



THE UNITED REPUBLIC OF TANZANIA NATIONAL AUDIT OFFICE



PERFORMANCE AUDIT REPORT ON OPERATION AND MAINTENANCE OF WATER SUPPLY SCHEMES IN TANZANIA



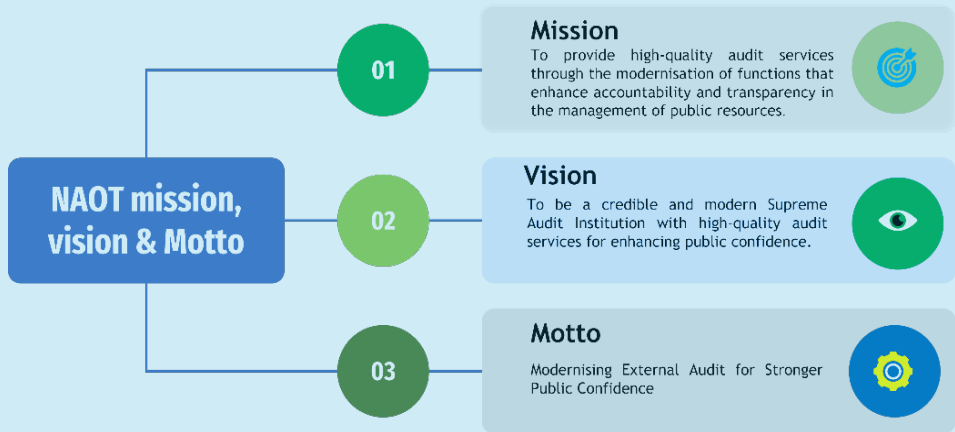
CONTROLLER AND AUDITOR GENERAL

MARCH 2023



About National Audit Office

The statutory mandate and responsibilities of the Controller and Auditor General are provided for under Article 143 of the Constitution of the United Republic of Tanzania, 1977 and in Section 10 (1) of the Public Audit Act, Cap. 418.



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PREFACE



Section 28 of the Public Audit Act, CAP 418 [R.E. 2021] gives mandate to the Controller and Auditor General to carry out Performance Audit (Value-for-Money Audit) to establish the economy, efficiency and effectiveness of any expenditure or use of resources in the Ministries, Departments and Agencies (MDAs), Local Government Authorities (LGAs) and Public Authorities and Other Bodies which involves enquiring, examining, investigating and reporting, as deemed necessary under the circumstances.

I have the honour to submit to Her Excellency, the President of the United Republic of Tanzania, Hon. Dr. Samia Suluhu Hassan, and through her to the Parliament of the United Republic of Tanzania, the Performance Audit Report on the Operation and Maintenance of Water Supply Schemes.

The report contains findings, conclusions, and recommendations that are directed to the Ministry of Water and Rural Water Supply and Sanitation Agency.

The Ministry of Water and Rural Water Supply and Sanitation Agency had the opportunity to scrutinize the factual contents of the report and comment on it. I wish to acknowledge that discussions with the Ministry of Water and Rural Water Supply and Sanitation Agency have been useful and constructive.

My Office will carry out a follow-up audit at an appropriate time regarding actions taken by the Ministry of Water and Rural Water Supply and Sanitation Agency in implementing the recommendations given in this report.

In completing the audit assignment, I subjected the draft report to a critical review of subject matter experts, namely Eng. Romanus Mwang'ingo, an Independent Consultant and Dr. Richard J. Kimwaga from University of Dar es Salaam who came up with useful inputs for the improvement of this report.

The report was prepared by Mr. Victor F. Mapigano (Team Leader), Mr. Paschal L. Msele (Team Member) under the supervision and guidance of Mr. Michael D. Malabeja (Chief External Auditor), Mr. James G. Pilly (Assistant Auditor General) and Mr. George C. Haule (Deputy Auditor General).

I would like to thank my staff for their commitment in preparing this report. I also acknowledge the audited entities for their cooperation with my Office which facilitated the timely completion of the audit.



Charles E. Kichere
Controller and Auditor General
United Republic of Tanzania
March, 2023



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LIST OF ABBREVIATIONS AND ACRONYMS

BUWASA	: Bukoba Urban Water Supply and Sanitation Authority
CBWSOs	: Community Based Water Supply Organisations
DAWASA	: Dar es salaam Water Supply and Sanitation Authority
DC	: District Council
DUWASA	: Dodoma Urban Water Supply and Sanitation Authority
EAS	: East African Standards
EWURA	: Energy and Water Utilities Regulatory Authority
HQ	: Head Quarters
ISSAIs	: International Standards for Supreme Audit Institutions
IAMP	: Integrated Asset Management Plan
INTOSAI	: International Organisation of Supreme Audit Institutions
KPI	: Key Performance Indicators
KUWASA	: Kigoma Urban Water Supply and Sanitation Authority
LUWASA	: Lindi Urban Water Supply and Sanitation Authority
Maji-MIS	: Maji Management Information System
MIMS	: Maintenance Information Management System
MoU	: Memorandum of Understanding
MoEST	: Ministry of Education, Science and Technology
MoW	: Ministry of Water
MTEF	: Medium Term Expenditure Framework
MUWSA	: Moshi Urban Water Supply and Sanitation Authority
MWAUWASA	: Mwanza Urban Water Supply and Sanitation Authority
NGOs	: Non-Governmental Organizations
NRW	: Non-Revenue Water
NTA	: National Technical Awards
O & M	: Operation and Maintenance
PAC	: Poly-Aluminium Chlorine

PO-RALG	: President's Office - Regional Administration and Local Government
RUWASA	: Rural Water Supply and Sanitation Agency
SCADA	: Supervisory Control and Data Acquisition
SDGs	: Sustainable Development Goals
TANESCO	: Tanzania Electric Supply Company Limited
TANROADS	: Tanzania National Roads Agency
TARURA	: Tanzania Rural and Urban Road Agency
TBS	: Tanzania Bureau of Standards
TZS	: Tanzanian Shilling
WSSAs	: Water Supply and Sanitation Authorities
URT	: United Republic of Tanzania
DCOM	: Design, Construction Supervision, Operation and Maintenance



EXECUTIVE SUMMARY

Achieving Sustainable Development Goal (SDG) 6, "availability and sustainable management of drinking water and sanitation for all," among others, requires maintaining existing water schemes sustainably. In recent years, the government of Tanzania has prioritised on the expansion and improvement of water services through heavily investing on water infrastructure projects. This is in response to meeting the country's growing water demands as a result of the rapid rate of urbanisation and population growth. The government water target is to achieve 95% and 85% coverage of water services in urban and rural areas respectively by 2025.

However, more efforts are directed on the quantity of built infrastructure, with little attention on the operation and maintenance of the built infrastructure. As a result, there have been a malfunction of water infrastructure consequently reducing the reliability of water supply systems and increase the risk of their failures.

According to the Tanzania Water Status Report, 2020 approximately 30% of constructed Water Points were not operational from 2014 to 2019. This indicates a significant government's investment loss and demonstrates the operation and maintenance challenges in water supply service. As a result, rural water service becomes low and, in some cases, unavailable.

The audit mainly focused on assessing the adequacy of Rural Water Supply and Sanitation Agency (RUWASA) and Water Supply and Sanitation Authorities (WSSAs) to operate the established water supply projects in the country. It also focused on assessing the adequacy of the Ministry of Water in monitoring the performance of RUWASA and WSSAs in operating and maintaining water projects in the country.

The audit covered 3 financial years that is (2019/20 to 2021/22) in order to come up with adequate audit conclusions and recommendations based on the established performance trend. Also, this was the period when Rural Water Supply and Sanitation Agency was established (2019), thus, its performance was assessed based on the time when it was established. The audit evidence was gathered through document reviews, interviews with relevant officials, and observation through physical verification.

Main Audit Findings

The Operation and Maintenance of Water Supply Schemes in Urban Areas

Inadequate Water Supply Infrastructure's Operation Plans, Schedules and Procedures

It was observed that 3 out of 8 visited WSSAs' water infrastructure were operated without having formal operating procedures that could be followed by all operators. This happened mainly due to lack of guidance and awareness programme to the Operation and Maintenance staff on the necessity of having formal and analysed operational procedures for each system installed in water supply scheme. Similarly, the equipment operational manuals for the recently installed water supply infrastructure, were not available at the site.

Therefore, non-existent of operational plans and procedures suggests that, the operation activities were conducted based on personal experience and perspectives contrary to the best practice as required by the manufacturer's instructions.

Non-functioning of Water Supply Infrastructure

The Audit noted that, in 4 out of 8 visited WSSAs, there was a number of non- operating water facilities. This in turn lowered the quantity of water production below the installed capacity. The cases where non-operating water supply infrastructure were noted included, LUWASA whereby 4 boreholes were not working, DAWASA whereby standby pumps were default and BUWASA whereby 11 intake pump was not working due to motor breakdown. Also, in SUWASA, SCADA and chlorination systems were not working.

The non-functional of water systems in these cases, deprived the scheme beneficiaries of good and reliable water services as expected. On the other hand, the breakdown of one pump at Bunena intake (BUWASA) and lack of standby pump risked the community from not accessing water services in case of any pump collapse for different reasons.

Non-attainment of the Recommended Target of Non-Revenue Water

The Ministry of Water planned to reduce the percentage of Non-Revenue Water from the National average of 36% in July, 2014 to reach 28% of Non-Revenue Water in 2022¹. Similarly, the recommended service level of Non-Revenue Water as percentage of water production, was not more than 20%.

However, it was noted that, in 8 visited WSSAs, only 1 WSSA attained a recommended service level of Non-Revenue Water (NRW). The maximum NRW was noted in BUWASA with 42%, 45% and 44% in 2019/20, 2020/21 and 2021/22 respectively. Conversely, Moshi was a highly performing utility with 22%, 20% and 27% in 2019/20, 2020/21 and 2021/22 respectively.

The revealed reasons for non-attainment of the benchmark for NRW were; frequent bursting of water pipes due to irregular maintenance of aged and dilapidated water supply schemes and lack of bulk meters to measure water loss. Consequently, not all produced water was billed and reached the intended communities. In addition, visited WSSAs lost approximately a total of TZS 57.2 and 60.94 billion from NRW in the year 2019/20 and 2020/21² respectively.

Non-payment of Water Bill Debts by Some Government Entities

The Audit noted that, some government entities were supplied with water services but did not pay their water bill dues. It was revealed that, for the financial year 2019/20, various government entities had a total debt amounting to TZS 43.3 Billion as of May, 2020.

In addition, the annual average debts for 8 visited WSSAs was found to be TZS 31.7 billion starting from 2019/20 to 2021/22. DAWASA was a heavily indebted water utility with an annual average debt of TZS 11.309 billion. The minimum annual average debt was noted in LUWASA with an amount of TZS 119 million.

¹ page 52 and 108 respectively of the MoWT's Five Year Medium Term Strategic plan 2019/20 - 2023/24

² Analysis of data from EWURA for the financial year, 2020/21

Based on the inadequate effort from the Ministry of Water to support the collection of the existing enormous debts. There was a risk of not recovering the outstanding debts. Meanwhile, there is high risk for WSSAs not attaining the financial self-sustaining strategy of reducing heavy reliance on the government budget.

The Ministry launched a programme to improve revenue collection, which included launching a pilot project to install prepaid meters in Iringa region. The result of this pilot was promising in terms of resolving the existing revenue collection challenges. However, there were some observed challenges in this pilot programme relating to the technological robustness of the used technology and the sustainability of installation. Therefore, the Ministry was addressing these challenges and intended to expand this project to other WSSAs.

Inadequate Monitoring of Water Quality Parameters

It was found that, 2 out of 8 visited water facilities were not conducting water quality monitoring before and after the treatment of water. It was observed that, Lindi Urban Water Supply and Sanitation Authority (LUWASA) and Kigoma Urban Water Supply and Sanitation Authority (KUWASA) were not adequately monitoring the quality of water supplied to the community. The responsible official in LUWASA was on leave, at the time of visit and no one was assigned to perform this duty. Thus, the daily water quality control logbooks were not presented to the Auditors for verification.

Regardless of LUWASA serving a population of more than 71,241 people in Lindi Region, water treatment facilities for Ng'apa water supply scheme, whose investment was more than TZS 33 billion, lacked standard laboratory for daily/frequent testing of water quality as of September, 2022. Also, the designed automated chlorination system was not working.

Moreover, 2 out of 8 visited WSSAs namely; LUWASA and KUWASA did not conduct daily water quality measurements at the inlet and outlet of water treatment facilities. Whereas, BUWASA measured water quality parameters after treatment on daily basis. Based on these facts, the inadequate monitoring of water quality parameters in urban water supply scheme was attributed to non-adherence to water quality monitoring guidelines provided by EWURA.

Therefore, regular and adequate monitoring of water quality parameters would enable treatment plant operators and water quality officers to ensure that, the treated water meet the required standards. Also, daily water quality measurements at inlet and outlet would facilitate the evaluation of the performance of water treatment plants as the operators could notice any irregularities in treatment operations during the treatment process and rectify.

The Operation and Maintenance of water supply infrastructure in rural areas

Non-existent Water Supply Infrastructure's Operation Plans, Schedules and Procedures

The Audit noted that, all 19 visited Community Based Water Supply Organisations (CBWSOs) that were operating rural water supply schemes, none of them had a defined equipment's formal operational plan and procedures. The noted reasons for a lack of formal operating plan and procedures included; lack of awareness among the management team on the requirements of Water Operation and Maintenance Manual to have operation plan and procedures in place; and lack of training to ensure that, Management Team were capacitated on the preparation and use of operation plans and procedures.

As a result, operations of water supply schemes were based on personal experience and perspectives which was contrary to the manufacturer's instructions.

Inadequate Control on Water Billing and Revenue Collection in Rural Areas

The Audit noted that, all 19 visited CBWSOs were not collecting water bills from customers electronically, instead officials were collecting bills in cash. An Accountant or any other assigned official, distributed water bills manually and received cash which was then deposited to the bank account of CBWSOs.

Furthermore, 33 of the 19 visited CBWSOs had 100% unmetered customers, while the remaining 16 CBWSOs had metering performance that varied between 7% and 89% of the unmetered customers. Meanwhile, there were

no bulk water meters to measure the amount of water supplied to their customers.

Based on these facts, the inadequate provision of water meters to the customers posed difficulties for the CBWSOs to determine the amount of water supplied to the community and the expected amount of revenue collection. Therefore, NRW in rural areas would not be adequately assessed since they could not quantify or measure the quantity of water supplied to the community.

Inadequate Treatment of Water Supplied in Rural Water Supply Schemes

The Audit observed the absence of water quality monitoring programme for the rural water supply schemes. This was manifested by the fact that, there were no established mechanisms to ensure that, quality of supplied water to the community was known on daily basis. With regard to the borehole sources, they relied on the information obtained from the measurement taken during the project implementation. It was further found that, 14 out of 19 visited rural water supply schemes lacked periodic water quality parameters analysis to address the quality of water supplied to the community and take appropriate actions for any noted irregularities. However, only 2 CBWSOs namely; Lawate - Fuka and Makiwaru - Magadini in Siha DC were conducting water quality parameter test on quarterly basis using an external consultant.

Moreover, the Audit noted that, in rural water supply scheme, there were no qualified water quality personnel and equipment/tools for testing the basic water quality parameters such as turbidity, chlorine residual and other chemical contents. As a result, the safety of water consumer was not guaranteed. Therefore, government effort to safeguard the health of people was at risk since the community had a high possibility of consuming unsafe water.

All 19 Visited Rural Water Supply Schemes had no Functioning Water Treatment Facilities

The audit noted that, the available water treatment facilities were not functioning well. This was manifested by the fact that, 7 out of 19 schemes, equivalent to 42% had installed chlorination systems which were left without being operated. The remaining schemes had no any treatment

facilities. This implies that, water was supplied directly from the borehole sources to the community without any treatment. It was further noted that, for the schemes with chlorine dosing system, they did not have water treatment chemicals such as Calcium Hypochlorite and equipment for measuring residual chlorine.

The absence of functioning treatment system in rural water supply schemes was attributed to inadequate consideration on the provision of water treatment facilities during the planning and designing of rural water supply schemes. Whereas, the visited schemes, which were noted to have installed chlorination system, the system was installed later on after the completion of the construction of the schemes.

Generally, raw water was supplied to the community directly from the water sources. This posed a huge potential human health risk, especially during rainy season when runoff transport faecal contaminants which were deposited into water sources. It was most likely that, communities that consumed untreated water were prone to water borne diseases such as cholera, typhoid, dysentery and the alike.

Inadequate Management of Non-Revenue Water

The Audit noted that, RUWASA had no mechanisms in place for the proper data records on Non-Revenue Water at CBWSOs level and their transmission to the RUWASA-headquarter. This was caused by a lack of installed water meters for recording the exactly amount of water produced, transmitted and supplied to the customers.

In this regard, there was a high possibility of missing the 2023 NRW target of 26% due to lack of NRW monitoring mechanisms to determine the status in rural areas. RUWASAs at HQ and regional level were not adequately informed on NRW which hindered them from making appropriate decision to rectify this challenge.

On the other hand, all the schemes did not keep records, thus a lack of data on the amount of water produced and the quantity of water billed and sold. This led into difficulties to determine the actual expected revenue. Therefore, the sustainability of the schemes was inadequate due to revenue loss from NRW which was neither detected nor accounted for.

Inadequate Regular Surveillance Inspections Conducted to Water Supply Schemes in Rural Areas

The three years under the audit period, it was noted that, only 2 inspections were conducted in water supply schemes by RUWASA in January, 2020. The first inspection was done in Rukwa and Songwe region while the second inspection was done in Kagera, Geita, Mwanza, Mara and Simiyu. Thus, no inspections were conducted in the financial year 2021/22.

Moreover, these inspections were ad hoc as they only targeted specific water supply schemes which had reported some operational and maintenance challenges. However, at all RUWASA levels i.e RUWASA HQ to District's levels, regular inspections were not conducted as required, instead the inspections were conducted on ad hoc basis. In most cases, inspections were conducted when there were reported challenges in the specified water supply schemes.

Therefore, inadequate surveillance and inspection were linked to a lack of capacity building to Management Team in Rural Schemes as they were not aware of the requirements for conducting surveillance and inspection on the operation of water supply schemes.

Inadequate Maintenance of Water Supply Schemes

The 2020 review report on the Inspection of Water projects with Challenges in the Provision of Water in Rural Areas revealed that, 16 % of inspected 155 water supply networks in rural areas had malfunctioning challenges mainly due to irregular maintenance of the schemes.

According to this report, the government required a total of TZS 11 billion to fix the non-functional schemes caused by various issues including irregular maintenance, inappropriate design and the like. For instance, 1 out of 19 visited schemes namely; Ukombozi in Liwale DC was not supplying water to the community due to water pump breakdown. As a result, the community at Liwale DC who depended on Ukombozi scheme were not supplied with water services at the time of this audit.

Inadequate Monitoring of the Performance of CBWSOs in Rural Areas

Despite the requirement of RUWASA to conduct routine and special performance assessment of CBWSOs to establish the capacity to deliver quality and sustainable services, RUWASA was not implementing its mandated role effectively.

Moreover, in the years under the Audit that is (2019/20 to 2021/22) there was only one CBWSOs assessment report which was prepared in 2020/21. Meanwhile, there were no routine reports on the assessment of the performance of CBWSOs.

It was further noted that, the lack of assessment report on the performance of CBWSOs was partly contributed by lack of guideline for assessment of CBWSOs. According to the reviewed third quarter report for the financial year 2021/22, it was revealed that, the completion of the preparation of the guideline for evaluation of performance of CBWSOs would have been completed in the third quarter. This was based on the fact that, previously RUWASA did not have a CBWSOs performance assessment guideline.

Therefore, inadequate CBWSOs performance evaluation did not provide opportunity to registered CBWSOs for improving their performance. This was due to the fact that, without carrying out assessment, it is not possible to precisely identify weaknesses and areas for improvement.

Audit Conclusion

Generally, the Ministry of Water through Rural Water Supply and Sanitation Agency (RUWASA) and Water Supply and Sanitation Authorities (WSSAs), did not effectively operate and maintain water supply schemes to ensure their sustainability.

This emanated from the operational and maintenance weaknesses of water supply schemes in the country by Rural Water Supply and Sanitation Agency (RUWASA) and Water Supply and Sanitation Authorities (WSSAs). The noted areas of weakness included; inadequate water treatment systems for the water schemes which supply water to the community both in rural and urban areas, inadequate operation and maintenance, inadequate monitoring of water quality parameters, low capacity of CBWSOs to manage water supply schemes, inadequate collection of water

bill debts for the supplied water services mostly in urban areas from government Ministries and agencies, inadequate use of electronic collection system for revenue particularly in rural areas and inadequate coordination with other government agencies like TANROADS and TARURA.

Moreover, the Ministry did not monitor and evaluate the functions performed by RUWASA and Water Supply and Sanitation Authorities adequately. Whereas, the Ministry did not provide adequate oversight support to ensure that, the agencies perform their functions effectively including establishing water treatment facilities, the use of electronic systems for revenue collection particularly in rural areas, proper and adequate use of the existing and available prepared operational and maintenance support guidelines.

Consequently, water services posed a high risk of endangering human health due to the use of water which did not comply with safe and clean drinking water quality and standards. On the other hand, the collected revenue in rural areas was at risk of being misappropriated due to weak internal financial control.

The Audit Recommendations

Recommendations to the Ministry of Water

The Ministry of Water is urged to:

1. Develop a robust debt collection strategy to ensure that, all Government Ministries, Departments and Agencies which are heavily indebted by WSSAs pay their water bills timely. This can be established in collaboration with the Ministry of Finance and Planning and the Ministry of Home Affairs;
2. Ensure that, utilities with high energy consumption conduct regular energy audit and take appropriate energy use efficient measures;
3. Ensure that, RUWASA and WSSAs conduct periodic maintenance of the established water supply schemes in the country and keep records for all the maintenance activities done;

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4. Ensure that, utilities prepare and adopt Integrated Asset Management Plan. This will enable to integrate assets life with investment plans to reduce quantity of dilapidated infrastructure that cause water loss and excessive maintenance cost;
 5. Ensure that, RUWASA and WSSAs determine the levels of Non - Revenue Water in urban and rural areas and monitor the improvement;
 6. Monitor the performance of RUWASA and WSSAs and ensure that, they have functioning water treatment facilities and staffed by qualified and competent personnels;
 7. Ensure that, RUWASA at regional and LGAs levels develop a database of their customers which can be frequently updated and use electronic system in revenue collection;
 8. Ensure that, RUWASA and WSSAs continuously build the capacity at different levels and various actors to effectively operate and maintain water supply scheme; and
 9. Ensure that, funds for the operation and maintenance of water supply schemes in the country are not spent for other unplanned issues.

Recommendations to Rural Water Supply and Sanitation Agency (RUWASA)

The Management of RUWASA is urged to:

1. Device mechanisms to retain Community Water Management Team for water supply schemes including improved employment terms;
2. Ensure that, Community Water Management Team for water supply schemes have the required qualifications and competence;
3. Ensure that, each established water supply scheme in rural areas have operation and maintenance plan;

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4. Ensure regular maintenance of established water supply schemes and records are kept for all the maintenance activities done;
 5. Device mechanisms for effective monitoring of the performance of CBWSOs;
 6. Evaluate periodically the performance of CBWSOs and take appropriate measures;
 7. Raise awareness, orient and popularise the existing prepared water schemes operational and maintenance support guidelines and tools; and
 8. Ensure that, all water supply schemes in rural areas have functioning and proper water treatment facilities.



CHAPTER ONE

INTRODUCTION

1.1 Background Information

In recent years, the government of Tanzania has prioritised the expansion of water infrastructure projects. This is done to meet the country's growing water demands as a result of urbanisation and population growth. The 2025³ government water target is to achieve a 95% and 85% coverage of water services in urban areas and rural areas respectively. In order to achieve this target, the government has increased investment in water sector over the last ten years from TZS 563.1 billion to TZS 705 billion in 2020/21 fiscal year's budget. Regardless of improving the rate of expansion, the emphasis has remained on putting up more quantity of built water infrastructures, than on the maintenance of built infrastructures. As a result, there have been a deterioration of structures that have reduced the reliability of water supply systems and increased the risk of their failures⁴.

Moreover, inadequate maintenance, has led into rapid deterioration of the condition of water infrastructure. Consequently, the design useful life cannot be attained, and cost of long-term reconstruction has increased. According to Water Status Report, 2020 approximately 30% of constructed Water Points in Tanzania (138,987 out of 42,035) were not functional from 2014 to 2019. This implies that, there has been a huge investment loss by the government in water supply service. This in turn establishes the need for having a proper and adequate management strategy of water supply schemes. Short of that, sustainable water service is put at risk.

Water as a finite and vulnerable resource is unevenly distributed in space, time, quantity and quality across the country. Thus, access to quality water, sanitation, and hygiene differs between rural and urban areas. Evidence suggests that, at least 30% of groundwater-based supplies in Sub-

³ (WSDP 2006 – 2025)

⁴ "Rodriguez, Diego J.; van den Berg, Caroline; McMahon, Amanda. 2012. *Investing in Water Infrastructure: Capital, Operations and Maintenance*. Water papers; World Bank, Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/17252> License: CC BY 3.0 IGO."

Saharan Africa become inoperable within the first few years of installation⁵. Therefore, achieving SDG 6, "availability and sustainable management of drinking water and sanitation for all," requires maintaining the existing infrastructure sustainably in this era of Sustainable Development Goals (SDGs). Since the replacement of the MDGs with the SDGs, the goal of availability and sustainable management of drinking water and sanitation continue to be unattainable strategy⁶.

During the presentation of the budget to the Parliament for the financial year 2022/23, the Minister for Water revealed that, the status of the universal access to water was 74.5% and 86.5% in rural and urban areas respectively.

Furthermore, water Utilities Performance Review Report for the financial year 2020/21⁷ revealed that, operation and maintenance expenses for District and Township Water Utilities increased by 52% from TZS 12.04 billion in the Financial Year 2019/20 to TZS 18.36 billion in the Financial Year 2020/21. In addition, Water Utilities Performance Review Report for the financial year 2020/21⁸ revealed that, the costs incurred by Regional Water Supply and Sanitation Authorities was 37.2% of all costs for operation and maintenance. This could be attributed to inadequate operational and maintenance to water supply schemes.

According to the Operation and Maintenance of Water Supply and Sanitation Projects⁹ Manual, operation of water projects refers to planning and control of the extraction/collection, treatment, conveyance, and delivery of water, and/or the collection, treatment, and disposal of effluent. It covers the management of clients and public relations, legal, personnel, commercial, and accounting functions.

Furthermore, maintenance refers to the art or act of keeping the structures, plants, machinery and equipment and other facilities in an optimum working condition. Maintenance is therefore, categorised into

⁵ Cord, C., Javernick-Will, A., Buhungiro, E., Harvey, A., & Linden, K. (2022). Institutional influences on local government support for professionalised maintenance of water supply infrastructure in rural Uganda: A qualitative analysis. *PLOS Water*, 1(2), e0000003

⁶ IBID.

⁷ Districts and Township Water Utilities

⁸ Regional and National Water Projects Utilities

⁹ Ministry of Water (2020): Volume IV

preventive, corrective or reactive. Preventive maintenance includes works that are planned and carried on a regular basis to maintain infrastructures in good condition like inspection, disinfection of water tanks, cleaning and greasing of mechanical parts etc. While, corrective maintenance means to replace or repair something that was done incorrectly or that needs to be changed like replacement of faulty pump or reallocation of a pipe route. Also, reactive maintenance refers to responding to the crisis or public complaint resulted from failure and malfunction/breakdown of infrastructure.

In Tanzania, water supply and sanitation projects and services are managed by Urban Water Supply and Sanitation Authorities (UWSSAs) and Rural Water Supply and Sanitation Agency (RUWASA) under the Ministry of Water. The Authorities and Agency are responsible for ensuring effective operation and maintenance of water supply schemes in the country.

1.2 The Rationale for the Audit

The Audit was motivated by reported and observed operations and maintenance water supply schemes challenges by numerous publications. These indicated the existence of challenges in the country's management of water infrastructure operation and maintenance activities. The vast majority of operation and maintenance reports concluded by urging the government to increase its efforts in improving the Operation and Maintenance practices. The rationales are detailed as follows:

1.2.1 Inadequate Coordination of the Stakeholders in WSSAs Services Areas

According to Water Utility and the Performance Review Reports for fiscal year 2020/21, there was insufficient and weak coordination mechanisms among stakeholders in WSSA service areas while other infrastructure projects were in the implementation. In other words, stakeholders were fragmented in WSSAs service areas. This led into water pipe cuts that ultimately resulted into an increase in non-revenue water.

