Scaling Climate Smart Practices and Technologies for Food Security

REGIONAL MAPPING AND ASSESSMENT FOR KENYA

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List of Abbreviations

Abbreviation	Full Term
ABC	African Biogas and Clean Energy
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ATVET	Agricultural Technical and Vocational Education and Training
BC	Business Champions
BSF	Black Soldier Fly
CBD	Convention on Biological Diversity
CIDP	County Integrated Development Plan
CIIF	Climate Innovation and Investment Facility
CLA	Collaborating, Learning, and Adapting
CRAFT	Climate Resilient Agribusiness for Tomorrow
CSA	Climate-Smart Agriculture
DA	Development Agent
DFCD	Dutch Fund for Climate and Development
DFI	Development Finance Institution
EC	European Commission
EKN	Embassy of the Kingdom of the Netherlands
ERP	Enterprise Resource Planning
FAO	Food and Agriculture Organization
FFS	Farmer Field School
FMO	Dutch Entrepreneurial Development Bank
FNS	Food and Nutrition Security
FPO	Farmer Producer Organization

GHG	Greenhouse Gas
IMO	Indigenous Microbe Organisms
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
KCSAP	Kenya Climate Smart Agriculture Project
KII	Key Informant Interview
MFI	Microfinance Institution
MRV	Monitoring, Reporting and Verification
NDC	Nationally Determined Contributions
NGO	Non-Governmental Organization
OECD	Organisation for Economic Co-operation and Development
PICS	Purdue Improved Crop Storage
PPP	Public-Private Partnership
RVO	Netherlands Enterprise Agency (Rijksdienst voor Ondernemend Nederland)
SACCO	Savings and Credit Cooperative Organization
SDG	Sustainable Development Goal
SLDP	Sustainable Livelihoods Development Programme
SME	Small and Medium Enterprise
SNV	Netherlands Development Organisation
ToT	Training of Trainers
TVET	Technical and Vocational Education and Training
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
WWF	World Wide Fund for Nature

01 Executive Summary

East Africa's food systems face intertwined challenges of climate vulnerability, productivity stagnation, and ecosystem degradation. In Kenya, the urgency to advance Climate-Smart Agriculture (CSA) has never been greater as farmers confront erratic rainfall, soil degradation, and limited access to finance and markets. This study, *"Scaling Climate Smart Innovations in East Africa for Food Security",* aims to identify, assess, and prioritise climate-smart solutions, practices, and innovations, as well Climate Smart Agriculture (CSA) practice, that have the highest potential to strengthen Kenya's food security and climate resilience.

The assessment combined a comprehensive desk review with 21 Key Informant Interviews across 11 flagship regional initiatives, including The Climate Resilient Agribusiness for Tomorrow (CRAFT), 2SCALE, Pathways to Prosperity, and ABC Biodigester. Using a multi-criteria scaling framework aligned to Kenya's Climate-Smart Agriculture Strategy (2017-2026), each solution was evaluated across six readiness dimensions: inclusivity; institutional leadership; adaptability; scalability; sustainable finance; and partnerships. A Collaborating, Learning, and Adapting (CLA) lens ensured focus on systemic enablers of scaling rather than on isolated technologies.

It should be noted that, throughout this report, "solutions" refers to the full portfolio of 229 documented approaches; "CSA practices" are those which are effective and scaling-ready but represent established methods; and "innovations" are a defined subset—approaches that are novel, contextually adapted, or achieve breakthrough improvements in efficiency or reach. Where these terms appear in this report, they carry these specific meanings.

Key findings:

- 229 solutions were documented across East Africa, of which a subset were categorised as innovations or high-readiness CSA practices, which demonstrate high potential for scale in Kenya.
- Kenya hosts a vibrant climate-smart agriculture ecosystem, anchored by inclusive agribusiness models, climate-smart value chains, and growing investment in bioenergy, digital agriculture, and regenerative practices.
- High-performing cases, such as 2SCALE's partnership model, CRAFT's climate-resilient value chains, and ABC's biodigester enterprises, show measurable benefits in productivity, adaptation, and emissions reduction.
- However, scaling remains constrained by fragmented coordination, short-term funding, and limited alignment between public and private investment.

Cross-regional insights:

Across Ethiopia, Uganda, Mozambique, and Kenya, successful scaling correlated with locally embedded leadership, participatory design, and blended financing models. **Systemic enablers such as digital advisory tools, knowledge networks, and public-private partnerships were decisive for sustaining adoption and replication.**

Recommendations for Kenya:

- Deepen assessment of both innovations and CSA practices before investment to identify context-ready solutions.
- Institutionalise knowledge management systems that track solutions and practice performance and cross-country learning.

- Strengthen policy coherence and financing mechanisms to crowd in private capital for CSA solutions and practices.
- Integrate food security and climate resilience strategies, ensuring that scaling efforts address productivity, adaptation, and mitigation concurrently.

Kenya stands at the forefront of climate-smart transformation in East Africa. With targeted investment, coordinated learning systems, and adaptive policy support, the country can accelerate the transition to resilient, low-carbon, and inclusive food systems. This report provides a foundation, not an endpoint, for evidence-based scaling of solutions and practices that deliver lasting impact for farmers, ecosystems, and markets.

02 Background

This study was commissioned by the Netherlands Enterprise Agency (RVO) and the Embassy of the Kingdom of the Netherlands in Nairobi (EKN) to address a critical knowledge gap in regional food and nutrition security programming. Across East Africa, centrally funded FNS projects—spanning Ethiopia, Kenya, Mozambique, and Uganda—have generated substantial experience in climate-smart mitigation and adaptation. However, these innovations have not been systematically documented or shared in ways that enable replication and scaling. The assignment aimed to map successful climate-smart innovations and Climate-Smart Agriculture (CSA) practices from regional programmes, assess their contextual factors and scaling potential, and identify high-potential solutions for integration into Kenya's current and future FNS portfolio. The study combined a desk review of project documentation and impact evaluations with 21 Key Informant Interviews across 11 flagship regional initiatives. A multi-criteria scaling framework, aligned to Kenya's Climate-Smart Agriculture Strategy (2017–2026), was applied to evaluate innovations across six readiness dimensions: inclusivity; institutional leadership; adaptability; scalability; sustainable finance; and partnerships.

03 Methodology

Research framework

This research employed a mixed-methods approach combining Key Informant Interviews (KIIs) with a comprehensive desk review of project documentation. The framework was structured around three core components: (1) systematic innovation identification and documentation using unique identifiers; (2) multi-criteria assessment integrating quantitative scoring and qualitative analysis; and (3) explicit evaluation against Kenya's Climate-Smart Agriculture Strategy (2017-2026), enabling factors.

Key definitions

1. **Innovation**

– For the purposes of this research, innovation has been defined as, "*innovation is the development or application of new or existing solutions in ways that generate transformative impact. It can mean creating something entirely new, adapting an existing solution to a different context, or improving current approaches to increase efficiency, effectiveness, or reach. Innovation may be fuelled by science and technology, new social or business models, creative financing mechanisms, novel partnerships, or breakthrough improvements in delivering essential services and products.*"

This broad definition recognises that agricultural innovation encompasses not only technological advances but also **process innovations, institutional arrangements, market mechanisms, and knowledge transfer systems that demonstrably improve outcomes for farmers and food systems**.

2. **Climate-Smart Agriculture (CSA)**

– FAO defines Climate-Smart Agriculture (CSA) as *"an approach that helps guide actions to transform agri-food systems towards green and climate-resilient practices".* CSA supports reaching internationally agreed goals such as the SDGs and the Paris Agreement. It aims to tackle three main objectives: sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; and reducing and/or removing greenhouse gas emissions, where possible. CSA supports the FAO Strategic Framework 2022-2031 based on the Four Betters: better production; better nutrition; a better environment; and a better life for all, leaving no one behind. What constitutes a CSA practice is context-specific, depending on local socio-economic, environmental, and climate change factors. FAO recommends the approach is implemented through five action points: expanding the evidence base for CSA, supporting enabling policy frameworks; strengthening national and local institutions; enhancing funding and financing options; and implementing CSA practices at field level.

This definition was operationalised in the research by assessing innovations against all three CSA objectives **(productivity, adaptation, mitigation)** while recognising that not all innovations needed to address all three dimensions equally to be considered climate smart.

