KfW Development Bank

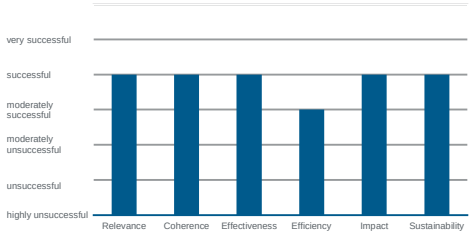
Ex-post evaluation
Stormwater Batumi I + II, Georgia

Title	Communal Infrastructure Programme: Stormwater (Phase 1); Climate Change Adaptation Programme in Adscharien -Batumi Stormwater II (Phase 2)		
Sector and CRS code	Water supply and sanitation - large systems 14020 (Phase 1) and Flood Protection 41050 (Phase 2		
Project number	Phase 1: 2011 66 719, Phase 2: 2013 97 728		
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)		
Recipient/Executing agency	Republic of Georgia / Batumi City Administration		
Project volume/ Financing instrument	EUR 14 million (EUR 7 million each phase) / budget grants		
Project duration	Phase 1: 2012-2021, Phase 2: 2016-2021		
Reporting year	2024	**Year of random sample**	2024

Objectives and project outline

The objective at the outcome level was to provide improved protection against flooding for the population in Batumi and the expanded urban area. This was intended to improve the living conditions of the population in the target region and strengthen resilience to the adverse effects of climate change at the impact level. Key measures included the separation of the wastewater and rainwater systems, the construction of a pumping station including a retention basin, and the construction of main rainwater collectors in Batumi.

Overall rating:
successful



Key findings

The planned measures were largely implemented as intended. The primary objective of a significant reduction in the frequency of flooding has been achieved by the project. Overall, the expectations for the project have been met. It is rated as successful for several reasons, including the following:

- The project is characterized by high relevance. The expansion of the rainwater system was a high priority for the Georgian government and was in the interest of the urban population of Batumi as the direct target group of the project.
- Higher costs, a longer duration, and relatively high consulting costs diminish the otherwise satisfactory efficiency of the project.
- The increased flood protection and improved bathing water quality have enhanced the living conditions of the target group and increased resilience to the impacts of climate change.
- Ongoing deficits in limiting the inflow of extraneous water into the sewer system are outside the direct influence of the project and only slightly reduce its effectiveness.
- Currently, a functioning operation and maintenance of the financed infrastructure can be ensured thanks to solid staffing and resource allocation. However, there remain risks to the durability of the achieved effects.

Conclusions

- Investments in the rainwater system can stimulate the economy and generate positive environmental impacts in addition to improved flood protection.
- In times of climate change, coastal cities are recommended to integrate a rainwater system when expanding drinking water and wastewater services.
- The absence of a rainwater tariff or a tariff that is too low for wastewater disposal can pose a risk to the long-term sustainable operation and maintenance of the system.

Ex post evaluation – Rating according to DAC criteria

Overview of rating:

Relevance	2
Coherence	2
Effectiveness	2
Efficiency	3
Impact	2
Sustainability	2
Overall rating:	**2**

List of abbreviations:

BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (Federal Ministry of Economic Cooperation and Development)
BTS	Batumi Tskali
CAPEX	Capital Expenditures
COI	Clean Oceans Initiative
DAC	Development Assistance Committee
DC	Development Cooperation
EUR	Euro
EPE	Ex post Evaluation
FC	Financial Cooperation
FC E	FC Evaluation
NECP	Nationalen Integrierten Energie- und Klimaplans
OPEX	Operational Expenditures
PEA	Project Executing Agency
SCADA	Supervisory Control and Data Acquisition
SDG	Sustainable Development Goals
SMART	Specific, Measurable, Achievable, Relevant, Time-bound
UNFCCC	United Nations Framework Convention on Climate Change
TC	Technical Cooperation

Overall context

The subject of this report is a two-phase project for the construction of a rainwater management system in the city of Batumi. The project aligns with the BMZ core theme of responsibility for our planet - climate and energy, in the action area of sustainable urban development, and was examined and implemented as a complementary component of the financial cooperation program "Rehabilitation of Municipal Infrastructure Facilities in Batumi" within the framework of bilateral development cooperation between Georgia and Germany. The overarching program now spans five phases and essentially includes the rehabilitation and new construction of water supply and wastewater disposal facilities in the city of Batumi and surrounding areas. Phases I to IV were implemented from 2007 to 2022, while Phase V is still in implementation.

In a supplementary review of Phase III in 2011, a component for rainwater management in Batumi was introduced for the first time. Specifically, priority individual measures for adequate management and drainage of rainwater in the urban area were described, aimed at reducing the frequency of flooding during heavy rainfall events and improving the bathing water quality at Batumi beach. With another module proposal, the results of a supplementary review "Part 2" of the rainwater component were presented in 2016. The implementation of the two rainwater components took place in parallel from 2016 to 2021. This report evaluates the measures realized in the area of rainwater management. Due to the close interconnection of the financed measures of both components and their joint implementation, a combined assessment is conducted rather than a separate one. The corresponding evaluation mission took place in March 2024, together with an evaluation mission for the investment measures made in Phase IV in the water supply and particularly wastewater disposal systems of Batumi, due to the close interlinking in planning, design of construction contracts, and financing of the two projects. However, the reporting will be separate.

The project implementer of the project to be evaluated was, as in the completed phases I – IV, the city administration of Batumi. While it was responsible for the preparation and execution of the investment measures, the newly established utility company Batumi Tskali (BTS) took over the responsibility for the operation and maintenance of the water supply and wastewater disposal facilities as well as for rainwater management. BTS is 100% municipally owned and is under the supervision of the city. An organizational chart showing the division of responsibilities at BTS is provided below.