In this regard, water was supplied and wasted without reaching the intended users. Moreover, there was no cost recovery, which increased the government's burden of subsidising water infrastructure operations. Therefore, inadequate coordination of stakeholders led into the

duplication of efforts rather than creating synergies for the available meagre resources.

1.2.2 Low-Cost Recovery among the National Projects of WSSAs

According to water utilities performance review report for fiscal year 2020/21, the return on investment in water infrastructure was exceptionally low in all projects implemented and managed by WSSAs. This potentially impeded effective service provision and pushed utilities to rely more on government subsidies thus, threatening the sustainability of service delivery. Therefore, ineffective operation and maintenance of water supply schemes, resulted into low-cost recovery among WSSAs.

1.2.3 Dilapidated Water Infrastructures

During the Parliament session in June, 2018, one Member of Parliament representing Nanyamba District was complaining on the presence of dilapidated water infrastructures in Newala Plateau water supply scheme. He added that, Makonde Water Supply Scheme was facing a challenge of deteriorated water infrastructure that hindered its efficiency in water service delivery¹⁰

Moreover, the visit made by Permanent Secretary, Ministry of water in February, 2018 to water supply projects in Mtwara revealed that, water projects in the region were facing a challenge of dilapidated infrastructure and lack of electricity for water pump operation due to inability of water authority to pay electricity bill.¹¹

Furthermore, Water Utilities Performance Review Report for the financial year 2020/21¹² revealed that, there was a continuous increase in the number of annual pipe breaks per kilometre. In FY 2020/21 pipe breaks increased to 0.76 from 0.49 in FY 2019/20 and 0.45 in FY 2018/19. It was further elaborated that, Mugango-Kiabakari, Makonde and Wanging`ombe WSSAs recorded relatively high numbers of pipe breaks per kilometre per year of 1.93, 0.64 and 0.45 respectively. The breaks were attributed to dilapidated water networks. Dilapidated water infrastructure was faced

¹⁰ <http://www.muungwana.co.tz/2020/06/chikota-aibana-serikali-kuhusu-uchakavu.html>

¹¹ https://www.youtube.com/watch?v=Gr60XZLbk_E

¹² Regional and National Water Projects Utilities

with a number of operational and maintenance challenges which hindered them to sustainably and reliably provide water supply services.

1.2.4 The Leakage of Water along the Supply System

The Controller and Auditor General (CAG) Performance Audit Report on the management of water projects (report of March 2019) revealed that, 41% of visited water projects had a challenge of water leakage in the pipes, connection and water storage tanks which decreased the ability of water projects to meet the intended supply capacity.

As it was reported, among the noted leakages in water projects included: Leakage of water in the rising main and absence of non-return valve in the rising main at Pohama and Sepuka water supply project; Leakage of water in the Water Storage Tank at Gumanga, and Hydrom water supply projects etc. Based on this huge water loss due to leakage, it was difficult for water utilities to recover the full operational cost which would otherwise be used to maintain these water supply schemes. Ultimately, the utilities business models would not be fulfilled.

1.2.5 Lack of Budget Allocation for the Maintenance of Water Projects in Kilolo District

According to the study titled, 'Assessment of factors affecting Maintenance of Rural Water Supply Schemes, 2018'¹³, it was revealed that, there was no allocation and source of budget for maintenance of water projects in Kilolo District. As a result, water projects in Kilolo DC were not maintained leading to ineffective supply of water to the intended users/community. Thus, inadequate budget allocation for maintenance makes it difficult for the utilities to meet their operational and maintenance needs.

¹³ S.A Oberlin (2018) Assessment of factors affecting Maintenance of Rural Water Supply Schemes: A Case Of Kipaduka Water Scheme, Kilolo District, Tanzania

1.3 The Design of the Audit

1.3.1 The Audit Objective

The main objective of the audit was to assess whether the Ministry of Water through Rural Water Supply and Sanitation Agency (RUWASA) and Water Supply and Sanitation Authorities (WSSAs), effectively operate and maintained water supply Schemes in order to ensure their sustainability.

Specific Audit Objectives

In order to address the main audit objective, three specific audit objectives were used.

These specific objectives of the audit were to assess whether:

- a) RUWASA and WSSAs adequately operate the established water supply schemes in the country;
- b) RUWASA and WSSAs adequately maintained the established water supply schemes in the country; and
- c) MoW adequately monitored the performance of RUWASA and WSSAs in operating and maintaining water schemes in the country.

1.3.2 The Scope of the Audit

The main audited entity was the Ministry of Water. The Ministry is responsible for the formulation of policies, legislative guidance and strategies of water supply and sanitation services. Also, the Ministry is responsible for provision of technical advice, monitoring performance of Community Based Water Organisations and coordinating and monitoring water authority strategies and plans.

The scope of the audit covered three financial years (2019/20 to 2021/22) in order to come up with adequate audit conclusions and recommendations based on the established performance trend. Also, this was the period when Rural Water Supply and Sanitation Agency was established (2019), so its performance would be assessed based on the time when it was established.

The audit focused mainly on the operations and maintenance of water supply schemes in the country. Specifically, the audit focused on: adequacy of operations of water supply schemes, adequacy of maintenance of water projects in the country; and adequacy of the Ministry in monitoring the performance of CBWSOs and WSSAs and RUWASA.

Regarding the operation of water supply infrastructures, the audit focused on: the prepared plans and schedules, water abstraction from source, billing and revenue collection process, water transmission from source (transmission mains and distribution system), water treatment operations, water storage operations, metering of water supplied to the customers, and billing and revenue collection process for both urban and rural areas.

Also, on maintenance of water supply networks, the focus was on all types of maintenance activities, i.e., preventive, corrective and reactive maintenance. For all the types of maintenance, the focus was on: planning for maintenance, surveillance of water supply network, repair or replacement of various parts of water supply infrastructures, Inventory of parts and tools needed for repairs and replacement, system cleaning and greasing of mechanical parts for both urban and rural areas.

With regard to monitoring the performance of RUWASA, WSSAs and CBWSOs, the focus was on the plans and strategies for monitoring, frequency of monitoring, reporting mechanisms and the sanctions issued for the non-performance.

The Audit assessed the adequacy of both RUWASA and WSSAs in ensuring adequacy of resources for effective operations of water supply in the country. Moreover, the Audit assessed adequacy of both RUWASA and WSSAs in: preparation and implementation of maintenance plan, surveillance/inspections of available water infrastructure and taking action for noted default, and the mechanism in place for coordinating the maintenance of established water infrastructure with stakeholders.

1.3.3 The Assessment Criteria

In order to assess the effectiveness of operations and maintenance of water supply projects in the country, assessment criteria were drawn from legislations, standards, good practices and Strategic Plans, Operational and Maintenance Manuals for water supply and sanitation projects of the Ministry of Water.

The following are the assessment criteria for each of the specific audit objective:

(a) Effectiveness of the Operations and Maintenance of Water infrastructure

The Ministry of Water planned to reduce the percentage of Non-Revenue Water from the National average of 36% in July, 2014 to 25% by June, 2024. Specifically, the Ministry planned to reach 28% of Non-Revenue Water in 2022 *[Pages 52 and 108 respectively of the MoW's Five Year Medium Term Strategic plan 2019/20 - 2023/24]*

(b) Adequacy of the Implementation of Operational Guidance Manual of Water Supply Infrastructure

Water Agencies and Authorities are required to set up routine procedures for preparing and updating the maps and inventory of water infrastructures. In additions, the Authorities are required to set operations plans which are specific and should contain procedures for operating the distribution system. *[Pages 74 & 76 respectively of the Design, Construction, Supervision, Operation and Maintenance Manual; Volume IV, Fourth Edition]*.

Water Authorities are required to continuously treat water and monitor the quality of water supplied at such times and in such a manner as may be prescribed in the water quality standards or regulations *[Section 20 (b) of water Supply and Sanitation Act of 2019]*.

In this regard, RUWASA is required to improve water quality to rural communities' water schemes. This would be achieved through the increase of installed water scheme treatment facilities from 33% to 60% by 2025; monitoring water quality quarterly; and water quality compliance to

standards at all levels (turbidity, pH and residual chlorine) *[SO2 of RUWASA's Medium Term Strategic Plan 2020/2021 - 2024/2025]*.

This implies that, water Agencies and Authorities are required to collect fees and levies including any regulatory levy for water supply and sanitation services supplied to consumers by the Water Authority *[Section 20 (i) of water Supply and Sanitation Act of 2019]*.

(c) Adequacy of the Implementation of Maintenance of Water Supply Networks

Water Supply infrastructure are required to be maintained on a regular basis and the records for observation should be kept in a logbook. In addition, the records for maintenance conducted should be kept to enhance efficient maintenance of the system later *[Pages 74 & 90 of the Design, Construction, Supervision, Operation and Maintenance Manual; Volume IV, Fourth Edition]*.

That being the case, water authorities are required to inspect Water Pumps at least once per year by qualified/trained operators/engineers *[Page 91 of the Design, Construction, Supervision, Operation and Maintenance Manual; Volume IV, Fourth Edition]*.

Therefore, Water Supply Utility or Authority or RUWASA are required to establish procedures for prompt repair of leaks and for attending efficiently and accurately to the leaks. *[Page 79 of the Design, Construction, Supervision, Operation and Maintenance Manual; Volume IV, Fourth Edition]*

(d) Adequacy of the Ministry of Water in Monitoring RUWASA, WSSAs & CBWSOs

The Ministry of Water is responsible to coordinate and monitor WSSAs plans *[Water Sector Development Programme 2006 - 2025: 8-7]*.

The Ministry is responsible for monitoring the operations and maintenance of the Implementing agencies i.e RUWASA, WSSAs and CBWSOs *[MoW's Five Year Medium Term Strategic Plan 2019/20 - 20223/24]*.

Therefore, RUWASA is responsible to monitor water quality and standards of performance of the community organisation in the provision of water supply services. In addition, RUWASA is responsible for registration of CBWSOs in the country [Section 41 (b) of water Supply and Sanitation Act Of 2019].

1.4 Sampling, Methods for Data Collection and Analysis

Various methods for sampling, data collection and analysis were used by the Audit Team as presented below:

1.4.1 Sampling Techniques Used in the Audit

Purposive sampling method was used to select regions that were visited based on the available categories of Water Supply and Sanitation Authority (WSSA) in that particular region. The Audit Team also used a factor of Non-Revenue Water (NRW) in selecting LGAs and regions that were covered since operation and maintenance, when not implemented adequately, leads to the increase in the levels of NRW. This ensured that, assessment of performance of the Ministry of Water and its respective agencies were done adequately. Detailed information on the selected WSSAs, LGAs and regions is as follows:

(i) Category of WSSAs and Water Supply Projects

Water Supply and Sanitation Authorities were classified into three categories which are Category A, B and C. *Category A* are WSSAs which have a financial, technical and managerial capability to operate water supply projects and recover all cost of operation; *Category B* are WSSAs which have technical and managerial capability to operate water supply projects and recover all cost of operation except part of their investment cost; and *Category Care* WSSAs which are still getting financial, managerial and technical support from the Government and partially recover their operational costs. The Audit Team ensured that the selected regions comprised all of the categories of WSSAs in the country. This was purposely done to ensure that, the performance of all the categories of WSSAs are assessed since they are different in their modality of operation. Also, combining all the categories of WSSAs in the assessment provided comprehensive and reliable findings thus, establish valid conclusions and appropriate recommendations.

(ii) Percent of Non-Revenue Water

Non-Revenue Water (NRW) is the amount of water that a water utility produces minus the amount that is sold to consumers and brings revenues, usually this is presented in percentage term. High per cent of NRW in water supply projects gives an indication of inadequate operation and maintenance on such Water Supply Schemes. The Ministry of Water targeted to reach 28% of NRW by 2022¹⁴. From each category of WSSAs, selection of WSSA considered the factor of maximum and minimum level of NRW. This ensured that, WSSAs with different performance levels are covered and that their operations are assessed and compared.

Therefore, the Audit Team selected WSSAs in respective regions based on the two factors above as detailed in **Table 1.1** as follows:

Table 1.1: The Selection of Regions that were Visited during the Audit

Category of WSSAs	NRW (As per EWURA's report, 2021) (%)	Maximum and Minimum NRW in respective category	Selected WSSAs	Remarks
The Selected WSSAs from Category A				
Arusha	51	Maximum		Although Arusha and Moshi WSSAs qualified, the Audit Team decided to replace Arusha with DAWASA.
DAWASA	39		DAWASA	
Dodoma	35			
Iringa	27			
Kahama	26			
Mbeya	28			
Morogoro	43			
Moshi	20	Minimum	Moshi	(i) Arusha and Moshi WSSAs are in the same zone and are nearby; hence, their challenges were assumed to be the same.
Mtwara	26			(ii) Dar es Salaam WSSA was
Musoma	44			
Mwanza	36			
Shinyanga	26			
Tanga	21			
Songea	21			
Tabora	38			

¹⁴ MoW's Five Year Medium Term Strategic plan 2019/20 - 2023/24:

Category of WSSAs	NRW (As per EWURA's report, 2021) (%ge)	Maximum and Minimum NRW in respective category	Selected WSSAs	Remarks
				selected since it is the largest WSSA in the country and serves two regions. Also, among category A WSSAs, DAWASA has also relatively higher percentage of NRW. The Audit Team was of the view that recommendation s that would be issued would enhance improved performance to the WSSA which serve the business city of the country.
The Selected WSSAs from Category B				
Bukoba	44	Maximum	Bukoba	The selected WSSAs are Bukoba and Sumbawanga, although Kigoma UWSSAs qualified it was not selected since the Team went during pre-study, therefore second minimum WSSA was selected which is Sumbawanga. Also,
Kigoma	33	Minimum		
Singida	37			
Sumbawanga	35	Second Minimum	Sumbawanga	

Category of WSSAs	NRW (As per EWURA's report, 2021) (%ge)	Maximum and Minimum NRW in respective category	Selected WSSAs	Remarks
				the second minimum has relatively insignificant difference in the percentage of NRW with Kigoma.
The Selected WSSAs from Category C				
Babati	31			Based on the set criteria Lindi and Bariadi were selected
Lindi	37	Maximum	Lindi	
Bariadi	29	Minimum	Bariadi	
Geita	36			
Mpanda	30			
Njombe	36			

Source: Auditors' Analysis of EWURA Performance Review Report (2021)

From **Table 1.1**, the selected WSSAs that were visited were: DAWASA, Moshi, Bukoba, Sumbawanga, Lindi and Bariadi. In this regard, the regions that were visited in respect to the selected WSSAs are Dar es Salaam, Kilimanjaro, Kagera, Rukwa, Lindi and Simiyu regions.

From the selected WSSAs, two water projects were visited; national water projects were prioritised when present in the WSSAs that were visited. When selecting the water projects to be visited factors like age, means of transmission of water and source of water were also considered since have influence in the operations and maintenance frequencies and costs. E.g., water supply projects which were in operation for a significant period of time were considered to have more frequencies and costs for maintenance.

The Rural Water Supply and Sanitation Agency

The audit covered Rural Water Supply and Sanitation Agency (RUWASA) at Headquarters and selected regions. The selected regions that were covered were based on the selected WSSAs whereby regions covered were

the one where selected WSSAs are located. In this regard, the selected regions visited were Kilimanjaro, Kagera, Rukwa, Lindi and Simiyu regions.

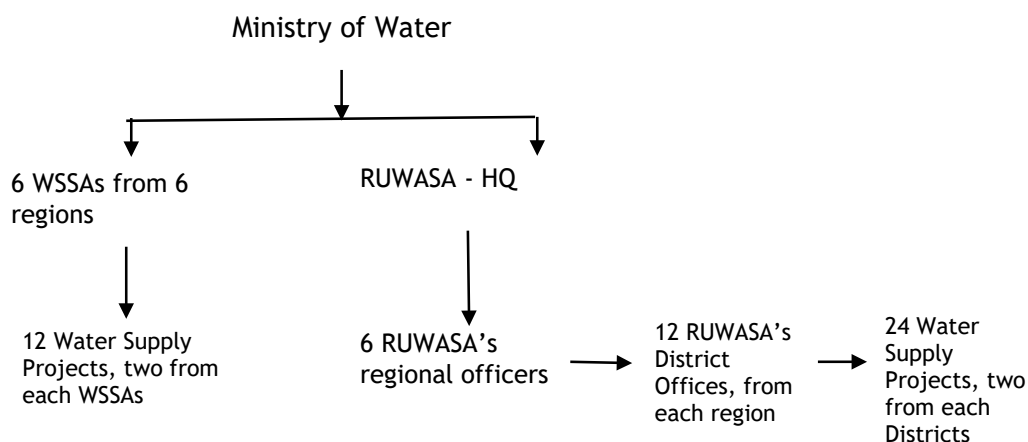
Despite the fact that, Dar es Salaam (where DAWASA is located) qualified to be visited, there was no offices for RUWASA since the city has no rural setup. In this regard, Coastal region replaced Dar es Salaam to ensure that rural setup was also covered. The criteria for selecting Coastal region were that the selected WSSAs i.e., DAWASA also operate in the Coastal region, thus, the criteria used were the same as for the other regions.

From each selected region, 2 LGAs were visited. The criteria used to select LGAs were the number of CBWSOs in the respective LGAs whereby the LGAs with minimum and maximum number of CBWSO were selected. The selected LGAs that were visited included: Kyerwa DC, Muleba DC, Nkasi DC, Sumbawanga, Lindi MC, Liwale DC, Itilima DC, Maswa DC, Mwanga, Siha DC, Kibaha TC and Kisarawe DC. For detailed information on the selected LGAs see **Appendix 3**.

In each visited LGA, 2 water projects were visited. The criteria for selecting visited water supply infrastructure was capacity of the respective water supply infrastructure, in this regard 2 water supply projects with the maximum capacity were visited at each LGA.

Moreover, for the selected LGAs, when the LGA had District or Township Water Supply and Sanitation Authority, then Water Authority was given priority. For the 2 water supply projects visited in such LGA, one must come from the Authority. **Figure 1.1** shows the summary of the coverage of the Audit.

Figure 1.1: The Summary of the Coverage of the Audit



Source: Auditors' Analysis on the Sampled Entities (2022)

1.4.2 The Methods of Data Collection

Both qualitative and quantitative data were collected to enhance complementarity of both qualitative and quantitative data regarding the performance of the Ministry of Water in managing operational and maintenance of water infrastructures in the country. The Audit Team used different methods to collect information from the audited entities and other stakeholders.

These methods included *documentary review*, *interviews* and *Observation through physical verifications* as detailed below:

(a) Documentary Review

The Audit Team reviewed documents from MoW, WSSAs and RUWASA and its selected Regional and Districts offices, to get comprehensive, relevant and reliable information on the performance of MoW, WSSAs and RUWASA regarding the operations and maintenance of water supply infrastructures in the country.

Document review was also done to clarify and triangulate the information obtained through interviews. The reviewed documents from the audited entities were confined within the period under the audit i.e., from 2019/20 to 2021/22. The reviewed documents included Planning, Performance and Progress Reports, Monitoring and Evaluation Reports, Water Supply and Sanitation Act, 2019, Operation and Maintenance of Water Supply and Sanitation Projects Manual of DCOM as shown in **Appendix 4** of this audit report.

(b) Interviews

Interviews were conducted with officials from MoW, RUWASA and WSSAs. The Audit Team also conducted interviews with officials from the selected RUWASA Regional and District's offices in the country in order to assess the performance in operations and maintenance of water supply projects in the country. Officials who were interviewed at the Ministry of Water were: Director of Water Supply and Sanitation Division, Assistant Director - Operations and Maintenance Sections and Officials from Operations and Maintenance Sections. From RUWASA, the interviewed officials were: Manager of Technical Support Section, Officials from Operations and Maintenance Section, Director of Planning and Coordination Section and Regional and District Managers for the visited Regions and Districts.

Also, for WSSAs the interviewed officials were Technical Managers, Officials from Operation Section, Officials from Maintenance Section, Head of Commercial Department, Officials from Revenue Section, Officials from Data and Billing Section, Water Quality personnel and Officials from Customer Service Section. Furthermore, interviews were used to validate information from the documents reviewed as shown in **Appendix 5** of this report.

(c) Observation through Physical Verification

The Audit Team observed the established water supply schemes through physical verification in order to assess physical performance. The Audit Team visited 2 water supply schemes from each of the 6 selected WSSAs. The visited Water Supply Schemes in WSSAs included Mzakwe Water Supply Scheme at DUWASA, Ng'apa Water Supply Scheme in LUWASA, Ruvu Juu Water Supply Scheme in DAWASA, Shiri Water Supply Scheme in MUWSA,

Bunena Water Supply Scheme in BUWASA, Kigoma Water Supply Scheme in KUWASA, and Kapripoint Water Supply Scheme in MWAUWASA.

Moreover, the team visited 2 water supply schemes from each of the selected 12 RUWASA's Districts Offices in the country. The visited Water Supply Scheme were : Mzirunda and Super in Lindi DC, Ukombozi and Mbuli in Liwale DC, Nyaminywili and Ngorongo in Rufiji DC, Bungu and Hanga in Kibiti, Lembeni and Kifaru in Mwangi DC, Makiwalu and Lawate - fuka in Siha DC, Uhai and Izigo in Muleba DC, Kyeka and Nyaruki in Kyerwa DC.

During the physical verification of water supply schemes, the Audit focused on assessing status of maintenance and operations of water infrastructures installed in the schemes. This comprised of issues like availability of operation and maintenance records, functionality of the installed infrastructures etc.

1.4.3 The Methods of Data Analysis

The collected information were analysed using both qualitative and quantitative methods to obtain facts and sufficient information regarding the overall performance of MoW, RUWASA and WSSAs in ensuring effective operations and maintenance of water supply schemes.

a) Analysis of Qualitative Data

- Content analysis techniques were used to analyse qualitative data by identifying different concepts and themes originating from interviews or document reviewed and categorised them based on its assertion;
- The extracted concepts or themes were either tabulated or presented as they were to explain or establish a relationship between different variables originating from the audit questions;
- The recurring concepts or themes were quantified depending on the nature of data portrayed; and
- The quantified information (concepts/themes) were then summed up or averaged on spreadsheets to explain or establish the relationship between different variables.

b) Analysis of Quantitative Data

- Quantitative information was tabulated on spread sheets to develop point data or time series data and relevant facts extracted from the figures obtained; and
- The tabulated data were summed up, averaged or proportioned to extract relevant information and relationships from the figures; and
- The sums, averages or percentages were presented using different types of graphs and charts depending on the nature of data to explain facts for point data or establish trends for time series data and other quantitative information/data with single occurrence were presented as they are in the reports by explaining the facts they assert.

1.5 Information Validation Process during the Audit

Prior to the validation process, the National Audit Office, that conducted the audit exercise, commissioned an experienced expert in water sector to ensure validity of the information obtained and presented in the audit report. The expert reviewed the report and provided the relevant inputs, comments and recommendations for its improvement.

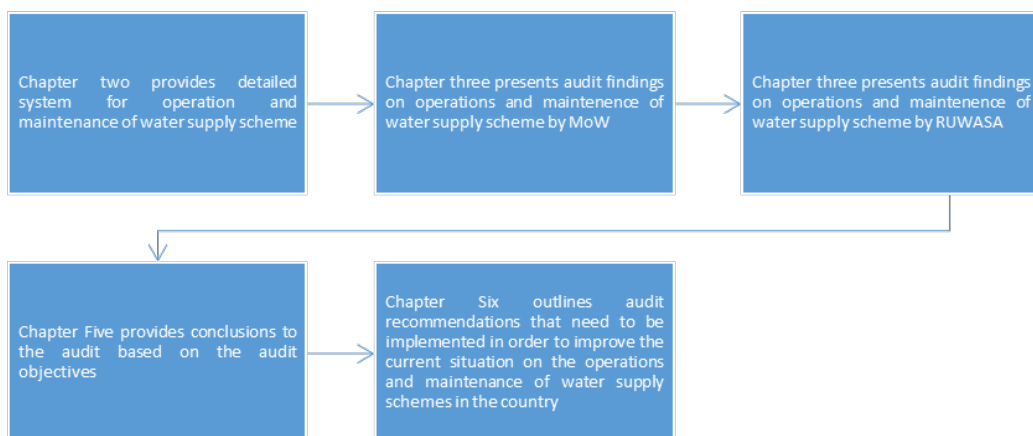
The Ministry of Water and Rural Water Supply and Sanitation Agency were given the opportunity to review the draft audit report and comment on the information presented. They confirmed on the accuracy of the information presented in the report. The validation was then accomplished through the set legal process.

1.6 The Standard Used for the Audit

The audit was done in accordance with the International Standards for Supreme Audit Institutions (ISSAIs) on performance auditing issued by the International Organisation of Supreme Audit Institutions (INTOSAI). These standards require that the audit is planned and performed in order to obtain sufficient and appropriate audit evidence to provide reasonable basis for the audit findings and conclusions based on the audit objectives.

1.7 The Structure of the Report

The remaining part of this report covers the following



CHAPTER TWO

THE SYSTEM FOR THE OPERATION AND MAINTENANCE OF WATER SUPPLY SCHEME

2.1 Introduction

This chapter describes the operations and maintenance system of water projects in the country. Therefore, the legal framework governing operations and maintenance of water projects, the roles and responsibilities of the key players in the operations and maintenance of water projects, process for the operations and maintenance of water projects, funding and human resources for the operations and maintenance of water projects are elaborated as follows:

2.2 The Legal Framework Governing the Operations and the Maintenance of Water Supply Schemes

The operations and the maintenance of water projects in the country is guided by the following policies, acts, guidelines and strategies as detailed as follows:

2.2.1 The Governing Policies and Legislations

Figure 2.1 provide detailed information regarding the policies, the legislation and regulation governing the operation and the maintenance of water supply schemes in the country. It comprises; National Water Policy, 2002; Water Supply and Sanitation Act No. 5 of 2019; Water Supply and Regulation, 2019 as detailed as follows:

Figure 2. 1: The Legal Framework Governing the Operations and the Maintenance of Water Supply Schemes



Source: Auditors Analysis from Governing Legislations (2022)

2.2.2 The Sustainable Development Goals, Master and Strategic Plans

i) The Sustainable Development Goals

Sustainable Development Goal No.6

In order to ensure availability and sustainable management of water and sanitation for all, the global goals also targeted that by 2030, to provide support and strengthen the participation of local communities in improving water and sanitation management. The performance of attaining this goal can be measured by considering: *proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management.*

ii) The Strategic Plans

MoW's Five Year Medium Term Strategic Plan 2019/20 - 2023/24

The strategic plans highlighted the areas which need improvements, among the areas for improvement included interventions on operations and maintenance of water projects in the country. Moreover, the strategic plan highlighted the challenges on operations and maintenance of water projects which lead to unsustainable water projects. In addition, the strategy provides the way forward for effective operations and maintenance of water projects in the country.

iii) The Guidelines and Manual

Design, Construction Supervision, Operational and Maintenance Manual, 2020

The manual provides the guidance on the operations and maintenance requirements for the water projects. Among the important aspects includes; meaning of operations and maintenance of water projects; categories of maintenance; objective, strategies and procedures of operations and maintenance of water projects.

Water and Wastewater Quality Monitoring Guidelines, 2020

Guidelines cover all the key aspects of water quality monitoring for water supply and sanitation authorities. These includes; the setting up of water quality parameters; number of samples and frequency of sampling; monitoring aspects, compliance and operation, interpretations and reporting. The guidelines also highlight the procedures and methods to be adopted in undertaking the key elements of water and quality monitoring by Water Supply and Sanitation Authorities.

2.3 The Roles and Responsibilities of the Key Stakeholders

2.3.1 Role of the Key Players

a) The Ministry of Water

The Ministry of Water is the key player when it comes to operations and maintenance of water projects in the country. According to Water Supply and Sanitation Act, 2019, the Ministry is responsible for various functions as categorised in **Figure 2.2**:

Figure 2. 2: The Functions of the Ministry of Water

Development of policies, plans & strategies functions	Coordination functions	Monitoring and regulations functions
<ul style="list-style-type: none">•Determine policy, legislative and strategy aspects of the provision of water supply and sanitation services;	<ul style="list-style-type: none">•coordinate technical and financial support for water supply and sanitation services;•coordinate planning and resource mobilisation for water supply and sanitation services through external support, Non-Governmental Organisations and the public; and•coordinate and monitor water authority strategies and plans.	<ul style="list-style-type: none">•ensure the provision of the technical guidance to Water Supply and Sanitation Authorities and RUWASA;•monitor the performance of and regulate community based water supply organisations; and•supervise the implementation of the provisions of water supply and sanitation service.

