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A Scaling Strategy for Resilient Nature-Based Water Solutions in Refugee-Hosting Landscapes of East and Horn of Africa and the Great Lakes Region

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Acronyms and Abbreviations

CRS	Catholic Relief Service
GIS	Geographic Information System
IDPs	Internally Displaced Persons
FACS	Fragile and Conflict-Affected areas
IGAD	Intergovernmental Authority on Development
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
IWMI	International Water Management Institute
MEL	Monitoring, Evaluation, and Learning
MENA	Middle East and North Africa
NAPs	National Adaptation Plans
NbS	Nature-Based Solutions
NDCs	Nationally Determined Contributions
NGOs	Non-Governmental Organizations
OECD	Organization for Economic Cooperation and Development
RNBWS	Resilient Nature-Based Water Solutions
RENEW	Resilient Nature-Based Water Solutions for Food Systems and Women's Empowerment
SSA	Sub-Saharan Africa
SWC	Soil and Water Conservation
ToC	Theory of Change
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNHCR	United Nations High Commissioner for Refugees
WHO	World Health Organization
WWF	World Wide Fund for Nature

Summary

Refugee-hosting landscapes in East and Horn of Africa and the Great Lakes region face interconnected environmental, social, economic, and institutional challenges. These challenges arise from land degradation, water scarcity, climate variability, natural resource pressures, livelihood insecurity, displacement, conflict, and limited institutional capacity. Addressing them requires integrated approaches that simultaneously strengthen ecosystems, water security, livelihoods, governance, and resilience. Resilient Nature-Based Water Solutions (RNBWS) combine ecosystem restoration, sustainable water management, and inclusive governance.

This report presents a strategy to scale RNBWS from research and pilot interventions to widespread, sustained adoption across these landscapes. It draws on empirical evidence that identifies interventions, assesses their technical, social, economic, and institutional feasibility, and highlights conditions that enable or constrain scaling. A Theory of Change explains how evidence, financing, supportive policies, institutional capacity, partnerships, and community participation interact to drive adaptation, replication, institutionalization, and sustainability.

The proposed framework adopts a systems perspective, recognizing scaling as more than replicating technologies. It integrates six mutually reinforcing dimensions: technological, institutional, policy, financial, market, and knowledge and learning. Scaling advances through four complementary pathways: horizontal (across landscapes), vertical (through policies and institutions), functional (expanding livelihood and economic opportunities), and diagonal (sharing learning and knowledge across sectors and countries). These pathways progress through three phases: foundation and demonstration; expansion; institutionalization and sustainability.

Effective scaling depends on strong governance and partnerships across regional, national, landscape, community, and knowledge levels. Regional actors facilitate coordination and cross-country learning; national institutions provide policy leadership and mobilize resources; landscape-level stakeholders coordinate implementation; and community organizations support participation, stewardship, and management. Knowledge partners contribute research, innovation, capacity development, and evidence to inform scaling and decision-making.

The strategy aligns financing with the maturity and readiness of RNBWS. Early investments focus on evidence generation, demonstration, capacity development, institutional strengthening, and stakeholder engagement. As approaches mature, financing expands through public, climate, development, blended, and private-sector sources. The implementation pathway supports a gradual transition from demonstration and learning to adaptation, supporting the transition from demonstration to expansion, institutionalization, and sustained adoption.

A Monitoring, Evaluation, and Learning framework supports continuous assessment of progress, outcomes, impacts, and scaling performance. Beyond accountability, it enables adaptive management by generating evidence to identify bottlenecks, strengthen partnerships, improve investments, and refine implementation – keeping scaling decisions responsive to changing conditions and emerging evidence.

Overall, sustainable scaling of RNBWS depends on several enabling factors. These include evidence, policies, institutions, financing, markets, partnerships, community ownership, and learning. These elements must be combined within a coherent framework. Together, they transform research and pilot interventions into long-term, large-scale impacts. Such impacts enhance ecosystem health, water security, resilient livelihoods, and social cohesion. They also advance the empowerment of women and youth. These gains extend across refugee-hosting landscapes in East and Horn of Africa and the Great Lakes region.

1. Introduction

In Sub-Saharan Africa (SSA), increasing pressures arising from climate change, environmental degradation, protracted conflicts, and the resulting mass human displacements threaten both livelihoods and ecosystems (Gayo et al., 2025). This region, particularly East and Horn of Africa and the Great Lakes, hosts 24.7 million forcibly displaced persons, of which 5.7 million are refugees and asylum-seekers, and 19 million are internally displaced persons(UNHCR, 2025). Refugees and internally displaced persons (IDPs) are often found living in landscapes characterized by high levels of environmental fragility, vulnerability to climate shocks, and institutional constraints. The landscapes hosting refugees often offer limited water and other natural resource availability, degraded and unproductive land, poor infrastructure, and inadequate institutional capacity for sustainable management of scarce natural resources (Mekuria et al., 2026). Climate stress, including recurrent droughts and floods, amplifies the limited and already fragile agricultural production and exacerbates the risks of food and water insecurity in these landscapes (Assefa et al., 2020).

Given the multifaceted nature of the problem, conventional sectoral interventions have been hardly able to address these challenges effectively. Recently, Nature-Based Solutions (NbS) have emerged globally as cost-effective approaches for simultaneously addressing climate change adaptation, biodiversity conservation, disaster risk reduction, and food and water security (Walters et al., 2016; Ghaedi et al., 2026). Falling under NbS, Resilient Nature-Based Water Solutions (RNBWS) is a more recent approach that integrates ecosystem restoration with water management and governance to enhance the resilience of both ecosystems and communities (Belhaj Fraj et al., 2025; Mekuria et al., 2026). Importantly, RNBWS also create opportunities for livelihood diversification, strengthen community participation, and promote inclusive governance of natural resources (Mekuria et al., 2026a).

Despite their demonstrated potential, successful implementation of RNBWS at scale is constrained by many factors. The lack of an enabling environment, such as policies, institutional coordination, investment mechanisms, community ownership, governance arrangements, knowledge exchange, and long-term monitoring systems, is among the important factors preventing sustainable scaling (Woltering et al., 2019; Kyambade et al., 2025).

The present scaling strategy is situated within the International Water Management Institute's (IWMI) wider regional engagement on nature-based solutions, water governance, and resilience in displacement-affected and fragile settings, and is developed under the CGIAR Food Frontiers and Security Science Program through the Resilient Nature-Based Water Solutions for Food Systems and Women's Empowerment (RENEW) project (Mekuria et al., 2026b). This engagement is grounded in IWMI's resilient nature-based water solutions (RNBWS) work across the water-scarce and fragile landscapes of the Middle East and North Africa (MENA) region and Ethiopia (Mekuria et al., 2024; Palay et al., 2026) and in its assessments of water security, climate resilience, and flood risk for refugee, internally displaced, and host communities in Ethiopia (Singh et al., 2024; Haile et al., 2024; Assefa et al., 2024). RENEW builds on this prior RNBWS experience across Africa, the MENA region, and South Asia and promotes South–South learning to develop transferable, investment-ready, and conflict-sensitive models for water and land management in fragile contexts (Mekuria et al., 2026b). Lessons emerging from RENEW and these related IWMI studies connect individual interventions to a broader regional scaling agenda, clarifying the technical, institutional, governance, and financing conditions under which solutions can be adapted, governed, financed, and sustained across diverse refugee-hosting landscapes (Singh et al., 2024; Palay et al., 2026). Framed in this way, the distinctive contribution of the Food Frontiers and Security Science Program lies not in identifying promising interventions alone, but in generating the evidence, partnerships, and institutional learning needed to scale them responsibly in complex, conflict-affected operating environments (Gebrezgabher et al., 2026).

Against this background and building on the identification and mapping of RNBWS (Mekuria et al., 2026a) this study aims to develop a scaling strategy and framework. It outlines the necessary institutional, financial, policy, governance, and implementation mechanisms required to facilitate the large-scale adoption of RNBWS across refugee-hosting areas in East and Horn of Africa and the Great Lakes region. Specifically, the study: (i) articulates a Theory of Change that links RNBWS interventions with long-term development impacts, (ii) identifies the enabling conditions, opportunities, risks, and barriers that may affect the scaling outcomes, (iii) identifies potential stakeholders and defines the roles and responsibilities, (iv) indicates the technological, institutional, policy, financial, market, and knowledge dimensions of the scaling framework, (v) identifies investment priorities and financing pathways that can make RNBWS implementation viable, sustainable, and responsive to specific local needs, and (vi) propose an implementation roadmap and MEL framework to guide adaptive scaling.

2. Empirical Evidence for Developing Scaling Strategy

Refugee-hosting regions in East and Horn of Africa and the Great Lakes region are shaped by interconnected environmental, social, economic, and institutional pressures that influence both the performance of RNBWS and their potential for scaling. Land degradation, water scarcity, climate variability, resource pressure, and livelihood insecurity often interact with population displacement, competing resource claims, and institutional constraints (Laird et al., 2021). These conditions also vary considerably across landscapes and between refugee and host populations. Evidence from refugee-hosting areas in Central and Eastern Africa shows that environmental pressures are embedded within broader questions of resource access, local institutions, governance, and relationships between displaced and host communities (Laird et al., 2021). Scaling RNBWS therefore requires an understanding not only of which interventions are technically effective, but also of the conditions under which they can be adopted, governed, financed, adapted, and sustained.