Project coverage

This study draws on insights from 11 projects operating across East and Southern Africa, spanning diverse focus areas from climate finance and value chain resilience to smallholder service delivery and farmer-led irrigation

Table 1: Project coverage

PROJECT & COUNTRIES	FOCUS AREA
1. **DFCD** - Global	Climate finance initiative
2. **CRAFT** - Tanzania, Kenya, Uganda	Value chain development and climate resilience
3. **2SCALE** - Kenya, Uganda	Partnership-based inclusive agribusiness
4. **Pathways to Prosperity** - Kenya, Tanzania, Mozambique	Food systems transformation
5. **Acting Now** - Kenya, Ethiopia	Climate adaptation and disaster risk reduction
6. **Horti-Life** - Ethiopia	Horticulture value chain
7. **Moyee Coffee** - Kenya	Kenya Fair Trade coffee innovation
8. **One Acre Fund** - Kenya, Ethiopia, Uganda, Rwanda	Smallholder service delivery model
9. **ABC** - Kenya, Uganda	Biogas technology and market development

10. **Sustainable Livelihoods Development Programme (SLDP)** - Mozambique	Integrated rural development
11. **Mangwana** - Mozambique	Farmer-led irrigation

**Countries listed are relevant to this work and not exhaustive of the full country scope of each project*

Solution identification and analysis

The research followed a six-stage analytical process:

1. **Capture:** 229 climate-smart solutions were documented across the 11 projects reviewed, drawing on KIIs and project documentation.
2. **Categorisation:** Each solution was classified firstly by an intervention categorisation: (1) Technological solutions; (2) Process-based solutions; (3) Policy-driven solutions; (4) Market-based solutions; (5) Partnership and institutional solutions; (6) Climate-smart agricultural practices, followed by an innovation potential which was by its primary mechanism of change—practice (agronomic methods farmers apply); technology (physical inputs, tools, or digital systems); or approach (institutional models, delivery mechanisms, or financing arrangements).
3. **Screening:** Solutions were assessed for evidence quality, Kenya relevance, and data completeness. 38 solutions were excluded with documented reasons, leaving 191 for detailed analysis.
4. **Scaling readiness scoring:** Each solution was scored across six dimensions (25 points each, 150 total): participatory and inclusive design; leadership and institutional support; adaptive capacity; potential to achieve scale; sustainable funding models; and partnerships and networks. Solutions scoring 120-150 were classified as high priority.
5. **Kenya contextualisation:** High-scoring solutions were further assessed against Kenya's enabling environment, including policy alignment, financing landscape, and implementation feasibility.
6. **Innovation classification:** The priority list was then reviewed against the agreed definition of innovation to identify which solutions represent genuinely transformative approaches—whether through novelty, contextual adaptation, or breakthrough improvements—rather than replication of established practices.

Limitations

7. **Project selection and coverage:** Three of 14 initially considered projects were excluded due to limited documentation, timing constraints, or stakeholder availability. Some projects were too early in implementation to identify scalable solutions confidently, while others had concluded with key staff no longer accessible. The breadth of countries and projects covered within the study timeframe also limited the depth of engagement possible with each initiative, meaning interviews captured insights from a subset of implementing partners rather than all consortium members. Project selection may therefore be biased toward well-documented initiatives with established Dutch development partnerships.
1. **Resource and scope constraints:** The scope, in terms of budget and time, did not allow for additional investigation to find more information once a solution was highlighted, including more time to identify further key informants, conduct additional interviews, or extend the document review beyond the initially provided materials. Significant time was required to identify suitable interviewees and source relevant documentation, which constrained the breadth of coverage within project timelines.
2. **Data quality variance**: Evidence ranged from rigorous evaluations to self-reported data. Baseline information was generally not available for most innovations, quantitative impact

data was at times unavailable, attribution of bundled interventions was challenging, and time lags meant some impacts reflected early-stage rather than sustained outcomes.

3. **Geographic and temporal constraints:** The five-country focus excluded potentially relevant innovations from other East African, Southern African, West African, and global contexts. The July-October 2025 timing meant that recent innovations had long-term scaling trajectories.

Assumptions

1. **Context transferability assumptions:** Kenya fit assessments relied on assumptions about agro-ecological similarity, institutional comparability, market parallels, and farmer capacity equivalence that may prove optimistic or conservative depending on specific implementation contexts within Kenya's diverse agricultural zones.
2. **Identifying implicit climate innovations:** The research was motivated by the hypothesis that many climate-relevant initiatives exist within Dutch government-funded projects but may not be explicitly framed as climate mitigation, adaptation, or resilience interventions in project documentation. While KIIs successfully surfaced some of these implicit climate innovations, it remained challenging to systematically identify where further research could uncover additional initiatives, as they were not always clearly signalled in available materials. We recommend further deep-dive research to bring out additional insights.
3. **Stakeholder representation gaps:** In line with the agreed scope of work, this research relied on secondary sources and key informant interviews rather than direct farmer engagement. The validity of farmer-related insights, therefore, depends on the extent to which interviewed stakeholders drew on substantive, in-depth interactions with farmers in their own work
4. **Mitigation strategies for limitations**: Multi-source triangulation, explicit documentation of evidence quality, transparent scoring criteria, conservative estimation when evidence was limited, and flagging of areas requiring further research addressed these limitations. The systematic methodology and transparent documentation enable iterative refinement as additional data becomes available, and implementation learning accumulates.

The full scoring framework, categorisation methodology, and detailed criteria for each analytical stage are provided in Annex E. A glossary of climate-smart agriculture terminology is included in Annex D.

04 Regional Climate Smart Innovation Mapping

This mapping reflects innovations identified through KII and document reviews. The approach for mapping innovations was to capture every solution mentioned and considered a possible innovation, and then analyse which ones would be of most interest for this scoping exercise. While efforts were made to gather comprehensive information, challenges persisted in consistently assessing impact, reach, and scope equally between projects because, at times, information was distributed across stakeholders and limited access to all relevant personnel. These innovations are included to illustrate the breadth of climate-smart activities across the region.

Country overview

Table 2: Country overview

COUNTRY	SOLUTIONS	TECH	PRACTICE	APPROACH	KEY PROJECTS	PRI. FOCUS AREA
Kenya	73	18	18	37	- Horti-Life - Pathways - 2SCALE - ACTING Now	- Soil & Inputs - Market & Value Chain - Extension & Training
Ethiopia	29	8	3	18	- ABC - CRAFT - One Acre Fund - Acting Now	- Extension & Training - Seeds & Varieties - Irrigation & Water
Mozambique	18	7	4	7	- Mangwana/SODP - CRAFT	- Irrigation & Water - Extension & Training - Agronomic Practices
Uganda	7	3	3	1	- CRAFT - Moyee Coffee - ABC - Pathways to Prosperity - DFCD	- Agroforestry & Trees - Post-Harvest - Seeds & Varieties

Cross-regional themes and patterns

Analysis of the 229 solutions identified across the 11 projects revealed consistent patterns in how climate-smart innovations are being designed, delivered, and scaled. Seven cross-cutting themes emerged from both the KIIs and document review, highlighting common success factors as well as persistent implementation gaps. These patterns provide important context for understanding which approaches have traction across diverse contexts—and where systemic barriers continue to limit impact.

Table 3: Cross-regional themes and patterns

THEMES	KEY PATTERNS OBSERVED
Extension Models	Lead Farmer/ToT dominant across all countries. FFS institutionalisation (Ethiopia, Mozambique). Farmer-to-farmer learning more effective than traditional extension and consistently applied across projects. Demonstration plots and model farms as knowledge hubs.
Integrated CSA Packages	Bundled approaches outperform single interventions. Improved seed varieties emerged as major climate innovation focus across all countries. Agroforestry systems combining fruit/shade/fodder trees prevalent in coffee. Diversification emphasised through coffee, sesame, cashew, and fruit trees. Value chain-specific CSA packages (CRAFT). Water management packages combining drip, mulching, harvesting. Reduction in chemical use promoted across projects.

Market and Finance	Cooperative strengthening universal. Blended finance (DFCD). Results-based financing (ABC). Digital payments and market information systems. Contract farming and outgrower schemes. Revolving funds at cooperative level. Market linkages with Netherlands consistently prioritised. All projects engaging with Dutch private sector where possible.
Organic Input Production	Bio-slurry from biodigesters (Kenya, Uganda). Community-level compost/biocompost production. Biopesticides from indigenous microbes. BSF systems for fertiliser and feed. Youth groups as distribution channels.
Digital Systems	Mobile money and digital wallets. Weather information via SMS/apps. Database systems for aggregators. Digital weighing scales. Blockchain for supply chain transparency. Remote sensing for irrigation.
Partnerships	Public-private for seed systems. Research institute-farmer linkages. Multi-ministry coordination. NGO-private-government consortia. University partnerships. Regional platforms for learning. Dutch private sector engagement integrated across projects.
Implementation Gaps	Access to finance primary barrier. Limited after-sales service. Data quality challenges. High upfront costs. Weak policy-practice linkages. Need for sustained technical support beyond projects. Climate resilience cannot be tackled in isolated value chains—requires a systems approach.

Other countries worth noting: Tanzania and Rwanda

While Rwanda and Tanzania were not primary focus countries for this analysis, several notable climate-smart solutions emerged during the KIIs that offer valuable comparative insights for Kenya. In Rwanda, One Acre Fund showcased the country's powerful government partnerships on agricultural innovation, including collaborative work on seed centres that promote local seed supply and the policy-level adoption of bean-maize intercropping practices to improve soil health. KIIs for SLDP and Mangwana highlighted that they introduced low-tech furrow irrigation agriculture to Rwanda, adapted from their Mozambique experience, after discovering farmers were using inappropriately large-scale irrigation systems that drowned small vegetable plants. Additionally, TRAIDE programmes offer an innovative approach to support the private sector where TRAIDE empowers the private sector to develop sustainable solutions for development challenges in emerging economies. The programmes help national and international businesses through local and dedicated support to achieve their impact potential. Under this, the TRAIDE programmes are implementing a clean cooking stoves impact cluster in Rwanda. Tanzania emerged through multiple interviews—particularly with DFCD and CRAFT—as a context where lead farmer extension models have been successfully deployed, despite the country's challenging investment landscape. Both countries demonstrated solutions in organic soil amendments, with Rwanda advancing mukuna green manure systems and Tanzania progressing on ministry-led soil testing kit distribution, offering potential adaptation pathways for similar agroecological contexts in Kenya.

