KfW Development Bank

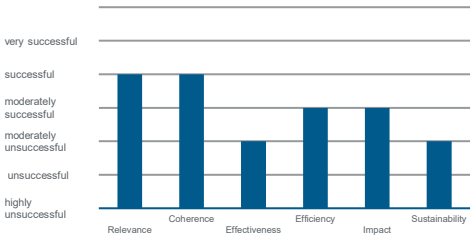
Ex post evaluation
Urban Water and Sanitation Programme, Eastern Province, Phase III, Zambia

Title	Urban Water and Sanitation Programme, Eastern Province, Phase		
Sector and CRS code	Water supply and sanitation – large systems (14020)		
Project number	2011 65 869		
Commissioned by	Federal Ministry for Economic Cooperation and Development		
Recipient/Project-executing	Ministry of Finance/Ministry of Local Government		
Project volume/ Financing instrument	EUR 5.7 million, (grant)		
Project duration	09/2012 – 01/2017 (52 months)		
Year of report	2022	**Year of random sample**	2020

Objectives and project outline

The project included the maintenance, modernisation and expansion of the existing water supply systems (and, to a lesser extent, sanitation) in all of Eastern Province's district capitals and its provincial capital. The evaluated Phase III included measures in Katete as well as in Chipata to a limited extent. The FC programme aimed to alleviate health risks from waterborne diseases while ensuring dignified and humane living conditions by providing a sufficient supply of water and sanitation to the target group (impact). This was to be achieved by appropriately guaranteeing a supply of water to the vast majority of the small-town population, as well as retailers, commercial businesses and public institutions in the programme locations in Eastern Province (outcome).

Overall rating:
moderately unsuccessful



Key findings

- Although the main objectives of the project were achieved, the continued high levels of unaccounted for water impair the effectiveness, particularly in Katete's water supply system, which was rehabilitated and expanded four years ago and whose water distribution systems are predominantly gravity-fed.
- In terms of negatives, it should also be pointed out that the water kiosks in Katete are only in operation for four months a year during the dry season due to a lack of demand, so it must be assumed that the customers of the kiosks (mainly poor segments of the population) continue to switch to unsafe water sources, and thus the prevalence of water-induced diseases is still present.
- The utilisation rate of the plants is currently very low at one third, and the economic performance of the operator is also not sufficient for sustainable operation.

Conclusions

- It seems advisable to use realistic consumption values in project locations where there is a high water table and correspondingly many privately owned shallow wells in order to avoid designing the facilities to be too large and the associated higher costs.
- For similar projects, an awareness-raising campaign should be carried out with the target group. If this secures a year-round demand for safe drinking water, water kiosks can also be run economically outside the dry season and contribute to the reduction of water-induced diseases.

Rating according to DAC criteria

Overall rating: 4

Ratings:

Relevance	2
Coherence	2
Effectiveness	4
Efficiency	3
Impact	3
Sustainability	4

Relevance

Both at the time and from today's perspective, the project correctly identified one of the key problems in Zambia's Eastern Province: the insufficient water supply available to the population in the rapidly growing district capitals and urban peripheral areas. At the time of the programme appraisal in 2009, Zambia had one of the highest degrees of urbanisation in Sub-Saharan Africa (45% as per PP; 37% according to latest statistics for 2009). Around 85% of the urban population lived in urban peripheral areas. As a result of the high population growth (2.1% per annum) and constant rural-to-urban migration, the supply of water and basic sanitation could not be expanded in line with the increasing resident numbers. Across Zambia, only 70% of the urban population had safe access to drinking water in 2009. Between 2012 and 2017, this figure stalled at around 83%, before increasingly slightly to 86% in 2018. Of the urban population, only around 29% had access to improved basic sanitation facilities in 2009, with the number now estimated to have risen to 64%. The population with no guaranteed access to affordable drinking water and basic sanitation facilities with acceptable hygiene levels uses unimproved water sources or contaminated surface water. The spread of waterborne diseases can be encouraged by the low connection rate, along with substandard levels of hygiene awareness around water use and the disposal of sewage, faeces and solid waste.

