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Reaching the Most Vulnerable: Scaling Up Service Delivery in Urban Water Supply and Sanitation

Cluster Evaluation Report

AFRICAN DEVELOPMENT BANK GROUP

January 2020

An IDEV **Project Cluster Evaluation**

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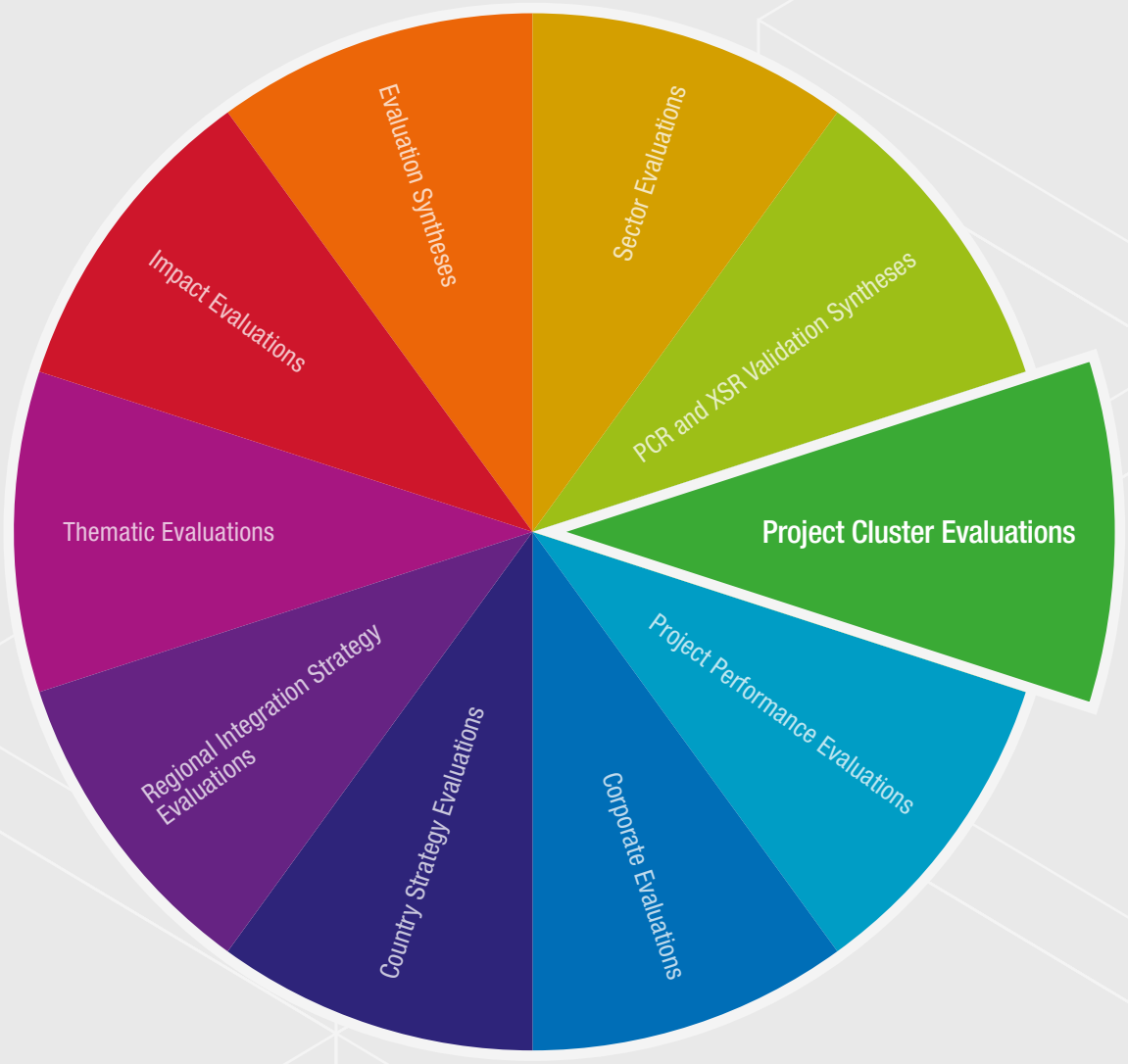

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An IDEV **Project Cluster Evaluation**

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Reaching the Most Vulnerable: Scaling Up Service Delivery in Urban Water Supply and Sanitation
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About the AfDB

The overarching objective of the African Development Bank Group is to spur sustainable economic development and social progress in its regional member countries (RMCs), thus contributing to poverty reduction. The Bank Group achieves this objective by mobilizing and allocating resources for investment in RMCs and providing policy advice and technical assistance to support development efforts.

About Independent Development Evaluation (IDEV)

The mission of Independent Development Evaluation at the AfDB is to enhance the development effectiveness of the institution in its regional member countries through independent and instrumental evaluations and partnerships for sharing knowledge.

Independent Development Evaluation (IDEV)

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Abbreviations and Acronyms

AfDB	African Development Bank
BOD	Biological Oxygen Demand
CSPs	Country Strategy Papers
DWSSP	Dar es Salaam Water Supply and Sanitation Project
EIRR	Economic Internal Rate of Return
ESIA	Environmental and Social Impact Assessment
FIRR	Financial Internal Rate of Return
IWRM	Integrated Water Resources Management
MDGs	Millennium Development Goals
M&E	Monitoring and Evaluation
MoWSSP	Monduli District Water Supply and Sanitation Project
NRW	Non-revenue Water
ONAS	National Sanitation Authority of Senegal
OVI	Objectively Verifiable Indicator
PPP	Public-Private Partnership
RMCs	Regional Member Countries
UWS	Urban Water Supply
UWSS	Urban Water Supply and Sanitation
WACC	Weighted Average Cost of Capital
WSS	Water Supply and Sanitation
WSSIS	Water Supply and Sanitation and Institutional Support Project

Executive Summary

Introduction and Evaluation Purpose/Scope

This report synthesizes the key findings of evaluations of 15 Urban Water Supply and Sanitation (UWSS) projects, approved and implemented in 2001-2016 by the African Development Bank Group (AfDB, or "the Bank").

This cluster evaluation aims to: (i) assess the relevance, effectiveness, efficiency and sustainability of UWSS projects; and (ii) draw lessons from what worked and what did not work.

This evaluation report is expected to inform the design and implementation of future UWSS projects under the Bank's High 5s priorities related to improving the quality of life for the people of Africa.

The Bank approved 76 UWSS projects (amounting to UA 586 million in net loans and grants) in the period 2001-2009.

Fifteen UWSS projects, with a total net approval amount of UA 342 million, were purposively selected for this cluster evaluation. These projects are located in 12 Regional Member Countries (RMCs) as follows: one each in Cameroon, Republic of Congo, the Comoros, Ethiopia, Ghana, Kenya, Mauritania, Mauritius and Senegal; and two each in Morocco, Mozambique, and Tanzania.

Project Cluster Performance

Development Outcomes

Overall performance

The cluster of projects comprises four urban sanitation only projects, 10 UWSS projects, and one water supply only project. All the cluster projects were rated satisfactory on their development outcomes[1], with the exception of the Senegal and Mauritania projects.

The project cluster objectives were relevant, but there were weaknesses in some design aspects, such as risk assessments and the choice of technologies used.

The objectives of the project cluster were aligned with the water supply and sanitation demands and priorities of the 12 project countries.

The project cluster's objectives aligned with the Bank's priorities and strategies, which view water supply and sanitation as a crucial component of development.

As can be deduced from the extensive demand for water supply and sanitation, the projects were coherent.

National laws, regulations and tariffs ensured the inclusion of poor and vulnerable groups such that they could effectively access and benefit from water supply and sanitation projects through social tariffs, stand pipes and public latrines.

Project designs had some weaknesses, including (i) the lack of a holistic strategy to integrate all infrastructure activities into a single development package; and (ii) some risks were not adequately addressed including water tariff adjustments, the quality and reliability of water sources, the maintenance and sustainability of projects, the cost of energy, institutional capacity, private operators' capacity, population and livestock growth, and the quality of existing distribution/collection networks.

In addition, some project designs were driven by predetermined technologies rather than technology choices to address needs and best value for money.

Significant Achievement of Objectives

There was a significant accomplishment of project water outputs, but uneven performance in improving access (outcomes) to sustained, quality UWSS services. All projects, except for those in Kenya and Senegal, accomplished their expected outputs. However, the evaluation found limited functionality of water infrastructure, as some of the water supply systems that were installed, rehabilitated or extended were not used optimally or had ceased to function. In addition, projects exhibited uneven performance in improving access to urban water, and limited integration of water projects with non-water related activities.

With regard to sanitation, although there were some success stories in wastewater management, sanitation in general remained a challenge for most project countries. For instance, in two of the 10 projects that included water and sanitation components, achievement of the sanitation components was missed completely, that is, in Tanzania MoWSS and Ethiopia. Three other projects (Kenya, Mozambique Niassa and the Comoros) only partially accomplished the required sanitation components.

The cluster projects were economically viable. Nevertheless, they experienced substantial implementation delays.

Based on the Economic Internal Rate of Return (EIRR), the projects were found to be viable economically. Data constraints limited the evaluation of the projects' Financial Internal Rate of Return (FIRR). However, from the perspective of the public utilities, the projects' financial viability was unsatisfactory, mainly due to low revenue generation, high investment and operating costs.

The cluster projects did not follow their implementation timetables nor their initial cost plans. Project loans took 35 to 103 months to fully disburse, with an average of 66 months, compared to a target of 49 months. Eight projects experienced cost underruns of 3 to 19 percent, mainly attributable to project downscaling. Implementation delays were mostly due to slow loan ratification for instance in Kenya, Mozambique and Senegal; procurement procedure issues; poor quality at entry; delays in the preparation of tender documents after loan approval (the Comoros); poor performance of contractors (Kenya); or slow payment of government counterpart funds for instance in Kenya, Mauritania and Tanzania.

Satisfactory Sustainability of UWSS Project Benefits

All projects' benefits, except for Mauritania, Senegal and the Comoros, were found to be sustainable. Financial viability was the weakest sustainability sub-criterion.

The projects displayed viable technical soundness; realistic capacity for institutional sustainability; efficient political support and a positive government environment; effective ownership and partnership sustainability; satisfactory environmental and social sustainability; and resilience to external factors.

The projects experienced weak financial viability due to the poor performance of UWSS utilities, a risk that was not mitigated. Recurrent challenges related to (i) inadequate staff, human resources capacity and logistics; (ii) a high level of non-revenue water and (iii) incomplete metering installations. Other challenges included (i) high operating costs; (ii) poor coordination; (iii) mismanagement of resources; (iv) the lack of cost-sharing arrangements; and (v) failure to collect debts.

Project M&E Performance

Limited Monitoring and Evaluation (M&E) systems

Four of the projects did not incorporate M&E into their initial designs, that is, in Mauritius, Tanzania DWSS and MoWSS, and Kenya. In the other projects, the planned M&E systems were not operationalized or used effectively.

The Objectively Verifiable Indicators (OVI) of key project outcomes were reported adequately. However, three of the projects (Ethiopia, Mozambique Institutional and Mauritania) did not generate sufficient data for their performance indicators to be assessed, while four other projects (Morocco 8, Senegal, Mauritania and Tanzania DWSS) provided incomplete baseline data. In other cases, the reliability of some of the M&E data left much to be desired, with specific operational data unavailable for most of the projects.

Key Issues and Lessons

Quality of feasibility studies

Lesson 1: Project design requires a sound preparatory phase, with adequate and updated feasibility studies, for successful subsequent implementation.

- Inconsistent quality of project design was a challenge that led to partial implementation of project outputs and limited spatial coverage. Each project in the cluster grew out of technical/engineering and feasibility studies. However, the poor quality or the outdated nature of some feasibility studies, such as those of Kenya Nyahururu and Ethiopia, created inconsistencies, which necessitated subsequent modifications to project engineering designs. These extensive modifications to project scope due to design errors and exogenous factors resulted in the use of sub-optimal solutions that adversely affected project efficiency and their physical targets.

- Modifications increased the costs of water supply, which consequently limited implementation of the sanitation components for wastewater and solid waste management. The feasibility studies also became obsolete due to the prolonged time lag between the prefeasibility stage and the effective dates of projects.

- Risk analyses were not updated during the project cycle and the following risks were not adequately addressed: (i) reliability of supply and quality of project inputs; (ii) access to reliable power to run pumps and treatment equipment; (iii) lack of appropriate and effective cost-sharing mechanisms; and (iv) weak commercialization of services and their by-products. In addition, high levels of non-revenue water and free dumping had negative impact on the financial capacity of the associated agencies.

Integrated urban water cycle and sanitation value approach strategy

Lesson 2: UWSS projects need an integrated water cycle and sanitation value-chain approach if they are to maximize water supply results and resolve sanitation issues.

- An appropriate balance is required between investing in water, sanitation, hygiene and capacity development components to enhance achievement of the desired results from urban water interventions. The limited achievement of project outcomes in urban water development was partly due to the failure to integrate water production with distribution, as was the case in Mauritania, Tanzania Monduli, and Kenya, and with sanitation as was the case in Ethiopia and Mauritania.

- Moreover, urban sanitation requires an integrated approach through its three main pillars, namely (i) wastewater collection and treatment; (ii) fecal sludge management (compost, biogas and electricity); and (iii) commercialization. This value-chain approach remained limited in many of the Bank's projects such as in Mauritius, Senegal and Morocco Ninth, even if some good practices, albeit limited, emerged from some projects such as in Mauritius and Senegal. The re-use of treated effluent for irrigation purposes in Mauritius improved the overall water balance in a project area where there was a shortage of irrigation water.

Use of "state-of-the-art" technologies in UWSS

Lesson 3: The use of "state-of-the-art" technologies in UWSS is only relevant if they meet needed technology requirements and there is adequate availability of spare parts and relevant expertise.

- The urban sanitation project cluster used state-of-the-art technologies such as activated sludge process, aerated lagoons and waste stabilization ponds. Intensive treatment technologies used for urban sanitation, such as activated sludge process with biological nutrient removal and tertiary treatment with rapid gravity sand filters and UV disinfection, were found to be appropriate for Mauritius, while lagoon-based treatment plants were found to be appropriate for Morocco.

- However, some of the selected technologies proved to be ill-suited to local conditions, such as in Senegal and Congo. In Dakar, Senegal, where land availability is an issue, the appropriateness of using an activated sludge process was questionable as it did not fit well with the local context. It presented risks to the power supply, costs of operation, and variations in effluent loadings. In Congo, although the choice of technology was appropriate, the system failed to function effectively due to lack of sufficient capacity to operate and maintain the plant. Consequently, the discharge of excreta into the environment was still common practice.

- Regarding water supply, some RMCs, such as the Comoros, experienced difficulties in operating the built water system. In addition, the availability of spare parts and subsequent required expertise was challenging for a number of water systems, such as in Ethiopia, Mozambique, Senegal and Mauritania.

Sustaining UWS project benefits

Lesson 4: Since UWS projects can be undermined by utilities' poor performance (technical, financial and commercial), addressing utilities' shortcomings is a necessary prerequisite to sustain the project benefits.

- The main challenge that was found to compromise the sustainability of the benefits of UWS projects relates to inadequate and unaddressed performance of utilities. Poor performance of utilities was evident in (i) high levels of non-revenue water; (ii) inadequate staff, human-resources capacity and logistics; and (iii) unreliable services.

