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Embedding Environmental, Social and Governance (ESG) Principles in Public Water Utilities for Environmental Sustainability and Climate-Resilient Development: The NWSC Experience in Uganda

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Abstract

Background: Environmental, Social and Governance (ESG) principles provide a useful framework for examining how institutions manage environmental impacts, social inclusion and accountability. Although ESG is frequently discussed in private-sector and investment contexts, public water utilities are central to ESG implementation because they influence water security, sanitation, environmental protection, catchment management, climate resilience and inclusive development.

Objective: This study examines how the National Water and Sewerage Corporation (NWSC) integrates ESG principles into public water utility operations and institutional governance in Uganda, with emphasis on environmental sustainability and climate-resilient development.

Methods: The study adopted a qualitative institutional case study and policy analysis approach. Data were drawn from NWSC integrated annual reports, environmental and corporate governance documentation, programme records, institutional publications, sector reports and observational insights from programme implementation between 2022 and 2025. A descriptive thematic analysis was used to examine how NWSC practices align with the environmental, social and governance pillars.

Results: NWSC has embedded environmental principles through tree planting, water source protection, catchment management, wastewater treatment, non-revenue water reduction and resource-efficiency efforts. Social principles are reflected in inclusive service delivery, public standpipes, community engagement, school outreach, occupational health and safety, workforce development and gender and youth inclusion initiatives. Governance principles are reflected in corporate governance structures, audited annual reporting, performance management, regulatory compliance and accountability mechanisms. Programme records indicate that NWSC serves about 18 million people in over 270 towns, has installed more than 21,600 public standpipes, operates wastewater treatment infrastructure including the Lubigi plant with a treatment capacity of about 45,000 m³/day, and has planted more than 5.8 million trees under environmental conservation initiatives.

Conclusion: NWSC's experience demonstrates that ESG can function as a practical public utility governance framework for strengthening environmental sustainability, social inclusion, institutional accountability and climate-resilient development. The case highlights the value of mainstreaming ESG into public water utility strategy, performance management and service delivery in Uganda and comparable contexts.

Keywords: Environmental, Social and Governance, ESG, Public Water Utilities, Environmental Sustainability, Climate Resilience, Water Governance, Inclusive Development, Uganda, NWSC.

Introduction

Water utilities operate at the intersection of environmental sustainability, social welfare and institutional accountability. Their operational decisions influence the availability and quality of water resources, the resilience of sanitation systems, the protection of ecosystems, and the capacity of communities to withstand climate-related risks. As countries pursue sustainable development, the governance of public utilities has therefore become central to environmental protection, inclusive growth and climate-resilient service delivery. Environmental, Social and Governance (ESG) principles offer a structured way to examine these responsibilities. The environmental pillar focuses on resource stewardship, pollution control, climate resilience, biodiversity protection, water source protection, energy efficiency and responsible infrastructure planning. The social pillar concerns inclusion, equity, occupational safety, community

engagement, affordability, human capital development and stakeholder welfare. The governance pillar concerns accountability, transparency, ethical leadership, performance management, compliance, risk management and institutional oversight. While ESG is often associated with corporate reporting and investment decision-making, the framework is increasingly relevant to public institutions that deliver essential services and manage public resources.

In the water sector, ESG is particularly relevant because sustainable water and sanitation services require environmental protection, social inclusion and accountable governance to be addressed together. Sustainable Development Goal 6 emphasizes universal and equitable access to safe and affordable drinking water, sanitation, hygiene, water quality improvement, wastewater management, water-use efficiency and integrated water resources management [1]. Similarly, water governance frameworks emphasize effectiveness, efficiency, trust, stakeholder participation and accountable institutions [2]. Public water utilities must therefore operate not only as infrastructure providers but also as environmental stewards, public health enablers and governance actors. Uganda's National Water and Sewerage Corporation (NWSC) provides a useful public-sector case for examining ESG integration in a developing-country water utility context. NWSC is responsible for water supply and sewerage services across numerous towns and municipalities and has expanded its service mandate while implementing environmental, social and governance initiatives. These include catchment protection, tree planting, wastewater treatment, non-revenue water reduction, public standpipes, workforce development, community engagement, performance management, corporate governance systems and audited public reporting.

