A PERFORMANCE AUDIT REPORT ON THE MANAGEMENT OF WATER CATCHMENTS BY THE NATIONAL WATER RESOURCES MANAGEMENT AGENCY

FEBRUARY 2025

FOREWORD

In submitting this Performance Audit Report on the Management of Water Catchments by the National Water Resources Management Agency for tabling before Parliament, I refer to Section 119 (2) of the 1991 Constitution of Sierra Leone, which mandates the Audit Service Sierra Leone (ASSL):

"To audit and report on all public accounts of Sierra Leone and public offices including the Judiciary, the central and local government institutions, the University of Sierra Leone and other public sector institutions of like nature, all state-owned corporations, companies, and other bodies and organisations established by an Act of Parliament or any statutory instrument or otherwise set up wholly or in part out of public funds."

Section 11 (2c) of the Audit Service Act of 2014 as amended in 2023, mandates the Audit Service Sierra Leone to carry out value-for-money and other audits, to ensure that efficiency and effectiveness are achieved in the use of public funds. In furtherance to that, Section 11(2c), and 95(6) of the Public Financial Management Act of 2016 states "Nothing in this Section shall prevent the Auditor-General from submitting a special audit report for tabling before Parliament on matters that should not await disclosure in the annual report."

In line with our mandate as described above, I am pleased and honoured to submit this Performance Audit Report on the Management of Water Catchments by the National Water Resources Management Agency for the period between 2019-2023.

I would like to thank the auditors for the great commitment they demonstrated during the preparation of this report. I also extend my gratitude to the auditee for their continued support and fruitful contributions throughout the audit exercise.

Abdul Aziz

ACTING. AUDITOR-GENERAL

ABBREVIATIONS AND ACRONYMS

ACDP	Acoustic Doppler Current Profiler
ADB	African Development Bank
ASSL	Audit Service Sierra Leone
CRS	Catholic Relief Services
CSOs	Civil Society Organisations
CSSL	Conservation Society Sierra Leone
DBMS	Database Management System
DL	Drilling Licences
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
ESMPs	Environmental and Social Management Plans
ESO	Environmental and Social Officer
FGDs	Focused Group Discussions
FY	Financial Year
GIS	Geographical Information System
GVWC	Guma Valley Water Company
GWS	Groundwater Stations
Ha	Hectare
IEC	Information, Education and Communication
ISSAIs	International Standards of Supreme Audit Institutions
IWRM	Integrated Water Resources Management
Km^2	Square Kilometre
m^3	Cubic Meter
MDAs	Ministries, Departments and Agencies
MECC	Ministry of Environment and Climate Change
MEL	Monitoring and Evaluation Plan
MLHCP	Ministry of Lands, Housing and Planning
MoF	Ministry of Finance
MTNDP	Medium-Term National Development Plan
MWRS	Ministry of Water Resources and Sanitation

NGOs	Non-Governmental Organisations
NLe	New Leones
NMA	National Mineral Agency
NPAA	National Protected Area Authority
NWRMA	National Water Resources Management Agency
PSAs	Private Sector Actors
SALWACO	Sierra Leone Water Company
SDGs	Sustainable Development Goals
SDP	Strategic Development Plan
SLEWRC	Sierra Leone Electricity and Water Regulatory Commission
SOPs	Standard Operating Procedures
SSEA	Strategic Social and Environmental Assessment
SWS	Surface Water Stations
TWSSP	Three Towns Water Supply and Sanitation Project
US$	United States Dollars
WAPWAF	Western Area Peninsular Water Fund
WBMB	Water Basin Management Board
WCM	Water Catchment Management
WCMC	Water Catchment Management Committee
WUP	Water Use Permit
YSL	Yardo Sierra Leone

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GLOSSARY

An Aquifer:	A subsurface layer, rock, or other geological strata of sufficient porosity and permeability to allow a significant flow of groundwater or the abstraction of substantial quantities of groundwater.
Economic Analysis	Economic analysis essentially entails the evaluation of costs and benefits.
Ecosystem Services:	Various goods and services that humans derive from the environment.
Economic Instruments:	Are financial tools used by the National Water Resources Management Agency (NWRMA) to achieve specific objectives of water legislation. For example, water use permits, and drilling licenses.
Equilibrium Water Pricing Game Model:	A method and path that each stakeholder in raw water use pricing is involved in decision-making by proposing to increase or decrease the price in different rounds until price comparisons are matched.
Environmental Impact Assessment:	An environmental management tool that provides a structured process of evaluating the likely environmental impacts of proposed water development projects, considering inter-relatedness between socio-economic, cultural, and human-health impacts, both beneficial and negatively adverse for sustainable socio-economic development.
Game Rationality Analysis:	A process that encourages engagement and participation of all stakeholders involved in a water use charge tariff setting in a participatory manner, to arrive at set raw water charges that promote fairness, equity, and economic efficiency as regards raw water use allocation and pricing.
Legislative/Regulatory Instruments:	Denotes a broad variety of laws and regulations as regards water use and development to promote IWRM. The NWRMA sets binding requirements to manage water resources sustainably, through planning, implementation, monitoring, and reporting on water use and development within water resources.

Scenario Analysis:	A process of analysing the impacts of potential future events on the performance of water resources by considering various outcomes and presenting different management options and benefits for future development paths.
Shallow Well:	A dug or drilled hole into the ground in which the low water level is about 7m or less below the pump installation.
Snowball Sampling:	A sampling technique that the auditors used to access and interview water users not registered with NWRMA through referrals. First samples were identified, interviewed, and asked to assist auditors in identifying other potential non-registered water users.
Strategic Social and Environmental Assessment:	A systematic and comprehensive process that encompasses a range of analytical and participatory approaches used for evaluating the environmental considerations into policies, plans and programmes and evaluating the interlinkages with economic and social considerations to promote water resources management and sustainability.
Systems of Environmental-Economic Accounting:	Is a standardised framework used to assess and compile environmental statistics (water, land, air and biodiversity) and link such statistics to economic statistics to reflect the contribution of the water sector to Gross Domestic Product (GDP).
Unconfined Aquifer:	A soil structure or rock that is directly open at the surface of the ground and groundwater is directly recharged.
Water Allocation:	A process of distributing water supplies to meet the various community requirements, environment, and economic activities.
Water Accounting:	It is a systematic quantitative assessment of the status and trends in water supply, demand, distribution, accessibility and use in specified sectors, producing information that informs water resources, management and governance to support sustainable development outcomes for society and the environment.

Water Catchment:	An area of land where rainfall collects in rivers and streams that flow into reservoirs, and/or recharge groundwater aquifers through percolation. The captured water later becomes water for drinking and other economic uses when harnessed.
Water Catchment Management:	A subset of IWRM planning approaches sustainable water resource management from a catchment perspective in contrast to a piecemeal approach that artificially separates land management from water resources management.
Water Catchment Management Planning:	A standard process to ensure that the formulation and implementation of interventions within water catchments are: (i) efficient, (ii) effective, (iii) feasible, (iv) viable, and (v) sustainable.
Water User:	A person or an entity who withdraws groundwater or uses surface water from within the boundaries of water catchments.
Water Demand Management Tool:	A tool that aims at (1) reducing the quantity or quality of water required to accomplish a specific task; (2) adjusting the nature of the task so it can be accomplished with less water or lower quality water; (3) reducing losses in movement from source through use to disposal; (4) shifting time of use to off-peak periods; and (5) increasing the ability of the water systems to operate during droughts.
WaterROUTE (Water Route Optimisation Utility Tool & Evaluation):	A model which adjusts water supply network configurations based on infrastructure investment costs while considering the water quality requirements of the users.

EXECUTIVE SUMMARY

Background

In 2017, the National Water Resources Management Agency (NWRMA) (hereinafter referred to as "the Agency"), was established to regulate, utilise, protect, develop, control, and generally manage water resources throughout Sierra Leone. Subsequently in 2019, the Agency unveiled a five-year Strategic Development Plan (SDP), 2019-2023, to promote Integrated Water Resources Management (IWRM), through a coordinated development and management of water, land and related resources to maximise economic and social welfare equitably, without compromising the sustainability of vital ecosystems. Water Catchment Planning and Management forms a critical management unit in the IWRM[1].

By 2015, the total annual cost for Sierra Leone to address water scarcity and access to clean and safe drinking water was estimated at $ 93.3 million, and $ 287.5 respectively (Water Action Hub)[2]. However, effective 2016 to date, these cost estimates remain unknown. The 2028 Presidential Address, recognised that the current trends in the management of the country's water resources are insufficient for sustainability, and therefore pledged, "***to protect all major watershed areas against deforestation and other environmental problems, and also to undertake reforms in the water sector including unbundling water generation from distribution as it is in the energy sector to improve on efficiency and cost recovery"***.

Between 2019 and 2023, the NWRMA received a total of NLe 6,771,587 to implement the SDP 2019-2023. The SDP included Watershed and Catchment Protection as one of the key goals, in addition to the development of regulatory and institutional including Water Basin Management Boards, Water Catchment Management Committees, Planning, Monitoring, and Stakeholder Coordination and Collaboration for collective management of the water resources both at domestic and regional levels. However, there has been an increasing trend of degradation of water catchments. Therefore, it is most likely that the achievement of the Presidential Pledge did not materialise due to the continued degradation of water catchments. Hence, the Audit Service Sierra Leone (ASSL) conducted a Performance Audit on the Management of Water Catchments by the NWRMA.

[1] NWRMA, strategic plan- 2019
[2] https://wateractionhub.org/geos/country/196/d/sierra-leone/

Audit Objective

To assess the measures put in place by the NWRMA to ensure effective and efficient management of environmental flows and water quality in catchments.

Audit Questions

1. To what extent did the NWRMA effectively and efficiently, plan and implement water catchment management activities?
2. How effective and efficient was the monitoring system in ensuring good water supply and use within catchments?
3. How effective and efficient were the economic instruments in water use regulation and development?
4. To what extent has the NWRMA ensured effective collaboration and coordination with other stakeholders in water catchment management?

Scope

The audit focused on water catchment management (WCM) by the NWRMA between 2019 and 2023. The audit covered water catchment planning activities and their implementation, monitoring systems, the performance of water use permits and drilling licenses, and collaboration and coordination activities. A total of 7 out of 12 water catchments governed by the NWRMA under a river basin planning and management system (RBPM) were covered.

Key Findings

1. **Limited Evidence-Based Planning**

   From the inspection of the server, review of water users' files, and interviews held with the NWRMA staff, it was noted that there is a significant amount of data on water level, quality, water use and drilling activity reports. These reports are shelved and unprocessed ascribed to the lack of a water resources management information system, due to limited funding. Without data, designing interventions and determining the required resources to increase the government efforts to stop water catchment degradation, and maximise socio-economic returns from water catchment management will be very challenging. The MDAs and the development partners already feel the effect of limited data. If unaddressed, the unintended burdens will delay service delivery and poor public accountability.

For example, at NWRMA, internal revenue projection for water use is based on the number of water users instead of issued water quota allocation to the economic sectors. Whereas Guma Valley Water Company

expressed concerns over data as a major limitation in managing rivers within catchment areas which are important to their water intake points in the Western Area Peninsular National Park. Additionally, the interviewed managers from GOAL Sierra Leone and World Hope International, implementing water sanitation and hygiene (WASH) programmes expressed their concerns over the lack of data on areas with high iron concentrations above the drinking water thresholds. They further revealed that despite the heavy investments undertaken, the unavailability of data has resulted in drilling and immediate decommissioning of boreholes in areas with high iron content.

2. Weak Mechanisms to Promote Efficient Water Allocations and Use

The review of the developed water demand management tool revealed a lack of water allocation quotas among economic sectors due to the lack of water balance. This increased the risk of water supply-demand conflicts and low investments in efficient water use technologies.

A raw water tariff pricing system has been developed. However, it did not promote fairness, equity and economic efficiency. The analysis of NWRMA Water Use Charges revealed a generalised rate for water uses despite they fall under different categories with varied demands, return on investments, environmental impacts and cost of management. For example, the mining, industrial and commercial water uses are priced at the same rate of NLe 0.12 ($ 0.005) per cubic meter (m^3) of water. Whereas large-scale irrigation and aquaculture water uses are priced at NLe 0.048 ($ 0.002) per m^3. The main cause of the same pricing for different water uses was due to lack of economic analysis. As a result, this increased the risk of low uptake of raw water through illegal means and consequently impacted revenue collection. For example, the revenue collection progressively increased from NLe 82,779 in 2019, to NLe 833,691 in 2020, but drastically decreased to NLe 209,569 in 2021. However, it increased from NLe 784,630 in 2022, to NLe 2,222,485 in 2023. Nevertheless, weak enforcement of water users to renew their licences and make timely payments also featured in the low revenue performance.

With regards to monitoring of water usage, there was a lack of metering systems for water users. The monitoring schedules of water users were limited to two visits per year and therefore they, were unable to accurately capture and verify the volume of water issued for proper reconciliation as well as the timely resolution of water use-related complaints and grievances.

3. Inadequate Institutional and Governance Structures

In the period reviewed, there were no operational NWRMA regional offices and Water Basin Management Boards (WBMB) declared. Upon inspection of one of the Regional Offices established at the premises of SALWACO, Bo City, it was found non-operational due to inadequate funding. Additionally, efforts to

establish Water Catchment Management Committees (WCMC) in the Western Area was somewhat successful but the committee remained non-functional. A case of non-compliance in the formation of WCMC as per Section 27 (1) of the NWRMA Act of 2017 was observed. The WCMC were formed without the declaration of WBMB. For WCMC to be operational, a WBMB should be declared first, and it is the responsibility of the WBMB to lead the establishment with support from NWRMA.

The absence of the above-mentioned institutional and governance structures was attributed to limited funding and therefore, this slowed the efforts to protect catchment areas nationwide. The SALWACO in Kenema and Port Loko offices confirmed undertaking sensitisation, routine surveillance monitoring, and enforcement visits to water catchment areas, covering their water recharge and intake points without the involvement of any institutions and structures for IWRM. Without regional offices, WBMB and WCMC, the government's efforts to stop water catchment degradation are likely to remain more challenging.

4. **Weak Enforcement**

The review of stakeholder's re-establishment of the Western Area Peninsula National Park Core Area (Greenbelt) Report of 2022 and the Delineation and Mapping Reports for Rokel, Taia/Pampana and Western Area Peninsular Water Catchments disclosed a high and increasing rate of degradation of water catchments. The main causes were encroachment for settlements, mining, and poor solid waste management and disposal. Encroachment for settlements was predominant but not limited to Jeff Town, and Bureh in the Western Area and Bankasuka in the Port Loko district. Whereas, in the case of mining, the hotspots were Kambui Hill in Kenema, especially Lambaya micro-catchment and Mashekira in Tonkolili district. The cities of Bo, Kenama, Makeni and Western Area are faced with challenges of unsustainable solid waste management.

This increasing rate of catchment degradation was due to limited outreach on water catchment protection, and weak enforcement in collaboration and coordination with other stakeholders. This, consequently increases the depletion of groundwater sources, illegal abstraction, especially water production and packaging for commercial and safe drinking water within piped network systems under utility companies, and access to contaminated water sources. These are the main causes of the current water scarcity, limited access to clean and safe drinking water and increased cases of waterborne diseases, of which typhoid is the most predominant.

Conclusion

The audit findings revealed that the government efforts, with support from its development partners, to reverse water catchment degradation during the 4 years under review registered insignificant progress. This

covered limited knowledge of water catchment areas in critical danger. This includes lack of targets and implementation guidelines for water legislation, inefficiency in raw water use charges, inadequate water allocation and monitoring systems, lack of enabling institutional and governance structures, and lack of water resources management information system. We recognised two main vulnerabilities as to why the recorded insignificant progress in reducing the degradation of water catchments was observed, which are as follows:

i) The NWRMA lacked a clear start-up plan and technical support. Such provisions could have offered the Agency a clear road map, and guidance from a highly experienced-technical specialist, in the discipline of IWRM with a transdisciplinary lens, to sail the appointed and onboard Director General and Technical Directors during the start-up processes of the Agency.

ii) The Agency received inadequate financial resources and therefore, was unable to undertake key technical studies such as economic analysis of water uses, political economy analysis, and gender and climate change assessments, to support evidence-based planning in WCM. We could determine what informed the planning process for the management of water catchments in the NWRMA SDP 2019-2023, water legislation, raw water-use charges.

Key Recommendations

A) Government of Sierra Leone

1. Recruit a Technical Advisor to support and guide the government efforts in integrated water resources management in a systematic and structured manner.

2. Mobilise adequate financial resources for water resources management, if the novel goal for the decentralised IWRM is to be achieved.

B) National Water Resources Management Agency

1. Undertake a Strategic Social and Environmental Assessment (SSEA) of the Water Resources to inform IWRM and planning.

2. With the outcomes of the SSEA, validate the current raw water use charges, using the equilibrium water pricing model and game theory, as well as the water demand management tool to promote efficient water use and allocation.

3. Develop water budgets for the 12 major water catchments. This should be updated periodically to ensure efficient water allocation between economic sectors and water users.

4. Establish and ensure full operation and functionality of NWRMA regional offices.

5. Develop an operational guideline for WBMB and WCMC and declare the Water Basin Management Boards for the Rokel and Western Area Catchments, as well as ensure that they are operational and functional.

6. Review the NWRMA (Water Use and Catchment) Regulations of 2021 and (Groundwater Development and Protection) Regulations, of 2021, to provide restrictions on the installation of private boreholes for commercial water production and packaging of drinking water within locations with piped water networks under water utility companies.

7. Explore a means of metering the volume of raw water abstracted by every water user either through direct installation of meters and/or an incentivised scheme for self-meter installation based on standards and services, provided by the Agency.

8. Revise the monitoring schedules from two site inspections per year to monthly undertakings.

9. Ensure that an Information Management System for Water Resources Management is established.

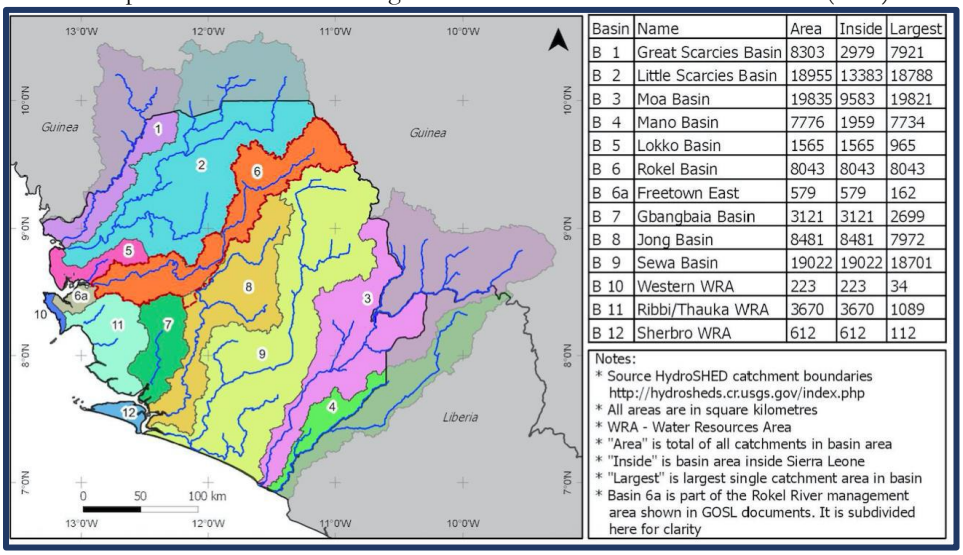
1.0 INTRODUCTION

1.1 Background

According to the United Nations World Water Development Report, published by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) in 2023, over 50 per cent of global water catchment areas experience deviation from normal river discharge conditions in 2022. Most of these areas are drier than normal, while a small percentage of basins experience more or much more discharge than normal. A similar trend was observed in 2021. The report further revealed that in 2022, more than 60% of major water reservoirs saw below-normal or above-normal inflow, and anomalies in soil moisture and evaporation echoed those in river discharge conditions. This presents a challenge in providing water to all users under the changing climate system. Water is critical to sustaining livelihoods and ensuring social and economic development. However, a total of two billion people (26% of the global population) do not have access to safe drinking water[3].

Sierra Leone with over seven million people, faces numerous challenges in its recent history to date, resulting in widespread displacement, poverty, and inadequate infrastructure. One critical issue hindering progress for the population is the limited availability and access to clean water[4]. The country remains endowed with an abundance of water resources in the 12 major water catchments, governed under the River Basin Planning and Management System (RBPM). See **Figure 1**.

Figure 1: A Map of Sierra Leone Showing Location of River Basins and their Sizes (Km^2)



Basin	Name	Area	Inside	Largest
B 1	Great Scarcies Basin	8303	2979	7921
B 2	Little Scarcies Basin	18955	13383	18788
B 3	Moa Basin	19835	9583	19821
B 4	Mano Basin	7776	1959	7734
B 5	Lokko Basin	1565	1565	965
B 6	Rokel Basin	8043	8043	8043
B 6a	Freetown East	579	579	162
B 7	Gbangbaia Basin	3121	3121	2699
B 8	Jong Basin	8481	8481	7972
B 9	Sewa Basin	19022	19022	18701
B 10	Western WRA	223	223	34
B 11	Ribbi/Thauka WRA	3670	3670	1089
B 12	Sherbro WRA	612	612	112

Notes:
* Source HydroSHED catchment boundaries http://hydrosheds.cr.usgs.gov/index.php
* All areas are in square kilometres
* WRA - Water Resources Area
* "Area" is total of all catchments in basin area
* "Inside" is basin area inside Sierra Leone
* "Largest" is largest single catchment area in basin
* Basin 6a is part of the Rokel River management area shown in GOSL documents. It is subdivided here for clarity

Source: *Ministry of Water Resources cited in NWRMA Strategic Development Plan, 2019-2023*

[3] https://www.unwater.org/publications/un-world-water-development-report-2023
[4] https://healingwaters.org/the-sierra-leone-water-crisis-what-can-we-do/

Over the years, the increasing water demand for domestic consumption coupled with increased urbanisation, agriculture, illegal mining, energy needs, and industrial use, has equally impacted the degradation of water catchments through a number of pressures. These include illegal water abstraction, construction of houses in buffer zones, fertiliser/pesticide applications, discharge of industrial effluents, and indiscriminate dumping of untreated domestic and acidic mine wastes. As a result, both water quantity and quality within water catchments have increasingly continued to decline, limiting access to clean and safe drinking water, tied with increased cases of waterborne diseases, low agricultural productivity, electricity load shedding etc. Water catchments are widely recognised as the most effective management units for the protection of water resources, both water quality and supply.