05 Scaling Readiness Highlights

Assessment framework and criteria

This research employed a mixed-methods approach combining Key Informant Interviews (KIIs) with a comprehensive desk review of project documentation. The framework was structured around three core components: (1) systematic innovation identification and documentation using unique identifiers; (2) multi-criteria assessment integrating quantitative scoring and qualitative analysis; and (3) explicit evaluation against Kenya's Climate-Smart Agriculture Strategy (2017-2026) enabling factors.

Technical evidence-based and viability

The high-priority solutions cluster around three strategic themes that collectively address Kenya's CSA transformation: bioeconomy and soil health, farmer-centred extension systems, and climate-resilient production practices.

Project overview

2SCALE (14 solutions)
Partnership brokering model operating across nine countries, focusing on inclusive agribusiness development with emphasis on Base of Pyramid market access and eco-efficient practices.

Solution Categorisation: Technology (10) | Practice (1) | Approach (3)

Partnership Brokering	• Unique model connecting smallholders with agribusiness through systematic broker-to-transparent-intermediary approach. Facilitates market linkages while building cooperative capacity and transparency.
Processing Technology	• Solar panels for processing plants, packaging lines, and ERP systems for large cooperatives enable value addition at scale. Cotton processing upgrade (Nakatonzi) demonstrates value chain transformation potential.
Quality Control Systems	• Moisture meters for grain quality control and digital weighing scales with mobile integration address post-harvest losses and enable transparent transactions. Hermetic bags distribution through unions reduces storage losses.
Seed Supply Chain	• Improved seed supply chain management including Agrico potato variety certification and Dutch potato variety regulatory support. Research-to-farmer linkages strengthen input access.
Eco-Efficient Practices	• Climate-smart practices adoption through partnership channels, emphasising practices that maintain productivity while reducing environmental impact.

ABC Biodigester programme: Integrated bioeconomy approach (6 solutions)
The African Biogas and Clean Energy (ABC) Program represents a mature bioeconomy model, achieving scale across Uganda and Kenya with strong private sector engagement.

Solution Categorisation: Technology (0) | Practice (2) | Approach (4)

Bio-slurry Value Proposition	• Originally focused on biogas for cooking, the programme evolved through farmer feedback to emphasise bio-slurry as the primary value driver. Bio-slurry improves soil health, water retention, and nutrient content while reducing chemical fertiliser dependency. Uganda's more advanced market provides implementation lessons for Kenya acceleration.
Market Systems	• Smallholders produce surplus bio-fertiliser that, in many cases, local enterprises aggregate and sell, creating a grassroots circular economy. Demonstrated sustainability through private sector participation counters chemical fertiliser markets while generating farmer income. This has been particularly effective in Uganda, where it was initially driven by farmers in a grassroots effort, which later caught the attention of the government and is now being standardised through policies with a specific partnership between the Ministry of Energy and the Ministry of Agriculture.
Enabling Mechanism	• Dedicated biodigester loans through MFIs/SACCOs address the investment barrier with 2.5-year break-even. Community training also operates through women's groups, SACCOs, and radio, creating peer-to-peer learning networks for production, storage, and application knowledge.

ACTING NOW (8 solutions)
Food security programme integrating climate-smart water management, seed and soil systems, market linkages and value addition, and institutional strengthening approaches, with county government alignment for sustainability.

Solution Categorisation: Technology (2) | Practice (1) | Approach (5)

Water & Climate Resilience	• Drip irrigation with credit access, water harvesting structures, and commercial fodder/silage systems (1.2 million kg produced) address seasonal climate variability and ensure year-round productivity through mechanised conservation services.
Seeds, Soils & Regenerative Practices	• Localised seed systems for drought-tolerant varieties, cooperative-produced bio-solutions (bio-compost, bio-fertilisers), and intercropping/agroforestry integration improve soil health, carbon sequestration, and climate risk diversification.
Market Systems	• Quality-based payment systems and cooperative-level value addition (grading, processing, branding) incentivise climate-smart practices while reducing post-harvest losses and diversifying income streams.
Institutional Strengthening	• FPO strengthening, Training of Trainers (ToT) extension systems, and county government alignment build collective capacity and ensure continuity beyond project timelines through embedded local knowledge transfer.

CRAFT Approach: Systems-level market transformation (31 solutions)
The Climate Resilient Agribusiness for Tomorrow (CRAFT) programme pioneered a market systems approach across Kenya, Uganda, and Tanzania, through a Climate Innovation and Investment Facility (CIIF) and effective use of Business Champions (BC).

Solution Categorisation: Technology (11) | Practice (5) | Approach (15)

Business Champions	• Integrate training facilities, and follow-up support, creating business champions who drive local CSA adoption. Exceptional scores across all parameters demonstrate strong participatory design, leadership buy-in, adaptive capacity, and partnership quality.
SME Co-Investment	• Grants to SMEs and cooperatives for CSA integration de-risk private sector climate investment, while building commercial pathways. A blended finance approach demonstrates scalable development-agribusiness partnership.
Systems Integration	• Lead farmers are an integral part of the programme for reaching dispersed communities. Multi-crop diversification and farmer field schools shift focus from single crops to whole farming systems. Peer learning was also cited as a key component because farmers trust peer farmers over external experts.

DFCD (12 solutions)
Blended finance mechanism combining DFI-NGO-fund manager consortia with EC guarantee backing, demonstrating innovative climate finance structures for agriculture and nature-based solutions.

Solution Categorisation: Technology (0) | Practice (1) | Approach (11)

DFI-NGO-Fund Manager Consortium	• Unique structure combining development finance institution resources, NGO technical expertise, and fund manager investment discipline. EC guarantee-backed blended finance mechanism de-risks private investment.
Contractual TA Requirement	• Technical assistance requirements in investment contracts ensure farmer impact alongside financial returns. Addresses gap between climate finance and smallholder reach.
Circular Economy Investments	• Chanzi (Black Soldier Fly waste-to-feed) and Sanovation (fecal sludge to energy briquettes) demonstrate circular economy pathways. Waste-to-value approaches address multiple challenges simultaneously.
Smallholder Aggregation	• Cinch Markets model for smallholder land aggregation and commercialisation. East Africa Foods CSA investment demonstrates viable commercial-climate integration.
Climate Finance Innovation	• Phase structure evolution enables graduated support. Cross-institutional grant committee governance ensures accountability. Climate-focused FI intermediation with use-of-proceeds tracking.

Horti-Life (27 solutions)
Horticultural value chain development programme with strong Farmer Field School institutionalisation. While climate was added later as a component, the project demonstrates numerous climate innovation examples.

Solution Categorisation: Technology (8) | Practice (3) | Approach (16)

FFS Institutionalisation	• Government adoption and national rollout of FFS approach. TVET system strengthening for extension workers. Integration with Development Agent (DA) system ensures sustainability.
ATVET Curriculum Development	• Practical farming curriculum with entrepreneurship training. Short certification courses for spray services, nursery management, and FFS facilitation create employment pathways.
Improved Seedling Systems	• Nurseries at Kebele level with national quality standards development. Dutch seed company linkages to local agro-dealers enable improved variety access. Zone variety demonstrations support adaptation.
Integrated CSA Package	• Bundled practices including ring irrigation, mulching, and composting (bioswury). Soil health improvement through water retention. Flexible adoption model recognises 40-50% adoption still effective.
Private Sector Approach	• Private technical staff (not NGO approach) for sustainability. Investment facility for input companies. Horticultural loan products with banks (zero default rate achieved).

Mangwana and SLDP (18 solutions)
Farmer-led irrigation development and climate-resilient livelihoods in Beira Corridor (Mangwana) and Gorongosa (SLDP), with solutions successfully transferred to Rwanda.

Solution Categorisation: Technology (7) | Practice (4) | Approach (7)

Farmer-Led Irrigation	• Low-tech furrow/canal irrigation achieved highest assessment score. Already transferred to Uganda and Rwanda. Enables farmer scale-up from 0.25 to 2-3 hectares while providing risk reduction. Minimal capital investment makes it ideal for smallholder contexts.
Staggered Planting	• No-cost behavioral adjustment reducing climate risk through temporal diversification. Successfully scaled in Mozambique, demonstrating farmer-led adoption without external subsidy.

Digital Agriculture	• Soil humidity sensors and remote sensing for irrigation mapping. Two-way SMS system (Smart Farming) enables farmer communication and information access. Solar irrigation supported where appropriate.
Lead Farmer Model	• Farmer-to-farmer learning approach with discussions at lead farmer's farm. Personal development plans with grant component enable individual progression. Farmer-led irrigation development methodology.
Gorongosa Livelihoods	• Alternative livelihoods through coffee, honey, and chili diversification. Climate resilience through diversification in buffer zone communities. Private sector contract farming creates market linkages.

Moyee Low-Carbon Coffee (22 solutions)
Coffee sector transformation emphasising biosolutions production at the cooperative level, multi-tree agroforestry systems, domestic market development, and local processing infrastructure retaining 50% of value in Kenya.