Project Summary

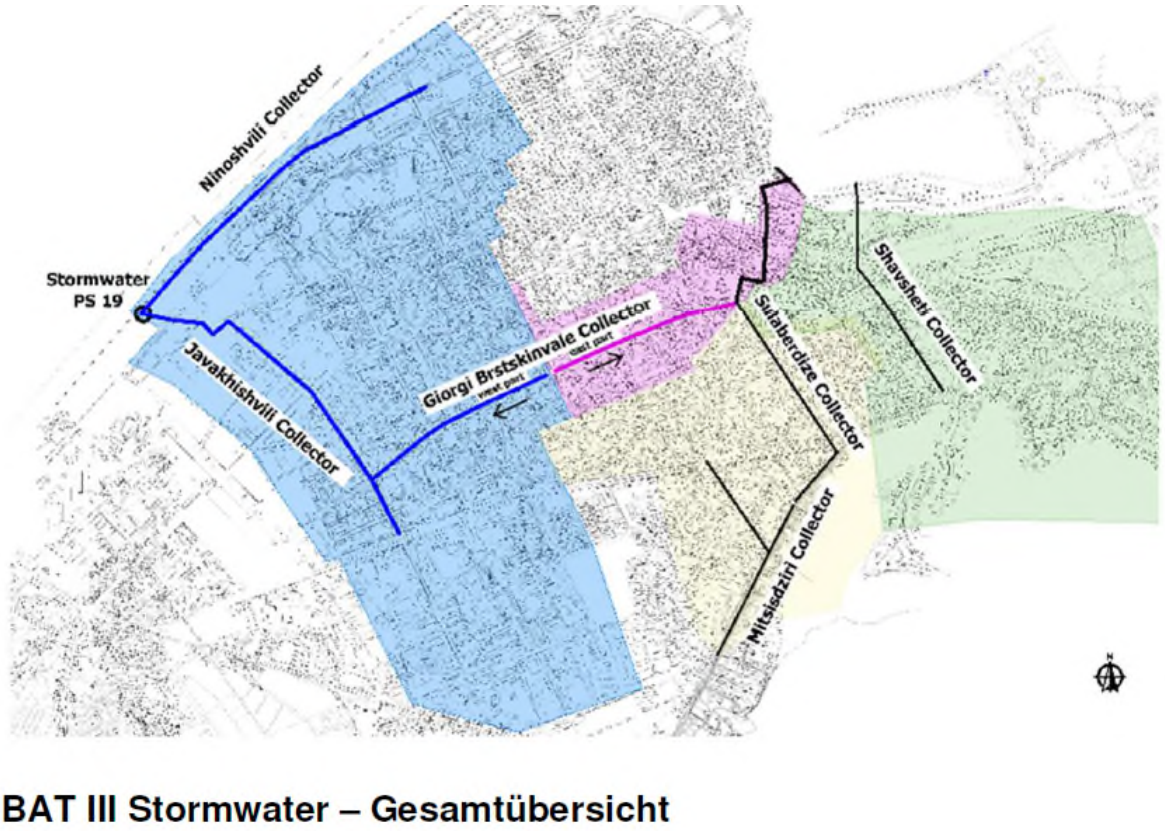
The project financed the expansion of rainwater facilities in a heavily flood-affected part of the western Georgian city of Batumi to reduce the frequency of flooding during heavy rainfall events while simultaneously achieving improved bathing water quality. Specifically, a pumping station including a retention basin and outlet, as well as rainwater collectors and connection lines, were financed. The overarching objective was to improve living conditions and strengthen climate resilience. The target group of the project was the residents of the city of Batumi, particularly those in the city center, which was especially hard hit by flooding.

Total Costs

In EUR million	Investment (planned)	Investment (actual)
Total cost	**14,5**	**18,44**
Counterpart contribution	0,5	4,44
Financing	14,0	14,0
of which BMZ funds	*14,0*	*14,0*

Map/Satellite image of project country incl. project area/locations

Figure 1 – Map of project in Batumi including realized investments in sewage system



Source: Final control report (Abschlusskontrollbericht) of KfW. The Map shows Pumpstation PS 19, Javakhishvili Collector as well as Giorgi Brtskhinvale rainwater collector (in blue) whose construction was financed with project funds..

Rating according to DAC criteria

Relevance

Alignment with policies and priorities

The project to be evaluated is part of the now five-phase bilateral development cooperation (DC) between the city administration of Batumi and Germany in the area of water supply and wastewater disposal. The implementation of the rainwater component was carried out at the explicit request of Georgia. With its focus on improving rainwater management, the project aligns with the "Fourth National Communication of Georgia to the UNFCCC" from 2021, which also mentions measures related to water management and climate change. The project supports the goals of the Clean Oceans Initiative (COI) by contributing directly to the protection of the Black Sea through improved wastewater and sludge treatment as well as the expansion of the wastewater network. Overall, the project to be evaluated is consistent with the relevant political and institutional frameworks and aligns with the strategies and priorities of the partner government.

Germany is the only international donor supporting the city administration of Batumi in drinking water, wastewater, and rainwater management. The cooperation takes place through financial cooperation. The present project is integrated into the BMZ Strategy 2030, particularly under the core theme "Responsibility for our Planet – Climate and Energy" in the area of "Sustainable Urban Development" and the action field "Urban Water Management." During the planning phase, the project corresponded to the then-valid BMZ sector concept "Urban Water Management" and remains consistent with the strategic direction of the BMZ for Georgia today. The project also fits into the overarching development policy goal of environmental and resource protection and the BMZ

Caucasus Initiative. It contributes to the protection of international waters and thus aligns with the European Neighborhood Policy as well as the Black Sea Synergy adopted by the EU in 2007.

The quality features of German development cooperation are reflected in this project, particularly in relation to the human right to water and the fight against inequalities. The focus on areas heavily affected by flooding and the improvement of water quality concerns the entire population of Batumi and thus has an inclusive character.***Alignment with needs and capacities of persons concerned***

Batumi is the rainiest city in the entire South Caucasus, with an average annual rainfall of about 2,700 mm. The city is located in a flat river delta directly on the Black Sea and is characterized by a unique topographical location, surrounded by mountainous terrain and intersected by numerous rivers. The combination of high rainfall, topographical conditions, limited drainage options for surface water into the sea, sealed surfaces, and partially unfavorable geological conditions for infiltration has led to frequent flooding, particularly in the city center. At many locations, separate rainwater collectors were lacking at the time of the review, resulting in the entire sewer system, including the treatment plant, being overloaded. Additionally, rainwater was discharged directly into the sea at some locations near the bathing beaches of Batumi, leading to significant contamination.

The frequent flooding resulting from intense rainfall had the following impacts:

- Impairments of economic activities due to traffic disruptions in the city center; shops were hard to reach, street markets could not take place, and flooding persisted for extended periods.
- Overloading of the wastewater network, as rainwater infiltrated the sewer system, leading to flooding of wastewater in the city center and overloading of the treatment plants.
- The rainwater mixed with wastewater was discharged untreated into the sea, resulting in significant pollution of seawater and health risks for the population.

For the population of Batumi, the project was therefore of great importance to protect property from flood damage, reduce health risks, improve quality of life, and maintain economic activities. Furthermore, it is Georgia's goal to make Batumi a more attractive tourism destination, as tourism, particularly through casinos and beach tourism, is one of the main economic factors in the city alongside the banking and real estate sectors. Therefore, it was a priority to take measures that ensure the city's attractiveness and accessibility for visitors.

The project was not explicitly designed to promote specific population groups in terms of its objectives. However, since women in the intervention area are often responsible for household management and were thus significantly affected by cleaning measures after the floods, the project still has gender impact potentials.