Water catchments are areas of land where rainfall collects in rivers and streams that flow into reservoirs, and/or recharge groundwater aquifers through percolation. The captured water later becomes drinkable for the communities when harnessed. They provide a significant natural barrier to water yield and contamination, presenting them most effective in the protection of source water to the maximum degree practical. Their protection and management make them crucial in source water protection through the removal of microbiological, chemical and physical contamination[5].

In 2017, the National Water Resources Management Agency (NWRMA) was established to regulate, utilise, protect, develop, control, and generally manage water resources throughout Sierra Leone. See **Appendix 1**, for the organogram for NWRMA. In 2019, the Agency unveiled a five-year Strategic Development Plan (SDP), 2019-2023, to promote integrated water resources management (IWRM), coordinated development and management of water, land and related resources to maximise economic and social welfare equitably, without compromising the sustainability of vital ecosystems. Water catchment planning and management is a critical management unit in IWRM.

1.2 Motivation of the Audit

By 2015, the total annual cost for Sierra Leone to address water scarcity and access to clean and safe drinking water was estimated at $ 93.3 million, and $ 287.5 respectively (Water Action Hub)[6]. However, effective 2016 to date, these cost estimates remain unknown. The presidential address of 2018 recognises that the current trends in the management of the country's water resources are insufficient for

[5] HR Wallingford, (2003) *Handbook for the Assessment of Catchment Water Demand and Use.* Project Report. HR Wallingford Ltd / DFID.
[6] https://wateractionhub.org/geos/country/196/d/sierra-leone/

sustainability, and pledged, "*to protect all major watershed areas against deforestation and other environmental problems and also to undertake reforms in the water sector including unbundling water generation from distribution as it is in the energy sector to improve on efficiency and cost recovery*" (NWRMA, 2019).

The period 2019 and 2023, the NWRMA received a total of NLe 6,771,587 to implement the SDP 2019-2023, See **Table 1**. The SDP included watershed and catchment protection, in addition to the development of regulatory and institutional structures; planning; monitoring; and stakeholder coordination and collaboration for collective management of the water resources, both at domestic and regional levels. However, there is still an increasing trend of degradation of water catchments. It is most likely the achievement of the Presidential Pledge did not materialise due to the continued degradation of water catchments.

Table 1: Annual Planned Budget and Amount Received by the NWRMA between 2019 and 2023[7]

Year	Budget (NLe)	Actual (NLe)	Variance (NLe)
2019	n/a	392,810	392,810
2020	2,113,200	1,077,600	(1,035,600)
2021	3,254,100	1,504,525	(1,749,575)
2022	3,254,200	815,152	(2,439,048)
2023	2,388,500	2,981,500	593,000
Total	**11,010,000**	**6,771,587**	**(4,238,413)**

Source: *NWRMA Budget and Actual Allocation 2019-2023*

Currently, in Sierra Leone, it is estimated that 95% of water is used for agricultural production. However, 90% of Sierra Leone's food demand is being met through imports, an indicative message of limited water storage infrastructures to put water into maximum productivity. The households have already felt the current soaring food prices, important to the current food insecurity situation in the country[8]. On the other hand, the effects of the application of fertilisers/pesticides, coupled with indiscriminate dumping of waste (domestic, industrial effluents and mine), continue to impact water quantity and quality for both water utility companies and water users[9]. Additionally, some rivers and streams are severely contaminated and sedimented, most notably in the Western Area Peninsular National Park and Rokel water catchments,

[7] The amount received was in the old currency. This was converted to the new Leones to match the differences in the denomination as the country used the old currency in the FYs 2020 through the end of June 2022. However, effective July 2022, a new currency was introduced by the Central Bank of Sierra Leone.

[8] *https://thewaterproject.org/water-crisis/water-in-crisis-sierra-leone*

[9] *https://www.landportal.org/ru/node/91844*

thus increasing the cost of operations and water treatment for the Guma Valley Water Company (GVWC) and the Sierra Leone Water Company (SALWACO). Therefore, leveraging access to unclean and unsafe drinking water sources by the people. This has already delayed the achievement of the Government of Sierra Leone's targets of Sustainable Development Goals (SDGs) committed in the Medium-Term National Development Plan of 2019-2023.

By the end of 2022, the total population with access to clean and safe drinking water was reported at 10.26%.[10] This is far below the commitment of Government in Sierra Leone's Medium-Term National Development Plan (MTNDP) of 2019-2023 which states, "the percentage of the population with access to safe drinking water increase from 59.6% to 80% by 2025". Additionally, the planned time for water delivery and access is about 6 hours,[11] compared to the commitment of "the percentage of the population with access to an improved water source within a total collection time of 30 minutes increased from 69% to 85% by 2023"[12]. It is against this background that the ASSL conducted a performance audit on the management of water catchments by NWRMA.

[10] https://www.macrotrends.net/global-metrics/countries/SLE/sierra-leone/clean-water-access-statistics#google_vignette

[11] Interviewees at SALWACO and GUMA

[12] https://www.social-protection.org/gimi/ShowRessource.action;jsessionid=Xn0RbDJTBcPkZ7OxJFS5AIRqyyfkY7kmIIOAvgIaGeUaS0-SokLm!1945465934?id=57691#:~:text=The%20plan%20charts%20a%20path,model%20%E2%80%93%20for%20this%20plan%20period.

2.0 AUDIT METHODOLOGY

The audit was conducted in accordance with the International Standards of Supreme Audit Institutions (ISSAIs), issued by the International Organisation of Supreme Audit Institutions (INTOSAI) and operationalised in the Working Papers on Conducting Performance and Environmental Audits Manual of the ASSL. The auditors followed these guidance notes to adhere to ISSAIs throughout the audit exercise from the planning phase, gathering sufficient evidence, examination of audit evidence, and synthesis of material findings, to draw reasonable conclusions and recommendations during reporting.

2.1 Audit Objective

The objective of the audit was to assess the measures put in place by the NWRMA to ensure effective and efficient management of environmental flows and water quality in catchments.

2.2 Audit Questions

1. To what extent did the NWRMA effectively and efficiently, plan and implement water catchment management activities?
2. How effective and efficient were the monitoring systems in ensuring good water supply and use within catchments?
3. How effective and efficient were the economic instruments in water use regulation and development?
4. To what extent has the NWRMA ensured effective collaboration and coordination with other stakeholders in water catchment management?

2.3 Audit Design and Scope

The auditors used both a system and a result-oriented approach. The system-oriented approach aimed to examine the state of the water catchments management at multi-actor and multi-level. Whereas the result-oriented approach was used to assess whether the impact, outcome and output objectives of the NWRMA have been achieved, and/or whether the process/procedures/systems were operating as intended.

The audit focused on water catchment management by the NWRMA between 2019 and 2023. This audit covered water catchment planning and implementation of activities, monitoring systems, Water Use Permits (WUPs) and Drilling Licences (DLs), and collaboration and coordination.

A total of 7 out of 12 water catchments governed by the NWRMA were covered. These included Rokel, Western Area Peninsular, Taia/Pampana, Loko, Moa, Sewa and the Little Scarcies, hotspots of degradations. The Rokel and Western Area Peninsular were assessed, for being the most significant water sources to Freetown and the only 2 water catchments, in which the Agency concentrated most of its interventions for the review period. Whereas Moa, Sewa, Loko, Taia/Pampana and the Little Scarcies catchments, with limited interventions, were considered as controls. The studied administrative boundaries with the water catchments comprised the Bo, Kenema, Port Loko, Bombail, Tonkolili Districts and the Freetown City Councils.

2.4 Audit Criteria

The audit criteria were drawn from the following key documents:

- The National Water and Sanitation Policy, 2010.
- National Water Resources Management Agency Act, 2017.
- National Water Resources Management Agency (Water Use and Catchment) Regulations, 2021.
- National Water Resources Management Agency (Groundwater Development and Protection) Regulations, 2021.
- The Environmental Protection Act, 2000 (Amended), the Environmental Protection Agency Act, 2022.
- Sierra Leone Electricity and Water Regulatory Commission Act, 2011.
- The NWRMA 5-Year Strategic Development Plan, 2019-2023.
- The NWRMA Water Resources Management Coordination Framework.
- Dublin-Rio Principles, the Dublin Statement on Water and Sustainable Development,1992.

2.5 Sampling

A total of 14 micro-catchments within the 7 major catchments provided in **Section 2.3**, were sampled purposively, based on whether reported degraded; encroached; undisturbed ecosystem; sites for surface water monitoring stations; water sources for local community and intake points for water utility companies, and NWRMA had reported protection and restoration activities undertaken. See details in **Table 2** below.

Table 2: Micro-catchments Selected for the Audit and Reasons

No	River Basin	Micro-Catchments	Location	Reason (s) for Selection
1	Sewa	Jembe	Kenema	Reported degradation
		Ngelehun	Bo	Installed monitoring station and water intake point
		Tabe	Bo	Installed surface monitoring station and source of water for local community
		Kortugbuma	Bo	Reported water intake point for both local community & water users
		Gbesseh	Bo	Reported degradation
2	Rokel	Rokel Village	Port Loko	Reported degradation and source of water to local community
		Magburaka	Tonkolili	Installed surface monitoring station
3	Taia/Pampana	Mashekira	Tonkolili	Reported degradation from mining
4	Moa	Soleyei	Kenema	In-situ ecological system
		Lambaya	Kenema	Reported degradation and source of drinking water
		Doiwala	Kenema	Reported encroachment for settlement
5	Little Scarcies	Konshu	Bombali	Reported encroachment and degradation
6	Loko	Bankasuka	Port Loko	Reported encroachment, contamination and source of water
7	Western Area	York	Freetown	Reported encroachment and restoration, water source for Guma and local community

The auditors purposively sampled a total of 45 participants from the different groups of stakeholders. These included local communities in both rural and peri-urban areas, staff of councils, CSOs/NGOs, water utility companies, water users, ministries, departments, and agencies (MDAs). However, for the water users that were not regularised by the NWRMA, we used snowball sampling. The auditor identified the first sample either through the district and/or city council staff and continued to reach others through referrals until a reasonable number of samples were obtained. See **Table 3**, for the list of water users sampled.

Table 3: List of Water Users Sampled by Water Use Category, Status of Regularised with NWRMA and Location

No.	Name of Water User	Water Use Type	Status	Location
1	Happy Life Water	Water packaging	NR	Bo
2	Joy Fresh/ACME Merchandise & Services	Water packaging	NR	Bo
3	Beacon Lodge	Hospitality	NR	Bo
4	Aryorkoh Pure Water	Water packaging	NR	Bo
5	Jah Pure	Water packaging	NR	Bo
6	Blue Diamond	Water packaging	NR	Bo
7	Sister Diamond	Water packaging	NR	Bo
8	Tee Spring Water	Water packaging	NR	Bo
9	Nice	Water packaging	NR	Bo
10	Kuma	Water packaging	NR	Bo
11	Tia	Water packaging	NR	Bo
12	Vamah Natural Spring	Water packaging	NR	Bo
13	Mena Hills Hotel	Hospitality	NR	Makeni
14	Medkura Pura Natural Water	Water packaging	NR	Makeni
15	Royal Pure Water	Water packaging	NR	Makeni
16	M.R Distilleries	Industrial	R	Freetown
18	Rainbow Paint & Chemicals	Industrial	R	Freetown
19	Jolax Manufacturing	Industrial	R	Freetown
20	The Place Resort	Recreation, Hotel and Hospitality	R	Freetown
21	Koidu Holdings Limited	Mining	R	Freetown
22	SOCFIN Agricultural Company	Agriculture	R	Freetown

Notes: ***NR*** **=** *Non-regularised and* ***R*** **=** *Regularised by NWRMA*

Furthermore, we purposively sampled the storage room at the Hydro-Information Department to assess the status of equipment and waste landfills at the city councils of Bo, Kenema and Makeni, to explore any works undertaken by NWRMA, to sustain capacity built, best practices and infrastructures gained under the Three Towns Water Supply and Sanitation Project (TWSSP) that was implemented by the Ministry of Water Resources and Sanitation (MWRS), with funding from the GoSL and the African Development Bank (AfDB)[13]. Whereas, to assess the conditions and functionality of water level and quality monitoring stations, we purposively sampled a total of 11 out of 57 hydrological monitoring stations, comprising 7 surface water and four groundwater stations. See **Table 4** for a list of hydrological stations by location and reasons for selection.

[13] The TWSSP provided access to adequate, safe, and reliable water supply and public services for the three cities in Bo, Kenema, and Makeni and enhanced the institutional, operational, and management capabilities in Sierra Leone. The rationale for selected cities was based on their being densely populated after Freetown the auditors inspected 3 waste landfills.

Table 4: List of Hydrological Stations Sampled by Location and Reasons

Sample No	Site	River Basin ID	Reason for Selection	Location
SWS/001/2024	Magburaka	Rokel	Offline	Tonkolili
SWS/002/2024	Addax Lungi	Loko	Offline	Port Loko
SWS/003/2024	Ngelehun/Gudama	Sewa	Offline	Bo
SWS/004/2024	Tiloma	Moa	Online	Kenema
SWS/005/2024	Konshu	Little Scarcies	Offline	Bombali
SWS/006/2024	Rokel Village	Rokel	Offline	Port Loko
SWS/007/2024	Bumpe	Sewa	Online	Bo
GWS/001/2024	Bo-SALWACO Premises	Sewa	Offline	Bo
GWS/002/2024	Kenema	Moa	Offline	Kenema
GWS/003/2024	Bombali	Rokel	Offline	Bombali
GWS/004/2024	Magburaka	Rokel	Offline	Tonkolili

Note: SWS means Surface Water Monitoring Station and GWS means Groundwater Monitoring Stations.

2.6 Methods of Data Collection

The auditors used document reviews, physical inspections and observations, structured interviews, checklists, and focused group discussions (FGDs), to gather the audit evidence between 20th May and 13th June, 2024.

a) Documents Reviews

The auditors conducted an intensive and systematic review of documents. These included but not limited to:

- The NWRMA Five-year Strategic Development Plan (2019-2023) to understand planned activities and performance tracking indicators for water catchment management.
- The NWRMA Raw Water-Use Charges, to understand the objectives and criteria used and efficacy of data feeds into the raw water use tariff setting process, to promote fairness, equity and economic efficiency in IWRM. See **Appendix 2** for a detailed list of documents reviewed and the reasons for the review.

b) Physical Inspections and Observations

Site inspections were undertaken to gather evidence from the hydrological stations; water users' intake points, riverbanks within the selected micro-catchments, waste landfills at city councils, equipment storage room, and degraded sites reported demarcated and restored.

c) Interviews

Interviews were conducted with participants drawn from the different stakeholder groups sampled, to corroborate information gathered from document reviews, field inspections and focused grouped discussions (FGDs). See **Appendix 3** for the list of stakeholders interviewed and the reasons.

d) **Checklist**

e) Furthermore, we administered a checklist to all the departmental heads at the NWRMA to understand the following:

- The status of the monitoring systems and water resources information management system,
- Availability of water balance sheets and/or budgets for the 12 water catchments. See Appendix 4 for the detailed checklist used.

f) Focused Group Discussions

To examine the works of the NWRMA at the grassroots levels in the WCM, a total of 8 focused group discussions (FGDs) were held with the local communities in both rural and peri-urban areas of the councils, to understand their perceptions of access to adequate, clean and safe drinking water; water use needs, level of involvement in water source protection by NWRMA, challenges in accessing adequate, clean and safe drinking water and explore their desires to protect water sources. See **Table 5** for details on locations where FGDs were held.

Table 5: Locations of Places Where FGDs were Administered

No	Village Name	District
FGD01	Blamawo	Kenema
FGD02	Nyadeyama	Kenema
FGD03	Jembe	Kenema
FGD04	Bumpegao	Bo
FGD05	Rokel	Port Loko
FGD06	Water Works	Port Loko
FGD07	Mubuff Mining Site, Mashehira	Tonkolili
FGD08	York Village	Freetown

2.6 Examination of Audit Evidence

To examine the evidence gathered and draw inferences, to answer the audit questions:

- The outcomes of the documents reviewed, stakeholders interviewed, and FGDs were categorised into themes in alignment with deliverables and indicators established in the NWRMA SDP 2019-2023. The provisions in the water laws and policies, by using thematic mapping, content and simple statistical analysis, to report on planning, implementation, and monitoring systems in water source protection and management activities.

- To quantify the actual target of 30% of water catchment areas in critical danger protected, restored and regenerated in SDP 2019-2023 in terms of kilometre square (Km^2), we synthesised the high-risk areas classified in the water catchment delineation and mapping reports for Rokel, Western Area Peninsular and Taia/Pampana catchments. Therefore, we used a total of 1089 Km^2 as the baseline, to evaluate the progress made in the protection and restoration of catchment areas in critical danger. See **Table 6.**

Table 6: Synthesised Target for the Protection, Restoration and Regeneration of Catchment Areas in Critical Dangers in Square Kilometres (Km^2)

Delineated and Mapped Water Catchments in Kilometre Square and Year	Western Area 2021	Rokel 2021	Taia/Pampana 2022
Total catchment areas in critical danger	140.04	3492.24	0.00
The planned target of 30% of catchment areas in critical danger, delineated and mapped for protection, restoration and regeneration.	**42.012**	**1047.672**	**0.00**

Source: *NWRMA, 2024*

- For the effectiveness of economic instruments, we summed and disaggregated the number of water use permits and drilling licences issued and renewed per year, to observe the rate of uptake and cross-examined with the annual revenues collected.

- To determine the volume of water abstracted and revenue uncollected from the identified non-regularised water users:

i) Firstly, the auditors excluded the unregulated water users who were either connected to SALWACO and/or Guma piped water network systems and had installed a private well, to avoid distortion of the observations.

ii) There were variations in demand for processed water based on seasonal changes. We normalised the amount of water used and/or processed by averaging the amounts used and/or processed in litres and/or bundles during dry and wet seasons, to determine the average amount of water used and/or processed per month. Due to limited record keeping, for water users who operated the same intake point in Bo, we assumed the same water usage rate.

iii) The above captured units were used by normalising the storage capacity, and volume of water abstracted, processed, packaged, and/or used, from litres and/or bundles to cubic meters (m^3), the standard dimension used by the NWRMA in raw water charge quantification. See **Table 7** below for the conversion factors used.

Table 7: Quantifications and Dimensions Used to Compute the Volume of Raw Water Abstracted Unregulated

No.	Captured Units	Fundamental Units
1	1000 litres	1 cubic meter (m^3)
2	1 bundle	20 sachets
3	1 bundle	10000 millilitres (ml)
4	1 millilitre	0.000001 cubic meter (m^3)
5	1 year	12 months=365 days

iv) The unit price charge per cubic meter for water user categories that fall under recreation purposes covering hotels and hospitality, as well as water production and packaging were not provided for, in the Third Schedule of Water Use and Catchment Regulations of 2021. We used the one set by SALWACO at NLe 37/m^3.

v) We considered the payment of the application and administrative fees for processing the water use permit as a one-off charge. We used rates for provincial locations in the Third Schedule of the Water Use and Catchment Regulations of 2021, since all the non-regularised were in the provinces.

vi) The total revenue uncollected from non-regularised water users was determined using the following formulae:

$\sum E_{rw} = \sum R_{rw\text{-}abst} + AP_f + Adm_f$ 1

Where.

$\sum E_{rw}$ = Total revenue uncollected from the water users for the period operated without authorisation (SLE)

$\sum R_{rw\text{-}abst}$ = Total revenue uncollected from the volume of raw water abstracted for the period operated without authorisation (SLE)

AP_f =Application fees for a water use permit (SLE)

Adm_f = Administrative fees for processing water use permit (SLE)

$\sum R_{rw\text{-}abst} = \sum V_o * UPC$ 2

Where;

$\sum V_o$ = Total volume of raw water abstracted for the period operated without a water use permit (m^3)

UPC = Unit Price Charge Per Cubic Meter abstracted (SLE)

$\sum V_o = V_{abst\text{-}a} * N$ 3

Where;

$V_{abst\text{-}a}$ = Volume of raw water abstracted per annum(m^3)

N= Number of years operated without a water use permit

$V_{abst\text{-}a} = V_{abst\text{-}m} * 12$ 4

Where;

$V_{abst\text{-}m}$ = Volume of raw water abstracted per month (m^3)

12 = Number of months in a year.

$V_{abst\text{-}m} = 365/T_{cs}$ 5

Where,

365= Total number of days per year

T_{cs} =Time taken, to exhaust one-off filled storage capacity per abstraction (days)

$T_{cs} = S_f/V_{pus}$ 6

Where;

S_f= Storage Capacity filled in a single abstraction (m^3)

— V_{pus}= Volume of water abstracted, processed, used or sold (m^3/day): computed from the Average bundles processed per day* 20 * 500 * 0.000001 and Average number of litres of water produced and used per day/1000 per water user.

- To report on the effectiveness of collaboration and coordination by the NWRMA with other stakeholders, we used a 5-point Likert Scale to rate the achievement of the deliverables in the NWRMA Water Resources Management Coordination Framework. Where five denoted exceedingly met expectations and one was unsatisfactory. See **Table 8.**

Table 8: A 5-Point Likert Scale Used to Evaluate the Performance of the NWRMA in Collaboration and Coordination Against the Deliverables in the Coordination Framework.

Score Ranges	Ratings	Description
4.5-5.0	5	Exceedingly met expectations
3.5-4.49	4	Above expectations
2.5-3.49	3	Met expectations
1.5-2.49	2	Fairly met expectations
<1.49	1	Unsatisfactory

2.7 Audit Limitations

i) Time Constraints: Only 14 micro-catchments and 6 registered water users were covered. However, the sampling procedure and criteria used were robust and reliable. The samples covered water packaging, agricultural, mining and industrial uses. Whereas for the water users, we spread the risk of missing some areas during the review of files, by administering interviews with 3 water users whose files were not reviewed and those not registered by the NWRMA. Hence, the audit conclusions drawn were logical to inform decision-making and planning.

ii) Limited Indicators: The indicators under Goal 3 on the Protection of Watershed and Catchment in SDP were output indicators and excluded outcome and impact indicators. For example, the number of households protected from floods by restoration of areas in critical danger was lacking. We could not examine the efficiency of the protection and restoration activities in their entirety.

iii) Data Challenge: There was lack of ecosystem and/or water accounts to examine the contribution of the Agency's interventions to the economy from a perspective of Systems of Environmental-Economic Accounting (SEEA). Furthermore, the audit scarcely addressed the aspect of water quality. Data on water quality obtained from SALWACO raw water intake points and treatment plants were incomplete to evaluate water quality within catchments.

