Ex post evaluation – Burkina Faso

Sector: Water, sanitation and waste water management - large systems (CRS Code 14020)
Programme/Project: Sewage Disposal Bobo-Dioulasso, Phases I and II
BMZ Nos. 2001 66 348* and 2004 66 334
Implementing agency: Office national de l'eau et de l'assainissement (ONEA)

Ex post evaluation report: 2016

		Project A+B (Planned)**	Project A+B (Actual)**
Investment costs (total)	EUR million	6.9	6.5
Counterpart contribution	EUR million	0.9	0.5
Financing	EUR million	6.0***	6.5***
of which BMZ budget funds	EUR million	5.6	5.6

*) Projects in 2014 random sample.
**) Amount applies to both phases, no longer meaningful to separate.
***) Includes financial contribution from the African Development Bank for technical studies (EUR 0.4 million).

Summary: Both of the projects, which were initially planned separately and then carried out jointly, were designed to facilitate the partial sewage disposal in Bobo Dioulasso, the second-largest city in Burkina Faso. The FC measures included a central treatment pond mainly for industrial and grey water, a waste water collection system as well as connections for industrial companies and some other polluters. A sewer system subsequently financed by the French development bank AfD channels the waste water from a further 200 households to the treatment plant.

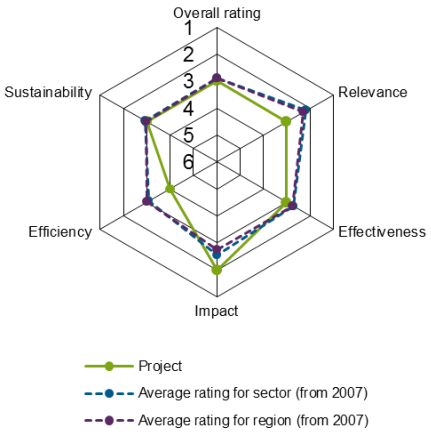
Objectives: The ultimate objective was to contribute to reducing the health risk potential for the population of Bobo Dioulasso and lower the pollution load for the city's environment. The project objective of the modified Phases I and II was to significantly reduce the pollutant load of the waste water.

Target group: The target group were industrial companies and indirectly also the entire population of Bobo Dioulasso (roughly 700,000 inhabitants in 2015), as well as those living in the downstream areas of the rivers Houét and Mouhoun.

Overall rating: 3 (both projects)

Rationale: The project has brought about noticeable improvements in the environment and reduced health risks. However, the success is nuanced by the extremely low capacity utilisation of the treatment plant at just 20-40 %, the problem that many industrial companies use private wells and therefore pay no or little water and waste water fees, and the low covering of costs by the waste water tariffs.

Highlights: ---



Rating according to DAC criteria

Overall rating: 3 (both projects)

As the project was rescheduled one year after the Phase I appraisal, the pre-treatment of industrial waste water was dispensed with in favour of a larger treatment pond and Phases I and II were implemented in one go. For this reason, a separate evaluation of the two phases is no longer possible nor meaningful.

The project has brought about a significant reduction in pollution and a plausible reduction of health risks. However, some factors hinder the project's success:

- The very low utilisation of the capacity of the waste water treatment plant.
- The non-observance of the polluter-pays principle: both the investment costs and a large part of the current costs of waste water disposal for industrial companies are borne by the general public (lower cost recovery ratio for sewage tariffs and the fact that most industries use private wells, pay no extraction fees for the water drawn from these and have entered into no discharge agreements with ONEA concerning the payment of waste water fees).

Relevance

The project focused on the core problems relevant at the time, which it was able to resolve: (1) health risks and the negative impact on living conditions (strong foul odour) caused by an open sewer running straight through the city, (2) significant environmental damage to the Bingbélé forest at the main discharge point for collected waste water in the northeast of the city, and (3) long-term threat of contamination to the drinking water resources of the city of Bobo Dioulasso.

The project concept was amended one year after the appraisal and, rather than setting up individual pre-treatment facilities by the industrial companies, the plan was to ensure the full treatment of industrial waste water in the municipal waste water treatment plant to be constructed. This solution was the most cost-effective at the time of the detailed planning, as it aimed to dispose of waste water from lesser known large waste water producers. However, the solution proved useful only to a limited extent, as it relieved industrial companies of their responsibilities (polluter-pays principle). Experience shows that projects for industrial companies are subject to great uncertainty. This is because, for obvious reasons, government bodies do not receive sufficient information on the business plans, such as production expansion or reduction, relocation, etc. Thus, there was high level of planning uncertainty which had an adverse effect in the present case (see section entitled Efficiency).

The maturation ponds planned at the appraisal of Phase II would have been necessary to achieve the original objective of waste water quality for irrigation purposes (target indicator at the appraisal), but were however never built. From today's perspective, the achievement of irrigation water quality was not an appropriate objective in this phase and the decision not to build the maturation ponds was the right one.