It can be stated that the floods and their negative consequences were correctly identified as a core problem, and the measures were aligned with the development policy needs and capacities of the affected population.***Suitability of project concept***

The project concept aimed to reduce the frequency of flooding in the city center of Batumi by separating the wastewater and rainwater systems, constructing a pumping station including a retention basin, and building main rainwater collectors. The proposed approach is technically proven, and the system is considered easy to manage. Additionally, the system is known for effectively mitigating flooding while simultaneously reducing water pollution. Organizationally, after annual tendering, the operation of the facilities was integrated into the municipal utility company BTS, which has its own department for rainwater management. At the time of the review, this department received a separate and adequate budget from the city administration, which was firmly anchored in the municipal budget and not funded from separate rainwater tariff revenues. It could therefore be assumed in the design that sustainable operation of the facilities could be ensured.

The project's theory of change can be described as follows: By structurally separating the wastewater and rainwater systems, constructing rainwater house connections, rainwater collectors, and a pumping station with a retention basin and outlet to the sea, as well as financing house connections, capacities are created that improve rainwater management and thus flood prevention (outputs). Through the commissioning and ongoing operation of the rainwater infrastructure, water volumes can be controlled so that flooding in the city center of Batumi is prevented and untreated wastewater no longer reaches the sea. The population of the city center is thus better protected from flooding (outcome). The more effective flood protection leads to an improvement in the living conditions of the population in Batumi and the expanded urban area and increased climate resilience (impact). As possible secondary effects, investments in the rainwater management system have the potential to (1) reduce the

inflow of extraneous water to the treatment plant, thus relieving capacity, (2) improve water quality in the coastal area of the city, (3) enhance settlement hygiene, and (4) thereby promote tourism development. These secondary effects can also positively impact the overarching objectives. The causal chain appears coherent and valid from today's perspective. However, the economic benefits, particularly from tourism, the real estate sector, and the reduction of economic damages from flooding, could have been explained more clearly in the concept.

To strengthen the capacities of BTS, an accompanying measure was conducted in parallel to the ongoing financial cooperation investment measures in Batumi (Phase IV). As part of it, aspects of rainwater management were also addressed. For example, consultants supported the company in awarding contracts. Furthermore, training on the use, efficient operation, and maintenance of the rainwater infrastructure was conducted. The accompanying measure also appears appropriate and goal-oriented in retrospect.

Overall, the design of the measures was sufficiently precise and plausible. For measuring goal achievement, an indicator for flooding frequency was defined at the time of the review. Additionally, indicators for bathing water quality and the inflow of extraneous water into the wastewater system were established. While these do not allow for direct conclusions about the achievement of the module objective (improved protection against flooding), they provide information about potential positive secondary effects from the implemented measures and are also relevant for the overarching objectives. Therefore, the indicators were retained in the context of the evaluation. The indicators were generally appropriate. However, their scope in the original formulation was broadly defined, which could give the impression that the module and the associated measures covered the entire urban area of Batumi. For this reason, the indicators were specified to focus on the actual project area (the city center). The measurement criteria for the indicators were appropriate and met the SMART criteria (specific, measurable, achievable, realistic, and time-bound). No separate indicators were defined for the overarching objective (improvement of quality of life and climate resilience). Instead, it was assumed that the overarching objective would be achieved through the fulfillment of the module objective. This assumption is plausibly justifiable (see also Impact).

The present project was part of a comprehensive, openly designed development cooperation program for the "Rehabilitation of Municipal Infrastructure Facilities in Batumi." As part of a restructuring, the project was later integrated into the development cooperation program "Good Governance in the South Caucasus," which aimed, among other things, to improve the provision of public infrastructure services to the population, particularly in the area of wastewater disposal and treatment. Due to the intended improvement in the flooding situation and the associated improvement in the living conditions of the population in Batumi, the project is consistent with the goals of the updated development cooperation program.

Reaction to changes/adaptability

During the implementation of the project, there were no significant deviations from the original project planning. However, there were cost and time delays resulting from inadequate planning documents from the consultant and restrictions due to the COVID-19 pandemic (see Efficiency).

Rating summary:The intended improvement of rainwater management was a priority objective of the project implementer and fit meaningfully into the existing portfolio as well as the objectives of bilateral cooperation. The design was aligned with the needs of the target group and the capacities of the implementer. The underlying logic of the project is plausible. The goals formulated during the project appraisal are assessed as realistic from both today's and past perspectives; the adjustments made during this evaluation serve merely as a semantic clarification. The relevance of the project is considered high, and the assessment is therefore rated as successful.

Relevance: 2 (both phases)

Coherence

Internal coherence

The project is part of a comprehensive engagement of financial cooperation in the Georgian water sector and fits meaningfully into the then-existing program of bilateral development cooperation "Good Governance in the South Caucasus," which aims to improve the provision of public infrastructure services to the population – measured by the number of people no longer affected by flooding and connected to a functioning wastewater system. The goal of the development cooperation program was to sustainably and environmentally improve the living conditions of

the population at the municipal level, in line with the principles of democracy, the rule of law, and transparency. The expansion of the rainwater system is complementary to the parallel ongoing wastewater measures of the financial cooperation portfolio in Batumi. By separating wastewater and rainwater connections, the inflow of extraneous water to the treatment plant could be reduced, and water quality in the coastal area improved, thus contributing to the overarching program objectives. Technical cooperation is not active in the Georgian water sector. Due to the lack of technical cooperation engagement in the water sector, the accompanying measure of financial cooperation supports the implementer and thus makes a meaningful contribution to the financial cooperation instrument of infrastructure financing.

The measure complies with the norms and standards of German development cooperation and integrates into international environmental and climate policy objectives. It strengthens the resilience of urban infrastructure against extreme weather events and flooding, thereby also protecting vulnerable and affected individuals. No inconsistencies of the project with other relevant international norms and standards are evident.***External coherence***

The financial cooperation measures complement the previous self-financing of the Batumi city administration, which fulfills its tasks both in Batumi and in other locations in the vicinity without external development financing. Individual components, such as rainwater collectors, are partially financed from the city's own budget. The design of the measure was specifically aligned with the existing rainwater management systems of the city of Batumi. Additionally, already existing infrastructure measures were rehabilitated and expanded. The German financial cooperation is the only donor in the water sector of Batumi. Therefore, there were no direct consultations with other donors.

Rating summary:

The internal and external coherence of the project is rated as good.