- Utility performance in the project cluster was generally poor, with a large gap in water service coverage and relatively high non-revenue water losses, mainly in the larger utilities as was the case in Mauritania and Tanzania. In addition, 54 percent of the water providers failed to cover

their operating costs. The inadequacy of tariff revenues was a concern in some projects such as in Tanzania, Senegal, Mozambique and Kenya), and sometimes required huge subsidies such as in Senegal and Kenya, due to non-compliance with tariff adjustment schedules. Lastly, only two of the 13 utilities reviewed claimed to provide water 24 hours a day, while only four of the 15 projects provided wastewater collection and treatment including Congo, Morocco, Senegal and Mauritius.

Reducing negative environmental impacts

Lesson 5: UWSS projects that include wastewater, sludge and solid treatment plant components need systematic mainstreaming of in-depth environmental and social impact assessments to reduce the negative environmental impacts.

- The systematic mainstreaming of Environmental and Social Impact Assessments (ESIAs) in sanitation projects, particularly those related to wastewater treatment plants, is more important than an inefficient environmental categorization strategy. The Bank did not integrate critical environmental and social requirements at the appraisal phase, which would normally be recommended for such projects.

- Inappropriate environmental categorization of projects with wastewater, sludge and solid treatment plants in Ethiopia, Senegal, Congo, Morocco, Mauritania, Mozambique Niassa and Tanzania MoWSS, led to insufficient environmental assessment, which resulted into negative environmental impact. Despite the availability of national environmental plans, laws and policies, the cluster projects except Mauritius and Morocco, did not dispose effluent in accordance with the requisite standards.

- Due to insufficient or lack of fecal sludge and wastewater treatment in Congo, Ghana, Senegal and Mauritania, project countries continued to dispose raw fecal sludge and untreated wastewater generated from urban communities into the natural environment, leading to significant negative environmental impact.

Fostering the achievement of outcomes in UWSS projects

Lesson 6: UWSS projects need to address service delivery and behavioral change issues if they are to maximize the impact of the built infrastructure.

- The success of the Bank's UWSS interventions is measured more in terms of the number of people who gained access to water (compared with the target) than the systematic quality of services and the contribution to development objectives. This led to sub-optimal investments, inadequate focus on the beneficiaries, and a lower prioritization of self-monitoring.

- Limited revenue collection and human resource capacity of water providers adversely affected the financial health of the utilities as well as the reliability of their service delivery.

- Finally, some planned outcomes required profound behavioral change among stakeholders, especially the beneficiaries. This failed to occur in the cluster projects. Despite awareness campaigns undertaken by the projects, much still needs to be done in terms of raising awareness and changing behavior related to (i) hand-washing with soap (Mozambique); (ii) improved water storage conditions (Mozambique); and (iii) observing good hygiene practices (Congo, the Comoros and Cameroon). Behavioral change is a long-term process, which cannot be achieved within the context of the limited actions of the cluster projects.


SERVICE

Introduction

This report synthesizes the results of a cluster evaluation of 15 Urban Water Supply and Sanitation (UWSS) projects funded by the African Development Bank Group (AfDB, or "the Bank"). The cluster evaluation assessed the performance of the projects in order to draw lessons for future policy and practice in designing and implementing UWSS projects. The assessment is based on the OECD-DAC[2] evaluation criteria of relevance, effectiveness, efficiency and sustainability.

AfDB-funded Urban Water Supply and Sanitation Projects

The water sector has long been a priority for the Bank as is recognized in (i) the 2007 High-Level Panel Report on "Investing in Africa's Future"; (ii) the Bank's Ten-Year Strategy; (iii) the Millennium Development Goals (MDGs); (iv) the Sustainable Development Goals (SDGs); and (v) the Bank's High 5s priority related to improving the quality of life for the people of Africa.

During the period 2005-2016, the Bank funded 223 WSS projects (amounting to UA 3.71 billion of net approvals)[3] of which 157 were investment projects (amounting to UA 3.65 billion) and 66 were studies (amounting to around UA 60 million). Out of the 223 projects, 109 are completed (76 investment projects and 33 studies). The completed investment projects represent UA 958 million of net approvals. The Bank estimates that investments in urban areas account for approximatively 61 percent[4]. Accordingly, the investment projects in urban areas during the evaluation period 2005-2016 amount to about UA 2.23 billion in total net approvals.

With a total net approval amount of UA 342 million, 15 completed UWSS projects were selected for this cluster evaluation. These projects are located in 12 RMCs including Cameroon (1), Republic of Congo (1), Ethiopia (1), Ghana (1), Kenya (1), Mauritania (1), Mauritius (1), Morocco (2), Mozambique (2), Senegal (1), Tanzania (2), and the Comoros (1).

The main objective of the water sector interventions in the project countries was to enable the countries to achieve their commitments to the MDGs in terms of universal access to potable water supply, together with significant progress in sanitation and good hygiene practices, by 2015. The aim was for the UWSS projects to contribute toward poverty alleviation through: (i) reduction of productive time wastage; (ii) a reduction in healthcare costs; (iii) an increase in industrial and commercial activities; and (iv) the generation of employment opportunities in targeted areas. The cluster projects were expected to do this by maintaining and improving access to reliable, affordable and sustainable water supply and sanitation services, available for the different categories of customers in the designated areas.

The ability of the beneficiaries to access an affordable, reliable and sustainable drinking water supply is expected to significantly improve living conditions and hygiene practices, reduce morbidity levels and enhance health conditions, promote education, and boost economic growth. In addition, increased access to and use of reliable sanitation systems is expected to reduce the incidence of disease caused by poor hygiene and sanitation, through enhanced wastewater treatment and use of sanitation by-products. The projects are also designed to enhance urban living standards and promote income-generating activities.

Evaluation Purpose and Scope

This cluster evaluation was conducted to (i) provide the Bank's Board of Directors and Senior Management with credible and actionable evidence on the extent of the development results and implementation performance of AfDB-funded UWSS projects; and (ii) provide the Bank's operations management and staff, and other stakeholders, with relevant lessons to inform the Bank's strategic project design and implementation of UWSS.

This cluster evaluation covers 15 AfDB-funded UWSS investment projects in 12 African countries (Annex 2 presents a list of the cluster projects). All UWSS projects have been completed. The cluster evaluation focuses on project relevance, effectiveness, efficiency and sustainability, with key synthesis questions focused on the extent to which project results were achieved, and the factors that facilitated or limited their achievement.

Evaluation Approach, Methods and Limitations

The project-level evaluations use a theory-based approach. As the projects' theories of change were not explicit at appraisal or implementation, the evaluation team reconstructed a UWSS project logic model (Annex 1). This provided the basis for assessing results, both at the individual project level and at the project cluster level.

The quantitative and qualitative data regarding the performance indicators and water-sector conditions were drawn from (i) desk reviews of relevant Bank documents and literature; (ii) interviews with key stakeholders, both inside and outside the Bank; and (iii) field visits of purposively selected project sites. Each category of data was analyzed using mainly descriptive statistics. Comparative analysis was also conducted at the indicator level using baselines, targets and actual results. Evidence was triangulated from the various data sources and methods.

The UWSS cluster evaluation was limited mainly by:

- The purposive nature of the sample of fifteen projects. This limitation was mitigated by the reasonable sample size, which constituted about 15 percent of the total investment projects net amount and 35 percent of the completed investment projects net amount.
- Lack of baseline data and insufficient M&E at project and sectoral level to support the post-completion evaluation reporting. A mini-survey of around 500 households conducted for each project-level evaluation mitigated these limitations.
- Shortcomings associated with field visits and stakeholder interviews especially in terms of insufficient coverage of project sites and beneficiaries. The triangulation of evidence from other sources reduced the extent of the impact of these limitations.

Project Cluster Performance

Development Outcomes

Overall performance. The cluster of projects comprised four urban sanitation-only projects, 10 water supply projects with sanitation (UWSS) components, and one water supply-only project. The development outcomes of 13 of these 15 projects were rated as satisfactory; only two (Mauritania and Senegal) were considered unsatisfactory.

Relevance

Project objectives were relevant, but there were weaknesses in some design aspects, such as risk assessments and the choice of technologies.

The projects' objectives of improving access to reliable, quality and sustainable water supply and sanitation services were aligned with development priorities as expressed in RMCs' national development policies, plans and strategies. These were committed to achieving the MDG of "halving the number of people who do not have access to safe drinking water and basic sanitation by 2015". The project cluster addressed the real needs of urban populations, including suburban and unreached poor urban areas, and entities that face inadequate access to WSS services and water resource preservation and protection issues. Government development priorities in WSS also include the need to raise awareness of the advantages of adopting good sanitation, hygiene and health behaviors.

The project cluster's objectives were also aligned with the Bank's priorities and strategies, which consider water supply and sanitation as crucial for development. They also conform to the Bank's Integrated Water Management Policy. The promotion of economic growth and development activities are also important outcomes of the project cluster, in addition to providing reliable water supply and sanitation services for urban populations. The Bank's Country Strategy Papers (CSPs) for the project countries address water supply and sanitation constraints in each country within the framework of sector investment programs. The objective is to improve the quality of life (explicitly expressed in 10 of the 15 projects) and reduce poverty (explicitly expressed in 5 of the 15 projects). The CSPs consider basic infrastructure, including water supply and sanitation, a significant factor in mainstreaming the cross-cutting issues of gender, environment and private sector participation to strengthen the foundation for sustainable development. Water supply and sanitation service projects also provide opportunities for other development activities. For instance, the deliverables help to promote private sector participation and enhance economic growth, and the impact this can have on the living standards of the beneficiaries.

The project cluster was consistent with the extensive demand for water supply and sanitation in urban areas due to rapid population growth. National laws and regulations aim to ensure the inclusion of poor and vulnerable groups in gaining access to, and benefits from, water supply and sanitation through social tariffs, stand pipes and public latrines. The project cluster's outputs were found to meet the real needs for water supply and sanitation services of both those who are able to pay for connections, and those who cannot afford to pay and require special arrangements. This also implicitly aims to ensure the environmental and social integration and sustainability of such interventions. Sanitation projects such as those for Congo, Cameroon and Senegal responded to the real needs of those facing regular floods and their adverse impact on economic activity, the mobility of people, and the recurrence of sanitation, hygiene and

drinking water-related diseases. In Mauritius, high population density and industrial concentration in the Plaines Wilhems region explained the need to increase the capacity and extent of the area covered by the sewerage system.

While the project cluster had clear objectives, with planned outputs relevant to water supply and sanitation, it presented weaknesses in terms of design. The fundamental links between project outputs and the expected medium and long-term outcomes, for example, improved living standards, increased economic growth and improved business environment, and enhanced institutional capacity and sustainability, were not always clearly addressed in Mauritius, Tanzania and Ethiopia. In addition, project design was weak in integrating effective M&E systems to ensure the systematic collection of relevant data with clear responsibilities and a well-defined frequency in Senegal, Tanzania DWSSP[5] and MoWSSP[6], Mauritius and Kenya.

Weaknesses were also noted in (i) the selection of technologies; (ii) risk assessment; (iii) the use of an integrated approach; (iv) political interference; and (v) poor quality of feasibility studies, with the weakest aspects being as follows:

- **Inadequacies in project design were associated with the technology options that were not appropriate and thereby reduced the functionality of the systems, resulting in a number of failures and reducing project benefits.** It was the case for the Bank's WSS interventions in Ethiopia, Ghana, Kenya[7], Mauritania[8], Mauritius, and Mozambique Niassa projects, and Senegal[9]. One of major concerns for expanding water supply and sanitation services is to select technologies that can be effectively and efficiently operated and maintained, taking into account the conditions in the project area. **In this context, the evaluation found that project designs in Senegal, Mauritius, Ghana and Mauritania were mainly driven by the selected technology rather than considerations of technical and financial appropriateness.** For instance, in Mauritius and Senegal, the use of a tertiary treatment system of domestic wastewater (for example, activated sludge process) with complicated and energy-intensive technologies necessitated capacity building to ensure that the skills to operate the system efficiently were locally available, both now and in the future. Therefore, applying design-based standards to the detriment of the flexibility of service delivery can be a risk factor for the system. For instance, proper control of the activated sludge process is essential in ensuring production of good effluent.

- **Critical risks were not adequately addressed.** Although water sector reforms and continued government commitment were clearly addressed as risks in all projects, tariff adjustment was not given adequate consideration in seven of 15 UWSS projects[10]. Critical risks concerning the reliability and quality of water resources[11] were also not adequately addressed. The evaluation of Integrated Water Resources Management (IWRM) policy found that only five of a sample of 40 projects explicitly addressed water resources management and conservation. These risks were covered in only five out of the 15 projects including Morocco (2), Kenya (1) and Tanzania (2). In addition, the maintenance and sustainability of facilities were not adequately addressed in nine of the 15 projects reviewed. Furthermore, only two of the 15 projects raised risks concerning energy costs, institutional capacity, private operator failure, population and livestock growth, complementary programs, and the quality of distribution networks.

- **Insufficient use of an integrated approach.** The project cluster design did not sufficiently use a holistic strategy to integrate all UWSS components as one package (water production, water distribution network, wastewater management, solid waste management, and utility capacity) with these areas all closely linked to each other. For instance, new water supply projects usually increase wastewater flow which creates or exacerbates problems of drainage

Box 1: The Failure of a PPP in Tanzania DWSSP

A leasing contract was awarded in a single-bidder process to City Water Services Limited (CWS) after three rounds of bidding that took place over five years. Other bidders who were not selected raised the issues of risks and baseline data. The government, however, did not consider these two issues in contracting CWS. After two years in operation, CWS ceased to operate or maintain the system due to increasing cost and unpaid bills. As a result, the PPP collapsed, and the government had to establish a state-owned utility to take over and manage, operate and maintain the system.

Source: Tanzania DWSSP PER.

and solid waste management. The Mauritania project for instance focused on water production without sufficiently integrating distribution, wastewater management, and capacity of the utility to efficiently manage the new system.

In addition, there is limited integration of water projects with non-water-related activities. The existence of water supply and sanitation is the cornerstone of many development activities. Accordingly, providing water supply and sanitation services needs to be integrated with development initiatives that can promote the viability of the services. The availability of water supply and sanitation is seen as an opportunity, taken up by the beneficiaries and business entities, to enhance their existing commercial activities and to create new businesses. These services can be directly linked to tourism and micro, small and medium-sized business activities. This represents an important opportunity for improving the standards of living of targeted communities. However, only Mauritius and Morocco gave serious consideration to this aspect.

- **Project design was also negatively affected by political interference and the poor quality of feasibility studies.** In the Ghana, Kenya and the Comoros case studies, the locations of and management of water supply and sanitation services were politically determined. This had adverse impacts on the choice of locations and on the operation and management of water supply and sanitation services.

Private-sector engagement in operating and managing water and sanitation facilities was a common strategy in all the project countries. However, private performance was weakened by political interference in project design and management, and a weak regulatory environment. A case in point is the Tanzania DWSSP, in which the planned stakeholder participation failed, and the Public-Private Partnership (PPP), which was the central pillar of the initial project design, ultimately collapsed (Box 1). Moreover, inconsistent project design due to project downscaling limited the geographic coverage of outputs in Mozambique Niassa.