The measures implemented as part of the project were fundamentally a suitable means of helping to reduce health hazards resulting from the population's poor supply situation. By improving the water supply, the aim was to curb the use of unsafe water sources and, by extension, decrease the prevalence of waterborne diseases. From today's perspective, the impact chain makes sense, as the water supply available to the population in the programme locations has replaced the traditional, unhygienic water sources and the public's contact with contaminated water has decreased.

Overall, the programme design was coherent. However, planning updates should have taken place after delays in the planning phase. In addition, it would have made sense to pay more attention to replicability by the local population in the pilot sanitation measures. The pilot latrines were largely constructed from concrete elements and were therefore stable, but probably too expensive for the population to replicate. Alternatives made from cheaper local materials could have been offered here.

Due to the limitations in the design, we attribute only just good relevance to the project.

Relevance rating: 2

Coherence

The project was part of the German-Zambian DC "water sector reform programme in Zambia" and made up the third phase of the multi-stage effort to improve urban water supply and sanitation in Zambia's Eastern Province. It was in line with the priority area strategy paper for the Zambian water sector (2010–2015). The aim of the water sector programme in urban areas is to improve the supply of water and sanitation services. There is intensive donor coordination in the water sector. Germany was the chair of the coordination group in 2021, and the World Bank is the current chair.

There are close synergies with the current water supply/water resource management projects and those in the pipeline in Chipata and the Southern Province. During the third phase, there were no other donors working on activities directly or indirectly related to the FC module in the programme locations, meaning it was not possible to benefit from synergies with other donors' programmes.

Coherence rating: 2

Effectiveness

The programme objective set was to appropriately guarantee a supply of water and basic sanitation to the vast majority of the small-town population, as well as retailers, commercial businesses and public institutions in the programme city of Katete in Eastern Province. As the indicators relate to the improvement of the water supply, they were only assessed for Katete. The emergency measures in Chipata were limited exclusively to the procurement of spare parts and are therefore not taken into account here.

The achievement of the objective at outcome level was measured using the following indicators:

Indicator*	Status PA, target PA	Ex post evaluation
(1) Water availability during normal operation	PA: A few hours Target value: at least 18 hours/day	Katete: 24 hours – **achieved**
(2) Total unaccounted for water as a percentage of water production in the distribution network	PA: > 50% Target value: < 30%	Katete: 2020: 38% – **not achieved**
(3) Consumption points equipped with water meters	PA: none/0% Target value: 100%	Katete: 100% – **achieved**
(4) Population in the supply area who obtain their drinking water from the public supply network.	PA: < 30% Target value: 80%	Katete: 77% via house connection 9% via water kiosks – **achieved**
(5) Minimum per person drinking water consumption in the catchment area of the programme-financed water kiosks	PA: N/A Target value: five litres per person per day	Katete: Kiosks are only in operation for four months/year; individual consumption figures are not available; **– not achieved****
(6) The water quality is compliant with the national standard.	PA: no Target value: Yes	Katete: 100% – **achieved**
(7) Collection rate (fee collections as a percentage of water billed)	PA: 35% to 58% Target value: 85%	Katete: 97% **– achieved**
(8) EWSC cost recovery ratio (running costs, including appropriate maintenance and small replacement investments, as a percentage of actual fee revenue)	PA: 30–60% (not including appropriate maintenance and replacement investments) Target value: 100%	EWSC: 63% of the operating costs are covered. Katete: 111% of the operating costs are covered. **– not achieved**

*) Target is classified as achieved if the indicators are met in the third year of operation (all indicators).
**) Exclusively used as drinking water.