This paper develops the conference presentation entitled "Embedding Environmental, Social and Governance (ESG) Principles in Public Water Utilities: The NWSC Experience in Advancing Inclusive and Climate-Resilient Development in Uganda," presented during Uganda Water and Environment Week 2026, into a full-length journal manuscript. It examines how ESG principles are operationalized in a public water utility context and draws lessons for environmental sustainability, climate-resilient development and accountable public service delivery.

Objectives

The study was guided by the following objectives:

- To examine how ESG principles are operationalized within a public water utility context.
- To assess how ESG-aligned practices contribute to environmental sustainability, social inclusion and governance effectiveness at NWSC.
- To document lessons on the applicability of ESG as a governance framework for public water utilities in developing-country contexts.
- To identify opportunities for strengthening ESG reporting, monitoring and climate-resilient water utility management.

Materials and Methods

Study Design

The study adopted a qualitative institutional case study and policy analysis approach. This design was selected because the purpose of the study was to document and interpret ESG integration in a functioning public utility rather than to test a controlled intervention. The case study approach enabled the analysis of institutional practices, programme outputs, governance systems and policy relevance within their real-world context.

Study Setting

The study focused on the National Water and Sewerage Corporation of Uganda. NWSC is a public water utility with responsibility for water supply and sewerage service delivery across its operational areas. The corporation operates in a context characterized by rising urbanization, increasing demand for safe water and sanitation, climate-related pressure on water resources, infrastructure expansion needs and growing public expectations for accountable service delivery.

Data Sources

Data were obtained from institutional and documentary sources. These included NWSC Integrated Annual Reports, corporate governance frameworks, environmental management programmes, institutional publications, programme reports, sector reports and observational insights from programme implementation. The analysis focused on ESG-related institutional practices documented between 2022 and 2025, with additional reference to key indicators reported in the NWSC Integrated Annual Report FY 2023/2024 and the UWEWK 2026 ESG conference poster.

Analytical Approach

A descriptive thematic analysis was used to examine how NWSC practices align with the environmental, social and governance pillars. The analysis involved identifying institutional practices under each ESG pillar, summarizing reported programme outputs and interpreting their contribution to environmental sustainability, social inclusion, climate resilience and governance effectiveness. Quantitative indicators were treated as institutional output indicators rather than independent impact evaluation results.

Ethical Considerations

The study relied on institutional reports, published information, programme records and professional observational insights. It did not involve clinical data, personal health records, individual human-subject interviews or identifiable personal information. Future studies that collect individual-level data from staff, customers or communities should obtain the necessary ethical approvals, institutional permissions and informed consent.

Results

Overview of ESG Integration within NWSC

The analysis shows that NWSC's institutional practices can be organized under the three ESG pillars. The environmental pillar is reflected in catchment protection, tree planting, wastewater treatment, resource efficiency and non-revenue water reduction. The social pillar is reflected in inclusive access, public standpipes, customer and community engagement, workforce development, occupational safety and youth and gender inclusion. The governance pillar is reflected in corporate governance structures, audited annual reporting, performance management, regulatory compliance, internal accountability and stakeholder engagement.

Table 1: ESG Alignment of Selected NWSC Institutional Practices.