3.0 WATER CATCHMENT MANAGEMENT

This section presents an overview of the management of water catchment activities by the NWRMA. These include governing legal frameworks; plans; stakeholders, and process descriptions.

3.1 Legal Frameworks

- **The National Water and Sanitation (WASH) Policy, 2010:** The Policy aims to respond to the urgent need in Sierra Leone for integrated water resources management as well as the provision of safe and adequate water and sanitation facilities. In particular, the Policy advocates for:
    i) The fundamental human right of access to safe and adequate water to meet basic human needs
    ii) Provision of education to improve hygiene practices and increased access to adequate sanitation facilities
    iii) Careful management of water resources as a socially vital economic good to sustain growth and reduce poverty.
    iv) A participatory approach that will help the conservation and protection of water resources in the country.

- **The National Water Resources Management Agency (NWRMA) Act, 2017:** This Act provides for the equitable, beneficial, efficient, and sustainable use and management of Sierra Leone's water resources. It is an instrument formed to governs the mandates and functions of the NWRMA; to regulate, utilise, protect, develop, control, and generally manage water resources throughout the Sierra Leone plan.

- **The Environmental Protection Act 2000 (Amended), the Environmental Protection Agency Act, 2022:** The Environmental Protection Act of 2000 provides the framework for effective environmental protection and its administration. This Act establishes the National Environment Protection Board and makes provisions for environmental impact assessments and environmental standards, among others. The Act gives the responsibility to the Department of Environment to coordinate all environmental-related activities of Government Ministries and local authorities and act as the focal point of all national and international environmental matters relating to Sierra Leone. The aim is to promote the formulation of national environment goals and strategies; formulate or promote the formulation of and monitor the implementation of environmental policies, programmes and projects, standards and regulations; promote, and

support environmental education and training. The 2022 amendment further provides for the continuation of the Sierra Leone EPA to provide for more effective and efficient environmental protection and management and other related matters.

- **The National Protected Area Authority and Conservation Trust Fund Act, 2012:** This Act provides for the establishment of the National Protected Area Authority and Conservation Trust Fund. This is to promote biodiversity conservation, wildlife management, and research, to provide for the sale of ecosystem services in the National Protected Areas and to provide for other related matters. It prohibits permission for any activity in the National Protected Areas, restriction, control or regulation of burning of vegetation or the cutting, felling or removal of timber in or from the National Protected Areas or any part thereof, including water catchments.

- **Sierra Leone Water Company Act, 2017:** This Act provides rules relating to water supply by the Company. The established Company shall (a) develop and operate satisfactory water supply services at a reasonable cost and on a self-supporting basis in every specified area stipulated in the First Schedule, and (b) facilitate the provision of safe water and related sanitation services in rural communities and small towns.

- **The National Water Resources Management Agency (Dam Safety) Regulations, 2021**: The NWRMA Act gives Sierra Leone Ministries – led by the Ministry of Water Resources – the power to regulate controls over water activities, to protect, improve and promote sustainable use of Sierra Leone's water environment.

- **The National Water Resources Management Agency (Ground Water Development and Protection) Regulations, 2021:** Delivers commissions to introduce regulatory controls over groundwater development, use, protection and decommissioning to protect, improve and promote sustainable use of Sierra Leone's water environment.

- **Sierra Leone Electricity & Water Regulatory Commission Act, 2011:** This Act established the Sierra Leone Electricity & Water Regulatory Commission (SLEWRC), to regulate the provision of the highest quality of electricity and water services to consumers independently and transparently in accordance with the provisions of the Act for the electricity and water industries issue, and as the case may be. Renew, amend, suspend, revoke, and cancel licences for non-compliance. Provide

guidelines on rates chargeable for the provision of electricity and water services. Protect the interests of consumers and providers of electricity and water services. Monitor standards of performance for the provision of electricity and water services. Promote fair competition among public utilities and conduct studies relating to the economy and efficiency of public utilities.

- **The National Water Resources Management Agency (Water Use and Catchment) Regulations, 2021:** These Regulations, made under Section 36 of the National Water Resources Management Agency Act No. 5 of 2017, provide for dam classification and safety procedures. The Regulations define maintenance of a dam; responsibility for a dam without decommissioning and notifying the Agency; emergency preparedness and response plan; Environment Protection Agency; and hazard potential.

- **The Five-Year Strategic Development Plan (SDP) 2019-2023:** This consolidates the NWRMA's interventions and commitments to achieving the vision of the NWRMA established under the NWRMA Act, 2017, "To be one of the leading water resources management agencies in West Africa".

  The NWRMA-SDP unveiled interventions to address the issues in the management and regulation of water resources in Sierra Leone with proposed workable strategies. This is to ensure that raw water users do not have undue advantage over others. The development of groundwater sources guided, while at the same time making sure that the country's water resources are conserved and managed in a sustainable way that will fulfil the aspirations of the Sustainable Development Goal (SDG6) and beyond.

- **The Dublin-Rio Principles, the Dublin Statement on Water and Sustainable Development, 1992:** The GoSL is a full member state of the United Nations, obligated to adopt and implement water resources management interventions in a manner that reflects an international understanding of the equitable and efficient management and sustainable use of water. The decision was agreed upon in 1992 at the preparatory meeting of the United Nations Conference on Environment and Development and coined the Dublin Statement on Water and Sustainable Development. The Dublin Statement unveils four principles on water:
  - Principle 1: Water is a finite and vulnerable resource: Fresh water is a finite and vulnerable resource, essential to sustain life, development, and the environment.

- Principle 2: Participatory approach: Water development and management should be based on a participatory approach, involving users, planners, and policy-makers at all levels.
- Principle 3: The role of women: Women play a central part in providing, managing and safeguarding water.
- Principle 4: Social and economic value of water: Water is a public good and has a social and economic value in all its competing uses.

3.2 Stakeholders and Their Roles

The identified relevant stakeholders that the NWRMA closely collaborates with, and engages in the planning and implementation of water catchment management activities are as follows:

- Ministry of Water Resources and Sanitation (MWRS).
- Sierra Leone Energy and Water Regulatory Commission (SLEWRC).
- Sierra Leone Water Company (SALWACO).
- Guma Valley Water Company (GVWC).
- National Mineral Agency (NMA).
- Environmental Protection Agency (EPA).
- Ministry of Environment and Climate Change (MECC).
- National Protected Area Authority (NPAA).
- Ministry of Lands, Housing and Country Planning (MLHCP).
- Ministry of Agriculture and Food Security (MAFS).
- District and City Councils.
- Local Community/Private Sector Actors.
- The Conservation Society of Sierra Leone (CSSL).
- Catholic Relief Services (CRS). See **Appendix 5** for a detailed list of stakeholders and their detailed roles.

3.3 Process Description

This section presents the activities at the NWRMA from a systems perspective, to plan, protect and manage water catchments sustainably, through a River Basin Planning and Management (RBPM) approach.

a) Nationwide Mapping of Watersheds and Catchments

The NWRMA conducts nationwide delineation and mapping of the watersheds and catchments. The Agency applies a Geographical Information System (GIS), to describe the catchments, by compiling and organising the data and information on water catchments– "*the knowledge base"*, to support the planning and management processes through the understanding of drivers, pressures, state, impacts and appreciate the opportunities within the catchments. Water resources Strategic Social and Environmental Assessment (SSEA) and Modelling are conducted parallel to this process, to acquire information such as water stock, climate change, landscape and markets, and stakeholders' perceptions of ecosystem services (goods and services that benefit people) before extensive planning.

b) Water Use Regulations and Development

To regulate water- use and development activities within water catchments, the NWRMA develops/updates, and implements legislative and economic instruments covering surface water use, pollution management; groundwater development and protection as well as reservoir developments. Whereas, to ensure wider adoption of the legislative instruments, the Agency develops implementation guidelines and implements them together with water use permits and drilling licences.

Applications for water uses and/or drilling activities are submitted by the prospective applicants to the Director General, NWRMA using the templates provided under the First Schedules of the NWRMA (Water Use and Catchment) Regulations, 2021 and (Groundwater Development and Protection Regulations), 2021 respectively. The NWRMA reviews the applications for the adequacy of information provided and verifies the details of the applicants, locations and sources of water, and drilling rig details, amongst others. Once all requirements are met, on-site verifications are conducted, and if determined without deviations, then applications are approved, and the proponents are asked to pay the stipulated fees.

For water use permits, the application fees, administrative fees and fees for the volume of water to be abstracted, set out in the Third Schedule of Water Use and Catchment Regulations of 2021, informed by the NWRMA raw water use charges. Whereas drilling license fees are based on the category of drilling rigs. A and B in the Second Schedule of the Groundwater Development and Protection Regulations of 2021. The charges accrued from the water use permit and drilling license issuance are collected through the Consolidated Fund and are a key source of internal revenue for the Agency.

c) Declaration of Water Basin Management Board and Formation of Water Catchment Management Committees

The NWRMA develops guidelines and operationalises a functionality of the Water Basin Management Boards (WBMB) and Water Catchment Management Committees (WCMC). Through the creation and identification of the membership, and motivation. The NWRMA develops and administers training to WBMB and WCMC. The declaration of WBMB is led by the River Basin Operations Officer (RBOO). The formation, support supervision, monitoring and reporting on the WCMC activities; are led by the WBMB with technical support and supervision provided by the Agency.

d) **Institutional Capacity Strengthening**

The Agency recruit staff at the various departments at the NWRMA headquarters. To advance service delivery through technical capacity strengthening, the Agency conducts a capacity needs assessment and identifies capacity competencies to be strengthened, to promote integrated WCM. The Agency also offers technical assistance and/or leads business/proposal developments, solid waste management, mobilisation of funds, to address sectoral concerns that could have significant adverse impacts on water quantity and quality, which are likely to stall socio-economic development and societal welfare.

e) Promotion of Knowledge in Water Catchment Management

Compilation of information on catchment status is performed periodically by NWRMA in consultation and coordination with the WBMB, councils, MDAs, and local community members. For each water catchment, an inventory is undertaken, and the information is disseminated through briefs, reports, awareness campaigns etc. Such information includes the location of the catchment; the type of fauna and flora; soil status, water levels and quality of water, and existing water uses among others.

f) Coordination and Collaboration

In the quest to protect water catchments from degradation in a holistic manner through multi-actor and multi-level approaches, the NWRMA undertakes planning, implementation, monitoring, inspection and regulation of proposed and/or existing developments, in collaboration with the stakeholders. The outcome such as engagement in the minutes of the coordination meeting, inspection and monitoring reports are produced and action points are used for transformational change in water catchment planning and management processes. For example, grievance and complaint management associated with water use rights, drilling licences, operations and maintenance of hydrological stations, renewals or cancellation of water use rights and drilling activities, etc.

Furthermore, the Agency establishes and maintains a database management system to process, store and share data on water resources with various stakeholders to integrate the WCM activities within work plans and budgets. For example, in the case of the mining sector, the NWRMA and the NMA plan, to conduct a joint periodical inspection, monitoring, and supervision of mining sites to assess their compliance with the conditions of approval of the EIA.

4.0 FINDINGS AND RECOMMENDATIONS

4.1 Planning and Implementation of Water Catchment Management Activities

Section 13 (1) of the NWRMA Act, 2017 states that the object for which the Agency is established is to regulate, utilise, protect, develop, conserve, control and generally manage water resources throughout Sierra Leone. In Sub-section two (2) Without prejudice to the generality of Subsection (1) the Agency shall perform the following functions-(a) propose comprehensive plans and strategies for the conservation, development and improvement of water resources. In the SDP 2019-2023 under Goal 3-protection and restoration of watersheds and catchments, the NWRMA planned to protect, restore and regenerate 30% of the watersheds and catchment areas in critical danger (high-risk areas).

Sub-section 2 (b) of the NWRMA Act states that the NWRMA shall initiate, control and coordinate activities concerned with the development and utilisation of water resources including the supervision and regulation of –(i) the Water Basin Management Boards; and (ii) Water Catchment Area Management Committees. (c) grant water rights and collect raw water charges; (d) collect, collate, store and disseminate data or information on water resources in Sierra Leone in collaboration with other relevant institutions.

4.1.1 Nationwide Mapping of Watersheds and Catchment Areas

The NWRMA delineated and mapped Rokel and Western Area Peninsular in 2021 and Taia/Pampana in 2022, using NLe 3,351,771.33. The delineation and mapping of Rokel and Western Area Water Catchments were conducted with external inputs, supported by the United Nations Development Programme (UNDP). Whereas the Taia/Pampana Water Catchment was done in-house. See **Table 9** below.

Table 9: Protected and Restored Catchment Areas in Critical Danger between 2019 and 2023.

Delineated and Mapped Water Catchments and year	Western Area 2021	Rokel 2021	Taia/Pampana 2022
Total Area (km²)	223	8043	8400
The planned target of 30% of catchment areas in critical danger, delineated, protected, and restored (km²).	42.012	1047.672	0.00
Total Expenditure (SLE)	129,189.9	3,222,581.4	0.00
Cost per 1 km² (SLE)	3,075.05	3,077.91	0.00
Area protected (km²)	3.803	0.00	0.00
Area restored (km²)	0.00	0.00	0.00
Area regenerated (km²)	0.00	0.00	0.00

Source: *NWRMA delineation and mapping of catchments and sub-catchments in the Rokel/Western Area basin and Taia/Panpana 2021 and 2022*

From **Table 9** above, 3 of the 12 water catchments were delineated and mapped. This provided a limited knowledge base of catchment areas in critical danger to inform the planning processes for WCM. A total of 3.803 km² out of 1089 km² of catchment areas in critical danger were protected in the Western Area. This covered 0.878 km² around No.2 Beach; 1.463 km² in Tombo and 1.463 km² in Madina. Therefore, the target of 30% for the protection, and restoration of catchment areas in critical danger planned, was high and unachieved. The Agency implemented the delineation and mapping activities, after the completion of the NWRMA SDP 2019-2023. Therefore, the results were not able to inform the planning for water catchment protection and restoration.

- For Taia/Pampana delineation and mapping exercises done in-house, the critical danger quantification of the catchment areas was lacking. We identified limited expertise and an incomplete water catchment management planning framework as the main cause for incomplete mapping results.

- Furthermore, only the Management Plan for Rokel Water Catchment entitled Rokel River Basin Management of 2023 was developed. The Agency presented to the auditors, limited funding for not developing other water catchment management plans. Nevertheless, the Rokel Catchment Management plan focused on key aspects of mining waste, agricultural pollution, solid waste management, climate change, water use allocation and monitoring. Nevertheless, the plan lacked a theory of change (ToC). This increased the risk of misalignment of the planned activities with long-term visions of the GoSL in the MTNDP, to foster accountability by setting clear metrics, milestones and adaptive learning in the IWRM. Additionally, the plan lacked a monitoring, evaluation and learning (MEL). Therefore, it increased the risks of unclear indicators, means of verification, and data collection instruments, to effectively track, evaluate, and report on the implementation progress.

- The target of 30% for catchment areas in critical danger planned for protection and restoration was not adjusted due to inadequate funding, to conduct a mid-term evaluation and reporting on the implementation of SDP 2019-2023. Consequently, the Agency was unable to identify positive achievements, areas of deviations, and effect the applicable changes to the plan, for its successful implementation.

Recommendations

1. By the end of Quarter 2 of FY 2025, the Director of Planning, Research and Operations should ensure that the drafting of the Water Catchment Management Planning Framework is completed, to guide a systematic and structured integrated assessment and planning of water catchments.

2. By the end of Quarter 4 of FY 2025, the Director General should ensure capacity is enhanced at the Planning, Research and Operation Department in the areas of Strategic Planning and Development Process for the IWRM.

3. By the end of Quarter 3 of FY 2025, the Monitoring and Evaluation Officer should develop the theory of change and Monitoring and Evaluation Plan for the Rokel River Basin Catchment Management Plan of 2023, subsequent Catchment Management Plans yet to be developed and the 5-Year Strategic Development Plan for the Agency under review.

4. The Director Planning, Research and Operations should ensure that mid and final evaluations of the already developed Rokel River Basin Management catchment management plan, and the wider NWRMA SDP are conducted, to keep track of progress and make timely decisions for any deviations.

Management Response

1. Your recommendation is considered very seriously, and the drafting of the Water Catchment Management Planning Framework will be completed by the end of the second quarter in 2025 to guide a Systematic and Structured Integrated Assessment and Planning of Water Catchment.
2. The Director General will enhance capacity at the Planning, Research, and Operations Department in the area of strategic planning and Development processes for IWRM.
3. This is noted and the Monitoring and Evaluation Officer will develop the theory of change and Monitoring and Evaluation Plan for the Rokel River Basin Catchment Management Plan by the third quarter of 2025.
4. The Director will take necessary actions to conduct mid and final evaluations of the already developed Rokel River Basin Management Plan and the wider NWRMA SDP to keep track of progress and make timely decisions for deviations.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

4.1.2 Regulatory Frameworks for Water-use Planning and Development

Under Goal 1 in the 5-year Strategic Development Plan 2019-2023, NWRMA committed to developing regulatory and institutional frameworks for managing and protecting water resources, reflecting the Integrated Water Resources Management (IWRM) principles. These included legislative instruments on water use and drilling activities. Additionally, Regulation 3 of the NWRMA Water Use and Catchment, 2021 states that, pursuant to Subsection (2) of Section 28 of the NWRMA Act the following water uses shall be exempted from requiring a permit -(a) water abstracted by mechanical means and used only for domestic purposes where abstraction does not exceed thirty cubic meters (30m³) per month; (b) subsistence agricultural water use for land areas not exceeding 5 hectares; and (c) use of water resources for the purposes of firefighting water use.

Furthermore, Regulation 3 in the Sierra Leone Electricity and Water Regulatory Commission Act, 2011 (Act No. 13 of 2011) Entitled the Bottled and Sachet Water Production Regulations, 2019 states that a person shall not produce or import packaged water unless that person holds a permit issued by the Commission. Proceeding in Regulation 4, the Commission categorize permits as follows- (a) the bottled water production permit which entitles the holder to produce bottled water for sale or drinking; (b) the sachet water production permit which entitles the holder to produce sachet water for sale or drinking. The prospective proponents and/or permit holders are required under Regulation 5 (3) (b) to obtain a Water Abstraction Permit from the NWRMA.

The NWRMA developed four legislative instruments to regulate water use and development activities within water catchments. These included the NWRMA (Water Use and Catchment) Regulations, 2021; the (Groundwater Development and Protection) Regulations, 2021; (Dam Safety Regulations), 2021, and the (Water Pollution and Control) Regulations, 2021. However, the implementation of these instruments had flaws due to:

a) Lack of Targets for Water Legislation

The four legislative instruments lacked targets. A respondent from NWRMA disclosed that the Agency was financially constrained, and therefore was unable to conduct comprehensive action-oriented and development research, to inform target setting for the instruments. As a result, the Agency lacked sufficient data during the development of water legislation.

Consequently, NWRMA was unable to effectively and efficiently determine the resources required to implement, monitor, and deliver the desired specific changes and be held accountable, including the Parliament on whether the water legislation contributed to the desired goals in the period reviewed.

b) Absence of Implementation Guidelines for the Legislative Instruments

Furthermore, the implementation guidelines for the developed water legislations were not developed, due to limited funding. The NWRMA presented to the audit team that the Agency was financially constrained to the extent that, the majority of planned activities in SDP 2019-2023 were not achieved.

This increased the risk of slowed implementation through non-voluntary adoption by the stakeholders and high burdens of enforcement. Legislative instruments are prescriptive and do not offer best practices and alternatives for implementation. Best practices in policy development and implementation identify implementation guidelines instrumental, for their strengths of offering guidance and best practices directly to the stakeholders on what their roles are, what they should do and how they can do it, to help them follow the rules whilst allowing for flexibility, cost savings through use of common sense in different applicable scenarios.

Recommendations

1. By the end of Quarter 1 of FY2025, the Director General should ensure capacity is built in-house in both strategic and result-based planning, especially at the Department of Planning, Research and Operations.

2. By the end of Quarter 2 of FY2025, the Outreach Management should develop and widely disclose the implementation guidelines for the water legislative instruments to various relevant stakeholders.

Management Response

1. This is noted, and necessary actions will be taken to enhance the capacity in-house in both strategic and result-based planning in the Department of Planning, Research, and Operations by the 1st quarter of 2025.

2. This is noted and necessary action shall be taken to develop and widely disclose the implementation guidelines for the water legislative instruments to various relevant stakeholders.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

c) Integration of the Relevant Water Sector Governing Legal Frameworks

The Agency integrated and implemented a number of relevant water sector legal frameworks to promote WCM sustainably. These included but were not limited to the EPA Act of 2022; the WASH Policy of 2010; the Sierra Leone Electricity and the Water Regulatory Commission (SLEWRC) Act, 2011. See **Section 2.1** on Legal Frameworks. Nevertheless, there was limited integration of the relevant legal frameworks in WCM due to the lack of a legal framework register. As a result, the Agency was unable to track and mainstream all the legal frameworks in water use planning and development activities effectively and efficiently.

The directive in the SLEWRC Act, 2011 commissions all production and water packaging applicants to acquire water use permits before issuance of a licences by the SLEWRC. Nevertheless, the Agency did not establish raw water use fees for the aforesaid category in the Third Schedule of the NWRMA (Water Use and Catchment) Regulations, 2021. A reason provided to the auditors by an interviewee from NWRMA was that "***the Agency is not responsible for regulating companies dealing with water production and packaging, but it is the responsibility of the Sierra Leone Energy and Water Regulatory Commission***". Hitherto, the sources of water production and packaging were mainly groundwater sources, within the mandate of the NWRMA, and were not exempted from controls in Regulation 13 of the Water Use and Catchment Regulations of 2021.