The measures were implemented in consultation with the partner country and other donors. The chosen approach (treatment pond, separate sewers) corresponded substantially to the waste water plan for the city drawn up in 1998. The concept broadly corresponded to the Federal Ministry for Economic Cooperation and Development's (BMZ) Sectoral Water Strategy, except that the polluter-pays principle was not implemented.

Taking into account the above restrictions, we award an overall rating of satisfactory.

Relevance rating: 3 (both projects)

Effectiveness

The following indicators were defined for the achievement of the project objective.

Indicator	Ex post evaluation
(1) NEW: since their connection to the city sewer system and following the commissioning of the treatment pond, waste water from the main polluters is no longer discharged untreated into public waters.	**Achieved**.
(2) NEW: purification capacity of the lake sewage treatment plant: The lake sewage treatment plant achieved the following average annual purification capacities in relation to: - Biological oxygen demand (BOD_5): 80%, - Chemical oxygen demand (COD): 70%, - Suspended solids: 40%.	**Largely achieved**. The lake sewage treatment plant achieved the following average purificationresults in 2014 in relation to: - BOD_5: 86% (with an implausible figure of 69% in October), - COD: 67% (with an implausible figure of 30% in October), - Suspended solids: 40%.
(3) NEW: The capacity utilisation of the plants is 70%.	**Clearly missed.** Capacity utilisation is a low 20-40%.
(4) Control systems for measuring the input values of industrial waste water and the discharge values from the lake sewage treatment plant are in place and are operated properly.	**Partially achieved.** The control systems are in place, but do not operate properly (quality and evaluation of the laboratory analyses).

The three main polluters now dispose of all their waste water through the city sewage system. Since the time of the project appraisal, two further main polluters have ceased operations permanently and do not produce waste water any longer. For the most part, the city's population disposes of grey water in a decentralised manner.

The project has been successful in significantly reducing the pollution load from industrial waste water. Within the scope of the appraisal of Phase II, the three main polluters currently connected represented around 80% of the total waste water volume estimated for the industrial sector (1,440m^3/day, excluding the two closed companies), with a waste water volume of approximately 1,140m^3/day as estimated at the time and a daily[1] organic pollutant load of 30,000 inhabitants. No exact figures are available regarding the number of industrial companies that are currently not connected to the sewage system and their waste water production. Assuming the three local units still produce around 80% of the total industrial waste water load, and taking into account the levels of purification mentioned above, it can be estimated that the project has reduced the pollution load from industrial waste water by around 60-70% (small dye works have not yet been connected).

The introduction of toxic waste water (especially waste water containing heavy metals) was largely eliminated by the selection of the connected industrial companies. This was also sensible from an ex post perspective, as waste water monitoring by ONEA is only carried out intermittently.

Personnel and equipment for waste water monitoring are available in the laboratory of the Bobo Dioulasso regional directorate, both in relation to the waste water-producing industrial companies as well as for monitoring the purification results of the treatment pond. However, the documented analysis results often show significant inconsistencies. This applies to both the typical waste water characteristics expected and

[1] This figure is based on the assumption of an inhabitant-specific grey water load of 40g BOD_5/E*d used in engineering planning.

to the reduction of individual waste water parameters as a result of the individual procedure steps followed in the lake sewage treatment plant. Furthermore, some measurements are taken very infrequently (e.g. chromium parameters).

The achievement of the project objective is also limited by the fact that no discharge agreements were concluded between ONEA and the industrial companies, as was originally planned. In addition to the permitted limit values, the discharge agreements would also have included a waste water surcharge for the use of well water, as well as a counterpart contribution.

Due to the low capacity utilisation, we rate the overall effectiveness as marginally satisfactory.

Effectiveness rating: 3 (both projects)

Efficiency

The chosen solution (gravitational dewatering in a main collector, treatment ponds) has low specific costs of 63 EUR /population equivalent. The operating costs are also low thanks to the choice of technology.

Given the existing pollutant load, the capacity utilisation of the treatment pond is estimated by the evaluation mission to currently be 35-40%. However, other technical expert opinions refer to a very low utilisation of 20%. The capacity utilisation can be attributed to the following reasons: the domestic connection rate, which is significantly lower than expected at the appraisal, the insolvency of two heavily polluting industrial companies and the fact that the two largest companies, contrary to expectations, have implemented modern pre-treatment facilities. In addition, the sewage system planned by the African Development Bank was not built. It is unlikely that the planned connection of other smaller public and private customers to the sewage collection system by the German FC in the coming years will be able to improve the situation so significantly that capacity utilisation will reach the desired level.

An FC-funded laboratory is now used as a storage room. It was later discovered that it made sense to utilise the Bobo Dioulasso regional laboratory. The 50 drying beds built next to the waste water treatment plant also remain unused thus far, and are too large from today’s perspective.