ESG Pillar	Selected NWSC Practices	Contribution to Environmental Sustainability and Climate-Resilient Development
Environmental	Tree planting, water source protection, catchment management, wastewater treatment, environmental compliance, resource efficiency, non-revenue water reduction.	Supports ecosystem protection, water security, reduced losses, pollution control and resilience of water and sanitation systems.
Social	Public standpipes, inclusive service delivery, community engagement, sanitation campaigns, school programmes, occupational health and safety, workforce development, gender and youth inclusion.	Improves equitable access, community welfare, stakeholder participation, human capital development and social legitimacy of utility operations.
Governance	Board oversight, executive management structures, audited annual reports, internal audit mechanisms, performance management programmes, compliance systems and stakeholder accountability.	Strengthens transparency, trust, regulatory compliance, operational performance and long-term institutional sustainability.

Environmental Pillar: Environmental Stewardship and Climate Resilience

NWSC has embedded environmental principles through water source protection initiatives, environmental compliance mechanisms, catchment management, tree planting, wastewater treatment and resource efficiency programmes. These initiatives recognize that water utility sustainability depends on the protection of ecosystems and water resources from which water supply systems draw. One of the most visible environmental interventions is tree planting and catchment protection. Programme records indicate that NWSC has planted more than 5.8 million trees under environmental conservation initiatives. These actions are linked to broader efforts to protect water sources, stabilize catchments and strengthen climate resilience. Tree planting is particularly relevant to public water utilities because catchment degradation, deforestation and climate variability can affect water availability, water quality and treatment costs.

Wastewater treatment is another important environmental sustainability function. The Lubigi wastewater treatment plant is reported to have a treatment capacity of about 45,000 m^3 per day. Wastewater treatment contributes to pollution control, protection of receiving environments and the circular management of water resources. It also demonstrates the link between sanitation infrastructure, urban environmental management and water ecosystem protection. NWSC has also pursued non-revenue water reduction. The ESG poster reported reduction of non-revenue water from above 60% to approximately 32%. Although further independent verification and trend analysis would strengthen this evidence, reduction in non-revenue water is environmentally significant because it improves resource efficiency, reduces unnecessary abstraction, lowers production losses and supports operational sustainability.

Social Pillar: Inclusive Service Delivery and Stakeholder Welfare

The social pillar is reflected in NWSC's service expansion, public standpipe programme, workforce development, occupational safety systems, community outreach and inclusion initiatives. Public water utilities carry a social mandate because safe and reliable water and sanitation services directly affect households, schools, workplaces, health facilities and vulnerable communities. Programme data indicate that NWSC serves about 18 million people in more than 270 towns and has installed over 21,600 public standpipes. Public standpipes are important social infrastructure because they support access for communities and customers who may not yet have individual household connections. In ESG terms, such initiatives demonstrate the link between utility performance, social equity and inclusive development.

NWSC's social practices also include school programmes, sanitation campaigns and customer engagement platforms that promote responsible water use, hygiene practices and environmental stewardship. These initiatives expand the utility's contribution beyond service provision into public education, behavioural change and community participation. They also provide channels through which customers and communities can better understand water conservation, sanitation and environmental protection. Workforce-related social practices include occupational health and safety, human capital development and capacity building. The poster records a workforce size of more than 3,000 employees, while the manuscript notes the corporation's significant investment in staff capacity across operational areas. A competent, motivated and protected workforce is central to safe water and sanitation service delivery, emergency response, asset management and customer service.

Governance Pillar: Accountability, Performance and Institutional Oversight

Governance principles are reflected in ethical leadership standards, transparency measures, performance management, regulatory compliance, internal audit and stakeholder accountability. NWSC operates through a structured governance system that includes board oversight, executive management structures, internal accountability mechanisms and annual reporting. The corporation's annual reports are audited by the Auditor General, which strengthens public accountability and transparency.

Performance management is also central to the governance pillar. Institutional reform and performance programmes, including SCAP100, are reported as part of NWSC's governance and performance improvement mechanisms. Such programmes can support operational discipline, target setting, accountability and continuous improvement. In the context of ESG, performance management helps translate sustainability objectives into measurable institutional action. Governance is particularly important for public utilities because they manage public resources, serve diverse stakeholders and operate within regulatory and public-sector accountability systems. Effective ESG implementation therefore requires more than environmental projects or social outreach; it requires governance systems that embed ESG into strategy, budgeting, reporting, risk management, procurement, compliance and decision-making.