Solution Categorisation: Technology (2) | Practice (10) | Approach (10)

Biosolutions Production	• Cooperative-level production of biocompost, biopesticides, and liquid foliar fertilisers at six facilities. Indigenous microbe technology (IMO) harvested from local forests reduces dependence on synthetic inputs. Project achieved 335,956 kg biocompost and 9,779L liquid foliar production.
Multi-Tree Agroforestry	• Comprehensive system integrating coffee with medicinal, fruit (avocado, macadamia, banana), and shade trees (Grevillea, Calliandra). Ground cover with intercropping (beans, sweet potato) improves soil health and food security. Coffee cherry waste composting reduces methane emissions (~40% of value chain emissions). Demo farmer achieved 17% higher soil organic carbon than conventional neighbours.
Youth Engagement Model	• Youth groups serve as biosolutions distribution service, creating employment while extending reach. Youth councils established at cooperative level with reduced registration fees. Intercropping addresses generational succession in coffee farming.
Local Value Retention	• Local processing factory retains 50% of coffee value in Kenya (18 permanent jobs). Bottom price guarantee (replacing premium model) protects farmers when market prices drop. 60% farmer income increase achieved, although living income gap widened due to 72% cost-of-living increase; gap closure projected by 2027.
Partnership Model	• Agriterra (cooperative capacity building), FairChain (digitalisation and traceability), Moyee (commercial partner). ReNature brought in via RVO Impact Accelerator fund.

One Acre Fund (31 solutions)
Cross-country model operating in 10 countries with a consistent, data-driven approach to smallholder support at scale, anchored in a strong Climate Smart Strategy integrating agroforestry, soil health, and diversified cropping.

Solution Categorisation: Technology (4) | Practice (8) | Approach (19)

Climate Smart Strategy	• Comprehensive organisational strategy integrating climate resilience into core service delivery. Combines improved seeds, IPM, soil fertility building (compost, cover crops), and agroforestry. Regional scale provides extensive replicability evidence across diverse agroecological zones.
Climate Resilience Training	• Packaged training integrating climate adaptation practices into farmer group meetings. Real-time weather-based planting guidance using data systems. Human-centred design ensures behavior change effectiveness.
Agroforestry at Scale	• Carbon credit programmes and community-led tree nurseries enable large-scale agroforestry adoption. Green Legacy landscape restoration partnership in Ethiopia demonstrates government collaboration potential. Faidherbia tree species for drought resistance.
Credit-Linked Inputs	• Agricultural insurance bundled with credit and satellite-based verification. High-intensity training and last-mile delivery model ensures input access and proper use. Credit model enables smallholder investment
Research & Adaptation	• Research stations with trial processes enable continuous improvement. Impact evaluation and data systems support evidence-based scaling. Agri-SME investment arm extends reach through private sector partnerships.

Pathways to Prosperity (22 solutions)
Market-systems approach to coffee and cash crop value chains with emphasis on carbon credit integration, county government alignment, and farmer-to-farmer learning through model farm demonstrations.

Solution Categorisation: Technology (4) | Practice (3) | Approach (15)

Market Linkage Model	• Systematic approach connecting farmers to markets through inclusive service delivery, with two-track extension covering both commodity-specific and whole-farm approaches.
Carbon Credit Agroforestry	• Bonus model integrating carbon credits with agroforestry, creating additional income streams while building climate resilience. Multi-tree systems combining fruit, shade, and fodder trees.
Lead Farmer/ToT Model	• Facilitated lead farmer networks for farmer-to-farmer learning. Grafting and top-working skills transfer enables local propagation capacity. Coffee Research Institute partnership ensures technical quality.
Model Farm Demonstration	• Early adopter strategies create visible proof points for climate-smart practices. Regional adaptation of agroforestry with context-specific fruit and nut trees.

06 Innovation Assessment

All solutions presented in this assessment were either identified through the comprehensive document review or referenced during Key Informant Interviews (KIIs) as contributing to climate resilience, adaptation, or mitigation in some capacity. To ensure rigorous and consistent classification, each solution was assessed against two distinct frameworks: (1) the definition of innovation established in the methodology, and (2) the FAO Climate-Smart Agriculture criteria.

The innovation definition adopted for this research states that: "*Innovation is the development or application of new or existing solutions in ways that generate transformative impact. It can mean creating something entirely new, adapting an existing solution to a different context, or improving current approaches to increase efficiency, effectiveness, or reach. Innovation may be fuelled by science and technology, new social or business models, creative financing mechanisms, novel partnerships, or breakthrough improvements in delivering essential services and products.*"

The CSA assessment evaluates each solution against the FAO's three core objectives: (1) sustainably increasing agricultural productivity and incomes; (2) adapting and building resilience to climate change; and (3) reducing and/or removing greenhouse gas emissions where possible. Solutions do not need to address all three dimensions equally to be considered climate-smart, reflecting the context-specific nature of CSA implementation.

How solutions were assessed

Step 1: Solution Categorisation

All 229 solutions identified through KIIs and document review were categorised by:

Intervention type: Technological | Process-based | Policy-driven | Market-based | Partnership and Institutional | Climate-smart Practice

Innovation potential: Practice (agronomic methods) | Technology (physical inputs, tools, digital systems) | Approach (institutional models, delivery mechanisms, financing)

Many solutions span multiple categories. Classification reflects the primary mechanism of change.

Step 2: Scaling Readiness Assessment

Each solution was scored against a six-factor framework (25 points each, 150 total).

Factor	What it measures
Participatory & Inclusive	Farmer engagement, gender, youth, community ownership
Leadership & Institutional	Government alignment, private sector, farmer org leadership
Adaptive & Flexible	Learning mechanisms, farmer feedback, climate resilience
Scale Potential	Design for scale, market pull, cost-effectiveness
Funding Models	Business viability, affordability, sustainability pathway
Partnerships & Networks	Partnership quality, knowledge sharing, value chain links

Priority thresholds: High (120-150) | Moderate (90-119) | Low (60-89)

Step 3: Innovation and CSA Classification

High-scoring solutions were assessed against two definitions:

Innovation: Does it create something new, adapt to a different context, or achieve breakthrough improvements?

CSA: Does it address productivity, adaptation, and/or mitigation? (Based on FAO criteria)

Important: A high scaling score does not automatically mean a solution qualifies as an *innovation*. Established practices implemented well can score highly on scaling readiness while not meeting the threshold for innovation. Both classifications are valuable: scaling readiness indicates potential for Kenya replication, while innovation/CSA classification may determine eligibility for different funding streams.

Worked example: Staggered planting (Mangwana and SLDP)

Participatory	Leadership	Adaptive	Scale	Funding	Partnerships	TOTAL
22	22	22	22	20	20	**128/150**

Innovation Classification: NO (staggered planting is an established practice)

CSA Classification: YES (addresses climate adaptation)

This solution scored high on scaling readiness but did not qualify as an innovation—demonstrating that effective, proven practices remain valuable for Kenya replication even when they are not novel.

Selection of solutions for classification assessment

Of the 191 solutions that passed initial screening, 20 were selected for detailed innovation and CSA classification. This subset was drawn from solutions scoring 120 or above on scaling readiness, prioritising those with sufficient evidence to support confident classification.

Importantly, many solutions across projects exhibited significant homogeneity—for example, lead farmer extension models, farmer field schools, and improved seed distribution systems appeared in multiple projects with similar design features. Rather than assess each variant separately, representative examples were selected to avoid redundancy while ensuring coverage across solution types, geographies, and implementing projects.

The classification exercise served a specific purpose: to distinguish between solutions that qualify as innovations under the study definition (novel, adapted to new contexts, or achieving breakthrough improvements) and those that represent effective CSA practices, which, while valuable and high-scoring on scaling readiness, do not meet the threshold for innovation. This distinction matters because funding streams, replication strategies, and knowledge management approaches may differ across categories. A high scaling-readiness score indicates potential for Kenya uptake; an innovation or CSA classification indicates what kind of solution it is and how it should be positioned.

Innovation Classification Assessment

Both tables below are ordered from highest to lowest scaling readiness score.

This table presents the 10 solutions (of 20 assessed) that met the study's definition of innovation, focusing on whether it represents something genuinely new, adapted, or improved in a way that generates transformative impact.

Table 4: Innovation Classification Assessment

SOLUTION	PROJECT	SCORE	INNOVATION RATIONALE
Localised Climate Innovation Business Champions	CRAFT	141	Meets “novel partnerships” and “new social or business models” criteria. Local innovation ecosystem working with BCs generating transformative impact for context-specific climate solutions.
DFI-NGO-Fund Manager Consortium Model	DFCD	137	Meets “creative financing mechanisms” and “novel partnerships” criteria. Blended finance consortium structure represents financial innovation generating transformative impact for climate investments.
Bio-Fertiliser Market Development Model	ABC Programme	135	Meets 'new social or business models' criterion. Market systems approach to bio-inputs represents process innovation in market mechanisms that demonstrably improves farmer access.
Climate Resilience Training Package	One Acre Fund	133	Meets “breakthrough improvements in delivering essential services and products.” Systematic curriculum specifically designed for climate resilience represents process innovation in knowledge transfer systems.
CRAFT SME Co-Investment Model	CRAFT	129	Meets “creative financing mechanisms” criterion. Co-investment structure for CSA SMEs represents novel approach to “enhancing funding and financing options” that demonstrably enables scale.
CSA Service Delivery Model via Lead Farmers	CRAFT	125	Meets “new social or business models” and “adapting an existing solution to a different context” criteria. Novel integration of CSA-specific content into lead farmer delivery represents process innovation with potential transformative impact.
Agri-Financing Model for Biodigester Adoption	ABC Programme	120	Meets “creative financing mechanisms” criterion. Tailored agricultural finance product for clean energy adoption represents financial innovation that demonstrably enables technology uptake.
Staggered Irrigation Scheduling	Mangwana and SLDP	118	Meets “improving current approaches to increase efficiency, effectiveness, or reach” criteria. Novel application of scheduling techniques to optimise water use represents process innovation that demonstrably improves outcomes for farmers.