Effectiveness

While there were significant achievements in project outputs, uneven performance in improving access to sustained, quality UWSS services was an issue. *This uneven performance was mainly due to the limited functionality of water facilities. In addition, while there were some success stories in wastewater management, the project cluster experienced challenging sanitation interventions.*

UWSS Outputs Achievement

The Bank's UWSS projects produced satisfactory physical infrastructure outputs for water supply, but less so for sanitation facilities and services. The Bank's support delivered a significant number of water supply infrastructure outputs. All the 15 projects, except Kenya and Senegal, achieved more than 75% of their expected physical infrastructure outputs. The undelivered water supply infrastructure outputs were mainly due to tight financial constraints, which led to the scaling-down of projects. This was the case in nine of the 15 urban WSS projects

including Senegal, Mauritania, Kenya, Tanzania Monduli, Mozambique Niassa, Mozambique UWSS, Congo, the Comoros, and Ethiopia. The main physical water supply outputs included water intake, boreholes, treatment plants, transmission lines, reservoirs of tanker water, distribution networks, kiosks and boreholes, meters and lab facilities.

The level of sanitation outputs achieved was low. These outputs included wastewater treatment plants, sewerage networks, sewer pumping stations, reservoirs, pipelines to transport raw water and treated water, remote management systems; households' latrines and public toilets; and hand-washing facilities. Only four of the UWSS cluster projects provided wastewater collection and treatment, and only 42% of projects achieved more than 75% of the expected sanitation physical outputs (Annex 4, Table A4.1).

Under-utilization of water infrastructure. Some of the water supply systems that were installed, rehabilitated or extended under the cluster projects were not optimally used or were not functioning at the time of the evaluation. The under-utilization of the water infrastructure was mainly due to (i) insufficient water availability at source (Mtoni for Tanzania DWSSP); (ii) lack of appropriate distribution network (Tanzania Monduli, Mauritania[12]); (iii) design shortcomings (Kenya); (iv) lack of a stable power supply (electricity) to pump the water (Tanzania DWSSP); and (v) lack of an appropriate structure to manage the facilities, thus leading to their disuse for a long period following their delivery (the Comoros[13]).

The Bank also provided institutional strengthening and capacity-building activities for improved service delivery, and better operation and maintenance, including billing efficiency, metering ratios and logistical support. The support activities were focused on providing equipment and studies. Outputs were mainly in terms of office rehabilitation as was the case in the Comoros and Kenya, and provision of equipment as was the case in the Comoros, Ghana, Kenya, Mozambique, and Tanzania MoWSS. In addition, studies were delivered in support of (i) water utilities in Mauritania and Senegal); (ii) urban WSS sector strategy and water resources plan in Tanzania; (iii) sanitation strategy and planning in Congo and Tanzania DWWP; (iv) strategic institutional framework inthe Comoros; and (v) a gender mainstreaming strategy in Kenya. The Bank also provided technical assistance for the UWSS in Ethiopia, Ghana and Mozambique.

UWSS Outcomes Achievement

The UWSS interventions achieved satisfactory water outcomes, notwithstanding the challenges in sustaining access to potable water and improved sanitation services. Thirteen of the 15 UWSS cluster projects achieved significant outcomes in terms of (i) access to potable water; (ii) access to improved sanitation services; and (iii) operational capacities. The benefits of UWSS were most clearly manifested in Morocco and Mauritius, where the governments integrated UWSS with tourism and small- and medium-sized business opportunities within their integrated development strategy and plans. This approach optimized UWSS use, business development and expansion, and helped to raise living standards.

Improved access to potable water. The cluster evaluation estimated that the UWSS support provided potable water to about 6 million (79%[14]) of the target of around 8 million people in the project areas. This performance was variable, spatially uneven in terms of distribution, and challenged by failure to deliver uninterrupted potable water supply. Only four of 11 cluster UWSS projects (36%) met their anticipated number of beneficiaries, while 72% of projects met at least 75% of anticipated beneficiaries (Annex 4, Table A4.2). None of the UWSS projects achieved the objective of potable water supply 24 hours per day to all customers[15]. The number of hours of water service per day varied between localities within the same project[16] and across projects. For instance, on average, 17 hours for Kenya and Mozambique Nassia, 12 hours for Mozambique WSSIS, and 9 hours

for Tanzania MoWSSP. For the Tanzania DWSS project, only 25% of customers obtained 24 hours of water supply service at the standard pressure level compared with the planned rate of 70%. For the Ethiopia Harar project, customers received water for only 14 hours per day. In Ghana Huni Valley, users reported an effective water flow of just 2 hours a day. In the case of Isiolo[17] in Kenya, the level of potable water supply declined after the intervention.

The main reasons for this are the following:

- Failure to adequately incorporate the effect of population increase in project design.
- The under-utilization of water production capacity in Tanzania DWSSP and Mauritania. In addition to the unrealized water production capacity (about 25%), the available water production capacity was not optimally used because of the multiple factors already highlighted under the output section above.
- The low quality of the water distribution network resulting from limited investment and inadequate performance of the water utilities (with the exception of Morocco), leading to high levels of non-revenue water (NRW) and water contamination. Some of the urban water distribution networks were aging and of inadequate quality , for instance, in Mauritania and Kenya. They adversely impacted on the project benefits because of water leakages and contamination from wastewater. In the case of the Mauritania project, for example, water leakage from the old system was 58%. In addition to the water loss, the wastewater leaking from septic tanks and the sewage network was a source of contamination in the water supply network. This exposed the beneficiaries to health hazards, including waterborne diseases.
- In some cases, the project delivered water that was not tested to customers, for instance in Ethiopia and Mozambique Niassa in Lichinga, or not sufficiently tested[18], for instance in, Mozambique Niassa and Kenya.
- Investment imbalance regarding water production, distribution and sanitation, with the Bank's projects focused on water production capacity. Three UWSS cluster projects with no sanitation components were associated with negative environmental impacts.

Wastewater management. This can affect the beneficiaries' health if the wastewater is not properly treated and discharged. In addition, dumping this water out of a complete and controlled proper sewerage system can negatively impact the groundwater aquifers and water supply quality through leakage into supply pipes. In the presence of heavy rainfall, as is the case in Mauritania, this can also result in flooding outside the system. Four of the 15 projects provided wastewater collection and treatment including Congo, Morocco, Senegal and Mauritius. Wastewater management was successful in Morocco and Mauritius, but not in the rest of the casestudy countries. In general, the Mauritius and Morocco projects made good progress toward the development objective of environmentally-appropriate collection and treatment of sewage and disposal of effluent and sludge. For Mauritius, the St Martin plant is treating sewerage to a level higher than targeted at appraisal[19]. The lack of baseline information in general, and the lack of monitoring and evaluation (M&E) mechanisms for the project's environmental and social aspects in particular, make it difficult to accurately report on progress toward the project's development objectives, at least against the targets identified at appraisal. In Morocco, the lagoon technology was well tested and adapted to the size of the two cities (Boujaâd and Oued Zem) and their climatic environments. While this technology is land-intensive, it has two major advantages: the purification process is natural and does not require energy, and the quantity of sludge produced is low compared with the "activated sludge" process. The latter is crucial, as sludge management is currently a major concern for the country.

In the case of Senegal, the UWSS project delivered an incomplete wastewater treatment plan. This led to inadequate treatment capacity of the plant

Box 2: Some Emerging Good Practices in Wastewater Management in Mauritius and Senegal

- **Mauritius:** The volume of treated effluent used for irrigation is 4.7 million m³ in 2015. The plant could generate 91,913 kWh of electricity in December 2016. The sludge disposal reached 300.2 tons in December 2016. About 25% of the plant's energy needs are generated through methane gas.
- **Senegal:** Methane gas production saved 30-35% of operating expenses and electricity bills.

Source: Mauritius and Senegal PERs.

in relation to the volume of wastewater entering, where part of the pre-treated effluent was rerouted. Much of the excess sludge was discharged with the purified effluent because it could not be treated. ONAS's sea discharge objective for 2009 was 85%, which it failed to achieve. In fact, the specific average treatment output (sea discharge) for the last year of operation 2009[20] was about 75%, with a minimum of 56% and a maximum of 81%.

With the exception of Mauritius and Senegal (see Box 2), the commercialization and use of sanitation by-products (treated water, sludge and biogas) remained weak in all the project countries. For Senegal, the volume of purified water sold was about 3,000 m³/month in 2010. This dropped to 574 m³/month in 2011 due to the suspension of distribution to the Dakar-Technopole Golf Club in 2010, the only remaining consumers being market gardeners[21].

Challenging sanitation intervention outcomes. The performance of the urban sanitation interventions was a challenge for all project countries, with the exception for Morocco. Regarding improved sanitation services, the UWSS project cluster was expected to cover around 6 million people in the projects' areas, but only provided access to about 2 million people (42%[22]). Only two of the nine cluster Urban Sanitation projects (22%) met their anticipated beneficiaries, while 56% of projects met at least 75% of anticipated beneficiaries (Annex 4, Table A4.2). The UWSS sanitation performance was weakened by the low level of sanitation outputs, some of which, particularly the latrines, were not fully functional. Table 1 below shows the variable levels of sanitation results of three of the UWSS projects.

The uneven UWSS sanitation results are further illustrated below:

- In Ethiopia, the UWSS project delivered the sanitation study in full, but only half of the expected hygiene education and awareness creation activities and works. In addition, none of the other sanitation arrangements, including construction of public and communal latrines, was effective.

Table 1: Sanitation Results in Selected AfDB-funded Urban Water Supply Projects

Project	Expected	Realized
1. Senegal Dakar City Sanitation Project	Two new treatment units, each with a capacity of 10,000 m³/day, put in place.	The project was able to build only one incomplete unit (without a sludge treatment process) with a capacity of 11,300 m³/d, falling short of the target due to a drastic reduction in the volume of work initially planned for this component. Overall, the project has helped to increase the secondary treatment capacity of the Cambérène Wastewater Treatment Plant from 5,700 m³/d to 17,000 m³/d.
2. Congo Brazzaville and Pointe Noire Sanitation Project	Four excreta treatment plants built in Brazzaville and Pointe Noire.	Four excreta treatment plants built in Brazzaville and Pointe-Noire. However, the plants are still struggling to work well due to construction faults, theft of equipment and operating budget shortfalls.
3. Morocco Nine Drinking WSS	Volume of treated water: 20,000 m³/day	26 % of target achieved.

- The Ghana, Mozambique Niassa, Mozambique UWSS and Tanzania Monduli projects focused on creating awareness on the need for improved sanitation and hygiene at the community level to facilitate the construction of household toilets. In this respect, the projects only constructed demonstration latrines. This strategy proved successful where ownership was effective such as in Mozambique and Tanzania. In contrast, household latrine uptake was very low in Ghana[23]. Two other projects partially accomplished the required sanitation components, namely Kenya and the Comoros.

- Although public latrines were built, they were not working properly or were not used in nine of the 15 projects. This was mainly due to (i) technical challenges (Ghana); (ii) lack of ownership (Ghana, Congo); (iii) inappropriate siting (Ghana, the Comoros); and (iv) a lack, remoteness or deterioration of piped water connections (Mozambique Nassia, Congo, the Comoros).

Limited capacity to ensure adequate service delivery. Capacity issues also constrained the performance of the UWSS sanitation interventions. For example, in the Dakar City Sanitation Project in Senegal, efforts to build capacity within the national authority in charge of sanitation were hindered by the lack of infrastructure maintenance or a development plan. In Kenya, partly because of capacity constraints, the UWSS project failed to achieve its target of reducing NRW from 60% in 2007 to 30% in 2012. In Isiolo, the WSP had to decommission some of the new distribution lines due to the high number of leakages and pipe bursts. The Mauritania urban water supply project helped to strengthen the private sector by creating a favorable environment for nurturing small enterprises in WSS such as network installation works, plumbing and various services. The project failed to provide sufficient capacity building to SNDE, a key player in the water sector institutional framework (AfDB, 2015).

Efficiency

The cluster projects were viable economically. However, they suffered from poor financial performance from the perspective of public utilities, and there were also substantial implementation delays.

Substantial implementation delays. No cluster project followed its implementation timetable. Instead, projects experienced substantial time overruns, with none of the 15 projects meeting its original closing date or implementation period. As Table 2 shows, the average project implementation period (from approval to completion) was 83 months (6 years and 11 months), which equates to an average delay of 24 months relative to the average planned duration at appraisal. The implementation duration ranged from a minimum of 49 months (4 years and 1 months) in Ghana, to 111 months (9 years and 3 months) in Ethiopia. On average, the project cluster's first disbursement occurred 10 months after the entry-into-force date. Three projects experienced a delay of longer than one year from the entry-into-force date to first disbursement, namely Mauritius, Senegal and Mauritania. The average disbursement period (from first to last disbursement) of the 15 projects was 66 months, compared with the target of 49 months. The project cluster loans took 35 to 103 months to disburse fully. Implementation delays were mainly due to slow loan ratification such as in Kenya, Mozambique and Senegal, procurement procedure issues, poor quality at entry, delays in the preparation of tender documents after loan approval such as in the Comoros, poor performance of contractors such as in Kenya, and the slow payment of government counterpart funds such as in Kenya, Mauritania and Tanzania. Table A4.5 in Annex 4 provides further details on projects timeline.

Table 2: Project Time Performance (months)

Project	Approval to completion [M]	Entry into force to completion [M]	Entry into force to first disbursement [M]	First disbursement to last disbursement [M]
1. Morocco Eighth Drinking WSS Project	72	66	7	63
2. Mozambique Niassa Provincial Towns Water and Sanitation Project	81	64	2	69
3. Mozambique Urban WSS and Institutional Support Project	89	51		57
4. Ethiopia Harar WSS Project	111	92	3	103
5. Ghana Improved Sanitation and Water Supply Services	49	42	1	35
6. Tanzania Dar es Salaam WSS Project	101	79	12	72
7. Tanzania Monduli District Water Project	65	58	5	63
8. Mauritania Nouakchott City Drinking Water Project	85	81	38	55
9. Cameroon Yaoundé Sanitation Project	103	98	7	91
10. Morocco Ninth Dinking WSS Project	87	79	7	77
11. Senegal Dakar City Sanitation Project	94	81	24	59
12. Congo Brazzaville and Pointe Noire Sanitation Project	73	68	0	81
13. Mauritius Plaines Willems Sewerage Project- Stage 1	77	66	14	36
14. Kenya Water Services Boards Support Project	78	63	4	75
15. Comoros WSS Project	81	80	10	61
Average	**83**	**71**	**10**	**66**

Cost overruns and underruns. The projects also did not follow their initial cost plans. All 15 completed UWSS projects experienced cost overruns or underruns (Annex 4, Table A4.6). Eight projects experienced cost underruns of 3 to 19 percent of the original amount. Another three projects including Tanzania DWSSP, Morocco Ninth and Mauritius, had cost overruns of 3 to 16 percent. Mauritania was an exceptional case in that after cost re-estimation increased the project cost by 105 percent, donors provided supplementary financing. However, the extent to which projects were completed within the cost estimated at appraisal could not be easily assessed, as some planned elements of projects were revised during implementation. In most cases, cost savings or underruns were attributable to projects being scaled down as was the case with Senegal, Kenya, Tanzania Monduli, Mozambique Niassa, the Comoros and Ethiopia.