Table 2: Selected ESG Indicators from NWSC Programme Records and UWEWK 2026 Poster.

Pillar	Indicator	Reported statistic	Interpretation
Environmental	Trees planted	More than 5.8 million trees	Supports catchment protection and climate resilience.
Environmental	Wastewater treatment capacity	Lubigi plant: about 45,000 m^3/day	Supports pollution control and urban environmental management.
Environmental	Non-revenue water	Reduced from above 60% to approximately 32%	Indicates improved resource efficiency and operational sustainability.
Social	Public standpipes	More than 21,600 public standpipes	Supports inclusive access to water services.
Social	Population served	About 18 million people	Reflects the scale of utility contribution to national development.
Governance	Towns served	More than 270 towns	Reflects the scale of governance and service delivery coverage.
Governance	Accountability mechanism	Annual reports audited by Auditor General	Supports transparency and public-sector accountability.

Discussion

The findings show that ESG can be a practical governance and sustainability framework for public water utilities. Although ESG is often discussed in the context of private companies, investors and corporate reporting, the NWSC case demonstrates that public utilities also operate within environmental, social and governance responsibilities. For a water utility, the environmental pillar is not peripheral; it is directly connected to water source protection, wastewater treatment, catchment management, climate resilience and resource efficiency. The environmental pillar is especially significant because water utilities depend on ecological systems that are increasingly exposed to climate variability, land-use change, pollution and urban growth. Tree planting, catchment protection and wastewater treatment are therefore not merely corporate social responsibility activities.

They are strategic interventions that can support long-term water security, reduce environmental degradation and improve resilience of water and sanitation infrastructure. This aligns with international sustainability thinking that treats water as a shared resource requiring responsible management and disclosure of water-related impacts [3]. The social pillar is also fundamental to water utility sustainability. Access to water and sanitation is linked to dignity, health, education, productivity and inclusive development. Public standpipes, service expansion, community engagement and school outreach show how water utilities can respond to social inclusion within their operational mandate. In developing-country contexts, utility ESG frameworks must therefore pay attention to vulnerable customers, affordability, community trust, customer education and equitable infrastructure expansion.

The governance pillar provides the institutional foundation for both environmental and social performance. Without governance systems, ESG risks becoming a collection of isolated initiatives rather than a mainstreamed approach to decision-making. NWSC's use of corporate governance structures, audited annual reporting, performance management and accountability mechanisms demonstrates how ESG can be institutionalized within public utility management. This supports the broader water governance view that effective, efficient and inclusive governance is necessary for sustainable water outcomes [2].

A key lesson from the NWSC experience is that ESG should be embedded into the core strategy of public utilities rather than treated as a reporting exercise. ESG integration should influence infrastructure planning, catchment management, customer service, human resource development, procurement, risk management, finance, performance contracts and public reporting. For utilities facing climate risks, ESG can also provide a framework for linking environmental resilience, operational efficiency and social equity. The case also contributes to debates on utility transformation. The World Bank's Utility of the Future approach emphasizes innovative and strategic utility management to improve operational efficiency, resilience, adaptability and inclusive service delivery [4]. NWSC's experience is consistent with this direction because the corporation's ESG-aligned practices combine institutional reform, environmental action, service expansion and accountability. The implication is that ESG can complement utility modernization by adding a sustainability and stakeholder-accountability lens to performance improvement.

However, the NWSC case also shows the need for more systematic ESG monitoring and reporting. The available indicators demonstrate scale and institutional action, but future reporting could be strengthened by using clearer ESG metrics, baseline comparisons, annual trend analysis, independent verification and outcome indicators. For example, environmental reporting could include catchment condition indicators, wastewater treatment performance, energy efficiency, water quality compliance and greenhouse gas considerations. Social reporting could include access indicators, vulnerable customer support, gender and youth participation, occupational safety outcomes and stakeholder satisfaction. Governance reporting could include ethics, procurement transparency, risk management, board oversight, grievance handling and compliance performance.