RNBWS encompass diverse interventions whose suitability and effectiveness depend on local ecological, hydrological, socioeconomic, and institutional conditions (Mekuria et al., 2026b). Evidence is therefore required to establish where particular solutions are appropriate, the benefits and trade-offs they generate, and the adaptations required across different landscapes and populations. This shifts the purpose of evidence from demonstrating that an intervention “works” toward assessing its readiness and suitability for scaling. Broader scaling literature provides the conceptual basis for this assessment: interventions cannot simply be replicated because their performance depends on interactions among technologies, institutions, actors, incentives, resources, and context, and scaling may amplify unintended environmental or social effects when these interactions are insufficiently understood (Wigboldus et al., 2023; Sartas et al., 2020). These are general scaling principles, while the empirical evidence generated by the Resilient Nature-Based Water Solutions for Food Systems and Women's Empowerment (RENEW) described below provides the empirical foundation for applying them to RNBWS in refugee-hosting landscapes.

Scaling in fragile, conflict- and displacement-affected settings is fundamentally different from conventional expansion. Displacement can rapidly change the number, location, and resource needs of users; contested or insecure land and resource rights can limit who may implement, maintain, or benefit from an intervention; fragmented mandates can divide authority across government, humanitarian, development, refugee-affairs, and community institutions; and changing refugee-host relationships can alter the legitimacy and distributional effects of scaling decisions. These are not merely additional contextual variables. They can change whether scaling is feasible, who bears its costs and risks, and whether an intervention reduces vulnerability or intensifies competition and inequality. Scaling readiness and risk assessment must therefore examine the legitimacy of land and water access arrangements, representation of displaced and host groups, institutional

authority and coordination, financing and maintenance responsibilities, conflict dynamics, benefit-sharing, and safeguards for adapting, slowing, or pausing expansion when conditions deteriorate. The dedicated evidence base on scaling in fragile and conflict-affected areas (FCAS) is still emerging; however, the Al Murunah/PHENOMENAL experience similarly shows that adoption readiness depends on combining technical feasibility with institutional capacity, inclusive governance, social acceptance, government alignment, financing pathways, and adaptive delivery in fragile and water-scarce settings (Palay et al., 2026).

Within this broader conceptual framing, the empirical foundation of this strategy is evidence generated through the RENEW project across White Nile, El Gedaref, and Kassala states of Sudan (Mekuria et al., 2026a). This evidence documented widespread land degradation, water insecurity, and livelihood vulnerability, compounded by high dependence on natural resources and competition over land, water, grazing, and fuelwood. It further revealed limited formal land tenure, ambiguities in land and resource rights, institutional-capacity gaps, and weak coordination among government and humanitarian actors—constraints that directly affect implementation and scaling readiness.

The evidence also pointed to four complementary intervention groups—tree-based RNBWS, rainwater harvesting and storage, soil and water conservation, and ecological restoration—with extensive but spatially differentiated opportunities across the three states. Soil and water conservation offered the largest potential in all three states and tree-based options showed substantial potential, while rainwater harvesting was particularly prominent in Kassala and ecological restoration had comparatively greater potential in White Nile; many locations were suitable for more than one intervention (Mekuria et al., 2026b). These findings support context-specific portfolios rather than uniform replication, guiding spatial targeting and investment prioritization, with final selection integrating biophysical suitability with livelihoods, market access, land tenure, governance, community priorities, institutional capacity, and conflict sensitivity. This aligns with the IUCN Global Standard for Nature-based Solutions, which emphasizes biodiversity outcomes, economic feasibility, inclusive governance, management of trade-offs, and adaptive management alongside an intervention's capacity to address societal challenges (Walters et al., 2016), and strengthens the case for coordinated, sustained investment in restoration and nature-based approaches (World Bank, 2021; UNEP, 2025).

Beyond this initial targeting, evidence generation should continue throughout the scaling process rather than end once an intervention has been demonstrated. Initial research establishes intervention suitability and scaling readiness; implementation then generates evidence on technical and ecological performance, adoption, institutional capacity and governance, costs and economic viability, benefits, maintenance, emerging bottlenecks, and unintended outcomes; and monitoring, evaluation, stakeholder feedback, and learning enable interventions, safeguards and scaling strategies to be adapted as conditions change. This iterative relationship between evidence and implementation matters because readiness for scaling is not static, and interventions that work in one landscape may need adaptation before expanding into another (Sartas et al., 2020). Progression from demonstration toward wider expansion should therefore depend on evidence that the critical technical, ecological, social, institutional, and financial conditions for sustainable scaling are sufficiently developed, rather than on successful demonstration or elapsed implementation time alone. In fragile and displacement-affected settings, such reviews should also examine changing access and security conditions, institutional legitimacy, the distribution of benefits and burdens, grievances, and potential effects on resource-related tensions.

The RENEW evidence, together with evidence from the broader literature, therefore, performs three related functions in this RNBWS scaling strategy. First, it supports the selection and prioritization of interventions and landscapes by establishing where RNBWS are technically, environmentally, socially, and economically appropriate. Second, it identifies the enabling conditions and binding constraints that determine scaling readiness, informing

the governance arrangements, policy and institutional changes, partnerships, investment priorities, and financing mechanisms required to support wider adoption. Third, it provides a basis for assessing distributional effects and potential trade-offs, including who bears the costs of implementation and maintenance, who receives the resulting ecosystem and livelihood benefits, and whether scaling affects access to land, water, and other natural resources. Evidence therefore informs not only whether to scale an RNBWS, but where, for whom, through which institutional and financing arrangements, and under what safeguards.

Accordingly, the scaling strategy developed in this study is grounded in empirical evidence generated through the RENEW project (Mekuria et al., 2026b). This evidence provides the basis for identifying suitable RNBWS and the conditions affecting their implementation and scaling, and it informs the Theory of Change, governance arrangements, scaling framework, investment strategy, implementation roadmap, and Monitoring, Evaluation, and Learning framework presented in the subsequent sections. The central principle is that evidence informs scaling decisions, implementation generates new evidence, and continuous learning enables RNBWS and their enabling environment to be progressively adapted to achieve sustained and equitable impact at scale.

3. Theory of Change for Scaling Resilient Nature-Based Water Solutions

The Theory of Change (ToC) for this scaling strategy is centered on how RNBWS can move from research evidence and individual interventions to wider and sustained adoption**.** It assumes that scaling requires more than implementing technically sound solutions. In this sense, the ToC addresses two interconnected processes: how RNBWS generate environmental, livelihood, and social benefits, and how the institutional, policy, financial, market, and knowledge conditions required for these interventions to scale can be strengthened. Scaling therefore involves changes in the wider enabling environment alongside the adaptation and replication of RNBWS themselves. It depends on coordinated investment, supportive policies, capable institutions, effective partnerships, community ownership, appropriate financing and market incentives, and continuous learning (Wigboldus et al., 2023; WHO, 2026). When these enabling conditions are sufficiently strengthened, and context-specific risks and trade-offs are appropriately managed, successful RNBWS may be adapted, replicated, institutionalized, and sustained across priority landscapes.

However, progression from demonstration to wider scaling depends on whether the critical constraints affecting adoption and sustained implementation have been sufficiently addressed. Scaling decisions should therefore consider the readiness of both the RNBWS and their enabling environment, including institutional capacity and coordination, policy support, financing and maintenance arrangements, land and resource governance, market incentives, and community participation (Sartas et al., 2020). Wider adoption and sustained implementation are then expected to contribute to improved ecosystem health, greater water security, more resilient livelihoods, stronger social cohesion, and increased participation and empowerment of women and young people.

3.1. Impact Pathways

The Theory of Change identifies five interconnected impact pathways through which RNBWS contribute to sustainable development in refugee-hosting landscapes of East and Horn of Africa and the Great Lakes region. These pathways illustrate how investments in ecosystem restoration, institutional strengthening, and community engagement lead to environmental, social, and economic outcomes over time. Although presented separately, the pathways are closely linked and reinforce one another (Figure 1): progress in one pathway often creates positive effects in others, resulting in broader and more sustainable impacts (FAO, 2021; IPCC, 2022).