Thanks to the promoted measures, the households in Katete connected to the water distribution network have continuous access to a secure water supply. According to EWSC, the water quality complies with the national limit values, which are based on the WHO guideline and are acceptable (indicator 6). Measurements are carried out daily at the treatment plant and on a random basis once a month in the distribution network at household level. We were unable to carry out our own water quality control measurements. However, there were sufficient and well-maintained measuring devices in the laboratory, reviewed measurement reports showed no abnormalities and the personnel appeared to be experienced and trained. Chemicals for precipitation and disinfection of the water were present.

According to official information in Katete, the technical and administrative unaccounted for water (indicator 2) in the fourth year of operation (2020) amounted to around 38%, exceeding the target of 30%. This figure is far too high for a four-year-old network, even in an African context. Although it was not possible to carry out a root cause analysis as part of the ex post evaluation, major leaks in the network do not appear to be the cause. Rather, it can be assumed that the quality of the house connections (these are outside the buildings and not protected) as well as the easy access for illegal connections (low installation depth, line routing easily recognisable) contribute to the high loss rates. In addition, the quality of Chinese domestic water meters is questionable and their accuracy is not inspected by the supplier. Despite the fact that the high levels of unaccounted for water are associated with substantial, lost revenues or increased operating costs for EWSC, no regular loss reduction studies are carried out in Katete. It appears that the leak detection equipment provided for this purpose can no longer be found.

EWSC states that 100% of connected water consumers in the Katete supply area have a water meter (indicator 3), a figure which is reflected in the official statistics from the National Water Supply and Sanitation Council (NWASC). A sufficient quantity of domestic water meters for new connections or for replacement was available at the EWSC's warehouse on site.

In 2015, the intent was to reach a total of 16,000 people from the predominantly poor small-town population in the programme city of Katete (indicator 4). Since population growth was higher than anticipated, the population in Katete was already 20,586 in 2017, and we projected growth of almost 3% p.a. to 21,500 for 2020. Based on an average of eight people per household, the connection rate is 89%. The assessment of the supply via water kiosks remains problematic. Officially there are nine public standpipes in the city area. However, these are only open during the dry season (max. four months per year) and, according to EWSC, should supply 25 households or 200 people each. It is not possible to make statements about the amount of water consumed per person during this time. However, the fact that the supplier has difficulties in finding standpipe operators due to the low earnings (40% of turnover) suggests that individual consumption is limited to pure drinking water requirements and that the population is mainly supplied via privately owned shallow wells. This impression was confirmed by a visit to a typical suburban residential area (almost every house had its own well).

The EWSC collection rate (indicator 7) in Katete is 97% and is therefore good. However, this figure is only 63% for the entire Eastern region. Despite the high loss rate and incomplete collection rate, the operator in Katete manages to achieve an operating cost surplus of 11%. This is due to low energy costs for the operation of the city (only one pump station with a low pumping head, residual distribution using gravity), good raw water quality with little need for treatment chemicals and the fact that spare parts procurement is controlled centrally from Chipata and therefore does not burden the individual supply centres. However, it is regrettable that the operating cost recovery ratio for the entire EWSC supply area is currently only 63%, while the full cost coverage is low at 46%. EWSC states that the dilapidated supply network in Chipata, which supplies well over half of all its customers, is subject to extremely high losses and costs. Since there is no separate cost centre accounting for the individual provincial locations, the overall financial situation of EWSC is decisive for the achievement of the cost coverage indicator, as much as the delegation appreciates the good figures in Katete.

In Katete, EWSC does not generate any revenue from sanitation services. However, EWSC also does not provide any sanitation services. Private companies are available to empty domestic latrines; there is only a rudimentary wastewater network within one school for which EWSC does not incur any costs. Although the adjacent wastewater ponds were rehabilitated as part of the project, they are used exclusively for school wastewater. In practice, the domestic latrines are not emptied due to the high fees for the Lusaka-based service provider. The only emptying vehicle in Chipata is no longer roadworthy.