Coherence: 2both phases)

Effectiveness

Achievement of (intended) goals

The objective of the project at the outcome level was to improve the protection of the population in Batumi and the expanded urban area from flooding. To measure goal achievement, an indicator for flooding frequency was defined at the time of the review. Additionally, indicators for the inflow of extraneous water to the treatment plant (Indicator 2) and for water quality (Indicator 3) were established to capture any positive secondary effects of the implemented measures. Since only Indicator 1 directly informs the primary objective of the project, this indicator receives greater weight in the assessment than the other two indicators. The achievement of the formulated target indicators can be summarized as follows:

Table 1: Indicators for and achievement of goals at outcome level

Indicator	Status at Appraisal (2016)	Target value according to EPE (2021)	Actual value at AK (2021)	Actual value at EPE (2024)
(1) Number of Floods in the Project Area	1 flood with significant amounts and prolonged standing water per year	Reduction of flooding frequency: a) Park areas 1x in 2 years b) Residential areas 1x in 5 years c) Government buildings 1x in 10 years	Significant reduction in flooding frequency	Achieved

(2) Inflow of Extraneous Water to the Treatment Plant (in %)	Inflow of extraneous water is 120 – 150% of dry weather flow	Limitation of extraneous water inflow to 55%	Inflow of extraneous water is 70 – 100% of dry weather flow	Partially achieved
(3) Improvement of Bathing Water Quality at the Beach Area of the Project Area of Batumi according to EU Bathing Water Directive, measured based on the concentration of coliform bacteria (Escherichia coli) and enterococci (Intestinal enterococci)	E-coli on average 3,7E+08 cfu/100 ml	E-coli 500 cfu/100ml Enterococci 185 cfu/100ml	Last measurements from June 2021: E. coli: << 500 cfu/100 ml Enterococci << 185 cfu/100 ml	Achieved

Contribution to goal achievement

Indicator 1: The infrastructure was constructed and put into operation satisfactorily. Pumping station 19 and the underground collectors are operational and exhibit high structural quality. They continue to meet the desired requirements. Additionally, BTS independently financed connections for roof and courtyard drainage to the rainwater system. These measures were supported by the accompanying measure and function effectively.

At the time of the review, it was established that the focus of the rainwater measures should be on rehabilitating the main rainwater channels to the pumping station (Giorgi Brtskinvale collector, Javakhishvili collector, Mtisdziri collector, Shavsheti collector), including retention and catchment basins for the rainwater outlet (Outlet 19), but detailed measures and cost planning only occurred during implementation. The following outputs were financed at the end:

- Lot 1: Construction of pumping station 19 with a capacity of 5.1 m³/s, including a retention basin (1,800 m³) and another basin for storing the first flush of wastewater from the rainwater sewer at the beginning of a rainfall event. The outlet to the sea was implemented in the same construction contract but was financed from the city of Batumi's own funds as agreed.

- Lot 2: Construction of the 1.5 km long main rainwater collector Javakhishvili.

- Lot 3: Construction of the 1.7 km long Giorgi Brtskhinvale rainwater collector and an additional 1.4 km of connection and service lines. Additionally, the city of Batumi constructed or rehabilitated further rainwater collectors with its own funds in accordance with the program and agreement.

Before the implementation began, Batumi was regularly plagued by severe flooding, resulting in large volumes of water standing in the city for extended periods. Official statistics on flooding frequency are not maintained by the city administration. However, according to estimates from the Batumi city administration, BTS, and surveyed households, flooding has significantly decreased, particularly in previously heavily affected areas that households referred to as "swamp areas." All parties confirmed that flooding in the project area has significantly reduced since the commissioning. During heavy rainfall events, water masses now drain quickly and efficiently.

Aspects of the infrastructure that require improvement include the currently non-functional SCADA system (Supervisory Control and Data Acquisition) at pumping station 19. This software system is crucial for real-time monitoring, control, and management of the facilities. BTS has confirmed this issue and has assured a prompt resolution. Additionally, sand accumulates in pumping station 19, necessitating regular and labor-intensive cleaning to ensure the long-term efficiency of the system.[1] BTS is also aware of this problem, and appropriate resources are being allocated and implemented to ensure a sustainable solution.

[1] This problem is technically difficult to avoid due to the cobblestones embedded in sand in the relevant urban area.

Indicator 2: Extraneous water generally refers to water that is not located where it is intended. In this context, it refers to water that unintentionally infiltrates the sewer system (e.g., groundwater entering through leaks or unwanted rainwater inflow), mixes with wastewater, and drains together. Extraneous water can drastically increase the incoming wastewater volume at the treatment plant, potentially exceeding the plant's capacity multiple times, thus posing an unnecessary economic and ecological burden. Before the commissioning of the rainwater collectors and pumping station, the high inflow of rainwater into the urban wastewater system regularly led to overloading of the treatment plant. By separating the rainwater and wastewater systems, the dilution of wastewater by rainwater, which leads to inefficiencies, was to be reduced, thereby preventing overloading of the treatment plant. The indicator measures the dry weather flow, i.e., the volume of water flowing in the sewer after a prolonged period without the influence of rainfall, and thus serves as a supplementary measure to determine whether rainwater connections have been decoupled from the wastewater system and redirected to the new rainwater system. Before the construction measures began, the inflow of extraneous water was estimated at 120 - 150% of the dry weather flow. After the commissioning of the financed infrastructure, this was reduced to 70 – 100% of the dry weather flow. Thus, while the inflow of extraneous water could not be reduced to the targeted extent, it was still significantly decreased. This reduction can plausibly be attributed to the fact that a large number of rainwater connections were redirected to the rehabilitated rainwater channels as part of the project. The failure to meet the target value at the time of the final control was, according to the implementer, due to the continued existence of damaged wastewater pipes that are still connected to the sewer system and through which groundwater is entering the system. BTS claims to be continuously working to decouple the entire rainwater system from the sewer system to further reduce the inflow of extraneous water to the treatment plant. Therefore, the lack of target achievement for Indicator 2 is primarily due to factors outside the project's measure package.

Indicator 3: Chemical measurements of the concentration of coliform bacteria (Escherichia coli) and enterococci at the sea outlets of the wastewater system at the time of the final control show that the bathing water quality at those locations where the rainwater infrastructure was implemented has significantly improved. The discharges affected by the infrastructure measures of the financial cooperation project showed excellent water quality in past examinations. However, during the evaluation, no samples could be taken for the discharge values at the outlet of the treatment plant, as the sampler was not functioning (indicating maintenance deficiencies). Therefore, the assessment is based on data collected before 2024. The reported improvement is partly due to the separate rainwater system, which collects rainwater, filters out coarse contaminants, and appropriately discharges surface water into the sea. Additionally, it is due to a reduction of wastewater in the rainwater system. It is critically noted that in some areas outside the immediate project area, the separation of wastewater and rainwater sewer systems has not yet been fully achieved, and therefore untreated wastewater continues to reach the sea at some outlets, negatively impacting bathing water quality, especially during the high tourism season. Near the mouths of the Chorokhi and Mejinistskali rivers and the Shilin Channel, there are also frequent exceedances of the limits, which, according to project officials, are most likely due to inflow from the rivers. In conclusion, it can be stated that within the intervention area, the inflow of untreated water has been significantly reduced due to the measures taken, thereby fundamentally improving bathing water quality. Seasonal impairments of bathing water quality are attributable to factors outside the project's influence.