SOLUTION	PROJECT	SCORE	INNOVATION RATIONALE
Green Legacy Landscape Restoration Partnership	One Acre Fund	110	Meets “novel partnerships” criterion. Cross-sector partnership model for landscape restoration at scale represents institutional innovation generating transformative impact.
University Partnerships for Horticulture Training	Horti-Life	108	Meets “novel partnerships” criterion. Formal university-extension linkage represents institutional innovation for “breakthrough improvements in delivering essential services.”

Climate-Smart Agriculture Classification Assessment

This table presents the 19 solutions (of 20 assessed) that qualified as Climate-Smart Agriculture practices based on their contribution to the three CSA objectives: productivity, adaptation, and/or mitigation.

Table 5: Climate-Smart Agriculture Classification Assessment

SOLUTION	PROJECT	SCORE	CSA RATIONALE
Furrow/Canal Irrigation	Mangwana and SLDP	144	Addresses productivity objective (sustainably increasing agricultural productivity) and adaptation (water management for climate resilience).
Localised Climate “Innovation Hubs”	CRAFT	141	Supports “strengthening national and local institutions” (FAO action point) and enables locally-appropriate solutions across all three objectives.
Bio-Slurry as Organic Fertiliser	ABC Programme	139	Addresses mitigation (circular waste management, reduced synthetic inputs) and productivity (improved soil fertility).
DFI-NGO-Fund Manager Consortium Model	DFCD	137	Directly supports “enhancing funding and financing options” (FAO action point) for climate adaptation and mitigation investments.
Bio-Fertiliser Market Development Model	ABC Programme	135	Addresses mitigation (reduced synthetic fertiliser emissions) and productivity (sustainable soil management).
Lead Farmer/TOT Model with Facilitation	Pathways/Acting Now	134	Supports adaptation objective through improved delivery of climate-resilient practices.
Climate Resilience Training Package	One Acre Fund	133	Directly supports adaptation objective and FAO action point “expanding the evidence base for CSA” through structured training.
Farmer Field School with Demonstration Plots	CRAFT	130	Supports productivity and adaptation through hands-on capacity building for climate-resilient practices.
CRAFT SME Co-Investment Model	CRAFT	129	Supports “enhancing funding and financing options” (FAO action point) enabling investment in climate-smart enterprises across all three objectives.

SOLUTION	PROJECT	SCORE	CSA RATIONALE
Staggered Planting (Rain-Fed)	Mangwana and SLDP	128	Addresses adaptation objective (building resilience to climate change) by reducing climate variability exposure through temporal diversification.
CSA Service Delivery Model via Lead Farmers	CRAFT	125	Directly addresses all three objectives: productivity, adaptation, and mitigation through structured CSA delivery.
Community Training on Organic Fertiliser Production	ABC Programme	124	Addresses mitigation (reduced synthetic fertiliser emissions) and productivity (local input production, soil health).
Agroforestry Programmes	One Acre Fund	123	Addresses all three objectives: productivity (diversification), adaptation (microclimate regulation), mitigation (carbon sequestration).
Agri-Financing Model for Biodigester Adoption	ABC Programme	120	Directly addresses mitigation (renewable energy, reduced deforestation) and supports "enhancing funding and financing options."
Staggered Irrigation Scheduling	Mangwana and SLDP	118	Addresses adaptation (climate resilience through water management) and pproductivity (resource efficiency).
Lead Farmer Model	Mangwana and SLDP	115	Supports adaptation objective through knowledge transfer systems enabling climate-resilient practice adoption.
Farmer-to-Farmer Learning Approach	Mangwana and SLDP	112	Supports adaptation objective through knowledge transfer systems that build adaptive capacity.
Green Legacy Landscape Restoration Partnership	One Acre Fund	110	Addresses mitigation (reforestation, carbon sequestration) and adaptation (ecosystem restoration, landscape resilience).
University Partnerships for Horticulture Training	Horti-Life	108	Supports "strengthening national and local institutions" (FAO action point) and builds capacity for productivity and adaptation.

Classification results

Of the 20 solutions assessed, 10 (50%) met the criteria for innovation, while 19 (95%) qualified as Climate-Smart Agriculture practices. Notably, several high-scoring solutions that did not qualify as innovations (such as furrow irrigation, staggered planting, and lead farmer models) nonetheless represent highly effective CSA practices. This underscores the importance of distinguishing between innovation status and climate impact—established good practices implemented well can deliver substantial climate resilience benefits even without qualifying as innovations under strict definitional criteria.

High-priority innovations identified for consideration

Proven climate-resilient practices from regional learning

1. **Bio-fertiliser market development model (ABC Programme):** A market systems approach that demonstrably improves farmer access to organic inputs while reducing synthetic fertiliser dependency. The model addresses both mitigation (reduced emissions) and productivity (sustainable soil management), with proven scalability through existing agro-dealer networks across East Africa.
2. **Agri-financing model for biodigester adoption (ABC Programme):** Tailored agricultural finance products enabling clean energy adoption among smallholders. Successfully deployed in Kenya and Ethiopia, this model directly addresses deforestation reduction while creating circular nutrient systems. The financing mechanism removes the primary barrier to biodigester uptake—upfront capital costs—making it ideal for replication.

Cross-regional analysis

The cross-regional analysis reveals that, while Kenya leads in many areas of climate-smart agriculture and innovation sophistication, the most critical lesson from neighbouring countries is that simplicity and context appropriateness of solutions drive long-term impact and scalability. Projects like Resilience's farmer-led furrow irrigation in Mozambique and ABC's biodigester production model in Uganda demonstrate that low-tech, locally-replicable solutions can achieve broader farmer adoption than complex technical solutions. This suggests prioritising farmer-led extension models, bundled CSA approaches, strong financing mechanisms, public-private partnerships, digital systems reducing transaction costs, local organic input production capacity, county government alignment, and peer-to-peer learning platforms. These patterns inform the detailed Kenya case studies and scaling assessments in subsequent report sections.

Regional collaboration opportunities

Of the 16 high-priority solutions, 12 already operate across multiple East African countries, demonstrating proven transferability and creating natural pathways for Kenya to leverage regional expertise.

Uganda-Kenya Bio-Economy Exchange	• Uganda's more advanced biodigester market offers immediate lessons for Kenya's acceleration. ABC Programme's bio-slurry market systems, financial products, and farmer cooperative models transfer directly with contextual adaptation.
Mozambique-Kenya Practice Transfer	• While not innovation, it is still a effective CSA practice and the low-tech irrigation and staggered planting successfully transferred from Mozambique to Uganda and Rwanda demonstrate clear Kenya pathway. These no-cost or low-cost practices require primarily knowledge transfer, enabling rapid scaling through existing extension systems.

Multi-Country Programmes	• CRAFT's simultaneous Kenya-Uganda-Tanzania operation creates natural learning exchanges. One Acre Fund's 10-country network provides ready-made institutional infrastructure with robust regional monitoring systems. The DFI-NGO-Fund Manager Consortium exemplifies integrated regional collaboration, combining FMO development finance, local NGO presence (SNV, WWF), and commercial fund management.

These regional networks substantially reduce Kenya's adoption risk and accelerate implementation. Rather than piloting unproven concepts, Kenya can leverage documented successes from neighbouring countries with similar smallholder farming systems, benefiting from comparative implementation insights and cross-country adaptation experiences.

07 Success Factors and Barriers to Scale

Common success factors across the region

1. **Farmer-centred approaches drive adoption:** Across all countries examined, the most effective solutions were those rooted in farmer-to-farmer learning and peer validation. The lead farmer model emerged as a consistent success factor for driving forward CSA, with demonstration plots managed by community members proving far more convincing than external expert advice. Farmers adopt climate-smart practices when they can see tangible results in contexts that mirror their own circumstances, and when these demonstrations are facilitated by peers who understand local realities. This "seeing is believing" principle transcends national boundaries and value chains.
2. **Simplicity as innovation:** A striking finding is that many of the most impactful solutions are noteworthy not for their technological sophistication but for their simplicity and accessibility. What appears "old" or "basic" from a technical perspective often represents genuine innovation to the smallholder farmers encountering these practices for the first time. The success of these approaches lies in their adaptation to local contexts and farmer circumstances, rather than in their novelty as concepts. Solutions that farmers can understand, afford, and implement with locally available resources consistently show higher adoption rates than complex or capital-intensive alternatives.
3. **Economic viability as entry point:** Income generation consistently emerged as the primary entry point for farmer engagement with climate-smart practices. Farmers adopt solutions when they see a clear business case—whether through increased yields, reduced input costs, or improved market access. Climate resilience benefits, while significant, are often realised as secondary outcomes of economically motivated decisions. This finding suggests that framing climate interventions around livelihood improvement, rather than leading with climate messaging, may be more effective in driving adoption.
4. **Private sector as sustainability anchor:** Successful scaling across the region is anchored by private sector actors with genuine business incentives to sustain interventions beyond project timelines. Companies facing the effects of climate change and real supply chain challenges—such as quality inconsistencies or volume reliability—proved to be the most committed partners. Those with "impact in their DNA" as social enterprises, rather than those treating development outcomes as corporate social responsibility add-ons, demonstrated stronger post-project continuation. The most sustainable models integrate commercial actors not as beneficiaries of grant funding, but as partners with aligned business interests.
5. **Multi-stakeholder coordination as enabling framework:** Projects that successfully brought together county governments, research institutions, private sector actors, and farmer cooperatives achieved broader and more sustained climate impact than those

operating in isolation. This coordination proved particularly effective when stakeholders co-designed solutions to their own challenges rather than receiving externally prescribed interventions. In Kenya specifically, alignment with County Integrated Development Plans (CIDPs) emerged as a critical factor for ensuring post-project sustainability and government ownership.