Viable economic performance. Except the Ghana project, cost-benefit analysis was conducted at ex-ante, completion or ex-post for all projects. Variation from PAR with regard to the EIRR was calculated for 11 out of 15 projects (Table 3). No comparison was possible for five of the projects including Cameroon, Comoros, Congo, Ghana, and Senegal, owing to data limitations.

Table 3: Economic Internal Rate of Return Ex-ante and Ex-post

Project	EIRR (PAR)	EIRR (PCR)	EIRR (PER)	Variation from PAR	Opportunity Cost of Capital (OCC)
1. Morocco Eighth Drinking WSS Project	23.5	-	24.4	0.9	10%
2. Mozambique Niassa Provincial Towns Water and Sanitation Project	14	12.4	20	6	12%
3. Mozambique Urban WSS and Institutional Support Project	18.13	28	24	5.87	10%
4. Ethiopia Harar WSS Project	23	27.65	-	4.65	-
5. Ghana Improved Sanitation and Water Supply Services	-	-	-	-	-
6. Tanzania Dar es Salaam WSS	21	2.92	2.92	-18.08	8%
7. Tanzania Monduli District Water Project	33	45	42	9	-
8. Mauritania Nouakchott City Drinking Water Project	16.4	-	15.9	-0.5	-
9. Cameroon Yaoundé Sanitation Project	-	27	27.7		12%
10. Morocco Ninth Dinking WSS Project	14.8	15	27	12.2	10%
11. Senegal Dakar City Sanitation Project	25.17	-	-		-
12. Congo Brazzaville and Pointe Noire Sanitation Project	24.7				12%
13. Mauritius Plaines Willems Sewerage Project- Stage 1	12.41	-12	6	-6.41	10%
14. Kenya Water Services Boards Support Project	20.5	21.84	20	-0.5	12%
15. Comoros WSS Project	19.62	18.09	-	-1.53	7%

These 11 projects had EIRRs in excess of their respective opportunity costs of capital, except for Tanzania DWSSP and Mauritius. Significant discrepancies between the EIRRs estimated at the different stages were noted for seven of the 11 projects.

Poor financial performance. FIRR analysis was carried out for only eight projects (Table 4). The FIRRs of the remaining seven projects could not be re-calculated because of data limitations. Six out of eight projects with re-estimated FIRR indicated a Weighted Average Cost of Capital (WACC). Compared with their respective WACC, five of the six projects showed a positive financial performance, while the FIRR of the Mauritania project was small due to low income from water selling (water pricing) and high operating costs, especially the cost of energy, processing of reagents and wages. However, from the perspective of public utilities, the projects' financial viability was unsatisfactory, mainly due to relatively low revenue generation and high investment and operating costs.

Table 4: Financial Internal Rate of Return Ex-ante and Ex-post

Project	FIRR (PAR)	FIRR (PCR)	FIRR (PER)	Variation from PAR	Weight Cost of Capital (WACC)
1. Morocco Eighth Drinking WSS Project	16.5	-	22.4	5.9	5.6%
2. Mozambique Niassa Provincial Towns WSS Project	5	4.7	5	0	1.5%
3. Mozambique Urban WSS and Institutional Support Project	7.16	20	28	20.84	4.6%
4. Ethiopia Harar WSS Project	4	3.19	-	-0.81	3%
5. Ghana Improved Sanitation and Water Supply Services	-	-	-	-	-
6. Tanzania Dar es Salaam WSS	9	8.73	-	-0.27	5.6%
7. Tanzania Monduli District Water Project	-	8	6	-	1.7%
8. Mauritania Nouakchott City Drinking Water Project	3.9	-	0.33	-3.57	-
9. Cameroon Yaoundé Sanitation Project	-	-	-	-	-
10. Morocco Ninth Dinking WSS Project	-	-	13.5	-	-
11. Senegal Dakar City Sanitation Project	-	-	-	-	-
12. Congo Brazzaville and Pointe Noire Sanitation Project	-	-	-	-	-
13. Mauritius Plaines Willems Sewerage Project- Stage 1	5.75	-15	-8	-13.75	-
14. Kenya Water Services Boards Support Project	8.8	-	7	-1.8	-
15. Comoros WSS Project	7.71	-	-		-

Mixed project-cost effectiveness. Cost effectiveness was analyzed in 12 of the 15 projects. Only six out of those 12 projects including Morocco Eight and Ninth, Mozambique UWSS, Ghana, Ethiopia and Mauritius, presented satisfactory unit costs compared with national or regional experience for similar projects. This satisfactory level of performance was a result of several factors comprising, among others, competitive tendering and international bidding in line with project covenants and country procurement systems. Costs were also effective where complete feasibility studies with safeguard measures were conducted prior to project implementation.

Five projects were rated unsatisfactory in a large part due to mismanagement of resources and poor coordination, non-revenue water, failure to collect debts, a high cost of operations, cost overruns, and the high unit cost of latrines as was the case in Kenya, Congo, Tanzania DWSSP, Mozambique Niassa and Senegal. Displacement and land acquisition caused some delays, and cost overruns had an adverse impact on cost effectiveness. For one project (Mauritania), it was not easy to compare unit costs with those of others projects in the RMCs of the sub-region, given that such projects were so different in terms oftechnical solutions, consistency, etc.

Sustainability

The UWSS projects achieved sustained benefits, although there was weak financial viability. *All project benefits, except for Mauritania, Senegal and the Comoros), were sustained. However, financial viability was the weakest sustainability sub-criterion. The Comoros project was technically sound, exhibiting strong ownership and sustainable partnerships, as well as social and environmental capability. In contrast, the Mauritania and Senegal projects failed in all aspects of sustainability.*

Viable technical soundness. All projects were technically viable except four, including Kenya[24], Mauritania, Ghana[25] and Senegal[26]. The remaining 11 projects had good technical designs using advanced technologies, though not necessary appropriate. Simple plans and extensive experience from similar projects had positive impacts However, overlycomplicated designs, advanced technologies and low availability of expertise and spare parts, were a challenge for sustainability in other cases including Ethiopia, Mauritania, Mauritius and Senegal. Incomplete infrastructure and the improper use of the facilities that had been built had adverse impacts on the sustainability of other project outputs as was the case in Congo, Ghana and Mozambique Niassa.

Weak financial viability due to the poor performance of UWSS utilities. The project cluster experienced challenges that compromised its financial viability. The most recurrent challenges related to: (i) lack of staff, inadequate human resources capacity and logistics in Senegal, the Comoros, Mozambique Niassa and Mauritania; (ii) high level of non-revenue water in Ghana, Kenya, Ethiopia and Tanzania Monduli; and (iii) incomplete metering installation in Mauritania, Tanzania MoWSSP and DWSSP. Other challenges included: (i) high operating costs in Mauritania and Mozambique; (ii) poor coordination in the Comoros and Kenya; (iii) mismanagement of resources in Kenya; (iv) a lack of cost-sharing arrangements in Ethiopia; and (v) a failure to collect debts in Mauritania. Table A4.3 in Annex 4 presents selected indicators of water utilities' commercial and technical performance.

Sustained government subsidies were required in all countries for the continued functioning of WSS utilities. Government subsidies were needed in all the RMCs for the financial health of water supply and sanitation utilities to be secured. The existing tariff system started with a lifeline social tariff for the first 5 m3, except for Ghana, where the limit was 10 m3. This social tariff was used for the inclusion of poor and vulnerable groups in Tanzania, Ethiopia, Kenya and Mozambique, and represented 3 to 5 percent of the minimum monthly salary. Above this limit, the tariff escalated as a progressive block scheme. Industrial and commercial activities had special high tariffs. There was also a special social tariff for social purposes such as ambulances, churches and mosques in Mozambique.

Sanitation projects suffered from chronic economic and financial problems. All sanitation projects and those with sanitation components suffered from a lack of appropriate and affordable wastewater tariffs and collection procedures. The responsible agencies were greatly impaired by a lack of technical and managerial capacity in producing and commercializing by-products. In some countries, such as Congo and Cameroon, this problem was due to insufficient legislative efforts on the part of governments to establish laws and by-laws to regulate tariffs on wastewater collection and selling of by-products. Such reforms are needed to establish the organizational structure of sanitation services, private sector participation and cost-sharing mechanisms as well as to facilitate an effective implementation of a 'polluter pays' principle.

Realistic capacity for institutional sustainability. Ten of the 15 projects were found to have achieved the effectiveness of the relevant institutions at ex-post assessment. The projects provided capacitybuilding, logistical support and technical assistance that improved the capacity and operational and managerial skills of the involved institutions and staff. In these 10 projects, institutional sustainability was strong, as the roles of the key project stakeholders were very well defined and coordinated. Decentralization of service operations and management was a key success factor in Morocco, Ethiopia, and Tanzania. Moreover, the relevant stakeholders operated vocational training schemes for technicians and managers in various aspects of the WSS business. However, weak financial and human capacity for planning, operating and management created challenges in the remaining five projects.

Political pressure and improper institutional arrangements also had an adverse impact. Coordination and cooperation among the stakeholders remained challenging in the five other projects, namely Senegal[27], Mozambique 1 and 2, Mauritania, and the Comoros[28].

Efficient political support and governance environment. All projects except three, namely Senegal, Kenya and Ghana, had sufficient political support and a governance environment. The political context was stable in all project countries. Adequate anti-corruption laws and publicsector ethics existed and were enforced. Water supply and sanitation services were prioritized as stated in poverty strategy papers, government development plans and sector strategies. The use of the Bank's procurement system for international bidding was also a factor for success. However, political interference in some cases, for instance Kenya[29] and Ghana[30], led to poor quality of works, duplication of effort, and wastage of resources. In Senegal, the government lacked the determination needed to improve the situation of the implementation and operating agency.

Effective ownership and partnership sustainability. All the UWSS projects promoted effective ownership and partnership through the participation of relevant stakeholders at national, regional and district levels, regarding the sources of water, technology and service prices. Establishing Water Users' Associations and Water Boards played an important role in promoting (i) beneficiaries' ownership and their agreement to pay for services with affordable tariffs, and (ii) the reliability of services, which enhanced willingness to pay for the services. However, coordination among the relevant stakeholders was not as effective in Ghana, Kenya, Congo, and Cameroon. In addition, cost-sharing arrangements among stakeholders remain challenging in Ethiopia, Senegal, Kenya and Cameroon.

Satisfactory environmental and social sustainability. All 15 projects benefited from investment in promoting positive environmental and social conditions in the targeted areas. All cluster projects were in Environmental Category II, except Mauritius, which was placed in Environmental Category I. All the project countries had national environmental plans, laws and adequate mitigation measures. However, illegal discharges of industrial wastewater in Morocco and Tanzania, poor biological treatment in Senegal, non-compliance with marine discharge standards in Senegal, the absence of sanitation services in Ethiopia and Mauritania, lack of data collection and monitoring of environmental impact in Mauritius, and lack of the necessary investments and delays in counterpart funding in Mozambique Niassa and Tanzania Monduli, all had adverse impact on the environmental and social sustainability of the projects. In fact, classified under Environmental Category II, these projects were not subject to an in-depth environmental and social impact assessment. Therefore, no measures were required to reduce significant negative environmental impact. It can be questioned whether the environmental categorization of these projects was correct, given their nature.

In social terms, the projects provided considerable enhancement to the health and education of the beneficiaries. They also had positive impacts on gender quality and equality in Morocco and Ghana. In several cases, a robust system existed or had been established for the inclusion of poor and vulnerable groups in Kenya, Ghana and Tanzania. In others, a positive environment was created by the project, encouraging the creation of new job opportunities and small businesses in Morocco, Mauritius and Ethiopia. This environment was also reflected by the willingness of the beneficiaries to pay for services.

Resilience to external factors. During the implementation period of these projects, three important events occurred, namely (i) a global financial crisis; (ii) a food commodity crisis; and (iii) an oil price crisis. The global financial and food commodity crises had marginal indirect impact on African countries. However, the global financial crisis had a negative impact on the UA and the corresponding exchange rates. The oil price crisis had a negative impact on the major oil importing African countries.

Only six of the 15 projects were adversely affected by exogenous factors and risks. The weak resilience of these six projects, rendering their benefits unsustainable, was seen most in the price fluctuations of fuel and raw materials, and the reduced reliability of the electricity supply, as was the case in Mozambique 1 & 2, the Comoros, Senegal, Mauritius and Mauritania. The other nine projects did not report any exogenous factors or risks. Other important factors/risks that could be addressed were resource mobilization for operations and maintenance, and the investments needed for completing project components in Ethiopia and Mauritania.

Project Monitoring and Evaluation

Limited monitoring and evaluation (M&E) systems

Four of the projects did not incorporate M&E into their designs including Mauritius, Tanzania DWSS and MoWSS, and Kenya. For the other projects, the planned M&E systems were not operationalized or were used ineffectively. Moreover, the OVI for key project outcomes (Annex 3) were inadequately reported.

Three of the projects did not generate sufficient data in order to allow their performance indicators to be assessed including Mauritius, Ghana and Ethiopia, with four other projects providing incomplete baseline data including Morocco 8, Senegal, Mauritania and Tanzania Dar es Salaam.

The trustworthiness of some of the M&E data left much to be desired, with specific operational data not available for most of the projects. Utilities did not keep separate data for individual areas/projects within RMCs, and the absence of data made performance monitoring for single projects challenging.

Key Issues and Lessons

Quality of Feasibility Studies

Lesson 1: Project design needs a sound preparatory phase, with adequate and updated feasibility studies, if implementation is to be successful.

Inconsistent quality of project design was a challenge that led to the partial implementation of some project outputs and limited spatial coverage. Every project in the cluster was developed from technical/engineering and feasibility studies. However, the poor quality or outdated nature of some of the feasibility studies such as Kenya Nyahururu[31] and Ethiopia created inconsistencies and numerous subsequent modifications to project engineering designs. These widespread and significant modifications to the scope of projects, as a result of initial design errors and exogenous factors, resulted in the use of sub-optimal solutions that adversely affected efficiency and the achievement of physical targets. This situation led to an increase in the cost of water supply and consequently limited the implementation of sanitation components for wastewater and solid waste management. The feasibility studies also became obsolete in some projects due to the prolonged time lag between the prefeasibility stage and the effective date of these projects. Inconsistent project designs therefore led to the partial implementation of project outputs and limited spatial coverage.

Nothing stays the same forever. Efficient project design requires, in addition to the targeted outputs, a pragmatic and **updated risk analysis,** mitigation measures, for viable execution. In this regard, project designs presented the risks relating to water supply and sanitation services, the financial health of UWSS utilities and the political context. In addition to the fact that risk analyses were not updated during the project cycle, the following risks were also not properly addressed:

- Reliability of the supply and quality of project inputs.
- Access to reliable power to run pumps and water treatment equipment.
- Lack of appropriate and effective cost-sharing mechanisms.
- Weak commercialization of services and by-products. Non-revenue water and free dumping have negative impacts on the financial capacity of the respective agencies.

Integrated Urban Water Cycle and Sanitation Value-chain Strategy

Lesson 2: UWSS projects need integrated water cycle and sanitation value-chain approaches if they are to maximize water supply results and resolve sanitation issues.

