly inadequate amount of the tariffs, however, is compensated for by the fact that the Moroccan state supports the ONEE with tax-financed subsidies which are agreed in regular “Contrats Programmes”, and thus the operation of ONEE facilities in the drinking water, sewage and electricity sectors has always been ensured, at least in the past. Despite this, the ONEE has reported negative results for a number of years. In 2014 for example, the ONEE reported losses of EUR 174 million, despite government operating subsidies of EUR 205 million. Dependence on subsidy payments is set to continue increasingly in the future. The reasons for this include, in particular, the increasing pressure on the ONEE to operate waste water disposal facilities in ever smaller locations without an adequate tariff structure, as well as the merger with the even less profitable energy provider ONE, completed in 2012 (and which is not yet reflected in the current financial figures).

A total of 6.8 million m³ of waste water is treated each year by the new treatment plants built as part of the programme evaluated here. Avoiding the introduction of untreated waste water into soils and the sea, a practice which was typical in the past, results in a significant contribution to the protection of vulnerable drinking water resources in Morocco and also contributes to improved water quality. In the coastal location of Essaouira, ensuring a proper bathing water quality also has a direct impact on tourism, which is important for the economy. The still unresolved issue of the disposal of sewage sludge should, however, be assessed critically. The ONEE is aware of the problem and, by their own account; a study into a national solution for the problem is planned. In the visited locations (with the exception of Essaouira, where significant desludging has not yet taken place), the sludge accumulated by the treatment plants during the course of waste water treatment is pumped onto drying beds as necessary. After drying, controlled landfills which are operated nearby provide for the long-term deposit of the dried sludge. Assuming that these landfills are operated in a satisfactory manner, the described procedure is acceptable in terms of sustainability.

From today's perspective, the positive aspects of sustainability dominate, since without the investments in the waste water sector, there would be serious, long-term damage to water resources. This can also be used to justify the tariff levels which are too low to cover operating costs, especially in the context of water scarcity in Morocco, and the extensive compensation of financial deficits by means of government subsidies which took place in the past.

Sustainability rating: 3

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

Projects (and programmes) 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).