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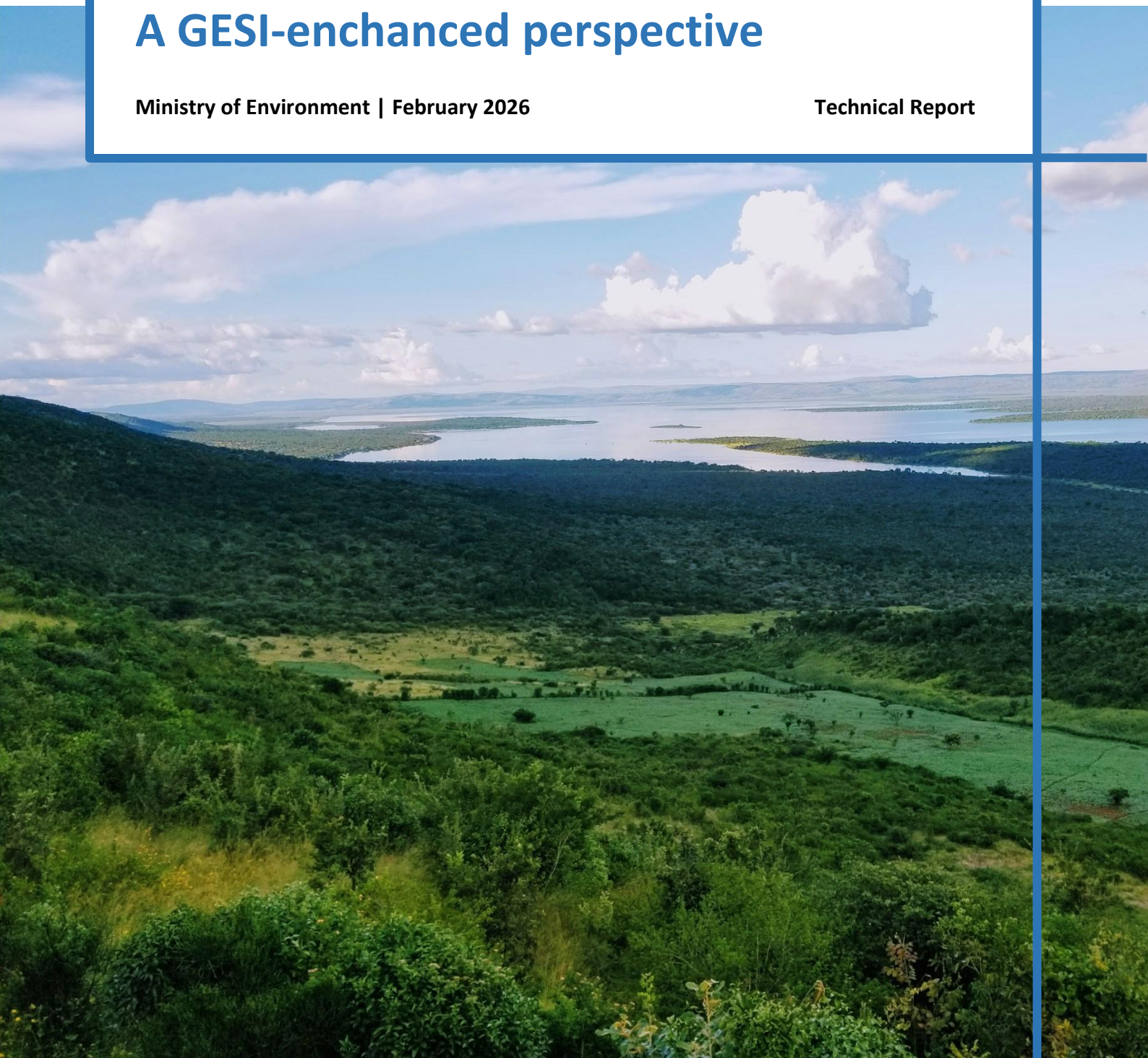
MINISTRY OF ENVIRONMENT

Assessment of Indicators, Baseline Data, and Targets for MEL in Rwanda's Water: A GESI-enchanced perspective

Ministry of Environment | February 2026 **Technical Report**



Technical report: Assessment of Indicators, Baseline Data, and Targets for MEL in Rwanda's Water: A GESI-enhanced perspective