When it comes to water, most of the industrial companies have a mixed connection of tap water from ONEA and water from private wells. The companies do not disclose how much is obtained from each source, and this is subject to monthly fluctuations. The fee for the use of raw water from private wells is very low and does not reflect the scarcity of water. Only one of the three companies pays this low fee; the other users of private wells do not. The low price and the low collection rate of the fee for raw water are inappropriate in a project region where water resources are scarce.

A waste water fee was introduced in 2008 and increased slightly in 2014, but is still very low by comparison. The waste water segment is constantly in the red as the tariffs come nowhere near to covering costs. According to a tariff study, the full cost recovery ratio of waste water tariffs was 50% in 2012, and 27% in 2014. It can therefore be assumed that there is also a significant coverage shortfall in relation to operating costs. In addition, the waste water tariffs are levied only on the water volumes supplied by ONEA, not on water consumption from private wells. Although ONEA benefits from a good cost recovery situation overall, projects like this place a strain on its earnings position.

Generally, the industrial companies connected to the sewage network in Burkina Faso do not bear the costs of waste water disposal from their production, but pass these on instead to ONEA customers. Thus, the waste water tariffs do not sufficiently contribute to waste water reduction or to recycling. However, according to the tariff study from 2013, industrial consumers pay significantly more in water tariffs than is required to cover the costs for the water they obtain from ONEA. This therefore represents a reasonable incentive for lowering water consumption, at least to some extent. Given the lack of data and the lack of an alternative to water from private wells, it is not possible to estimate the net effect. Due to the excess capacities described above and the low cost recovery ratio in the sewerage area, the efficiency criterion is assessed as no longer satisfactory.

Efficiency rating: 4 (both projects)

Impact

The project focused on industrial waste water at an isolated major source of pollution for several bodies of water and habitats (Houét river, Bingbélé forest and Kou river). Within the scope of the evaluation trip, no recent data was available regarding the water quality in the two rivers. It can be assumed, however, that it was possible to reduce the increase in the pollutant load in the river water in Bobo Dioulasso by more than 50% through the execution of the project. As a result of the project execution, it has likely been possible to significantly reduce this increase in the pollutant load in the river water by 60-70%. However, the Houét is still contaminated from other sources (waste, waste water from small dye works, etc.). Following the programme measures, the natural balance in the Bingbélé forest has been fully restored and the river Kou is now largely clean.

Reliable health data was also unavailable. However, thanks to the fact that waste water no longer runs right through the city in an open sewer, it is highly plausible that it has been possible to reduce the health risks. A significant improvement in living conditions can also be noted thanks to the elimination of the foul odour and the plagues of flies and mosquitoes.

We therefore consider it plausible that the ultimate objectives of reducing the health hazard potential for the population and reducing the pollution load for the city's environment have been achieved.

Minimal negative side effects can result from the practice of irrigating vegetables with water from the Houét. The treated waste water is not of irrigation quality, as to achieve this would have incurred disproportionately high costs. Compared with the situation before the project, however, the major polluters have achieved a significant reduction in pollution of the river. Even considering the fact that this water was used for irrigation before the project, we consider this risk to be acceptable.

As one of the first treatment ponds in Burkina Faso, the project acts as a model and is visited regularly by decision-makers and school classes, among others.

Impact rating: 2 (both projects)

Sustainability

The selected technology is robust, easy to operate and has low operating costs. ONEA is a strong executing agency and partner in several FC projects. However, the operational expertise for the waste water sector is significantly lower than for the drinking water sector.

The nationwide cost recovery of the project-executing agency through water and waste water tariff revenues was determined in a static calculation: in 2014, ONEA was able to cover 122% of the operating costs, including financing costs, and 91% of the full costs. The economic sustainability of the project-executing agency, which is active throughout the country, thus requires ongoing subsidies. Subsidies are provided by the state, but are not always received on time and are not always adequate. New and replacement investments are regularly funded by external donors. The current sector reforms are targeted, among other things, at increasing ONEA's performance. In recent years, these reforms have resulted in a high collection rate (over 95%), declining personnel costs and low unaccounted for water. According to the tariff study from 2013, in contrast to the waste water sector, the water tariffs in Bobo Dioulasso cover all costs. An extension of the sewage network is not realistic without external subsidies or massive tariff increases, which would be higher than almost any other country in West Africa.

A low risk for sustainability is the future sewage sludge disposal (sludge removal required around 2017). ONEA plans to dispose of dried sludge through composting or depositing on existing landfill sites. No data is available concerning the pollution load of the sludge. Due to the known, predominantly organic pollution in the waste water from connected companies and the household-like waste water from other connected facilities (such as hotels, schools, public facilities, etc.), the sludge is not expected to contain elevated levels of toxic substances. Composting options are currently under consideration for the Ouagadougou treatment plant. In the case of similar industrial companies in the catchment area of this waste water treatment plant, it is likely that the results of the proposed sludge examinations could be applied to the sludge from the Bobo Dioulasso treatment plant.

Sustainability rating: 3 (both projects)

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).