Since the inflow of extraneous water and bathing water quality are of lesser importance for achieving the module objective than Indicator 1, they receive less weight in the effectiveness assessment. In summary, it can be stated that the project measures of BAT III for rainwater management were largely effective. The improvements in the flooding situation and bathing water quality (see overarching effects) are beneficial for the entire population of Batumi, particularly in the direct financial cooperation project area, and are non-discriminatory for all residents. By strategically selecting the project location, a neighborhood that is particularly affected by flooding was supported and can therefore be considered disadvantaged and vulnerable. The project has clearly contributed to achieving the module objective.

Women are often responsible for household management in the intervention area and are thus significantly affected by the floods. The project had gender impacts through improved protection. During the evaluation mission, it was noted that many women are employed at the operator BTS, particularly in administration; however, no women work in the annually re-tendered rainwater department. This is because the work of cleaning the channels and maintaining the entire infrastructure, especially during flood events, is traditionally carried out predominantly by men. The correct sizing of the systems for effectively managing water volumes during heavy rainfall events was an important internal success factor.

Quality of implementation

The implementation of the project was the responsibility of a specially established working group (Project-Executing Agency, PEA) within the city administration of Batumi. To support the city administration in planning, tendering, construction supervision, and acceptance, as well as during the start-up phase of the investment measures, an international implementation consultant was engaged. This consultant took over the planning and design services, enabling efficient development of a comprehensive concept and prompt tendering and implementation of the measures. Construction supervision was also carried out by an implementation consultant, whose procurement was internationally tendered in accordance with the financial cooperation procurement guidelines. The tasks of the implementation consultant had to be re-tendered due to inadequate performance. The services of the subsequent implementation consultant were deemed good by the implementer.

Despite minor conceptual improvements, the quality of the inspected infrastructure is mostly rated positively. The module was implemented by the project implementer and BTS with sufficient personnel and administrative capacities. The implementation consultant provided very good support. Organizationally and technically, BTS was the natural and, despite annual tenders, de facto only operator for the planned measures. The quality of implementation was good. Further improvements in the operation of the facility are to be achieved through the ongoing accompanying measures of Phase V (see Sustainability).

Unintended effects (positive or negative))

There were no indications of deficiencies in occupational safety or cleanliness/environmental impacts at the inspected sites. No unintended negative or positive effects were identified in the project.

Rating summary:

The frequency of flooding in the urban area has decreased, thus achieving the module objective. The bathing water quality has also improved due to the measures. Limitations exist regarding the reduction of extraneous water inflow into the sewer system, whose target value has not been achieved in recent years or has only been partially achieved. The implementation was of good quality. Overall, the positive aspects clearly outweigh the negatives, so the effectiveness of the project is considered (still) successful.

Effectiveness: 2 (both phases)

Efficiency

Production efficiency

At the beginning of the implementation phase, the estimated cost for the planned investment program was €14.5 million. In reality, there were significant cost increases, resulting in total investments ultimately reaching €18.44 million. This increase was primarily due to additional measures related to pumping station 19 and, in particular, the outlet to the sea, which were included and billed through amendments to the ongoing construction contract for Lot 1. Consequently, the resulting cost increases only slightly negatively impact the assessment of efficiency. The additional services were fully financed through local funds. Additional costs arose from the re-tendering of the implementation consultant due to inadequate performance. Despite these challenges, the increased funds and the proposed technical solutions represented an effective and efficient concept for eliminating the main bottlenecks in the drainage system of the central urban area.

Overall, approximately €200 per capita was invested in the rainwater measures, benefiting around 70,000 people in the center of Batumi (population 2020). The Ninoshvili collector does not yet direct rainwater to pumping station 19 as originally intended, due to ongoing construction along its route. This slightly reduces the original number of beneficiaries.

The rainwater component was divided into three construction lots: Lot 1 for a new pumping station with various retention basins, Lot 2 for the Javakhishvili collector, and Lot 3 for the Giorgi Brtskhinvale collector, including the connection lines. The division into these three lots also appears sensible in retrospect.

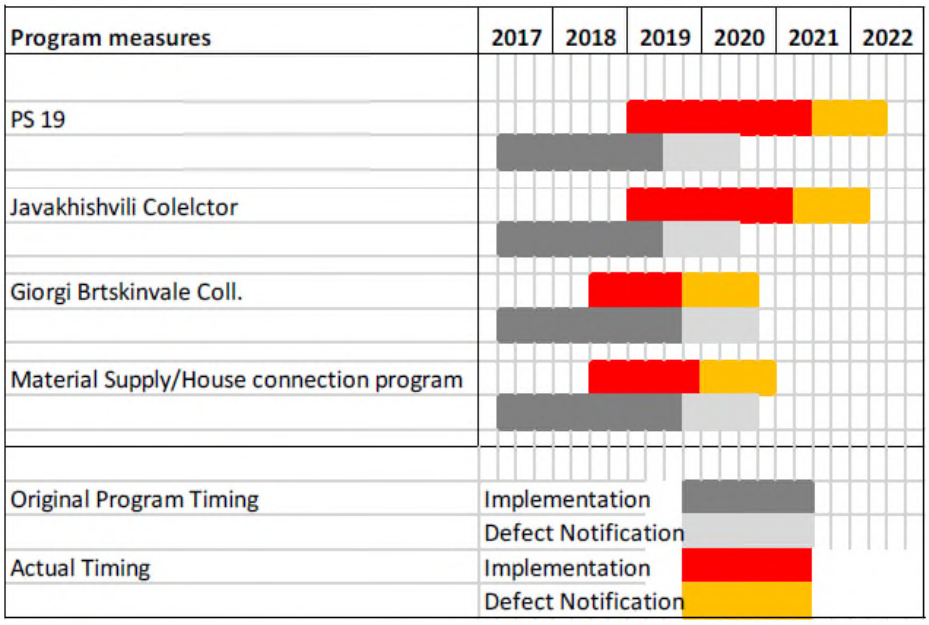
Consulting costs amounted to 15.9% of the investment sum. The reason for this relatively high share is that the consulting services had to be re-tendered due to the inadequate performance of the first consultant. The costs for the second consultant would amount to 12.2% of the investment sum. This amount is acceptable but still rather high. The high consulting costs diminish production efficiency. Additionally, the amendments were quite high in the various lots, with an increase of 66% for Lot 1 and 30% for Lot 2. These are related to the complexity of the construction services in the city center.