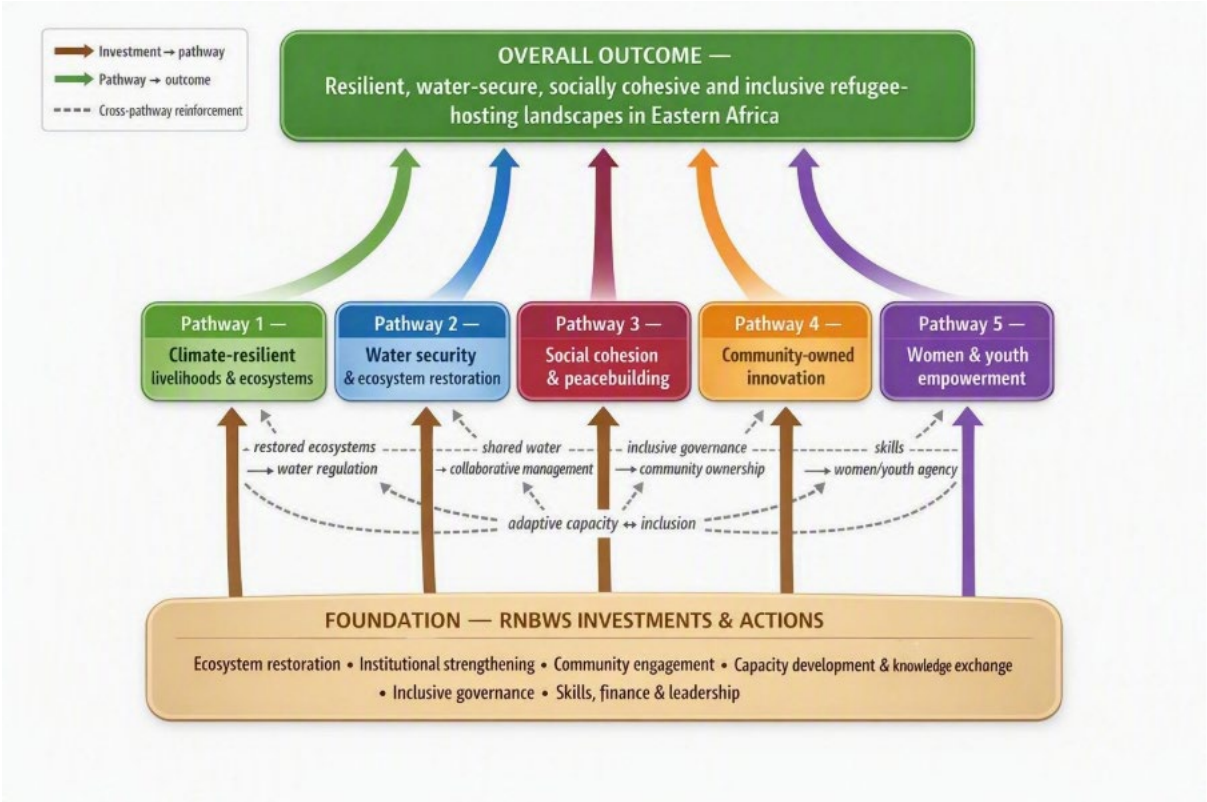


Figure 1. Conceptual Theory of Change showing how RNBWS investments simultaneously drive five interconnected impact pathways whose mutual reinforcement converges on resilient, water-secure and inclusive refugee-hosting landscapes in East and Horn of Africa and the Great Lakes region.
Source: Authors creation

Pathway 1. Climate-resilient livelihoods and ecosystems: Implementing RNBWS contributes to the restoration of degraded landscapes. Restored ecosystems improve vegetation cover, enhance soil moisture, reduce soil erosion and increase ecosystem productivity. These environmental improvements strengthen ecosystem resilience and reduce the vulnerability of communities to climate-related shocks, such as droughts and floods. At the same time, healthier ecosystems provide essential services, including fertile soils, water regulation and biodiversity conservation, supporting livelihoods and improving the adaptive capacity of refugee and host communities (FAO, 2022; IPCC, 2022).

Pathway 2. Water security and ecosystem restoration: Improved water security is a central outcome of RNBWS (CRS, 2025; Speed et al., 2026), as it supports crop production, livestock development, domestic water supply, and ecosystem health, ensuring food and water security and environmental sustainability (FAO, 2021; World Bank, 2021)

Pathway 3. Social cohesion and peacebuilding: Refugees and host communities often, due to their proximity, share natural resources. Collaborative management of these shared resources is, therefore, an important entry point for managing tensions and supporting peaceful coexistence; cooperation over natural resources management does not, however, automatically translate into peacebuilding. Where they are inclusive and well governed, participatory planning, inclusive governance, and joint decision-making can help strengthen trust among stakeholders and encourage collective action in landscape restoration (Siangulube et al., 2023; Kazanskaia, 2025). Under such conditions, community-based management of water, land, and forest resources can help to minimize resource-related conflicts, improve social cohesion, and build stronger partnerships between local institutions, governments, and communities. In this way, inclusive governance can contribute not only to improved natural resource management but also to greater social stability and resilience in refugee-hosting landscapes (FAO, 2021; UNHCR, 2025).

However, these outcomes should not be assumed to follow automatically from collaborative natural resource management. Depending on the context, interventions may also reinforce existing inequalities, generate competition over access to resources or benefits, or exacerbate tensions among resource users. Realizing potential peacebuilding benefits therefore requires conflict-sensitive design and implementation, inclusive and legitimate governance arrangements, equitable benefit-sharing, and ongoing attention to local conflict dynamics and unintended consequences.

Pathway 4. Community-owned innovation: Long-term sustainability depends on the ability of communities to adopt, adapt, and sustain restoration practices beyond the lifespan of individual projects. Capacity development, knowledge exchange, extension services, and institutional support enable communities to apply innovative approaches that respond to local environmental and socio-economic conditions (FAO, 2012). Integrating scientific knowledge with indigenous knowledge further enhances the relevance and acceptance of RNBWS interventions. As communities gain technical skills and confidence, they become active partners in innovation, monitoring and adaptive management. In this way, community ownership can be strengthened and the likelihood of sustained scaling increased (Wigboldus et al., 2023; CGIAR, 2026).

In refugee-hosting landscapes, meaningful community ownership extends beyond participation in planning, training, and implementation. In practice, it also concerns who holds decision-making authority, whose knowledge and priorities shape the design of investments and interventions, who controls or accesses the resulting benefits, and who assumes responsibility for long-term management and maintenance. These arrangements may differ for refugees and host communities, particularly where land and resource rights are unequal or insecure. Explicitly recognizing and negotiating these dimensions — through legitimate local institutions, equitable benefit-sharing, and clearly assigned management responsibilities — helps to ensure that ownership is substantive and inclusive rather than nominal.

Pathway 5. Women and youth empowerment: Women and young people play a vital role in landscape restoration, natural resource management, and rural development. Their active participation in planning, implementation, enterprise development, leadership and monitoring strengthens program effectiveness and promotes inclusive development (Kobugabe et al., 2024; Shibabaw et al., 2025). Targeted investments in skills development, access to finance, entrepreneurship and leadership opportunities enable women and youth to benefit from restoration-related economic activities while contributing to community resilience, provided they also have equitable access to decision-making and to benefits generated. Where these conditions are met, empowering these groups enhances social inclusion, improves household livelihoods, strengthens local institutions and supports the long-term sustainability of RNBWS interventions (FAO, 2021; Azcona et al., 2022)

Collectively, these five impact pathways illustrate that scaling RNBWS extends beyond environmental restoration. Under enabling conditions, it can also strengthen livelihoods, improve water security, support social cohesion, foster community-owned innovation, and advance the meaningful participation and empowerment of women and youth. These social outcomes do not, however, follow automatically from scaling: they depend on conflict-sensitive design, inclusive and legitimate governance, equitable benefit-sharing, and genuine local ownership — including clarity over decision-making authority and benefits for both refugees and host communities. Where these conditions are in place, the pathways can reinforce one another and contribute to more resilient ecosystems and more prosperous, inclusive, and climate-resilient refugee-hosting landscapes across East and Horn of Africa and the Great Lakes region and elsewhere.

3.2. Theory of Change Results Chain

The Theory of Change is organized around a results chain linking inputs, activities, outputs, outcomes, and long-term impacts (Figure 2; UNDAF, 2018). In this study, the ToC assumes that when scientific evidence, financing, supportive policies, institutional capacity, community participation, and partnerships are mobilized, they enable the implementation of diverse RNBWS. These interventions generate tangible outputs, including restored ecosystems, improved water infrastructure, strengthened community capacities, and supportive policies that lead to enhanced ecosystem functioning, water security, resilient livelihoods, and greater social inclusion. Over time, these outcomes contribute to climate-resilient landscapes and communities, sustainable ecosystem services, reduced resource-related conflicts, and the empowerment of women and youth, ultimately achieving the goal of restoring ecosystems, securing water resources, and improving livelihoods in refugee-hosting landscapes of East and Horn of Africa and the Great Lakes region. Although presented as a results chain, the scaling process is not strictly linear. Evidence generated through implementation, monitoring, and stakeholder feedback should be used to reassess scaling constraints, adapt interventions and delivery arrangements, and inform subsequent decisions on expansion and institutionalization. This creates a continuous feedback loop between evidence generation, implementation, learning, and scaling decisions.

The theory of change identifies several critical enabling conditions that cut across all stages of implementation (Figure 2). These enabling conditions create the institutional, financial, social, and technical environment necessary for RNBWS to be successfully implemented, scaled, and sustained. Without these foundational conditions, the planned activities and investments are less likely to generate the intended outputs, outcomes, and long-term impacts, making them essential for achieving the overall goal of restoring ecosystems, securing water resources, strengthening livelihoods, promoting social cohesion, and empowering women and youth in refugee-hosting landscapes of East and Horn of Africa and the Great Lakes region.