Barriers to scaling

1. **Accessibility and affordability as critical constraint:** The most frequently cited barrier to scaling climate-smart solutions is the intersection of accessibility and affordability. Even when solutions demonstrate clear technical effectiveness, their adoption remains limited if inputs, equipment, or services are not locally available or financially within reach of smallholder farmers. This constraint manifests differently across contexts—from working capital needs for biosolutions ingredients to the capital intensity of irrigation infrastructure to the upfront investment required for biodigesters. The gap between demonstration success and widespread adoption consistently stems from these fundamental access challenges.
2. **Project duration misalignment with climate agriculture timelines:** Four-year project cycles emerged as insufficient for climate-smart agriculture interventions, particularly those involving tree-based systems. Stakeholders across multiple countries cited the need for six-to-eight year minimum durations to allow for tree maturity, visible benefits to neighbouring farmers, and adequate time to measure real sustainability. This timeline constraint is compounded when projects have too many impact objectives, which dilutes focus and reduces the depth of intervention possible within limited timeframes. The mismatch between donor project cycles and agricultural investment horizons creates a structural barrier to demonstrating and scaling longer-term climate adaptations.
3. **Fragmented knowledge management and definition inconsistency:** Climate-smart agriculture is defined and applied inconsistently across projects, countries, and implementing partners. This variability makes it difficult to aggregate learning, compare effectiveness, and transfer solutions between contexts. Knowledge about climate adaptation, mitigation, and resilience outcomes often remains siloed within consortium partners and implementing organisations, captured in grey literature or not formally documented at all. The absence of unified frameworks and systematic knowledge management systems means that valuable lessons from one project frequently fail to inform design of subsequent initiatives, even within the same geographic region or value chain.
4. **Financing mechanisms disconnected from farmer reality:** Access to appropriate financing emerged as a persistent constraint across all countries. In many cases, projects either lacked a financing component entirely or separated financial inclusion into distinct initiatives rather than integrating it into core design. When financing was available, the products often failed to match smallholder farmer cash flow patterns—requiring repayment schedules misaligned with harvest cycles, offering interest rates prohibitive for agricultural investments, or imposing collateral requirements that exclude the farmers most needing capital. Microfinance institutions, while present in the region, are frequently based in urban centres with limited understanding of agricultural lending risks and farmer needs.
5. **Competing resource demands and trade-offs:** Farmers face competing demands on limited resources that can undermine climate-smart practice adoption. The need to use crop residues as fuel rather than as mulch for soil improvement represents one clear example, where household energy needs conflict with soil health practices. Similarly, the labour requirements of certain climate-smart practices may compete with income-generating activities or other farm management tasks during critical periods. These trade-offs are not always anticipated in project design, and insufficient attention is paid to how

interventions fit within the broader household livelihood system rather than being evaluated solely on agronomic benefits.

6. **Enabling environment weaknesses.** While Kenya and other East African countries have developed robust policy frameworks supporting climate-smart agriculture, significant gaps exist in policy implementation, regulatory enforcement, and coordination across government agencies. Funding shortfalls mean ambitious targets lack adequate domestic resource allocation, while international climate finance remains difficult to access. Capacity gaps in extension services, limited skilled personnel, and inadequate data management systems further constrain the translation of policies into on-ground impact. The disconnect between policy ambition and implementation capacity represents a significant barrier to scaling solutions, even where enabling policies technically exist.

Knowledge gaps and research needs

1. **Innovation scaling assessment methodology:** Current approaches to assessing scale lack consistency across projects and countries. Stakeholders measure adoption through varied and often incomparable metrics: number of farmers reached, percentage of practices adopted, geographic coverage, or persistence of practices post-project. There is insufficient understanding of what constitutes meaningful scale in different contexts—whether breadth of farmer reach matters more than depth of practice integration; how to assess quality of adoption versus mere exposure; or how to measure spillover effects beyond direct project participants. Furthermore, there is limited research on the trajectory of innovation adoption over time. How long after project closure do practices persist? At what point does an innovation transition from being project-sustained to being market-driven? What indicators signal that an innovation has achieved self-sustaining momentum versus requiring continued external support? Without clearer frameworks for assessing scaling pathways and their sustainability, it remains difficult to distinguish between genuine scaling success and temporary project-induced adoption.
2. **Value chain-specific climate adaptation:** While some climate-smart practices have broad applicability, the research consistently highlighted that effective adaptation requires value chain-specific approaches. However, there are knowledge gaps regarding which combinations of practices work best for different crops, how practices should be sequenced or prioritised for specific farming systems, and how climate adaptations in one value chain affect farmer resilience across their entire portfolio of activities. The importance of diversification for climate resilience is frequently cited, yet most projects remain single-crop focused. There is insufficient understanding of how climate interventions in one value chain (such as coffee or potato) can be designed to support broader farm system resilience, or how farmers make trade-offs between investing in climate adaptations for different enterprises. Research is needed on how to design crop-specific interventions within a farming systems perspective that acknowledges smallholders' diversified livelihood strategies.
3. **Lead farmer model formalisation and sustainability:** While the lead farmer approach is universally acknowledged as effective, there is a knowledge gap regarding how to formalise and sustain this model post-project. Lead farmers currently receive ad hoc compensation (transport reimbursement, small stipends, in-kind support), but little research exists on viable business models that would make lead farmer services self-sustaining. Questions remain about optimal compensation structures, how to scale lead-farmer networks without diluting quality, which skills beyond technical farming knowledge are needed for effective farmer-to-farmer extension, and how to integrate lead farmers into formal extension systems without losing their peer credibility. Related to this is a gap in understanding what makes certain farmers effective as demonstrators beyond their farming success. Stakeholders noted that farmers with education or former civil service experience often became the most effective lead farmers, suggesting that status,

communication skills, or teaching orientation matter as much as farming technique. However, this observation has not been systematically investigated or incorporated into lead farmer selection and training approaches.

Opportunities for cross-learning

Uganda's advanced positioning in CSA

An interesting finding from this regional mapping is that Uganda appears to be somewhat ahead of Kenya in its approach to climate-smart agriculture, despite Kenya's reputation for technological advancement and agricultural sophistication. Uganda has successfully institutionalised farmer field school approaches within its extensive Development Agent system, created functional multi-ministry coordination (particularly between Energy and Agriculture for biodigester promotion), and developed bottom-up grassroots movements around solutions like bio-slurry. This suggests valuable opportunities for Kenya to learn from Uganda's government institutionalisation pathways, particularly regarding how to embed climate-smart practices within national extension systems rather than keeping them project-dependent. Uganda's experience also offers lessons on the importance of sustained engagement—taking nine years to fully institutionalise farmer field schools within government systems demonstrates the patience and long-term commitment required for genuine government ownership. Kenya's tendency toward rapid technological adoption may benefit from Uganda's methodical approach to ensuring solutions become embedded in public sector delivery rather than remaining in the pilot or NGO implementation phase.

Ethiopia's research-extension integration

Ethiopia's experience with ATVET (Agricultural Technical and Vocational Education and Training) partnerships offers a model for creating sustainable pipelines of practically trained extension workers. By integrating practical farming experience into theoretical agricultural education, Ethiopia has addressed a common regional challenge—the disconnect between agricultural education and field-level implementation capacity. Kenya could explore similar approaches through its Agricultural Training Institutes (ATIs) and TVET Authority, creating pathways for graduates to gain practical climate-smart agriculture experience as part of their qualification rather than learning only in classroom settings. Ethiopia's systematic approach to institutionalising solutions—including internal review sessions that integrate climate considerations, kebele-level nurseries for improved seedling access, and SCIF-style grants strengthening private sector capacity—provides a template that could be adapted to Kenya's county government structure and existing agricultural development frameworks.

Mozambique's context-specific opportunity approach

Mozambique's model of opportunity-driven crop selection, where farmers, private sector, and implementers jointly decide on value chains based on proven market demand rather than donor prescription, offers an alternative to more standardised intervention approaches. This market-focused methodology, combined with the use of alternative livelihood strategies to address deforestation and biodiversity concerns in Gorongosa, demonstrates how climate interventions can be designed to acknowledge political economy constraints and regional marginalisation while still achieving impact. Kenya could apply this principle of ground-level co-design, particularly in its more marginalised regions, where top-down approaches may face similar challenges to those encountered in Gorongosa. The emphasis on ensuring market access before scaling production, and on using commercial farmers' platforms for technology demonstration (such as Smart Farming digital tools), offers approaches that leverage Kenya's relatively more developed digital infrastructure.