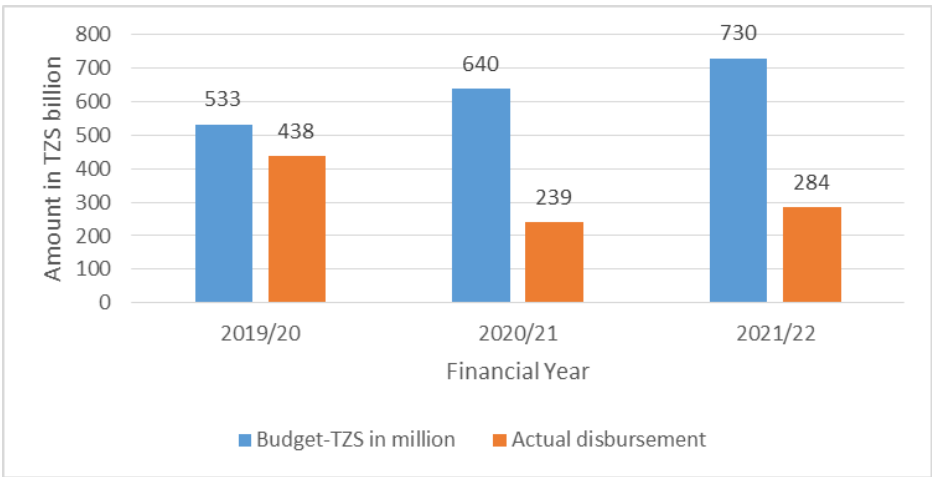
Source: Water Supply and Sanitation Act (2019)

Funding of Activities performed by Water Supply and Sanitation Division

Water Supply and Sanitation Division is responsible for technical support to water authorities at urban areas and RUWASA at rural areas. Specifically, the Division through the Operations and Maintenance and Service Delivery Management and Support sections, provide technical support on operations and maintenance of water schemes in the country. **Figure 2.3**

shows a budget for the Water Supply and Sanitation Division for execution of their day to day activities.

Figure 2. 3: The Funding of Water Supply and Sanitation Division



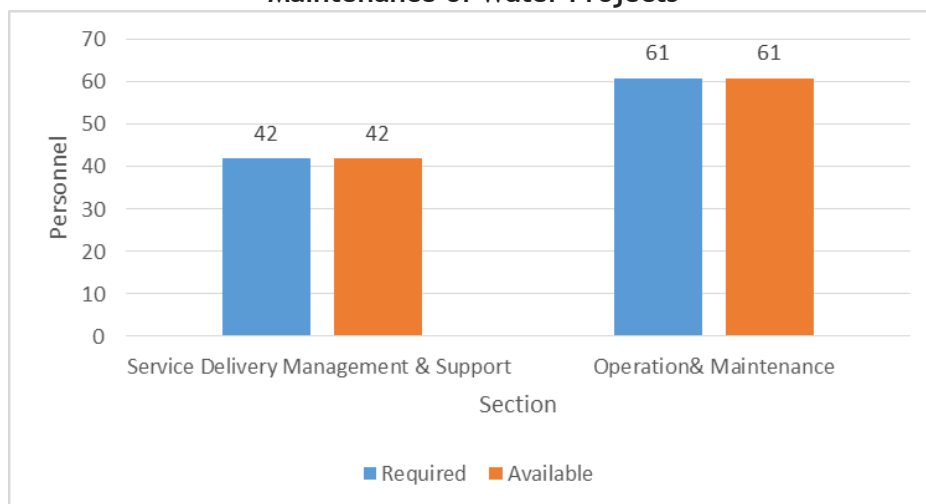
Source: MNRT's MTEF for 2019/20 - 2021/22

Figure 2.3 shows that, for the financial year 2019/20 and 2020/21, Water Supply and Sanitation Division received 82% (438 out of 533) and 37% (239 out of 640) of the requested budget to implement various activities in water sector. In 2021/22 the Ministry received only 39% (284 out of 730) of the requested budget.

Human Resources Allocated to facilitate Operations and Maintenance of Water Projects

The Operation and Maintenance and Service Delivery Management and Support Sections are responsible for facilitating the operations and maintenance of water projects in the country. In exercising their duties, the Sections requires human resources as detailed in **Figure 2.4**.

Figure 2. 4: The Human Resources for the Operations and the Maintenance of Water Projects



Source: Personnel Enrolment of Staff from Ministry of Water (2022)

Figure 2.4 shows that, the two sections namely the Operations and Maintenance and Service Delivery Management and Support sections have the required human resources according to their needs whereby each has 100% of the required human resources.

b) The Rural Water Supply and Sanitation Agency (RUWASA)

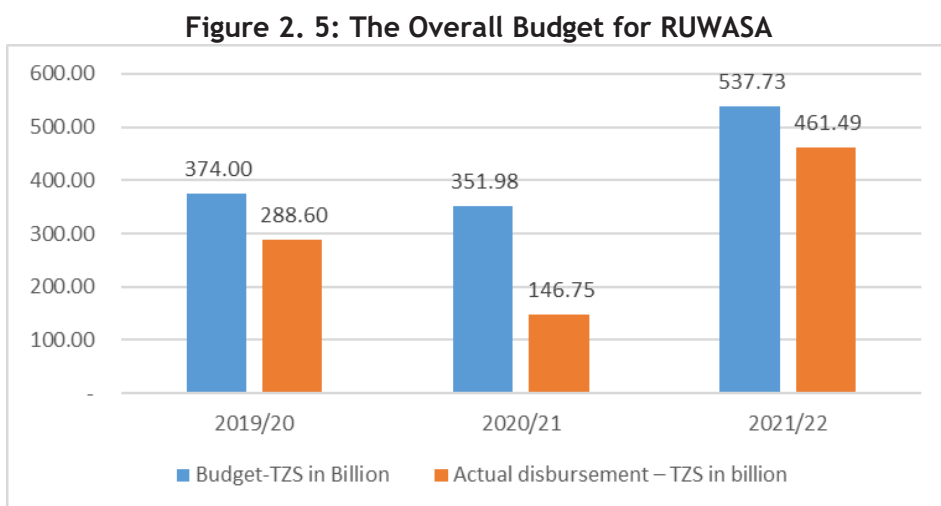
The Rural Water Supply and Sanitation Agency (RUWASA) is the key player when it comes to operations and maintenance of rural water projects in the country. According to section 43 of Water Supply and Sanitation Act No. 5 of 2019, the main functions of RUWASA include:

- (i) plan, design, construct and supervise rural water supply projects;
- (ii) monitor and evaluate performance of community organisations in relation to rural water supply and sanitation services;
- (iii) provide financial and technical support to community organisations for major maintenance of rural water schemes;
- (iv) provide support to community organisations in relation to management, operation and maintenance of rural water supply schemes;
- (v) facilitate training and capacity building to community organisations in financial, technical and management of rural water supply; and

(vi) register and regulate the performance of community organisations.

Funding of Activities for the Operations and the Maintenance of Water Sector in Rural Areas

In facilitating the operations and the maintenance of water schemes in rural areas, RUWASA set budget annually. **Figure 2.5** indicates the budgeted and actual disbursement amount at RUWASA for the period of three years.



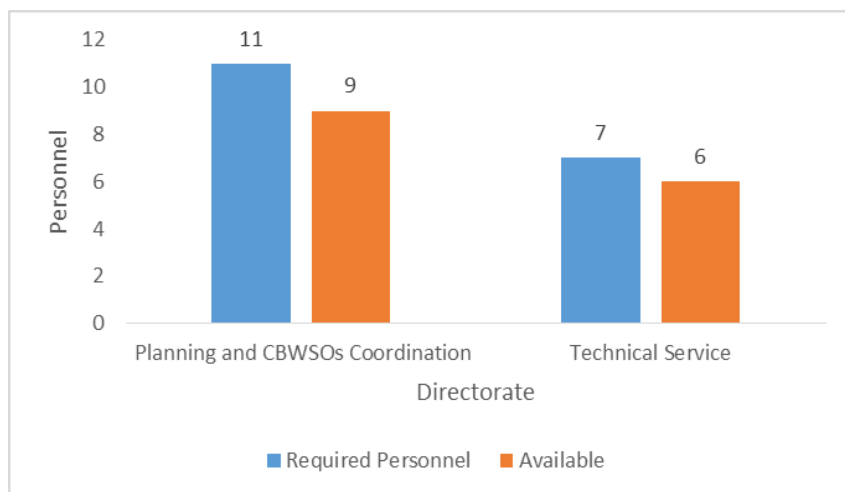
Source: RUWASA's MTEF and Financial Statement 2019/20 - 2021/22

Figure 2.5 shows that, for a period of three financial years, 2019/20 to 2020/21 RUWASA received fund less than planned budget. For the financial year 2019/20 the Agency received 77% (288/374), in 2020/21 it received 42% (146/351) while in 2021/22 the agency received 86% (461/537).

The Human Resources to facilitate the Operations and the Maintenance of Water Projects

The main Directorates at RUWASA which are directly involved in the the operations and the maintenance of water schemes are; Technical Service Directorate and Planning and CBWSOs Coordination Directorate. **Figure 2.6** shows the status of human resources for the two Directorates which are directly responsible to facilitate the operations and the maintenance of water projects in rural areas in the country.

Figure 2. 6: The Human Resources to facilitate the Operations and the Maintenance of Water Projects in the country



Source: Personnel Enrolment of Staff from RUWASA (2022)

Figure 2.6 shows that, for the required eleven officials in Directorate of Planning and CBWSOs coordination, there are only 9 staff which accounts to 82% of the requirement. Also, there are 6 out of 8 required staff in Technical Service Directorate which accounts to 86% of the requirement.

c) The Community Based Water Supply Organisations (CBWSOs)

According to Section 15 of Water Supply and Sanitation Act No. 5 of 2019, a Community Based Water Supply Organisation is established by the agreement of the majority of the members of a community.

CBWSOs are the key players in the operations and the maintenance of water Schemes. Section 33 of the Act, further elaborate the powers and main functions of CBWSOs which includes:

- (i) own movable and immovable properties including public taps and waterworks;
- (ii) manage, operate and maintain public taps and waterworks and provide an adequate and safe supply of water to its consumers;
- (iii) determine rules for the use of public taps and or waterworks by consumers; (d) install water meters for the purpose of measuring the amount of water supplied to a public tap or a consumer;

-
- (iv) charge consumers for the water supplied from public taps and or waterworks;
 - (v) limit the access of any persons from water source, public taps or from supplies from the waterworks who are not complying with the rules, regulations or the constitution of the community organisation; and
 - (vi) consult and cooperate with the village council or any other institution responsible for land to plan and control the use of land in the immediate vicinity of the water points and or waterworks.

d) Water Supply and Sanitation Authorities (WSSAs)

Water Supply and Sanitation Authorities are the key players in the operations and the maintenance of water projects in the country. According to section 15 of Water Supply and Sanitation Act No. 5 of 2019, as a licensee are responsible for the efficient and economical provision of water supply and sanitation services authorised by EWURA. In this regards, under its areas of jurisdictions, each water authority is responsible for the operations and maintenance of water projects.

2.3.2 The Roles of Other Stakeholders

a) Energy and Water Utilities Regulatory Authority (EWURA)

According to section 28 of Water Supply and Sanitation Act No. 5 of 2019, EWURA is mandated to regulate the activities performed by WSSAs in the country. Moreover, the section describes main functions of EWURA when regulating WSSAs which include:

- (i) exercise licensing and regulatory functions in respect of water supply and sanitation services;
- (ii) establish guidelines on tariffs chargeable for the provisions of water supply and sanitation services; and
- (iii) establish standards relating to equipment attached to water and sanitation system.

Furthermore, with regards to regulating functions of water authorities and services, EWURA is responsible to prepare a report to be submitted to the Minister on: a comparative analysis of the performance of the licensees in relation to performance targets specified in the licenses; and a statement of all directives and orders given to licensees during the year in question.

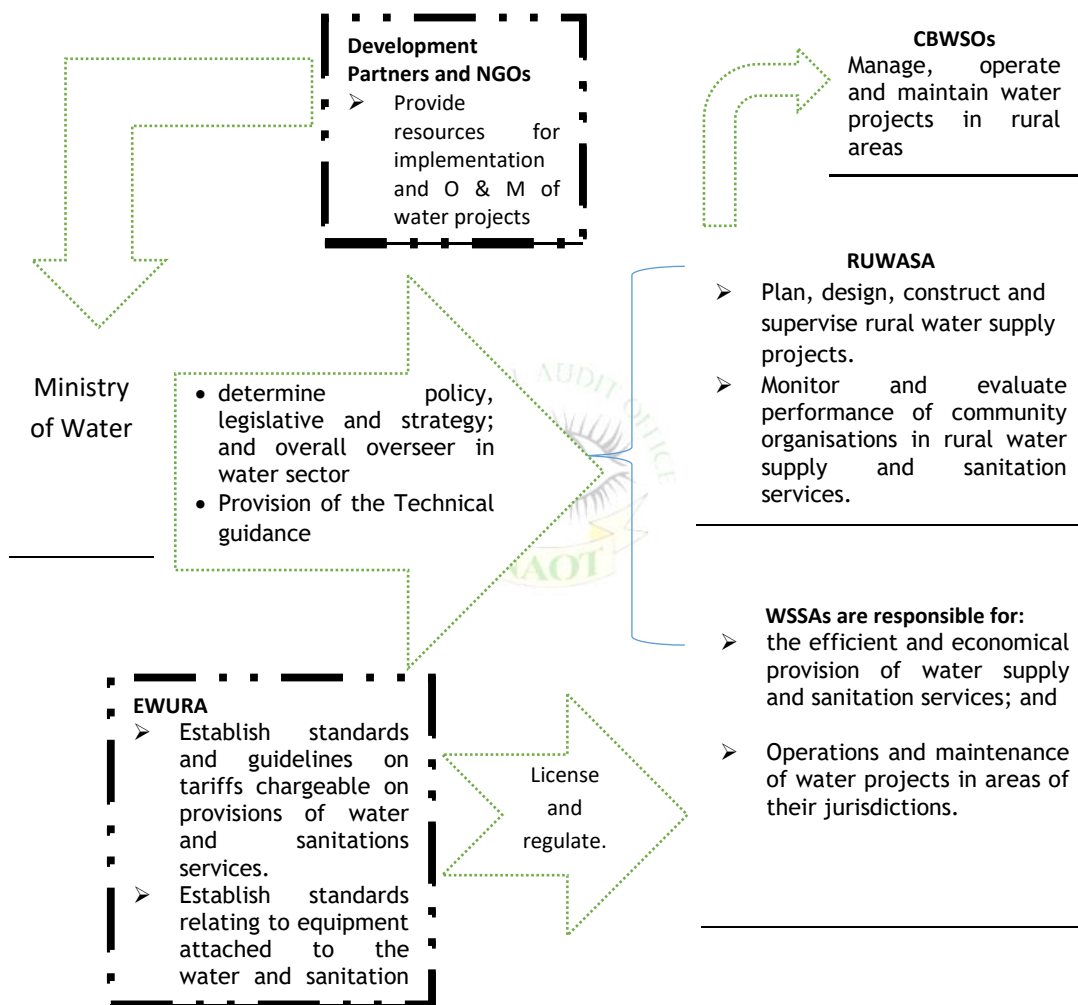
b) Development Partners and Non-Governmental Organisations

Development partners and Non-governmental Organisations are the key players in water sector. Among the important roles they play is the funding of various water projects in the country including funds and awareness rising on the needs for the operations and maintenance of water projects in the country.

According to Section 5 (d) of Water Supply and Sanitation Act No. 5 of 2019, the Ministry of Water is responsible for coordinating planning and resource mobilisation for water supply and sanitation services through external support, Non-Governmental Organisations and the public.

Figure 2.7: provides the summary of the relationship of the key stakeholders in the operation and the maintenance of water supply schemes in the country.

Figure 2. 7: The Human Resources to facilitate the Operations and the Maintenance of Water Projects in the country



Source: Auditors' Analysis on Human Resource from the Ministry of Water (2023)

2.4 The Process for the Operations and the Maintenance of Water Projects

The operations and maintenance of water projects in the country is vested at the Ministry of Water through Water Supply and Sanitation Authorities in urban areas and Rural Water Supply and Sanitation Agency specifically in rural areas. The following is the process for the operations and the maintenance of water projects in rural and urban areas respectively.

(a) The Process for the Operation and the Maintenance of Water Supply Schemes in Urban Areas

The process for the operations and the maintenance of water projects in urban areas is detailed as follows:

Preparation of operation and maintenance Tools: Upon handling over of constructed water projects to the operations and maintenance department, O&M Engineer prepare operation and maintenance plan and schedule for the project in accordance with operation and maintenance Manual.

Daily Operations and Maintenance Activities: The operations and maintenance of water projects are either based on day to day operations or scheduled plans for maintenance depending on the manual of particular water projects.

The day to day projects operations includes; operating pumps and water tanks, chemical dosing at water treatment Plant, records of daily operations of water facilities, conducting routine inspection of water production facilities according to operational plan and preparation of daily reports to be submitted to the management.

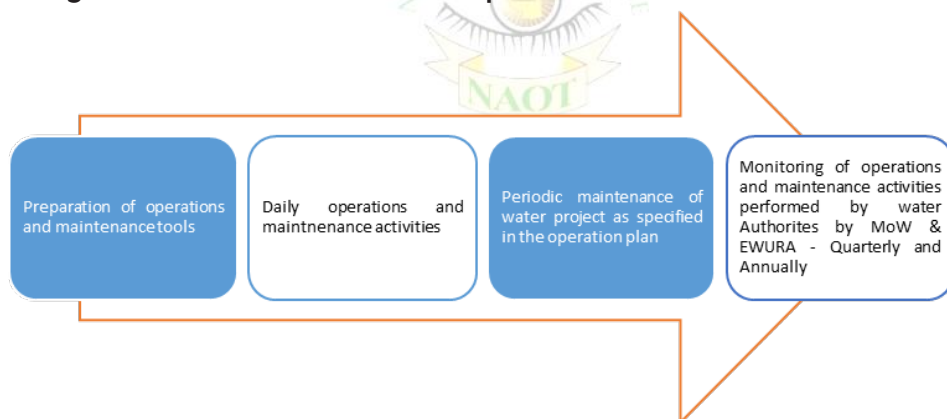
Daily water quality control includes daily measurement of water quality parameters for both raw and treated water i.e., PH, total dissolved solid, temperature, turbidity and in accordance with water quality plan by laboratory technician. This ensures that, supplied water meet the national and international standards.

Daily maintenance activities include; O&M Engineer receiving the reported problem in water supply system and assigning the technician to attend the problem, the technician would replace or repair water infrastructure accordingly and produce report for future decision making and monitoring water infrastructure.

Periodic Maintenance of water supply schemes: In addition to daily maintenance, water supply schemes are maintained based on the specific project's operation manual whereby major maintenance is done as specified in the operations plans e.g. quarterly or semi-annually.

Monitoring the Operations and the Maintenance Activities implemented by Water Authorities: The Ministry of Water monitor the activities performed by WSSAs through the operations and maintenance department as stipulated in Water Supply and Sanitation Act No. 5 of 2019. In addition, EWURA monitor the activities performed by WSSAs to ensure that, the quality of service comply with EWURA guideline in water utility.

Figure 2.8: The Process for the Operations and the Maintenance of



Water Projects in Urban Areas in the Country

Source: Auditors' Analysis on Data from the Ministry of Water (2023)

(b) The Process for the Operations and the Maintenance of Water Projects in Rural Areas

The process for operations and maintenance of water projects in rural areas is detailed as follows:

Capacity building and provision of Guidelines regarding operations and maintenance of constructed water projects: Upon finalisation of constructed water Project by RUWASA and handing over to CBWSO, RUWASA conduct capacity building to Management Team (CBWSOs) on how to operate and maintain all the facilities of the constructed water projects.

Daily operations and maintenance of water projects: The technician who is the secretary of the CBWSO is responsible for the day to day operations of all the facilities of water projects including pump system, water tanks, water taps etc. Furthermore, would be responsible to keep records on daily operation of facilities like pump.

Conducting Small Maintenance: The technician is to be responsible for conducting small maintenance. All the reported cases regarding bursting of pipes or leakages reported or observed during routine inspections are attended by technician to ensure provisions of water to the community.

Approval to use or support of fund resources from RUWASA district level: When maintenance need fund to finance the equipment which need replacement, CBWSO would seek approval from district's water engineer. In addition, when the maintenance requires replacement of major equipment which CBWSO cannot finance, request is submitted to RUWASA district, region and RUWASA HQ office for support.

Monitoring of CBWSOs activities by RUWASA: RUWASA monitor all the activities performed by CBWSOs. The CBWSOs are required to submit report regarding the operations and the maintenance of water projects in rural areas. RUWASA later submit reports on operation of water projects in rural areas to the Minister.

Figure 2.8: The Process for the Operations and the Maintenance of Water Projects in Rural Areas in the Country



Source: Auditors' Analysis on Data from the Ministry of Water (2023)

CHAPTER THREE

THE OPERATION AND MAINTENANCE OF WATER SUPPLY SCHEMES IN URBAN AREAS

3.1 Introduction

This chapter presents audit findings on the operations and the maintenance of water supply schemes in urban areas as implemented by the Ministry of Water and Water Supply and Sanitation Authorities.

3.2 Inadequate Compliance to the Standard Operational Procedures of Water Supply Infrastructure in the Country

Adequacy of the implementation of the Standard Operating Procedures¹⁵ is the key for the effective operations and the sustainability of established water supply infrastructure. The Audit noted various weaknesses implying inadequate implementation of the Standard Operational Procedures of water supply infrastructure in the country as detailed as follows:

3.2.1 Inadequate Planning for the Operation of Water Supply Infrastructure

According to Section 4.2 of MoW's Operational and Maintenance Manual, water entities are required to prepare their own respective operation plans for water supply infrastructures for smooth and efficient operation of water supply schemes. Moreover, water supply entities were required to prepare plans for capacity building of operation and maintenance, personnel, plan for operating Individual unit in water supply system, plan for spares and tools provision, plan for water Audit and leakage control, plan for efficient use of power, providing education and information communication relating to water and sanitation services.

However, there was inadequate planning as follows:

¹⁵ as per Design, Supervision, Operation and Maintenance Manual, 2020.

(a) Inadequate Water Supply Infrastructure's Operational Plans, Schedules and Procedures

Section 4.2 of the Operational and Maintenance Manual stipulates that, water entities should prepare operational plans, schedule and procedures of every major unit as well as the totality of projects as a whole. The overall operational plan should be scheme wise to meet the needs of various individual units and should comprise procedures for routine tasks, checks and inspection at set intervals viz. daily, weekly, quarterly, semi-annually or annually.

Through site visit to 8 WSSAs, it was revealed that, WSSAs did not have formal prepared operation plan and procedures for their water supply schemes as the whole and individual unit as shown in **Table 3.1:**

Table 3. 1: The Analysis of the Availability of Operational Plans, Schedule and Procedures

NAME OF WSSA	Name of Water Supply Scheme	Presenc e of Overall Planning	Operati onal Plan for Major Unit	Inspection Schedule			
				Dail y	Week ly	Month ly	Annual ly
MWAUWAS A	Kapri point water supply scheme	✓	✓	x	x	x	x
KUWASA	Kigoma water supply Scheme	x	x	x	x	x	x
DUWASA	Mzakwe water supply scheme	x	x	x	x	x	x
BUWASA	Bunena Water supply Scheme	✓	✓	x	x	x	x
DAWASA	Ruvu Juu Water Supply Infrastructu re	✓	✓	x	x	x	x
LUWASA	NG'APA	x	x	x	x	x	x

NAME OF WSSA	Name of Water Supply Scheme	Presence of Overall Planning	Operational Plan for Major Unit	Inspection Schedule			
				Daily	Weekly	Monthly	Annually
	water supply Scheme						
MUWSA	Nsere spring	✓	✓	x	x	x	x
SUWASA	Majengo Water Supply	✓	✓	x	x	x	x

Source: Auditors' Analysis on Data from Physical Verification of the visited WSSAs (2022)

Table 3.1 indicates that, for the visited 8 WSSAs, 3 were operated without having formal operating procedures that could be followed by all the operators. This was linked to a lack of guidance and awareness programme provided by the MoW to O&M staff on the necessity of having formal and prepared operational procedures to each water supply system installed. In addition, even the operational manuals which came with equipment were not available at the water plant for the existing installed water supply infrastructure.

The absence of operations plan and procedures implies that, operations activities were conducted based on personal experiences and perspectives, which could lead into performing operations against the manufacturer's instructions.

According to the responses from the Ministry following the factual clearance meeting, those documents of the operation manual, plans, and procedures were supposed to be posted in the designated room under normal circumstances. Unfortunately, the documents were not present during the site visit.

(b) Inadequate plans for the spares and Tools Provisions, Water Audit and Leakage Control and plans for efficient use of Electric Power

According to Section 4.2 of MoW's Operational and Maintenance Manual, water entities are required to prepare plan for spares and tools provision,

plan for water audit, leakage control and plan for efficient use of electric power.

However, the review of the available performance reports 2019/20 to 2021/22 from the visited 8 WSSAs revealed that, the Authorities did not prepare plan for spares and tools provision, water audit and leakage control and plan for efficient use of power. For detailed information on the available and missing plans is presented in **Table 3.2**

Table 3. 2: The Status of Availability of Various Plans at visited WSSAs

Name of WSSA	Plans for Capacity Buildings	Plans for spares and Tools Provisions	Plans for Water Audit and Leakage Control	Plans for Efficiency Use of Power
MWAUWASA	✓	x	X	x
KUWASA	✓	x	X	x
DUWASA	✓	x	X	x
BUWASA	✓	x	X	x
DAWASA	✓	x	X	x
LUWASA	✓	x	X	x
MUWSA	✓	x	X	x
SUWASA	✓	x	X	x

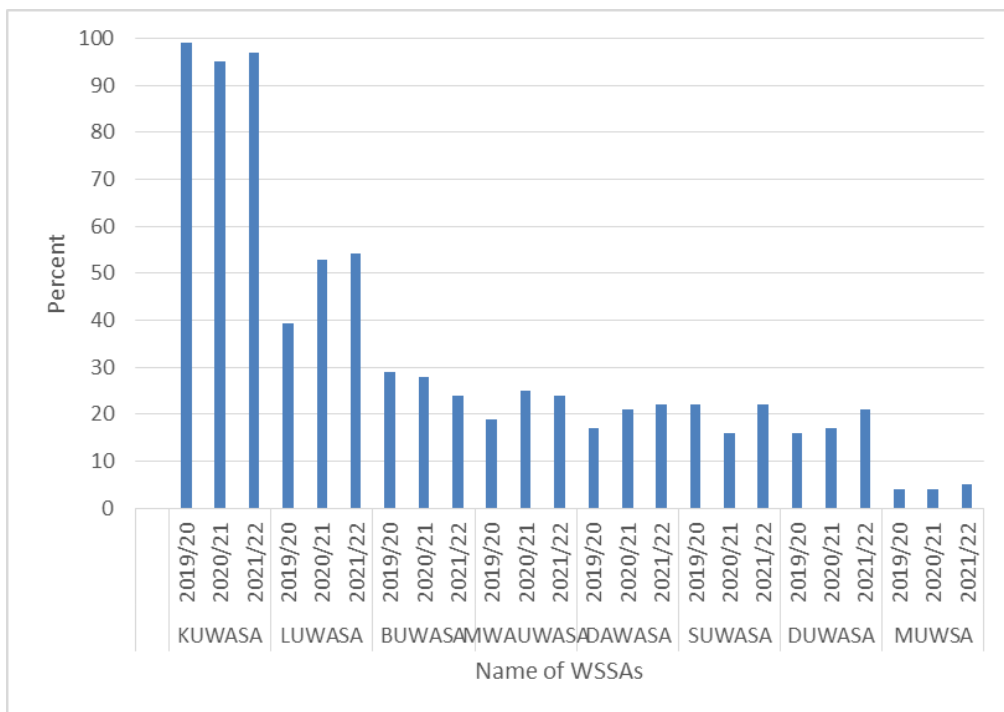
Source: Training Programme from WSSAs and Physical Verification to Water Schemes (2022)

Table 3.2 shows that, for the 8 WSSAs, all Water Authorities had capacity building programmes/plans targeting staffs responsible for the operation of water schemes. However, they lacked plans for spares and tools provisions, Water Audit and leakage control, Water Audit and efficient use of electric power.

Lack of plans for tools and spares provision and water audit and leakage control contributed to high percentage for NRW.

The lack of energy efficient plan led into the use of high amount of electricity in operating water supply schemes, In turn this resulted to high amount of funds allocated for O&M to cover costs for electricity bill. This is detailed in **Figure 3.1**.