Ministry of Environment, Department of Environment and Climate Change, Kigali, Rwanda
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Executive Summary

Rwanda's third *Nationally Determined Contribution* document (NDC 3.0) places integrated water resources management at the forefront of its green, inclusive, and climate-resilient development agenda. Anchored in Vision 2050, the revised Green Growth and Climate Resilience Strategy 2023 and the second National Strategy for Transformation (NST 2) (2024–2029), the NDC 3.0 aims to achieve the following: (i) rehabilitate over 1 million ha of degraded catchments by 2030, (ii) expand water-quality monitoring from 51 to 76 water bodies by 2030 (and to 101 by 2035), (iii) protect 40% of at-risk households from floods by 2030 (60% by 2035), (iv) double irrigated acreage from 102,000 ha in 2025 to 200,000 ha by 2030, and (v) increase per-capita storage from 5.3 m^3 to 12 m^3 by 2030 and to 17.6 m^3 by 2035.

A gender equity and social inclusion- (GESI-)enhanced assessment conducted by the Ministry of Environment and the National Adaptation Plan (NAP) Global Network has revealed that, while these targets are technically robust, they currently lack explicit measures related to gender, equity, and social inclusion. Existing indicators do not differentiate benefits by gender, disability, or settlement type, nor do they track women's groups or youth cooperatives in restoration activities. Furthermore, most on-the-ground restoration activities have been implemented with the active participation of women's groups—whether in nursery management, community mobilization, or monitoring—yet this vital contribution remains largely unreported in official documentation. Strengthening both quantitative and qualitative reporting on women's roles is therefore essential; it will not only acknowledge their leadership but also guide tailored support, capacity building, and resource allocation going forward. Currently, institutional silos in the Ministry of Environment, Rwanda Water Resources Board, and Rwanda Environment Management Authority insufficiently disaggregate data systems, and the absence of ring-fenced budgets for gender-responsive and disability-inclusive programming further undermines the equity of adaptation outcomes.

To address these gaps, Rwanda will amend the Water Resources Management Law and Environmental and Social Impact Assessment regulations to require disaggregated GESI indicators and enforceable social inclusion plans in all permits and contracts. A Joint GESI Coordination Unit within the Climate, Environment and Natural Resources Sector Working Group will align policy, capacity, and financing, including dedicated budget lines for women's cooperatives, training stipends for persons with disabilities, and youth apprenticeships. By embedding GESI in all legal frameworks, institutional mandates, financing mechanisms, and participatory monitoring, evaluating, and learning, Rwanda will ensure that its water sector adaptation advances ecological resilience and equitable access, control, and benefits for all citizens.

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List of Abbreviations

CENR climate, environment and natural resources sector

ESIA Environmental and Social Impact Assessment

GESI gender equity and social inclusion

GGCRS Green Growth and Climate Resilience Strategy

MEL monitoring, evaluation, and learning

MoE Ministry of Environment

NAP national adaptation plan

NDC nationally determined contribution

NISR National Institute of Statistics of Rwanda

NST National Strategy for Transformation

REMA Rwanda Environment Management Authority

RWB Rwanda Water Resources Board

1. Introduction

Rwanda reaffirms its commitment to a green, inclusive, and climate-resilient development paradigm through its principal policy instruments: *Vision 2050* (Ministry of Finance and Economic Planning, 2020) and the *Green Growth and Climate Resilience Strategy* (GGCRS), originally promulgated in 2011 and revised in 2023 (Ministry of Environment, 2023). These frameworks articulate the government's strategic objective to harness the nation's abundant hydrological endowments—lakes, wetlands, and orographic rainfall—while mitigating the heightened risks of flash flooding, land degradation, and hydrological disequilibrium engendered by rapid urban expansion and climate variability.

Recognizing water as a critical cross-sectoral input underpinning health, agriculture, energy, and biodiversity, the government acknowledges persistent inequities in water access, control and governance. Women, smallholder farmers, and residents of informal settlements in Rwanda face heightened exposure to water-related hazards. Women constitute a large proportion of the agricultural workforce, and female-headed households—comprising 25% of rural households—are more likely to experience food insecurity and limited adaptive capacity (Hitayezu et al., 2021). These GESI-related vulnerabilities exacerbate ecological fragility and undermine national development objectives.