This did not only increase illegal borehole installations and unregulated water abstraction but also resulted to revenue loss. The risk mostly crowded in water production and packaging use with the highest number recorded in Bo City. See **Figure 2**, for a shared water intake, where 9 of the non-regularised water production and packaging users and See **Table 10** for the list of unauthorised water users engaged in water production and packaging as well as hotel and hospitality.

Figure 2: A Fenced Water Abstraction Point for 9 water production and packaging users in Kortugbuma, Bo City

Credit: ASSL 23/05/2024

Table 10: List of Unauthorised Water Users Unregularised, Volume Abstracted and Revenue Uncollected

No	Water Users	Water use	Years of Operated without Permit (N)	Storage Capacity-S (m3)	Unit	Normalized Volume of Water processed or used per day-Vpus (m3)	Time Taken to Exhaust One-off Filled Storage Capacity-Tcs (days)	Volume abstracted per Year-Vabst-a (m3)	Volume of Water Abstracted without permit-Vo (m3)	Uncollected Revenue-Rrw (SLE)
1	Happy Life Water	WP	3	10	Bdles	2.15	5	785	2354	93,807
2	Joy Fresh/ACME Merchandise & Services	WP	1	10	Ltrs	1.00	10	365	365	20,205
3	Beacon Logde	HS	5	5	Ltrs	1.21	4	443	2216	88,675
4	Aryorkoh Pure Water	WP	3	5	Bdles	1.50	3	548	1643	67,473
5	Jah Pure	WP	2	5	Bdles	1.50	3	548	1,095	47,215
6	Blue Diamond	WP	3	5	Bdles	1.50	3	548	1643	67,473
7	Sister Diamond	WP	1	5	Bdles	1.50	3	548	548	26,958
8	Tee Spring Water	WP	2	5	Bdles	1.50	3	548	1095	47,215
9	Nice	WP	4	5	Bdles	1.50	3	548	2190	87,730
10	Kuma	WP	2	5	Bdles	1.50	3	548	1095	47,215
11	Tia	WP	3	5	Bdles	1.50	3	548	1643	67,473
12	Vamah Natural Spring	WP	1	10	Bdles	2.50	4	913	913	40,463
13	Mena Hills Hotel	HS	5	10	Ltrs	1.43	7	522	2608	103,193
						Total			**19405**	**805,093**

Source: *Field Data, 2024.* Note: **WP**=Water production and packaging, and **HS**=Hotel and hospitality

From the table above, a total of 13 unauthorised water users illegally installed boreholes and abstracted up to 19405 m^3 of water with a revenue loss estimated at NLe805,093, in uncollected fees for water use permit application, administrative fees and volume of water abstracted.

The NWRMA (Water Use and Catchment) Regulations of 2021 and the (Groundwater Development and Protection Regulations) of 2021, scarcely provided restrictions on the installation of private boreholes for commercial water production and water packaging for drinking water in areas with piped water network systems under water utility companies. This did not only increase payment defaults, especially for SALWACO, but also increased the risk of groundwater depletion, and access to potentially contaminated water sources.

For example, in Bo City, where Njala University-Bo Campus and Beacon Lodge disconnected from the SALWACO piped water system relied on private boreholes. The review of the revenue collection report from SALWACO, Bo office revealed a total of NLe68,659 uncollected from Njala University-Bo Campus

(NLe51,629) and Beacon Lodge (NLe17,030). Moreover, the boreholes inspected were shallow wells, significant recharge systems for deep unconfined aquifers, and potential water sources for future prospecting, especially in the dry season. Whereas the water quality specialist at SALWACO, Bombali District, and Environmental Officers for Bo and Makeni cities revealed that most of the households are not connected to public sewer lines but rather operate soak pits, yet potential contamination sources to shallow wells.

If these trends continue unaddressed. There is the likelihood of continued depletion of groundwater sources, increased cases of water-borne diseases, and weak cash flows for public water utility companies, to sustain the reliable supply of clean and safe drinking water to the citizens. Best practices suggest putting restrictions on borehole installations within areas with piped water network systems for commercial use, not only to safeguard water utility companies but also to safeguard potential groundwater sources from depletion and pollution. The aim is to provide governments with a safety net to sustain their obligations of ensuring reliable water supply, enhanced access to clean and safe drinking water by the people at affordable rates.

Recommendations

1. By the end of FY 2024, the Director of Legal, Registration and Regulations should develop a legal framework register, to capture all relevant laws to the water resources sector and periodically update for any promulgations.

2. By the end of FY2026, the Director of Legal, Registration and Regulations, should review the NWRMA (Water Use and Catchment) Regulations of 2021 and (Groundwater Development and Protection) Regulations of 2021, to include restrictions on the installation of private boreholes for commercial water production and packaging for drinking water in areas with piped water networks of water utility companies.

Management Response

1. Necessary actions shall be employed to develop a legal framework register to capture all relevant laws to the water resources sector and shall be periodically updated for any promulgations by end of 2024.
2. The Director of Legal and Regulation expressed grave concern about this recommendation. The Director shall review the regulations by the end of 2026.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

4.1.3 Raw Water Use Charges

Section 13 (1) of the NWRMA Act, 2017 states that the object for which the Agency is established is to regulate, utilize, protect, develop, conserve, control and generally manage water resources throughout Sierra Leone. (2) Without prejudice to the generality of subsection (1) the Agency shall perform the following functions-(a) propose comprehensive plans and strategies for the utilisation, conservation, development and improvement of water resources.

Principle 4 of the Dublin-Rio Statement on Water and Sustainable Development: Social and economic value of water of the Dublin Statement, recognises water is a public good and has a social and economic value in all its competing uses. Therefore, managing water as an economic good is an important way of achieving efficient and equitable use, and encouraging conservation and protection of water resources through valuing and charging for its uses. Principle 2: Participatory approach: advocates that water development and management should be based on a participatory approach, involving users, planners, and policy-makers at all levels. The development of raw water use charges is an integral part.

The NWRMA developed raw water use charges to integrate the dimensions of social fairness, equity, economic efficiency, and environmental sustainability in the IWRM. The criteria used in pricing raw water setting were the opportunity cost of water use, recovery, marginal costs, and negative environmental externalities. Which aligned with best practices in water use tariff setting, widely used in many other developing countries.

The raw water-use charges per cubic meter (m^3) for abstractive uses, relied on the cost of managing 10% of water resources by the NWRMA and the volume of water available for abstraction nationwide, based on the Water Security Report of 2015. The approach used, applied the Water Route Optimization Utility Tool and Evaluation (Water-ROUTE) model, by optimising water supply demand and considering infrastructural investment costs while accounting for the water quality requirements.

However, the NWRMA raw water use charges had gaps and were as follows:

i) The Agency lacked a detailed economic analysis of water use and therefore was unable to ascertain the economic cost and benefits of water uses before pricing. For example, the cost and benefits of the mining/industrial/commercial water uses were assumed as "***have great economic benefits***" and affixed a generalised charge of NLe 0.12 (US$ 0.005) per m^3 of water abstracted.

Whereas large-scale irrigation (private schemes) and aquaculture were assumed to have "***the same return on investment***" and price at NLe 0.048 ($ 0.002) per m^3. Mining, industrial, commercial water, large-scale irrigation and aquaculture water uses have varied water demands, returns on investments, environmental impacts and pollution management costs. This increased the risk of low willingness of water users to adopt the pricing rates. The Water-ROUTE model excluded the preference of the councils to share available water, the water utility companies' willingness to adopt the pricing rates and water users' willingness to take up the raw water use pricing (consumer surplus).

ii) Moreover, the NWRMA lacked the raw water use tariff-setting model-solving block chain, for the auditors to verify whether the Agency was rational in the trade-offs between the cost of supply and willingness to pay the set charges by the stakeholders; by increasing and decreasing the water use charges per m^3 until an adjusted raw water use price comparisons are matched for mutual agreement. The unintended risk was the non-compliance with the water principle of high quality and pricing system that promotes efficient water use, alleviates supply-demand conflicts, and prevents pollution.

iii) The reliance on the Water Security Report of 2015 in the raw water use tariff setting, had a significant time lag of four years, to ensure the accuracy of the actual volume of water available, demanded and used (water balance) nationwide, especially under the climate change and increasing population. The NWRMA had no water balance established for the period under review. Therefore, the cost of water supply and demand would have changed significantly by 2019 due to natural causes and imperfect market factors such as demand, and inflation, at the time of pricing.

Based on the above-identified gaps, the NWRMA raw water-use charges administered in the period under review did not promote fairness, equity and efficiency, and therefore were ineffective and inefficient in maximising water uses for the maximum socio-economic returns on investments.

4.1.4 Water Use Allocations

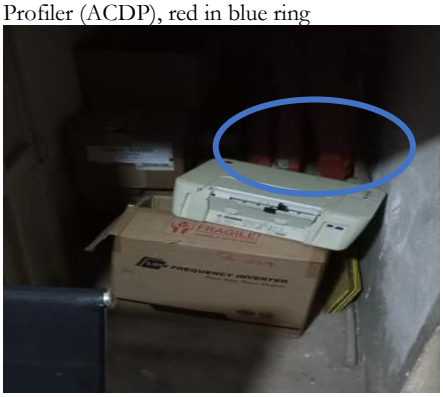
Section 3.1.1 of the National Water and Sanitation (WASH) Policy of 2010, commits to establishing mechanisms to ensure fair and equal allocation of water resources, for efficient water resource utilisation so that social and productive sectors and the environment receive their adequate share of the water resources. This is the responsibility of NWRMA in collaboration with all stakeholders.

NWRMA developed a Water Demand Management (WDM) tool and regulated the amount of water use and disposal of wastewater to alleviate pressure on freshwater supplies through the water use rights. However, the WDM tool was inefficient in the allocation of water between the economic sectors due to the lack of sectoral water allocation quotas.

For example, Koidu Holdings Limited applied for 20,075 m^3/year for its mining operation. Nevertheless, the adjusted and issued volume of water was 5,240,160 m^3/year. This increased the risk of water supply-demand conflict between sectors. Furthermore, it did not incentivise investments in efficient water use technologies or infrastructures, especially in times of scarcity and/or areas with high marginal utility value for water use but low scarcity. The auditors noted the absence of water balance, as the main cause of inefficient allocation of water between the economic sectors.

The key reason offered by the Agency for the lack of water balance was limited funding to purchase motorised boats and undertake river discharge studies. However, the review of the asset register and inspection of the equipment storage room at the hydro information department, revealed an Acoustic Doppler Current Profiler (ACDP) and water level meters available, critical equipment to generate river discharge data. See **Figures 3** and **4** for visually inspected and verified equipment.

Figure 3: The Acoustic Doppler Current Profiler (ACDP), red in blue ring



Credit: ASSL 13/06/2024

Figure 4: Water Level Meters

Credit: ASSL 13/06/2024

We underscored the limitations of inadequate finance. We however, equally noted the probability of lack of prioritisation as a main cause for the absence of water balance. The total internal revenue generated was NLe 4,183,156.65 and formed a proportion of 61.7% of conditional funds received from the MoF in the period reviewed. Therefore, with available equipment, the NWRMA could have allocated some funds from internally generated revenue, to hire motorised boats and performed at least one off-river discharge study for one or two major rivers, especially in the Rokel and Western Area Peninsular water catchments, where the Agency concentrated its interventions in the period reviewed. However, this was not done.

Furthermore, the asset register presented to the auditors lacked detailed information such as year of purchase, value, condition, location, etc. Hence, the likelihood of asset losses/damages without proper tracking as well as incomplete asset data for inclusion of all NWRMA's assets into the State's General Ledger for effective planning of disposal and replacements/additions.

During asset verification, we noted that the inspected storage room has limited space, to keep all the tools and equipment and was shared with the server and its components. This increased the risk of damage.

Recommendations

1. By the end of FY 2027, the Director of Planning, Research and Operations should undertake a SSEA of Water Resources to inform the IWRM for planning. The assessment should encompass a comprehensive identification of all water uses and services, economic analysis of water uses/services, climate change, gender, and political economy analysis.

2. By the end of FY2027, with the outcomes of the SSEA, the Water Resources Economist should validate the current raw water use charges by using the equilibrium water pricing model and game theory as well as validate the water demand management tool to enhance efficient water use and allocations.

3. By the end of FY 2024, the Director General should collaborate with the Ministry of Finance and secure funding to purchase at least one motorised boat to support studies on river discharge.

4. By the end of FY 2027, the Director of Planning, Research and Operations in collaboration with the Director of Hydro Information should develop water budgets for the 12 major water catchments. This should be used with periodic updates to ensure efficient water allocation between economic sectors.

5. By the end of Quarter 1 of FY2025, the Director of Human Resources and Administration should establish a comprehensive asset register in place for the Agency.

Management Response

1. This is noted and necessary actions shall be taken as recommended by the end of FY2027. A comprehensive assessment that informs Integrated Water Resources Management (IWRM) and planning shall be adopted. A comprehensive SSEA report that provides insights into water

resource uses, economic value, social impacts, and governance factors will be prepared. The outcome of the assessment will guide IWRM strategies and policies moving forward.

2. Necessary actions shall be taken first, to employ a Water Resources Economist, and the appointed/employed staff shall develop the Pricing model including, a validated and potentially revised raw water pricing structure, coupled with a robust water demand management tool. These will promote efficient water usage and ensure fair pricing mechanisms that reflect economic and social realities

3. The Director General has always collaborated with the Ministry of Finance to secure funding for many projects in the Agency.

4. The recommendation is noted, and the two directors shall develop the budget for 12 major water catchments by the end of 2027. Periodic updates shall also be done to ensure efficient water allocation between economic users.

5. We acknowledge the importance of maintaining a comprehensive asset register and are committed to addressing this recommendation promptly. The Director of Human Resources and Administration will lead the initiative to establish the asset register by the end of Quarter 1 of FY2025.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

4.1.5 Implementation of the NWRMA (Water Use and Catchment) Regulations, 2021

Under Regulation 2 of the Water Use and Catchment Regulations 2021, pursuant to Section 29 of the NWRMA, Act 2017, a person wishing to engage in any of the water use activities stipulated under that section shall apply to the Agency for a permit in the format as set out in the First Schedule. Furthered under Regulation 15, an applicant who is granted a permit shall pay the permit fees set out in the Fifth Schedule. Whilst Regulation 25 (1) states that charges shall be levied for the following per the fees set out in the Third Schedule-a) water abstraction or water use; b) dredging, diversion, damming, and storing; and c) issuance of a permit.

For the period reviewed, the NWRMA ensured that only complete applications for water use rights were received, processed, and issued with permits timely, due to good filing, tracking, and storage systems. All three 3 files of Koidu Holdings Limited, M.R Distilleries, and SOCFIN Agricultural Company reviewed, complied with Schedules 1 and 2 of NWRMA (Water Use and Catchment) Regulations. However, the Agency arbitrarily charged the water abstractive uses, contrary to the provisions in Regulation 15, which referenced the fees in the Fifth Schedule, yet non-existed.

The NWRMA disclosed to the auditors that there was no Fifth Schedule in the NWRMA (Water Use and Catchment Regulations) of 2021 and extended that the Regulations only constituted three schedules i.e. Schedule 1, 2, and 3, and disclosed the existence of the Fifth Schedule as an error. Such errors presented affirmative risks to the Agency covering legal, operational, financial, image, and reputation.

We strongly advised the Agency that such errors must be stopped henceforth, through a thorough internal review and supervision of all works executed by external consultants regardless of whether legal works or not.

Recommendations

1. By the end of Quarter 2 of FY2025, the Director of Legal, Registration and Regulations should review the NWRMA (Water Use and Catchment) Regulations 2021, and effect corrections to the errors made within the text and in the Schedule arrangement. Attention should be paid to the omitted fees for all other water uses unaddressed in the Third Schedule.

2. By the end of Quarter 1 of FY2025, the Senior Planning Research Officer should develop a simplified Quality Control and Assurance Framework for managing both the internal and externally contracted works of the Agency.

Management Response

1. The recommendation is noted with grave concern and the Director of Legal, Registration, and Regulations, shall review the NWRMA (Water Use and Catchment) Regulations, 2021, and effect corrections to the errors made within the text and in the Schedule arrangement, by the end of the 2nd quarter of 2025.

2. The Senior Planning Research Officer/Manager will develop a simplified Quality Control and Assurance Framework for managing both the internal and externally contracted works of the Agency, by quarter 1 2025.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

4.1.6 Management of Environmental and Social Risks in Water Use and Development Projects

Regulation 10 (1) of the NWRMA (Water Use and Catchment) Regulations of 2021 states that where the Agency after consultations with the relevant MDA considers the proposed water use to require an environmental impact assessment, it shall notify the applicant to submit evidence that an environmental impact assessment has been approved by the EPA if it is not attached to his application form. Section 24 (1) of the EPA Act, 2022, states that a person shall not undertake or cause to be undertaken activities set out in the First Schedule unless he holds a valid environmental impact assessment license issued by the Agency for that purpose. Under Section 27 (1) An applicant shall, where a decision has been taken that a project requires a license, prepare and submit an environmental impact assessment (EIA) of the environmental project to the Agency in the form set out in the Third Schedule. Under Section 31, a license issued under this Act shall(a) authorize the licensee to undertake such activity as may be specified in the license; (b) be valid for 12 months from the date of issue and may be renewed, subject to such terms and conditions as may be prescribed; (c) not be transferable; and (d) contain such conditions as may be necessary for the protection of the environment.

The Agency managed environmental and social (E & S) risks associated with water use and development activities by ensuring that EIA licences and reports were submitted by water use right applicants, to comply with the provisions in Regulation 10 (1) of the NWRMA (Water Use and Catchment) Regulations of 2021 aligned with Sections 24 (1) & 27 (1) of EPA Act. All the 3 water user files reviewed for Koidu Holdings Limited, M.R Distilleries, and SOCFIN Agricultural Company had EIA reports and licences in place due to good record systems. However, there were gaps as follows:

i) Non-compliance with the provisions under section 31 of the EPA Act of 2022. In all 3 files reviewed, copies of EIA licenses had elapsed one year without evidence of renewed versions. This increased the risk of revenue loss should the EPA close such companies.

ii) E & S risks were managed at one phase in the EIA processes i.e., at the report disclosure phase. An interviewee at the NWRMA disclosed that the Agency only verified evidence of EIA licences at the time of application by water users and drilling licences. Such limitation did not provide for

robust appraisal and mitigation of E & S risks throughout the EIA cycle for water resources development and management projects.

According to the International Finance Corporation's best practices, which many countries' EIA processes/systems/regulations, are benchmarked upon, including Sierra Leone, recommends that lead agencies such as the NWRMA integrate E & S management through the project cycle. The aim is to allow for the determination of the right expertise, to undertake a robust assessment, design the best mitigation measures and enhancements alternatives that are feasible for IWRM, to safeguard against sustainability concerns, from the terms of reference and/or scoping reports, reviews and disclosure of EIA reports, implementation of Environmental and Social Management Plans (ESMPs) and decommissioning phase.

Recommendations

1. The Director General should engage with the Executive Director of EPA, to ensure that NWRMA develop sector-specific EIA guidelines and fully participates throughout the EIA cycle, from the review of Terms of Reference and/or Scoping Reports through disclosure of final reports, implementation of ESMPs and decommissioning of the projects with great potential risks on the water resources.

2. On an annual basis, the License and Compliance Manager should track the validity of EIA licences and enforce the water users to renew their licenses timely with EPA as well as other relevant licences.

Management Response

1. We acknowledge the recommendation for the Director General to engage with the Executive Director of the Environmental Protection Agency (EPA) regarding sector-specific Environmental Impact Assessment (EIA) guidelines. NWRMA will prioritize collaborating with EPA to develop tailored EIA guidelines for water resource-related projects, ensuring NWRMA's active participation throughout the entire EIA cycle. This includes the review of Terms of Reference (ToR) and/or Scoping Reports, active involvement in the assessment process, and monitoring the implementation of Environmental and Social Management Plans (ESMPs). Special attention will be given to high-risk projects, ensuring robust oversight, particularly during decommissioning stages, to mitigate potential impacts on water resources.

2. The License and Compliance Manager will establish a system to track the validity of all EIA licenses issued to water users. An annual audit process will be implemented to review the status of these licenses. Users will be proactively notified of upcoming expirations, and enforcement measures will be put in place to ensure timely renewals in compliance with EPA and other regulatory requirements. This

initiative will not only enhance compliance but also contribute to safeguarding water resources by ensuring that all projects are in line with current environmental standards and regulations.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

4.1.7 Water Management Basin Boards and Water Catchment Management Committees

Section 24 of the NWRMA Act, 2017 states that the Agency may, for efficient water management declare any area to be a National Water Basin. Proceeding in Section 25(1) There shall be, in respect of each National Water Basin declared by the Agency under Section 24, a Water Basin Management Board for the area in question which shall, subject to the overall supervision and direction of the Agency, be responsible for the performance of the following functions in paragraphs (a) through (h). Proceeding in Section 27. (1) There shall be, in respect of each protected catchment area within a Water Basin, a water catchment area management Committee established by the Water Basin Management Board in consultation with the Agency and relevant local authorities, which shall perform the following functions in paragraphs (a) through (l).

Principle 1 of Dublin-Rio Principles, the Dublin Statement on Water and Sustainable Development recognises freshwater as an infinite and vulnerable resource, essential to sustain life, development and the environment. The development of institutional frameworks capable of integrating human systems-economic, social and political is critical yet represents a considerable challenge

An interview with respondents from the planning, research and operation department revealed that no WBMB was declared. However, the Agency established and trained 32 WCMC members in the Western Area Peninsular Catchment. Moreover, verification of the activity report provided to the auditors on 'the Establishment and Training of WCMC at Madina', revealed community mobilisation conducted in 2023, while the activities of WCMC establishment and training were concluded in February 2024. Nevertheless, the WCMCs were non-functional.

The Agency presented to the auditors, limited funding, as the main cause of non-declared WBMB and non-functional WCMC. Nevertheless, we identified inconsistencies regarding the formation of WCMC as follows:

i) The WCMCs were formed without operational guidelines, establishing their composition and roles in catchment management activities.

ii) The establishments of WCMCs were undertaken directly by the NWRMA in place of WBMB, contrary to the provisions in Section 27(1) of the NWRMA Act of 2017. Before, forming any

WCMC, a WBMB should be declared first, and it is the responsibility of the WBMB to lead the establishment and training of the WCMC, with technical support and guidance from the Agency through the office of the River Basin Operation Officer. Consequently, this increased the risk of ineffective water catchment planning, limited advice to the relevant local authorities in making rules and bylaws, support supervision, monitoring and reporting on the WCMC's activities, for the efficient planning and management of water catchments.