Figure 3.1: The Percentage of O&M budget paid as electricity bills in WSSAs



Source: Auditor's Analysis of Data from Visited WSSAs (2022)

Figure 3.1 shows that, 2 out of 8 visited WSSAs had more than 50% of the allocated budget for O&M which was used for electricity bills. KUWASA used nearly 100% of O&M in all 3 years to pay for the electricity bills. For the remaining 4 WSSAs, despite showing that the percentage of O&M which were used for electricity bills were below 50%, the money spending was significant as it ranged from TZS 293 to 713 million. For detailed information on the amount of budget for O&M allocated and electricity bill see **Appendix 6**

Moreover, other noted causes for high amount of electricity in operation of water supply schemes were:

- (i) Topography/terrain of the service areas, review of MWAUWASA annual progress report, 2021/22 revealed that, among the challenges on operation of water supply schemes, was high electricity bill due to the use of many booster stations in the mountain areas; and

-
- (ii) Interviews with officials in the visited areas also indicated that, long distance covered by water supply schemes also contribute to high amount of electricity bills. This was due to the fact that, there would be need to have many booster stations to ensure that water reach to the targeted areas.

3.3 The Installed Capacity of Water Supply Scheme were not Fully Utilised

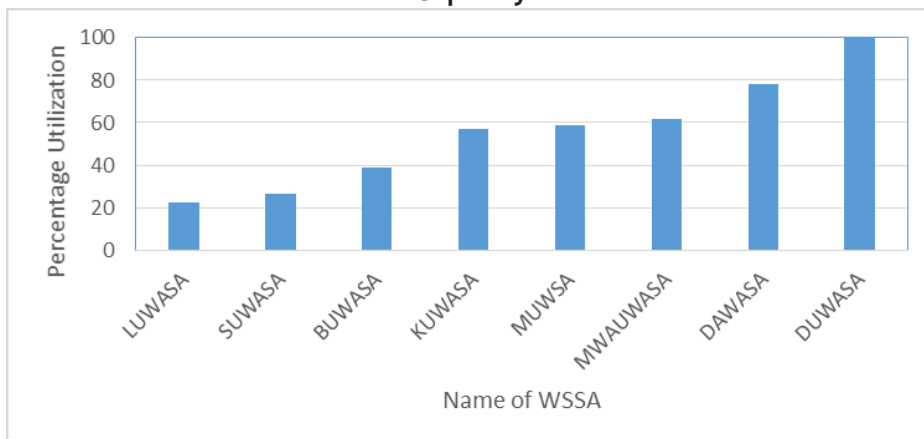
According to Section 21(a) of Water Supply and Sanitation Act of 2019; WSSAs were required to keep custody, acquire, through compulsory purchase, construct and operate water and sanitation works.

The Auditor's analysis of the 2022 EWURA National and Regional water utilities performance review report revealed that, for the past three consecutive financial years, overall annual water productions were lower than the operational capacity of the installed water supply infrastructures despite the fact that water demand was not met. For instance, in financial year 2020/21, it was noted in BUWASA which was supposed to meet the water demand of 13,871 m³, and had water production capacity of 18,000 m³ but the actual production was 7,041m³. Also, it was noted that, in MUWSA that, the demand was 53,296 m³ where it had water production capacity of 57,038m³ but the actual water production was 33,507m³.

The report further indicated that, for the financial year 2020/21, water production was 65.5% of the total production capacity and for the year 2019/20 and 2018/19 were 65.8% and 70% respectively. The capacity was thus progressively declining over the 3 years.

This implies that, the daily water production was also lower than the maximum capacity of daily facilities water production that can produce per day. Meanwhile for the visited 8 WSSAs, the total daily water production was noted to be below the installed capacity of the facilities as detailed in **Figure 3.2**.

Figure 3.2: The Percentage of Utilisation of Installed Infrastructure Capacity



Source: Auditors' Analysis of data from visited WSSAs (2022)

Figure 3.2 shows that, out of 8 visited WSSAs, only 1 (DUWASA) utilised installed capacity by 100%. DAWASA and MWAUWASA were also noted to have relatively high utilisation of the installed capacities of 78.5% and 61.8% respectively. Moreover, LUWASA was noted to have the lowest utilisation capacity among the visited WSSAs with only 22.6% utilisation capacity.

During the visit to water supply schemes operated by the above WSSAs, it was noted that, the underutilisation of the installed water was mainly caused by the following factors:

The response from the Ministry during the factual clearance meeting further indicated that, power outages and fluctuation was one of the reasons for not achieving full capacity. The Ministry acknowledged the given reasons by auditors and stated that, it is temporary, as upon rectification the plant can attain full capacity. However, the Ministry needs to address all the factors which cause the plant not to attain full capacity of water production even though they regarded it as temporary.

3.3.1 The Existence of Non- Operating Water Supply Infrastructures

During the site visit to the visited WSSAs, the Audit noted that, in 3 out of 8 visited WSSAs, were observed to have a number of non- operating facilities which in turn lowered the quantity of water production below the installed capacity. While in the other 6 WSSAs, all infrastructures were working properly as detailed in Table 3.3.

Table 3.3: The Non-operating Infrastructures in the Visited Water Supply Schemes

Visited WSSA	Project	Non-operating facilities	Remarks
LUWASA	Ng'apa Water supply scheme	Boreholes	4 out of 8 boreholes were not working. As a result, 5,712 M ³ of expected water could not reach to the community per day. Non-working borehole reduced the quantity of water production hence, full production capacity could not be attained.
DAWASA	Ruvu Juu Water Supply Scheme	Pump	One standby pump from the old treatment plant at intake was not working.
BUWASA	Bunena Water Supply Scheme	Pump	At the time of visit, one out of the three intake pumps were not working due to motor breakdown for about two weeks.
SUWASA	Majengo Water Supply Scheme	SCADA System	It was not able to detect line pressure due to default of pressure sensor. Flow meters were also not working due to default of electrode.
		Chlorination system	Chlorination pump were not working due to default surge tank.

Source: Auditors' Analysis of Data and verification from visited Eight WSSAs (2022)

Table 3.3 indicates that, 4 out of 8 visited WSSAs with water supply infrastructure were not working as designed. This reduced the intended amount of water to be produced. According to the interviews held with officials from LUWASA, the non-functioning of 4 boreholes was due to:

- (i) collapse of transformer which facilitated operations of 2 boreholes;
- (ii) stopping abstracting water from 1 borehole due to high level of turbidity; and
- (iii) the need for maintenance of 1 borehole in order to continue working.

This situation resulted into 5,712 M³ of water per day to be not produced. Thus, denying the community from getting water services as planned by the government. Meanwhile the breakdown of 1 pump at Bunena intake (BUWASA) with no standby pump, risked the community from accessing water service in case of any pump breakdown for different reasons.

The response from the Ministry during factual clearance meeting indicated that, actually the auditors' observation was true, there were non-operating water supply structure like boreholes that collapsed due to environmental reasons and some of them had electrical and mechanical failure like transformer burst, motor blown and electronic gadgets failure like control panel.

3.3.2 Dilapidated Water Supply infrastructure

Review of Annual Performance Report for the financial years 2019/20 to 2021/22 and interview with the officials to the visited 8 WSSAs, revealed that, 3 out of 8 visited WSSAs had dilapidated water supply infrastructures.

The review of 2020/21 BUWASA Annual Report revealed that, for the financial year 2020/21, the Authority observed high frequency of various pipe bursts which were caused by dilapidated water infrastructure because of expired pipes which were too weak to withstand normal pressure in the distribution and service line systems.

Also, the review of DAWASA Annual Progress Report of 2020/21, revealed that, there were scenarios of water loss from customer's pipes and transmission line which were mainly caused by expired pipes and high-water pressure.

Similarly, Interview with LUWASA officials revealed that, despite of having the new water production plant and transmission main at Ng'apa Water supply scheme. Water distribution networks were dilapidated due to expired life span which caused frequent bursting of water pipes. This resulted into inability to attain the maximum production capacity of the infrastructure. According to interviewed officials, it was revealed that, the construction of Ng'apa transmission main did not involve existing distribution network due to constrained budget.

3.4 Inadequate Water Billing and Revenue Collection

Section 48 of Water Supply and Sanitation Services (Licensing and Quality of Service) Rule of 2020; stipulated that, water supply licensee shall prepare customer's bill and it shall contain all necessary information such as bill number, billing period, customers bill name, meter number, location, date at which bill were issued, method of communication of complaints, etc.

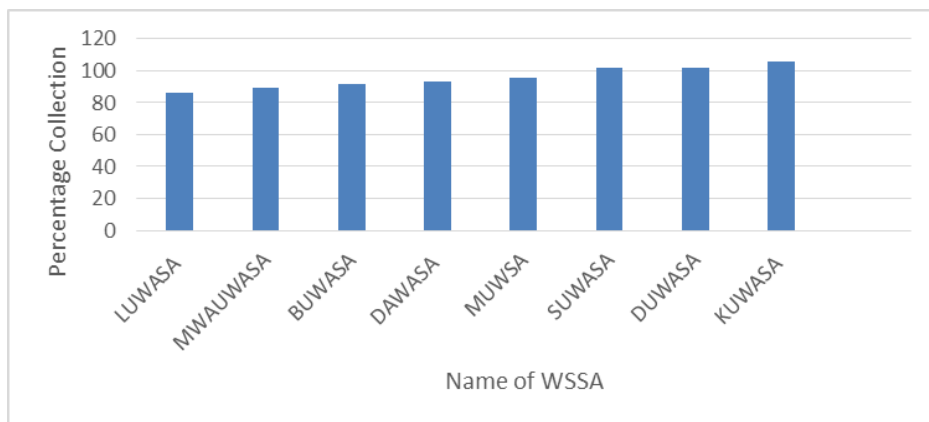
During the Audit, it was noted that, the billing process in WSSAs were conducted through Unified Billing System. The system facilitated billing process by building up the bill, sending information to customers and displaying the billing and payment status after inputs of meter reading.

However, the following weaknesses were noted:

3.4.1 Not all Billed Amount were Collected from the Customers

The review of billing reports for WSSAs revealed that, the annual total amount of water collection from water bills was less than the total billed amount as shown in **Figure 3.3**.

Figure 3.3: The Amount of Revenue Collected from Water bill by WSSAs



Source: Auditors Analysis of financial data from visited WSSAs (2022)

Figure 3.3 shows that, 3 out of 8 visited WSSAs collected revenue from billed amount by 100%. Furthermore, 5 out of 8 visited WSSAs collected less than 100% from the billed amount. Despite the general collection from billed amount being more than 80% in all 8 visited WSSAs, the actual collection from billed amounts in respective year was less than the percentage shown. This was due to the fact that, the collection included amount from debts of the previous years. For detailed information on billed amount to specific WSSA refer **Appendix 7**.

In an interview with officials in the visited WSSAs it was revealed that, they could not separate amount collected from previous debt and that from billed amount in the respective year. It was further noted that, the current practice of collecting debts amount do not differentiate collected amount of debts basing on the billed amount in a respective year, instead the collected amount of debts includes debts from billed amount in respective year and collection of debt from previous years. As a result, it was difficult to assess the performance of debt collection which relate to the target of a particular year since the collection comprised of debts from previous years. According to the interviewed officials, the system cannot separate the transactions of current and previous year.

Therefore, ineffective collection of water bill revenue in WSSAs was caused by non-payment of high water bill debts by the government entities and ministries. In interviews with officials, it was confirmed that, the government entities, agencies and Ministries were the highly indebted entities.

Interview with officials from the Ministry acknowledged the existence of the problem and emphasised that, they were piloting the use of prepaid meters in WSSAs of Iringa, Moshi, and Tanga in order to address the issue of huge debts.

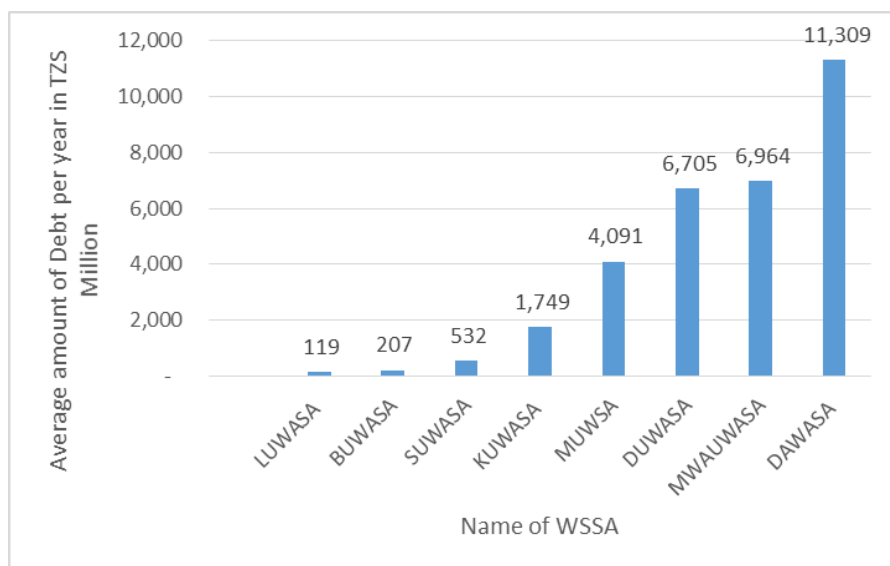
Non-payment of Debts by the Government Entities: WSSAs were responsible to ensure that all water customers pay for the water service through billing. However, the due amount was not effectively collected. The Audit noted that, there was a huge amount of debt to customers who were supplied with water services.

It was further revealed that, for the financial year 2019/20, various government entities, agencies and Ministries had a total water bill debt amounting to TZS 43.3 Billion as of May, 2020. However, the Ministry did not provide data for the financial year 2020/21 and 2021/22.

However, the Ministry of Water effort in collaboration with the WSSAs in facilitating the payment of the existing debts was noted in 2019/20 with the presentation of the total amount of debt in the letter dated 15 June, 2020 with Ref. No. FA.3/186/01 to the Permanent Secretary, the Ministry of Finance and Planning, requesting payment of debt for various government entities. Regardless of this situation, the Ministry did not provide to the Audit Team the document indicating the total debt for the financial years 2020/21 and 2021/22, instead they advised to request the same from the WSSAs which were they visited.

Therefore, the debts from 8 visited WSSAs were analysed for various years starting from 2019/20 to 2021/22. It was noted that, the visited WSSAs had amount of debt ranging from TZS 119 to 11,309 million. **Figure 3.4** shows the average amount of debt per year to specific visited WSSAs.

Figure 3.4: The Average Debt per Year to each of the Visited WSSA



Source: Auditors' Analysis of Data from visited WSSAs (2022)

Figure 3.4 shows that, DAWASA was highly indebted with an annual average debt of TZS 11.309 billion. The least and lowly indebted was LUWASA with an annual average amount of debt of TZS 119 million.

Inadequate effort to support collection of the existing huge debts especially from government entities risks the possibilities of recovering the debts. Thus, resulting into inability to sustain water service delivery. This in turn lead to WSSAs not to attain the objective of being the financially self-sustaining entities through revenue from supplied water services and reduce dependence on the government. In an Interview with Officials from the Ministry of Water, it was elaborated that, they were in a pilot regarding the use of the prepaid meters in the WSSAs of Iringa, Moshi and Tanga to address the issue of huge debts.

3.4.2 Inadequate Control of Meter Reading Process

During billing process, the meter readers had to visit each water meter and record the readings to create water bills. It was noted that, the billing system did not provide access to capture important information including the location of water meter during the meter reading to ascertain its location as a check system.

Also, it was found that, the established meter reading control was a meter reader to take photo after reading which were to be used as references when complaints arose. The control was not adequate because GIS system were not supported by system to ensure that photos were taken on the exact meter location.

The lack of the provision for water meter's geographical location in billing system was linked to the inability of billing officer to realise the meter readings which were not for the intended meter. The billings system only provided an alert when there was a too high/low readings compared to previous reading.

3.4.3 Lack of Due Process to Determine Appropriate Water Meter

Section 3.2 of the Guidelines for water meter selection, installation, testing and maintenance for water supply and sanitation authorities, stipulated the criteria that, WSSAs have to consider on the selection of water meters. WSSAs were required to conduct assessment to analyse water quality, flow rate, water pressure, and other technical and socio-economic considerations to come out with type, size and class of water meter for their operations.

During the Audit it was noted that, all the visited 8 WSSAs had more than one model of water meters installed in water supply scheme without having the basis for selection of such water meters. Interviews conducted with officials from the Ministry of water and officials from LUWASA revealed that, in Lindi region and most of coast regions area, water was corrosive as it contained lots of salt which frequently damaged installed water meters. They further emphasised that, the zone requires to have customised water meters according to base on the environmental conditions.

Table 3.4 indicates various meters models which were used by the visited WSSAs.

Table 3. 4: The Different types of water meter used in WSSAs

WSSA	Number of Model of Meters used	Name of Models used
MWAUWASA	6	ABB, Kent, Maddalena, Soccum, Bylan, Kimei
KUWASA	2	Kimei and Mopec
DUWASA	19	ABB, Bylan, B-Meter, China, Corona, Hit Italy, Iran, Itron, Joy meter, Kent, Kimei, Laison, Luna, Null, Sensus, Unimag, Wasser garage, Water Tech
LUWASA	5	Baylan, Kimei, Weisdom, B.meter and Zenner
DAWASA	6	Sensus, Fuju, Gkmj, Arad, Baylan, Kent, Kimei
MUWSA	5	Bylan, Wasser garage, zenner, Kent, Elster
BUWASA	6	GKMJ, Baylan, Itron, Zenner, Kimei, Joys200 Prepaid Water Meter
SUWASA	4	Kimei, Mopec, Bylan, DS90TAR

Source: Data from Respective Visited WSSAs (2022)

Table 3.4 shows different models of water meters used by the visited WSSAs. The Use of different types of water meters without due process to select appropriate water meters led into short service lifespan of water meters especially in coastal regions.

Based on these facts, there was high possibility of recording erroneous water bills to customers. This increased the risk of either over billing or under billing due to low efficiency of water meters. In addition, operating using various models of water meters provided difficult conditions for the effective operations and maintenance activities. This was due to the fact that, the procurement of spares and other maintenance kits were difficult unlike when the authorities operated using only one or two types of meters.

3.5 Inadequate Treatment of Water Supplied to the Community

Section 20 (b) of Water Supply and Sanitation Act of 2019, states that, WSSA shall secure the continued supply of water for all lawful purposes by continuously treating water and monitoring the quality of water supplied at such times and in such a manner as may be prescribed in the water quality standards or regulations made under this Act. However, in a review of EWURA Water Utilities Performance Review Report for Regional, National and District WSSAs published for the financial year 2019/20 and

2020/21 it was found that, the percentage compliance to the safe and clean drinking water standards as stipulated in TBS (TZS 789:2018 - EAS12:2018) was not 100% for sample of water collected from: National Water Supply Scheme, Regional Water Supply Schemes, and Districts and Township Water Supply Schemes.

Moreover, for the financial year 2019/20 EWURA collected 85, 525, and 213 samples from National, Regional, and District Water Supply Schemes respectively to check their compliance to Water Quality Standards. Also, for financial year 2020/21 the number of collected samples were 76, 521, and 241 from National, Regional and District Water Supply Schemes respectively. Among the tested samples, the number of samples that complied with safe and clean drinking water standards expressed in percentage were as shown in **Table 3.5** as follows:

Table 3. 5: The Percentage of Collected Samples that Complied with Water Quality Standard

Financial Year	Parameter Tested	Percentage of samples Complied for Regional and National WSSAs	Percentage of samples Complied for National Water Supply Schemes	Percentage of samples Complied for Districts and Township Water Supply Schemes
2019/20	PH	87	94	91
	Turbidity	84	60	63
	E-Coli	95	79	86
	Residue Chlorine	52	14	31
2020/21	PH	94	97	83
	Turbidity	84	50	72
	E-Coli	94	83	93
	Residue Chlorine	48	27	29

Source: Water Utilities Performance Review Reports by EWURA for FY, 2019/20 and 2020/21

Table 3.5 shows that, for the available data of 2 out of 3 years under the Audit, there were no water quality parameters with all of its collected samples met the water quality standards (100% compliance). For the 2 financial years the highly complied parameter was PH with more than 80% of collected samples that complied with water quality standard while the lowest compliance was residual chlorine whereby the percentage of samples met the standards was between 52% and 14% inclusively.

Furthermore, the review of monthly water quality monitoring report from 1 out of 8 visited WSSAs, revealed that, monthly analytical water test conducted by LUWASA showed that, Chlorine residual, turbidity and Iron (Fe) did not meet standards established by Tanzania Bureau of Standards (TBS). Interview with the officials from the Ministry of Water indicated that, other reasons for inability to comply with the requirement of Tanzania the Bureau of Standards was the use of expired chemical reagents that were intended for dosing or calibration of laboratory equipment.

During the Audit it was noted that, inadequate treatment of water supplied to the community was due to the following:

3.5.1 Water Supply Schemes that Abstract its Water from Surface Sources lack Conventional Water Treatment Facilities

Chapter seven of the MoW's Design Manual recommended treatment process flow for the most common water sources in Tanzania. According to the Manual, water abstracted from surface water sources need conversional water treatment facilities, to facilitate disinfection, filtration, and sedimentation process.

During the Audit, it was noted that one out of the eight visited regional water supply schemes which abstract water from surface sources did not have conventional water treatment facilities. This was noted in Kigoma WSSA whose water source was from Lake Tanganyika. Despite being surface water sourced, the only treatment facility employed was chlorination.

In the absence of the fully fledged conventional treatment system, undesirable and unwanted pollutants in raw water due to seasonal climatic changes or human activities would not be removed hence risking the health of water consumers. Also, can reduce water supply infrastructure lifespan due to corrosion or encrustation to areas where raw water is excessively hard.

Response from the Ministry during factual clearance indicated that, for the Kigoma water supply scheme, which abstracted water from Lake Tanganyika, the intake was a temporary solution for saving the people in Kigoma, while the new intake was under construction. The auditors were

of the view that, although it was a temporary solution, still the community of Kigoma deserved to consume well-treated water. However, site visit to Kigoma noted that, the new intake under construction did not involve construction of conventional treatment system.

3.5.2 Inadequate Water Quality Testing Before and After Treatment

According to Section 3.2.2 of EWURA Guideline for water and wastewater quality monitoring for water supply and sanitation authorities, WSSAs should monitor water from the sources for the parameters that treatment works was specifically designed to remove and other parameters that provide general indication of water quality. Also, it should monitor the water leaving the treatment plant for parameters that the facility were designed to remove.

During the site visit to water treatment facilities, it was noted that, in 2 out of 8 visited water treatment facilities, there was no daily measurement of water quality parameters before and after treatment. This was observed in Lindi Urban Water Supply and Sanitation Authorities (LUWASA) and Kigoma Urban Water Supply and Sanitation Authority (KUWASA), treated water was inadequately tested but supplied to the community. Moreover, at the time of visit in LUWASA, the responsible officer was on leave for the whole month without replacement of the daily activities of testing the quality of supplied water. Also, the daily water quality control logbook was not presented to Auditors for verification.

Despite LUWASA serving more than 71,241 people in Lindi Region, water treatment facilities for Ng'apa water supply scheme, with investment of more than TZS 33 billion, lacked standard laboratory for daily/frequent testing of water quality as per requirement. **Photo 3.1** shows the room which was used as laboratory without proper organisation that was required for a laboratory.



Designated room and equipment for daily monitoring of water quality at Lindi Urban Water Supply and Sanitation Authority

Photo 3.1: Designated room as Laboratory in LUWASA. The Photo was taken by Auditors on 05th February, 2022

Furthermore, the automated chlorination system was not working at that time. Interview with the officials at LUWASA revealed that, they were not able to fix the malfunction of the system because they had no adequate knowledge/training to repair the fault noted.

Detailed information regarding specific water supply schemes and noted weaknesses in **Table 3.6**.

Table 3. 6: The Status in measuring water quality parameters before and after treatment.

Name of WSSA	Daily Tests of Raw water Quality Parameters.	Daily Test of water parameters after treatment.
LUWASA	There were no daily water quality test conducted to raw water before treatment at Ng'apa treatment plant.	Water quality test after treatment was conducted in monthly basis and not in daily basis.
KUWASA	There were no daily quality test conducted to raw water before treatment by chlorine dosing.	Water quality tested after treatment was conducted in monthly basis and not in daily basis.
DAWASA	Raw water quality check was tested every one hour for new treatment system at Upper Ruvu scheme. Measurements	Treated water quality parameters were tested every one hour for new treatment system at upper Ruvu. Measurements were not

Name of WSSA	Daily Tests of Raw water Quality Parameters.	Daily Test of water parameters after treatment.
	were not done for old treatment system.	done for old treatment system.
MUWASA	Raw water quality parameters were tested from the main sources	Water parameters were tested after chlorine dosing.
BUWASA	There were no daily quality test conducted to raw water before treatment at Bunena Treatment Plant.	Water parameters for Treated water leaving the treatment plant were tested daily.
DUWASA	Raw water parameters were tested from the main sources	Water parameters were tested after treatment
MWAUWASA	Raw water parameters were tested from the main sources	Water parameters were tested after treatment
SUWASA	There were no daily water quality test conducted to raw water before treatment at Majengo treatment plant. Raw water was tested once per week.	Water quality test after treatment was conducted in weekly basis and not in daily basis at Majengo treatment plant.

Source: Auditors' Analysis of Information and Verification to the visited WSSAs (2022)

Table 3.6 shows that, for 8 assessed WSSA, 2 WSSAs namely LUWASA and KUWASA did not conduct daily testing of water entering and leaving the treatment plants after treatment. BUWASA only measured the water quality parameters after treatment on daily basis.

On the other hand, DAWASA did not conduct water quality parameter checks for old treatment plant at upper Ruvu treatment Plant. Water quality monitoring was conducted for new water treatment plant whereby parameters for raw and treated water were measured at every hour. It was further noted that, at old water treatment system, no monitoring was conducted to water parameters to assess the efficiency of treatment. Whereas, the Authority assumed that, the efficiency in treatment for system would be the same.

Inadequate monitoring of water quality parameters in urban water supply schemes were attributed by non-adherence of Water Authorities to their water quality monitoring plans approved by EWURA. The approved plan by EWURA requires each water supply scheme to have and maintain the necessary equipment to measure and monitor different water quality parameters such as temperature, electrical conductivity, pH, dissolved oxygen and total suspended solids, and other biological indicators. As presented in Table 3.4 different WSSAs did not fully comply with measuring water quality parameters. The reason for non-compliance was linked to the fact that, water treatment facilities was not fully operational as detailed in section 3.5.3. Detailed information shown in **Appendix 9** of this report.

Therefore, monitoring water quality parameters would enable treatment plant operators and water quality officers to regulate the dosing process during treatment to ensure that, water leaving the treatment plants met the required standards. Also, daily measurements would facilitate the evaluation of the performance of water treatment plants and the operators could notice any irregularities in the treatment operations during the treatment process.

3.5.3 Some of Water Treatment Facilities Were not Functioning

The visit to LUWASA observed that, at the treatment plant there were two installed systems for chemical dosing, one for chlorine dosing and the other for Poly-Aluminum Chlorine (PAC) dosing. It was observed that, the system for PAC dosing was turned off for the reason that, the raw water was clean. Auditors noted that, no testing were undertaken in the raw water to assess whether the coagulation were required or not before reaching a decision to switch off the PAC dosing system. Other noted non-operating treatment facilities were as described in **Table 3.7**.

Table 3. 7: The Non-operating Treatment Facilities noted in Visited Water Supply Scheme

WSSA	Visited water supply scheme	Non-operating water treatment facilities	Impact
MWAUWASA	Kapripoint	Supervisory Control and Data Acquisition (SCADA) system for monitoring operation of	The treatment operators were unable to get real time information for

WSSA	Visited water supply scheme	Non-operating water treatment facilities	Impact
		facilities installed in treatment plant was not working properly, as a result they shifted to manual system	monitoring water treatment facilities including dosing pumps, filters, water tank levels, and Quality of water entering and leaving the plant.
LUWASA	Ng'apa	PAC dosing system to facilitate coagulation during treatment process was switched off.	PAC dosing were not conducted.
		Chlorine dosing system was not working due to clogging of chlorine solution in dosing system. Hence chlorination was not conducted.	Chlorine dosing was conducted manually which posed the risk of overdosing or under dosing.
		Supervisory Control and Data Acquisition (SCADA) system for monitoring operation of facilities installed in treatment plant was not working properly, as a result they shifted to manual system	Level of water in filters was monitored manually. Also, operators were unable to monitor the status of borehole that was supplying water to treatment plant on real time.
MUWSA	Shiri and Nsere spring	Standby pump for chlorine dosing at Nsere and Shiri spring was not working	Risk of not dosing supplied water when operating pump failed due to different reasons.
BUWASA	Bunena Water scheme	The Morden Turbidity meter was not working due to bulb problem. The laboratory technician was using the	Risk of inadequate reading as the morden turbidity meter was more accurate than old

WSSA	Visited water supply scheme	Non-operating water treatment facilities	Impact
		old turbidity meter which was not much effective.	turbidity meter.
SUWASA	Majengo Treatment Plant	Chlorination system	Chlorination pump were not working due to default of surge tank.
		PH meter	The PH meter was not working due to default of detector. According to officials they were in procurement process.