The main collectors Mtisdziri, Sulaberidze, and Shavsheti could not be implemented under the KfW loan/grant financing. The reason for this was that the design and tender documents were of insufficient quality, and the costs for other investments were significantly higher than estimated.

The measures to strengthen the main collectors were complemented by a component aimed at separating surface water from the wastewater disposal in the backyards of houses, which increased the effectiveness and efficiency of the measures. This initiative was largely carried out by the city or BTS.

The execution of the works extended over a period of two and a half years, which is considered appropriate for the implementation of the project. However, the start of implementation was delayed by about two years due to the original implementation consultant providing inadequate planning documents. Additionally, restrictions due to the COVID-19 pandemic and the underestimated impacts of construction work on traffic conditions led to further delays. Particularly during the tourist season, there was a slowdown in construction progress. The planned and updated implementation periods are listed below.

Figure 2: Representation of the Temporal Shift of Major Investment Measures.



Allocation efficiency

The provided financial cooperation grant is considered a suitable instrument due to the supplementation and expansion of the original development loan in the area of rainwater management. Due to the additional need of the city of Batumi for rainwater infrastructure, this financial support is complementary to Phase I of rainwater management as well as to the planned own contribution of the city of Batumi. Sole financing of the infrastructure by the city of Batumi would have been financially unfeasible. For this reason, the financial cooperation grant was sensible and efficient for this project.

The facilities were adjusted in optimal size and function according to the available resources. The selected technology allowed for efficient implementation, according to technical experts.

In the first phase of the project evaluated here, a financial cooperation-funded rainwater master plan for the city of Batumi was created, which laid the foundation for efficient planning and implementation of the investment measures. Given previous flooding and heavy rainfall events, the city of Batumi independently awarded and implemented acute rainwater measures from its own funds during the preparation and planning phase. With the

project evaluated here, a meaningful package of measures was agreed upon with the city of Batumi based on the rainwater master plan, which encompasses both rainwater components and aligns them sensibly.

Rating summary:

Higher costs, a longer duration, and relatively high consulting costs diminish the production efficiency of the project, which is why the efficiency is overall rated as only partially successful.

Efficiency: 3 (both phases)

Impact

Overarching (intended) developmental changes

The adjusted goal within the framework of the evaluation was to increase climate resilience and improve the living conditions of the population in Batumi and the expanded urban area. No indicators were formulated for measuring goal achievement, with the argument that the achievement of the module objective directly contributes to the overarching objective. This assumption is appropriate and plausible in this case – a reduction in flooding frequency. Furthermore, it is plausible to assume that an improvement in the rainwater system can have slightly positive effects on the health situation of the urban population as well as on revenues from tourism and other economic activities. However, the attribution gap is large in these cases, with a correspondingly small expected effect size. Due to the lack of available secondary data on the health situation for Batumi, corresponding indicators cannot be used in the evaluation. Instead, the assessment of goal achievement is primarily based on qualitative impressions from on-site surveys and plausibility considerations. Additionally, the change in bathing water quality (see Effectiveness) is considered as an aspect that influences quality of life and health situation for the assessment of goal achievement.

Contribution to overarching (intended) developmental changes

As outlined in the chapter on effectiveness, the measures of the project have led to a reduction in flooding frequency and relief of the sewage system. Of the 13 previously identified flood hotspots, only 2-3 areas now experience occasional and short-term flooding. During the evaluation mission, residents reported significant improvements compared to the situation before construction began. Previously, water regularly caused damage to furniture and other personal belongings, posing significant challenges for residents. Business owners shared similar experiences; they reported market stalls being washed away before the construction measures, resulting in substantial financial losses. These positive feedbacks demonstrate the effectiveness of the measures implemented and highlight the importance of flood protection for the quality of life of the population.

In the household surveys, there were exclusively positive responses regarding the quality of bathing water. No illnesses related to bathing visits were reported. However, it should be noted that there were no indications before the measures that bathing visits were associated with subsequent illnesses. Scientific data regarding health development before and after the measures were not collected by the authorities.

A challenge for water quality is the rapidly growing tourism in Batumi. More and more large hotels are discharging their wastewater directly into the sea due to delays in the expansion of the sewer network and the treatment plant, without being connected to the municipal wastewater system. During certain wave conditions, this untreated wastewater can reach bathing areas that benefit from financial cooperation funding. This problem has been increasingly observed, especially after the high season in August 2024.

The project has contributed to increasing the climate resilience of the city of Batumi. Since the planning phase of the project, heavy rainfall events in the region have been increasingly documented, highlighting the urgency of measures in the area of rainwater management. Given the ongoing climate change, it is expected that these heavy rainfall events will continue to increase in Batumi and the surrounding region. This leads to an increased risk of flooding, threatening both urban infrastructure and the well-being of the population.

Contribution to overarching (unintended) developmental changes

According to various stakeholders, the improved bathing water quality and reduced flood risk significantly promote the entire economy. While systematic studies that support these assessments with objective figures are not available, it seems plausible that the measures contribute to the long-term stability and growth of the economy, including the tourism sector and the real estate sector, thereby promoting sustainable economic development in the region.***Rating summary:***The impact of the project is clearly evident. The measures have plausibly led to an improvement in the living conditions of the population in the catchment area of the rainwater component and have also increased climate resilience. In addition to a decrease in flooding frequency as the dominant project effect, anecdotal evidence points to increased tourism potential and positive effects for the local economy. Positive health effects seem plausible but cannot be conclusively proven due to a lack of available data. Due to these diverse results, the impact is assessed as successful within the framework of the evaluation.

Impact: 2 (both phases)

Sustainability*Capacities of persons concerned*

The city administration has sufficient personnel and financial capacities. The expertise of the staff is assessed as good. The same applies to the communication and cooperation between the city administration and the operator of the rainwater infrastructure, BTS.

BTS also has sufficient capacities and is able to sustainably manage potential risks. BTS employs a total of 522 staff members responsible for water supply and wastewater disposal, including a special team of 80 people responsible for the operation and maintenance of the rainwater system, including the main pumping station PS19. This staffing capacity is considered sufficient to efficiently perform necessary tasks such as cleaning sand traps, removing sediment at pumping station 19, and emergency responses. The existing machinery and equipment base is also deemed adequate.