Recommendations

1. By the end of Quarter 3 of FY2025, the Director Planning, Research and Operations should develop an operational guideline for WBMB and WCMC, declare the WBMB for the Rokel and Western Area Peninsular Water Catchments as well as ensure that they are operational and functional.

2. The Director Planning, Research and Operations ensure all establishment activities for WCMC should be led by the WBMB with close support supervision and technical guidance by the Agency as provided in the NWRMA Act of 2017.

Management Response

1. We acknowledge the recommendation and confirm that by the end of Quarter 3 of FY2025, the Director of Planning, Research, and Operations will prioritize the development of comprehensive operational guidelines for the Water Basin Management Board (WBMB) and Water Catchment Management Committees (WCMC). These guidelines will define clear roles, responsibilities, and processes, to ensure effective management of water resources within the Rokel and Western Area Peninsular Water Catchments. Additionally, steps will be taken to formally declare the WBMB for these catchments and ensure that they are fully operational and functional. This will involve engaging key stakeholders, mobilizing resources, and ensuring the infrastructure and administrative frameworks are in place.

2. By the NWRMA Act of 2017, the establishment activities for the WCMC will be led by the WBMB under close supervision and technical guidance from the Agency. The Director of Planning, Research, and Operations will ensure that WBMB assumes leadership in the establishment process, while the Agency provides the necessary support to facilitate smooth implementation. This collaborative approach will help ensure that the WCMCs are set up in alignment with legal

frameworks and are equipped with the capacity to manage water resources effectively at the local level.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

4.1.8 Institutional Capacity Strengthening

In SDP 2019-2023, the NWRM committed to developing a framework for water resources management (WRM) capacity development and knowledge management. The framework should aid in making informed decisions and achieving sustainable WRM, and adequate knowledge management systems, through effective capacity development and support to sustain the development of appropriate skills and information for WRM.

4.1.8.1 Staffing at the Agency

The Agency planned to fill 32 positions in the period reviewed, based on the Institutional Capacity Assessment Report provided to the auditors. Out of 32 positions, 14 vacancies were filled and 18 vacancies remained unfilled. The NWRMA presented to the auditors, that the Agency made a request to MoF for recruitment. However, approval was not granted due to the lack of wage bill. See **Table 11,** staffing status for the period reviewed.

Table 11: Status of Staffing at the NWRMA

No	Position	Planned Vacancies	Filled	Gap
Office Director General				
1	Director General	1	1	0
2	Confidential Secretary	1	1	0
Internal Auditor Unit				
3	Principal Auditor	1	0	1
Finance Department				
4	Director of Finance	1	1	0
5	Finance Manager	1	0	1
6	Finance Officer	1	1	0
7	Assistant Accountant	1	0	1
8	Accounting Officer	1	0	1
Legal, Regulations and Outreach Department		**0**	**0**	**0**
9	Director of Legal, Regulations and Outreach	1	1	0

10	Manager Media and Outreach Unit	1	0	1
11	Media & Outreach Officer	1	1	0
12	Assistant Media & Outreach Officers	2	1	1
13	Compliance & Monitoring Officers	3	1	2
14	Legal Officer	1	0	1
15	Paralegal	1	0	1
Administration & HR Department				
16	Director, Administration & Human Resources	1	1	0
17	Administration & Human Resources Manager	1	0	1
19	Administration & Human Resources Officer	1	1	0
20	Procurement & Contract Manager	1	0	1
21	Procurement Officer	1	1	0
22	Logistics Officer	1	0	1
23	IT Officer	1	0	1
24	Secretaries	3	0	3
25	Office Assistants	3	2	1
26	Receptionists	2	0	2
27	Drivers	6	2	4
Hydrological Services Department		0	0	0
28	Director, Hydrological Service	1	1	0
29	Manager, Hydrological Service	1	1	0
30	Hydrologist Officer	1	1	0
31	Assistance Hydrologist Officer	1	1	0
32	Hydrogeologist Officer	1	1	0
33	Assistant Hydrogeologist	1	1	0
34	Assistant Database Analyst	1	0	1
35	Assistant Environmental Officer	1	0	1
36	Castral Officer	1	0	1
37	GIS Officer	1	1	0
38	Water Quality Analyst	1	0	1
	Total	**32**	**14**	**18**

Source: *NWRMA, 2024*

From **Table 11** above, the manpower plan was not up-to-date. The organisational structure of the NWRMA was constituted of only four departments in place of the five approved departments. The staffing details for the Department of Planning, Research and Operations, as well as the staff requirements for regional offices were lacking. We attributed this gap, to weak internal review and supervision processes. Consequently, the Agency was unable to evaluate its capacity and efficiently plan, to deliver decentralised IWRM.

Building on the vision of decentralised IWRM, we noted limited comprehension of the administrative functions of the NWRMA. Four respondents from the Planning, Research and Operations, Finance and Hydrological Services departments, demonstrated a full understanding of the mandate of the Agency but were limited regarding administrative functions. Knowledge of only three administrative functions: "***regulation, catchment protection and management monitoring and assessment***" were stated, dissimilar to the established of: "***regulate, utilise, protect, develop, control, and generally manage water resources throughout Sierra Leone***" in Section 13 of the NWRMA Act of 2017. This concerned us about the future of decentralised IWRM. Similarly, such limitations also appeared on the website of the Agency. We reasoned this on the lack of systematic and structured processes for induction and orientation of the staff upon onboarding. This increased the risk of incoherency in the planning and management of water resources from top to grassroot levels, and poor public accountability.

Furthermore, the NWRMA operated without a substantial internal auditor but relied on an auditor sent by the MoF periodically. As a result, the Agency lacked a risk management policy and a master risk register to identify and manage risk through a well-established systematic internal risk assessment process. Therefore, this exposed the NWRMA to many risks in the period reviewed.

Recommendations

1. By the end of Quarter 3 of FY2025, the Director of Human Resources and Administration should prepare detailed staff onboarding tools and subsequently conduct a one-off general staff induction meeting, to explicitly unpack the administrative functions of the Agency to the staff.

2. By the end of Quarter 1 of FY2025, the Director General should fast-track with the Ministry of Finance and ensure that a substantial internal auditor for the Agency, is recruited.

3. By the end of FY 2025, the Internal Audit unit of the Agency should develop and implement a risk management policy and maintain an up-to-date master risk register. Such undertakings should encompass all risks related to finance, programmes and operations, litigations, image and reputation.

4. By the end of Quarter 1 of FY 2025, the Information and Technology (IT) Manager and the Outreach Manager should update the website of the Agency, to explicitly display the administrative functions of the Agency for knowledge and awareness of complete services delivered by the Agency for accountability to the wider stakeholders.

5. The Director General and the different heads of departments should strengthen support supervision of Agencies and department activities respectively.

6. For every Financial Year, the Director of Human Resources and Administration should ensure that the manpower plan is kept up to date on an annual basis, encompassing headquarters and regional office's needs.

Management Response

1. The Director of Human Resources and Administration will ensure that, by the end of Quarter 3 of FY2025, comprehensive staff onboarding tools are developed. These tools will include structured orientation materials, job-specific training guides, and detailed overviews of the Agency's administrative functions. Additionally, a one-off general staff induction meeting will be conducted to unpack the administrative roles, processes, and functions of the Agency. This will help enhance staff understanding of their roles within the organization and foster better alignment with the Agency's strategic objectives.

2. We recognize the importance of establishing a strong internal audit function. The Director General will prioritize engagement with the Ministry of Finance to expedite the recruitment of a qualified internal auditor by the end of Quarter 1 of FY2025. This will strengthen the Agency's internal control mechanisms and ensure compliance with financial and operational regulations.

3. By the end of FY2025, the Internal Audit unit will develop and implement a comprehensive risk management policy. This policy will address risks across finance, programmes, operations, litigations, and the Agency's image and reputation. In conjunction with this, an up-to-date master risk register will be maintained to document and track all identified risks, ensuring proactive management and mitigation strategies are in place.

4. The Information and Technology (IT) Manager, in collaboration with the Outreach Manager, will ensure that the Agency's website is updated by the end of Quarter 1 of FY2025. This update will clearly display the Agency's administrative functions and the full scope of services it provides. The website will serve as an informative platform for stakeholders and the public, promoting transparency and accountability.

5. The Director General, alongside heads of departments, will work to strengthen the support supervision of the Agency's activities. Departmental heads will be held accountable for overseeing the effective implementation of activities within their respective departments, ensuring alignment with the Agency's strategic goals and compliance with internal processes.

6. The Director of Human Resources and Administration will ensure that a manpower plan is maintained and kept up to date annually, reflecting the needs of both headquarters and regional offices. This plan will be reviewed at the end of every Financial Year to ensure that the Agency's staffing requirements are met and that adequate human resources are in place to support the organization's operations.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

4.1.8.2 Management of Capacity Building Programmes

The implementation of technical capacity-building activities at the NWRMA was guided by a comprehensive capacity-building plan, integrated into the WASH Sector Capacity Strategy and Programme Design Phase 1 (2020-2025) and the Agency benefited from a total of 27 trainings. These included but were not limited to; 1) management of hydrological monitoring infrastructures, 2) management, resource mobilisation and operationalisation methodologies for successful execution of the Western Area Peninsular Water Fund (WAPWAF), amongst others. See **Appendix 6**, for a list of pieces of training undertaken. However, there was weak implementation of the capacity-building plan due to the following:

i) The NWRMA terms and conditions of service, 2019 lacked explicit provisions for bonding after study leave is granted, especially for long-term pieces of training, 6 months and above. The Agency lacked a comprehensive Human Resources Management Policy. In one particular case, a staff benefited from a master's degree Programme in Water Resources Management outside the country, and subsequently proceeded to a Doctor Programme but never returned. This not only increases the risk of high staff turnover at the Agency but also brain drain[14] to the country.

[14] Brain drain is the depletion or loss of intellectual and technical personnel.

ii) The selection of the participants, especially for external pieces of training, were not well articulated to the training calls. For example, a case in which technical staff undertaking the operation and maintenance of hydrological stations were sent to attend training programmes oriented to financial management in place of financial staff was noted.

iii) Training evaluation forms were sent out to the benefited staff for appraisal and tracking of the outcomes of the training, however, received low compliance.

Based on the above-identified gaps, the NWRMA was unable to track and evaluate the impacts of pieces of training undertaken on the Agency's capacity, identify areas of success, gaps and plan for additional capacity strengthening areas and appropriate the resources in an effective and efficient manner for the period reviewed.

Recommendations

1. By the end of Quarter 3 of FY2025, the Director of Human Resources and Administration should review the Terms and Conditions of Service of 2019, and migrate to a comprehensive Human Resources Management Policy, including the provisions for bonding after the grant of study leave for both NWRMA and donor-funded capacity building programmes.

2. On an annual basis, the Director of Human Resources and Administration should coordinate with all the heads of department to ensure that the performance objectives set by the staff include at least one area where skills and knowledge have been acquired through completed training for effective evaluation.

Management Response

1. The Director of Human Resources and Administration will review the existing Terms and Conditions of Service (2019) by the end of Quarter 3 of FY2025. This review will include the migration to a comprehensive Human Resources Management Policy that incorporates up-to-date HR practices and regulations. The new policy will address key areas such as bonding agreements for employees who are granted study leave, whether through NWRMA's internal programmes or donor-funded capacity-building initiatives. This provision will ensure that employees who benefit from training or education support are committed to returning their skills and expertise to the Agency for a specified period, thereby enhancing capacity retention.

2. On an annual basis, the Director of Human Resources and Administration will coordinate with all department heads to ensure that staff performance objectives include at least one area where skills and knowledge gained from completed training are applied. This requirement will be integrated into the performance evaluation process, enabling the Agency to assess the effectiveness of its training programmes and ensure that the acquired skills are actively contributing to improved job performance and overall organizational success. This approach will enhance accountability for learning and development initiatives while aligning staff growth with the Agency's operational needs.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

4.1.9 Public Education, Awareness and Sensitisation of Stakeholders

For the period reviewed, the NWRMA spent a total of NLe 629,273.5 on public education and awareness raising in the IWRM. A total of 20 citizen scientists were trained in data collection and monitoring within Rokel Water Catchment. An interviewee at the NWRMA disclosed that the Agency conducted a number of awareness and sensitisation campaigns at the commencement phase, especially since the concern of the IWRM was perceived as a new concept.

Out of the eight focus group discussions held to determine whether the NWRMA has engaged in activities as related to the IWRM, only the community group engaged in York Village revealed that they were sensitised and made aware of the best practices for the protection of water catchments and its benefits in disaster prevention by the NWRMA in collaboration with CRS and YARDO Sierra Leone. In addition, out of the 20 water users engaged, only 2 water users, the M R Distilleries and the Rainbow Paints & Chemicals revealed that they are aware of water use permits, licence applications and water quality standards. A recorded interview from Rainbow Paints & Chemicals "***We only met with them at the time they were persuading us for the water use permit***". On the contrary, the Environmental Officers of Kenema and Bo City revealed that they have no knowledge of the existing water legislation and limited engagement with the NWRMA. Whereas, the Environmental Officer for Makeni City Council disclosed that, recorded verbatim "***I am not aware of the existence of NWRMA and what they do***". A key technical stakeholder at the council level within the Sewa and Rokel Water Catchments.

From the aforesaid, we noted limited penetration at a lower level due to the non-existence of the NWRMA regional offices. The Agency was unable to effectively promote the active involvement of the stakeholders

in planning to ensure water use efficiency and reverse the degradation of water catchments, especially with the increasing population growth and climate change, to ensure water availability in good quality, for both present and future generations.

Recommendations

1. By the end of Quarter 3 of FY2025, the Outreach Manager should develop outreach methods (community outreach, social media campaigns, and educational programmes tailored to various demographics) as well as enough information, education and communication (IEC) materials, ranging from briefing notes, posters, calendars on IWRM, etc. Together with IEC materials, disseminate copies of the NWRMA Act, 2017 and water legislation to all relevant stakeholders from top to low levels of water resources governance, to enhance participation in IWRM activities.

2. On an activity, quarterly and annual basis, all heads of departments should ensure proper records management for all the Agency's activities, not only limited to public education and awareness, water use files, and radio talk show records.

Management Response

1. The Outreach Manager will ensure that, by the end of Quarter 3 of FY2025, a diverse set of outreach methods is developed to effectively engage different demographics in Integrated Water Resources Management (IWRM). This will include community outreach initiatives, social media campaigns, and tailored educational programs to raise awareness of water management issues. Additionally, comprehensive Information, Education, and Communication (IEC) materials such as briefing notes, posters, calendars, and other resources will be prepared to provide clear and accessible information on IWRM.

2. On a quarterly and annual basis, all heads of departments will ensure that proper records are maintained for all the Agency's activities. This will include meticulous documentation related to public education and awareness initiatives, water use files, and records of radio talk shows. Effective records management will not only improve transparency and accountability but will also

support monitoring and evaluation efforts, ensuring that the Agency's operations align with its strategic objectives and regulatory requirements.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

4.2 Monitoring, Reporting and Data Management Systems

Under Section 34 (1) of the NWRMA Act, 2017, the Agency shall establish and maintain national, basin and catchment water resources monitoring and information systems which shall provide for the collection of data and information necessary to assess: a) the quantity of water in the various water resources; (b) the status of groundwater aquifers; (c) the quality of water resources and the state of the general aquatic environment; and (d) the use of water resources, including a register of water uses authorised for all categories of uses. Under Regulation 27 (4) in Water Use and Catchment Regulations 2021, the Agency may install bulk flow meters at raw water abstraction facilities for the purposes of monitoring water abstractions.

4.2.1 Operation and Functionality of Hydrological Stations

The NWRMA operated a total of 57 hydrological stations (25 surface and 32 groundwater monitoring stations) in the period reviewed, to monitor the level and quality of water. However, out of 11 (7 surface and 4 groundwater monitoring stations) sampled, only 1 groundwater monitoring station in Bombali District was functional. Whereas the 10 hydrological stations were non-functional. This was due to a number of factors, which ranged from theft of solar panels, faulty constant flow bubblers, SAT links, exhausted batteries, vandalism, and exhausted internet data.

One surface water monitoring station in Bumpeh was not accessed by the auditors due to a rusted lock, an indication of long-time existence without inspection and maintenance. Consequently, the NWRMA was unable to undertake weather forecasting, establish water balances, plan for disaster prevention and mitigation, and plan research activities for the WCM. See **Appendix 7**, for a detailed status of the 11 hydrological stations sampled.

The Agency presented to the auditors, inadequate funding as the main cause of poor operation and maintenance of the hydrological stations. Nevertheless, our close engagement with the nearby community, inspection and interviews, revealed the following risks:

i) Limited awareness and sensitisation of the stakeholders on the importance of the water monitoring stations. In the case of Bumpeh, a female respondent disclosed that "***They just wasted money in the facility instead, the money should have been given to us for sharing***". This increased the risk of theft, and vandalism cases and reduced support of the stakeholders to provide safety and security over the hydrological stations.

ii) Lack of prioritisation: Upon inspection of the server, the auditors found that hydrological stations faulty and offline can be detected and reported and actions are undertaken in real-time by the Agency through allocation of the internally generated revenue for instant inspection and maintenance of the detected faulty and/or offline hydrological stations.

iii) Furthermore, absence of sentinel sites (control stations) for quality control and assurance purposes. Respondents from the hydro information department revealed the non-existence of stations for quality control and assurance. Therefore, the Agency was unable to lock on some key stations for routine operation and maintenance, especially in times of financial constraints, to ensure constant data supply for planning purposes.

iv) Upon sampling a few of the standard operating procedures (SOPs) in place regarding inspections, operations, maintenance, data analysis and reporting as regards hydrological stations, there were inconsistencies with widely adopted best practices recommended by the World Meteorological Organisation. For example, proposed in the Operation and Maintenance Strategy for Sierra Leone Hydrological Monitoring Stations and Institutional Capacity Building, among the list of SOPs supplied to the audit team, narrated that "***During the exercise discharge measurements will be conducted on all rivers or stream with surface water stations and maintenance will be done on the automatic station equipment. Discharge measurement will then be conducted at a surface water location using Acoustic Doppler Current Profiler (ADCP)***".

A respondent from the Hydro-Information Department disclosed that since the first drafting of SOPs, no revisions were made. Consequently, this increased the risk of lack of an explicit, structured and coherent layout process ranging from equipment description, their use, how to use, in measurements of river depth, width, and velocity, computation of cross-sectional areas, with visual illustrations and formulae, data capture forms, reporting templates etc.

Recommendations

1. By the end of FY2025, the Director of Hydro Information should prepare a comprehensive inspection, maintenance data analysis and reporting manual for the hydrological stations (surface and groundwater station). The manual should be updated periodically based on lessons learnt from the field for efficient application.

2. By the end of FY2025, establish at least one or two quality control stations, each for surface and groundwater monitoring within each river basin.

3. On a quarterly basis, the management of the Agency should allocate some percentage from the internally generated revenue to cater for the routine inspection and maintenance of the hydrological stations.

Management Response

1. The Director of Hydro Information will ensure that by the end of FY2025, a detailed manual for the inspection, maintenance, data analysis, and reporting processes for hydrological stations (both surface and groundwater) is developed. This manual will provide step-by-step procedures to standardize the inspection and maintenance of these stations, ensuring accurate data collection and analysis. Furthermore, the manual will be periodically updated based on lessons learned from field operations, ensuring it remains practical and effective for efficient application.

2. By the end of FY2025, the Agency will establish at least one or two quality control stations in each river basin, dedicated to monitoring surface and groundwater quality. These stations will be crucial in ensuring that water quality data is consistently accurate and reliable, enhancing the Agency's ability to manage and protect water resources effectively. The establishment of these quality control stations will be integrated into the broader hydrological monitoring framework.

3. On a quarterly basis, the management of the Agency will allocate a percentage of the internally generated revenue to fund the routine inspection and maintenance of hydrological stations. This allocation will ensure that the necessary financial resources are consistently available to support the proper functioning and upkeep of these critical stations. Regular maintenance will improve the longevity and operational efficiency of the hydrological infrastructure, contributing to more effective water resource management.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

4.2.2 Monitoring of Water Usage

The monitoring systems established for water use at the Agency included quarterly self-reporting and two annual periodic inspections in the period reviewed. The self-reporting required a regularised water user to report on the volume of water used every quarter, to track for compliance with the volume of water issues. Whereas the two annual site visits verified that the water usage self-reported was consistent with the issued volume of water as well as solved any grievances and complaints that may arise over water use rights.

All the 3 files of SOCFIN Agricultural Company Ltd, M.R. Distilleries and Koidu Holdings Limited reviewed, were compliant with the established routine quarterly reporting schedules by NWRMA. Whereas the on-site inspections of the Place Resort, M.R. Distilleries, Rainbow Paint & Chemical, and Jolax Manufacturing Company premises by the auditors, showed that none of the water users had an installed in-let metering system, to capture the volume of water abstracted. Similarly, the water intake points at the SALWACO facilities inspected in Bo, Bombali, Kenema, Port Loko and Tonkolili, lacked in-take metering systems.

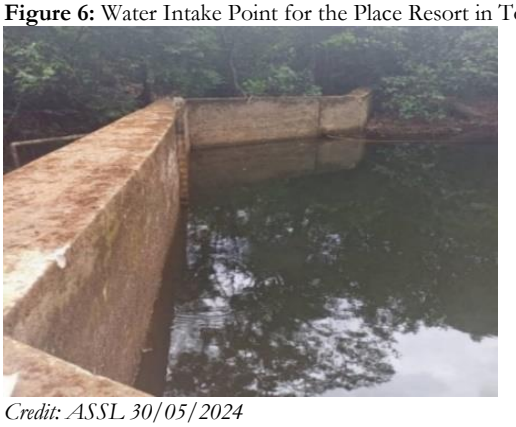
See **Figures 5** through **8**, abstraction installations without in-let meter systems.