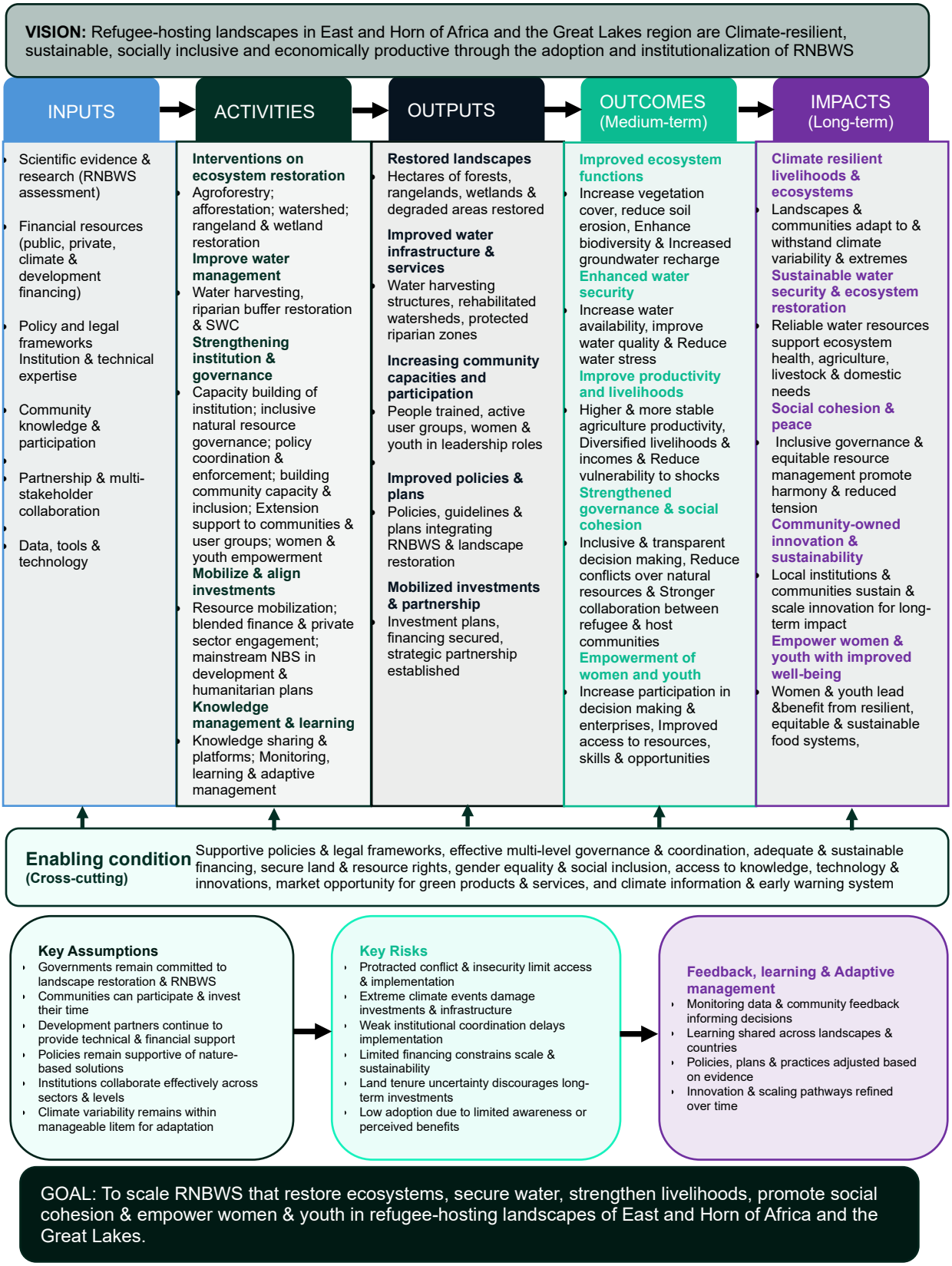


Figure 2. Theory of Change for scaling Resilient Nature-Based Water Solutions in Refugee-Hosting Landscapes of East and Horn of Africa and the Great Lakes region.
Source: Authors creation

4. Governance Arrangements and Stakeholder Roles for Scaling

Scaling RNBWS requires coordinated action among actors with different mandates, resources, expertise, and interests. No single institution can provide the policy authority, technical knowledge, financing, implementation capacity, and local ownership required for landscape-scale scaling. To support the scaling of RNBWS, a multi-level governance structure is proposed (Figure 3), linking regional, national, landscape, and community actors through a connected knowledge and learning system. Regional institutions provide strategic coordination, policy dialogue, and cross-country learning; national platforms align policies, mobilize resources, and coordinate stakeholders; landscape platforms guide implementation and local coordination; and community organizations drive participation, resource management, and long-term sustainability. Continuous knowledge generation, sharing, and learning across all levels ensure evidence-based decision-making and adaptive scaling. Together, these interconnected governance mechanisms create the institutional foundation needed to effectively scale and sustain RNBWS interventions across refugee-hosting landscapes in East and Horn of Africa and the Great Lakes region.

In fragile and displacement-affected settings, these governance arrangements must also account for potentially fragmented institutional mandates, overlapping humanitarian and development responsibilities, unequal access to land and water resources, and differences in the rights and representation of refugees and host communities. Governance arrangements should therefore be adapted to the specific institutional and political context, working through legitimate existing structures wherever feasible while strengthening inclusive participation, accountability, and coordination across humanitarian, development, and government actors.

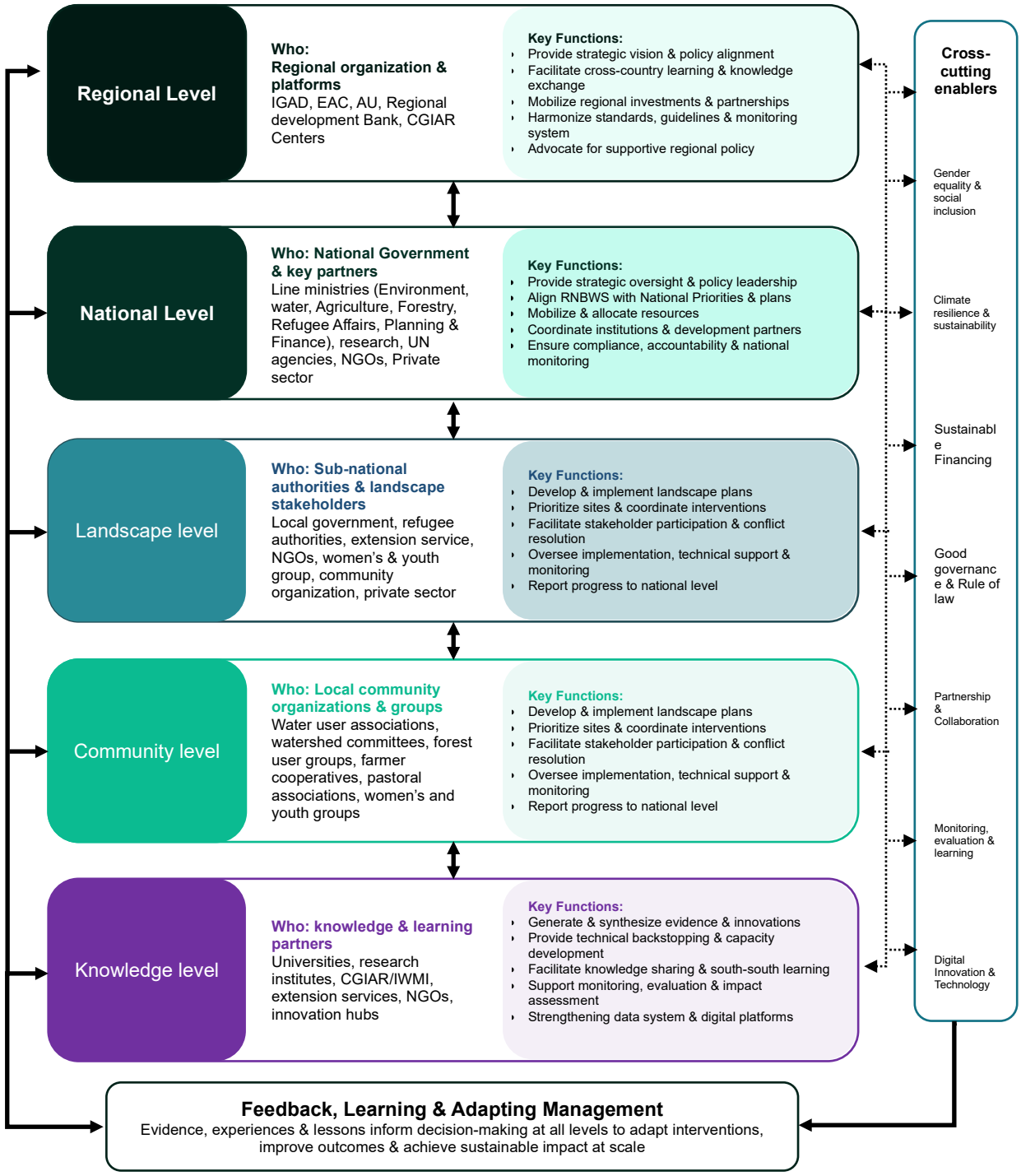


Figure 3. Multi-level Governance architecture for scaling RNBWS: From Regional coordination to Community-led implementation.
Source: Authors creation

The study also proposed that partnerships should be designed around specific scaling functions rather than general collaboration. Table 1 summarizes the proposed strategic partnerships facilitating the scaling of RNBWS.

Table 1. Strategic partnership for scaling RNBWS in East and Horn of Africa and the Great Lakes region

Partnership	Primary scaling function
Government - Research	Evidence-based policy and technical standards
Government - Private sector	Investment and market development
Research - Extension	Translation of evidence into practice
Research - Community	Co-production and adaptation of solutions
Humanitarian - Development	Linking short-term support with long-term resilience
Public - Private	Infrastructure, services and enterprise development
Regional partnerships	Cross-country learning and replication

The governance architecture therefore provides the institutional basis for the scaling pathways described in Section 5. Horizontal scaling requires capable local delivery and community institutions; vertical scaling requires coordination between landscape, subnational, and national governance systems; functional scaling requires partnerships across public, private, community, and knowledge actors; and diagonal scaling depends on mechanisms for learning and coordination across sectors and countries. Governance arrangements should evolve as scaling progresses, with responsibilities increasingly embedded in institutions capable of sustaining implementation, financing, and accountability beyond individual projects.