The technical operation of the predominantly gravity-fed water supply infrastructure is simple and does not require any in-depth specialist knowledge of the personnel. Eight technical and administrative staff from EWSC are deployed at each site. The personnel at the water treatment plant appeared to have received sufficient training; regular maintenance measures on the electromechanical equipment were carried out and documented properly. Appropriate maintenance plans were in place and followed. The premises and structures were clean and well maintained. Measurements of water quality are carried out regularly using the latest technology. Spare parts and consumables were available to a small extent but still sufficient. Overall, we rate the operation and maintenance of the infrastructure as good.

Due to the insufficient sewage volume and wasteload, the FC-financed sewage lines and treatment ponds were not efficiently utilised, as only one school was connected. It is striking that no access to the ponds was planned, and therefore private companies that empty domestic latrines in the city cannot unload the sludge into the ponds. The investments in the pond facilities are therefore not utilised.

Some of the financed demonstration toilets are not used or are not used regularly. However, it appears that a few private latrines are now equipped with a ventilation duct. It is not clear whether this can be attributed solely to the spill-over effect of the project.

Although EWSC is the owner and operator of the promoted infrastructure, the Ministry of Local Government and Housing (MLGH) was the programme executing agency, as EWSC still did not have the required implementation capacity shortly after it was set up in 2009. The gap between when the water supply systems were initially designed in 2007 and ultimately put into operation in 2016 was significantly lengthier than had been assumed during the programme appraisal. As a result, the design for the district town of Katete was not updated before the actual implementation. The forecast water demand should have been revised downwards based on experience in similar projects. At present, the volume of water produced (albeit with an unaccounted for water rate of 38%) is 1,144 m³/d; after more than five years of operation, this corresponds to just 29% of the design capacity of the constructed infrastructure. The main reason for this is the low specific water consumption from the network, which can always be seen in competition with the cheaper water from the domestic shallow wells. According to statistics, the specific daily consumption is less than 20 litres per capita per day. An awareness-raising campaign for consumers before and during implementation of the project for greater use of clean drinking water did not take place or did not take place in sufficient form. For this reason, the measures are not considered efficient at the low utilisation rate.

Due to the massive unaccounted for water in spite of the rehabilitation, the low water usage rate at the water kiosks and the low utilisation rate of the water infrastructure built, we rate the effectiveness as unsatisfactory. The inadequate cost coverage also contributes to the fact that the criterion of effectiveness can no longer be rated as satisfactory.

Effectiveness rating: 4

Efficiency

The average specific per capita investment costs in Katete amount to around EUR 200 at the time of commissioning in 2017. In comparison, this value is slightly higher than the per capita costs of similar water supply systems, but results from the dispersed settlement structure and the resulting necessary network length as well as the water treatment facilities.

The project's term was approx. 6 years, 2.5 years longer than originally planned. The main reasons were delays in the award of contracts (intermediate prequalification) and prolonged execution of the construction work due to delayed permits and weather conditions. Acceptance of the completed infrastructure was also delayed by half a year, as the dam had to fill up before it could be commissioned. However, the delays that occurred can still be assessed as acceptable overall.

We rate the production efficiency as satisfactory overall.

The development policy effects achieved in the field of health would not have been attainable for less money using alternative approaches. The improved drinking water supply is highly valued by the close to

20,000 people currently supplied in Katete. This is also reflected in the high collection rate.

Overall, we rate the allocation efficiency as good, and the overall efficiency as satisfactory.

Efficiency rating: 3

Impact

During the appraisal, no indicators were defined to measure development objective achievement (impact). The assumption that there would be positive health impacts from the continuous supply of clean drinking water, accompanied by hygiene measures, fundamentally rests on sound logic (e.g. by bringing about a reduction in diarrhoeal diseases among toddlers).