Rwanda's government partnership model for scaling

While Rwanda ended up not being a core focus country of this study, Rwanda's approach to government partnerships emerged repeatedly in stakeholder interviews as a benchmark for effective scaling. The government's willingness to mandate practices like intercropping based on evidence from pilot programmes (such as One Acre Fund's trials) demonstrates how responsive policy can rapidly scale successful solutions. Rwanda's model shows that when government partnership quality is high and there is genuine willingness to adapt policies based on evidence, the transition from project pilot to national scale can happen more quickly than the typical multi-year institutionalisation process. While the context of Rwanda and Kenya is vastly different, this does suggest opportunities to strengthen the evidence-to-policy pathway, particularly through more systematic engagement with county governments that have agricultural mandates. Rather than treating government as a required "public partner" checkbox, projects could prioritise relationship-building with government champions who can translate successful solutions into county-level policy and programming.

Cross-country platforms and knowledge exchange

The regional presence of organisations like One Acre Fund, 2SCALE, Solidaridad, Agriterra and SNV creates natural platforms for cross-country learning that are currently underutilised for innovation transfer. These organisations operate in multiple East African countries simultaneously, creating opportunities for structured South-South knowledge exchange—such as bringing Kenyan lead farmers to observe Ethiopian farmer field schools, or facilitating exchanges between Ugandan biodigester technicians and Kenyan organic fertiliser associations. Beyond organisational platforms, there are opportunities to leverage regional bodies and networks—such as the East African Community, regional agricultural research organisations (ASARECA), and pan-African farmer organisations—to systematically share lessons on climate-smart agriculture scaling. The creation of regional innovation hubs or communities of practice focused on specific challenges (such as soil health, irrigation efficiency, or farmer financing) could accelerate learning across countries while respecting context-specific adaptation needs.

08 Recommendations

This mapping exercise has successfully identified solutions across East Africa with potential for replication and scaling in Kenya, highlighting five critical success factors: farmer-centred approaches; accessible simplicity; economic viability as entry point; private sector sustainability anchors; and multi-stakeholder coordination. However, the scope of this work—while providing valuable directional insights—represents an initial scan rather than the comprehensive investigation required to inform significant financial commitments. The following recommendations outline pathways to deepen this foundation, strengthen institutional learning systems, and position the Netherlands' engagement in Kenya's climate-smart agriculture landscape for sustained impact.

Deepen innovation assessment before investment decisions

1. **Expand stakeholder consultation with consortium partners:** This consultancy interviewed a subset of implementing partners from each project, yet the depth of knowledge about climate adaptation, mitigation, and resilience outcomes often resides with consortium partners not reached during this phase. A structured follow-on

engagement with these technical implementers would capture innovation details, farmer adoption trajectories, and scaling constraints that could not be documented within the current scope. This deeper dive is particularly critical for projects like DFCD and One Acre Fund, where the breadth of countries and interventions meant only surface-level insights could be gathered on specific East African contexts.

2. **Conduct targeted feasibility studies on priority solutions:** The five priority solutions identified in this report—ABC biosolutions production models; CRAFT approaches; furrow irrigation systems; digital extension platforms; and bio-slurry fertiliser programmes—warrant detailed feasibility assessments before financial commitments are made. These studies should examine Kenya-specific enabling conditions, regulatory requirements, market readiness, farmer willingness to pay, and realistic timelines for achieving scale. While this mapping has identified what works elsewhere, understanding whether and how these solutions can be adapted to Kenya's unique context requires investigation beyond the scope of this initial scan.
3. **Learn from Kenya's existing successes:** An interesting finding from this regional scan is that Kenya is already implementing many solutions identified in other countries, reflecting its position as a regional leader in agricultural technology adoption. What Kenya can learn from Uganda, Ethiopia, and Mozambique is not necessarily the solutions themselves, but rather the simplicity of implementation approaches—the farmer-led methodologies, the stripped-down technologies accessible at the village level, and the patient institutionalisation processes that ensure government ownership. A follow-on phase could systematically document Kenya's own climate-smart agriculture successes that may be overlooked precisely because they function well, creating opportunities for Kenya-to-region knowledge flows alongside the region-to-Kenya transfers this study has emphasised

Establish systematic knowledge management systems

1. **Create unified framework for defining and tracking climate-smart agriculture:** The variability in how climate-smart agriculture is defined and reported across RVO and EKN projects creates significant barriers to learning aggregation and cross-project synthesis. Establishing a unified framework—including agreed definitions of what constitutes CSA versus broader agricultural development, standardised indicators for measuring adaptation and mitigation outcomes, and consistent reporting templates—would enable future projects to build on rather than duplicate past efforts. This alignment should happen at the programming stage, not as a retrofitted requirement, ensuring that climate solutions are systematically captured from project inception rather than being teased out retrospectively as this consultancy was required to do.
2. **Institute quarterly climate coordination convenings:** RVO and EKN staff working on climate-related projects across food security, energy, and water sectors would benefit from regular coordination meetings to share emerging lessons, identify synergies, and prevent inadvertent duplication. These quarterly convenings should include not only project officers but also technical advisors and select consortium partners, creating space for adaptive learning and course correction during implementation rather than only at evaluation endpoints. The wealth of climate-relevant activities currently happening across the Netherlands' Kenya portfolio remains under-recognised, partly because knowledge sharing mechanisms have been insufficient—a challenge that structured, recurring dialogue could address.
3. **Develop regional knowledge exchange platform:** Organisations like One Acre Fund, Agriterra, Solidaridad, and SNV operate across multiple East African countries simultaneously. They are repeated consortium partners for EKN and RVO, yet their potential as conduits for South-South learning remains underutilised. EKN and RVO could catalyse a regional knowledge exchange platform—whether through these existing actors

or via regional bodies like the East African Community—that facilitates structured learning exchanges: Kenyan lead farmers observing Ethiopian farmer field schools; Ugandan biodigester technicians training Kenyan organic fertiliser associations; or Mozambique's market-driven crop selection methodology being adapted to Kenya's marginalised counties. Such a platform would leverage the Netherlands' multi-country presence to strengthen regional climate resilience while ensuring Kenya benefits from solutions emerging across the broader East African landscape.

Adopt integrated approaches to food security and climate resilience

1. **Recognise food security requires multi-pillar strategies:** One Acre Fund's six-pillar climate strategy—combining credit access, agricultural inputs, training, and market linkages—demonstrates that food security and climate resilience cannot be achieved through single-sector interventions. Future programming should resist the temptation to address climate change, food security, or farmer income in isolation, instead designing integrated approaches that acknowledge the interconnected nature of smallholder livelihoods. This may mean accepting approaches that seem contradictory when viewed through narrow lenses—such as supporting both coffee production (often criticised as not contributing to food security) alongside food crop interventions—but that together build household resilience across multiple dimensions.
2. **Embed end-user finance from project design phase:** The accessibility and affordability barrier cited across all countries highlights that climate-smart innovations fail to scale not due to technical ineffectiveness but due to financing gaps. Rather than treating financial inclusion as a separate workstream or subsequent project phase, future interventions should integrate end-user finance mechanisms—whether through guarantee funds, working capital facilities, or partnerships with financial institutions—from the design stage. The ABC Programme's learning that biosolutions require pre-financing for ingredients, and DFCD's evolution toward financial institution intermediation, both underscore that the pathway to scale runs through appropriate financing structures, not just farmer training and technology demonstration.
3. **Extend project timelines to match agricultural investment horizons:** The consistent feedback that four-year projects are insufficient for climate-smart agriculture—particularly for tree-based systems requiring six-to-seven years to demonstrate benefits—necessitates a fundamental shift in programming approaches. This is demand driven rather than programme driven; where multi-year timelines are not feasible within single project structures, consider designing phased programmes with built-in transition mechanisms to subsequent phases, or creating programmatic umbrellas (similar to how the Moyee project transitioned into Acting Now) that allow solutions to mature across multiple funding cycles. The alternative—continuing to design four-year interventions for systems requiring longer timeframes—perpetuates a cycle of incomplete demonstrations and abandoned farmer relationships that undermines trust and scaling potential.

Prioritise strategic interventions for Kenya context

1. **Elevate soil health through bio-slurry scale-up:** Biodigesters represent one of the oldest Dutch-funded climate interventions in Africa, yet their relevance has never been higher given current concerns about soil degradation, food security, and climate adaptation through soil resilience. With the bio-slurry byproduct now recognised as the primary value proposition—improving soil chemical composition, enhancing water retention, and increasing crop yields—there is compelling justification for renewed investment in this proven, simple technology. Kenya has already enacted organic fertiliser standards and benefits from a booming agri-financing sector with presidential support; what is needed is strategic engagement that frames biodigesters as a soil health and food security

intervention rather than only a clean energy solution, and that addresses end-user finance constraints through existing financial infrastructure.

2. **Support commercial biosolutions producers to cross the "valley of death":** Kenya has emerging commercial actors producing biosolutions at cooperative level, yet they face a "valley of death" between pilot success and commercial scale—constrained by working capital needs, regulatory barriers for local products competing with imported synthetics, and cultural perceptions that Kenya-made solutions are inferior to imports. Rather than introducing new solutions, the Netherlands could provide critical support to help these nascent enterprises achieve viability: structured working capital facilities, advocacy for enabling environment improvements, and strategic partnerships with Dutch agribusinesses that could provide technical expertise or market linkages. The political economy challenge of state capture in synthetic fertiliser trade suggests that supporting local biosolutions producers requires both commercial assistance and careful navigation of existing power structures.
3. **Leverage county government structures for sustainability:** The finding that alignment with County Integrated Development Plans (CIDPs) significantly strengthens post-project sustainability suggests a more systematic approach to county government engagement. Rather than treating county partnerships as implementation conveniences, future programming could prioritise counties demonstrating genuine agricultural development commitment, invest in capacity building for county extension systems, and explicitly design interventions to embed within—rather than parallel to—county structures. Uganda's nine-year institutionalisation timeline and Rwanda's rapid evidence-to-policy pathway offer contrasting but complementary models for how patient government engagement or responsive policy champions can translate pilot successes into scaled impact.