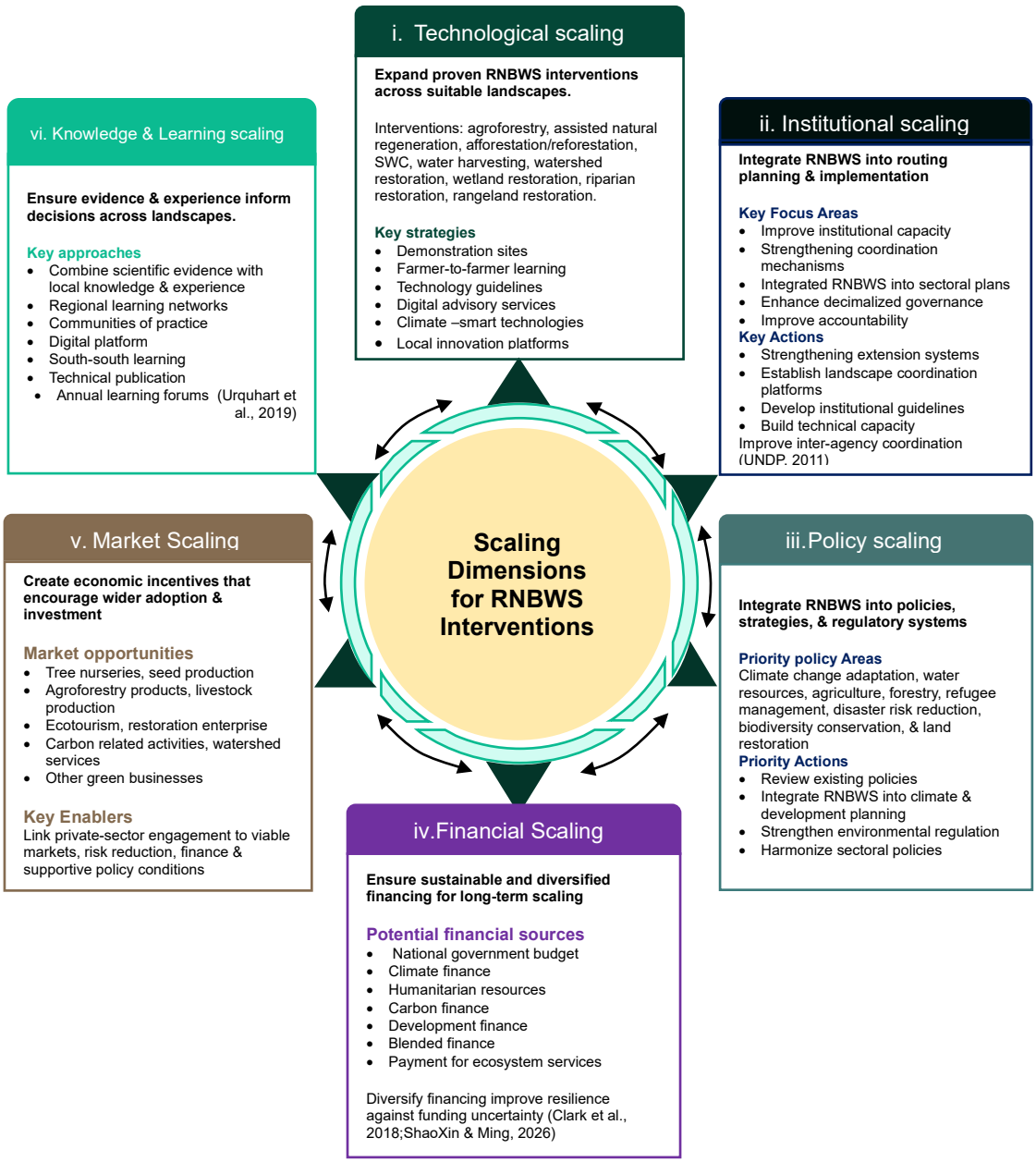
5. Scaling Framework for Resilient Nature-Based Water Solutions

The study proposed a scaling framework that transforms the identified enabling conditions and governance arrangements into a practical approach for scaling RNBWS. It assumes that scaling is a systemic process, where technological solutions must be supported by compatible institutional, policy, financial, market, and knowledge systems, suggesting coordinated actions across these dimensions rather than solely on the dissemination of technology.

5.1 Scaling Dimensions

For scaling RNBWS interventions, the framework considered six interrelated dimensions (Figure 4). They are closely connected and should be addressed together. Technological scaling provides the practical RNBWS options that can be expanded across suitable landscapes. *Institutional scaling* ensures that these approaches are supported by capable institutions and effective coordination. *Policy scaling* creates an enabling environment by integrating RNBWS into relevant policies, plans, and regulations. *Financial scaling* provides the resources needed for sustained implementation and expansion. *Market scaling* creates economic incentives that encourage communities and private actors to invest in RNBWS. Finally, *knowledge* and *learning scaling* helps capture experience, share evidence, and improve implementation over time. Together, these dimensions create the conditions for moving RNBWS from isolated initiatives to *coordinated, sustained*, and *widely adopted solutions.*

The six scaling dimensions are interdependent rather than separate areas of intervention. Progress in one dimension may be insufficient where constraints persist in others; for example, technically effective RNBWS may remain difficult to scale without institutional capacity, supportive policy, sustainable financing, viable delivery mechanisms, or systems for knowledge and learning. Scaling strategies should therefore assess the combination of



conditions required for a particular RNBWS and identify which dimensions constitute the most important bottlenecks to wider and sustained adoption.

Figure 4. Dimensions and their strategies in scaling RNBWS across refugee hosting landscapes in East and Horn of Africa and the Great Lakes region.
Source: Authors creation

The relative importance of each dimension will vary across interventions and contexts. Scaling should therefore not require an identical package of technological, institutional, policy, financial, market, and knowledge interventions in every landscape; instead, the combination and sequencing of actions should respond to the specific constraints, opportunities, actors, and capacities identified through empirical assessment.

5.2 Scaling Pathways and Phases

The scaling framework combines four complementary pathways (Figure 5) and three broad phases. The pathways show how RNBWS can expand, become institutionalized, create new livelihood opportunities, and support knowledge sharing. These are horizontal, vertical, functional, and diagonal scaling**.** They work together and are not strictly sequential. Horizontal scaling supports the replication and adaptation of effective RNBWS across suitable communities and landscapes, while vertical scaling embeds RNBWS within policies, plans, budgets, institutional mandates, and implementation systems. Functional scaling extends the benefits and functions of RNBWS through complementary livelihood, enterprise, market, and ecosystem-service opportunities, while diagonal scaling supports learning, coordination, and transfer of knowledge across sectors, stakeholders, landscapes, and countries. The appropriate combination of pathways will depend on the scaling objectives, context, and constraints identified for particular RNBWS and landscapes.

The process moves through three phases: Foundation and Demonstration (Years 1-2)**,** Expansion (Years 3-5), and Institutionalization and Sustainability (Years 6-10)**.** The phases may overlap as evidence and experience grow. However, these timeframes should be treated as indicative planning horizons rather than fixed thresholds for progression. Movement from demonstration to expansion and from expansion to institutionalization should depend on evidence of scaling readiness, including demonstrated technical and ecological effectiveness, social acceptability, institutional ownership and capacity, appropriate land and resource governance, viable financing and maintenance arrangements, and the extent to which critical scaling bottlenecks have been addressed (Sartas et al., 2020)**.** Different RNBWS and landscapes may therefore progress through the phases at different rates.