Source: Auditors' Analysis of data from visited WSSAs (2022)

Table 3.7 shows that, in LUWASA facilities which were not operating was for controlling turbidity and chlorine content in supplied water. As the result the level of residual chlorine and turbidity in water supplied to the community did not meet the required standards as stipulated in table 3.4.

On the other hand, in MUWSA non-working facilities was standby pump for chlorine dosing. This phenomenon posed a risk of lack of chlorine dosing pump when on duty pumps stopped working. However, in BUWASA and MWAUWASA, the noted non-working facilities were turbidity meter and automated system for water quality parameter readings respectively. All these lowered the efficient of monitoring water quality parameters. Also, in SUWASA PH meter and chlorination system were not working.

3.6 Inadequate Operation of Water Supply Infrastructure

Section 21(a) of Water Supply and Sanitation Act of 2019, require WSSAs keep custody, acquire, through compulsory purchase, construct and operate waterworks and sanitation works. To achieve this objective, water supply organisation were required to develop operational procedures to ensure that, water network can operate satisfactorily, function efficiently and continuously and last for a considerable time as possible at lowest cost.

However, the Audit noted various weaknesses in operating water supply infrastructure as detailed as follows:

3.6.1 Inadequate Records of Pumps Operations

According to Section 10.3 of O&M manual, during pump operations, a logbook should be maintained to record the observations, which should cover timings when the pumps were started, operated and stopped during 24 hours, a Voltage in all the three phases, a current drawn by each pump-motor set and total current drawn at the installation, a Frequency, a Readings of vacuum and pressure gauges.

Moreover, should record Motor winding temperature, Bearing temperature for the pump(s) and motors, Water level in the intake/sump, Flow meter reading, Daily Power Factor (PF) over 24 hour's duration, and any specific problem or event in the pumping installation or pumping system (e.g., burst in pipeline, tripping or fault, power failure).

Information observation through the site verifications revealed that, 11 pump stations from 8 WSSAs were visited to assess the status of pump operations. In all the visited pump stations there were no full records of pump operation status as per requirement of section 10.3 of O&M manual. The detailed information on the specific water pumping station and the status of the records on pumps operation are detailed in **Table 3.8**.

Table 3. 8: The Status of pumping operation Records in the visited Water Schemes

WSSAs	Pumping stations	Observed Pump Operation records
MWAUWASA	Kapripoint intake pumps	Operation hours
KUWASA	Intake pump station	Time, voltage, current, pump pressure
DUWASA	Mzakwe pump station	Pumps voltage, current, pressure and water level at storage tank.
	Mailimbili pump station	Operation time was recorded.
LUWASA	Ng'apa pump stations	Time, voltage, current, pressure, flow meter.
DAWASA	Ruvu Juu intake pumps and Treated water booster pumps	Time, water level, voltage, Current, flow meter readings, Pump head
MUWSA	Kilimanjaro booster Pumps	Time, water level, voltage, Current, flow meter readings
BUWASA	Bunena Pump station and	Time, Voltage, Current, Used

WSSAs	Pumping stations	Observed Pump Operation records
	intake pumps	Electrical Unit. For raw water pumps only working hours were recorded.
SUWASA	Booster Pump	Quantity of electricity used

Source: Auditors' Analysis of data from visited WSSAs (2022)

Table 3.8 shows that, at Kapripoint intake, and Mailimbili pump station, operating conditions such as voltage, current, pressure, temperature, and pressure were not recorded. In all station pump operation temperature were not recorded.

Based on these facts, improper pump operation recordings were linked to a lack of effective pump operation procedures that would give all necessary instructions to pump operators. Therefore, this led into lowering the possibility for pump operators to notice any irregularity in pump operation and difficulties for the WSSAs to assess the performance of the pumps.

3.7 Inadequate Maintenance of Water Supply Schemes

According to the Design, Construction Supervision, Operation and Maintenance (DCOM) Manual, 2020, the WSSAs and RUWASA are required to conduct maintenance of implemented water supply networks in order to keep them working at the designed conditions.

The Audit noted various challenges regarding the maintenance of water projects related to establishment of maintenance information management system, inadequate records for the conducted maintenance, high levels of NRW, and defective water meters as detailed as follows:

3.7.1 Lack of Preventive Maintenance Plans

Section 4.2 of O&M Manual requires water supply entities to prepare plans for the smooth operation and maintenance of every major unit and water supply network as whole. The overall operation and maintenance plan should be a project specific to meet the needs of various individual units.

However, it was noted that, in all the visited WSSAs, there were no established annual/periodic maintenance plans that would ensure continuous preventive maintenance to water facilities installed in water

supply schemes. It was further noted that, maintenance in water supply infrastructure were conducted as corrective actions.

Moreover, WSSAs relied on corrective maintenance for the reason that, the priority of WSSAs was to ensure 100% coverage of water service. As a result, priority was given to new and extension projects than preventive maintenance activities. It was further noted that, the preventive maintenance that were conducted by WSSAs were those which did not require extensive budget such as greasing works, and infrastructure cleaning and other maintenance that was part of daily operations.

3.7.2 Inadequate Maintenance Records for the Water Supply Schemes

Water Project Operation and Maintenance Manual direct that, all maintenance activities should be written down on maintenance records. On the other hand, the records on each maintenance or repair works in water supply system along with the cost of materials and labour are supposed to be maintained along with date.

However, it was noted that, 5 out of 8 visited WSSAs, did not have adequate maintenance records while 2 had no maintenance records at all. Detailed information regarding the specific WSSAs is presented in **Table 3.9**.

Table 3. 9: The Status of Maintenance Records of Water Supply Schemes

NAME OF WSSAs	Present of Maintenance Records	
	Inadequate maintenance records	Absence of records at all
DUWASA	✓	
MWAUWASA	✓	
DAWASA	✓	
LUWASA		x
BUWASA	✓	
KUWASA	✓	
MUWSA		x
SUWASA		x

Source: Auditors' Analysis of Data from visited WSSAs (2022)

Table 3.9 shows that, for the visited eight WSSAs, 5 had inadequate maintenance records for the water supply infrastructure while 3 had no records at all. The 5 WSSAs with inadequate records were using counter books in recording daily operations of water pumps which included; the name of the technician, hours for pumps operation and time when pump was on and off. However, there were no any records for major maintenance.

Despite the O&M requirements to keep the maintenance records, the Audit noted that, operators (technicians) were not properly guided and directed effectively by Engineers in order to ensure that, records for maintenance were kept.

Consequently, the performance of water supply networks could not be assessed effectively to determine its sustainability and take appropriate corrective decisions. In addition, maintenance records would help to create specialised maintenance programs and be used to prevent expensive repair. In this regard, water supply infrastructure without maintenance records was at risk.

3.7.3 Inadequate Establishment of the Maintenance Information Management system

The establishment of maintenance information management system to track the performance of water supply network at an exact time was a prerequisite condition for effective operation and maintenance of water supply infrastructure. The effective functioning of the system was expected to enhance tracking of the performance of water supply network at any time and assist the officials responsible to take appropriate actions.

Despite its importance, 2 of the 8 WSSAs had not established information management system (SCADA) to track the performance of the infrastructure. Moreover, 4 out of the 5 established information systems, were not working properly.

Moreover, all 8 visited WSSAs, lacked automated system to provide exactly time regarding the functionality of the distribution network, as the available system was either for providing information on functionality of production or treatment plant. The detailed information on the visited WSSAs and the status of the systems are shown in **Table 3.10**.

Table 3. 10: The Status of Maintenance Information Management System (MIMS) in the visited WSSAs

Name of WSSAs	Status of MIMS		Remarks on the functioning defects noted
	Present (✓)/Absence (x)	MIMS coverage area	
DUWASA	✓	Production	The available system for tracking functionality of borehole at the time of the audit was not working properly. According to the operator, the system was installed by Chinese; the officials who were operating the system did not have the know-how for rectifying the defects.
MWAUWASA	✓	Treatment plant	The system did not measure water quality parameters like turbidity as before; recently they use manual system for daily measuring of water quality parameters. The operators lacked capacity to correct the noted defects.
DAWASA	✓	Treatment plant	The system was working well
KUWASA	X		There were not any system to track functionality of established infrastructure
LUWASA	✓	Treatment and Production	The system could not track the functionality of boreholes. According to the officials they did not have adequate knowledge to rectify the system
BUWASA	✓	Treatment and Intake	The system did not track operation at intake point
MUWSA	X		There was not any system to track functionality of established infrastructure
SUWASA	✓	Treatment and Production	The system could not track the boreholes effectively. Flow meter and system were not tracked.

Source: Auditors' Analysis of Data from Visited WSSAs (2022)

Table 3.10 shows that, 6 out of 8 visited WSSAs, had the systems for tracking performance of water supply network. Out of 5 only 1 (DAWASA) was working effectively while 4 were noted to have some defects.

As a result of lack or malfunctioning of information management system in the visited WSSAs, the responsible officials were not adequately informed regarding the performance of the established water supply network. This also prevented them from taking appropriate measures timely especially when there was default in water supply network. For instance, when turbidity increased, the officials at MWAUWASA could not detect immediately as opposed to when the system could be automatic.

3.7.4 Inadequate Surveillance and Inspections of the System of Water Supply Networks

The staff from Operation and Maintenance Department in WSSAs are required to conduct surveillance along water supply networks to detect damage, or deterioration in the network and conduct a respective measure¹⁶. Moreover, water pumps are required to be inspected at least once per year by a qualified/trained operators/engineer¹⁷.

Review of Quarterly Reports and action plans from visited WSSAs for the financial year 2019/20 to 2021/22, revealed that, WSSAs did not conduct surveillance/inspection of water supply networks. However, officials from the visited WSSAs revealed that, they mostly conducted inspections on ad hoc basis upon reported cases of defective water supply networks.

In addition, it was found that, only Moshi Urban Water Supply and Sanitation Authority out of 8 visited WSSAs prepared reports for ad hoc inspections conducted. From the reviewed inspection reports the key findings which were noted as weaknesses include; lack of maintenance of the key installed parts of water supply schemes chambers, and valves; lack of maintenance schedules for the key components of water supply schemes, lack of corrective maintenance and lack of marking poles to indicate the route of laid pipes of trunk main.

Furthermore, inadequate inspection to water supply networks in WSSAs posed risks on the sustainability of water supply schemes in the country. This emanated from the fact that, this situation might lead to high costs

¹⁶ Section 7.5.1(c), and 9.4 of Ministry of Water O&M Manual

¹⁷ Pg 91 of the Operation and Maintenance of Water Supply and Sanitation Projects Manual, 2020 Fourth Edition

of maintenance or replacement of parts which were not inspected and maintained on time.

In interview with officials from the Ministry of Water, it was elaborated that, other reasons for inadequate surveillance were lack of manpower and resources, although there was no analysis of the same submitted to Auditors. This resulted into non-attainment of recommended level of water service of Non-Revenue Water as detailed as follows:

Non-attainment of Recommended Service Level of Non-Revenue Water

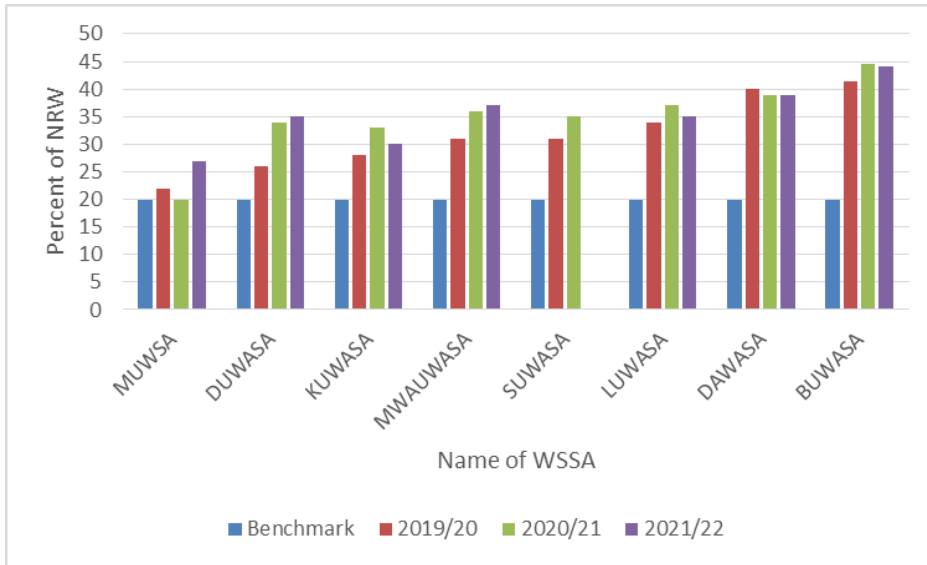
The Ministry of Water planned to reduce the percentage of Non-Revenue Water from the National average of 36% in July, 2014 to 25% by June, 2024. Specifically, the Ministry targeted to attain 26% of Non-Revenue Water in 2023¹⁸.

In addition, a report from EWURA supported this view indicating that, Non-Revenue Water as percentage of water production, it is recommended that, the service level benchmark to be not more than 20%.

However, it was noted that, in 8 visited WSSAs, only 1 WSSA namely Moshi Urban Water Supply and Sanitation Authority attained a recommended service level of non-revenue water in 2020/21. Detailed information regarding status of Non-Revenue Water in each WSSA in the country for the past two years are shown in **Figure 3.5**.

¹⁸ page 52 and 108 respectively of the MoW's Five Year Medium Term Strategic plan 2019/20 - 2023/24

Figure 3.5: The Status of Non-Revenue



Source: Auditors' Analysis of data from EWURA (2022)

Figure 3.5 shows that, for the financial year 2019/20, 2020/21 and 2021/22 out of eight visited WSSAs only 1 WSSA namely Moshi managed to meet recommended level of 20% NRW in 2020/21. The maximum NRW was noted in Bukoba with 42%, 45% and 44% in 2019/20, 2020/21 and 2021/22 respectively. Among the visited 8 WSSAs, Moshi had a satisfactory performance with 22%, 20% and 27% in the year 2019/20, 2020/21 and 2021/22 respectively.

Among the noted causes for non-attainment of benchmark for NRW were:

- (i) Frequency bursting of pipes due to lack of preventive maintenance of water supply networks. This led into water loss as noted during the review of annual progress reports of visited WSSAs.
- (ii) Inadequate coordination with other Ministries and Government Agencies during establishment and implementation of water supply projects. This led into leakage due to destruction of water supply networks by other ministries and government agencies especially when establishing road infrastructure. From interviewed officials at visited WSSAs it was revealed that, there were some few cases when TARURA and TANROADs constructed road network destructed the established water supply networks.

(iii) Lack of bulk meters to measure water loss: Among the visited WSSAs, MUWSA had lowest NRW of 20%. BUWASA recorded NRW of 44% in 2020/21. It was noted that, MUWSA installed a bulk meter in all its distribution zones that facilitated monitoring of water losses. In BUWASA bulk meters were only installed at the productions and storage tanks and there was no bulk meter in water distribution junctions. Hence, it was difficult to trace unnoticed water loss in the network. The same experience was also noted in DAWASA whereby it was difficult to assess the level of NRW for each DAWASA's zones due to lack of bulk water meters.

As a result of high percentage of NRW water, the produced water did not reach the targeted communities. NRW for visited WSSAs was equivalent to TZS 60.94 and 57.2 billion losses of revenue in the year 2020/21 and 2019/20 respectively. The detailed information regarding specific WSSA and amount lost is presented in Table 3.11.

Table 3. 11: The Annual revenue lost from NRW above the allowable limit of 20% for year 2019/20 and 2020/21

Visited WSSAs	Estimated Amount of water lost as NRW (M ³)	Annual Revenue loss due water loss (Billion TZS)	Estimated Amount of water lost (M ³)	Annual Revenue loss due water loss (Billion TZS)
	FY 2020/21		FY 2019/20	
MUWSA	-	-	235,848	0.2
LUWASA	144,417.55	0.26	113,776	0.2
SUWASA	196,486.30	0.28	341,807	0.4
KUWASA	460,281.90	0.6	792,562	0.4
BUWASA	556,559.30	1.1	501,152	0.9
DUWASA	2,704,252.80	3.8	1,625,031	2.3
MWAUWASA	4,694,382.24	8.8	3,586,563	3.8
DAWASA	27,718,687.89	46.1	29,467,180	49
Total revenue loss		60.94		57.2

Source: Auditors' Analysis of WSSAs Performance Report (2022)

Table 3.11 shows that, the maximum water loss above the acceptable limit was found in DAWASA which amounted to TZS 46.1 and 57.1 billion in 2020/21 and 2021/20 respectively. Meanwhile, the minimum was noted in MUWSA with zero amount since the level of NRW was 20% in 2020/21 while in 2019/20 were MUWSA and LUWASA with TZS 0.2 billion each.

Table 3.9 furthermore it is indicated that, for the visited 8 WSSAs, the government lost approximately a total of TZS 60.94 and 57.2 billion from NRW in 2020/21 and 2019/20 respectively. The data for the financial year 2021/22 were not analysed since they were not issued by EWURA. For detailed information on the cost lost for each WSSA see **Appendix 8**.

Response from the Ministry during factual clearance meeting indicated that, non-revenue water was still a major issue on water supply projects. There were Commercial losses such as theft, non-payment, and inaccurate meter systems, incorrect readings or meter-tampering, meter bypassing and the like. Also, there were Physical losses such as water leakages and broken pipes, pipe bursting and infrastructure vandalism.

3.7.5 Inadequate Maintenance of the Noted Defects in the System for Water Supply Schemes

Water Supply and Sanitation Authorities are required to establish procedures for prompt repair of leaks and for attending efficiently and accurately to the leaks¹⁹. Moreover, Water Supply Networks are required to be maintained on a regular basis and the records for observations should be kept in a logbook²⁰

However, observation through physical visits in 8 WSSAs revealed that, defects found in the water supply networks were not rectified accordingly. Further details are found in Table 3.12.

¹⁹ Pg 79 of the Operation and Maintenance of Water Supply and Sanitation Projects Manual, 2020 Fourth Edition

²⁰ Pg 90 of the Operation and Maintenance of Water Supply and Sanitation Projects Manual, 2020 Fourth Edition

Table 3. 12: The Experience of Unrectified Defects noted in visited WSSAs

Name of Water Supply Network	Name of Water Supply Network	Noted weaknesses which were not rectified.
DUWASA	Mzakwe boreholes water sources	<ul style="list-style-type: none"> The SCADA system no longer gives information regarding performance of some boreholes to the monitoring center at Mzakwe Office. The operators at boreholes were replaced by the installed system when it was working well. However, designated officials to operate boreholes at Mzakwe were removed when the system were functioning well. At the time of this Audit, the system was not functioning, and operators were not returned to monitor operation of boreholes instead they relied on the security guard who lack technical knowhow at all. The system needed to be updated and DUWASA did not have experts to ensure that the system is updated for proper functioning
MWAUWASA	Capri Point water treatment plant	<ul style="list-style-type: none"> The Authority had automated system for reading the operation status of facilities in treatment plant. At the time of this Audit the was no longer functioning well. The water quality assurance officials revealed that, they monitor operation of treatment plant manually, they have no capacity to restore the system which has a defect
LINDI	4 out of 8 established boreholes were not working. The boreholes namely were namely: Boreholes	<ul style="list-style-type: none"> One borehole had high level of turbidity hence the borehole was abandoned. According to the officials, during borehole establishment, survey conducted was not adequately to assess the quality of water before drilling borehole to ensure that, borehole was constructed at source with water which

Name of Water Supply Network	Name of Water Supply Network	Noted weaknesses which were not rectified.
	Number 9, 11, 13 and 14.	<p>meet standards.</p> <ul style="list-style-type: none"> • Two boreholes were not operated due to motor breakdown. • One borehole needed maintenance in order to resume its operations. • The SCADA system installed on the treatment plant was not working to provide the operation status of the facilities such as boreholes and filters, and they were unable to fix the system due to lack of expertise support.
BUWASA	Bunena Water supply Scheme	<ul style="list-style-type: none"> • 1 out of 3 intake pumps was not operated due to motor breakdown. • The Morden Turbidity meter was not working due to bulb problem. The laboratory technicians were using an old turbidity meter which was less accurate compared to the Morden one.
MUWSA	Shiri and Nsere source	<ul style="list-style-type: none"> • Standby pump for chlorine dosing at Nsere and Shiri spring was not working due to motor problem.
SUWASA	Majengo Water Supply Scheme	<ul style="list-style-type: none"> • Chlorination system was not working • SCADA System

Source: Auditors' Analysis of Information from Physical Verification during the Audit (2022)

Table 3.12 shows defects found in the visited water supply schemes in WSSAs that were not rectified.

The main causes for not rectifying the noted defects included:

- (i) Inadequate capacity to operate the installed automation systems for operating water supply networks e.g., Officials at Mzakwe Water Supply Network had no technical knowhow to repair the installed digital system for monitoring boreholes which was installed by the Chinese experts. The available officials were not adequately trained to run and repair the system when any fault occurs. Also, officials at

MWAUWASA revealed that, they had no capacity to restore the failed system for reading water quality parameters.

- (ii) Inadequate training of officials during installation and handling over of installed system by the contracted companies. In this regard, the companies which were contracted to execute various system for water supply schemes did not adequately train the local officials during installation and handling over of the installed systems. This was noted in LUWASA where the Authority was unable to repair a SCADA system installed in the production and treatment system. As a result, it posed some difficulties in running the installed system and whenever any malfunction occurred the officials were not able to fix the system.

These experience of not rectifying noted defects in water supply networks were likely to lead to poor performance of the networks. There was the risk that, even the coverage of areas supplied with water services might be reduced if appropriate actions were not taken to the noted defaults. This was due to the fact that, water supply infrastructure would not be utilised to its maximum capacity. Thus, water demand would not be attained.

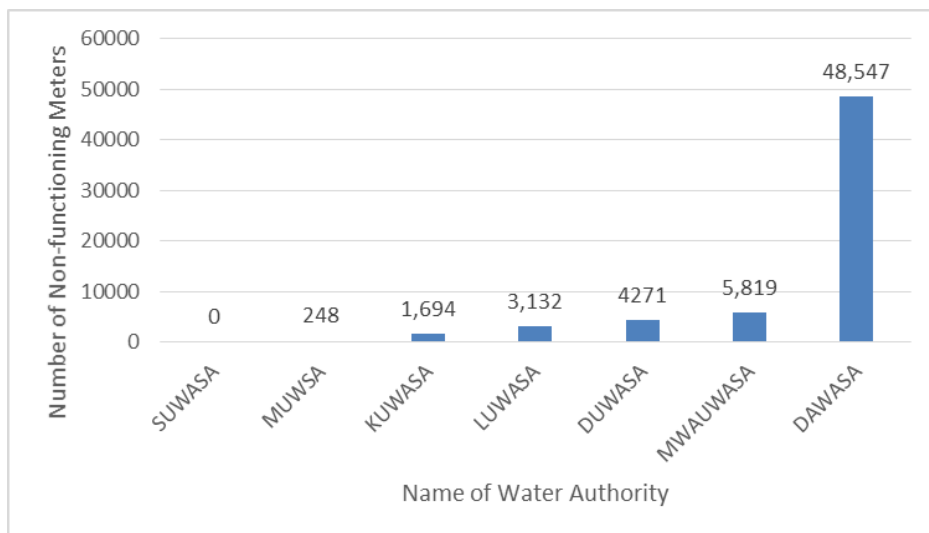
Interview with officials from the Ministry of Water confirmed these experiences and elaborated further that, the main challenge was the source of funds for doing repair and replacement. This emanated from the fact that, most WSSAs could not afford an immediate clearing of a fault or replacement of defective spare parts.

3.7.6 Presence of Water Meters Which Were Not Functioning

According to the best practices, installed water meters to customers are required to be replaced within 5 years. Moreover, all defective water meters are supposed to be replaced for the enhanced provision of intended water services.

However, the Audit Team noted that, there was no tendency to replace installed water meter after every 5 years. Moreover, there were defective meters in visited WSSAs which were not replaced timely as shown in **Figure 3.6**.

Figure 3.6: The Status of the Non-functioning Water Meters



Source: Analysis of Data from respective WSSAs (2022)

Figure 3.6 shows that, the maximum number of defective water meters was noted in DAWASA, For instance DAWASA had 48,547 water meters while the minimum was noted in SUWASA with 0 water meters. The figure further shows that, in the visited WSSAs, only SUWASA had no non-working meters.

During Audit it was noted that, presence of non-working meters was caused by a lack of periodic maintenance of defective meters and periodic meter test in order to assess their performance and take appropriate measures. This in turn posed the risk of overbilling or under billing to the customers of water services. This emanated from the fact that, there was no accurate information regarding the actual amount of water supplied and consumed by the customers.

3.7.7 Inadequate Coordination among the Key Stakeholders for the Established Water Supply Schemes

The Ministry of Water is responsible for coordination of various Ministerial Departments, i.e., PO-RALG, MoEST, MoW²¹. In addition, the Ministry is responsible to coordinate and monitor WSSAs plans²².

According to Water Supply and Sanitation Act of 2019, WSSAs are required to liaise with relevant government authorities on matters relating to water supply and sanitation and the preparation and execution of plans relating to the expansion thereof. Moreover, Section 33(g) of the Act require CBWSOs to consult and cooperate with the village council or any other institution responsible for land to plan and control the use of land in the immediate vicinity of the water points and or waterworks.

However, review of Water Utilities Performance Report FY 2020/21 indicated that, there was inadequate coordination among stakeholders in WSSAs' service areas during the execution of other infrastructure projects which resulted in water pipe cuts. Thus, the increase in leakage and Non-Revenue Water (NRW).

During interviews with officials from visited WSSAs, it was revealed that, roads construction by TARURA/TANROADs was associated with cutting of water pipes. The officials revealed that, the main cause was inadequate coordination among the Ministries and agencies regarding established water infrastructures routes. It was further revealed that, there was ineffective communication on the developed master plan of established water infrastructure. As a result, during the implementation of water infrastructure, there was periodic destruction of water infrastructure.

Based in these facts, in the financial year 2019/20 and 2020/21, the recorded NRW were 27.4% and 24.4% respectively. Water pipe cutting was cited as one of the contributing factors to NRW. In this regard, WSSAs lost expected revenue from produced water which did not reach to the intended consumers.

²¹ pg 244 of Operation and Maintenance of Water Supply and Sanitation Projects Manual, 2020 Fourth Edition

²² WSDP 2006-2025; 8-7

3.8 Inadequate Monitoring of the Performance of RUWASA, WSSAs and CBWSOs by the Ministry of Water

According to Section 5 of Water supply and sanitation Act No. 5 of 2019, MoW is responsible to coordinate and monitor water authorities' strategies and plans, monitor the performance and regulate community based water supply organisations, and supervises implementation of the provisions of water supply.

However, the Audit noted inadequate monitoring and evaluation of O&M activities conducted by WSSAs in the country. This was indicated by the weaknesses described as follows:

3.8.1 Inadequate Planning for Monitoring the Operations and Maintenance of Water Supply Schemes

Review of MoW's Medium Term Strategic plan for financial year 2019/20 to 2023/24 noted that, one of the objectives of MoW was to improve the universal access to adequate, safe and clean water through increasing investment including strengthening of water infrastructure's operations and maintenance Activities.

However, MoW did not have a plan for monitoring the operation and maintenance of water supply infrastructure implemented by water entities. Hence, MoW lacked the guiding tool to ensure effective monitoring of O&M activities.

Interviews with O&M officials and review of Five Year Medium Term Strategic Plan 2019/20 - 2023/24 revealed that, the national strategies were to ensure safe water accessibility up to 98% and 90% of the population for urban and rural areas respectively by 2023/24. There have been notable efforts by MoW in establishing new water projects to supply water to the areas with no access to quality and safe water. However, the operations and maintenance on monitoring activities to ensure sustainability of established water supply scheme has not been prioritised.

This was evident in the review of the budget for the financial years 2019/20 to 2021/22 that did not indicate specific budget allocated for the execution of the plans for monitoring and evaluation of the operation and maintenance of water infrastructures This implies that, the sustainability

of water supply schemes were at risk due to lack of feedback on progress of implementation.