Figure 5: In-let point without a metering system at Jolax Manufacturing Company

Credit: ASSL 30/05/2024

Figure 7: Unprotected & Unmetered Water Inlet Point at M.R Distilleries

Figure 6: Water Intake Point for the Place Resort in Tokeh



Credit: ASSL 30/05/2024

Figure 8: Casted and Unmetered Water Inlet Point at Rainbow Paints.

Credit: ASSL 30/05/2024

Credit: ASSL 30/05/2024

From the monitoring records, and lack of in-let metering systems, the auditors could not reconcile the volume of water issued against the amounts abstracted to ascertain, whether the actual volume of water issued and abstracted was complied.

A respondent from NWRMA explained to the auditors that the Agency was unable to undertake monthly inspections, procure, and install in-let metering systems due to financial constrained. Similarly, an interviewee from GUMA stated that: "***NWRMA is underfunded to afford the in-let water meters and technical capacity to install such meters. The intake water meters for large scale application in the case of GUMA could go about US$ 1,500 -2,500, and required a high level of technical expertise to install"***.

Furthermore, the current complaint handling procedure in the NWRMA (Water Use and Catchment Regulations) 2021 was restricted to handling complaints related to rejected applications for water use rights. For example, one water user complained in the monitoring report, reviewed was: "***The Management of M.R Distilleries is kindly asking NWRMA to install meters in the boreholes to quantify the volume of water being used by the company. The reason being, the fees paid by the company are too exorbitant and not reflective of what the company is utilising"***. However, there was no evidence of the resolution of the matter filed, hence unresolved. Similarly, interviewees from SALWACO expressed their dismay over the fixed charges for raw water uses without knowing the exact volume of water abstracted but this was never resolved.

The self-reporting method and lack of in-take metering systems did not only increase untimely tracking and resolution of non-compliances and complaints of water users but increased the risk of inaccuracy in the information provided by the water users. As a result, the monitoring systems were unable to promote water use efficiency and therefore, were ineffective and inefficient for monitoring water use rights in the

period reviewed. Best practice suggests in-let metering systems and monthly monitoring schedules for good accounting and reconciliation of the volume of water used against the issued volume.

Recommendations

1. By the end of Quarter 1 of FY2025, the Director Planning, Research and Operations should explore a means of metering the volume of raw water abstracted by every water user either through direct installation of meters and/or an incentivised scheme for self-meter installation based on standards and services, provided by the Agency.

2. By the end of Quarter 1 of FY 2025, the Director of Legal, Registration and Regulations should develop a grievance-handling mechanism and widely disclose it to all the stakeholders.

3. By the end of Quarter 1 of FY2025, the Director Planning, Research and Operations should revise the monitoring schedules from two site inspections per year to monthly monitoring undertakings.

Management Response

1. By the end of Quarter 1 of FY2025, the Director of Planning, Research, and Operations will explore effective means of metering the volume of raw water abstracted by all water users. This will include evaluating the feasibility of directly installing meters for monitoring water abstraction or implementing an incentivized scheme where water users are encouraged to install self-metering systems. The metering systems will adhere to the standards and services set by the Agency, ensuring accurate tracking and management of water usage. The objective is to enhance water usage accountability and enable better resource management, with clear guidelines on the installation process and associated incentives.

2. The Director of Legal, Registration, and Regulations will ensure that by the end of Quarter 1 of FY2025, a comprehensive grievance-handling mechanism is developed. This mechanism will outline the process for stakeholders to raise concerns or disputes related to the Agency's services or regulations. The grievance-handling procedure will be transparent, accessible, and widely communicated to all stakeholders. This will foster trust and enhance stakeholder engagement, while also ensuring that grievances are resolved efficiently and fairly in accordance with the established legal and regulatory frameworks.

3. The Director of Planning, Research, and Operations will revise the monitoring schedules for water abstraction and other related activities by the end of Quarter 1 of FY2025. The current schedule of two site inspections per year will be updated to monthly monitoring visits. This increase in frequency will allow for more proactive oversight, ensuring better compliance with water management regulations and timely identification of any issues that may arise in the field. Monthly monitoring will improve the Agency's ability to enforce regulations and ensure that water resources are managed sustainably and efficiently.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

4.2.3. Water Resources Management Information System

The auditors engaged the NWRMA on the water user database, including but not limited to site water use demand management plans and site investigation reports etc. There were significant amounts of data on

water use and drilling activities. They were, however, shelved and unprocessed due to the lack of a database management system (DBMS)[15] and database officer in the period reviewed.

For example, WASH Managers interviewed from GOAL Sierra Leone and World Hope International, implementing WASH programmes across the country expressed their concerns over the lack of data on areas with high concentrations of iron above the threshold of drinking water. They further revealed that due to the unavailability of data drilling and immediate decommissioning of boreholes are done in areas with high iron content despite the heavy investments made. Similarly, an interviewee from Guma expressed concerns over data limitations at the NWRMA; "***Sometimes we request NWRMA on datasets regarding some river systems but they do not have. They are data constrained***".

The Agency revealed to the auditors that for the period reviewed, the NWRMA was financially constrained and was unable to establish a DBMS and recruit a database staff. Consequently, for the period reviewed, the Agency was unable to capture data, processing, and store it for internal use and external sharing, to foster evidence-based planning and decision-making in WCM by the Agency and other stakeholders in the period reviewed.

Recommendations

1. By the end of FY2027, the Director Planning, Research and Operations should ensure that a Water Resources Management Information System is established in place.

2. By the end of FY2027, the Director Planning, Research and Operations should recruit a database staff and subject the staff to rigorous induction and professional-based training in data analytics in water resources management.

Management Response

1. The Planning, Research, and Operations Department recognizes the critical importance of establishing a Water Resources Management Information System (WRMIS) to enhance data collection, analysis, and decision-making in water resources management. We are confident that the WRMIS will be fully operational by the end of FY2027, as per the audit recommendation.

[15] A DBMS is a critical component for system development in managing water resources data, as it offers data abstraction, integrity, security, sharing, and analysis, in a more secured and controlled manner, to inform planning. Such applications include but are not limited to forecasting future water allocations for the different sector-based development planning priorities, water quality, revenue projections, groundwater maps for sustainable siting and installation of boreholes etc.

2. The Planning, Research, and Operations Department agrees with the need to recruit and train dedicated personnel to manage the WRMIS effectively. Resource Allocation: Budget allocations have been planned to cover recruitment and training costs within the FY2026–FY2027 timeframe.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

4.3 Performance of Economic Instruments under Water Use Regulation and Development

Section 13 (2) b) of the NWRMA Act states that the Agency shall initiate, control and coordinate activities concerned with the development and utilisation of water resources including the supervision and regulation of –(c) granting water rights and collect raw water charges. Regulation 2 (1) of the NWRMA (Groundwater Development and Protection) Regulations, 2021 states that a person or an entity shall not construct a well for the purpose of a) abstraction, b) exploration, c) monitoring or d) research unless the person or entity holds a valid license in accordance with the NWRMA Act and Groundwater Development and Protection Regulations. In furtherance in Regulation 9 (1) of the regulations, a person who is granted a license shall pay the license fees set out in the regulations. Subsequently, Regulation 25 (1) states that charges shall be levied for the following per the fees set out in the Third Schedule-a) water abstraction or water use; b) dredging, diversion, damming, and storing; and c) issuance of a permit.

a) Uptake of Water Use Permits and Drilling Licenses

The NWRMA issued a total of 17 water use permits (WUPs) and 14 were renewed. Whilst the drilling licences (DL) issued were 30, with 29 renewals. The uptake of WUPs increased from 0 in 2019 to 6 in 2020, followed by a drop of 3 in 2021 and 3 sustained in 2022. However, in 2022, the uptake increased from 3 to 5 in 2023. Whereas for DL, the registration of rigs increased from 0 in 2019 to 12 in 2022, followed by 1 in 2021 and subsequently dropped to 2 and 3 in 2022 and 2023 respectively. This was due to a memo issued by the MWRS to the NWRMA to stop the registration of category C drilling rigs.

The fluctuations observed in the uptake of WUPs, and registration of DL were due to weak enforcement of water users and well developers to renew their WUPs and DLs respectively, by the NWRMA. Additionally, the non-exclusion of other water users (water packaging) and the limited awareness of stakeholders on the existing water legislation delayed the uptake and joint enforcement of uptake of WUPs

and DL by councils and other MDAs. This resulted in delayed payments and therefore, the NWRMA experienced unstable revenue generation in the period reviewed, discussed in the proceeding section.

b) Revenue Generation

Between 2019 and 2023, the revenue collection progressively increased from NLe 82,779.43 in 2019 to NLe 2,222,485.54 in 2023, from the implementation of the WUP scheme and DL registrations. See **Table 12** below.

Table 12: Revenue Collected Per Categories of Products and Services and Year

Year	2019	2020	2021	2022	2023
Product & Services	**Amt (SLE)**	**Amt (SLE)**	**Amt (SLE)**	**Amt (SLE)**	**Amt (SLE)**
1. Application Form	6,850.00	6,850.00	7,000.00	1,890.35	2,222,485.54
2. Administrative & Processing Fees	6,050.00	19,602.50	43,500.00	1,920.00	
3. Borehole license	42,450.00	77,550.00	121,861.16	99,605.87	
4. Water Usage	27,429.43	729,688.84	37,208.36	671,574.60	
5. Other	0.00	0.00d	0.00	9,640.00	
Total	**82,779.43**	**833,691.34**	**209,569.52**	**784,630.82**	**2,222,485.54**

Source: *NWRMA, 2024*. Note: The MoF did not disaggregate the revenue streams per water abstractive use and DL category. Hence, we could not verify which sector and DL category contributed the most.

From **Table 12** above, in 2020, the revenue increased drastically from NLe 82,779.43, total collections in 2019, to NLe 833,691.31, at 111%. This was due to high water use by some companies, especially those in the mining sector, who made huge payments. However, in 2021, there was a sharp decrease in revenue from NLe 833,691.34 to NLe 209,569.52 representing a 34% reduction in revenue collection due to delayed payments from the mining sector. Auditors could not ascertain whether the amount paid in 2020 covered 2021 from the internal revenue generation schedule. This was due to weak enforcement of water users and well developers to renew their WUPs and DLs.

In 2021, the revenue collected increased from NLe 209,569.52 to NLe 784,630.82 in 2022, an increase of 73% and NLe 2,222,485 in 2023. For 2023 collections, again there was an upturn in revenue collected from NLe 784,630.82 in 2022, to NLe 2,222,485.54, an increase of 65%. We ascribed this to the Agency's intensified outreach efforts to bring all water users under the water use permitting scheme. For example, Rainbow Paints and Chemical Company Ltd disclosed that they knew the NWRMA at the time they visited the premises, persuading the company to acquire a water use permit to avoid any unanticipated fines for non-compliance with Water Use and Catchment Regulations of 2021. If this trend is sustained, the revenue collection is likely to increase, to buffer gaps unrealised from the central government transfers.

However, the following gaps were identified:

- Revenue projections for water use charges were based on the number of active water users not volumes of raw water abstracted in the previous year across different economic sectors due to the lack of a water user database. This provided uncertainty in the projections and proper reconciliation of revenue generated.

- Annual disclosure of revenues accrued from water use permits and drilling license issuance in Annual Performance Reporting, did not tally with figures provided in annual financial reporting for the period reviewed. For example, in 2022, the annual performance report reflected NLe 993,586.55 compared to NLe 784,630.82 in the financial reporting. Therefore, this did not promote public accountability and therefore, the NWRMA was unable to persuade the public, councils, MDAs and the private sector actors (PSAs) for voluntary support to scale up the uptake of the economic instruments and enforce their implementations within their administrative jurisdictions.

- In furtherance, additional lines of revenue collection under "others" in 2022 lacked details. New lines of products and services need to be detailed and should be further developed, formalised, and included in the revenue planning process.

Recommendations

1. The Director of Finance should collaborate with the Director of Planning, Research, and Operations to use actual volumes of water issued in the previous years, for use in annual revenue target projections.

3. The Director of Planning, Research and Operations and the Director of Finance should ensure that actual annual revenue generated and reported in annual performance reports tally with the annual financial reports.

Management Response

1. The Finance Department acknowledges the importance of using accurate data for revenue target projections and is committed to improving collaboration with the Planning, Research, and Operations Department.

2. The Finance and Planning, Research, and Operations Departments recognize the need for consistency and accuracy in financial reporting. To address this recommendation, we are

implementing the following measures: Reconciliation Framework, Joint Reporting; System Integration, and Audit and Compliance.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

4.4 Collaboration and Coordination

Section 4(a) of the National Water Resource Management Agency Act 2017 states that, the Agency and other water institutions established by this Act shall in the performance of their duties be guided by the following: consultation and participation of relevant state institutions, local communities, women and other relevant stakeholders. Under Principle 1 of Dublin-Rio Principles, holistic management not only involves the management of natural systems; it also necessitates coordination between the range of human activities that create water demands, determine land uses, and generate water-borne waste production. For effective implementation of Section 4(a) and Principle 1, the Agency developed a Water Resources Management Coordination Framework, to create a platform for improved coordination geared towards sustainable and efficient water resources management.

For the period reviewed, the NWRMA undertook a number of collaboration and coordination activities guided by a Water Resources Management Coordination Framework. These included joint water catchment areas' assessment in Western Area Rural with Guma, MWRS, Ministry of Works, MECC and other stakeholders such as CRS and YARDO Sierra Leone (YSL); liaison with the local communities in data collection through a citizen science approach, and technical assistance to YSL in the restoration of 40Ha of land around the landslide site in York Village and 60Ha in Tokeh through planting of 100,000 trees.

The key notable achievement was a developed Business strategy with CRS, the WAPWAF Project, a $2 million initial investment into a $20 million initiative to ensure a healthy watershed for Greater Freetown and a reliable supply of clean water for all upstream and downstream users. Nevertheless, the implementation has not kicked off due to lack of start-up capital. See **Appendix 8**, for the detailed rating of the Agency's performance by the auditors based on the argumentative areas established in the NWRMA Water Resources Coordination Framework.

Despite the observed achievements above, the following limitations were identified and were as follows:

- Limited engagements of councils and other MDAs in integrating sectoral development policies and programmes tailored toward water catchment areas. The auditors did not find verifiable joint

monitoring reports between the Agency and the MLCP, as regards the implementation of a moratorium issued by MLCP in 2022, stopping all construction works within the Guma Valley dam, due to the degradation of water catchment areas. Moreover, our engagements with artisanal miners along river Pampana revealed that only NPAA and NMA have been engaging the miners without the participation of the NWRMA. Similarly, Environmental Officers from Kenema and Bo City, revealed no close engagements were undertaken with the NWRMA. Consequently, the NWRMA was unable to slow the degradation of water catchments through poor waste management, encroachment and mining. See **Figures 9** through **16**.

Figure 9: Unsegregated Waste Dumped at Bo City Landfill.

Credit: ASSL/06/2024

Figure 10: A Non-Functional 2 Aerated Lagoons at the Waste Landfill, Makeni City.

Credit: ASSL/06/2024

Figure 11: An Erected Perimeter Wall and a House Built in the Greenbelt in Jeff Town, Western Area

Credit: ASSL/04/2024

Figure 12: Human Encroachment Along Bankasuka River Bank in Water Works Village, Port Loko.

Credit: ASSL/06/2024

Figure 13: A Pillar Installed by a Private Individual in New England, Soleyei, Kambui Hills-Kenema

Figure 14: Mashekira Micro-catchment Along Taia/Pampana River Heavily Degraded by Gold Mining Activities in Tonkolili.

Credit: ASSL/05/2024

Figure 15: Sand Mining Along Sewa River in Jembe Village

Credit: ASSL/05/2024

Credit: ASSL/06/2024

Figure 16: Small Artisanal Mining in Lambaya River, Non-Functional Water In-Take Point for SALWACO Kambui Hills

Credit: ASSL/05/2024

- Exclusion of other stakeholders: The representation and participation of the PSAs was included in the coordination framework. Hitherto, the role of PSAs in the IWRM is multifaceted and increasingly recognised as vital for sustainable WRM. Their involvement can mobilise financial resources, technical expertise, and innovative solutions. These opportunities were missed by the NWRMA in the period reviewed.

- Non-functionality of the NWRMA regional offices: For example, the auditors inspected one regional office that the Agency disclosed as open in Bo, at the premises of SALWACO. However, it was found closed for about one year due to limited funding. Therefore, the NWRMA was unable to effectively operate, collaborate and coordinate with lower stakeholders, hence delaying decentralised IWRM. For example, SALWACO regional managers revealed that the NWRMA's footprint in monitoring and enforcement to protect water catchments was limited. Whereas in the case of SALWACO Kenema and Port Loko offices, they revealed undertaking sensitisation, routine surveillance monitoring, and enforcement visits to water catchment areas, covering their

water recharge and intake points. The Agency was unable to protect all water sources without regional offices.

- Absence of Water Basin Management Boards, referred to in **Section 4.1.7**: The contribution of Water Basin Boards in catalysing the decentralised IWRM is far more reaching to the district councils and local communities at the grassroots through the water catchment management committees.

- Poor record keeping: The audit team could not verify action points raised at the Inter-sectoral Coordination Committee and other levels of committees (steering, general, and technical), to track the progress on the implementation progress as regards water source protection and management due to the absence of meeting minutes. A respondent at the Agency informed the auditors that such minutes are kept at the office of the General and they do not have access to it. Minutes are important to inform planning and management decision-making. Therefore, it should be shared with staff, especially the Technical Directors for effective and collective implementation of action points.

Recommendations

1. On an annual basis, the Director of Planning, Research and Operations should ensure continuous engagement with the MDAs and other stakeholders in planning and the implementation of water catchment activities.

2. By the end of Quarter 1 of FY 2025, the Director of Planning, Research and Operation should include a representation of PSAs in the coordination framework as one key stakeholder for collaboration and engagement. However, their engagements at the inter-sectoral coordination meeting should be on a case-by-case basis as they can be serious lobbies.

3. By the end of FY2026, the Director General should establish and ensure full operation and functionality of NWRMA regional offices.

Management Response

1. The Planning, Research, and Operations Department recognizes the importance of collaboration with MDAs and other key stakeholders for effective water catchment management. Necessary

actions shall be taken to enhance the implementation of the recommendation for continuous engagement.

2. The Planning, Research, and Operations Department agrees with the need to involve PSAs in water catchment activities, recognizing their potential contribution to resource management while managing any potential conflicts of interest. The following actions are being implemented.

3. Private Sector Representation: By the end of Q1 of FY2025, private sector representatives will be formally included in the coordination framework for water catchment planning and implementation. These representatives will be selected based on their relevance to the sector, ensuring a balanced and objective contribution to decision-making processes.

4. Case-by-case Engagement: Engagement with PSAs at inter-sectoral coordination meetings will be conducted on a case-by-case basis. Their involvement will be based on specific projects or issues where their expertise is required, and mechanisms will be put in place to mitigate lobbying influence.

5. The Director General acknowledges the need for establishing fully functional regional offices for the NWRMA to enhance the decentralized management of water resources. The following steps are being taken to ensure compliance with this recommendation by the end of FY2026: Regional Office Establishment, Staff Recruitment and Training, Operational Infrastructure and Monitoring and Evaluation.

Auditor's Response

Management response is noted. The issue remains unresolved and will be followed up in the subsequent audit.

5.0 AUDIT CONCLUSION

This section provides a consolidation of the outcomes of the audit exercise to the audit objective and questions. It reflects the views and justifications of stakeholders at multiple levels, audit evidence gathered and findings regarding water catchment management. Water catchments provide a significant natural barrier to water yield and contamination, presenting them most effective in the protection of source water to the maximum degree practical. Hence, rendering a state multi-annual availability of water in good quality for sustainable socio-economic development, when they are sustainably protected and managed.

The audit entailed the review of effective planning and implementation of water catchment management activities, monitoring systems to ensure good water supply and use limitations, performance of economic instruments, and collaboration and coordination in water catchment planning and management. See **Appendix 9**, for the Audit Design Report Matrix, for audit questions, sub-questions, criteria, scope, methods used to gather and analyse evidence, findings and limitations, to achieve the audit objective.

The audit findings revealed that the government efforts, together with its development partners, to reverse water catchment degradation during the 4 years under review registered insignificant progress as follows:

- The knowledge of water catchment areas in critical danger and good health nationwide is still very limited for effective and efficient planning for the protection, restoration and regeneration of water catchments nationwide.

- Regulatory frameworks exist for water use planning and development within water catchment, covering water use and catchments, groundwater development and protection, dam safety, and water pollution control activities. This, however, lacks targets and implementation guidelines. If this is not addressed, it will be challenging for the GoSL to determine the required resources to implement and monitor progress towards the desired goals for water catchment management. The undesired consequences are their slowed implementation, high cost of enforcement and poor public accountability.

- Efforts to promote social fairness, equity, economic efficiency and environmental sustainability in water use planning and development had gaps. The existing raw water charges, water use allocation mechanism and monitoring systems did not promote fairness, equity and economic efficiency mainly due to limited technical studies and involvement of all stakeholders. Therefore, the novel of ensuring efficient water use, allocations between economic sectors and compliances, are likely

not to yield maximum significant socio-economic returns on investments if the gaps highlighted are unaddressed.

- The novel goal of decentralised IWRM was delayed due to the non-existence and functionality of the necessary institutional and governance structures-NWRMA regional offices, the Water Basin Management Boards and Water Catchment Management Committees. This was mainly due to inadequate financing. If this is unaddressed, the government is likely to continue to experience ineffective collaborations and coordination between stakeholders in IWRM at provincial levels.

- The majority of the existing functional hydrological stations are non-functional. Compounding was the lack of a water resources management information system, to gather, store, process, use and share data on water catchments, for integrated evidence-based planning and implementation of water catchment management interventions.

We recognised two main vulnerabilities as to why the recorded insignificant progress in reducing the degradation of water catchments was observed, and they are as follows:

i) The NWRMA lacked a clear start-up plan and technical guidance. Such arrangements could have laid down a clear road map with a highly experienced technical specialist in IWRM with a transdisciplinary lens, to guide the appointed and onboarded Director General and Technical Directors through the start-up process of the Agency. For example, from the identification of key technical assessments to be undertaken, their executions and intensive stakeholder engagements for the validation. Thereafter, a joint co-design of strategic interventions for the water resources sector; development of a water sector strategic plan; economic instruments for water use regulation and development; operationalisation frameworks; system setting; onboarding of the operational and administrative staff and launch of a five-year Strategic Development Plan.

ii) The Agency was inadequately funded. Setting up a sensitive institution such as the NWRMA, especially to govern and manage water resources, the most sensitive resource in the world, would require significant amounts of financial resources, especially at the commencement phase, to support evidence-based planning in IWRM for successful service delivery. We could not make references empirically to what informed the SDP 2019-2023, legislative instruments, raw water use charges etc. Therefore, to the Government, we recommend that:

- Recruit a Technical Advisor to support and guide the efforts in integrated water resources management in a systematic and structured manner.