Policy and Practice Implications

The NWSC experience offers several implications for public water utilities and environmental governance institutions. First, ESG should be mainstreamed into institutional strategy, performance management and reporting rather than treated as an external or private-sector concept. Second, environmental sustainability should be directly connected to utility operations, including source protection, wastewater treatment, non-revenue water reduction and climate-resilient infrastructure planning. Third, social inclusion should be treated as a core utility responsibility, particularly in relation to affordable and equitable access, public standpipes, customer engagement and community education. Fourth, governance systems should provide the accountability architecture needed to sustain ESG commitments over time. For policy makers, the case suggests that ESG can be used as a public-sector governance lens for aligning water utility performance with sustainable development, climate resilience and inclusive growth. For utilities, ESG reporting can help communicate institutional value beyond financial performance by showing contributions to environmental protection, social welfare and accountable public service delivery.

Limitations

This study has several limitations. First, it is based on a qualitative institutional case study and therefore does not establish causal relationships between specific ESG practices and environmental or social outcomes. Second, the data are primarily drawn from institutional records, annual reports, programme documentation and observational insights. Third, some reported indicators are output indicators, such as number of trees planted, public standpipes installed or towns served, and do not independently measure long-term environmental or social impact. Fourth, the study does not include interviews with customers, staff, regulators or community stakeholders, which would provide additional perspectives on the effectiveness of ESG practices. Fifth, some programme figures may change over time as NWSC operations expand, so future studies should verify indicators against the most recent official reports.

Conclusion

The NWSC experience demonstrates that ESG principles can be meaningfully applied within public water utilities to support environmental sustainability, social inclusion, accountable governance and climate-resilient development. The case shows that ESG is not limited to private-sector investment or corporate disclosure. It can also function as a practical public-sector governance framework for institutions responsible for essential environmental services. Through water source protection, tree planting, wastewater treatment, non-revenue water reduction, public standpipes, community engagement, workforce development, audited reporting and performance management, NWSC illustrates how a water utility can embed ESG into institutional practice. The experience provides lessons for Uganda and comparable contexts where public utilities must balance service expansion, environmental protection, social equity and accountability.

Future research should strengthen the evidence base by assessing long-term environmental outcomes, customer and community perspectives, staff welfare indicators, climate resilience metrics and the extent to which ESG integration improves utility performance. A more formal ESG monitoring and reporting framework would further support accountability, comparability and learning across public water utilities.

Declarations

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Competing Interests

The author is an employee of the National Water and Sewerage Corporation, the institution discussed in this manuscript. This affiliation is disclosed. The author declares no other competing interests.

Author Contribution

Brownie Ebal conceptualized the study, reviewed institutional materials, interpreted the ESG framework and prepared the manuscript.

Data Availability

The data summarized in this manuscript are drawn mainly from publicly available NWSC Integrated Annual Reports, institutional publications, conference materials and other published sources. No unpublished dataset, confidential record or identifiable personal data is reproduced in the manuscript. Detailed institutional records may be available from NWSC subject to internal approval and applicable data governance requirements.

Permissions and Source Material

This manuscript does not reproduce photographs, proprietary datasets or restricted documents. The NWSC annual reports and other institutional reports cited are publicly available online and are used as cited documentary sources. Any unpublished institutional information referred to in the manuscript is presented only at a non-confidential summary level.

Ethics Statement

This manuscript reports an institutional case study based on documentary and programme information. It does not include individual-level human-subject data, clinical data or identifiable personal information. Any future study involving individual interviews, surveys or customer/staff-level data should obtain appropriate ethical clearance, institutional permissions and informed consent where applicable.

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