Recruitment at BTS for the area of rainwater management is also functioning efficiently. The human resources department oversees the selection of new employees, and there is currently high demand for positions, so a lack of qualified applicants is not evident. Newly hired staff undergo a six-month probation period, ensuring sustainable selection. Although there have been personnel fluctuations due to higher salaries in the private sector, continuity of staff has largely been ensured through the annual awarding of recurring contracts in the area of rainwater management at BTS.

A critical point is the current lack of a standardized onboarding training program. However, the current accompanying measure for Phase V plans a more institutionally sustainable approach: a comprehensive job description is to be developed with BTS and institutionalized. Furthermore, an independent and permanent training approach is to be pursued: with the introduction of state certifications for water sector-specific training programs, training courses are to be prepared and implemented in collaboration with Batumi State University. These will be specifically tailored to the needs of BTS but will be accessible to all trainees in the sector after certification (without further engagement from the accompanying measure). After successful certification, the costs of the training courses will be covered by the Georgian Ministry of Education. In addition to BTS staff, employees of the Ajara Water Alliance and rural community providers will also be able to participate in the training courses. This new approach adequately addresses the current challenge of a lack of sustainable knowledge management.

Contribution to support for sustainable capacities

The measure has significantly contributed to ensuring that the project is capable of operating long-term in personnel, institutional, and financial terms. The capacities of the target group and the project implementer, particularly BTS, have been strengthened to secure the positive effects of the investments in the long term. The accompanying measure has comprehensively supported BTS in numerous areas, leading to measurable improvements. This has not only increased the efficiency of rainwater management but also strengthened the institutional resilience of BTS.

In Phase V of project, which was already in implementation at the time of the evaluation, further contributions to optimizing BTS services are planned, particularly for new topics such as the aforementioned training and education concept. At the same time, new technologies are being utilized, which require a higher demand profile from BTS staff and can thus be addressed by the accompanying measure. However, the ongoing presence of the consultant poses a potential risk that partners may feel less pressure to take control of their strategic direction. An exit strategy should therefore be continuously discussed critically. At the same time, it was noted during the

evaluation that the accompanying measure training for the project evaluated here is an integral part of current operations and has been positively assessed accordingly. Furthermore, due to the newly financed technologies, there remains a need for accompanying support.

Durability of effects over time

Currently, adequate staffing and budget allocation ensure a functioning operation and regular maintenance. However, a recurring challenge for operations is the pollution of rainwater inlets on the street or household connections. This repeatedly leads to clogging of the system and overloads at pumping station 19. From the perspective of the evaluation, it would therefore be advisable to conduct awareness campaigns with the local population in the affected areas of the collectors to reduce pollution and resulting clogging.

While there is currently an effective emergency service that allows for a quick response to operational problems, a more comprehensive flood monitoring system does not yet exist. Accordingly, the current accompanying measure plans to implement systematic documentation of flooding and operational conditions of the facility in the Strategic Asset Management System (based on GIS). The goal is to draw systematic conclusions from better documentation, e.g., for targeted maintenance measures (e.g., cleaning or renewing/extending problematic sections of the rainwater system).

Financially, BTS has been profitable for the first time since 2023, allowing the company to increase its share of capital and operating expenses (CAPEX and OPEX) across all departments. However, since the rainwater department is outsourced from the BTS budget, its sustainable financing depends on the annually determined budget of the city administration. The annual re-tendering of rainwater management promotes sustainable and effective management practices. In recent years, BTS has continuously won the tenders. The city's OPEX budget was long insufficient to fully cover maintenance needs but has been increased from 1.7 million Lari in 2022 to 4.5 million Lari in 2024, with a further increase to 5.0 million Lari in 2025. This budget increase is currently seen as a sufficient basis for sustainable operation and efficient maintenance by BTS, enabling quick responses to heavy rainfall events.

The investment budget is also considered adequate. The city is currently financing additional measures independently of external donors to protect the entire city and its outskirts from flooding. Self-financed measures also divert rainwater from the surrounding mountains into the sea. Thus, the city mobilizes the necessary capital for future investments to further improve the flooding situation in Batumi.

A challenge and potential risk for the long-term financing of operations, maintenance, and expansion investments is the fact that rainwater has not yet been integrated into the tariff system for water/wastewater, and the costs of the rainwater system are therefore financed from the general budget. However, it is questionable whether a tariff-based financing of the rainwater system would be politically feasible. The flood risk only affects a limited part of the population, so a widespread introduction of a rainwater tariff could encounter acceptance issues. Introducing a tariff only in the affected urban areas, on the other hand, carries the risk of unequal treatment. Regardless of the scope of application, from the perspective of the evaluation, the introduction of a tariff system – or alternatively the increase of existing drinking water supply and wastewater disposal tariffs – is seen as an important step to secure sustainability, despite the political difficulties.

Another sustainability risk is posed by the rapid growth of Batumi and the accompanying need to further expand municipal infrastructure. This growth complicates a multisectoral, planned approach to addressing infrastructural needs. The mayor plans to present a corresponding development plan by the end of 2025 to meet these requirements.

Additionally, the rapidly growing tourism sector places significant pressure on urban infrastructure. To alleviate this burden, discussions are currently underway regarding the introduction of a tourism tax. Although the details of the structure and implementation of this tax have not yet been established, it would help mobilize urgently needed funds. These could also be directed towards the expansion and sustainable financing of rainwater management to prepare the city for the growing challenges.

Rating summary:

The project has succeeded in strengthening the capacities of the operator of the rainwater infrastructure and the city administration. Currently, the financial, personnel, and technical resources of the operator's rainwater

department are sufficient to ensure a functioning operation and maintenance. However, the ongoing growth of the city population and the tourism sector present structural challenges for Batumi and are already leading to localized overloads of the water infrastructure.

For the long-term securing of positive effects in the area of the rainwater system, the structured expansion of infrastructure based on a comprehensive development plan, as well as the introduction of a rainwater tariff or adjustment of the existing water tariff system to broaden the financing base, are of high relevance. Despite the remaining risks to the durability of the effects, the sustainability of the project is overall assessed as still successful within the framework of the evaluation.

Sustainability: 2 (both phases)

Overall rating: 2

The project is characterized by high relevance. The implemented approach aligns with the priorities of Georgia and addresses the needs of the target group. The project also integrates meaningfully into existing structures and is complementary to other financial cooperation measures in the area of wastewater disposal in the target region. A significant reduction in the frequency of flooding has been achieved, fulfilling the primary objective of the project. Ongoing deficits in limiting inflow of extraneous water into the sewer system are primarily outside the direct influence of the project and only slightly diminish its effectiveness. The quality of implementation was good. The increased flood protection and improved bathing water quality have enhanced the living conditions of Batumi's residents and increased resilience to the impacts of climate change. Accordingly, the project has contributed to the overarching development policy objectives.