In accordance with the Paris Agreement and its national obligations under the United Nations Framework Convention on Climate Change, Rwanda submitted its updated *Nationally Determined Contribution* (NDC 2.0) in May 2020. Building on that foundation, the NDC 3.0 was prepared to deepen the country's transition toward a just, low-carbon and climate-resilient green economy. This economy is fully aligned with Vision 2050's targets of upper-middle-income status by 2035 and high-income status by 2050. It also integrates the revised GGCRS and the *Second National Strategy for Transformation 2024–2029* (NST2) (Ministry of Finance and Economic Planning, 2024b) and the *Climate, Environment and Natural Resources Sector Strategic Plan* (2024–2029) (Ministry of Environment, 2024) to deliver an economy-wide program of adaptation and resilience.

Under NDC 3.0, integrated water resources management forms the cornerstone of climate adaptation in the water sector. This approach is prioritized because it enables coordinated development and management of water, land, and related resources across sectors to maximize social and economic welfare without compromising the sustainability of ecosystems. The program will rehabilitate over 1 million ha of degraded catchments by 2030, employing terracing and agroforestry to attenuate runoffs, enhance flood protection, and regulate dry-season flows. Concurrently, water-quality monitoring will be expanded from 51 to 76 water bodies by 2030 (and to 101 by 2035), while flood-protection measures will shield 40% of at-risk households by 2030 and 60% by 2035. To bolster agricultural resilience, irrigated area will increase from 102,000 ha in 2025 to 200,000 ha by 2030, thereby securing food production amid rainfall variability (Republic of Rwanda, 2025).

To ensure that these technical interventions yield equitable social outcomes, the Ministry of Environment (MoE), in partnership with the National Adaptation Pan (NAP) Global Network, has conducted a comprehensive gender equity and social inclusion- (GESI-)enhanced assessment of NDC 3.0 indicators, baselines, and targets for monitoring, evaluation, and learning (MEL) within Rwanda's water sector. While the Rwanda Environment Management Authority (REMA) and other institutions

actively contributed to the overall NDC 3.0 review process and participated in the GESI–MEL stakeholder workshop, the assessment itself was led by the MoE. This assessment will inform policy refinement, institutional coordination, and the allocation of resources necessary to deliver both technical efficacy and social resilience.

2. Policy and Institutional Context for Water Resources and GESI

Rwanda's approach to water sector adaptation is anchored in a cohesive and multi-tiered policy framework that elevates GESI to the core of national development. Table 1 provides a concise overview of Rwanda's key policies, laws, and institutional arrangements that embed GESI within the water sector, along with the remaining gaps that must be addressed to ensure truly inclusive and resilient water-resource management.

Table 1. Policy and institutional framework for water resources and GESI integration in Rwanda

Instrument/Institution	Role and GESI integration	Remaining gaps
NST2 (2024–2029) **(Ministry of Finance and Economic Planning, 2024b)**	Sets the overarching vision for a resilient environment; mandates GESI indicators and gender-responsive financing in all sector plans	Enforcement mechanisms for downstream data disaggregation and budget ring-fencing are currently inadequate.
Climate, Environment and Natural Resources (CENR) Sector Strategic Plan (2024–2029) (MoE, 2024)	Operationalizes NST2 and NDC commitments within the CENR sector; embeds GESI through inclusive adaptation priorities, community-level resilience actions, and targeted support to vulnerable groups	GESI indicators remain unevenly costed and monitored. There is limited capacity at decentralized levels to systematically track distributional and gender-differentiated outcomes.
GGCRS (MoE, 2023) and Water Resources Law No 49/2018 (Republic of Rwanda, 2018a)	Translates strategy into sector actions; codifies equitable allocation, environmental flows, and pollution control	Social inclusion plans and disaggregated social targets are not yet mandatory in permits and project approvals.
Environment Law No 04/2018 (Republic of Rwanda, 2018b)	Requires Environmental and Social Impact Assessments (ESIAs) for major water infrastructure with explicit GESI risk analysis	ESIA follow-up and reporting on social outcomes are inconsistent.[1]
MoE/Rwanda Water Resources Board (RWB)/REMA/CENR Sector Working Group	MoE leads policy; RWB manages permits and hydrology; REMA enforces ESIA compliance; CENR Sector Working Group coordinates across agencies and will integrate GESI into the 2021–2050 Master Plan	There are currently functional silos, a lack of unified MEL with social–technical metrics; and no ring-fenced funds or fully disaggregated data.