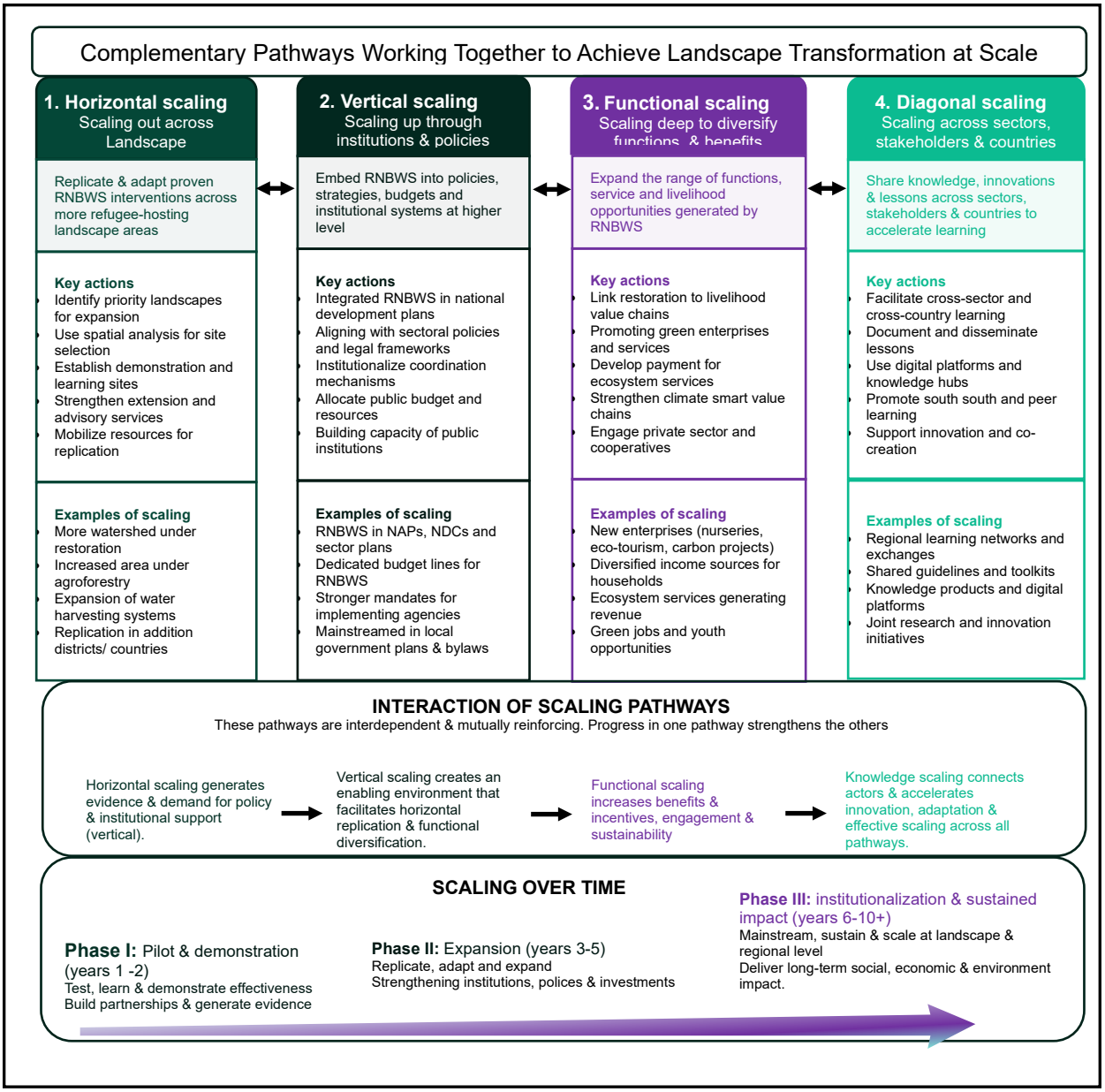


Figure 5. Pathways and phases for scaling Resilient Nature-Based Water Solutions across Host-refugee landscapes in East and Horn of Africa and the Great Lakes region.
Source: Authors creation

Adaptation and learning are important across all pathways and phases. Horizontal scaling should not imply standardized replication across locations, as differences in ecological conditions, livelihood systems, institutional capacity, resource access, and the needs of refugee and host populations may require interventions and delivery arrangements to be adapted. Similarly, vertical scaling requires more than formal recognition of RNBWS in policies and strategies; sustained institutionalization depends on their integration into relevant planning and budgeting processes, implementation mandates, technical systems, and accountability arrangements. Evidence generated during implementation should, therefore, be used to reassess scaling constraints, refine interventions and partnerships, and determine whether and how further expansion is appropriate.

Together, the pathways and phases provide a practical route from demonstration to wider adoption and sustained scaling (Sartas et al., 2020). Scaling should nevertheless be assessed not only in terms of the extent of expansion, but also in terms of the sustainability and quality of outcomes. Decisions to expand or institutionalize RNBWS should consider

whether environmental and livelihood benefits are sustained, how costs and benefits are distributed among refugee and host populations and other resource users, and whether scaling generates unintended pressures on land, water, ecosystems, or vulnerable groups. Monitoring these effects provides a basis for adapting scaling strategies as implementation progresses.

6. Investment Strategy for Scaling Resilient Nature-Based Water Solutions

Scaling Resilient Nature-Based Water Solutions requires consistent and predictable investment beyond individual projects. While initial funding is critical for demonstrating and refining RNBWS approaches, broader scaling necessitates resources for landscape-level implementation, institutional capacity building, knowledge generation, market development, monitoring, and long-term maintenance. Investment strategy links financing decisions to the various stages of scaling (See section 5.2) and prioritizes interventions based on demonstrated potential, landscape suitability, expected benefits, implementation feasibility, and the prospects for sustainable adoption (Shames, et al., 2014; FAO & Global Mechanism of the UNCCD, 2015). Investment should cover both RNBWS interventions and the systems that support their wider adoption. Key focus areas include the restoration of watersheds, wetlands, rangelands, riparian zones, and agricultural landscapes; water management interventions; strengthening institutional and technical capacity; applied research and knowledge systems; community capacity and participation; restoration-related enterprises; sustainable value chains; and monitoring, evaluation, and learning.

Investment decisions should prioritize long-term sustainability, economic efficiency, social equity, transparency and accountability, and adaptability to changing conditions. Financing should also be diversified to reduce dependence on short-term funding and strengthen the long-term viability of RNBWS scaling (Shames et al., 2014; Baffo et al., 2024). Resources should be allocated to landscapes with clearly identified needs, feasible implementation pathways, meaningful stakeholder engagement, and strong potential for sustained benefits (European Environment Agency, 2023). Furthermore, financing priorities should be reviewed periodically as new evidence and implementation experiences arise, allowing investments to adapt to changing conditions and scale outcomes.

Investment in RNBWS scaling also extends beyond financing physical implementation and restoration activities. Sustained scaling may also require investment in the enabling environment conditions identified in the preceding sections, including institutional capacity, coordination and delivery systems, community governance, evidence and monitoring, policy implementation, market development, and long-term operation and maintenance. Investment needs should therefore be assessed across the wider scaling system rather than only at the intervention level.

6.1. Investment Sequencing and Readiness

Investment should be sequenced in line with the maturity of RNBWS and the evidence available to support wider application. The three-phase approach (i.e., Piloting and Demonstration, Expansion, and Institutionalization) reflects established scaling principles that move innovations from testing and evidence generation toward wider adoption, institutional integration, and sustained delivery (Sartas et al., 2020; CGIAR, 2026). In the *piloting and demonstration phase*, the investment should focus on initial implementation in priority landscapes, including baseline assessment, demonstration, community engagement, capacity development, institutional strengthening, and monitoring. In the *expansion phase*, the investment should increase in approaches that demonstrate technical, ecological, institutional, and social viability, with greater emphasis on landscape-level restoration, water

infrastructure, market development, policy integration, and diversified financing. In the *institutionalization phase,* the focus should be on embedding RNBWS within government programs, budgets, and institutional systems, alongside increasing domestic financing, private-sector participation, long-term maintenance, and sustainable revenue mechanisms.

Investment decisions should be linked to evidence of scaling readiness rather than implementation phase alone. Before larger-scale investment is mobilized, assessment should establish whether critical technical, ecological, institutional, social, and financial constraints have been sufficiently addressed and identify which remaining bottlenecks require investment. This allows financing to be directed not only toward expanding interventions that are ready to scale, but also toward strengthening the conditions required for promising RNBWS to become scalable. Investment planning should also identify who bears the costs of implementation and maintenance, who captures the resulting benefits, and which actors have the mandate and capacity to sustain the intervention over time. This is particularly important where RNBWS generate benefits across multiple groups or jurisdictions, or where ecosystem and water-security benefits are primarily public goods and cannot readily generate direct financial returns.

6.2 Financing Pathways

No single financing source can support RNBWS throughout the scaling process. The financing approach should, thus, evolve with the maturity, scale, risk, and investment readiness of RNBWS. During the demonstration stage, grants and public or development-partner resources are important for generating evidence, demonstrating feasibility, engaging communities, building capacity, and strengthening institutions. As approaches demonstrate potential for wider application, financing can become more diversified through government co-financing, climate and development finance, blended finance, and private investment. At the institutionalization stage, domestic public financing becomes increasingly important and is complemented by private investment (zu Ermgassen & Löfqvist, 2024; CGIAR, 2026). Therefore, the financing pathway for scaling RNBWS starts with grant-supported demonstrations, followed by diversified expansion financing, and eventually leads to nationally owned and market-supported financing. This represents a gradual evolution in the financing mix rather than the replacement of one source by another; different financing sources may operate concurrently as RNBWS mature.

This evolution, however, is neither automatic nor time-bound, and its pace is difficult to predict. In protracted displacement and fragile and conflict-affected settings (FCAS), institutional capacity, fiscal space, and investment conditions may remain constrained for extended periods, slowing the shift toward diversified and domestically supported financing. Many RNBWS also deliver substantial public and non-market benefits without clear commercial returns, which can limit the scope and pace of private investment. Financing pathways will therefore vary considerably by context and intervention rather than following a fixed or predictable sequence, and sustained humanitarian, development, public, and climate-finance partnerships may remain necessary alongside other sources for prolonged periods.

7. Implementation Roadmap for Scaling Resilient Nature-Based Water Solutions

The implementation roadmap translates the scaling framework and investment strategy into a practical pathway from **demonstration to sustained adoption**. It recognizes that scaling RNBWS requires coordinated action across institutions, financing, technical capacity, information systems, and stakeholders. Nature-based water solutions often remain limited when implemented as isolated projects, making stronger governance, coordination, capacity, information, and financing important for wider uptake (OECD, 2021). The roadmap, therefore,

applies a phased approach informed by the Scaling Readiness perspective, which emphasizes readiness assessment, identification of scaling bottlenecks, stakeholder engagement, and adaptive learning (Sartas et al., 2020).