An appropriate balance is necessary between investing in water, sanitation, hygiene and capacity development components to maximize the achievement of urban water outcomes. The limited achievement of outcomes in urban water was due to, among others, failure to integrate water production with distribution such as in Mauritania, Tanzania Monduli and Kenya, and health. In Ethiopia, for instance, from the outset, the project sought to align its design with the Bank's IWRM policy and national government policies and strategies. This required integrating water supply, sanitation and hygiene promotion activities, and creating a favorable environment for the promotion of appropriate sanitation services. However, budget deficits compromised the sanitation component, adversely affecting the project's impact on the health of beneficiaries. In the case of Mauritania, although the new treatment station provided an additional 84,000 m³ of water a day, most of which (about 58

percent) was lost due to leaks in the old distribution network. This resulted in flooding in low-lying areas of the city. Furthermore, nearly 80 percent of the drinking water consumed (about 11 million liters) became wastewater, which in the case of Nouakchott, was partly released into the sub-soil by standalone sewage networks.

Urban sanitation requires an integrated handling through its three main pillars: wastewater collection and treatment, fecal sludge management (compost, biogas and electricity), and commercialization. This value-chain approach remains limited in the Bank's projects such as in Mauritius, Senegal and Morocco Ninth, even if some good practices, albeit limited, emerged from the Mauritius and Senegal projects. The re-use of treated effluent for irrigation purposes in Mauritius improved the overall water balance in the project area where there was a shortage of irrigation water. However, there was no systematic and scientific approach to assessing crop response to elements present in the effluents. In addition, the Morocco Ninth case corroborated: (i) the insufficient integration of treated wastewater management through the development of re-use projects with the social inclusion of farmers upstream of the wastewater treatment plant and former users of raw wastewater; (ii) lack of early identification of sludge disposal and treatment solutions; and (iii) the control of industrial pollution upstream from the collection and purification facilities.

Use of "State-of- the-art" Technologies in UWSS

Lesson 3: The use of "state-of-the-art" technologies in UWSS is only relevant if they meet the project requirements and there is adequate availability of spare parts and relevant expertise.

The urban sanitation project cluster uses state-of-the-art technologies (e.g., activated sludge process, aerated lagoons and waste stabilization ponds), but some of the selected technologies proved to be problematic, for instance in Senegal and Congo. In fact, all wastewater treatment processes require land, although less complex wastewater treatment technologies require more land than more sophisticated technologies.

Intensive treatment technologies used for urban sanitation were appropriate for Mauritius including activated sludge process with biological nutrient removal and tertiary treatment with rapid gravity sand filters and UV disinfection, and Morocco's lagoon-based treatment plants[32]. However, in Dakar, Senegal, where land availability is an issue, the appropriateness of using an activated sludge process was questionable, as it did not fit with the local context. It presented risks to power supply, costs of operation and variation in effluent loadings. The performance of the treatment plant was also jeopardized by the incomplete treatment process set up by the project. As a result, the project created a nuisance for people living close to the treatment plant and adversely affected treatment efficiency. In Congo, where electricity is also a critical issue, the proposed water treatment comprised: (i) settling tanks for the liquid-solid separation; (ii) anaerobic sludge digestion for floating matter from the settling tanks; (iii) drying beds for settled matter; and (iv) the reed-bed wastewater treatment system. Given the context of the project area, this choice was appropriate, as the process resulted in the release of sufficiently purified liquid effluents (with acceptable biological oxygen demand and bacteriological levels) that were not harmful to the environment. However, the system did not function effectively due to insufficient capacity to operate and maintain the plant. Consequently, the discharge of excreta into the environment was still common practice.

With regard to the water supply, some RMCs such as the Comoros, experienced difficulties in operating the water system that was built. The national water utility in charge of water management in Moroni refused to take over the management of the water system that was built or rehabilitated by the project, due to high recurring operating costs as a result of

running on fuel-based technology. The availability of spare parts and required expertise was also challenging for a number of water systems, such as in Ethiopia, Mozambique, Senegal and Mauritania. In contrast, for Ghana, the Community Water and Sanitation Agency (CWSA) established a private sector-managed distribution system of hand pump spare parts for the four recognized hand pumps in Ghana. Sales outlets opened up in all 10 regions and the private operator completed the repayment of the seed funds provided to kick-start the network.

Sustaining UWS Project Benefits

Lesson 4: Since UWS projects can be undermined by utilities' poor performance (technical, financial and commercial), addressing the utilities' shortcomings is a necessary prerequisite to sustain the benefits.

The main challenge for UWS project benefits relates to the poor performance of water utilities. This poor performance was evident in: (i) high non-revenue water; (ii) inadequate staff, human-resource capacity and logistics; and (iii) unreliable services. The performance of the water utilities in the project cluster was generally poor (Annex 4, Table A4.3), with large gaps in waterservice coverage. The utilities's dismal performance was partly deduced from the level of access to water services, with seven out of 13 waterproviders having less than 60 percent of water coverage[33]. Non-revenue water losses (measure of operational performance) accounted for 19 to 65 percent. Larger utilities such as those in Mauritania and Tanzania tended to have higher NRW losses than smaller utilities. In addition, 54 percent of the waterproviders did not cover their operating costs. For example, the operating cost coverage for the utility in Ethiopia was only 49 percent, while in Mauritania it was 46 percent. This created financial burdens for the utilities and limited the quality of services provided. The inadequacy of tariff revenues was a concern in some projects including Tanzania, Senegal, Mozambique and Kenya, with some requiring large subsidies such as Senegal and Kenya, due to non-compliance with the tariff adjustment schedule.

Beneficiaries' ability to pay can be resolved through cost-reflective tariffs. This type of tariff provides both the financial viability for the utilities and an affordability tariff for the inclusion of poor and vulnerable groups. The connection fees remain a challenge and some RMCs provide subsidies to utilities to cover this cost. Standpipes and public latrines are only a temporary solution to the unaffordability of connection fees.

Political and governance failures are the root cause of financial weaknesses within water supply and sanitation utilities. In all 12 RMCs that constituted case study countries for this evaluation, the water supply and sanitation utility companies are government-owned. As a result, water supply and sanitation services and tariffs are highly politicized. Currently, there is a general trend toward more private sector involvement to mitigate the burden on national budgets. Establishing wateruser associations and water boards is evidence of their importance for the financial viability of services, and in developing a sense of ownership among beneficiaries.

Reducing Negative Environmental Impacts

Lesson 5: UWSS projects related to wastewater, sludge and solid treatment plant components need systematic mainstreaming of in-depth environmental and social impact assessments if they are to reduce negative environmental impacts.

The systematic mainstreaming of ESIAs in sanitation projects, particularly those related to wastewater treatment plants, is more effective than the implementation of an inefficient environmental categorization strategy. The Bank chose not to integrate critical environmental and social impact requirements at the appraisal phase of the projects, which would normally be recommended for projects of this nature.

Inappropriate environmental categorization of UWSS projects related to wastewater, sludge and solid treatment plants led to insufficient environmental assessments in Ethiopia, Senegal, Congo, Morocco, Mauritania, Mozambique Niassa and Tanzania MoWSS, which resulted into negative environmental impact. Despite the availability of national environmental plans, laws and policies, the cluster projects, except for Mauritius and Morocco, failed to discard effluent in compliance with the requisite standards.

Due to insufficient or lack of fecal sludge and wastewater treatment in Congo, Ghana[35], Senegal[36] and Mauritania, project countries continued to discard raw fecal sludge and untreated wastewater generated from urban communities into the natural environment, leading to significant negative environmental impact.

Fostering the Achievement of UWSS Project Outcomes

Lesson 6: UWSS projects need to address service delivery and behavioral change issues if they are to maximize the impact of the infrastructure that is built by the project.

The success of urban water supply interventions is often deduced from the number of people that gain access to water (compared with the target) than the systematic quality of services and their contribution to development objectives. This approach resulted into poorly optimized investments, inadequate focus on the beneficiaries, and low prioritization of self-monitoring. With only about 75 percent of outputs achieved, the project cluster failed to achieve access to drinking water by about 22 percent (1.75 million people) of the target beneficiaries. This was accentuated by the failure of some of the facilities that were provided by the projects to function as expected due to improper operation and management; inadequate testing of the quality of water such as in Comoros; limited access to sanitation services such as in Ethiopia, Tanzania DWSSP, Mauritania and the Comoros; and lack of stakeholder and beneficiary ownership such as in the Comoros.

Limited revenue collection and inadequate human resource capacity among the waterproviders adversely affected the financial health of utilities and the reliability of their services. A successful institutional framework encompasses robust coordination, clear responsibilities, and cost-sharing arrangements. Encouraging the private sector to engage in the operation and management of UWSS is an important part of the solution.

Finally, some outcomes required profound behavioral change among stakeholders, especially among the beneficiaries. This was not achieved by this project cluster. In fact, despite the awareness campaigns that were undertaken by the projects, much remains to be done in terms of (i) hand-washing with soap in Mozambique; (ii) improved water storage conditions in Mozambique; and (iii) applying good hygiene practices in Congo, the Comoros and Cameroon. Behavioral change is a long-term process and would unlikely be achieved through the limited actions of UWSS interventions.


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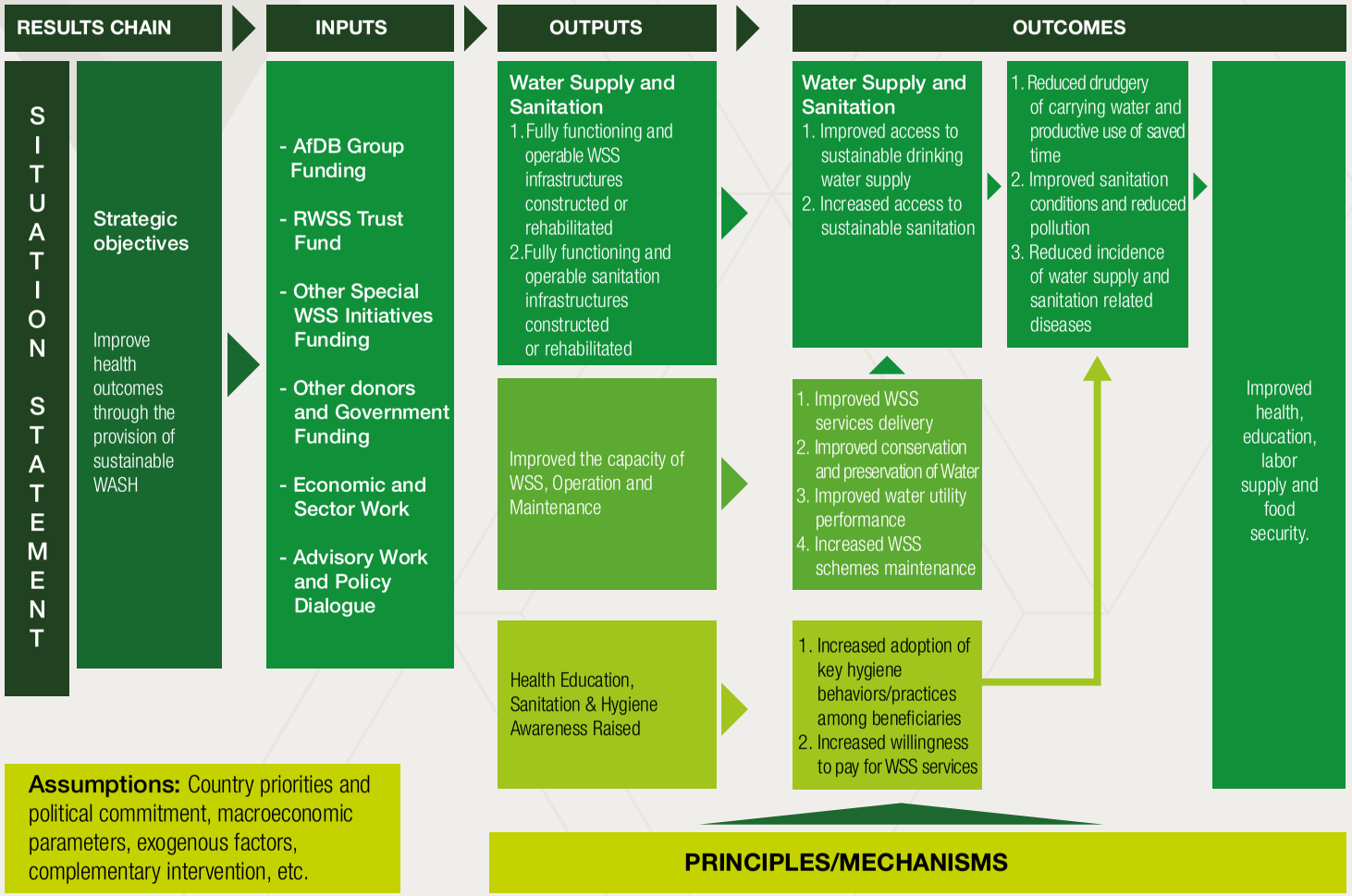
Annexes

Annex 1: UWSS Intervention Project Logical Model



Annex 2: List of Selected UWSS Projects

No	Country	SAP code	Division	Project Name	Status	Group	Approval Year	Net Loan (UA million)	Disbursement Rate (%)
1.	Morocco	P-MA-E00-005	OWAS2	Eighth Drinking WSS Project	CLSD	Water Supply and Sanitation	2004	53.64	100
2	Mozambique	P-MZ-E00-006	OWAS2	Niassa Provincial Towns Water and Sanitation Project	COMP	Water Supply and Sanitation	2009	18.00	97
3.	Mozambique	P-MZ-E00-003	OWAS2	Urban WSS and Institutional Support Project	COMP	Water Supply and Sanitation	2002	19.45	100
4.	Ethiopia	P-ET-E00-005	OWAS2	Harar WSS Project	COMP	Water Supply and Sanitation	2002	19.23	100
5.	Ghana	P-GH-E00-008	AWTF	Improved Sanitation and Water Supply Services	COMP	Water Supply and Sanitation	2009	1.75	100
6.	Tanzania	P-TZ-E00-003	OWAS2	Dar es Salaam WSS	CLSD	Water Supply and Sanitation	2001	33.99	100
7.	Tanzania	P-TZ-EA0-008	OWAS2	Monduli District Water Project	CLSD	Water Supply and Sanitation	2003	15.30	100
8.	Mauritania	P-MR-EA0-007	OWAS2	Nouakchott City Drinking Water Project	CLSD	Water Supply	2008	19.14	100
9.	Cameroon	P-CM-EB0-003	OWAS1	Yaoundé Sanitation Project	CLSD	Sanitation	2005	21.72	100
10.	Morocco	P-MA-E00-006	OWAS2	Ninth Dinking WSS Project	COMP	Water Supply and Sanitation	2006	71.57	93
11.	Senegal	P-SN-E00-002	OWAS1	Dakar City Sanitation Project	CLS	Sanitation	2001	11.87	100
12.	Congo CG	P-CG-E00-002	OWAS1	Brazzaville and Pointe Noire Sanitation Project	COMP	Sanitation	2009	12.75	94
13.	Mauritius	P-MU-EB0-005	OWAS2	Plaines Willems Sewerage Project- Stage 1	COMP	Sanitation	2007	7.34	100
14.	Kenya	P-KE-E00-005	OWAS2	Kenya Water Services Boards Support Project	COMP	Water Supply and Sanitation	2007	34.17	100
15.	Comoros	P-KM-EA0-001	OWAS2	Comoros WSS Project	COMP	Water Supply and Sanitation	2009	1.77	100
TOTAL								**341.69**	