In Katete, around 17,000 people supplied with water, around 1,800 of them via water kiosks. However, it is known that people who are supplied via water kiosks only use them for four months of the year, and therefore the kiosks are only open during these four months of the dry season. The rest of the time, the water from shallow wells is used, as the ground water in Katete is very high. This results in health risks for this population group (around 10% of the supplied population). EWSC, together with the local health authorities, conducts regular awareness-raising campaigns, often linked to water quality tests of these wells. If microbial contamination is found during these tests, this is a good argument for the authorities to recommend a house connection.

Due to the low population density, the small scale of the sewage measures did not lead to any improvements to public health. The construction of central sewage collection systems would not have resulted in technically adequate operation, as water consumption levels are too low. In addition, water consumption is too low for a central sewage system to cover its costs.

We do not have access to any official statistics indicating how well the programme helped to improve the public health situation. However, talks with the health authorities and some users have shown anecdotal evidence that the number of waterborne diseases has decreased. For example, a lower number of diarrhoeal diseases has occurred in recent years. However, health authorities only record cases that require hospitalisation, which are only the tip of the iceberg. There is still no indication that the programme has contributed to economic development. The noticeable improvement in the population's living conditions, which is manifested in the target group's high level of approval for the supply facilities, is predominantly limited to the reduced time and effort required to obtain water. As a result, this development primarily benefits women and children.

Overall we rate the impact as satisfactory.

Impact rating: 3

Sustainability

The operator, EWSC, currently has a UfW rate of 38%. The operator has not yet taken any steps to analyse the causes of this phenomenon and carry out a corrective action plan. Katete is not a high priority for the operator, as the district town only accounts for 6% of the people supplied. Although the head of EWSC is aware of the problems, he focuses his efforts on the district capital of Chipata, as the losses here are even more serious due to years of lack of maintenance.

The operator currently finds itself in a difficult financial position, having posted operating losses for several years. Equity was negative in 2020, i.e. the debts exceeded the company's assets and it is therefore effectively insolvent. Second-degree liquidity is low at 20%, which means that the liquidity situation is extremely strained, and short-term obligations cannot be covered. Both EBIT (earnings before interest and tax) and EBITDA (earnings before interest, taxes, depreciation and amortisation) have been negative in the past two reporting years. We do not have any financial statements for the other years. However, we know from other reports that the financial situation was already difficult before. Tariff increases have been rejected by the regulatory authorities in recent years for political reasons. EWSC is therefore dependent on government allocations, although these are not made or only to a very limited extent.

As already mentioned in the Effectiveness section, the cost recovery ratios are very low. From today's perspective, under the prevailing circumstances, sustainable operation of the promoted facilities is only guaranteed to a limited extent.

EWSC has been receiving support from FC since it was founded in 2008. FC funds have already been used to invest in water infrastructure in all associated cities. FC funds had already flowed into the Eastern Province before. For example, the provincial capital Chipata received promotional support for the area of water supply/wastewater disposal back in the 1980s.

Due to the executing agency's overall financial situation as described above, we rate the project's sustainability as unsatisfactory.

Sustainability rating: 4

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**, **coherence**, **effectiveness**, **efficiency**, **overarching developmental impact and sustainability**. The ratings are also used to arrive at an **overall rating** of a project's developmental efficacy. The scale is as follows:

Level 1	very successful: result that clearly exceeds expectations
Level 2	successful: fully in line with expectations and without any significant shortcomings
Level 3	moderately successful: project falls short of expectations but the positive results dominate
Level 4	moderately unsuccessful: significantly below expectations, with negative results dominating despite discernible positive results
Level 5	unsuccessful: despite some positive partial results, the negative results clearly dominate
Level 6	highly unsuccessful: 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.

The **overall rating** on the six-point scale is compiled from a weighting of all six individual criteria as appropriate to the project in question. Levels 1–3 of the overall rating indicate a "successful" project, levels 4–6 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 ("impact") and the sustainability are rated at least "moderately successful"
(level 3).