- Mobilise adequate financial resources for water resources management, if the novel goal for the decentralised IWRM is to be achieved.

REFERENCES

Borrás, S., & Edquist, C. (2013). The choice of innovation policy instruments. *Technological forecasting and social change*, *80*(8), 1513-1522.

Dendena, B., & Corsi, S. (2015). The Environmental and Social Impact Assessment: a further step towards an integrated assessment process. *Journal of cleaner production*, *108*, 965-977.

Ebrahimi, M., & Sadeghi, M. (2013). Quality management and performance: An annotated review. *International Journal of Production Research*, *51*(18), 5625-5643.

Farrukh, R. M. (2014). Water balance: achieving sustainable development through a water assessment and management plan.

Grönwall, J., & Danert, K. (2020). Regarding groundwater and drinking water access through a human rights lens: Self-supply as a norm. *Water*, *12*(2), 419.

Healy, R.W. *et al.* (2007) 'Water budgets: Foundations for effective water-resources and Environmental Management', *Circular* [Preprint]. doi:10.3133/cir1308.

Howe, C. W., Schurmeier, D. R., & Shaw Jr, W. D. (1986). Innovative approaches to water allocation: the potential for water markets. *Water resources research*, *22*(4), 439-445.

In re Water Use Permit Applications, 9 P.3d 409, 94 Haw. 97 (2000).

Johnson, C., & Smith, E. C. (2008, May). A mid-term terminal concept of operations: evaluation and evolution analysis. In *2008 Integrated Communications, Navigation and Surveillance Conference* (pp. 1-10). IEEE.

Naidoo, D., Nhamo, L., Mpandeli, S., Sobratee, N., Senzanje, A., Liphadzi, S., ... & Mabhaudhi, T. (2021). Operationalising the water-energy-food nexus through the theory of change. *Renewable and sustainable energy reviews*, *149*, 111416.

Nieuwoudt, W. L., & Backeberg, G. R. (2011). A review of the modelling of water values in different use sectors in South Africa. *Water SA*, *37*(12), 703-710.

Pavlou, P. V., Filippou, S., Solonos, S., Vrachimis, S. G., Malialis, K., Eliades, D. G., ... & Polycarpou, M. M. (2024). Monitoring domestic water consumption: a comparative study of model-based and data-driven end-use disaggregation methods. *Journal of Hydroinformatics*, *26*(4), 709-726.

Rothenberger, D., Frei, U., & Brugger, F. (2005). Policy principles and implementation guidelines for private sector participation in the water sector—a step towards better results. *Water Science and Technology*, *51*(8), 61-69.

Schreider, S. (2009, July). Water price dynamics, water derivatives and general equilibrium modelling. In *18th World IMACS Congress and MODSIM09 International Congress on Modelling and Simulation: Interfacing Modelling and Simulation with Mathematical and Computational Sciences* (pp. 3640-3646).

Waalewijn, P., Wester, P., & Van Straaten, K. (2005). Transforming river basin management in South Africa: Lessons from the lower Komati river. *Water International*, *30*(2), 184-196.

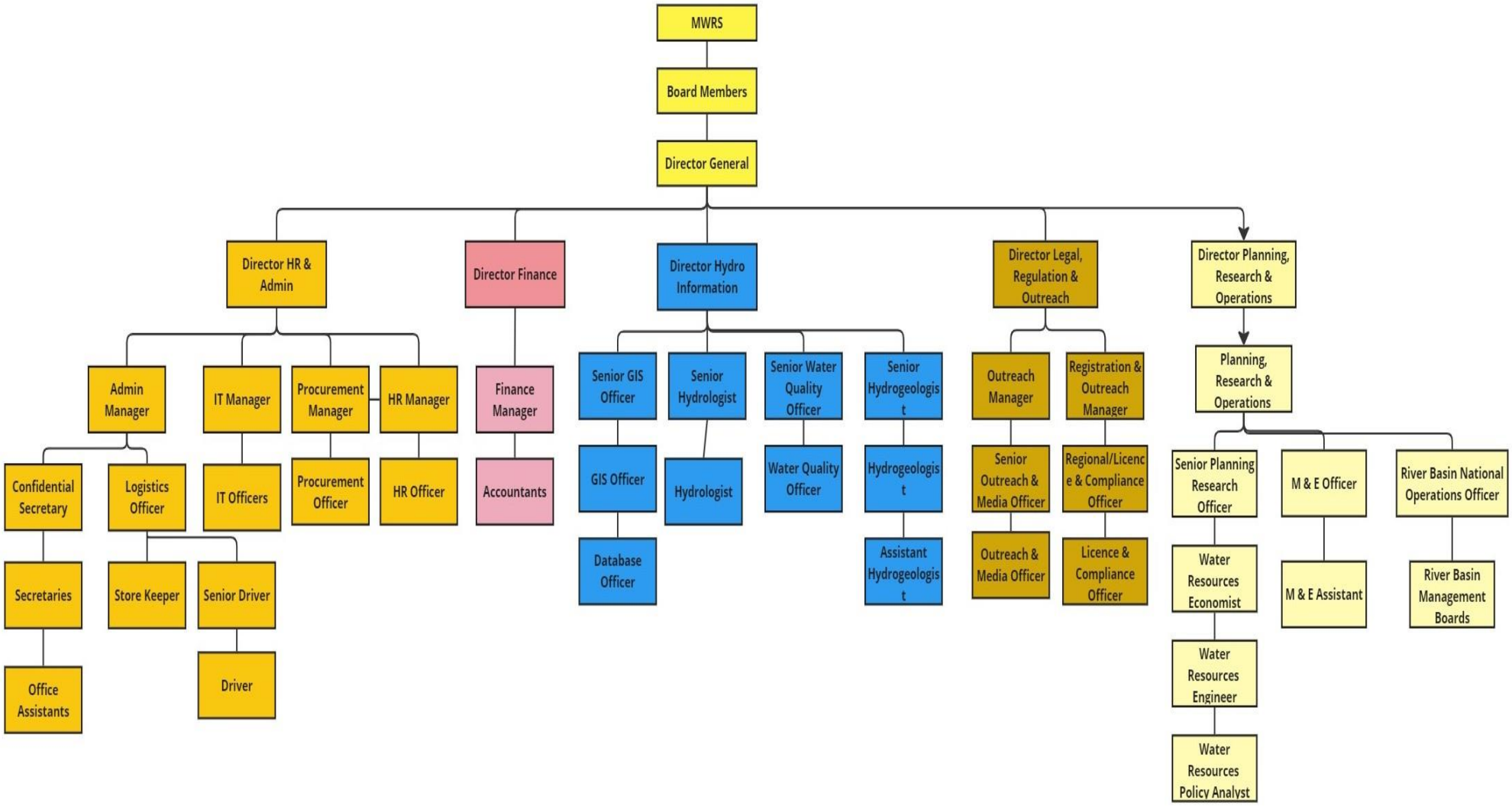
Wheeler, S. A., Nauges, C., & Grafton, R. Q. (2023). *Water pricing, costs and markets*. Technical Report of the Global Commission on the Economics of Water, Paris.

Wang, S., Liu, S., Yao, S., Guo, X., Soomro, S. E. H., Niu, C., ... & Hu, C. (2024). Game Theory Applications in Equilibrium Water Pricing of Multiple Regional Sources and Users. *Water*, *16*(13), 1845.

Willet, J., Wetser, K., Dykstra, J. E., Bianchi, A. B., Essink, G. H. O., & Rijnaarts, H. H. (2021). WaterROUTE: A model for cost optimization of industrial water supply networks when using water resources with varying salinity. *Water Research*, *202*, 117390.

World Meteorological Organization. (2009). Guide to hydrological practices, volume II, management of water resources and application of hydrological practices. *Extreme value analysis, WMO-No. 168*.

Appendix 1: Organogram of NWRMA



Appendix 2: List of Documents Reviewed and Reasons

No	Title of Document	Reason for Review
1	Handbook for the Assessment of Catchment Water Demand and Use. Project Report. HR Wallingford Ltd / DFID	– To conceptualize the meaning of water catchment and its importance in water source protection
2	The political economy of the urban water-pricing regime in Freetown, Sierra Leone	– To understand the water tariff regimes and challenges in water resources regulations and performance of water utility companies and burdens on the water users.
3	National Water Resources Management Agency (NWRMA) Five-year Strategic Development Plan (2019 -2023)	– Understand the situational complex of the water sector in Sierra Leone. – To understand the roadmap to IWRM and interventions undertaken by the NWRMA between 2019 and 2023. – Challenges faced by the NWRMA.
4	NWRMA Annual financial performance reports for 2019, 2020, 2021, 2022 and 2023	– To extract the annual planned budget, actual appropriations received and spent by the Agency.
5	NWRMA Annual Reports for 2019, 2020, 2021, 2022 and 2023	– To understand training undertaken to build staff capacity.
6	NWRMA Annual Performance Reports, 2019, 2020,2021,2022 and 2023	– To understand the key interventions undertaken by NWRMA concerning Integrated Water Resources Management (IWRM) for the period under review. – Identify key challenges that the NWRMA faced in the implementation of the SDP 2019-2023.
7	Stakeholders' re-establishment of the Western Area Peninsula National Park (WAPNP) Core Area (Greenbelt)	– To understand the drivers, pressures, state, impact and responses to the management of the WAPNP – Understand the characteristics of properties located within the Greenbelt – Understand management and structures in place to ensure effective management of the WAPNP water catchment.
8	NWRMA Water Resources Management Coordination Framework	– To understand the mechanism established to strengthen coordination with the Agency and between the stakeholders in water resources management.
9	The Human Right to Water and Sanitation Media Brief	– To know the average quantity of water needed by a person per day to meet his/her basic needs
10	The National Water Resources Management Agency Act, 2017. (IWRM)	– To know the functions of the entity and the parameters set therein for the integrated water

No	Title of Document	Reason for Review
		resource management
11	The Environmental Protection Act 2000 (Amended), the Environmental Protection Agency Act, 2022	– To know the roles of the EPA in the protection of water and the environment
12	Sierra Leone National Climate Change Strategy and Action Plan by EPA	– To see what has been put in place to respond to climate change (adaption and mitigation).
13	United Nations Sustainable Development Goals – the 2030 Agenda for Sustainable Development: Ministry of Finance and Economic Development- Advanced Draft Report on Adaptation of the Goals in Sierra Leone - July 2016	– To understand Sierra Leone has domesticated SDGs into the Medium-Term National Development Plan 2019-2023, especially the SDG Goal 6.
14	The National Protected Area Authority and Conservation Trust Fund Act, 2012.	– To understand the roles, the NPAA is undertaking in the protection of water catchments and how they are collaborating and coordinating with NWRMA and other stakeholders
15	Sierra Leone Water Company Act, 2017	– To know the roles, they are playing in rural catchment management and to assess how they are ensuring water quality
16	The National Water Resources Management Agency (Dam Safety) Regulations, 2021	– To see what is stated therein as requirements for Dam safety.
17	Sierra Leone Electricity & Water Regulatory Commission Act, 2011	– To explore and understand the set guidelines for the pricing of raw and treated water. – To understand how water resource revenue is to be used.
18	The National Water Resources Management Agency (Water Use and Catchment) Regulations, 2021.	– To understand the different regulations as regards water use and catchment management and the detailed requirements for water use planning and standards on water parameters.
19	Wash Strategy Capacity Building Strategy Program Phase 1 2020-2025	– To understand the capacity assessment done on the NWRMA by the Centre for Economic and Social Policy (CESPA)
20	Operations and Maintenance Strategy for Sierra Leone Hydrological Monitoring Stations and Institutional Capacity Building	– To understand how hydrological stations are managed across the country and to know the capacity building program undertaken to build the capacity of hydrological staff
21	Routine Monitoring Plan for Hydrometric Stations	– To explore and understand how routine monitoring of hydrological stations are done.
22	Standard Operating Procedure for Calibration of HL4 Multipara Meter	– To know the steps involved in calibrating the HL4 multipara meter
23	Standard Operating Procedures for Water	– To know the requisite sample collection

No	Title of Document	Reason for Review
	Quality Assessment and Monitoring – Ambient Water Quality	techniques used in water quality Assessment and Monitoring.
24	NWRMA Raw Water Use Charges	– To understand the criteria used in setting raw water use charges – Examine whether the tariff-setting process and raw water use charges promote fairness, equity and economic efficiency.

Appendix 3: List of Stakeholders Interviewed and Reasons

No	Designation	Institution	Reasons
1	Environmental Officer	Kenema District Council	– To understand how they collaborate with NWRMA in the management of water resources in their district – Challenges in working with NWRMA
2	Water Quality and Safety Specialist	SALWACO Makeni	– To understand the level of collaboration with NWRMA – Challenges in working with NWRMA and their community
3	WASH Director for West Africa	World Hope International	– To understand the level of collaboration with NWRMA – Challenges in working with NWRMA
4	Country Director	InterAid	– To understand the level of collaboration with NWRMA – Challenges in working with NWRMA
5	Environmental Officer and Civil Works Engineer	Bombali District Council	– To understand how they collaborate with NWRMA in the management of water resources in their district – Challenges in working with NWRMA
6	Chief Administrator and Ag. Environmental Officer	Makeni City Council	– To understand how they collaborate with NWRMA in the management of water resources in their municipality – Challenges in working with NWRMA
7	Station Manager	SALWACO Tonkolili	– To understand the level of collaboration with NWRMA – Challenges in working with NWRMA and their community
8	Civil Works Engineer	Tonkolili District Council	– To understand how they collaborate with NWRMA in the management of water resources in their district – Challenges in working with NWRMA

No	Designation	Institution	Reasons
9	Procurement Officer	Port Loko District Council	– To understand how they collaborate with NWRMA in the management of water resources in their district – Challenges in working with NWRMA
10	Station Manager	SALWACO Port Loko	– To understand the level of collaboration with NWRMA – Challenges in working with NWRMA and their community
11	Station Manager	SALWACO Bo	– To understand the level of collaboration with NWRMA – Challenges in working with NWRMA and their community
12	Rural WASH Programme Coordinator	GOAL Sierra Leone-Kenema Regional Office	– To understand the level of collaboration with local council and NWRMA in water resources management – Challenges in working with NWRMA
13	Station Manager	SALWACO Kenema	– To understand the level of collaboration with NWRMA – Challenges in working with NWRMA and their community
14	Regional Head	Civil Society Movement	– To understand the level of collaboration with local council and NWRMA in water resources management – Challenges in working with NWRMA
15	Head of Water Resources and Sanitation	Bo District Council	– To understand how they collaborate with NWRMA in the management of water resources in their municipality – Challenges in working with NWRMA
16	Programme Manager	MOPADA Sierra Leone	– To understand how they collaborate with NWRMA in the management of water resources in their municipality – Challenges in working with NWRMA

No	Designation	Institution	Reasons
17	Director of Technical Services	Guma Valley Water Company	– To understand the level of collaboration with NWRMA – Challenges in working with NWRMA and their community
18	Deputy Managing Director	Guma Valley Water Company	– To understand the level of collaboration with NWRMA – Challenges in working with NWRMA and their community
19	Director of Finance	Guma Valley Water Company	– To understand the mechanisms in place for resource mobilisation and utilisation for water catchment management
20	Production Manager	Guma Valley Water Company	– To understand interventions jointly implemented with NWRMA – To understand the challenges in the water catchment management that are affecting the utility systems and distributions
21	Director of Planning and Finance Senior Project Manager Senior Research Manager Maintenance and Operations Manager Station Manager Kono	SALWACO Head Office	– To understand interventions jointly implemented with NWRMA – To understand the challenges in the water catchment management that are affecting the utility systems and distributions
22	Chief Inspector of Mines	National Mineral Agency	– To understand the level of collaboration with NWRMA – Challenges in working with NWRMA and their community

No	Designation	Institution	Reasons
23	Director Planning, Research and Operations	NWRMA	– To understand the legal framework for water catchment protection – To understand the processes involved in the mapping of watersheds and catchments – To understand the activities being implemented concerning the assessment and monitoring of water catchment
24	Director of Finance	NWRMA	– To understand the mechanisms in place for resource mobilisation and utilisation for water catchment management
25	Director of Legal, Regulation and Outreach	NWRMA	– To know the number of awareness-raising campaigns to sensitise communities and educate the general public on water resource pollution and contamination management carried out
26	Administration and Human Resource Officer	NWRMA	– To know the measures or interventions undertaken to strengthen the capacity of the staff at the Agency
27	Managers -non-regularised water users	▪ Happy Life Water. ▪ Joy Fresh/ACME Merchandise & Services. ▪ Beacon Lodge. ▪ Aryorkoh Pure Water. ▪ Jah Pure Water. ▪ Blue Diamond. ▪ Sister Diamond. ▪ Tee Spring Water. ▪ Nice. ▪ Kuma. ▪ Tia. ▪ Vamah Natural Spring.	– To assess their level of awareness of water legislation, – Understand their sources of water, – To inventoried storage systems, – Understand the purpose of water use, – Capture the volume of water processed and or/used per day, – Understand means of water abstraction. – Verify validity of the water-use permits, – Understand monitoring mechanisms in place for tracking and capturing volumes of water abstracted,

No	Designation	Institution	Reasons
		▪ Mena Hills Hotel. ▪ Medkura Pure. Natural Water. ▪ Royal Pure Water.	– Understand the frequency of monitoring and reporting, and – Assess the level of satisfaction with the water-use permit scheme by the water users per sector.
28	Manager-Regularised water users	▪ M.R Distilleries. ▪ The Place Resort. ▪ Jolaks Manufacturing. ▪ Rainbow Paints & Chemicals.	

Appendix 4: Checklist Used

Date……

Auditee……

No.	Question	Yes, or No	Reasons and/or captured verbatims
1.	Has the Agency established or earmarked hydrological stations (G/W and S/W) within the 12 river basins for quality control and assurance purposes?		
2.	Is there a standard operating procedure for inspection of hydrological stations, operations maintenance and data processing?		
3.	Did the Agency develop the MEL Plan for the SDP 2019-2023, and the Rokel River Basin Water Management Plan?		
4.	Has the Agency developed in place implementation frameworks/guidelines for the water legislation developed and approved by the Parliament of Sierra Leone?		
5.	Has the Agency conducted a mid-term and terminal evaluation on the implementation of the 5-year Strategic Development Plan 2019-2023?		
6.	Has the Agency conducted any research as regards watershed and catchment protection and management?		
7.	Has the Agency modelled water balances/budgets for the river basins?		
8.	How does the Agency price the water users in water production and packaging as well as the hotel and hospitality industry?		
9.	Has the Agency secured a database for data storage and developed a management information system?		
10.	Does the Agency have enough staff and equipment to implement related water resources activities?		

Appendix 5: List of Stakeholders and Their Roles in Water Catchment Management

No	Player/Entity	Roles and Responsibilities
1	Ministry of Water Resources and Sanitation (MWRS)	• Formulate and implement water resource policies for the development and management of water resources. • Ensure improved access to safe drinking and safely managed sanitation facilities for all communities. • Develop water infrastructure for socio-economic development.
2	Sierra Leone Energy and Water Regulatory Commission (SLEWRC)	• Regulate the provision of the highest quality of electricity and water services to consumers and water industries issue. • Renew, amend, suspend, revoke, and cancel licences for non-compliance. • Provide guidelines on rates chargeable for the provision of electricity and water services. • Protect the interests of consumers and providers of electricity and water services. • Monitor standards of performance for the provision of electricity and water services. • Promote fair competition among public utilities, and conduct studies relating to the economy and efficiency of public utilities.
3	National Water Resources Management Agency (NWRMA)	• Regulate, utilise, protect, develop, control, and generally manage water resources throughout Sierra Leone.
4	Sierra Leone Water Company (SALWACO)	• To provide potable water supply services to six provincial towns in the country. • Extends to the provision of water and sanitation services to four regions of the country. The Company currently provides pipe-borne water supply services to a total of 12 towns namely; Bo, Kenema, Makeni, Lungi, Kambia, Lunsar, Magburaka, Mile 91 & Yonibana, Port Loko, Kabala, Pujehun and Kailahun.
5	Guma Valley Water Company (GVWC)	• Produce, distribute and conserve water within the limits of supply and other areas as may be determined by the Commission. • Control, development and management of Guma works and water supply services within the Western Area Peninsular.

6	National Mineral Agency (NMA)	• Maintain a Mining Cadastre Office. • Approve reconnaissance, exploration and mining works. • Carry out investigations and inspections necessary to ensure compliance with the provisions of the Act. • Advise holders of mineral rights on proper and safe mining methods. • Exercise regulatory administration and supervision over all reconnaissance, exploration, and mining operations and ensure that all conditions relating to mineral rights and the requirements are complied with.
7	Environmental Protection Agency (EPA)	• Plan, coordinate, issue, supervise, and monitor the conditions of approval of the EIA for water-related activities • Create public awareness of the environment and its importance to economic and social life, including water • Ensure the integration of environmental and climate change in national and sectoral planning • Maintaining linkages and/or partnerships with relevant Government MDAs in environmental management • Mobilise, expedite, and monitor resources for environmental management, the water sector is an integral part
8	Ministry of Environment and Climate Change (MECC)	• Formulate and facilitate the implementation of appropriate policies and programmes for sustainable management of water catchments. • Provide leadership on the development and supervision of the legal and policy framework for building national environmental resilience as it relates to climate change, and natural resources management, including water resources, forestry and wetlands conservation.
9	Forestry Department	• Carry out planning for the sustainable management of forests to minimise land use changes within water catchments. • Build the capacity of staff in forest management. • Sensitise and create public awareness of the importance of forest management in maintaining water, carbon and nutrient cycles. • Foster coordination and partnerships for forest management within water catchments. • Routine monitoring and enforcement.