Source: Compiled by the authors from Ministry of Environment, 2023, 2024; Ministry of Finance and Economic Planning, 2024; Water Resources Law No. 49/2018 on the use and management of water resources in Rwanda, Law No. 04/2018 on Environment, and institutional mandates of the MoE, RWB, REMA, and the CENR Sector Working Group.

[1] This is evidenced by assessments, such as the East African Network for Environmental Compliance and Enforcement and Netherlands Commission for Environmental Assessment (2024) and Habineza (2021), on bridging the ESIA implementation gap in Rwanda.

The policy landscape summarized above illustrates how Rwanda has, at each tier of its governance architecture, sought to mainstream GESI into water sector adaptation. At the highest level, the 2019 National Environment and Climate Change Policy establishes the government's vision of a "clean and healthy environment, resilient to climate variability and change, that supports a high quality of life for its society" (MoE, 2019). This vision is operationalized through the NST2, which explicitly integrates environmental sustainability and climate resilience as cross-cutting priorities essential to achieving the goals of Vision 2050. By mandating that all sector plans—including those for water supply, sanitation, irrigation, and catchment management—incorporate GESI indicators and dedicated financing for gender-responsive interventions, NST2 ensures that inclusive development remains a non-negotiable dimension of its implementation (MoE, 2024).

Within this strategic architecture, the revised GGCRS (2023) and the CENR Sector Plan (2024-2029) translate overarching objectives into concrete sectoral actions. The Water Resources Law No 49/2018 codifies principles of equitable allocation, user registration, protection of environmental flows, and pollution control, while Environment Law No 04/2018 requires that all major water-related infrastructure projects undergo ESIAs, with explicit analysis of GESI risks and opportunities (World Bank, 2018). The Revised National Gender Policy (Ministry of Gender and Family Promotion, 2021) further reinforces water security as a pillar of gender equality, calling for the equitable participation of women, youth, and persons with disabilities in water governance, service delivery, and benefit-sharing mechanisms.

The implementation responsibility is shared across the following institutions: (i) the MoE, which leads policy formulation and national coordination; (ii) the RWB, which administers permits and oversees hydrological monitoring and basin restoration; (iii) the REMA, which oversees compliance and ESIA enforcement; and (iv) local governments, which serve as frontline actors in the execution of water-related activities, including community mobilization, land-use enforcement, and the implementation of catchment and wetland rehabilitation programs. Although institutional mandates are clearly delineated, functional silos and uneven resource allocation have hindered the establishment of a unified MEL system that captures both technical and social outcomes. Water sector budgets have yet to allocate ring-fenced funds for women's cooperatives, disability-inclusive training programs, or youth apprenticeships in catchment rehabilitation, and data systems remain insufficiently disaggregated by gender, age, disability, or settlement type.

To address these gaps, the government will strengthen inter-agency coordination through the CENR Sector Working Group, mandate the incorporation of GESI indicators into the National Water Resources Master Plan (2021–2050), and require all water-sector MEL reports to include social vulnerability analyses. By aligning policy, institutional roles, and resource flows around an enhanced GESI framework, Rwanda will safeguard its hydrological assets and the rights, livelihoods, and resilience of all its citizens.

3. Review of Indicators, Baseline Data, and Targets in Water Resources

In early 2025, Rwanda convened a series of high-level consultations, engaging both national ministries and district authorities, to rigorously review and validate the adaptation indicators underpinning its water sector commitments in NDC 3.0. Between March and April 2025, the workshops held in Kigali identified six priority interventions, each paired with ambitious baselines and phased targets that align with the GGCRS and other strategic documents, such as NST2. Table 2 captures Rwanda's technical ambitions, in which the true measure of success will lie in embedding equity into each metric, ensuring that water adaptation not only meets volumetric and ecological targets but also advances the resilience and dignity of all Rwandans.