The process unfolds through several phases: evidence and readiness, demonstration, adaptation and expansion, institutionalization, and sustained adoption and learning. These phases are flexible; some activities may overlap as evidence and experience grow. Progression between phases should, therefore, be based on evidence of scaling readiness rather than elapsed time alone. Transition to the next phase should occur when the critical technical, ecological, institutional, social, and financial conditions for scaling have been sufficiently demonstrated or strengthened, and when major scaling bottlenecks identified in the preceding phase have been addressed. Where these conditions are not met, implementation should prioritize adaptation and bottleneck resolution before further expansion. Demonstration and learning can continue during the expansion phase, and institutionalization may begin when the conditions related to policy, institutions, and financing are favorable. Detailed implementation actions for each phase are outlined in Tables 2, 3 and 4. At the end of each phase, a scaling readiness review should assess performance against agreed technical, environmental, social, institutional, governance, and financing criteria, together with conflict sensitivity, equity, changes in resource access, and any unintended social and environmental implementation outcomes, and determine whether interventions should proceed to wider scaling, require further adaptation, or remain at the current scale, or be paused or discontinued—recognizing that a technically successful intervention may not be appropriate for expansion where it increases exclusion or tensions, creates inequitable access to resources, undermines local governance arrangements, or generates unintended social or environmental harm. These reviews should draw on MEL evidence and stakeholder assessment and provide a documented basis for subsequent scaling and investment decisions.

The roadmap should be treated as an adaptive implementation framework rather than a fixed sequence of activities. Responsibilities, investment priorities, and scaling pathways may need to change as implementation generates new evidence on intervention performance, institutional capacity, financing, community priorities, and unintended outcomes. Evidence from the MEL system should therefore feed directly into periodic implementation and scaling-readiness reviews, allowing activities to be continued, adapted, expanded, or discontinued based on demonstrated performance and changing conditions.

Table 2. Implementation action plan for Phase-I

Strategic objective	Priority Activity	Lead Institution(s)	Supporting Partners	Expected Output	Key Performance Indicator	Milestone
Establish effective governance & coordination mechanisms	Establish National Steering Committees and Landscape Coordination Platforms	National Governments	Regional organizations, local governments, international development & research institutes	Functional governance structures	Number of committees and platforms established	Governance structures operational
	Develop coordination guidelines & standard operating procedures	National Governments	Research institutions, NGOs	Coordination framework adopted	Coordination guidelines approved	Coordination framework implemented
Generate evidence for implementation & scaling	Conduct baseline assessments and landscape diagnostics, including assessment of institutional mandates and capacity, land and resource governance, community priorities, financing conditions, market opportunities, and other scaling constraints and enablers.	Research Institutions	Local governments, community organizations	Baseline and scaling-readiness diagnostic established	Baseline assessment completed	Baseline report finalized
	Identify and prioritize intervention sites and RNBWS based on suitability, expected benefits and trade-offs, community priorities, and scaling feasibility	Local Governments	Research institutions, community organizations	Priority sites and context-appropriate RNBWS identified	Number of priority sites selected	Site prioritization completed
Demonstrate & test priority RNBWS	Establish demonstration sites	Local Governments	Extension services, NGOs, communities	Operational demonstration sites	Number of demonstration sites established	Demonstration sites functional
	Implement priority RNBWS, including agroforestry, watershed	Local Governments	Community organizations,	RNBWS interventions demonstrated	Number & type of RNBWS implemented	Demonstration phase completed

	restoration, water harvesting, and wetland restoration		NGOs, private sector			
Strengthen institutional & community capacity	Train extension staff, local leaders, and community organizations	Research Institutions	NGOs, local governments	Improved technical capacity	Number of people trained, disaggregated by sex and age	Capacity-building program completed
	Strengthen community-based natural resource management groups	Local Governments	NGOs, community organizations	Functional community institutions	Number of active community groups	Community management plans operational
Mobilize initial investment for scaling	Develop investment plans and resource-mobilization strategies based on intervention costs, expected public and private benefits, financing gaps, investment readiness, and long-term operation and maintenance requirements	National Governments	Development partners, development banks	Investment strategy & financing plans	Investment plans developed & approved	Initial financing secured
Establish MEL and learning systems	Develop baseline indicators & monitoring systems	Research and MEL Institutions	Governments, communities, development partners	Functional MEL system	MEL framework & baseline indicators established	Monitoring system operational
	Document implementation lessons & scaling bottlenecks	Research Institutions	Implementing partners, communities	Evidence & learning products	Number of lessons & bottlenecks documented	Phase I learning review completed

Table 3. Implementation action plan for Phase II

Strategic objective	Priority activity	Lead institution(s)	Supporting partners	Expected output	Key performance indicator	Milestone
Expand proven RNBWS	Scale RNBWS that have demonstrated technical and ecological effectiveness and sufficient social, institutional, and financial readiness across suitable priority landscapes	Local governments	Research institutions, extension services, communities, development partners	RNBWS expanded to priority landscapes	Area & number of landscapes adopting RNBWS	Expansion achieved in priority landscapes
Adapt RNBWS to local contexts	Adapt proven interventions to different ecological and socio-economic conditions	Research & technical institutions	Local governments, communities, extension services	Context-specific RNBWS models	Number of interventions adapted and adopted	Adaptation guidelines documented
Strengthen extension & technical support	Expand extension services, technical guidance and advisory support	Extension institutions	Research organizations, local governments, NGOs	Stronger technical & advisory capacity	Number of extension personnel & communities supported	Extension systems functioning in priority landscapes
Strengthen institutional coordination	Improve inter-agency coordination and landscape-level collaboration	Local and national governments	Development partners, research institutions, civil society	Functional coordination mechanisms	Number of active coordination mechanisms; frequency of joint actions	Regular coordination established
Integrate RNBWS into plans and programs	Incorporate proven RNBWS into district & national sectoral plans, development programs, implementation mandates, and associated budget processes.	Government institutions	Research institutions, development partners	RNBWS reflected in relevant plans and programs	Number of plans & programs integrating RNBWS	Policy & planning integration completed
Mobilize diversified investment	Increase public, climate, development, blended, & private financing	Government and financing institutions	Development partners, climate funds, private sector	Increased & diversified investment	Amount & number of financing sources mobilized	Diversified financing portfolio established

Develop markets and green enterprises	Promote restoration enterprises, tree nurseries, sustainable value chains, & other RNBWS-related businesses	Private sector and local governments	Cooperatives, financial institutions, development partners	Viable RNBWS related enterprises & market linkages	Number of enterprises established; private investment mobilized	Priority market opportunities operational
Strengthen community participation	Support community organizations & inclusive participation in implementation & maintenance	Local governments & community organizations	NGOs, extension services, research institutions	Increased community ownership	Proportion of community organizations with defined roles in planning, implementation, monitoring and maintenance; representation of refugee and host populations, women and youth in decision-making structures.	Community mechanisms functioning
Strengthen regional knowledge exchange	Share implementation experience through learning platforms, communities of practice & technical exchanges	Research and regional institutions	Governments, CGIAR/IWMI, development partners	Lessons shared and applied	Number of learning events; lessons adopted	Regional learning mechanism operational
Monitor scaling performance & adapting implementation	Conduct periodic monitoring, evaluation and learning reviews	Research & monitoring institutions	Government, communities, development partners	Evidence generated for adaptive management	Number of reviews completed; corrective actions implemented	Periodic scaling review completed

Table 4. Implementation action plan for Phase-III

Strategic objective	Priority Activity	Lead Institution(s)	Supporting Partners	Expected Output	Key Performance Indicator	Milestone
Institutionalize RNBWS in development systems	Mainstream RNBWS into government policies, programs & development plans	National and Local Governments	Research institutions, development partners, regional organizations	RNBWS integrated into routine development systems	Number of policies, plans, and programs integrating RNBWS	RNBWS institutionalized in national and local planning and implementation systems
Strengthen long-term institutional ownership	Clarify institutional responsibilities for implementing, coordinating, monitoring, operation & maintenance	National and Local Governments	Research institutions, extension services, community organizations	Clear institutional roles and responsibilities	Institutional responsibilities formally assigned	Long-term institutional arrangements operational
Increase sustainable domestic financing	Integrate RNBWS into government budgets and public investment programs	National & Local Governments	Development partners, financial institutions	Increased domestic financing for RNBWS	Public funds allocated to RNBWS	Regular budget allocations secured
Strengthen private-sector engagement	Expand private investment in restoration enterprises, green businesses, and sustainable value chains	Private Sector and Government Institutions	Financial institutions, cooperatives, development partners	Increased private-sector participation	Private investment mobilized; number of enterprises supported	Private investment mechanisms established
Strengthen long-term maintenance and sustainability	Establish and implement maintenance arrangements for restored landscapes and water infrastructure	Local Governments and Community Organizations	Private sector, communities, technical institutions	Functional maintenance systems	Proportion of restored sites with maintenance arrangements	Long-term maintenance mechanisms operational
Institutionalize monitoring, evaluation and learning	Integrate MEL into routine institutional planning and decision-making	Research and MEL Institutions	Government, communities, development partners	Routine MEL system institutionalized	Number of regular monitoring and evaluation reports; evidence used in decisions	MEL integrated into institutional systems
Strengthen policy implementation	Support implementation and enforcement of	National and Local Governments	Research institutions,	Improved policy implementation	Number of relevant policies	Policy and regulatory

and regulatory support	policies and standards that promote RNBWS		development partners		and standards implemented	mechanisms functioning
Strengthen knowledge exchange & regional learning	Maintain national & regional learning platforms & share implementation experience	Research & Regional Institutions	Governments, CGIAR/IWMI, development partners	Sustained knowledge sharing mechanisms	Number of learning events and knowledge products	Regional learning system institutionalized
Assess long-term outcomes & impacts	Conduct periodic impact evaluations of environmental, economic, institutional, & social outcomes	Research and Evaluation Institutions	Governments, communities, development partners	Evidence on long-term performance and impact	Number of impact evaluations completed	Impact evidence informs policy and investment decisions
Support continued scaling and adaptation	Use evidence and learning to refine RNBWS and identify opportunities for further expansion	National and Local Governments	Research institutions, communities, private sector, development partners	Continued adaptive scaling	Number of adaptations or new scaling decisions based on MEL evidence	Continuous scaling and learning mechanism established