Annex 3: Sector Goals and OVIs by Project

Countries	Project name	Sector goals	Project objectives	Objectively Verifiable Indicators (OVI)	Risks and Assumptions
Morocco	Eighth Drinking Water Supply and Sanitation Project	Improve the living conditions of the population by providing access to drinking water and wastewater treatment.	1. Ensure sustainable drinking water delivery to several cities, the new tourism sites and port complexes, and facilitate access in rural areas without access; 2. Provide better sanitary conditions for the population and ensure protection and preservation of water resources.	1.1 Effective 2008, DWS demand satisfied in 5 cities whose current population stands at 1.6 million and will be 2.4 million in 2020; 1.2 Water resources available to feed DWS system in 13 rural communities, 9 small towns and over 300 douars with a total current population of 370,000 as from 2008; 1.3 As from 2008, supply drinking water to the 3 new tourist resorts and the new port complex; 2.1 The groundwater table well field, which supplies the zone running from Kenitra to Salé is protected as from 2008; 2.2 As from 2008, 30,000 people living in the Sidi Taibi Center have access to adequate liquid sanitation.	1. Government pursues the different reforms currently being implemented under the Water -SAP. 2. Good quality water resources available in sufficient quantity (drought, pollution, etc.). 3. Government support for PAGER is sustained. **Other risk** 1. Preservation of the resources.
Mozambique	Niassa Province Towns Water and Sanitation Project	To improve the health and quality of life and reduce poverty levels of the population of Mozambique through provision of water and sanitation services on a sustainable basis.	To improve the access, quality, availability and sustainability of water supply and sanitation services in Cuamba and Lichinga Towns in Niassa Province.	**Medium Term Progress (2015)** 1. Water supply improved and coverage rose from average 12% in 2009 to 70% in 2015; 2. Reduce time for fetching water from on average 1.5hrs/day in 2009 to 0.5 hrs/day in 2015; 3. UFW reduced from over 50% in 2009 to 25% in 2015; 4. Average daily hours of supply increased from 1.5 hours per day in 2009 to 24 hours per day in 2015; 5. Increase of population practicing good health / hygiene /sanitation from 25% in 2009 to 50% by 2015; 6. Incidence of diarrhea, dysentery and cholera reduced by at least 30% by 2015; 7. Reduced maternal mortality rate of 408/1,000 births in 2003 to 310/1,000 births by 2015. Source: Baseline data; monitoring system; DHS;	Stable macroeconomy. GOM continuous commitment to support the water and sanitation sector. Water sector reforms and capacity development activities sustained. GOM allocate timely and sufficient resources. Mitigation: Twinning arrangements, in project TA support, GOM to meet local counterpart funding obligations will be mitigated by keeping the counterpart fund requirement to the minimum.

Countries	Project name	Sector goals	Project objectives	Objectively Verifiable Indicators (OVI)	Risks and Assumptions
Mozambique	Urban Water Supply, Sanitation and Institutional Support Project	To provide adequate quantity and quality of water and sanitation services to the entire population of Mozambique.	To improve the access, quality, performance and sustainability of water supply and sanitation services in Chokwe, Inhambane, Maxixe, and Xai-Xai.	1. Increased coverage from 37 % to 65 % by 2007; 2. Occurrence of water borne diseases decreased by 25% by 2007.	**Project Objectives to Goal** 1. Sector reforms are continued and investment in the sector will match the growth in demand. 2. Beneficiaries of the health education and HIV/AIDS awareness campaigns and sanitation component continue to practice and observe good personal hygiene and environmental sanitation. **Output to Project Objectives** 3. Water supply and sanitary facilities are maintained at proper level and extensions are implemented when needed. 4. Tariff adjustments prepared, approved, and implemented in time
Ethiopia	Harar Water Supply & Sanitation Project	To provide social well-being, enhance national economic performance and ensure equitable provision of adequate water and sanitation services to all competing users at affordable cost on a sustainable basis.	The project objective was to improve access to water supply and sanitation services in the towns of Harar, Haremaya, Aweday, Adele and Dengego through improved water production, distribution and sanitation for improved health, poverty alleviation and economic growth.	1. Water supply of good quality increased to 23,155 m^3/day and sanitation services available to 90% of population in the project area at affordable rates by 2006; 2. Improved customer service and reduction in customer complaints by 2006; 3. Complete elimination of water rationing by 2006; 4. Incidence of water borne diseases halved by 2010.	**Project Objectives to Goal :** 1. Government remains committed to increasing access to water and sanitation services at national level, 2. Public and private investments in the sector are increased and sustained. **Output to Project Objectives :** 1. Electricity tariffs remain low, 2. HTWSSA is able to attract qualified personnel from the job market. Capacity to operate and maintain the proposed system. 3. Proposed tariff adjustment are implemented on time.

Countries	Project name	Sector goals	Project objectives	Objectively Verifiable Indicators (OVI)	Risks and Assumptions
Ghana	Improved Sanitation and Water Supply Service Delivery to the Urban Poor in Ghana	Expand access to sanitation and water supply to the urban poor in Ghana.	To build national capacity for planning and delivery of pro-poor WASH services for accelerating sustainable access to urban sanitation and water supply.	1. Reduction of percentage of urban poor with no access to WASH services; 2. Replication and scaling-up of innovative approaches and technologies; 3. Comprehensive set of supportive toolkits, guidelines, training material, etc. for building the capacity of MMDA and sector agencies across Ghana; 4. Involvement of private operators and entrepreneurs; 5. Updating of sector-wide strategies and plans to fully reflect pro-poor issues and the involvement of multi-sector partners in service delivery; 6. Functional learning/knowledge network:	**Reluctance of sector organizations to adopt innovative models:** To forestall this, ministries/agencies have already been extensively involved and will be at the forefront of project coordination, learning and sharing. Ways are being explored to involve more mid-level agency staff in project implementation to create champions with detailed design and implement. **Other critical risks** Lack of staff capacity at local government level for replication
Tanzania	Dar es Salaam Water Supply & Sanitation	1. Improved health and well-being of the population served. 2. Reduction in poverty status among the low-income beneficiaries. 3. Sustainable economic development.	Improved quality of provision of service in the Dar es Salaam Water Supply and Sanitation system in terms of accessibility, quality, quantity and reliability of service and affordability to residents.	70,000 new connections by 2005, Technical Losses decreases from 22% to 5% in the Transmission systems and 32.5% to 23% in Distribution between 2002 and 2006, No area experiences low pressure for more than 8 hours a day beyond 2006, Water quality meets National Standards by 2002 and WHO guidelines by 2006.	**Project Objectives to Goal** 1. Efficient delivery of water supply and wastewater disposal contribute to economic growth and poverty alleviation. **Output to Project Objectives** 1. Commitment to reform is maintained beyond the project implementation stages. 2. Complementary programmes to utilise increased availability and reliability by beneficiaries **Other critical risks** 1. Private operator failure in provision of WSS services 2. Conflict with private operator 3. Design of the sea outfall is based on attaining European bacteriological standards for bathing at the shore 4. Water supply projects are inherently subject to the consequences of droughts such as those associated with the El Nino phenomenon experienced in East Africa recently.

Countries	Project name	Sector goals	Project objectives	Objectively Verifiable Indicators (OVI)	Risks and Assumptions
Tanzania	Monduli District Water Project	Improved coverage of water and sanitation leading to sustainable livelihood in the form of improved health of population, reduction in livestock vulnerability and improved productivity, and increase in other water based economic activities;	Population of 18 villages and two town settlements have adequate and sustainable access to safe, and reliable drinking water supply to meet demand by 2011; enhanced awareness of sanitation and health; year-round availability of water for livestock.	1. 100% basic water service coverage in the selected villages being 39% of the district population by 2007; 2. 35% increase in households constructing appropriate sanitation systems as result of the promotion; and 50% reduction in water related diseases; 3. Reduction in livestock mortality due to displacement in the dry seasons; 4. Reduction in time spent by women in water collection from 16hrs to max. 2hrs per household; 5. Water supply facilities constructed by 2007 with capacity to meet basic drinking water demands of population of 109,000 by 2011 within walking distance acceptable to the communities and of 143,000 livestock units by 2011; 6. Socially acceptable sanitation identified and health education messages understood by at least 80% of the population of the project area by 2007.	**Project Objectives to Goal** Improved health, sustainable livelihoods and greater gender equity contribute to poverty reduction. **Output to Project Objectives** 1. The residents of the beneficiary villages actually use and properly manage the facilities installed. 2. Droughts more severe than allowed in the design do not occur. 3. Population growth rates remains normal. 4. Livestock numbers kept within the carrying capacity of the land. 5. Erosion and siltation higher than foreseen.
Mauritania	Nouakchott City Drinking Water Supply from River Senegal Project	Increase access to drinking water and contribute in the process, to better living conditions and less poverty.	Better meet Nouakchott dwellers' water requirements.	1. Nouakchott's daily water supply up from 44 to 73 liters/day/inhabitant in 2020; 2. Connection rate up from 35% to 80% in 2020; 3. Decrease in the specific incidence of waterborne diseases in Nouakchott which was 2.66 in 2002.	1. The country's economic development prospects fulfilled. 2. Sector's institutional framework strengthened. 3. Investments into DWS study for rural dwellers along the water supply system made. 4. SNDE's capacity to manage the new project-built structures and its future customers. 5. The quality of the water distribution system.

Countries	Project name	Sector goals	Project objectives	Objectively Verifiable Indicators (OVI)	Risks and Assumptions
Cameroon	Yaoundé Sanitation Project	Contribute to poverty reduction in the urban areas.	1. Contribute to rain water drainage in Yaoundé City. 2. Contribute to improving the living conditions of Yaoundé population. 3. Build the capacity of sector stakeholders in Yaoundé.	1. The mortality rate of the under-fives estimated; at 102% in 2000, will fall to 73% in 2015. 2. The maternal mortality rate of 560% in 1991 will fall to 124% in 2015; 3.1 The number of people regularly flooded will: fall from 53,000 in 2005 to 26,000 in 2007 and 10,000 in 2009, 3.2 The number of people occasionally flooded, down from 243,000 in 2005 to 120,000 in 2007 and 48,000 in 2009. 4. The prevalence of waterborne diseases in Yaoundé City will drop (malaria: 16.4% to 6.5% in 2007 and 5% in 2009, diarrhea: 3.8% to 2% in 2007 and 1.9% in 2009 and typhoid: 5.4% to 2.7% in 2007 and 2.2% in 2009); 5. Creation of 675 direct jobs in 2007 and 1 350 in 2009 and 1 175 indirect jobs in 2007 and 2 350 in 2009; 6. In 2007, 7 neighborhoods and in 2009, 14 neighborhoods concerned by the project will have a working pre-disposal system.	1. Sustainability of the solid waste pre-disposal system. 2. Continuation of the other poverty reduction programs. 3. Protecting the canal against the dumping of solid waste into the Mfoundi and its affluents by the riparian population. 4. Support for hygiene and sanitation activities by the project zone's population.
Morocco	Ninth Drinking Water Supply and Sanitation Project	1. Poverty reduction in rural and urban areas through access to DWSS service.	1. Sustainable improvement of rural water supply, notably in the provinces of Kénitra, Chefchaouen, Settat and Azilal. 2. Improvement of management of waste water in the province of Khouribga (towns of Khouribga, Boujaâd and Oued Zem).	1. Drinking water access rate in rural areas at the national level increases from 60% at end-2004 to 80% in 2008 and over 90% in 2010 (the Bank-financed project will permit raising the national rate by about 2.6% and in the provinces concerned by about 18%); 2. Rate or treatment of urban waste water at national level increases from about 5% currently to 15% in 2008 and to 30% at project completion (2010) and to 60% in 2015 (the Bank-financed project will help to increase the national rate by about 1.5%)..	1. Completion of loan arrangements for the Rural DWS program. 2. Management and maintenance of rural DWSS systems. 3. Partial recovery of DWSS service costs. **Other critical risks** 1. The sustainable preservation and availability of water resources. 2. Lack of maintenance and poor management. 3. Poor water quality.

Countries	Project name	Sector goals	Project objectives	Objectively Verifiable Indicators (OVI)	Risks and Assumptions
Senegal	Dakar City Sanitation Project	Contribute to improving socioeconomic and health conditions of Senegalese communities.	Contribute to satisfying the sanitation needs of Dakar's urban and sub-urban dwellers qualitatively and quantitatively by 2010.	1. 30% reduction in the diarrheal morbidity rate by 2010; 2. 25% reduction in diarrheal-related mortality by 2010; 3. 10% reduction in health expenditure by 2010; 4. IERR = 25.17%; 5. The treatment capacity of the Cambérène site raised by 20 000 m3/d by 2005; 6. Reclaimed Area sewage collection rate increases from 25% to 69% by 2005; 7. ONAS's organization enhanced; 8. The population of the project area sensitized on community sanitation problems by 2005	1. A comprehensive policy on WSS adopted. 2. A macroeconomic framework conducive to development put in place. 3. Sanitation tariff scale put in place. 4. Community support for the project 5. Release of industrial wastewater into the domestic sewerage system.
Congo CG	Brazzaville and Pointe Noire Sanitation Project	Ensure sustainable access to water and sanitation to improve the socioeconomic and health conditions of Congo's population.	1. Sanitation facilities in Brazzaville and Pointe Noire are strengthened and secured. 2. Attitude and behavior towards individual and domestic hygiene have changed positively.	**By 2015** 1. The rate of access to sanitation increases from 10.5% in 2008 to 50% by 2015; 2. The rate of infant and child mortality decreases from 117‰ in 2005 to 44‰ by 2015; 3. Maternal mortality decreases from 1100 to 825, i.e., 75% by 2015; 4. Reduction by at least 25% of the incidence of diarrheal diseases, i.e., 53‰ by 2015; 5. Malaria prevalence rate decreases from 5.6% in 2006 to 3% by 2015; 6. Reduction of health expenditure by 25%.	1. Continued reform of the sector. 2. Mobilization of resources needed for infrastructure. 3. Weak capacity of public structures. 4. Sustainability of infrastructure.