Table 2. Core water-resource adaptation indicators (validated April 2025)

Intervention	Indicator	Baseline[2] (2023/2024)	Target 2030	Target 2035	Lead agencies
Water storage and efficient use	Water storage per capita (m^3/person)	5.3	12	17.6	**RWB**, Ministry of Agriculture and Animal Resources, REMA
Artificial storage expansion	Artificial water storage per capita (m^3)	5.8	45	55	**RWB**, MoE, Water and Sanitation Corporation, private sector
Water quality and pollution control	Water bodies monitored for water quality and quantity	51	76	101	**RWB**, MoE, REMA
Flood protection	% of households in flood-prone areas protected	9%	40%	60%	**MoE**, ministry in charge of emergency management, Ministry of Infrastructure, RWB, local governments
User compliance and governance	Registered water users complying with permits and environmental fees	1,020	1,500	2,000	**RWB**, MoE
Catchment restoration	Hectares restored through agroforestry/terracing	332,861	550,000	640,000	**RWB**, Rwanda Forestry Authority, REMA
Ecosystem rehabilitation	Area of degraded wetlands and riparian zones restored (ha)	1,852	3,300	4,414	**REMA,** MoE, RWB

Source: Ministry of Environment, 2025.

Although these indicators are technically robust and provide clear milestones for storage, monitoring, protection, and restoration, none of them includes explicit measures of social inclusion. For instance, the water storage targets do not distinguish between rural and urban households, nor do they account for how women-headed or disability-affected families fare. Moreover, catchment restoration goals

[2] All indicators, baselines, targets, and lead agencies are derived from the updated *Nationally Determined Contribution (NDC 3.0)*, which is accessible online.

ignore female employment or youth-led cooperative participation, and there is no mechanism to assess whether informal water users, who are often the most vulnerable, can navigate permit procedures or benefit from fee structures.

In individual interviews during consultations, this omission resonates sharply. In an interview, an official from the National Institute of Statistics of Rwanda (NISR) remarked, "Our surveys tell us who has a piped connection, but they remain silent on whether that access translates into real improvements for women, youth or persons with disabilities." Her observation underscores a critical chasm between infrastructure achievements and lived experiences. Similarly, a respondent from REMA pointed out: "We can quantify hectares restored or households shielded from floods. However, without gender or disability disaggregation, we cannot confirm that those most at risk are genuinely benefiting." The voices of these two officials echo the results of recent UN-Water analyses (2022), which warn that nominal coverage statistics can mask deep inequalities.

Beyond indicator design, interviews conducted during the consultations revealed entrenched constraints in the data system. Although the NISR prides itself on employing instruments capable of showing gender and age disaggregation, REMA's officer described the stigma around disability as "a barrier that dissuades open disclosure," leading to underreporting in rural communities. The Ministry of Agriculture and Animal Resources' environment and climate change specialist added that "in the absence of reliable baselines on the use of irrigation by women and/or the youth and their roles in water committees, we lack reference points needed to gauge real change." Compounding these social obstacles, rural information and communications technology gaps force enumerators to revert to paper surveys, delaying analysis and degrading data integrity. Meanwhile, the RWB's confident assertion during the stakeholder consultations conducted as part of this assessment that "we face no challenges" suggests an institutional blind spot, with a risk of overlooking realities at the frontline of implementation. Comparable tensions between institutional narratives and on-the-ground experience have been observed by the Organisation for Economic Co-operation and Development (2021) in other policy arenas.

During the recent stakeholders' workshop on capacity building for district officials on the MEL of climate adaptation Phase 3, several participants noted that women's groups are responsible for most on-the-ground restoration activities, including nursery management, community mobilization and monitoring, yet these contributions are largely absent from official reports. Strengthening both quantitative and qualitative reporting on women's roles is therefore essential, not only to recognize and value their leadership, but also to inform more targeted capacity building, resource allocation, and policy support.

To bridge these gaps, stakeholders uniformly called for an integrated, rights-based approach.

First, gender, youth, and disability provisions must be formally enshrined in the 2018 Water Resources Law. Every adaptation grant or permit should be contingent on a mandatory Social Inclusion Plan, with disaggregated targets for women, young people, and persons with disabilities that embed accountability at the point of project approval.

Second, dedicated budget lines should be established for initiatives led by women's cooperatives and disability-focused organizations. Evidence from international climate finance mechanisms

demonstrates that ring-fenced funds not only improve targeting but also deliver co-benefits, such as local employment generation and enhanced nutrition outcomes.