Higher costs, a longer duration, and relatively high consulting costs diminish efficiency, which is overall assessed as satisfactory.

The project has succeeded in strengthening the capacities of the operator of the rainwater infrastructure and the city administration. Currently, a functioning operation and maintenance of the financed infrastructure can be ensured thanks to solid staffing and resource allocation. However, there are risks to the durability of the achieved positive effects. The introduction of a rainwater tariff or an increase in existing tariffs to cover the costs of rainwater disposal is considered important for long-term sustainability. Overall, the expectations for the project have been met. It is therefore rated as successful with a grade of 2 (both phases).

Contributions to Agenda 2030

The project aligns with the fundamental principles of the 2030 Agenda and contributes to several sustainability goals. With increased protection against flooding, it promotes sustainable urban development in Batumi (SDG 11) while simultaneously strengthening the resilience of the population to the impacts of climate change (SDG 13). At the same time, the project has contributed to an improvement in water quality (SDG 6), with positive social and ecological effects (SDG 14). The measures were inclusive in the sense that the entire population of the affected urban area benefits from better protection.**Project specific strengths/weaknesses and general conclusions/lessons learned** Strengths and weaknesses of the project included:

- The clear division of tasks between PEA/BTS and good coordination with the city administration by the implementation consultant with the rainwater department of BTS enabled effective and high-quality implementation of the project.
- The open design of the project concept allowed for the financing of priority measures for the effective expansion of the rainwater system, thus significantly contributing to the reduction of flooding frequency.
- The correct sizing of the systems for effectively managing water volumes during heavy rainfall events was an important internal success factor.
- The lack of a holistic approach to urban development in Batumi, particularly the inadequately planned expansion of the city and sealing of surfaces, may lead to further flooding in other parts of the city and overloading of the existing system in the future, potentially impairing the effects achieved by the project.
- The absence of a rainwater tariff poses a risk to the long-term sustainable operation and maintenance of the created infrastructure.
- The continued existence of damaged sewer lines diminishes the project effects regarding water quality.

General conclusions and lessons learned:

- The positive results of the project demonstrate that investments in the rainwater system can stimulate economic activities and generate positive environmental impacts, in addition to improved flood protection.
- The integration of a comprehensive rainwater management system in the development or expansion of the drinking water supply and wastewater disposal system is highly relevant in times of climate change to minimize flooding and flood risks while ensuring a viable wastewater management system. Early and comprehensive planning that envisions the parallel and coordinated development of the drinking water, wastewater, and rainwater systems not only increases the resilience of the city but can also significantly reduce costs for later adjustments and emergency measures.
- Introduction of a rainwater tariff for sustainable operation: The currently discussed introduction of a rainwater tariff (or alternatively an increase in existing tariffs for drinking water supply or wastewater disposal) would be an important factor for the long-term sustainability of the infrastructure's operation. The operator would be less dependent on potential budget cuts due to economic fluctuations and could continue to invest in preventive measures. Experiences from other contexts show that transparent and fair tariffs can raise public awareness of the importance of rainwater management and flooding.
- Utilization of an expanded flood monitoring system for systematic documentation of flooding and operational conditions of the facility in the Strategic Asset Management System.
- Pollution and clogging of rainwater inlets by debris reduce the efficiency of the rainwater system. Accompanying awareness-raising and sensitization campaigns have proven effective in raising public awareness of the importance of keeping rainwater inlets clean. The positive and appreciated project effects in the form of reduced flooding frequency can be strategically used to convince the public of the importance of regulated waste disposal.

The points mentioned above illustrate that an integrated approach to rainwater management not only contributes to preventing flooding but also promotes the sustainable development of the city. The implementation of the recommended measures and systems is considered crucial for the future resilience and efficiency of the city regarding rainwater management. The insights gained from the evaluation provide a foundation for further planning and implementation of measures to improve rainwater management.

Evaluation approach and methodology

Methodology of ex post evaluation

Ex post evaluations follow the approach of a rapid appraisal, i.e. a data-supported, qualitative contribution analysis resulting in an expert opinion. Effects are attributed to the project considering plausibilities, based on thorough analysis of documents, facts and impressions. This includes – if possible – the use of advanced technology (e.g. satellite imagery, online interviews, geocoding). There is a follow-up on possible conflicting information, attempting to eliminate inconsistencies and to base the rating on information that – to the extent possible – has been confirmed through different sources (triangulation).
Documents:
Report of the final control, final report of the implementation consultant, final report of the accompanying measure consultant, module proposal, monthly and quarterly reports of the consultant, Inception Report Phase V.

Data sources and tools of analysis:
Household surveys, BTS website and MIS

Interview partners:

Vice Mayor of Batumi, General Director of BTS, PEA Executive Committee, BTS (Department Director of Finance, Department Director of Wastewater/Stormwater, Head of Procurement Department, Head of IT Department, Head of Supervision Department, Head of Administration Department, HR Department, IT/Planning Department, Construction Department, Supervision and Monitoring Department, Billing Department, Drinking Water Laboratory, Wastewater Staff, Drinking Water Staff), City Administration (Head of Finance, Municipal Service Center, Architectural and Urban Development Department), residents (approximately 20 in various "flood hotspots"), Government of Ajara (Head of Tourism), implementation consultant (Team Leader and team), accompanying measure consultant (Team Leader and team).

The analysis of project effects is based on the theory of change defined at project appraisal and documented within the impact matrix, which may be updated for the purposes of the evaluation.

The evaluation report argues which factors contributed to the observed effects and why – as well as the probable extent of the project´s contribution (contribution analysis). The context of the project is taken into account concerning its influence on the results.
The conclusions are put into perspective regarding the availability and accuracy of the available data.
The framework of the evaluation is established by the evaluation conception.

This method provides a balance between cost and usefulness, generating evaluation findings with appropriate effort and expense. Also, it allows for a systematic success rating across the FC projects. Thus, an isolated ex post evaluation cannot fulfil the requirements of a scientific assessment in the sense of a strict causality analysis.

Following aspects caused limitations for the evaluation::
Missing data on health situation, missing data on flood monitoring, missing flood statistics.

Rating methodology

Projects are rated on a six-point scale for each of the OECD DAC criteria. 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 shortcoming

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

The overall rating on the six-point-scale is compiled by weighting all six 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 (“impact”) and the sustainability are rated at least “moderately successful” (level 3).

The annex to this report is available upon request (german only).

About this publication

Responsible:
FC E
Evaluation unit of KfW Development Bank
FZ-Evaluierung@kfw.de

KfW Bankengruppe
Palmengartenstraße 5-9
60325 Frankfurt am Main, Germany