Countries	Project name	Sector goals	Project objectives	Objectively Verifiable Indicators (OVI)	Risks and Assumptions
Mauritius	Plaines Wilhems Sewerage Project- stage 1	1. Protect the coastal environment. 2. Avert imminent pollution of surface and groundwater resources. 3. Reduce the health risk due to flooding from sewers, and 4. Contribute to sustainable socioeconomic development.	To provide environmentally appropriate collection and treatment of sewage and disposal of effluent and sludge from the Plaines Wilhems district.	1. No sewerage contamination of the coastal waters detected; 2. Sustained positive trend in water resource quality; 3. 3. Positive trend in water related diseases; 4. Sugar farmland under irrigation increased by 1,500 ha/year. 5. Tourism contribution to GDP not reduced on account of contamination of water resources by sewerage; 6. Households disposing domestic wastewater through onsite systems reduced by 33,087 by 2007 when the project would be fully commissioned; 7. Effluent from the St. Martin Treatment Works meets the prescribed WHO standards of 5mg/l for BOD and Suspended solids; 8. Digested sludge from the St. Martin Treatment Works is compatible with the method of disposal;	**Project Objectives to Goal** Government continues to give the sector the priority it deserves. **Output to Project Objectives** (Project Object. to Goal) 1. The Government remains committed to implementation of the National Sewerage Programme (recommended by the Master Plan Study) and the 2000 tariff policy. 2. Complementary programs are implemented to reduce environmental degradation of surface, ground and seawater as well as public health. 3. Land and housing development take advantage of opportunities created by sewerage infrastructure
Kenya	Water Services Boards Support Project	To contribute to the social well-being of the population, enhance the performance of the national economy through equitable provision of adequate quantity and quality of water and sanitation services to all competing groups at affordable cost on a sustainable basis.	To improve water supply and sanitation services in urban, peri-urban and rural communities within the Athi, Lake Victoria South, Northern and Tana Water Services Boards.	1. Reduced proportion of population below the basic needs poverty line from 46% in 2007 to 21.7% in 2015; 2. Reduced child (under five) mortality from 115 in 2007 to 33 in 2015 per 1000 live births; 3. Reduce maternal mortality from 414 in 2007 to 147 in 2015 per 100,000 live births; 4. Reduce diarrhea incidence by half by 2015; 5. Increase of access to urban water supply from 50% in 2007 to 90% by 2012 Reduced UfW from 60% in 2007 to 30% by 2012; 6. Reduce walking distance in rural areas to less than 500m; 7. Increase of rural population practicing good health/ hygiene / sanitation from 25% in 2007 to 50% by 2012; 8. Increase functional rural water committees by 50% by 2012; 9. Increase female membership of water committees from 30% in 2007 to 50% by 2012.	1. Stable macroeconomic framework continued. 2. Government continues to be committed to poverty reduction and improved quality of life. 3. Government continues to support the implementation of water supply and sanitation programs/projects. 4. Availability of resources. 5. Risk of losing staff to the private sector. 6. Water sector reforms related pursued and sustained. 7. Institutional framework of WSBs strengthened and implemented. 8. Community mobilized and continue to sustain the systems implemented. 9. Maintenance and operation continues to receive the priority and the resources to sustain the facilities. **Other critical risk** Tariffs issue. The consumers who pay water bills currently pay flat rates irrespective of water consumed and increasing tariffs to reflect true market value/actual volume consume could be a challenge.

Countries	Project name	Sector goals	Project objectives	Objectively Verifiable Indicators (OVI)	Risks and Assumptions
Comoros	Drinking Water Supply and Sanitation Project	Improve the socioeconomic conditions and sanitation of the Comorian population.	Ensure sustainable access to drinking water and sanitation services.	1. 3/4 reduction of the proportion of poor people by 2030; 2. Reduction of the infant/child mortality rate from 66/1,000 in 2009 to 35/1,000 in 2030; 3. Access rate to drinking water increases from 10% in 2009 to 100% in 2030; 4. Access rate to hygienic sanitation rises from 7% in 2009 to 100% in 2030. **By 2015** 1. Drinking water access rate increases from 10% in 2009 to 55% in 2015; 2. Hygienic sanitation access rate rises from 7% in 2009 to 20% in 2015; 3. Prevalence of diarrhea-related diseases among children below five years of age falls from 18.3% in 2009 to 13% in 2015 4. Reduced rate of cholera attack from 0.004 in 2007 to 0.001 in 2015	1. The fragility and complexity of the socio-political and institutional system, likely to lead to lack of State ownership. 2. Problem of sustainability of investments, given the lack of political will to recover the cost of managing installations. 3. Possibilities of delay in Project Implementation which may be caused by the executing agency's lack of experience in project management, inadequate knowledge of Bank rules and procedures and the high mobility of public service executives.

Annex 4: Performance Tables

Table A4.1 : UWSS Physical Sanitation Facilities' Achievement

Project	UWSS household latrines achievement (Compared to planned)	AfDB support strategy used for household latrines in AfDB-funded interventions
1. Morocco Eighth Drinking WSS Project	-	
2. Mozambique Niassa Provincial Towns Water and Sanitation Project	80%	Community-based behavior change approach
3. Mozambique Urban WSS and Institutional Support Project	30%	Community-based behavior change approach
4. Ethiopia Harar WSS Project	14%	
5. Ghana Improved Sanitation and Water Supply Services	92%	Market-based approach
6. Tanzania Dar es Salaam WSS	92%	
7. Tanzania Monduli District Water Project	-	Community-based behavior change approach
8. Mauritania Nouakchott City Drinking Water Project	-	
9. Cameroon Yaoundé Sanitation Project	73%	
10. Morocco Ninth Dinking WSS Project	71%	
11. Senegal Dakar City Sanitation Project	86%	
12. Congo Brazzaville and Pointe Noire Sanitation Project	93%	Financing approach
13. Mauritius Plaines Willems Sewerage Project- Stage 1	71%	Financing approach
14. Kenya Water Services Boards Support Project	50%	
15. The Comoros WSS Project	46%	

Source: PARs, PCRs and PERs.

Table A4.2 : Estimation of new people having gained access to drinking water supply and improved sanitation services through UWSS projects

Project	People having gained access to water supply			People having gained access to improved sanitation		
	Planned	Actual	Achievement ratio	Planned	Actual	Achievement ratio
1. Morocco Eighth Drinking WSS Project	1 970 000	1 812 400	92%	30 000	30 000	100%
2. Mozambique Niassa Provincial Towns Water and Sanitation Project	171 146	136 000	79%			
3. Mozambique Urban WSS and Institutional Support Project	246 550	338 772	137%			
4. Ethiopia Harar WSS Project	250 000	200 762	80%			
5. Ghana Improved Sanitation and Water Supply Services	25 000	10 000	40%	27 900	19 300	69%
6. Tanzania Dar es Salaam WSS	2 855 000	1 691 290	59%	3 400 000	476 000	14%
7. Tanzania Monduli District Water Project	109 000	109 000	100%			
8. Mauritania Nouakchott City Drinking Water Project	710 000	710 000	100%			
9. Cameroon Yaoundé Sanitation Project				517 372	510 900	99%
10. Morocco Ninth Dinking WSS Project	350 000	317 800	91%	300 000	350 000	117%
11. Senegal Dakar City Sanitation Project				542 500	205 960	38%
12. Congo Brazzaville and Pointe Noire Sanitation Project				800 000	743 000	93%
13. Mauritius Plaines Willems Sewerage Project- Stage 1				15 828	13 556	86%
14. Kenya Water Services Boards Support Project	1 085 000	790 823	73%			
15. The Comoros WSS Project	180 000	185 321	103%	20 000	7 041	35%
TOTAL	**7 951 696**	**6 302 168**	**79%**	**5 653 600**	**2 355 757**	**42%**

Source: PARs, PCRs and PERs and Evaluation Team estimations.

Table A4.3 : Water utility commercial and technical performance (2013)

Water Utility	Ethiopia	Tanzania	Mozambique						Mauritania	Kenya			
Indicators	HWSA (2012)	DAWASCO (2016)	Cuamba (2014)	Lichinga (2014)	Inhambane (2014)	Xai Xai (2014)	Chokwe (2014)	Maxime (2014)	SNDE (2008)	Nyahururu (2015)	Murang'A (2015)	Muranga South (2015)	Isiolo (20015)
Water coverage (%)	46.23%	55.15%	13.99%	23.50%	100.00%	99.05%	100.00%	73.81%	28.12%	80.48%	71.30%	39.89%	58.40%
Water coverage - Household Connection (%)	35.24%	25.37%	7.53%	15.53%	98.19%	87.97%	88.47%	54.66%	26.49%				
Water coverage – Public Water Points (%)	10.99%	29.78%	6.46%	7.98%	9.81%	11.08%	13.00%	19.15%	1.63%				
Unit operating cost Water only (US $/ m3 sold)	0.58		1.44						0.71				
Continuity of service (Hours/day)	13.77	17.0	16.0	17.0	23.0	24.0	16.0	24.0		20.0	24.0	19.0	11.0
Average Revenue Water only (US $/ m3 sold)	8.0		0.72	0.55					0.36				
Collection period (days)	79.61	117.0	174.38	274.08					764.69				
Collection ratio (%)	192.23		100.00%	100.00%	100.00%	100.00%	100.00%		84.06%	95.00%	98.00%	89.00%	100.00%
Operating cost coverage	49	1.07	0.56	1.14	0.9	1.12	0.93	0.79	0.45	1.1	1.11	1.0	0.93
Water production (liter/person/day)	61.42	99.57	66.64	82.4	124.34	90.9	71.85	71.74	202.01	117.47	98.32	86.23	93.2
Water production (m3/conn/month)	10.62	55.52	18.53	18.93	21.18	16.08	12.88	15.15	46.11	15.48	14.09	28.64	13.68

Water Utility	Ethiopia	Tanzania	Mozambique						Mauritania	Kenya			
Indicators	HWSA (2012)	DAWASCO (2016)	Cuamba (2014)	Lichinga (2014)	Inhambane (2014)	Xai Xai (2014)	Chokwe (2014)	Maxime (2014)	SNDE (2008)	Nyahururu (2015)	Murang'A (2015)	Muranga South (2015)	Isiolo (20015)
Water consumption (liter/person/day)	43.44	48.73	50.23	62.32	81.93	70.25	57.89	50.48	125.43	63.44	60.96	30.18	61.51
Water consumption (m3/conn/month)	7.51	27.18	13.97	14.32	13.95	12.43	10.38	10.66	28.63	8.36	8.74	10.03	9.03
Non-revenue water (%)	29.27%	51.06%	24.63%	24.36%	34.10%	22.72%	19.43%	29.63%	37.91%	46.00%	38.00%	65.00%	34.00%
Non-revenue water (m3/km/day)	13.77	57.6	5.98	10.87	12.06	5.41	3.56	5.21	21.86				
Non-revenue water (m3/conn/day)	0.1	0.93	0.15	0.15	0.24	0.12	0.08	0.15	0.57	0.23	0.18	0.61	0.15
Metering level (%)	92.56	100.00%	99.51%	99.81%	99.67%	100.00%	100.00%	99.74%	95.84%	100.00%	100.00%	94.00%	100.00%

Source: The International Benchmarking Network for Water and Sanitation Utilities (IBNET) - https://database.ib-net.org/quick?goto=utilities_results

Table A4.4 : Completion dates variations in months [+/-] and %

Project	Approval Date (a)	Planned Completion Date (b)	Actual Completion Date (c)	Estimated Time [M] (d)=(b)-(a)	Actual Time [M] (e)=(c)-(a)	Delay [M] (f)=(e)-(d)	Variation [+/-] in % (h)=(f)/(d)*100
1. Morocco Eighth Drinking WSS Project	24/11/2004	31/12/2009	31/12/2010	61	73	12	20
2. Mozambique Niassa Provincial Towns Water and Sanitation Project	29/04/2009	31/12/2013	30/03/2016	56	83	27	48
3. Mozambique Urban WSS and Institutional Support Project	20/12/2002	31/12/2007	30/06/2010	60	90	30	50
4. Ethiopia Harar WSS Project	04/09/2002	31/12/2008	31/12/2011	75	111	36	48
5. Ghana Improved Sanitation and Water Supply Services	18/09/2009	30/09/2013	31/12/2013	48	51	3	6
6. Tanzania Dar es Salaam WSS	17/12/2001	31/12/2007	30/06/2010	72	102	30	42
7. Tanzania Monduli District Water Project	27/11/2003	31/12/2008	30/06/2009	61	67	6	10
8. Mauritania Nouakchott City Drinking Water Project	24/09/2003	31/12/2007	31/12/2010	51	87	36	71
9. Cameroon Yaoundé Sanitation Project	14/12/2005	31/12/2010	31/07/2014	60	103	43	72
10. Morocco Ninth Dinking WSS Project	21/07/2006	31/12/2011	31/12/2013	65	89	24	37
11. Senegal Dakar City Sanitation Project	12/07/2001	31/12/2006	30/06/2009	65	95	30	46
12. Congo Brazzaville and Pointe Noire Sanitation Project	16/09/2009	31/12/2013	31/12/2015	51	75	24	47
13. Mauritius Plaines Willems Sewerage Project- Stage 1	20/06/2007	30/06/2012	31/12/2013	60	78	18	30
14. Kenya Water Services Boards Support Project	21/11/2007	31/12/2012	30/06/2014	61	79	18	30
15. Comoros WSS Project	17/12/2009	31/12/2012	31/10/2016	36	82	46	128

Table A4.5 : Timeline

Actual project timelines (months)

Project	Net Amount	Approval to Signature [M]	Signature to Effective [M]	Effective to First Disbursement [M]	First Disbursement to Completion [M]	Approval to First Disbursement [M]	Approval to Completion [M]
1. Morocco Eighth Drinking WSS Project	53.6	2	4	7	59	13	72
2. Mozambique Niassa Provincial Towns Water and Sanitation Project	18.0	5	12	2	62	19	81
3. Mozambique Urban WSS and Institutional Support Project	19.5	5	33		51	38	89
4. Ethiopia Harar WSS Project	19.2	2	17	3	89	22	111
5. Ghana Improved Sanitation and Water Supply Services	1.8	3	4	1	41	8	49
6. Tanzania Dar es Salaam WSS	34.0	5	17	12	67	34	101
7. Tanzania Monduli District Water Project	15.3	2	5	5	53	12	65
8. Mauritania Nouakchott City Drinking Water Project	19.1	2	27	38	54	31	85
9. Cameroon Yaoundé Sanitation Project	21.7	5	0	7	91	12	103
10. Morocco Ninth Dinking WSS Project	71.6	4	4	7	72	15	87
11. Senegal Dakar City Sanitation Project	11.9	0	13	24	57	37	94
12. Congo Brazzaville and Pointe Noire Sanitation Project	12.8	1	4	0	68	5	73
13. Mauritius Plaines Willems Sewerage Project- Stage 1	7.3	6	5	14	52	25	77
14. Kenya Water Services Boards Support Project	34.2	0	15	4	59	19	78
15. Comoros WSS Project	1.8	1	0	10	70	11	81
TOTAL	**341.7**						
Average Time (M)		3	9	9	63	20	83
Average Time weighted by net amount (M)		**3**	**9**	**8**	**65**	**20**	**88**

Planned times to completion (months)

Project	Net Amount	Approval to Completion [M]	Signature to Completion [M]	Effective to Completion [M]
1. Morocco Eighth Drinking WSS Project	53.6	61	58	57
2. Mozambique Niassa Provincial Towns Water and Sanitation Project	18.0	56	53	51
3. Mozambique Urban WSS and Institutional Support Project	19.5	60	57	48
4. Ethiopia Harar WSS Project	19.2	75	75	63
5. Ghana Improved Sanitation and Water Supply Services	1.8	48	46	46
6. Tanzania Dar es Salaam WSS	34.0	72	71	44
7. Tanzania Monduli District Water Project	15.3	61	58	58
8. Mauritania Nouakchott City Drinking Water Project	19.1	51	48	42
9. Cameroon Yaoundé Sanitation Project	21.7	60	58	55
10. Morocco Ninth Dinking WSS Project	71.6	65	63	62
11. Senegal Dakar City Sanitation Project	11.9	65	65	59
12. Congo Brazzaville and Pointe Noire Sanitation Project	12.8	51	52	50
13. Mauritius Plaines Willems Sewerage Project- Stage 1	7.3	60	75	72
14. Kenya Water Services Boards Support Project	34.2	61	76	73
15. Comoros WSS Project	1.8	36	37	35
TOTAL	**341.7**			
Average Time (M)		59	59	54
Average Time weighted by net amount (M)		**62**	**62**	**57**