Third, Rwanda's MEL architecture must evolve into a genuinely participatory system. As REMA's respondent urged, we must "move from extractive surveys to genuine dialogue" by convening district-level Water Monitoring Committees with rotational leadership among representatives of women, youth, and persons with disabilities. Complementing this, an official from the NISR recommended "quarterly reflection workshops" in which national agencies, district authorities, and community delegates collaboratively interpret data, adapt interventions, and share Indigenous Knowledge—aligning with the International Union for Conservation of Nature's 2023 best practices in adaptive management.

4. Assessment of Adaptation Outcomes From a GESI Perspective

Rwanda's NDC 3.0 has set forth technically rigorous targets for water storage, flood protection, and ecosystem rehabilitation. Yet when examined through a GESI lens, adaptation outcomes reveal critical gaps in who benefits, who participates, and how success is measured. Drawing on stakeholder interviews, field observations, and comparative studies both within Rwanda and internationally, this assessment explores (i) differential access and control, (ii) the distribution of economic benefits from restoration, and (iii) the depth of community participation. Each of these focal areas is underpinned by academic and policy evidence for stronger, more inclusive adaptation.

4.1 Differential Access and Control

Rwanda's commitment to expand per-capita storage from 5.3 m^3 to 17.6 m^3 by 2035 and to protect 60% of flood-prone households reflects laudable engineering ambition (MoE & RWB, 2025). However, aggregate statistics mask persistent inequities. As an NISR statistician emphasized during consultations, "We may report that 40% of households in Kigali's wetlands now have flood embankments, but our surveys do not reveal whether that protection extends to female-headed or disability-affected households." Similar patterns emerged in Uganda, where aggregate water-supply gains concealed a 30% access gap for women-headed households (Hay, 2021).

The Revised National Gender Policy (Ministry of Gender and Family Promotion, 2021) articulates the imperative of equitable access to water. Indeed, the *EICV7 Thematic Report: Utilities and Amenities 2023/24* found that, on average, women spent 1.5 hours per day collecting water, a burden unchanged since 2019, despite overall improvements in connectivity (NISR, 2025). Internationally, the UN-Water's Equity-Adjusted Water Access Index demonstrates that without vulnerability weighting—prioritizing the poorest quintile and persons with disabilities—coverage figures can overstate true inclusion by up to 20% (UN-Water, 2022). Adopting such an index in Rwanda would allow the MoE and RWB to report not only the volume of water stored per person, but also who actually benefits.

4.2 Distribution of Economic Benefits From Restoration

Catchment restoration will expand from 332,861 ha in 2023 to a projected 640,000 ha by 2035, yet the socio-economic dimensions of this work remain under-captured. Again, an official from REMA notes, "We restore hillsides with terraces, but we do not track whether women's cooperatives or youth groups are employed or contract earners." Rwanda's pilots in 2018 demonstrated that when restoration contracts explicitly targeted women's groups, women accounted for 45% of the total labour days, and their average incomes rose by 35% over three seasons (United Nations Environment Programme, 2022). Comparable evidence from Nepal indicates that gender-responsive agroforestry initiatives generate significantly higher job retention and spill-over benefits when combined with microcredit for women's collectives (Rosen & Giroux, n.d.).

Without tracking the proportion of restoration wages paid to women, youth, and persons with disabilities, Rwanda cannot assess whether its greening agenda functions as a pro-poor and pro-

gender economic driver. The World Bank (2020) argues that ring-fenced budget lines for women-led restoration not only improve targeting but also catalyze co-benefits such as enhanced household nutrition and diversified income streams. Embedding indicators such as "percentage of restoration contracts held by women's or youth cooperatives" into the NDC monitoring framework would align practice with international best practice and Rwanda's own NST2 commitment to equitable livelihoods (Ministry of Finance and Economic Planning, 2024).