3.8.2 Inadequate Monitoring of the Performance of WSSAs and RUWASA

According to Water Supply and Sanitation Act No. 5 of 2019, water supply projects in rural are required to be operated and maintained by CBWSOs under supervision of RUWASA. Further, it clarifies that, WSSAs are responsible for operation and maintenance of water supply schemes while the Ministry of Water acts as the overseer of WSSAs and RUWASA.

The Audit noted that, for monitoring purposes MoW established monitoring tools and mechanisms such as Management Information system (MIS), performance agreements and inspection activities.

However, the Audit noted that, monitoring the performance of WSSAs and RUWASA was not adequately done as elaborated as follows:

(i) Inadequate understanding of KPIs of Performance Contract between MoW and WSSAs

According to MoW's Officials, performance contracts with WSSAs were one of the monitoring tools used, whereby targets to be achieved by water authorities were agreed. Moreover, through performance contract, MoW aimed to assess WSSAs' performance and take appropriate actions for non-performance. For the three years under the Audit, the Audit noted that, WSSAs signed performance contract with MoW.

However, review of MWAUWASA fourth Quarter Report for the financial year 2020/21 indicated that, the KPI for the performance contract which were signed between the MoW and MWAUWASA were not clearly understood by the stakeholders.

Interview with officials revealed that, the causes for unclear understanding of the given KPI were; lack of awareness given to respective stakeholders to know the intention of the KPI and how to report them. In addition, inadequate physical verification by MoW of reported status of implementation of KPIs as per agreement also contributed to non-understanding of KPIs. This is based on the fact that, during physical verification of implementation status, officials from MoW could have explained to WSSAs' officials areas of KPIs which were not clear.

Moreover, interview with officials from the Ministry of Water clarified that, the officials from MWAUWA lacked understanding on the KPI due to lack of training. Thus, the Audit Team urged the Ministry of Water to ensure that, they provide training to WSSAs adequately on the agreed KPI.

(ii) Lack of Periodic Monitoring and Follow-Up of the Operations and Maintenance Activities Conducted in Urban and Rural Water Supply Schemes

Ministry of Water use the Maji Information System (MajIs) as a reporting mechanism to monitor the performance of WSSAs. Water Authorities were required to fill their performance data to the system daily, weekly and monthly. The data required in the system were technical, commercial, financial and personnel information. Also, MoW established the Maji-MIS system (Management Information System) as another monitoring tool. The system required data entry by Water Authorities every quarter. Data provided in online platforms were used by MoW for assessing the performance of Water Authorities against agreed targets.

Review of conducted follow-up reports noted that, instead of conducting periodical follow-up and monitoring on the operations and maintenance works conducted by WSSAs, MoW relied much on the information submitted by WSSAs through online platforms and only conducted monitoring on ad hoc basis.

Interview with MoW Officials revealed that, when there was an indication of non-performance on the information submitted by WSSAs then MoW conducted follow-up to such WSSAs to assess a particular issue based on the reported information. In this regard, official visits and inspection were conducted to water entities when there was a need but not periodically as detailed in **Table 3.13**.

Table 3. 13: The Conducted follow up to WSSAs

Name of WSSA	Reason for conducting follow up as per submitted report
Arusha Water supply and Sanitation Authority (AUWASA)	MoW was planning to conduct training on operations and maintenance of water project to water Authorities' Engineers and Technicians. AUWASA and MUWSA were selected as pilot Authorities whereby their O&M activities were assessed in order to use noted weakness to plan for training.
Moshi Water Supply and Sanitation (MUWSA)	
Makonde Water Project	The inspection was conducted by technical personnel from the Ministry of Water after receiving the information from Makonde Water Authority manager about the decline in pumps performance, whereby water production decreased from 344,000m ³ to 120,000m ³ per month.

Source: Auditors' Analysis of Monitoring Report from MoW (2022)

According to Officials from the MoW, funding for monitoring was the challenge because the Ministry of Water did not prioritise budget for monitoring of operation and maintenance activities at WSSAs. Instead MoW prioritised financing of on - going and new water supply projects.

As a result, the Ministry of Water did not effectively exercise its role as an overseer. On the other hand, MoW did not ensure that, remedial actions were taken as soon as possible for the noted weaknesses on operation and maintenance of water supply schemes. In this regards, the established water supply schemes were facing the risk of being unsustainable due to delayed corrective actions on noted anomalies.

Interview with the Ministry of Water officials confirmed the existing phenomena and further added that, that the ministry lacked consistent periodic monitoring and follow-up of operation and maintenance activities. This was due to the fact that, the ministry did not receive enough funds in its budget, implying that, funds for O & M were not prioritised. Therefore, the main focus and priority was on the development of new water project construction because there were some areas where water service not available at all.

(iii) *Lack of mechanisms to monitor the operation and maintenance of Rural Water supply infrastructure*

Despite the MoW establishing monitoring tools such as signing performance contracts with WSSAs and online platform for reporting the performance of Water infrastructures, the tools were applied to WSSAs and not applied for RUWASA in order to monitor the operations of rural water supply scheme.

Interview with RUWASA officials revealed that, RUWASA signed performance contract with Treasury Registrar. In addition, RUWASA was also submitting Annual Progress Reports to MoW. However, the progress reports from MoW lacked evidence on the assessment of the received quarterly report, follow up or any action taken from noted weaknesses. Also, officials from MoW revealed that, RUWASA had its Board of Directors which directly reported to the Permanent Secretary of MoW posing difficulties to take any actions whenever there were weaknesses on their day to day operations.

Therefore, lack of mechanisms to monitor the operations and maintenance activities of rural water supply schemes posed a risk on the inability of MoW to have a timely track of the status of O&M activities in rural water supply schemes.

CHAPTER FOUR

THE OPERATION AND MAINTENANCE OF WATER SUPPLY SCHEMES IN RURAL AREAS

4.1 Introduction

This chapter presents audit findings on the operations and the maintenance of water supply schemes in the country as implemented by RUWASA. The following are the detailed findings:

4.2 Inadequate Implementation of the Standard Operation Procedures of Water Supply Schemes in Rural Areas

According to Section 4.2 of MoW's Operational and Maintenance Manual, water entities are required to prepare operation plans for water supply infrastructures for smooth operation of water supply schemes. Operation plans, schedule and procedures should be prepared for every major unit as well as the totality of projects as whole. The overall operation plan should be project specific to meet the needs of the various individual units and it should encompass procedures for routine tasks, checks and inspection at set intervals versus daily, weekly, quarterly, semi-annually or annually.

During the Audit it was noted that, RUWASA customised the Operations and Maintenance Manual to come up with the Operations and Maintenance Guideline, 2021 for the Rural Water Supply Schemes. However, during the Audit, various weaknesses were noted that manifested inadequate implementation of the standard operation procedures of water supply scheme in rural areas as detailed as follows.

4.2.1 The Absence of Water Supply Infrastructure's Operational Plans, Schedules and Procedures

During the Audit, Auditors visited water supply schemes operated by CBWSOs in rural area to assess the operation of each individual equipment unit installed in water supply schemes. It was found that, in all 19 visited CBWSOs, water Management Team did not have defined equipment operational plan and procedures to ensure that, there is formal equipment operation instead of depending on personal perspectives and experience.

Similarly, interviews with Water Management Team responsible for operation of rural water supply schemes revealed that, the management team was not aware with the requirements of the MoW's O&M manual on water supply infrastructure's operations plan, schedule and procedures.

Moreover, lack of water supply infrastructure operation plan, procedures and schedule, were attributed to the fact that, 63% of visited rural water supply schemes were operated by operators, who were not aware on the technicality of water supply infrastructure contrary to Water Supply and Sanitation Act, No. 5 of 2019 which directs water management team to be composed of at least artisan, accountant and any other profession depending on the complexity of the scheme.

Also, RUWASA were required to ensure that, Water Management Team were well trained to create awareness on management of rural water supply schemes. It was found that, only 37% of CBWSOs visited had Water Management Team as per the Act. Most of the team were not trained to ensure that, they have capacity for preparing and using operation plans and procedures.

Therefore, the absence of operations plan and procedures resulted into operation of water supply schemes based on personal experience and perspectives. This led into operations contrary to the manufacturer's instructions. This impact was observed in the visit to Liwale DC, whereby water pump for Mkutano water supply scheme collapsed as the result of operating without inspection of the availability of engine oil.

4.2.2 The Absence of the Annual Capacity Building Plan for Rural Water Management Team

Section 4.2.2 of O&M manual stipulated that, the personnel who are already available or chosen to carry out defined actions as contained in the operation plan and procedures shall have to be trained or retrained through special courses or through "on the job training "to ensure that, all personnel are adequately trained to carry out the functions and activities listed in the operation plan and procedures.

During the audit it was noted that, on March, 2022 RUWASA developed a guideline for Capacity Building to CBWSOs that aimed to provide the strategies that would be used in capacity building and guide capacity building facilitators. Despite of the developed guideline by RUWASA, there

was no annual capacity building plan that was developed to ensure that, Members of Water Management Team were properly trained to operate and manage rural water projects.

Interview with RUWASA officials revealed that, since its establishment (2019) RUWASA management team was focusing on preparation of guidelines including training guideline that would be used in their operation including training of Water management team and CBWSOs at large.

This implies that, the absence of appropriate Water Management Team Training plan increased a risk of water facilities being operated with operators who were not well trained to operate the systems. Hence, unable to notice irregularity during system operations in order to take appropriate measures. This situation negatively impacted on the project sustainability.

4.2.3 Inadequate Control for Water Billing and Collection of Revenue in Rural Areas

According to Water Supply Act of No 5 of 2019 and guideline for establishing and registration of Community Based Water Supply Organisation of July, 2020, CBWSOs were responsible for water billing and collection of fees for the provided water services through their established water supply schemes in rural areas.

However, the audit noted that, for all 19 visited water supply schemes, CBWSOs were collecting cash for water bills from their customers. For CBWSOs whose customers were connected with water meters, Water Management Team or any staff assigned the work were responsible to visit the customer and provided the reading and requested for the payment. The inadequacy of the control of billing and revenue collection were contributed by:

(i) Lack of Electronic System for Billing and Collection of Revenue

The Audit noted that, Rural Water Supply Schemes lacked electronic system for billing and collection of revenue. However, review of letter from RUWASA HQ to Regional Offices with ref. no L.B.26/116/01A/76 dated on 9th August, 2022, noted an effort of connecting CBWSOs to

unified billing system in which RUWASA planned to start with 5 CBWSOs from each region as pilot although the coverage was still minimal.

(ii) Poor System of Handling Cash

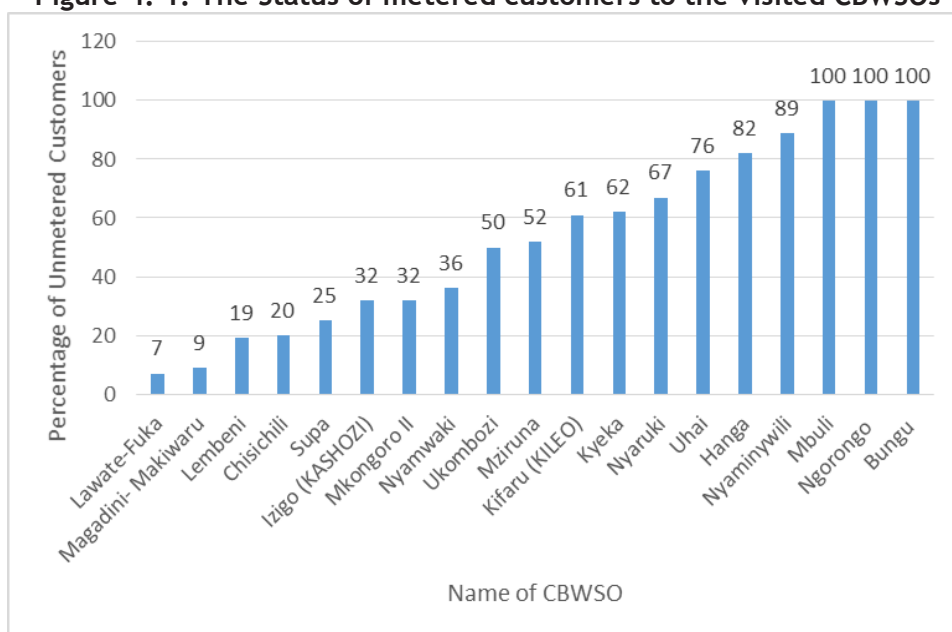
The revenue collectors were receiving money on cash basis and then deposit in bulk and listed in the accounts books. The audit noted poor documentation for which information of paid customers were easy to track.

(iii) Inadequate Metering of Customers for the Water Supply Schemes in Rural Areas

According to Water Supply and Sanitation Act, 2019, CBWSOs were required to install water meters for the purpose of measuring the amount of water supplied to a public tap or a consumer. Metering of customers who are supplied with water services also contribute to control of revenue since the quantity of water which are supplied to the customers are known.

However, in the visited CBWSOs in rural areas, it was noted that, there was inadequate water metering of customers who are enjoying water services. Moreover, there were no bulk meters in order to determine the overall quantity of water supplied to the customers. Detailed information on the status of installed meters to the visited CBWSOs are presented in Figure 4.1.

Figure 4. 1: The Status of metered customers to the visited CBWSOs



Source: Auditors' Analysis of Data from Visited CBWSOs (2022)

Figure 4.1 shows that, for the visited 19 CBWSOs, 11 had 50% or more of their customers with no water meter connections while 3 CBWSOs had 100% of their customers who were not metered at all. In addition, the visited CBWSOs were also lacking Bulk meters.

As a result, it was difficult to know the amount of water supplied to the community and the expected revenue. In addition, it was difficult to assess NRW in rural areas since they could not monitor the amount of water supplied to the community.

Moreover, there was no estimation of amount of water supplied to the community due to lack of bulk meter. Furthermore, for the CBWSOs which had no water meters, the cost for 20 litres ranged from TZS 40 to TZS 50 an average of TZS 45 per each 20 litres. Detailed information on the amount of revenue collected from CBWSOs without meters is presented in Table 4.1.

Table 4. 1: The Revenue Collection Status for Unmetered CBWSOs

RUWASA's Office	Name of CBWSOs	Total Customers	Average Amount Collected per Month- TZS	Amount collected per year - TZS
Liwale	Mbuli	8	178,500	2,142,000
Kibiti	Bungu	49	200,000	2,400,000
Rufiji	Ngorongo	43	323,060	3,876,720

Source: Auditors' Analysis of Data from RUWASA HQ (2022)

4.2.4. Inadequate Treatment of Water Supplied in the Rural Water Supply Schemes

Water Supply and Sanitation Act No. 5 of 2019 requires the water supply authorities to supply water that complies with water quality standards. Also, the National Guidelines on Drinking Water Quality Monitoring and Reporting stipulated that, quality of drinking water should be monitored by ensuring a treatment capabilities and performance of treatment facilities. Audit found shortcomings in monitoring the quality of water as explained as follows:

(i) The Absence of Water Quality Monitoring Programme for the Rural Water Supply Schemes

Best Practice from WSSAs²³ showed that, in order to ensure that, water supplied to the community meet the standards specified by TBS, water supplying entities requires to prepare a well-defined programme for monitoring the quality of water. The programme should describe the types of water parameters that would be periodically (on daily, weekly or monthly bases) monitored depending on the environment where the schemes were allocated, and the procedures that would be used for monitoring.

During the visit to rural water supply schemes, it was found that, there were no established mechanisms to ensure that, water quality status supplied to community was timely determined. With regard to the borehole sources, Water Management Team relied on the information obtained for the measurement taken during project implementation.

Also, it was noted that, in 17 out of 19 visited rural water supply schemes, there were no periodic measurements conducted to water quality parameters to address water quality supplied to the community and take an appropriate action upon noted any irregularities. Only 2 CBWSOs which were Lawate- Fuka and Makiwaru-Magadini in Siha DC had tendency to conduct water quality parameter test on quarterly basis using an external consultant.

Also, in rural water supply schemes, there were no qualified water quality personnel and equipment/tools for measuring water quality parameters such as turbidity, chlorine residual and other chemical contents in water. Interview with RUWASA officials revealed that, measurements for water content parameters were done whenever there was a need using external laboratories such as the ones from water authorities.

Absence of water quality monitoring programme were attributed mainly by a lack of water quality monitoring guidelines prepared by RUWASA. Other factors included lack of water quality personnel for rural water supply schemes who would ensure that, water supplied to the community was monitored to meet standards specified by TBS. On the other hand, there were no effectively established facilities for monitoring water quality.

RUWASA as a regulator did not pay much attention and facilitate enforcement to ensure that, water in rural areas was treated and reach into expected quality. The fact that, there were no personnel to ensure the quality of supplied water, the audit did not realise any efforts in terms of training or taking action to CBWSO which were supplying untreated water to the community. The lack of this enforcement posed risk to the health of individuals in rural areas especially water bone diseases. Thus, jeopardised government efforts to safeguard the health of the people.

(ii) Lack of Working Water Treatment Facilities

During the visit to rural water supply schemes , it was found that, out of 19 visited rural water supply schemes, 10 schemes had the installed chlorination system, but the system was left idle without operation. The remaining schemes had no treatment facilities and water was supplied directly to the community as it was abstracted from the boreholes. It was further noted that, in the schemes with chlorine dosing system there were no raw materials required for dosing including Calcium hypochlorite and equipment for measuring residual chlorine.

Therefore, inadequate functioning of water treatment system in the rural water supply schemes was attributed to inadequate consideration on provision of water treatment facilities during the planning and designing of rural water supply schemes. In the visited schemes, which were noted to have been installed chlorination system, the systems were installed later on after schemes constructions were completed. The status of water treatment facilities in visited rural water supply scheme are explained in Table 4.2 as follows;

Table 4. 2: Status of Availability of Water Treatment Facilities in the Visited Rural Water Supply Scheme

RUWASA DM offices	Name of Scheme	Other treatment Facilities	Tank for Chlorination	Remarks
Dodoma DC	Chisichili	x	x	Borehole water were supplied without treatment.
Magu DC	Nyanguge	x	✓	Facility for chlorination installed on water tank but Dosing was not conducted
Kigoma DC	Ngololo II	x	✓	
Lindi DC	Namda - Mmolela	x	✓	Facility for chlorination installed on water tank but Dosing was not conducted
	Ngawale and Madangwa scheme	x	✓	
Liwale DC	Ukombozi	x	x	No treatment done to borehole water supplied to community.
	Mbuli	x	x	
Rufiji DC	Nyaminywili	x	x	
	Ngorongos	x	x	
Kibiti DC	Bungu Scheme	x	x	
	Hanga	x	x	

RUWASA DM offices	Name of Scheme	Other treatment Facilities	Tank for Chlorination	Remarks
	Scheme			
Mwanga DC	Kifaru	x	x	Borehole and spring water for Kifaru and Lembeni respectively were supplied without treatment.
	Lembeni	x	x	
Siha DC	Magadini-Makiwaru	x	✓	Facility for chlorination installed on water tank but Dosing was not conducted
	Lawate-Fuka	x	✓	
Muleba DC	Uhai-Kalutanga	x	✓	Spring water was supplied to community without any treatment.
	Izigo	x	✓	
Kyerwa DC	Kyeka	x	✓	Facility for chlorination installed on water tank but Dosing was not conducted.
	Nyaruki	x	✓	

Source: Auditors' Analysis of Information from visited WSSAs (2022)

Table 4.2 indicates that, out of 19 visited schemes, 12 schemes which is equivalent to 63% had no treatment facilities and 8 schemes which is equivalent to 42% had chlorination system in which all of them were not in use due to absence of Calcium hypochlorite which was normally used as the disinfectant. **Photo 4.1** shows the condition in the visited water schemes.

	
<p>Photo 4.1(a): Showing Non-operating Chlorine dosing system for Namda Scheme at Lindi DC (Photo was taken by Auditors on 06/09/2022)</p>	<p>Photo 4.1 (b):Showing Non-operating Chlorine dosing system for Ngawale scheme at Lindi DC (Photo was taken by Auditors on 06/09/2022)</p>
	
<p>Photo 4.1(c): Showing Chlorination facilities installed in Lawate-Fuka and Magadini-Makiwaru Schemes in Siha DC (Photo was taken by Auditors on 21/09/2022)</p>	<p>Photo 4.1(d): Showing Chlorination facilities installed in Kyeka Schemes in Kyerwa DC (Photo was taken by Auditors on 21/09/2022)</p>

Photo 4.1: Visited Water Supply Schemes under CBWSOs (2022)

Moreover, the review of report on assessment of CBWSOs for the financial year 2020/21, it was revealed that, in rural areas, there was no clear procedure for testing water quality to CBWSOs in rural areas. CBWSOs only tested water quality whenever there was a need for doing so. Usually they used zonal laboratory offices. It was further revealed that, among the causes for not testing water quality included a lack of guidelines,

equipment, working tools and qualified human resources for testing water quality.

As the result, raw water was supplied to the communities without any form of treatment from the source. This practice posed a risk to human health, especially during rainfall when there were runoff containing other pollutants which are deposited into water sources. By supplying this, there were risks of cholera outbreak, typhoid and other disease.

4.2.5. Lack of the System to Minimise Turnover of the Water Management Team in CBWSOs

Water Supply and Sanitations Act no. 5 of 2019, required CBWSOs employ Community Water Management Team that shall be responsible for operations and maintenance of the rural water supply schemes. Permanent employment with reasonable package is part of retention mechanisms for the management team of water supply projects in rural areas.

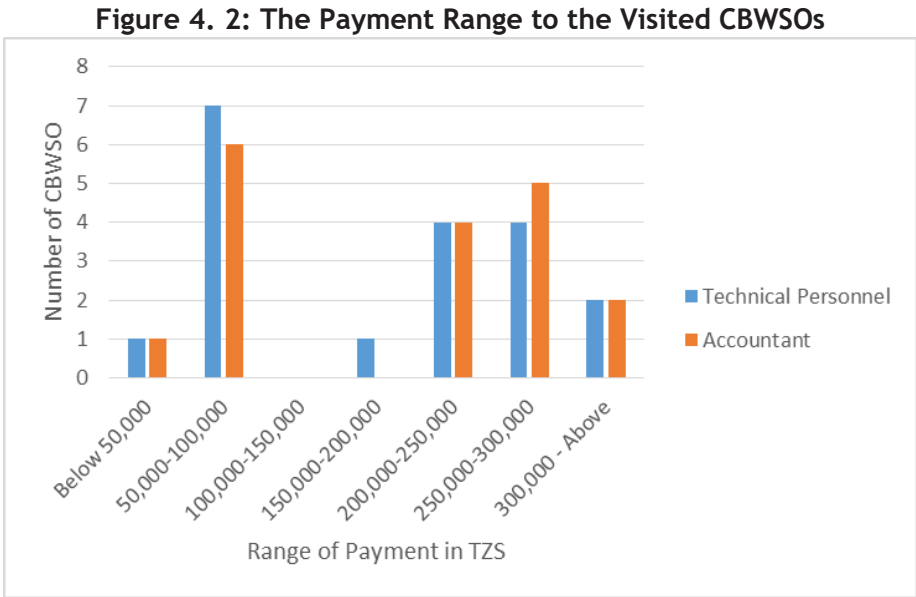
However, the following noted issues implied that, there was inadequate mechanism for retaining Management Team of water supply schemes in rural areas:

- (i) Management Team for water supply scheme had short term contracts: Although the Act require that, the Management Team of water supply schemes in rural areas to be employed, it was noted that, the Management for 6 out of 19 were only given contracts from 3 to 6 months, the rest only used verbal agreements.

According to officials in 2 out of 19 visited RUWASA's district offices, whenever they get other promising employment, they quit the work; this was noted in Chisichili in Dodoma MC and Ukombozi in Liwale DC.

- (ii) Lack of incentive to live in the rural areas to the Management Team: The Audit noted that, the Managing Team were paid monthly salary that in most cases ranged from TZS 30,000 to TZS 1,500,000. This salary range had an exception of 2 CBWSOs in Siha namely Lawate-Fuka and Magadini Makiwaru. In all the remaining CBWSOs salaries were below the minimum wage of TZS 370,000 as per Salary Circular of

2022. **Figure 4.2** shows the detailed information on the range of payment to CBWSOs.



Source: Auditors' Analysis of Data from Visited CBWSOs (2022)

Figure 4.2 shows that, out of visited 19 CBWSOs, only 2 were paying salary above TZS 300,000. Majority of the CBWSOs were in a range between TZS 50,000 to 100,000 which were 6 and 7 respectively. Whereas 2 CBWSOs from RUWASA District Offices were paying above TZS 300,000, and noted reasons was that, the CBWSOs had huge coverage with high average monthly collection whereby in the whole district, there were only 2 CBWSOs. The CBWSOs were Magadini-Makiwaru and Lawate-Fuka and they covered 29 and 28 villages with average collection per month of TZS 40 and 39 million respectively. Other CBWSOs covered between 1 to 10 villages while their average monthly collection was ranging between TZS 163 thousand to 22 million as shown in **Table 4.3**.

As a result, retention of Management Team in rural areas was still a big challenge. Whenever, they get green pastures they quitted from the job. This was evidenced in Chisichili CBWSOs whereby during the Audit there was no qualified Technician, according to the officials, qualified Technician left after securing permanent employment with satisfactory benefits.

4.2.6 63% of the Visited Rural Water Supply Scheme Were Operated by Unqualified Staff

According to Water Supply and Sanitations Act No. 5 of 2019, Community Water Management Team is the executive organ responsible for day to day operations and maintenance of the rural water supply schemes. Also, the Act states that, the Community Water Management Team shall be composed of, a Supervisor of the Organisation, who shall be a person possessing at least artisan certificate in a related field or above from a recognised institution preferably NTA Level 3, Treasurer who shall be a person possessing at least a basic certificate in accounting preferably NTA Level 3; and any such number of staff depending on the nature of the scheme.

During the visit to rural water supply scheme, it was found that, out of 19 visited schemes 12 which is equivalent to 63% were operated by unqualified water Management Team. In this regard, in 7 CBWSOs all the Management Team had unqualified staff while in 4 CBWSOs 1 staff (either artisan or accountant) in Management Team was unqualified. The detailed information is provided in Table 4.3.

Table 4. 3: The Status of Management Team in the Visited CBWSOs

Name of LGA	Name of CBWSO	Status of Staff [Meet Requirements (✓), Not Meet Requirements (X)]		Number of Villages Saved	Collection Per Month - TZS
		Artisan	Ass/ Accountant		
Lindi DC	Mziruna	✓	✓	5	735,833.33
	Supa	✓	✓	5	3,969,233.33
LiwaleDC	Ukombozi	x	x	6	163,166.67
	Mbuli	x	x	2	178,500.00
Rufiji DC	Nyaminywili	x	x	1	484,216.67
	Ngorongo	x	x	2	323,060.00
Kibiti DC	Bungu	x	x	4	200,000.00
	Hanga	x	x	1	3,253,433.33
Mwanga DC	Lembeni	✓	x	6	19,820,000.00
	Kifaru (KILEO)	✓	x	4	1,459,366.67
Siha DC	Magadini-Makiwaru	✓	✓	29	40,309,816.67
	Lawate-Fuka	✓	✓	28	39,083,423.33

Name of LGA	Name of CBWSO	Status of Staff [Meet Requirements (✓), Not Meet Requirements (X)]		Number of Villages Saved	Collection Per Month - TZS
		Artisan	Ass/ Accountant		
Muleba DC	Uhai	x	x	2	1,903,333.33
	Izigo (KASHOZI)	x	✓	5	5,515,433.33
Kyerwa DC	Kyeka	x	✓	10	1,323,666.67
	Nyaruki	x	✓	4	510,666.67
Dodoma DC	Chisichili	x	✓	1	4,564,000.00
Kigoma DC	Mkongoro II	✓	✓	9	22,480,400.00
Magu DC	Nyamwaki	✓	✓	10	12,119,396.33

Source: Auditors' Analysis of Data from Visited CBWSOs (2022)

Table 4.3 shows that, for the visited 19 CBWSOs, 63% had unqualified staff in the Management Team. Moreover, it shows that, for the CBWSOs with qualified staff in the Management Team, monthly collection was also higher compared to the one which had no qualified staff in the Management Team.

In addition, review of CBWSOs assessment report for the financial year 2020/21 indicated that, as of June, 2021 for the registered CBWSOs 2,002 only 600 had adequate number of human capitals in terms of number and qualification, this was only 30% of the registered CBWSOs.

The reason explained for the Water Management Team to lack qualification was due to the fact that, CBWSOs had no financial capacity to pay qualified officials to operate the rural schemes. Their monthly collections from water bills were not sufficient to cover operation costs and payment of artisans and accountants. However, auditor's assessment of average monthly revenue collection Vs Expenditure shows that, not all collected amount were utilised as detailed in **Table 4.4**.