8. Monitoring, Evaluation, and Learning Framework

The Monitoring, Evaluation, and Learning (MEL) framework tracks progress against the Theory of Change and assesses whether scaling is advancing as expected. It provides evidence for identifying progress, gaps, and areas for adjustment. The framework covers key results, indicators, means of verification, and the use of evidence across the three scaling phases. It also supports evaluation and continuous learning to improve implementation, investment, partnerships, and scaling decisions**.** Table 5 summarizes the MEL framework and the main indicators used to track progress, outcomes, scaling and learning (Sartas et al., 2020; Noltze et al., 2021).

Table 5. Monitoring, evaluation and learning framework for Scaling RNBWS

ToC level /scaling focus	Key results to monitor	Illustrative indicators	Means of verification	Use of evidence
Inputs	Resources and conditions for scaling are available	Funding mobilized; technical staff available; partnerships established; community participation	Financial records; project reports; partnership agreements	Assess readiness for implementation
Activities	Planned scaling activities are implemented	Restoration activities completed; water interventions implemented; training conducted; coordination meetings held	Field reports; training records; monitoring reports	Track implementation progress
Outputs	Immediate products required for scaling are delivered	Restored areas; water infrastructure; trained extension staff; strengthened institutions; investment plans	Field verification; institutional records; GIS/spatial data	Identify implementation gaps
Environmental outcomes	Ecosystem and water conditions improve	Vegetation cover; soil condition; water availability; groundwater recharge; reduced erosion	Environmental monitoring; remote sensing; field assessments	Assess environmental performance
Economic outcomes	Livelihood opportunities and resilience improve	Agricultural productivity; livelihood diversification; income opportunities; household resilience	Household surveys; livelihood assessments; market data	Assess livelihood benefits and investment value
Institutional outcomes	RNBWS become increasingly embedded in institutions	Policies and plans integrating RNBWS; institutional capacity; coordination mechanisms; public financing	Policy documents; budgets; institutional assessments	Assess institutionalization
Social outcomes	Inclusive participation and cooperation improve	Refugee-host collaboration; community participation; women and youth engagement	Stakeholder assessments; community records; interviews	Strengthen inclusion and social cohesion
Scaling progress	RNBWS expand and are sustained in appropriate contexts	Number of adopting landscapes; area under RNBWS; adaptation to new contexts; sustained adoption	Scaling assessments; GIS data; program records	Guide expansion and adaptation

Phase I: Demonstration	Evidence and scaling readiness are established	Baseline completed; demonstration sites established; feasibility assessed; capacity strengthened	Baseline studies; demonstration reports; readiness assessments	Decide what is ready for expansion
Phase II: Expansion	Proven approaches are adapted and expanded	New landscapes adopting RNBWS; financing diversified; institutional integration increased	Program reports; investment records; adoption studies	Identify and address scaling bottlenecks
Phase III: Institutionalization	RNBWS become part of routine systems	Government budget allocation; policy integration; domestic financing; maintenance arrangements	Government plans and budgets; institutional records	Assess sustainability
Learning and adaptation	Evidence informs subsequent decisions	Lessons documented; adaptations made; learning events held; decisions informed by MEL findings	Learning reports; review meetings; stakeholder consultations	Improve implementation, investment, and scaling decisions
Long-term impacts	Sustainable benefits are maintained	Climate-resilient livelihoods and ecosystems; improved water security; social cohesion; community innovation; women and youth empowerment	Impact evaluations; environmental and socio-economic data	Assess overall contribution of scaling

9. Conclusions

This report proposes a systems-oriented and evidence-based strategy for scaling Resilient Nature-Based Water Solutions (RNBWS) across refugee-hosting landscapes in East and Horn of Africa and the Great Lakes region. The proposed strategy recognizes that scaling involves more than replicating technically effective interventions; it requires simultaneous attention to the institutional, policy, financial, market, governance, social, and knowledge conditions that determine whether RNBWS can be adapted, adopted, sustained, and institutionalized. Importantly, the Theory of Change, governance arrangements, scaling framework, investment and financing approaches, implementation roadmap, and Monitoring, Evaluation, and Learning (MEL) framework presented in this report are proposed mechanisms for guiding future scaling and do not represent arrangements already implemented or impacts already achieved at scale.

A central principle of the strategy is that scaling should be evidence-based, context-specific, and readiness-driven. Evidence should establish not only technical and ecological effectiveness but also social acceptability, economic viability, institutional capacity, land and resource governance, financing and maintenance requirements, distributional effects, and potential environmental and social trade-offs. Scaling decisions should therefore consider where and for whom interventions are appropriate, the enabling conditions required, and how costs and benefits are distributed. Progression from demonstration to expansion and institutionalization should depend on evidence that critical scaling constraints have been sufficiently addressed rather than on successful demonstration or elapsed implementation time alone.

The proposed Theory of Change identifies five interconnected impact pathways: climate-resilient livelihoods and ecosystems; water security and ecosystem restoration; social cohesion and peacebuilding; community-owned innovation; and women and youth

empowerment. These pathways describe the intended environmental, livelihood, and social outcomes of scaling RNBWS and depend on supportive policies, capable institutions, coordinated investment, effective partnerships, community ownership, appropriate financing and market incentives, and continuous learning.

The report proposes a multi-level governance architecture connecting regional, national, landscape, community, and knowledge actors. This recognizes that no single institution can provide policy leadership, financing, technical expertise, implementation capacity, knowledge, and community ownership required for sustainable scaling. Partnerships are therefore proposed around specific scaling functions, with responsibilities progressively embedded within institutions capable of sustaining implementation, financing, maintenance, learning, and accountability beyond individual projects.

The proposed scaling framework integrates six interdependent dimensions—technological, institutional, policy, financial, market, and knowledge and learning—and four complementary pathways: horizontal, vertical, functional, and diagonal scaling. Rather than applying a uniform package across landscapes, the strategy proposes that the combination and sequencing of these dimensions and pathways respond to context-specific constraints, opportunities, capacities, and scaling bottlenecks. Scaling would progress through three flexible phases—foundation and demonstration, expansion, and institutionalization and sustainability—with adaptation and learning continuing throughout.

The proposed investment strategy similarly emphasizes scaling readiness, diversification, and long-term sustainability. Investment would support both RNBWS interventions and the wider enabling environment, including institutional capacity, governance and coordination, community participation, knowledge systems, market development, MEL, and long-term operation and maintenance. Financing is envisaged to evolve from grant, public, and development-partner support during demonstration toward increasingly diversified public, climate, development, blended, private, and domestic financing as interventions mature and become institutionalized.

The proposed implementation roadmap and MEL framework bring these elements together through an adaptive process. Periodic scaling-readiness reviews would use implementation evidence, monitoring results, and stakeholder feedback to determine whether interventions should be adapted, expanded, institutionalized, maintained at their existing scale, or discontinued. Continuous learning is therefore fundamental to identifying bottlenecks and unintended outcomes and to improving implementation, partnerships, investments, and subsequent scaling decisions.

This scaling strategy should be understood as a living framework, subject to periodic review and revision as implementation experience, contextual conditions, and scientific evidence evolve. In particular, the CGIAR Food Frontiers and Security Science Program is developing complementary research and technical support on scaling in fragile and conflict-affected settings (FCAS). Once the forthcoming “Scaling in FCAS” framework becomes available, the present strategy should be revisited to incorporate relevant guidance and lessons. This iterative approach will help ensure that the strategy remains responsive to the changing realities of refugee-hosting landscapes and emerging knowledge on responsible scaling.

Overall, sustainable scaling of RNBWS would require robust and continuing evidence, demonstrated scaling readiness, supportive policies and legal frameworks, capable and coordinated institutions, secure land and resource rights, diversified financing, viable market opportunities, effective partnerships, inclusive community ownership and participation, gender equality and social inclusion, access to knowledge and technology, climate information, long-term maintenance arrangements, and continuous learning and adaptive management. If effectively implemented and progressively adapted, the proposed strategy is

intended to contribute to the widespread and institutionalized adoption of RNBWS and, ultimately, to climate-resilient, environmentally sustainable, socially inclusive, and economically productive refugee-hosting landscapes, characterized by restored ecosystems, improved water security, resilient livelihoods, stronger social cohesion, community-owned innovation, and meaningful participation and empowerment of women and youth. These represent the intended contribution and long-term vision of the proposed strategy rather than impacts already achieved.

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