10	National Protected Area Authority (NPAA)	• Awareness of local communities, schools, and local administration on programmes, benefits, and services, relating to protected areas including land use best practices for land, soil, and water conservation in 'Protected Areas' and 'buffer zones • Manage, monitor, and evaluate forests in protected areas. Water catchments are an integral part. • Ensure policies and plans for protected area management integrate forest and biodiversity components. • Ensure participation of forest edge communities in the protection and co-management of forests inside and outside National Protected Areas
11	Ministry of Lands, Housing and Country Planning (MLHCP)	• Effectively plan and sustainably manage. • Administer the most important natural asset of this country, the land resource. • Facilitate equitable access to and control over land within the context of food security, poverty alleviation, housing provision and economic growth. Water Catchments are an integral part.
12	Ministry of Agriculture and Food Security (MAFS)	• Ensure integration of sustainable water catchment management in agricultural policy planning and development. • Provide alternative livelihood sources to reduce burdens on water catchments. • Ensure sustainable land-use practices through best agricultural practices such as agroforestry, mulching, etc, to reduce water catchment degradation.
13	District and City Councils	• Ensure that environmental issues are integrated into their local development planning and budgeting, in close collaboration and coordination with MDAs, private sectors and NGOs and implemented at the grassroots levels. • Participate in water catchment planning and management within their administrative boundaries and jurisdictions.
14	Local Community/Private Sector Actors	• Play a critical role in water catchment management by minimising water source contamination through proper waste disposal, treatment of wastewater and minimized discharge of raw sewage into water points, adoption of best agricultural practices, installation of water use efficiency and use of alternative renewable energy sources to protect water sources.

17	The Conservation Society of Sierra Leone (CSSL)	• Sierra Leone's oldest environmental non-governmental organisation (NGO) provides technical expertise in the conservation and wise use of the country's natural resources. The roles of CSSL are: • Save endangered and critical tree species • Protect forest sites for the provision of habitats • Ensure ecological sustainability of water catchments. • Enable communities for transformational change in water catchment management.
18	Catholic Relief Services (CRS)	• Promote nature-based reforestation of degraded land cover in water catchments for sustainable biomass supply • Contribute to the management of catchment areas by providing alternative livelihoods to the nearby communities • Strengthen the resilience of the local communities within water catchments through sustainable land use management practices

Appendix 6: List of Pieces of Training Undertaken Between 2019-2023

Year	Training
2020	▪ Methodological approach and planning process for preparing a Transboundary Diagnostic Analysis (TDA) and Strategic Action Plan (SAP) in a transboundary basin
	▪ Required tools for the development of a water fund
	▪ Management of hydrological monitoring infrastructures
	▪ Overview of communications/ communication skills, news writing, writing for Water Resources Management (WRM) - media alert, press release, backgrounder and factsheet
	▪ Outreach and advocacy, effective social media use and use of photography
2021	▪ Basics of Remote Sensing, GIS, land use and land cover mapping and drone technology.
	▪ Required tools for the development of a water fund.
	▪ Management of hydrological monitoring infrastructures.
	▪ Management, resource mobilization and other operationalization methodologies for the successful implementation of the WAPWAF.
	▪ Use of data collection, storage and analysis for hydrological monitoring
	▪ Local community people as citizen scientists for Citizen Science monitoring in the Rokel River basin which involved the participation of local communities to collect and analyse water quality and hydrological data using new scientific knowledge and approaches
	▪ Local community staff gauge readers for effective manual data collection and transmission by hydrological stations.
2022	▪ The use of Ecohydrological approaches for improving water quality
	▪ Concepts and methods of monitoring and evaluation
	▪ The use of nitrogen isotopes in water pollution studies
	▪ Management of hydrological monitoring infrastructures
	▪ Data collection, storage, and analysis for hydrological monitoring
	▪ Local community people as citizen scientists for Citizen Science monitoring in the Rokel River basin which involved the participation of local communities to collect and analyse water quality and hydrological data using new scientific knowledge and approaches
	▪ Local community staff gauge readers for effective manual data collection and transmission by hydrological stations
	▪ Operations of water fund for the operationalization of the WAPWAF
2023	▪ Hydromet season forecasting
	▪ Drought tools, assessment, and review of the national drought plan.
	▪ nitrogen isotopes in water pollution studies.
	▪ Forecasting tools, hydrological monitoring infrastructures, hydro climate season forecasting
	▪ Data collection, storage, and analysis for hydrological monitoring
	▪ Local community people as citizen scientists for Citizen Science monitoring in the Rokel River basin which involved the participation of local communities

Year	Training
	to collect and analyse water quality and hydrological data using new scientific knowledge and approaches
	▪ Operations of water fund for the operationalization of the WAPWAF

Appendix 7: Status of Hydrological Stations Sampled.

Sample No	Location	Observation	Pictorial	Narrative
SWS/001/2024	Magburaka	Non-functional		– The site is well secured with solar in place. – The constant flow bubbler is faulty. – Fuses have been disconnected due to an exhausted battery. – Disconnected logger
SWS/002/2024	Addax Lungi	Non-functional		– A functional battery is in place but disconnected due to a non-functional sat link and faulty constant flow bubbler. – The station is unsecured due to a broken perimeter wall caused by a tree trunk fall from a heavy storm. – Solar stolen.
SWS/003/2024	Ngelehun/Gudama	Non-functional		– Secured in a perimeter wall but solar was stolen. – Battery, Sat link, and constant flow bubbler functional but no transmitting data due to expired internet subscription.
SWS/004/2024	Tiloma	Non-functional		– Satlink not working. – Faulty constant flow bubbler due to hardware failure – No GPS detected – Faulty sat link. – Low battery.

Sample No	Location	Observation	Pictorial	Narrative
SWS/005/2024	Konsho	Non-functional		– Solar panel in place – Battery not working – Faulty constant flow bubbler – Last visited between the inspection round schedule, Dec 2023 and Jan 2024 – Disconnected logger
SWS/006/2024	Rokel Village	Non-functional		– Secured with perimeter wall. – Solar panel intact – Disconnected fuses. – Battery not working – Functional Sat link and constant flow bubbler.
SWS/007/2024	Bumpe	Not accessed due to a rusted lock		– The station is well secured. – Solar in place (viewed from above the roof) – Never visited since installation.
GWS/001/2024	Bo-SALWACO Premises	Non-functional		– The premised is well secured. – Solar panel and the functional whole system in place, however not transmitting. – expired internet subscription has been exhausted

Sample No	Location	Observation	Pictorial	Narrative
GWS/002/2024	Kenema	Functional		– Solar and whole system intact and functional. – Data is being transmitted.
GWS/003/2024	Bombali	Non-functional		– The station is secured with solar and the entire functional system component in place but not transmitting data due to an expired internet subscription.
GWS/004/2024	Magburaka-Water Directorate Premise	Non-functional		– The whole equipment was stolen. Only the perimeter wall is left standing.

Credit: ASSL/05/2024

Appendix 8: Rating of NWRMA's Performance on Argumentative Areas in Water Resources Coordination Framework

No.	Argumentative Areas	Ratings	Narrative
1	Develop a secure database for data storage and create a website for information sharing	Fairly met expectations	– The Agency gathered hydrological data and erected the websites for the period reviewed. – No established Database Management System to process, secure and share datasets with stakeholders. – No tracking list for data requestees and purposes for data use to inform planning actions at the Agency due to lack of record keeping.
2	Provide up-to-date information on water resources management and share information with NWRMA and other stakeholders	Fairly met expectations	– No verifiable updates and briefs on the health and functionality of water catchments are published on the Agency's website.
3	Conduct awareness raising campaign to sensitize communities and the general public against water resources pollution and contamination	Fairly met expectations	– A total of SLE 629,273.5 was spent on Public education and awareness raising, there was limited coverage nationwide. – Low coverage in terms of community awareness-raising and sensitisation campaigns. – Out of the eight focused group discussions administered, only the community group engaged in York Town in the Western Area Peninsular revealed that they were sensitized on the protection of water catchments and their benefits to avert disasters by NWRMA, in collaboration with Catholic Relief Services (CRS) and YARDO Sierra Leone.
4	Conduct regular joint monitoring exercises for pollution and contamination prone areas	Fairly met expectations	– The annual reports of the NWRMA giving accounts of the status and functionality of hydrological stations, monitoring reports on catchment protection activities in the western area etc. – Verifiable engagements with the local community in York town, the western area and SALWACO regional offices from interviews conducted. – No verifiable joint monitoring report between the Agency and the MLCP, as regards the implementation of a moratorium issued by MLCP in 2022 stopping all construction, works within the Guma Valley dam, due to the degradation of water catchment areas.

No.	Argumentative Areas	Ratings	Narrative
5	Review existing response platforms for floods and disasters early warning systems and adapt to incorporate new trends and technologies.	Below expectations	– No evidence of green water infrastructures established by the Agency, such as flood control structures, as well as any weather risks related technical advisory issued to the stakeholders.
6	Conduct awareness-raising exercises nationwide about catchment protection and restoration	Fairly met expectations	– A total of SLE 629,273.5 was spent on Public education and awareness raising, however, there was limited coverage nationwide. – The number of stakeholders reached out nationwide was not available. – Continued degradation of catchment areas in locations such as Jeff town, Bio Barray, in the western Area Peninsular; and the Kambui hills in Kenema are linked to limited outreach by NWRMA. – SALWACO regional offices, especially in Kenema argued that NWRMA's footprint in public education, awareness and sensitisation was limited within Kambui Hills.
7	Conduct regular joint assessments and monitoring of catchment areas nationwide and develop strategies to promote catchment protection and restoration	Fairly met expectations	– SALWACO engineers at regional offices acknowledged working closely with NWRMA in water quality monitoring and assessment, sustained by the fact, that most of the surface water monitoring stations are installed at the water intake points of SALWACO. – On the contrary, SALWACO regional managers argued that NWRMA's footprint in monitoring and enforcement to protect water catchments is limited. In the case of SALWACO Kenema and Port Loko offices, they revealed to the audit team that they have been undertaking sensitization, routine monitoring, and enforcement visits to Kambui Hills and Bankasuka respectively, to protect water sources their water recharge areas and intake points without the participation of the NWRMA. Similarly, Guma shared the same experience and operated the same approach undertaken by SALWACO in the provinces to protect their water

No.	Argumentative Areas	Ratings	Narrative
			recharge areas and intake points within the Western Area Catchment singly. – The York town and Tokeh communities confirmed a joint tree planting exercise with YARDO Sierra Leone and NWRMA. – Jembe village along the Bo-Kenema highway and Mubuff Mashehira in the Tonkolili district acknowledged engagements with paramount chiefs, NPAA and NMA respectively on good mining practices without the involvement of NWRMA.

Appendix 9: Audit Design Reporting Matrix

Audit Objective:		**To assess the measures put in place by NWRMA to ensure efficient and effective management of environmental flows and water quality in Water Catchments.**					
Audit Question 1:		**To what extent has the NWRMA effectively and efficiently planned and implemented water catchment management activities?**					
Sub-questions	**Audit Criteria**	**Scope**	**Audit Evidence**	**Method(s) of Evidence Gathering**	**Method of Analysis**	**Findings**	**Limitations**
1.1. Has the Agency delineated and mapped all the water catchments nationwide?	Section 13 (1) and (2) paragraphs b, c and d of NWRMA Act, 2017. Goal 3 in SDP 2019-2023: 30% of the catchment areas in critical danger protected, restored and regenerated.	Nationwide delineated, mapped, protected, and restored catchment areas in critical danger in kilometre squares. NWRMA GIS Unit and Department of Planning, Research and Operations.	Delineation and mapping spatial maps. Demarcation and Restoration Activity reports. Water catchment management plans.	Document review & interview	Simple statistical analysis and content analysis	The target set for the protection, restoration and regeneration of catchment areas in critical danger was high. No established theory of change as well a monitoring and evaluation (MEL) plan for the Rokel Water Catchment	The catchment areas in critical danger for Taia/Pampana Water Catchment were not indicated.
1.2. Has the Agency promoted integrated water use planning and development within water catchments?	SP Goal 1: Regulatory and Institutional frameworks for managing and protecting water resources. Regulation 3, Regulation 4, Paragraph (a), and Regulation 5 (3) Paragraph (b) of the Sierra Leone Electricity and Water Regulatory	Department of Planning, Research and Operations, number of bottled and sachet water users regularised, fees for bottled and sachet water abstractive	Legal framework register, unregularised water users, and fees established for the abstractive uses	Interviews and Document Review	Content analysis	legal framework tracker/register, hence the omission of other legal frameworks in planning. Proliferation of unregulated borehole installations for water production and packaging water use permitting	Low coverage of stakeholders

	Commission Act, 2011, entitled the Bottled and Sachet Water Production Regulations, 2019. Regulation 3, paragraph a, b and c of the NWRMA (Water Use and Catchment) Regulations, 2021. The NWRMA (Groundwater Development and Protection) Regulations, 2021	use, SALWACO				scheme and the provisions under the Groundwater Development and Protection Regulations, 2021, scarcely addressed the requirements of locations where borehole installations should take place	
1.3. What measures are in place to ensure successful implementation of the developed water legislation?	SP Goal 1: Regulatory and Institutional frameworks for managing and protecting water resources.	Water pollution control, groundwater development & abstraction, water use and catchment protection, dam safety, WASH programmes	Implementation guidelines and frameworks, stakeholder engagement reports, radio talk shows, newspapers, postage of guidelines and frameworks on the Agency's website	Interview & Document review	Content analysis	Delayed implementation due to lack of target and implementation guidelines for water legislation developed	Not Applicable (n/a)
1.4. What mechanisms are in place to regulate water use and development within water catchments	Section 13 (1) and (2) of the NWRMA Act, 2017. Principle 2 of Dublin-Rio Principles, the Dublin Statement on Water and Sustainable Development, 1992.	Raw water uses tariff system and Water Allocation Mechanism.	Water Accounting Report, Economic appraisal reports for water abstractive uses and management options. Raw water uses charge model-solving flow.	Interview & Document review	Content analysis	The raw water charges did not promote fairness, equity and economic efficiency. Absence of sectoral water quotas	n/a

	Section 3.1.1 of the National Water and Sanitation Policy, 2010		Water Quotas and Water Demand Management Tool.				
1.5. Has the Agency complied with NWRMA (Water Use and Catchment) Regulations, 2021?	Regulation 2, Regulation 15 and Regulation 25 (1), First Schedule and Third Schedule of the NWRMA (Water Use and Catchment) Regulations, 2021	Requirements in First Schedule and Fees in Third Schedule and Department of Legal, Registration and Regulations	Water user files, charged fees for water abstractive uses,	Interviews, Document review and site visits	Content and comparative analysis	Error during the drafting of NWRMA (Water Use and Catchment) Regulations, 2021 due to weak review and supervision system.	n/a
1.6. How does the Agency manage environmental and social risk in water use planning and development?	Regulation 10 (1) of the NWRMA (Water Use and Catchment) Regulations of 2021. First Schedule of the NWRMA (Water Use and Catchment) Regulations, 2021 Section 24, Section 27 (1), and Section 31 Paragraph a to d of the EPA Act, 2022	Water User files and Department of Planning, Research and Operations	Copies of comments on ToRs, Scoping Reports and EIA reports for water sector-related department projects. Copies of Valid EIA Licenses.	Document reviews & Interviews	Content analysis	Expired EIA licenses without renewals Limited participation of the Agency in the EIA process	Low coverage of stakeholders
1.7. Has the Agency declared Water Basin Management Boards and established Water Catchment Management Committees for the Water Catchments focused on for the period reviewed?	Section 24 paragraph a through h, Section 25 (1), and Section 27 (1) paragraph a through l of the NWRMA Act, 2017. Principle 1 of Dublin-Rio Principles, the Dublin Statement	Rokel and Western Area Water Catchment Areas, Operational guidelines, Department of Planning, Research and Operations	Register of the Water Basin Management Boards and Water Catchment Management Committees	Document review and interview	Content analysis	Absence of operational guidelines for the WBMB and WCMC. Non-compliance with the procedures for the establishment of WCMC	n/a

	on Water and Sustainable Development, 1992.						
1.8. Does the Agency have enough capacity to fully decentralize WRM?	Output 4.1 Strengthen the institution and staff capacity	Institutional Capacity Assessment Report	An up to date manpower plan	Document review	Content analysis	Lack of up-to-date manpower plan. Absence of a Substantial Internal Auditor	n/a
1.9. What are the staff capacity building programmes that the agency has implemented from 2019-2022	Output 4.1 Strengthen the institution and staff capacity	Technical expertise built in data analytics, research, policy & planning	Capacity building strategy, training reports, attendance lists, back to office reports	Interview & Document review	Thematic mapping, statistical analysis	limited engagement of the human resources and administration department in the implementation yet custodian of the plan; absence of explicit provisions on staff bonding after study, especially for long-term pieces of training, and non-articulated selection of staff to external training calls.	n/a
1.9.1 Has the Agency educated, sensitized and created awareness of the public on the IWRM?	Output 4.1 Strengthen the institution and staff capacity	Public education, awareness and sensitisation campaigns, community groups in vulnerable micro-catchments, district council staff, water	Training reports, attendance lists, radio talk show recordings, posters, news brief on website	Interview & Document review	Content and thematic analysis	Limited coverage. Poor record keeping.	Low number of stakeholders covered

		utility companies, and Department of Planning, Research and Operations.					
	Audit Question 2:	**How effective and efficient was the monitoring system in ensuring good water supply and use within catchments?**					
Sub-questions	**Audit Criteria**	**Scope**	**Audit Evidence**	**Method(s) of Evidence Gathering**	**Method of Analysis**	**Findings**	**Limitations**
2.1 How functional were the hydrological stations between the period, to inform the planning process at the Agency?	Section 34 (1) Paragraphs a, and b of the NWRMA Act, 2017	Existing hydrological infrastructures, equipment, software, water resource data sharing,	Equipment, monitoring reports	Interviews, document review, physical inspection of existing infrastructures,	Content Analysis, and Field pictorial display	Poor operation and maintenance of the hydrological stations. Absence of sentinel sites for quality control and assurance purposes	Unprocessed datasets
2.2. How effective was the monitoring of water usage limitations under the permitting scheme?	Section 34 (1) Paragraph d of the NWRMA Act, 2017. Regulation 27 (4) of the NWRMA (Water Use and Catchment) Regulations, 2021	Water use files, monitoring schedules and in-let metering systems, complaint handling	Equipment, monitoring reports as well as compliant resolutions reports	Interviews, document review, and site inspections	Content Analysis, and Field pictorial display	Increased risk of over-abstraction due to the absence of metering systems. Limited monitoring schedules. Non-Reddress of complaints from water users	Limited coverage of stations and water users

2.2 How does the Agency manage data as regards water resources management?	Section 34 (1) Paragraphs a, b, c and d of the NWRMA Act, 2017	Database Manage-ment System (DBMS), Ministries, Departments and Agencies, Water Utility Companies	Records of data requests and purpose of use, extracted datasets used in planning processes and research	Interviews, documents review, and access to the DBMS	Content Analysis	Absence of Database Management System	Low coverage of stakeholders
Audit Question 3:		**How effective and efficient were the developed economic instruments in water use regulation and development?**					
Sub-questions	**Audit Criteria**	**Scope**	**Audit Evidence**	**Method(s) of Evidence Gathering**	**Method of Analysis**	**Findings**	**Limitations**
3.1. What is the rate of uptake of water use permits and drilling licenses?	The NWRMA (water-use and catchment) Regulations, 2021 and the NWRMA (groundwater development & protection) Regulations, 2021	water use permits, drilling licenses, water users' awareness, Water use and drilling License Tracker	Number of water use permits and drilling licenses issued and renewed	Document review and interview	Simple statistical and content analysis	The uptake of water use permits and registration of drilling rigs with NWRMA fluctuated in the period reviewed due to limited awareness of the water users on the water use permit and license scheme	Limited time, hence low coverage of all files
3.1 How effective was revenue mobilisation and use from the economic instruments?	Goal 1: 1.6.3: Establish an NWRM fund and develop innovative mechanisms for generating and managing non-	Internal Revenue generation report, water uses and expenditures	Resource mobilization plan, water use database, monitoring reports	Interviews, documents review	Content and simple statistical analysis	Revenue projections from water use were based on the number of active water users not volumes of raw water abstracted	n/a

	budget water revenue. Section 13 (2) b) of NWRMA Act, 2017. Reg 2 (1), Reg 9 (1) and Reg 15 (1) b) of the NWRMA (Groundwater Development and Protection) Regulations, 2021					No formalisation on the spending of internally generated revenues, hence the likelihood of flawed spending without priorities.	
Audit Question 4:		**To what extent has NWRMA ensured effective collaboration and coordination with other stakeholders in water catchment management?**					
Sub-questions	**Audit Criteria**	**Scope**	**Audit Evidence**	**Method(s) of Evidence Gathering**	**Method of Analysis**	**Findings**	**Limitations**
4.1 How does the NWRMA ensure coordination and collaboration with other stakeholders?	Goal 1: Output 1.4: Effective water resource management sector coordination and monitoring and evaluation framework developed and operationalizes Section 5.5 SDP 2019-2023: NWRMA will create a multi-level coordination system at all scales from basins to catchments and sub-catchments and will work with partners to define	Sector coordina-tion framework, inter-ministerial technical working group, other stakeholders in integrated water manage-ment	Minutes of stakeholder meetings and inter-ministerial working, joint monitoring reports	Interviews, document review, focused group discussions (FGDs)	Interview and FGDs summaries, trend analysis	Limited engagement of councils and MDAs.	The minutes of the meeting were not available

	common priorities, share goals, agree on tactics and undertake joint monitoring.						
4.2 How involved were other stakeholders in the design of programmes and policies with regards integrated water resource management?	Section 4 (a) of the NWRMA Act, 2017. Principle 1 of Dublin-Rio Principles, the Dublin Statement on Water and Sustainable Development, 1992.	Programmes and policies, NWRMA Regional offices, district councils, Water Utility companies, communities in vulnerable areas, Waste Landfills	Minutes of joint stakeholder meetings, programmes and policies implementation reports, joint monitoring reports	Interviews, document review, FGDs, and site inspections	Interview and FGDs summaries, trend analysis	Exclusion of PSAs involved in the planning, design and implementation of programmes and policies No functional NWRMA regional offices as well as the absence of Water Basin Management Boards (WBMB)	Low coverage of stakeholders

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