4.3 Depth of Community Participation

The design of district-level Water Monitoring Committees, such as rotating leadership among women, youth, and persons with disabilities representatives, signals progress toward participatory MEL. However, participatory structures alone do not guarantee influence. In Ghana's Volta Basin, for example, women comprised 40% of the basin board membership on paper, but qualitative research found they were largely excluded from agenda-setting and decision-making processes (Quansah et al., 2019). Rwanda's experience with radio-feedback loops during the Wetlands and Poverty Reduction Project in 2022 suggests that when community dialogues are moderated by trained women facilitators and conducted in local vernaculars, reporting rates rise by 60% and the data collected reflect authentic priorities (Rwanda Wetlands and Poverty Reduction Project, 2022). The adaptive management theory underscores the importance of "iterative reflection workshops," in which quantitative data are paired with local narratives, enabling co-learning among agencies and communities (Gross et al., 2016).

4.4 Cross-Cutting Insights and Suggestions

A GESI-focused assessment makes it clear that technical achievements in storage, restoration, and protection must be complemented by measures that

- disaggregate outcome data by sex, age, disability, and settlement type, adopting indices such as UN-Water's Equity-Adjusted Water Access;
- track economic inclusion through contractual metrics for women's and youth cooperatives in restoration and infrastructure work; and
- institutionalize participatory MEL via iterative workshops, mediated feedback loops, and formal "Community Insights" reporting requirements.

It is only by embedding these dimensions into Rwanda's NDC monitoring that the country can transform its water sector adaptation from a narrowly technical pursuit into a genuinely inclusive process, thereby safeguarding both ecosystems and the dignity, livelihoods, and agency of all Rwandans.

5. Conclusion and Recommendations

5.1 Conclusion

Rwanda has established a clear and coherent policy trajectory for water sector climate adaptation, anchored in Vision 2050, the revised GGCRS of 2023, and NST2 of 2024. Under NDC 3.0, the nation has set ambitious targets for catchment rehabilitation, water-quality monitoring, flood protection, and irrigation expansion, which, when combined, promise strengthened hydrological resilience.

However, this assessment has demonstrated that without explicit GESI dimensions (including vulnerability-weighted access metrics, gender- and youth-inclusive economic opportunities, and genuine community-driven governance), these technical accomplishments risk perpetuating existing inequities. Aggregate indicators, no matter how robust they are, fail to reveal whether women, persons with disabilities, informal settlement dwellers, and other marginalized groups share equitably in new infrastructure or stewardship roles. Similarly, catchment restoration and flood-protection investments may fall short of pro-poor objectives in the absence of contractual safeguards and participatory feedback loops. To ensure that water sector adaptation advances both ecological integrity and social justice, Rwanda must move beyond conventional engineering metrics and embed GESI at every stage of planning, implementation, and evaluation.

5.2 Recommendations

Policy and regulatory reform: The 2018 Water Resources Law should be revised to require all water sector targets, performance indicators, and MEL frameworks to incorporate disaggregated GESI metrics. This will mandate the adoption of an equity-adjusted access index and require restoration contracts to specify minimum thresholds for the participation of women, youth, and people with disabilities. ESIA guidelines should be updated to include mandatory GESI risk and benefit analyses, with noncompliance being sanctioned through enforceable permit conditions.

Institutional and capacity strengthening: The MoE, RWB, and REMA should establish a Joint GESI Coordination Unit within the CENR Sector Working Group to oversee the harmonization of policy, monitoring tools, and capacity building across all levels of government. District administrators and sector ministries must be resourced to conduct gender-responsive planning, manage ring-fenced adaptation budgets, and facilitate community-led restoration initiatives. A national training curriculum on inclusive water governance, which should be developed in collaboration with the National Gender Cluster, will equip officials, community leaders, and water-user associations with the skills required to operationalize GESI commitments.

Financing and resource allocation: Budgetary provisions under NST2 must designate specific line items for gender- and youth-targeted water adaptation measures, including microfinance for women's cooperatives, stipends for community monitors with disabilities, and incentives for private sector partnerships that demonstrate inclusive employment outcomes. Performance-based financing mechanisms, such as linking the disbursement of adaptation grants to the achievement of social inclusion benchmarks, will ensure that one-off allocations translate into sustained GESI results.

MEL enhancement: The national MEL architecture should be reconfigured into a participatory system that combines quantitative data with qualitative community insights. Quarterly reflection workshops convened by the CENR Sector Working Group should bring together government agencies, community representatives, and civil society partners to co-interpret results, share Indigenous Knowledge, and adapt interventions in real time. Mobile and radio-based feedback channels must be scaled to enable marginalized groups to report on service quality, restoration progress, and emerging risks.

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