Actual times to completion (months)

Project	Net Amount	Approval to Completion [M]	Signature to Completion [M]	Effective to Completion [M]
1. Morocco Eighth Drinking WSS Project	53.6	72	70	66
2. Mozambique Niassa Provincial Towns Water and Sanitation Project	18.0	81	76	64
3. Mozambique Urban WSS and Institutional Support Project	19.5	89	84	51
4. Ethiopia Harar WSS Project	19.2	111	109	92
5. Ghana Improved Sanitation and Water Supply Services	1.8	49	46	42
6. Tanzania Dar es Salaam WSS	34.0	101	96	79
7. Tanzania Monduli District Water Project	15.3	65	63	58
8. Mauritania Nouakchott City Drinking Water Project	19.1	85	83	81
9. Cameroon Yaoundé Sanitation Project	21.7	103	98	98
10. Morocco Ninth Dinking WSS Project	71.6	87	83	79
11. Senegal Dakar City Sanitation Project	11.9	94	94	81
12. Congo Brazzaville and Pointe Noire Sanitation Project	12.8	73	72	68
13. Mauritius Plaines Willems Sewerage Project- Stage 1	7.3	77	71	66
14. Kenya Water Services Boards Support Project	34.2	78	78	63
15. Comoros WSS Project	1.8	81	80	80
TOTAL	**341.7**			
Average Time (M)		83	80	71
Average Time weighted by net amount (M)		**88**	**82**	**73**

Delays to completion (Actual times to completion – Planned time to completion) in months

Project	Net Amount	Approval to Completion [M]	Signature to Completion [M]	Effective to Completion [M]
1. Morocco Eighth Drinking WSS Project	53.6	11	12	9
2. Mozambique Niassa Provincial Towns Water and Sanitation Project	18.0	25	23	13
3. Mozambique Urban WSS and Institutional Support Project	19.5	29	27	3
4. Ethiopia Harar WSS Project	19.2	36	34	29
5. Ghana Improved Sanitation and Water Supply Services	1.8	1	0	-4
6. Tanzania Dar es Salaam WSS	34.0	29	25	35
7. Tanzania Monduli District Water Project	15.3	4	5	0
8. Mauritania Nouakchott City Drinking Water Project	19.1	34	35	39
9. Cameroon Yaoundé Sanitation Project	21.7	43	40	43
10. Morocco Ninth Dinking WSS Project	71.6	22	20	17
11. Senegal Dakar City Sanitation Project	11.9	29	29	22
12. Congo Brazzaville and Pointe Noire Sanitation Project	12.8	22	20	18
13. Mauritius Plaines Willems Sewerage Project- Stage 1	7.3	17	-4	-6
14. Kenya Water Services Boards Support Project	34.2	17	2	-10
15. Comoros WSS Project	1.8	45	43	45
TOTAL	**341.7**			
Average Time (M)		24	21	17
Average Time weighted by net amount (M)		**23**	**20**	**16**

Table A4.6 : Cost variations (%)

Project	Planned cost (million UA)		Actual cost (million UA)		Variation from planned total cost (%)	Notes
	Total	Share of AfDB	Total	Share of AfDB		
1. Morocco Eighth Drinking WSS Project	77.8	72.2%	71.0	72.3%	-9%	-
2. Mozambique Niassa Provincial Towns Water and Sanitation Project	18.63	90.0%	16.29	82.2%	-13%	Downscaling of project's outputs.
3. Mozambique Urban WSS and Institutional Support Project	24	89%	21.9	88.1%	-9%	Downscaling of project's outputs.
4. Ethiopia Harar WSS Project	27.11	77.5%	22.03	87.24%	-19%	Downscaling of project's outputs.
5. Ghana Improved Sanitation and Water Supply Services	Euro 2.805 million	70.5%				-
6. Tanzania Dar es Salaam WSS	US$ million 164.60	34.8%	US$ million 169.71	29.8%	3%	Actual overruns 9.3% of IDA contribution and underruns 8.8% of AfDB.
7. Tanzania Monduli District Water Project	15.511	100%	14.62	100%	-6%	Downscaling of project's outputs.
8. Mauritania Nouakchott City Drinking Water Project	US$ million 220	5.9%	US$ million 451.4	7.4%	105%	Supplementary financing supported by donors.
9. Cameroon Yaoundé Sanitation Project	28.49	89.9%	24.71	87.8%	-13%	Actual overruns 4.5% of government counterpart.
10. Morocco Ninth Dinking WSS Project	104.2	66.2	112.6	80.8%	8%	-
11. Senegal Dakar City Sanitation Project	13.45	88.7%	13.39	88.6%	0%	Downscaling of project's outputs due to high loss in currency conversion (CFA Franc).
12. Congo Brazzaville and Pointe Noire Sanitation Project	21.0	60.7%	20.38	59.0%	-3%	Actual overruns 4.2% of government counterpart. Downscaling of project's outputs.
13. Mauritius Plaines Willems Sewerage Project- Stage 1	132.37	10.3%	153.20	9.0%	16%	Actual overruns 28% funded by other sources, Government, China, EIB, and EU.
14. Kenya Water Services Boards Support Project	56.89	79.6%	52.80	80.1%	-7%	Actual overruns 16.7% of government contribution and UN Habitat reduced its contribution due to internal restructuring.
15. Comoros WSS Project	21.52	49.4%				Downscaling of project's outputs. Execution underperformance

Annex 5: Bibliography

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Endnotes

1. Development outcomes is the average of the four main criteria, namely relevance, effectiveness, efficiency and sustainability
2. Development Assistance Committee of the Organization for Economic Co-operation and Development
3. SAP database as at June 2017
4. AfDB/OWAS, 2016, The Bank Group Water Sector Activities and Initiatives for 2015
5. DWSSP: Dar es Salaam Water Supply and Sanitation Project
6. MoWSSP: Monduli District Water Supply and Sanitation Project
7. The choice of technology was inappropriate. Meters acquired in Nyahururu and Muranga south were incompatible with the requirements of the Water Service Providers (WSP) and remain largely unused. Pressure reducing valves were installed in The Murang'a South Water and Sanitation Company Ltd, but the WSP staff were not trained in their use and nor were operations manuals provided. Further, the automatic data logger was fitted with proprietary software by supplier from the United Kingdom, and thus the devise is costly to maintain. Moreover, the project design did not clearly define the distribution network. It did not also clarify the connectivity between the new system and the old one.
8. There were three technical options. The technical choice made had conclusive advantages, but caused adverse results in terms of cost and operation and maintenance requirements.
9. Land morphology and the consequences of storm runoff were improperly assessed. The primary thickener that prevents the direct sludge discharge from the treatment plant was abandoned. In addition, the technical options were not the best adapted to the Senegalese context. The activated sludge process, which is based on aerobic biological treatment, is the technical solution adopted for domestic wastewater treatment. This process is widely used in industrialized countries, mainly in Europe and North America. Although the treatment performance and reliability of activated sludge systems are well-tested, particularly in France, their operation has little flexibility and they are not easily adaptable to the context of African countries, especially in terms of energy consumption, as they do not tolerate significant flow changes
10. Ghana, Tanzania DWSSP and MoWSSP (see Box 1), Mauritania, Cameroun, Congo and the Comoros.
11. Vis-à-vis natural disasters, such as droughts, pollution, erosion, siltation, etc.
12. A high percentage of leakage (58%) was encountered in the old systems of the Mauritania project. In addition to the water loss, the wastewater infiltrated from septic tanks and the sewage network will find its way into the water supply network through leakage points.
13. The unique new water system (Mbeni) built under the project in 2015 was still not operational at the time of the evaluation mission (July 2017), with the risk that non-functional electrical equipment will deteriorate before use. The Mbeni commune refused to manage the system due to its high operational cost (diesel pump water scheme).
14. If the Tanzania DWSS Project is excluded, this percentage rises to 90% of a target population of 5.1 million.
15. Only two of the 13 water utilities reviewed claim to provide water 24 hours per day.
16. In the case of the Mozambique Niassa project, for instance, the PER revealed that from the regulator report (CRA, 2015) water is pumped to the network 19 hours a day in Lichinga and 16 hours a day in Cuamba. The figure in Lichinga will worsen due to the increase of the town's population against static production capacity.
17. From 18 hours a day in 2007/08 to 12 hours a day in 2015/16.
18. Fewer parameters tested than required.
19. An average of 2.3 mg/l biochemical oxygen demand (BOD) against a target of 10mg/l and total suspended solids (TSS) of 1.6mg/l against a target of 15mg/l.
20. Since July 2011, the purification rate is no longer determined due to lack of a flow meter.
21. It should be noted, however, that due to the importance of the issue of wastewater usage in market gardening, ONAS has established partnerships with the Spanish Cooperation Agency through the FAO to promote market gardeners' access to quality water in peri-urban areas (Greater Niayes). In addition, other research programs on the safe reuse of wastewater for agriculture were ongoing (WHO/FAO/CREDI Project).
22. It should be noted, however, that due to the importance of the issue of wastewater usage in market gardening, ONAS has established partnerships with the Spanish Cooperation Agency through the FAO to promote market gardeners' access to quality water in peri-urban areas (Greater Niayes). In addition, other research programs on the safe reuse of wastewater for agriculture were ongoing (WHO/FAO/CREDI Project).
23. If the Tanzania DWSS Project is excluded, this percentage rises to 83% of a target population of 2.2 million.
24. Only two households had latrines instead of the target of 200 households in Mankessim, and only 12 households had latrines compared with a target of 400 in Huni Valley. The low household latrine uptake adversely affected the testing of innovative technologies, which included ecological sanitation and reuse of urine and excreta/ feces.

25. Gravity transmission of water was incorporated in all the areas except Migori WSP where the terrains necessitated a pump system. However, the soundness of the constructed infrastructure was found to be lacking in all regions. In Isiolo, for instance, there were visible cracks in buildings and other indications of poor workmanship. Kandara bulk transmission in Murang'a South was never flushed out in addition to lacking washouts. Some equipment such as "appurtances", were difficult to operate because of inappropriate locations.

26. The water system provided did not meet the water demand due to an inadequate borehole yield, which affected the reliability of the water supply to users. The septic tank systems of public toilets were not properly designed and constructed with, in some cases, no provision being made for a soakage pit, thus causing rapid filling of tanks. Latrines with septic tanks and soak-aways had under-designed soak-away pits (low capacity), causing performance failure and resulting in unsafe wastewater being discharged into the environment. The defects in technical design had negative consequences on the environment and financial sustainability.

27. The project's technical sustainability was negatively affected by: (i) the technical options adopted due to the poor quality of designs; (ii) National Sanitation Authority of Senegal's (ONAS) weak financial, material and human-resources capacity due particularly to the State's failure to honor its commitments specified in the performance contract concluded with ONAS; (iii) frequent power outages and fuel shortages which impeded network and equipment maintenance operations; and (iv) very difficult operating conditions, particularly regarding the management of floating materials in degreasing lines and in the primary sedimentation tank (thick and compact layers of fats, which are very difficult to remove). The intensive activated sludge treatment system adopted was costly.

28. ONAS is not shielded from political pressure. It cannot prepare its own budget and freely mobilize funds commensurate with its real needs, although its autonomy is real.

29. The focal-point mechanism did not work mainly due to the interference of the mayor and the administrations of the municipalities. The lack of human resources and technical capacity prevented the relevant institutions from achieving their missions.

30. Another concern that can hinder sustainable development is the tendency of County governments to prefer working directly with communities instead of relevant agencies. This has promoted poor quality works, and significant duplication and wastage of resources. However, if the different bodies involved in the sector can coordinate effectively, growth will be felt and many more impacts realized.

31. The use of Waste Management Teams (WMTs) for toilet block management is relatively new, appeared weak and unsupported, and became more susceptible to political interference. The project did not make room for sufficient safeguards to reduce political interference. In Ashaiman, it took more than one year for the municipality to sign a contract with the private operators due to delays in appointing the Municipal Chief Executive (MCE). This meant that, in the absence of the MCE, the system could not work to ensure sustainable WASH to the inhabitants. In Mankesim, WMT integration into the local administrative system was not effective due to political interference as seen by reported conflicts of interest, a lack of incentives and low commitment.

32. The feasibility studies for Kenya Nyahururu may have been improperly conducted, leading to failed infiltration of wells, requiring the relocation of planned intake to less polluted areas.

33. The quantity of sludge produced was low compared with the "activated sludge" process tested and adapted to the size of the two cities (Boujaâd and Oued Zem) and their climatic context.

34. Population with access to water services (either with direct service connection or within reach of a public water point) as a percentage of the total population under utility´s nominal responsibility.

35. Independent environmental audits undertaken on the St. Martin Wastewater Treatment Plant as part of the government's National Sewerage Programme, supported by the European Union, show that the plant was being operated effectively, as the quality of treated effluents complied with the requisite standards (Mauritius)

36. Interviews and field assessment in Ghana revealed that no clear plans were in place for the final management of fecal sludge and/or excreta from toilet facilities in the project areas. A bio-plant was built at Ashaiman to utilize the excreta from one public latrine at the polyclinic, but the rest of the large quantities that are generated by the other latrines in Ashaiman are not catered for. There was an expectation in that the project could work with SAFISANA on fecal management, but it was not clear how this was going to work. Up to now, there has been no visible linkage or partnership established. Currently, the toilet facilities in all three project areas are discharging more fecal matter into the environment than normal as they quickly fill up and no effective treatment occurs. Fecal sludge (disposal) management was not extensively considered in the operational management of the public latrines from an environmental sustainability perspective.

37. Due to the unsatisfactory performance of biological treatment, non-compliance with marine discharge standards and failure to take rainwater into account in the serviced plots area, the project had a negative impact on the environment.

IDEV

Independent Development Evaluation
African Development Bank

An IDEV **Project Cluster Evaluation**

About this Evaluation

This report summarizes the results of a cluster evaluation of 15 AfDB-funded Urban Water Supply and Sanitation (UWSS) projects that were implemented in 12 regional member countries in 2001-2016. The evaluation assessed the performance of the selected projects and drew lessons for the design and implementation of future UWSS projects in line with the Bank's High 5s priorities related to improving the quality of life for the people of Africa.

The evaluation examined the relevance, effectiveness, efficiency and sustainability of the projects, the extent to which the intended project results were achieved, and the factors that facilitated or limited their achievement.

Lessons on what worked and what did not work for the UWSS cluster projects were distilled from multiple sources of evidence using both quantitative and qualitative data collection approaches including desk reviews of relevant Bank documents and literature; interviews with key internal and external stakeholders; and field visits of purposively selected project sites. Each category of data was analyzed using mainly descriptive statistics. Comparative analysis was also conducted.

Critical lessons from this evaluation include the importance of a sound preparatory phase backed by up-to-date feasibility studies for successful implementation; the relevance of "state-of-the-art" technologies, provided there is a match between project requirements, availability of adequate spare parts and relevant expertise; and the need to systematically address issues related to service delivery and behavioral change to maximize the impact of the UWSS infrastructure.

IDEV

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