Table 4. 4: The Percentage Expenditure of Collection Revenue

CBWSOs	Average collection	Average Expenditure	Percentage Expenditure of collection (% age)
	Amount in Thousand (TZS)		
Bungu	200	0	0
Kifarua (KILEO)	1,459,367	0	0
Mkongoro II	22,480	1,946	9
Ukombozi	163	20	12

CBWSOs	Average collection	Average Expenditure	Percentage Expenditure of collection (% age)
	Amount in Thousand (TZS)		
Lembeni	19,820	4,763	24
Hanga	3,253	1,034	32
Nyaruki	510	190	37
Supa	3,969	2,081	52
Chisichili	4,564	2,424	53
Mziruna	735	443	60
Uhai	1,903	1,177	62
Izigo (KASHOZI)	5,515	3,858	70
Magadini-Makiwaru	40,309	35,021	87
Nyaminywili	484	426	88
Nyamwaki	12,119	10,810	89
Lawate-Fuka	39,083	38,012	97
Kyeka	1,323	1,908	144
Ngorongo	323	477	148
Mbul	178	267	150

Source: Auditors' Analysis of Data from RUWASA (2022)

Table 4.4 shows that, to all visited CBWSOs their average monthly expenditure was below the collection. For the CBWSOs which experienced a maintenance in their schemes that required higher amount in such a way that their collections would not be sufficient to cover for such maintenance. These CBWSOs received support from RUWASA Offices to support default which were beyond their savings as noted in Kweka, Ngorongo and Mbuli.

4.3 Inadequate maintenance of water supply schemes in the rural areas

According to the Design, Construction Supervision, Operation and Maintenance (DCOM) Manual, 2020, the WSSAs and RUWASA are required to conduct maintenance of implemented water supply networks in order to keep them working at the designed conditions.

However, the Audit noted some weaknesses related to maintenance of water supply network. Detailed information is explained as follows:

4.3.1 Lack of Effective Preventive Maintenance Plans

According to Section 4.2 of MoW's Operational and Maintenance Manual, water entities are required to prepare operation and maintenance plans for water supply infrastructures for smooth operation of water supply schemes. The operations and maintenance plans should be prepared for every major unit as well as the totality of projects as a whole.

However, during the audit it was noted that, in all 19 visited rural water supply scheme there were no established annually/periodic maintenance plans that would ensure continuous preventive maintenance to water facilities installed in water supply schemes. It was noted that, maintenance in water supply infrastructure were conducted on correctively basis.

During interview with the Water Management Team responsible for operation of rural water supply schemes it was revealed that, they were not aware on the need for having water supply infrastructure maintenance plans. Despite RUWASA having role to provide capacity to CBWSOs and budgeting for capacity building for the financial year 2021/22, there were no reports on conducted training to CBWSOs in order to build capacity on the operation and maintenance of water supply schemes in rural areas. This hindered them to understand key issues regarding to O&M of water supply schemes in rural areas.

Therefore, Lack of water supply infrastructure maintenance plan was attributed by a lack of awareness among community water management team regarding the preparations and the use of maintenance plan.

4.3.2 Inadequate Records of the Maintenance Done to Various Parts of Water Supply Networks

Water Project Operation and maintenance Manual, Section 8.2.3.2 direct that, all maintenance activities should be documented on a maintenance records. In addition, the records on each maintenance or repair works in water supply system along with the cost of materials and labour shall be maintained along with date.

However, the Audit noted that, the operators in established water supply schemes had no records on conducted maintenance. Review of operation books from all 19 visited water supply schemes in rural areas revealed

that, there were no records on maintenance conducted. It was noted that, the operators were recording day to day operations which showed the pumps operation hours (time when pump was started and when switched off) without details of the maintenance done. In all 19 visited CBWSOs they were using counter books and filed log sheet in recording daily operations as detailed in Table 4.5.

Table 4. 5: The Status of noted Records in Visited CBWSOs

Name of LGA	Name of CBWSO	Status of Noted Records
Lindi DC	Mziruna	The noted records were purely for daily pump operation using Filed Log sheet.
	Supa	
Liwale DC	Ukombozi	There were not any records on the maintenance of water pump available.
	Mbuli	
Rufiji DC	Nyaminywili	There were no records on maintenance.
	Ngorongo	
Kibiti DC	Bungu	There were no any records on the maintenance of water pump available.
	Hanga	
Mwanga DC	Lembeni	There were no any records on Maintenance
	Kifaru (KILEO)	The CBWSO used counter book to record daily activity conducted on the scheme.
Siha DC	Magadini-Makiwaru	The noted records were for operation of water tank using counter books, there were no records for maintenance done.
	Lawate-Fuka	
Muleba DC	Uhai	The noted records were for operation of water pump (working hours) using counter book.
	Izigo (KASHOZI)	
Kyerwa DC	Kyeka	The noted records were for operation of water pump (working hours) using counter book.
	Nyaruki	There were no any records on maintenance of their schemes.
Dodoma DC	Chisichili	There were no any records on maintenance of water pump.
Kigoma DC	Mkongoro II	The noted records were purely for daily pump operation using Filed Log sheet.
Magu DC	Nyamwaki	The noted records were for operation of water pump (working hours) using counter book.

Source: Auditors' Analysis of noted records in Visited CBWSOs (2022)

Table 4.5 shows that, all visited CBWSOs had no proper records on conducted maintenance. As results, it was difficult to assess the performance of the specific water supply scheme and take appropriate actions for the critical areas with frequency breakdown. Moreover, , in

However, the Audit noted that, by comparing with the Urban Water Supply and Sanitation Authorities, RUWASA had no mechanisms to ensure that, data for Non-Revenue Water are captured from CBWSOs level and make them available at RUWASA-HQ. According to the officials from RUWASA in order to capture data for NRW, one has to ensure metering is established at water sources (intake), water tanks and at water supply point. This was not the case whereby in rural areas still metering level at water intake, water tanks and water supply schemes were not available.

Moreover, review of the proceeding from official meeting aimed for improving provision of water services in areas of supervision, operation and distribution of water services in Mbeya, Morogoro, Tabora and Mwanza zones dated June, 2021 revealed that, among the main challenges was lack of data on water services and incorrect data.

It was elaborated that, there were no data regarding Non-Revenue Water. In this regard, there was a risk of not attaining the set target on NRW since there was lack of monitoring regarding the status in rural areas. However, at RUWASAs region and HQ level they were not well informed regarding NRW which hindered them from making appropriate decision to facilitate improvement on the same.

Another consequence was that, the schemes did not have data on the amount of water produced against the quantity of water billed and sold. This affected the sustainability of the schemes based on the way they were operating as the loss of revenue due to lost water was not easy to be determined.

4.3.4 Lack of Maintenance Information Management System

The establishment of the system for the maintenance information management to track the performance of water supply network at the exact time was the prerequisite condition for the effective operation and maintenance of established water supply infrastructure. The effective functioning of the system makes easy to track the performance of water supply network at any time and assist the officials responsible to take appropriate measures.

However, in a review of the report on the improvement of the provision of water service on the area of supervision, operation and distribution of

June, 2021 indicated that, there was a need for the urgent establishment of the system for collection of information.

Interviews with officials to all visited regional and district offices indicated that, there was no Maintenance Information Management System in order to track the performance of water supply network at exactly time. In this regards, RUWASA HQ, Regional and District Offices were not in the position to know the performance of established water supply networks at the exact time. Moreover, CBWSOs were not able to know the exact time at which the performance of established water supply schemes through the system unless they reached the network physically.

This resulted into the established water supply schemes in rural areas not to be monitored in exactly time. On the other hand, there was no tendency of conducting periodic surveillance to all water supply networks taking into account vast geographical coverage in rural areas with limited resources. Therefore, the operation of pumps, boreholes and other water systems could easily be monitored if there could be a system to track the performance of water supply infrastructures in rural areas.

4.3.5 Inadequate Surveillance/Inspections conducted for Operational Water Supply Schemes in Rural Areas

According to O&M Manual²⁵ official responsible for O&M of the water organisation should go along the transmission line /water supply system frequently to detect damage, or deterioration in the system and take appropriate measures.

The Audit Reviewed two inspection reports conducted to water supply schemes by RUWASA in January, 2020. The Inspection Teams comprised of officials from RUWASA HQ, Regional and District Offices in respective water supply schemes. The first inspection was done in Rukwa and Songwe region while the second inspection was done in Kagera, Geita, Mwanza, Mara and Simiyu.

It was also noted that, the conducted inspections were specific for water supply schemes which had reported some challenges. In addition, for the three years under the audit, only 2 inspections were submitted. At all

²⁵ Section 7.5.1(c), and 9.4 of Ministry of Water O&M Manual, 2020

RUWASA levels i.e. RUWASA HQ to District's levels, there were no tendency of conducting inspections frequently. Instead, they conduct inspection on ad hoc basis mostly on the reported challenges to the specified water supply schemes.

From the reviewed inspection reports from the visited RUWASA district's offices, the Audit noted that, Liwale DC had conducted inspection to its water supply scheme though it was not regularly. The inspections were usually done upon raised issues like misbehaving of water pumps, non-working of generators or bursting of pipes as detailed in **Table 4.6**. Other visited RUWASA DCs, their progress reports were based on implementation of new water supply projects; they had no reports regarding inspection/surveillance on O&M of their water supply schemes.

Table 4. 6: The Report of conducted inspections to visited RUWASA's District Offices

Name of RUWASA District's Office	Name of Water Supply Scheme	Date when Inspected	Reason for Inspections/Surveillance
Liwale	Mbaya	22/02/2022	Water leakage and generator which stopped working
	Namihu	11/01/2022	The Water Supply Scheme stopped to supply water to the community
	Mbaya	01/02/2022	Non-working generator which needed maintenance
	Mpigamiti	25/02/2021	Water leakage, non-working generator, and damage of mota
	Mikunya, Nduruka and Kibutuka	06/01/2021	Leakage of water from pipes and distribution lines
	Water projects at Kipelele, Kibutuka, Mkundi, Barikiwa and Nyera Villages	16/06/2022	Water leakages, non-working generators, non working water pumps, and maintenance of water meters

Source: Auditors' Analysis of Data from Visited RUWASA's District Offices (2022)

Table 4.6 shows that, for the visited 8 RUWASA's District Offices, only Liwale District Offices and only 1 out of 3 financial year i.e 2021/22 conducted surveillance to some of water supply schemes. It was further noted that, all the conducted inspections were not based on the planned schedule for inspections instead, depended on raised issues to the specified water supply schemes. The following are some of the weaknesses noted from conducted inspections:

- (i) Lack of frequency maintenance for the inspected water supply schemes;
- (ii) Ignition of the generators without checking oil;
- (iii) Lack of maintenance/replacement of different spare parts of generator like oil pump, crane shaft, and bearings; and
- (iv) Lack of competent personnel to inspect the generators frequently and to avoid over whole maintenance which are so costly.

Despite of roles of conducting surveillance and inspections as per Operation and Maintenance Manual, 2020, all visited 19 CBWSOs had no routine inspections/surveillance which were conducted to their schemes.

According to the interview with Management Team of 17 out 19 visited CBWSOs, the main cause of lack of surveillance/inspections was lack of budget to implement such operations. The revenue collection from visited CBWSOs were not adequate to facilitate all activities (refer Table 4.3). Further, it was noted that, the Management Team had no capacity to conduct maintenance as it was found that, around 50% of the Management Team had no qualification. This hindered capacity for them to effectively conduct the inspection/surveillance to the established water supply schemes in rural areas. Also, there was no training report on capacity building conducted to Management Team by RUWASA.

This posed a risk to incur high cost in the course of operations for maintenance. However, this was also manifested in the review of report for inspection conducted by RUWASA on 2020 to rural water supply schemes which revealed that, for the inspected 155 water schemes, a total of TZS 11 billion were needed to repair the noted defects so that the schemes could operate efficiently.

4.3.6 Inadequate Maintenance of the Infrastructure for Water Supply Schemes

According to O&M Manual²⁶ official responsible for O&M of the water organization should go along the transmission line /water supply system frequently so as to detect damage, or deterioration in the system and conduct a respective measure.

Through the review of RUWASA's report namely 'Detailed information on the inspection of water projects with challenges in the provision water in rural areas', dated 2020, it was revealed that, for the inspected 155 water supply networks in rural areas, 16% of them had challenges due to irregular maintenance of the schemes.

In the visited rural water supply schemes, out of 19 visited schemes, in 1 scheme of Ukombozi (Liwale DC) there were no water service delivered to the community during the time of the visit due to pump breakdown. Interview with scheme supervisor and RUWASA officials observed that, despite the pump breakdown which occurred three days prior to the visit made by the Audit Team, they were still arranging with technicians to come for maintenance without being certain about the exact time to fix the problem.

As a result of irregular maintenance of water supply schemes, the government needed approximation a total of TZS 1.8 billion to repair them (16% of TZS 11 billion). In all inspected 155 schemes, a total of TZS 11 billion was needed to repair the noted faults caused by various issues like irregular maintenance and inappropriate design.

4.3.7 Inadequate Coordination System of the Stakeholders to Support Efficient Maintenance of Water Supply Network

According to the Guidelines for Operations and Maintenance of Rural Water Schemes and Sanitation Facilities, 2021 CBWSOs shall be effective and efficient in fulfilling their duties and obligations if they work well with all key stakeholders. Stakeholders are institutions, groups and individuals that have interest in the work of the organisation and can either affect or be affected by the business.

²⁶ Ministry of Water (2020) Operation and Maintenance Manual

According to Section 33(g) of Water Supply and Sanitation Act, 2019 CBWSOs are responsible to consult and cooperate with the village council or any other institution responsible for land to plan and control the use of land in the immediate vicinity of the water points and or waterworks.

Review of RUWASA Medium Term Framework 2020/21 -2024/25 revealed that, RUWASA managed to identify various stakeholders to work with in order to ensure sustainability of the established water supply network. Among the identified key stakeholders included TARURA, the Ministry of Works and Transport and TANESCO.

Despite these the presence of these stakeholders being key as they can highly affect the established water supply network when executing their road construction, distribution of electricity activities and facilitating/supporting electricity for operation of water pumps in rural areas. It was found that, there were no clear plan on how to engage them like conducting awareness to established water supply network to TARURA, agreement when executing various road construction activities to communicate all available water supply networks and means to protect them, signing MoU that, they have to rehabilitate water infrastructure whenever they make any kind of destruction in the implementation of their activities.

As the result, there was a risk of destructing established water networks due to inadequate system for coordination with other agencies and ministries. This was also revealed to 1 (Kigoma) out of 8 visited regions whereby, there were tendency of destruction of established water schemes during construction of roads. Also, due to inadequate engagement with TANESCO, there was the use of diesel in operating water pumps caused by lack of TANESCO services on electricity infrastructure related to water supply schemes as noted in 2 CBWSOs in Liwale DC. Therefore, the use of diesel was noted to be more costly compared to electricity from national grid.

4.4 Inadequate Monitoring of the Performance of CBWSOs in Rural Areas in the Country

According to Section 41 (b) of Water Supply and Sanitation Act of 2019, RUWASA was responsible to monitor water quality and standards of performance of the community organization in the provision of the water supply services.

Also, according to the Guidelines on the Regulation of Community Water Service Management, 2021, RUWASA is responsible to design a practical and cost-effective mechanism to follow up and track management of all service delivery interventions at a community level. The follow-up and tracking should be carried out regularly along with reviewing quarterly and annual implementation status reports.

However, inadequate monitoring of performance of CBWSOs in the operation and maintenance of water supply infrastructure was indicated by the noted weaknesses which are detailed as follows:

4.4.1 Inadequate Preparation of the Plans and Strategies to Monitor Performance of CBWSOs in Rural Areas

According to the Guidelines on Regulation of Community Water Service Management, 2021, RUWASA was responsible to establish a criterion for forming a monitoring team and issue a routine monitoring schedule that should be replicated at Regional and District levels.

However, during the visit to all RUWASA's regional and districts offices, there was no submitted monitoring schedule from RUWASA- HQ, Regional and District Level for the purposes of monitoring CBWSOs activities. In this regard, CBWSOs were operating and maintaining water supply schemes without expectation that, at specified date, RUWASA-HQ, Regional or District's Offices were expecting to visit them for monitoring purposes.

Interview with all visited RUWASA's 8 regional and districts offices revealed that, the practice was that, usually district offices visit CBWSOs upon the arise of certain issues which need technical support from them, but there was no monitoring plan or schedule. For instance, there was formulation of 9 teams to investigate reasons as to why 153 water supply schemes were not working in rural areas in 2020. The main reason was that, there were no monitoring report resulted from planned monitoring activities apart from the reports which based on non-working of water supply schemes in rural areas.

As the results the performance of CBWSOs was not improved as expected. It was also found that, in most cases CBWSOs operated and maintained water supply schemes as usual business without receiving technical advice from RUWASA through noted weaknesses during monitoring if they would be done periodically as required.

4.4.2 Inadequate Assessment of the Community Based Water Supply Organisations

According to Guidelines on Regulation of Community Water Service Management, 2021 RUWASA is required to conduct a routine and special performance assessment of all Community Service Management Entities to establish the capacity to deliver quality and sustainable services within the policy and legal requirements. The Performance Assessment shall be done once per year except in special cases where an assessment shall be done at any time of the year.

In addition, RUWASA is required to conduct assessment that should base on the annual physical and financial performance report prepared by the respective Community Water Service Entity and other information gathered in the course of continuous monitoring. The exercise would be useful and could assist in identifying performance levels including success and gaps and reasons for the same.

However, for the years under the Audit, from 2019/20 to 2021/22 there was only one report which was prepared in 2020/21 for assessed CBWSOs. In addition, there was routine report on assessment of CBWSOs.

It was noted that, lack of assessment report on the performance of CBWSOs was partly contributed by lack of guideline for assessment of CBWSOs. According to the reviewed third quarter report for the financial year 2021/22, it was noted that, the completion of preparation of the guideline for evaluation of performance of CBWSOs was completed in third quarter.

Inadequate evaluation of the performance of CBWSOs, hindered the improvement in the performance of registered CBWSOs through appropriate actions for the CBWSOs with unsatisfactory performance based on the noted and analysed challenges.

CHAPTER FIVE

AUDIT CONCLUSION

5.1 Introduction

This chapter presents conclusions of the audit categorised in two main parts namely, overall conclusion and specific conclusions. The conclusions are based on the results of analysed data and information gathered during audit to achieve the overall and specific objectives of the audit presented in Chapter One of this Performance Audit Report.

5.2 General Conclusion

Conclusion derived from the analysis of data and information collected is that, the Ministry of Water through Rural Water Supply and Sanitation Agency (RUWASA) and Water Supply and Sanitation Authorities (WSSAs), do not effectively and adequately operate and maintain water supply schemes for their sustainability.

The conclusion was based on the noted weaknesses in the operation and maintenance of Water Supply Schemes by both Rural Water Supply and Sanitation Agency (RUWASA) and Water Supply and Sanitation Authorities (WSSAs). It was noted that, there was inadequate water treatment system for water supplied to the community both in rural and urban areas; inadequate collection of water bills debts for the supplied water services mostly in urban areas particularly from government Ministries and agencies; inadequate use of revenue collection electronic system mostly in rural areas; and weak coordination with other government Ministries and Agencies including TANROADS and TARURA.

Also, the Ministry does not adequately monitor the functions performed by RUWASA and Water Supply and Sanitation Authorities. The Ministry has not provided adequate an oversight support role to ensure that, the agencies perform their functions effectively and efficiently like establishing water treatment facilities and use of electronic system for collecting revenue especially in rural areas, provide strategic guidance and direction to ensure that, the available operation and maintenance supporting guidelines and tools are popularised and put into effective use.

As a result, the community public health was put at high risks due to the consumption of raw and untreated water which does not meet safe and clean drinking water quality standards especially in rural areas; water supply infrastructure is at high risk of premature deterioration from corrosion; the collected revenue in rural areas are at high risk of being misappropriated due to weak controls; frequent cutting of pipes during construction of roads by government agencies like TANROADS, TANESCO and TARURA as the result of weak coordination.

5.3 Specific Conclusions

5.3.1 RUWASA and Water Supply and Sanitation Authorities do Not Adequately Operate Established Water Supply Schemes in the Country

Based on the findings, the audit concludes that, RUWASA and Water Supply and Sanitation Authorities do not adequately operate the established water supply schemes in the country. RUWASA and WSSAs have not put adequate efforts and due considerations in order to ensure that, established water supply schemes have appropriate functional water treatment facilities. In addition, there is laxity in RUWASA to ensure that billing and collection of revenue from issued water service is done using electronic system.

There were non-existent of operation plans, schedules and procedures mainly due to low emphasis and follow up of implementation on the same. This reduced effectiveness in operating the established water supply infrastructures. Consequently, water production capacity which was underutilised as noted during the visited WSSAs was relatively huge government investment loss. Also, existence of non-operating water supply infrastructures slowed down the government efforts of reaching out more people in providing water supply services.

All these contributed to inadequate operation of established water supply schemes in the country and negatively affected the reliability of water services to the targeted communities.

5.3.2 RUWASA and Water Supply and Sanitation Authorities do not Adequately Maintain Established Water Supply Scheme in The Country

Based on the findings, the Audit concludes that, RUWASA and Water Supply and Sanitation Authorities do not adequately maintain established water supply schemes in the country. Various maintenance weakness areas were noted including; lack of risk based plans, inadequate records of maintenance done, ad-hoc inspections of water supply schemes instead of programmed ones, and inadequate fixing of noted defects in water supply schemes partly due to lowly skilled scheme operators.

As a result, the Non-Revenue Water reduction strategy target was not achieved and realised. Moreover, the noted weaknesses resulted into frequent interruption of smooth and efficient operations of established water supply schemes which in turn would require a huge amount of funds to restore them to their normal operation conditions. This not only jeopardises the sustainability but sets back the government efforts to reach out as many people as possible to enjoy water supply services. Similarly, this presents a significant government investment loss.

5.3.3 The Ministry of Water Does not adequately Monitor the Performance of RUWASA and WSSAs in Operating and Maintaining Water Supply Schemes in the Country

Based on the findings, the audit concludes that, the Ministry of Water do not adequately monitor the performance of RUWASA and WSSAs in operation and maintenance of water supply schemes in the country. This was due to inadequate monitoring plan and inadequate monitoring of performance of WSSAs and RUWASA which hinders continuous improvement in the performance of the agencies. The Ministry of Water solely relies on the WSSAs performance reports prepared by EWURA for decision making. Normally, the Ministry of Water conducts inspections on implemented water supply schemes and provides the technical support to WSSAs upon request or notification of a defect at WSSAs.

On the other hand, the Ministry of Water relied on the performance of agreement between RUWASA and Treasury Register while lacking its monitoring tool to RUWASA unlike in WSSAs where the Ministry have performance agreement with WSSAs in the country.

Inadequacies noted were among of the hindrance factors to improved performance at RUWASA and WSSAs since the Ministry depended on the entities themselves to ensure they improve their performance without a close follow up. The Ministry would have devised mechanisms of assessing the authenticity of prepared reports.

5.3.4 RUWASA does not adequately monitor and evaluate performance of CBWSOs

RUWASA does not conduct assessment of all Community Water Services Management Entities. The requirement to assess performance of CBWSOs at least once per year were not adequately complied by RUWASA. From 2019/20 to 2021/22, there was only 1 CBWSOs performance assessment report which was conducted in 2020/21. This was mainly attributed to lack of CBWSOs performance assessment guideline. The development process of the guideline was finalised in the third quarter of the financial year 2021/22 although it is yet to be operationalized.

Due to inadequate operationalization of the CBWSOs performance assessment, it hinders the performance improvement of registered CBWSOs. Furthermore, the objective of highlighting areas for further improvement upon evaluation of the CBWSOs on yearly basis were not attained.

CHAPTER SIX

AUDIT RECOMMENDATIONS

6.1 Introduction

The audit findings and conclusions pointed challenges to be addressed in the operation and maintenance of water supply schemes in the country. The areas which need attention for further improvement were those related to strategies and plans, capacity development, regulation, monitoring and evaluation for the improved and enhanced sustainable water services delivery in the country.

The National Audit Office believes that, based on the principles of 3Es of Economy, Efficiency and Effectiveness, these recommendations need to be fully implemented to ensure improvement in the operation and maintenance of water sector in the country

Therefore, this chapter provides recommendations to the Ministry of Water and Rural Water Supply and Sanitation Agency (RUWASA).

6.2 Recommendations to the Ministry of Water

6.2.1 To improve Implementation of Standard Operational Procedures of Water Supply Schemes

The Ministry of Water is urged to:

- a) Develop a robust debt collection strategy to ensure that all Government Ministries, Departments and Agencies which are heavily indebted by WSSAs pay their water bills timely. This can be established in collaboration with Ministry of Finance and Planning and the Ministry of Home Affairs;
- b) Ensure that, utilities with high energy consumption conduct regular energy audit and take appropriate energy use efficient measures;

6.2.2 To Improve Maintenance of Water Supply Infrastructure

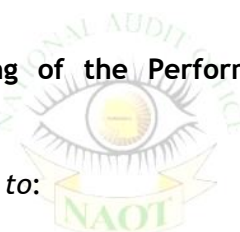
The Ministry of Water is urged to ensure that:

- a) RUWASA and WSSAs conduct periodic and regular maintenance of established water supply schemes in the country and records are kept for all the maintenance activities done;
- b) Ensure that, utilities prepare and adopt Integrated Asset Management Plan to integrate assets life with investment plans to reduce quantity of dilapidated water infrastructure that cause water loss and excessive maintenance cost;
- c) Ensure that, RUWASA and WSSAs determine the levels of Non - Revenue Water in urban and rural areas and monitor the improvement;

6.2.3 To Improve Monitoring of the Performance of RUWASA and WSSAs in the Country

The Ministry of Water is urged to:

- a) Monitor the performance of RUWASA and WSSAs and ensure that, they have functioning water treatment facilities and staffed by qualified and competent personnel;
- b) Ensure that, RUWASA at regional and LGAs levels develop their respective water customers databases which can be frequently updated and facilitate the use electronic system in collection of revenue;
- c) Ensure that, RUWASA and WSSAs continuously build the capacity at different levels and various actors to effectively and appropriately operate and maintain water supply schemes; and
- d) Ensure that, fund for the operation and maintenance of water supply schemes in the country are not spent for other unplanned issues.



6.3 Recommendations to the Rural Water Supply and Sanitation Agency (RUWASA)

6.3.1 To improve the Implementation of Standard Operational Procedures of Water Supply Infrastructures

The Rural Water Supply and Sanitation Agency is urged to:

- a) Device mechanisms to retain Water Management Team for water supply schemes including improved employment terms;
- b) Ensure that, Water Management Team for Rural Water Supply schemes have the required qualifications and competence;

6.3.2 To Improve the Maintenance of Water Supply Infrastructure/Network

The Rural Water Supply and Sanitation Agency is urged to ensure that:

- a) Each established water supply schemes in rural areas have maintenance plan; and
- b) Regular maintenance of the established water supply schemes is carried out and records are correctly kept for all the maintenance activities done.

6.3.3 To Improve Monitoring the Performance of CBWSOs in the Country

The RUWASA is urged to:

- a) Device mechanisms for effective monitoring of the performance of CBWSOs;
- b) Evaluate periodically the performance of CBWSOs and take appropriate measures;
- c) Raise awareness, orient and popularise the existing prepared water schemes operational and maintenance support guidelines and tools; and

-
- d) Ensure that, all water supply schemes in rural areas have functioning and appropriate water treatment facilities.



REFERENCES

1. Controller and Auditor General (2019): *The Performance Audit report on the management of water Projects in Rural Areas*.
2. Cord, C. and et al, (2022): Institutional influences on local government support for professionalised maintenance of water supply infrastructure in rural Uganda: A qualitative analysis.
3. Energy and Water Utilities Regulatory Authority (March 2022): Districts and Township Water Utilities performance Report.
4. Energy and Water Utilities Regulatory Authority (March 2022): Regional and National Water Projects Utilities performance Report.
5. <http://www.muungwana.co.tz/2020/06/chikota-aibana-serikali-kuhusu-uchakavu.html> Accessed on 28th April. 2022.
6. <https://www.ippmedia.com/sw/habari/dc-bukoba-ashangazwa-na-wananchi-wa-katare-kutopata-maji>. Accessed on 28th April, 2022.
7. Ministry of Water (2006): *Water Sector Development Programme 2006 - 2025*.
8. Ministry of Water (2020): Design, Construction, Supervision, Operation and Maintenance Manual; *Volume IV, Operation and maintenance of water supply and maintenance of water supply and sanitation project - Fourth Edition*.
9. Ministry of Water (2020): Water and Wastewater Quality Monitoring Guidelines.
10. Ministry of Water (June, 2020): Five Year Medium Term Strategic plan 2019/20 - 2023/24.
11. Ministry of Water (2020): Detailed Information on the Inspection of Water Projects with Challenges in the Provision of Water in Rural Areas

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12. Oberlin, S. A. and Kassim, M. S. (2018): Assessment of Factors Affecting Maintenance of Rural Water Supply Schemes in Kilolo District, Tanzania: *A Case of Kipaduka Water Scheme. African Journal of Applied Research* Vol. 4, No. 2 (2018), pp. 106-118
 13. Rural Water Supply and Sanitation Agency (2019/20 - 2021/22): Monitoring Reports.
 14. Rural Water Supply and Sanitation Agency (2019/20 - 2021/22): Quarterly Reports.
 15. Rodriguez, Diego J, and et al (2012): van den Berg, Caroline; McMahon, Amanda. 2012. Investing in Water Infrastructure: Capital, Operations and Maintenance.
 16. The United Republic of Tanzania (2002): National Water Policy.
 17. The United Republic of Tanzania (2009): *Water Management Act*.
 18. The United Republic of Tanzania (2019): Water Supply and Sanitation Act No. 5.
 19. The United Republic of Tanzania (2019): Water Supply Regulation.
 20. Water Supply and Sanitation Authorities (2019/20 - 2021/22): Quarterly Reports.



Appendix 1: Responses from the Audited Entities

This part covers the responses from the two audited entities namely, the Water (MoW), and Rural Water Supply Agency (RUWASA). The responses are divided into two parts namely general comment and specific comments from the audited entities. These responses are prescribed below:

Appendix 1(a): Responses from the Ministry of Water

General Comment

The Auditors recommendations has been adhered, MoW shall continue to improve in its functions to ensure the effective and efficient delivery of adequate, reliable, clean, safe and affordable water supply and sanitation services on both Urban and Rural community through WSSAs and RUWASA. The development of institutional framework and guidelines in different functions will help to improve the service delivery as well as the sustainability of the water supply infrastructures management will work in all specific comments by making sure that all the comments will be implemented as indicated in the implementation timelines.

Specific Comments

S/N	Recommendation to the MoW	Comments from MoW	Planned actions	Implementation Timelines
1.	Develop a robust debt collection strategy to ensure that all Government Ministries, Departments and Agencies which are heavily indebted by WSSAs pay their water bills timely. This can be established in collaboration with Ministry of	Ministry adhered with Auditor recommendation Ministry always conduct Meeting with the Government Ministries, Departments, and Agencies with large debts dues to settle the agreement and prepare a proper modality of paying their dues	<ul style="list-style-type: none">• To speed up the Installation of Prepaid water meters to those larger customers• To ensure the WSSAs have a proper agreement versa vi lager debtors on the payment of their dues	Financial Year 2024/2025...

S/N	Recommendation to the MoW	Comments from MoW	Planned actions	Implementation Timelines
	Finance and Planning and the Ministry of Home Affairs			
2.	Ensure that utilities with high energy consumption conduct regular energy audit and take appropriate energy use efficient measures	In the financial year 2021/2022 the Ministry has taken an initiative to build up a technical team for monitoring and evaluation of electromechanical works. EME Staff at the MoW have started with 20 WSSA's. The team has done power quality analysis and machine drive efficiency, study to solving the problem of high electric bill and pump breakdown. Also establishment of motor pump database and register for TANESCO usage portal for WSSA's	<ul style="list-style-type: none"> Strengthening the EME team by allocating enough budget for M&E on the energy audit. Review and develop appropriate pumping schedules 	Every FY; starting on 2023/2024, 2024/2025...
3.	RUWASA and WSSAs must conduct periodic and regular maintenance of established water supply	The Ministry is adhered with Auditors recommendation will make sure that the periodic and regular	<ul style="list-style-type: none"> To develop operation and maintenance schedule To conduct regular 	Every FY; starting on 2023/2024, 2024/2025...

S/N	Recommendation to the MoW	Comments from MoW	Planned actions	Implementation Timelines
	schemes in the country and records are kept for all the maintenance activities done	maintenance are conducted and all the records are kept for all maintenance activities.	monitoring <ul style="list-style-type: none"> Strengthen a budget allocation for conducting O&M in WSSA's 	
4.	Ensure that, utilities prepare and adopt Integrated Asset Management Plan to integrate assets life with investment plans to reduce quantity of dilapidated infrastructure that cause water loss and excessive maintenance cost	The Ministry adhered with Auditor recommendation will make sure that the Integrated Asset Management Plan will be in place.	<ul style="list-style-type: none"> To ensure WSSAs and RUWASA has prepared IAMP which integrate to Investment plan To ensure WSSAs and RUWASA set aside budget for preparation of IAMP. To develop WSSAs compliance checklist 	Every FY; starting on 2023/2024, 2024/2025...
5.	RUWASA and WSSAs determine the levels of Non - Revenue Water in urban and rural areas and monitor the improvement	MoW has taken this recommendation for improvement	<ul style="list-style-type: none"> Coordinate with EWURA to perform the evaluation and monitoring of NRW To develop/update as built drawings To develop and 	Every FY; starting on 2023/2024, 2024/2025...

S/ N	Recommendation to the MoW	Comments from MoW	Planned actions	Implementation Timelines
			implement NRW detection and reduction methods/strategies	
6.	Monitor the performance of RUWASA and WSSAs and ensure that they have functioning water treatment facilities and staffed by qualified and competent personnel	MoW has entered a MoU with RUWASA to employ graduates to supervise water supply schemes in rural areas	<ul style="list-style-type: none"> To assess performance of water treatment facilities To undertake staff audit (particularly on skill assessment) To develop O&M schedule 	Every FY; starting on 2023/2024, 2024/2025...
7.	Ensure that RUWASA at regional and LGAs levels develop their respective water customer's databases which can be frequently updated and facilitate the use of electronic system in collection of revenue	Ministry has adhered with Auditor recommendation; At the moment the Ministry has implemented electronic payment systems as a pilot in some of the regions in collection of revenue. Also the recommendation of providing water customer's database for WSSA's has been noted	To ensure RUWASA extend the use of electronic system in collection of revenue and water customer's database to all CBWOS	Every FY; starting on 2023/2024, 2024/2025...
8.	RUWASA and WSSAs to continuously	MoW itemises capacity building on every	To undertake capacity development of	Every FY; starting on 2023/2024,

S/ N	Recommendation to the MoW	Comments from MoW	Planned actions	Implementation Timelines
	build the capacities at different levels and various actors to effectively and appropriately operate and maintain the water supply scheme	implemented project at different level and scale. Also MoW provides facilitators from Water Stakeholders (Private and Government) to share experience on Water Supply Schemes	staff at all levels	2024/2025...
9.	The Ministry of Water should ensure that funds for the operation and maintenance for water supply schemes in the country are not spent for other unplanned issues.	MoW has taken this recommendation for improvement	Strengthen a budget allocation for conducting O&M in WSSA's	Every FY; starting on 2023/2024, 2024/2025...

Appendix 1(b): Responses from Rural Water Supply Agency

General Comment

The Auditors recommendations have been observed. RUWASA shall continue to improve in its business processes to ensure effective and efficient delivery of clean, safe, affordable and reliable water supply and sanitation services to the Rural community.

RUWASA has short-term and long-term plans that are implemented according to availability and allocation of resources.

For the past three years since its establishment in 2019, RUWASA has placed greater emphasis in the development of institutional frameworks and guidelines upon which its mandate will be fulfilled. During the financial year 2022/2023, RUWASA has embarked on disseminating the developed guidelines to its various levels and stakeholders. In the year 2023/2024, the focus shifts to implementation of the developed guidelines and enforcing compliance.

We strongly believe that, these efforts will ensure smooth execution of our mandate and facilitate attainment of the 85% water supply service coverage by 2025 as well as abiding by the various regulations and guidelines governing water supply and sanitation in Rural areas.

Specific Comments

S/ N	Recommendation to RUWASA	Comments from RUWASA	Planned actions	Implementatio n Timelines
1.	Ensure that, there are mechanisms in place to retain Water Management Team for water supply schemes including improved employment terms	The Auditors comment is observed	RUWASA in collaboration with President's Office Public Service Management and Good Governance, Prime Minister's Office - Labour, Youth, Employment and Persons with Disabilities, has already developed a draft Guideline	The draft Guideline will be submitted to Management for deliberation and to the board for approval before 30th June 2023.

S/N	Recommendation to RUWASA	Comments from RUWASA	Planned actions	Implementation Timelines
			<p>“Mwongozo wa Masuala ya Kiutumishi wa Vyombo vya watoa huduma ya maji ngazi ya jamii”</p> <p>The draft Guideline will be submitted to Management for deliberation and to the board for approval.</p>	
2.	Ensure that, Water Management Team for Rural Water Supply schemes have the required qualifications and competence	The Auditors comment is observed	<ul style="list-style-type: none"> Conduct training to graduates tailored to the needs of the CBWSOs through Learning Hub Model Project Conduct capacity building of CBWSOs to enhance their understanding on the need to comply to the requirement of the Water Supply and Sanitation Act No. 5 of 2019 on have qualified staff in the Management Team 	<ul style="list-style-type: none"> Graduate scheme program to be implemented by June 2023 Capacity building of 125 CBWSOs to be implemented by June 2023.

S/ N	Recommendation to RUWASA	Comments from RUWASA	Planned actions	Implementatio n Timelines
3.	Each established water supply schemes in rural areas have maintenance plan	The Auditors comment is observed	RUWASA has already established and put in place Guidelines for Operation and Maintenance of rural water supply and sanitation facilities and Guidelines for Operation and Maintenance of rural water supply and sanitation facilities. These guidelines will be used to facilitate preparation of operation and maintenance plans	A total of 640 CBWSOs will be capacitated to establish operation and maintenance plans by June 2023
4.	Regular maintenance of established water supply schemes is carried out and records are correctly kept for all the maintenance activities done	The Auditors comment is observed	RUWASA has already established and put in place Guidelines for Capacity Building for CBWSOs and Operation and Maintenance of Water supply schemes and Guidelines for Operation and Maintenance of rural water supply and sanitation facilities. These guidelines will be	A total of 640 CBWSOs will be capacitated to undertake regular maintenance of water supply schemes and keep records of all maintenance done by June 2023

S/ N	Recommendation to RUWASA	Comments from RUWASA	Planned actions	Implementatio n Timelines
			used to facilitate preparation of operation and maintenance plans. O&M plans will among other things establish a regular schedule for maintenance of water supply schemes.	
5.	Device effective mechanisms for monitoring of the performance of CBWSOs	The Auditors comment is observed	RUWASA has already established a Guideline for Regulation of CBWSOs. This guideline outlines mechanisms and procedures for monitoring the performance of CBWSOs	RUWASA will prepare and disseminate an effective mechanism for monitoring the performance of CBWSOs by June 2023.
6.	Evaluate periodically the performance of CBWSOs and take appropriate measures	The Auditors comment is observed	RUWASA has already established a Guideline for Regulation of CBWSOs. This guideline outlines mechanisms for evaluating the performance of CBWSOs and take necessary actions. RUWASA will establish a regular schedule for evaluating the performance of	A schedule for regular evaluation of the performance of CBWSOs by June 2023

S/ N	Recommendation to RUWASA	Comments from RUWASA	Planned actions	Implementatio n Timelines
			CBWSOs.	
7.	Raise awareness, orient and popularise the existing prepared water schemes operational and maintenance support guidelines and tools	The Auditors comment is observed	Through the CBWSOs Capacity Building Guideline, RUWASA will continue to raise awareness, orienting and popularizing the existing O&M guidelines and tools	RUWASA has planned sessions for capacity building of CBWSOs as well as Stakeholders to familiarize them with the O&M guidelines and tools by June 2023.
8.	Ensure that, all water supply schemes in rural areas have functioning and appropriate water treatment facilities	The Auditors comment is observed	<ul style="list-style-type: none"> • Conduct capacity building of CBWSOs to enable them operate and maintain water treatment facilities. • Ensure all inherited water supply schemes are installed with simple chlorination systems • Ensure that all (new and rehabilitation) project designs provide for the installation of appropriate 	<ul style="list-style-type: none"> • Conduct capacity building for 125 CBWSOs Management Team to be able to operate and maintain water treatment facilities • All newly constructed water supply schemes to be installed with simple chlorination systems coupled with operation plan by

S/ N	Recommendation to RUWASA	Comments from RUWASA	Planned actions	Implementatio n Timelines
			water treatment facilities	June 2023

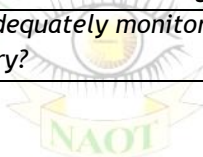


Appendix 2: Detailed Main Audit Questions with Sub-questions

This part provides details of the Audit questions and Sub - Audit questions used in this audit to answer each of the specific audit objective.

Audit Question 1	To what extent is operation and maintenance of water supply infrastructure in the country are adequate?
<i>Sub-question 1.1</i>	<i>To what extent do water supply network are operated to meet water demand?</i>
<i>Sub-question 1.2</i>	<i>To what extent do water supply network are adequately maintained to ensure produced water are effectively supplied to the customers?</i>
Audit Question 2:	Are the Standard Operational Procedures (SOPs) of water supply infrastructures in the country adequately implemented?
<i>Sub-question 2.1</i>	<i>Are the operation plans and schedules adequately prepared as per SOP?</i>
<i>Sub-question 2.2</i>	<i>Are the installed capacity of water supply infrastructure adequately utilized?</i>
<i>Sub-question 2.3</i>	<i>Is the RUWASA/UWSSA billing and revenue collection system properly managed to obtain reliable data?</i>
<i>Sub-question 2.4</i>	<i>Are RUWASA/UWSSA water treatment system properly operated to ensure that water supplied meets the required water quality parameters (turbidity, temperature, Ph and etc?</i>
<i>Sub-question 2.5</i>	<i>Does RUWASA adequately retain the management team of water supply projects in rural areas?</i>
<i>Sub-question 2.6</i>	<i>Do customers who use water services have properly functioning meter connection?</i>
<i>Sub-question 2.7</i>	<i>Do water agencies ensure that water intake, treatment plant and storage tanks are adequately operated?</i>
Audit Question 3:	Are the Maintenance of Water Supply Networks in The Country Adequately Implemented?
<i>Sub-question 3.1</i>	<i>Does RUWASA/UWSSA develop a risk based maintenance plans that clearly outline the resource required, the maintenance schedule, and the desired performance levels?</i>
<i>Sub question 3.2</i>	<i>Do RUWASA and UWSSA effectively keep records of all maintenance works done to various parts of water supply networks?</i>
<i>Sub question 3.3</i>	<i>Is there noticeable improvement in the country's non-water revenue management?</i>

<i>Sub question 3.4</i>	<i>Has RUWASA/UWSSA established a maintenance information management system to track the water network performance in real-time?</i>
<i>Sub question 3.5</i>	<i>Do the inspectors' team conduct adequate surveillance/inspections on the performance of the entire system of water supply network?</i>
<i>Sub question 3.6</i>	<i>Do WSSAs/RUWASA timely repair and replace the noted default in the system for water supply network?</i>
<i>Sub question 3.7</i>	<i>Does the existing system of coordination in UWSSAs/RUWASA support efficient maintenance of water network by all stakeholders?</i>
Audit Question 4:	Does MoW adequately monitor the performance of RUWASA, WSSAs and CBWSOs in operating and maintenance of water projects in the country?
<i>Sub-question 4.1</i>	<i>Does MoW have adequate plan and strategies for monitoring performance of its agencies in operations and maintenance of water projects in the country?</i>
<i>Sub-question 4.2</i>	<i>Are the mechanisms for monitoring the performance of CBWSOs in rural areas working effectively?</i>
<i>Sub-question 4.3</i>	<i>Does MoW adequately monitor the performance of WSSAs in the country?</i>



Appendix 3: Selected LGAs that Were Visited

This part presents the selected LGAs based on the sampling techniques used during the selection of RUWASA Regional and District offices.

Name of Region	Name of LGA	No. of CBWSO	Maximum/Minimum	Selected LGA
Kagera	Kyerwa	9	Minimum	Kyerwa
	Karagwe	16		
	Biharamulo	17		
	Missenyi	17		
	Bukoba	20		
	Ngara	21		
	Muleba	28	Maximum	Muleba
Rukwa	Kalambo	37		
	Nkasi	21	Minimum	Nkasi
	Sumbawanga	41	Maximum	Sumbawanga
Lindi	Kilwa	31		
	Lindi	38	Maximum	Lindi
	Liwale	22	Minimum	Liwale
	Nachingwea	23		
	Ruangwa	36		
Simiyu	Bariadi	20		
	Itilima	21	Maximum	Itilima
	Maswa	11	Minimum	Maswa
	Meatu	14		
Kilimanjaro	Hai	4		
	Moshi	7		
	Mwanga	12	Maximum	Mwanga
	Same	10		
	Siha	3	Minimum	Siha
Coastal	Bagamoyo	13		
	Kibaha	9	Minimum	Kibaha
	Kibiti	14	Maximum	

Name of Region	Name of LGA	No. of CBWSO	Maximum/Minimum	Selected LGA
	Kisarawe	14	Maximum	Kisarawe ²⁷
	Rufiji	14	Maximum	
	Mafia	7		
	Mkuranga	7		

Source: Auditors' Analysis on the List of CBWSOs from LGAs (2022)



²⁷ Since three LGAs was noted to have the same maximum number, random selection was done among them

Appendix 4: Document Reviewed and Reasons for the Review

This part provides the list of documents that were reviewed in order to obtain appropriate and sufficient information in order to come-up with the audit findings that are supported by sufficient evidences.

Category of the documents	Title of Reviewed Documents	Reasons for the Review
Plans and strategies	<ul style="list-style-type: none"> MoW and RUWASA Strategic Plans Annual Operational Plan Inspection plans Monitoring plans Budgets set aside for operations and maintenance of water supply projects in the country (2019/20-2021/22) 	<p>To assess the:</p> <ul style="list-style-type: none"> Effectiveness of MoW, WSSAs and RUWASA in the preparation of strategies and plans for operations and maintenance of water supply projects in the country Adequacy of the inspections and monitoring plans Budget and priorities for operations and maintenance of water supply projects in the country
Reports from MoW, WSSAs and RUWASA	<ul style="list-style-type: none"> Supervision Reports conducted by the Ministry Monitoring and Evaluation Reports conducted at WSSAs and RUWASA Inspections Reports Annual Internal Audit Reports Performance Reports 	<p>To assess the:</p> <ul style="list-style-type: none"> Effectiveness of MoW in monitoring WSSAs and RUWASA when implementing their activities on operations and maintenance of water supply projects in the country Effectiveness of MoW in monitoring and evaluating activities performed by WSSAs and RUWASA Effectiveness of WSSAs and RUWASA in the implementation of plans for operations and maintenance of water projects in the country The capacity of WSSAs and RUWASA in terms of human resources, guidelines, tools and funds for operations and maintenance of

Category of the documents	Title of Reviewed Documents	Reasons for the Review
		water supply projects in the country
Reports from RUWASA's Regional and District's Offices	<ul style="list-style-type: none"> • Performance Reports • Collection and Expenditure reports from CBWSOs • Monitoring reports at Districts and Regional Levels • Records of Maintenance of available water projects • Maintenance and operations plans of water supply projects 	<p>To assess the:</p> <ul style="list-style-type: none"> • Effectiveness of Regional and District Offices in monitoring performance of CBWSOs • Effectiveness of CBWSOs in carrying their day to day operations of their water supply projects in the country • Effectiveness of prepared plans for operations and maintenance of water supply projects in the country • Effectiveness in keeping records for maintenance of available water supply projects in the country

Source: Auditors' Analysis on the List of Reviewed Documents (2022)



Appendix 5: The List of Official interviewed and Reasons for the Interview

This part presents the list of Officials from the entities and institutions that were interviewed during the audit and the reasons for being interviewed.

Institution Covered	Title of Interviewed Official	Reasons for Interviewing
Ministry of Water	Director - Division of Water Supply and Sanitation	To assess the performance of system used by MoW in operations and maintenance of water projects in the country
	Assistant Director - Operations and Maintenance Sections	
	Officials - Operations and Maintenance Sections	
RUWASSA - HQ and 6 Regional Offices	Director - Technical Service Directorate	To assess the effectiveness of the system used by RUWASSA in operations and maintenance of water projects in the country
	Manager - Technical Support Section	
	Officials - Operations and Maintenance Section	
	Director - Planning and Coordination Section	
	Officials from Planning and Coordination Section	
6 Water Supply and Sanitations Authorities	Head - Technical Department	To assess the effectiveness of the system used by WSSAs in operation and maintenance of water supply projects in the country
	Officials - Operation Section	
	Officials - Maintenance Section	
	Head - Commercial Department	
	Officials - Revenue Section	
	Officials - Data and Billing Section	
	Officials - Customer Service Section	
Other Stakeholders	Officials from stakeholders as per outlined list hereunder: <ul style="list-style-type: none"> Tanzania Global Water Partnership (GWPTZ); Water Aids; and EWURA 	To confirm the presence of performance weaknesses relating to operations and maintenance of water supply projects in the country

Source: Auditors' Analysis of Interviewed Officials in the Visited Entities (2022)

Appendix 6: Budget of Operation and Maintenance Vs. Electricity bill

This part provides the budget of operation and Maintenance of selected WSSAs for the period from 2019/20 to 2021/22.

WSSA	Financial Year	Total O&M budget Amount in TZS Million	Annual cost for electricity bills Amount in TZS Million	Percentage of O&M budget paid as electricity bill.
MWAUWASA	2019/20	37,839	7,204	19
	2020/21	31,137	7,770	25
	2021/22	32,044	7,652	24
KUWASA	2019/20	1,011	998	99
	2020/21	1,024	976	95
	2021/22	1,221	1,185	97
DUWASA	2019/20	35,153	5,720	16
	2020/21	35,153	5,811	17
	2021/22	35,153	7,225	21
LUWASA	2019/20	901	354	39.3
	2020/21	785	417	53.0
	2021/22	941	510	54.2
DAWASA	2019/20	151	25	17
	2020/21	126	27	21
	2021/22	133	29	22
MUWSA	2019/20	7,972	293	4
	2020/21	8,175	340	4
	2021/22	8,899	422	5
BUWASA	2019/20	2,477	713	29
	2020/21	2,772	785	28
	2021/22	3,816	914	24
SUWASA	2019/20	1,754	378	22
	2020/21	1,859	298	16
	2021/22	1,952	439	22

Source: Auditors' Analysis of O&M Budget from Visited WSSAs (2022)

Appendix 7: Amount of Revenue Collected from Water Bill by WSSAs

This part presents the billed and collected amount in the respective financial year of WSSAs.

WSSA	Financial Year	Billed Amount in TZS Million	Collected Amount in TZS Million	% of uncollected revenue
MWAUWASA	2019/20	34,751	27,452	21
	2020/21	27,525	26,715	3
	2021/22	29,364	31,140	-
KUWASA	2019/20	2,320	2,252	3
	2020/21	2,387	2,475	-
	2021/22	2,512	2,989	-
DUWASA	2019/20	15,752	17,207	-
	2020/21	17,675	12,235	31
	2021/22	20,434	25,403	-
LUWASA	2019/20	830	659	20.6
	2020/21	893	722	19.2
	2021/22	916	900	1.8
DAWASA	2019/20	135,988	111,080	18
	2020/21	142,146	133,127	6
	2021/22	139,081	143,998	-
BUWASA	2019/20	2,485	2,073	16
	2020/21	2,573	2,363	8
	2021/22	3,149	3,127	1
MUWSA	2019/20	9,707	9,531	2
	2020/21	10,510	10,036	5
	2021/22	12,161	11,756	5
SUWASA	2019/20	1,335	1,428	-
	2020/21	1,568	1,586	-
	2021/22	1,703	1,691	1

Source: Auditors' Analysis of Billed and Collected Amount from Visited WSSAs (2022)

Appendix 8: Loss of revenue from NRW for the financial year 2020/21 on the visited WSSAs

This part presents the loss of revenue from NRW for the financial year 2020/21 on the visited WSSAs

WSSAs	NRW	NRW above limit above allowable limit (20%)	Annual Water Production (M ³)	Water loss Above the Allowable limit - 20% (M ³)	average Tariff - TZS per M ³	Revenue loss from NRW in TZS
DUWASA	35%	15%	18,028,352	2,704,252.80	1,397	3,777,841,162
MWAUWASA	36%	16%	29,339,889	4,694,382.24	1,873	8,792,577,936
KUWASA	33%	13%	3,540,630	460,281.90	1,400	644,394,660
LUWASA	37%	17%	849,515	144,417.55	1,800	259,951,590
DAWASA	39%	19%	145,887,831	27,718,687.89	1,663	46,096,177,961
MUWASA	20%	0	12,230,221	-	900	-
BUWASA	44%	22%	2,529,815	556,559.30	1,888	1,050,783,958
SUMBAWANGA	35%	15%	1,979,688	296,953.20	937	278,245,148
Total						60,899,972,415
Financial Year 2019/20						
WSSAs	NRW	NRW above limit above allowable limit (20%)	Annual Water Production (M ³)	Water loss Above the Allowable limit -20% (M ³)	Average Tariff - TZS per M ³	Revenue loss from NRW in TZS
MUWASA	22%	2%	11,792,420	235,848.40	800	188,678,720
LUWASA	35%	15%	758,510	113,776.52	1,700	193,420,088
SUWASA	34%	14%	2,441,485	341,807.90	1,231	420,765,525
KUWASA	29%	9%	11,792,420	292,562.10	1,400	409,586,940
BUWASA	42%	22%	758,510	501,152.30	1,888	946,175,542

ASA						
DUW ASA	27%	7%	2,441,485	1,625,031.10	1,397	2,270,168,447
MWA UWA SA	32%	12%	3,250,690	3,586,563.00	1,060	3,801,756,780
DAW ASA	40%	20%	2,277,965	29,467,180.00	1,663	49,003,920,340
Total						55,075,845,567

Source: Auditors' Analysis of NRW from Visited WSSAs (2022)



Appendix 9: Status in testing the Water Quality parameters before and after treatment

This part present specific Water Supply and Sanitation Authority and status in testing the water quality parameters before and after treatment.

WSSA	Daily Measurement of Raw Water Quality Parameters.	Daily measurement of Water Parameters after Treatment.	Remark
LUWASA	NILL	NILL	<p>Water quality tests were conducted monthly at established control points and residual Chlorine, turbidity and Iron (Fe) did not meet standards established by Tanzania Bureau of Standards (TBS). The noted results which were outside the range specified by EWURA and TBS standards are:</p> <ul style="list-style-type: none"> • Residue Chlorine was 0.52 • Iron was ranging from 0.31 - 0.57 • Turbidity was ranging from 6 to 11 <p>Whereby the required standard were: residue chlorine range from 0.2 - 0.5; Iron 0.3; and turbidity 0.5</p>
KUWASA	NILL	NILL	There were no daily tests of water parameter before and after treatment. The water quality parameters were only monitored at established point

WSSA	Daily Measurement of Raw Water Quality Parameters.	Daily measurement of Water Parameters after Treatment.	Remark
			in water network on monthly basis
DAWASA	Raw water parameters were measured every one hour for new treatment system at Upper Ruvu scheme. Measurements were not done for old treatment system.	Treated water parameters were measured every one hour for new treatment system at upper Ruvu. Measurements were not done for old treatment system.	Water quality was tested at sources, distribution network and other established control points. Water parameters met TBS standards
MUWSA	Raw water parameters were measured from the main sources	Water parameters were measured after chlorine dosing.	Water quality was tested and met standards established by Tanzania Bureau of Standards (TBS)
BUWASA	NILL	Water parameters for Treated water leaving the treatment plant were measured daily.	Water quality was tested at distribution network by taking sample from the established control points. Water parameters met TBS standards except for residual chlorine whereby out of 216 sample tested for residual Chlorine, 171 sample equivalent to 79.2% passed the test and 45 sample equivalent to sample of treated

WSSA	Daily Measurement of Raw Water Quality Parameters.	Daily measurement of Water Parameters after Treatment.	Remark
			water did not meet the TBS standards.
DUWASA	Raw water parameters were measured from the Wmain sources	Water parameters were measured after treatment	Water quality parameters were tested at distribution network by taking sample from the established control points. Water parameters met TBS standards
MWAUWASA	Raw water parameters were measured from the main sources	Water parameters were measured after treatment	Water quality parameters were tested at distribution network by taking sample from the established control points. Water parameters met TBS standards

Source: Auditors' Analysis of Testing of Water Quality from Visited WSSAs (2022)