09 Conclusion

A foundation for action

This mapping exercise has fulfilled its core objective: identifying climate-smart solutions across East Africa with strong relevance for replication and scaling in Kenya. It offers a strategic foundation for EKN Nairobi and RVO to enhance food security programming by leveraging proven interventions from the region. However, the breadth of coverage spanning multiple countries, value chains, and innovation types necessitated trade-offs in depth. As such, this report should be viewed not as a final product, but as a launchpad for targeted action.

From mapping to strategic replication

To move from insight to impact, a structured follow-up is essential. This requires:

1. **Target feasibility assessments** on high-priority solutions to assess Kenya-specific viability.
2. Deeper engagement with implementing partners **to capture operational knowledge.**
3. Strategic alignment between RVO and EKN **on how climate-smart agriculture (CSA) will be defined, funded, and embedded in future programming building on, rather than duplicating, existing interventions.**

Kenya's leadership and regional learning

Kenya's strong representation among identified solutions affirms its regional leadership in climate-smart agriculture and technological adoption. Yet the value of regional learning remains significant. **The solutions in neighbouring countries do not necessarily offer new**

technologies, but rather different pathways to scale, marked by simplicity, stronger farmer agency, and institutional patience. Understanding these dynamics, what enables solutions to endure and expand beyond project cycles, is the critical next frontier.

From projects to harnessing collection intelligence

The Netherlands' Kenya portfolio already contains a wealth of climate-relevant initiatives. However, their collective value remains under-leveraged due to fragmented information capture. Implementing the report's knowledge management recommendations through unified frameworks, regular coordination, and systematic learning capture would transform dispersed project experiences into strategic systems intelligence. Combined with deeper innovation analysis, this approach would position the Netherlands not merely as a project funder, but as a learning and systems-change partner within Kenya's CSA landscape.

A long-term commitment

This mapping should be viewed as a foundation, not an endpoint. It establishes what exists, what works, and where the greatest opportunities for investment lie. Translating these insights into tangible impact will require continued commitment to learning, adaptive management, and the long-term partnerships that meaningful climate resilience and food security demand.

Annexes

Annex A: List of Projects and Interviews
Annex B: Document Review **(See accompanying file - Innovation Analysis)**
Annex C: Full Innovation Mapping Matrix **(See accompanying file - Innovation Analysis)**
Annex D: Detailed Scaling Assessment Scores **(See accompanying file)**
Annex E: Glossary
Annex F: Methodology Tools and Interview Guides
Annex G: Policy Mapping **(See accompanying file)**

Annex A: List of Projects and Interviews

PROJECT & COUNTRIES	INTERVIEWS
1. **DFCD** - Global	2
2. **CRAFT** - Tanzania, Kenya, Uganda	3
3. **2SCALE** - Kenya, Uganda	2
4. **Pathways to Prosperity** - Kenya, Tanzania, Mozambique	3
5. **Acting Now** - Kenya, Ethiopia	1
6. **Horti-Life** - Ethiopia	2
7. **Moyee Coffee** - Kenya	2
8. **One Acre Fund** - Kenya, Ethiopia, Uganda, Rwanda	1
9. **ABC** - Kenya, Uganda	1
10. **Sustainable Livelihoods Development Programme (SLDP)** - Mozambique	2
11. **Mangwana** - Mozambique	2

Annex E: Glossary

Key Agriculture and Climate Terminology

The following terms were selected based on a keyword analysis of climate-smart innovation and agricultural development projects across Africa. The selection represents the core terminology most frequently used in climate change adaptation, mitigation, and agricultural sustainability work within the region's coffee value chains and broader agricultural development initiatives.

The glossary served as a systematic framework for reviewing project documents, reports, and stakeholder communications to identify how climate-related concepts were being articulated across the innovations assessed. By establishing a standardised terminology set, the review could consistently track which climate themes were most prominent, how organisations framed their climate interventions, and where gaps in climate language might exist.

TERM	DEFINITION	SOURE
Adaptation	In human systems, the process of adjustment to actual or expected climate and its effects in order to moderate harm or take advantage of beneficial opportunities. In natural systems, adaptation is the process of adjustment to actual climate and its effects; human intervention may facilitate this.	IPCC
Afforestation	The establishment of forest through planting and/or deliberate seeding on land that, until then, was not classified as forest.	FAO
Agriculture	The science, art, and business of cultivating soil, producing crops, and raising livestock. It includes crop and livestock production, forestry, fisheries and aquaculture.	FAO
Biodiversity	The variability among living organisms from all sources, including diversity within species, between species, and of ecosystems. This includes genetic diversity, species diversity, and ecosystem diversity.	Convention on Biological Diversity (CBD)
Climate	The state of the climate system, including a statistical description, of conditions in terms of mean and variability over a period of time.	IPCC
Climate Change	A change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.	UNFCCC
Climate Variability	Variations in the mean state and other statistics of the climate on all spatial and temporal scales, beyond individual weather events.	IPCC
Climate-Smart Agriculture (CSA)	An approach that helps guide actions to transform agri-food systems towards green and climate resilient practices. It aims to tackle three main objectives: sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; and reducing and/or removing greenhouse gas emissions, where possible.	FAO
Conservation Agriculture	A farming system that promotes minimum soil disturbance (i.e., no tillage), maintenance of a permanent soil cover, and diversification of plant species. It enhances biodiversity and natural biological processes above and below the ground surface, which contribute to increased water and nutrient use efficiency and to improved and sustained crop production.	FAO
Deforestation	The conversion of forest to other land use independently of whether human-induced or not. It includes the permanent reduction of tree canopy cover below the minimum 10% threshold.	FAO Global Forest Resources Assessment

Desertification	Land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors including climatic variations and human activities.	UNCCD (United Nations Convention to Combat Desertification)
Drought	A period of abnormally dry weather long enough to cause a serious hydrological imbalance.	IPCC
Ecosystem	A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.	Convention on Biological Diversity (CBD)
Food Security	Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. The four pillars are: availability, access, utilizsation, and stability.	FAO (1996 World Food Summit)
Fossil Fuels/Energy	Energy sources formed from the remains of dead plants and animals that have been buried and compressed over millions of years, including coal, oil, and natural gas.	IPCC
Global Warming	The estimated increase in global mean surface temperature averaged over a 30-year period, or the 30-year period centered on a particular year or decade, expressed relative to pre-industrial levels.	IPCC
Greenhouse Effect	The process in which the absorption of infrared radiation by the atmosphere warms the Earth. Greenhouse gases and clouds absorb infrared radiation emitted by the Earth's surface and the atmosphere itself.	IPCC
Greenhouse Gas (GHG)	Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, the atmosphere itself, and by clouds.	IPCC
Innovation	The implementation of a new or significantly improved product, process, marketing method, or organisational method in business practices, workplace organisation, or external relations.	OECD
Climate Mitigation	An anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases. Actions to reduce or prevent greenhouse gas emissions to limit climate change impacts.	IPCC/UNFCCC
Net Zero	When anthropogenic CO2 emissions are balanced globally by anthropogenic CO2 removals over a specified period. Net zero means cutting carbon emissions to a small amount of residual emissions that can be absorbed and durably stored by nature and other carbon dioxide removal measures, leaving zero in the atmosphere.	IPCC/UNFCCC

Resilience	The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner.	IPCC
Sea Level Rise	An increase in the mean level of the ocean. Relative sea level rise occurs where there is a net increase in the level of the ocean relative to local land movements.	IPCC
Sustainability/ Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.	UN Brundtland Report
Vulnerability	The propensity or predisposition to be adversely affected and encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.	IPCC AR6
Water	In the context of climate and agriculture, refers to freshwater resources essential for agricultural production, human consumption, and ecosystem functioning.	FAO/IPCC
Watershed	An area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel.	FAO
Weather	The state of the atmosphere at a particular place and time with regard to temperature, cloudiness, rainfall, wind and other meteorological conditions.	IPCC

Annex D: Methodology Tools and Interview Guides

The six-stage analytical process that was described in the main report was designed to move systematically from broad capture to targeted prioritisation. Stages one-to-three focused on building a comprehensive inventory: documenting all solutions mentioned in interviews and project materials, categorising them by mechanism of change, and excluding those with insufficient evidence or limited relevance to Kenya. Stages four-to-six then applied increasingly rigorous assessment criteria: first, scoring solutions against universal scaling readiness dimensions; second, evaluating high performers against Kenya-specific enabling factors; and finally, determining which of these priority solutions meet the threshold for genuine innovation as defined in this study.

CAPTURE (1)

Data collection methods

This study used a mixed-methods approach, primary qualitative data from Key Informant Interviews (KIIs) complemented by a systematic desk review to identify and assess climate-smart innovations across East Africa (October-November 2025). Methods were designed to prioritise relevance to Kenya and to capture both implementation experience and scaling readiness.

Sampling and participants:

- **KIIs conducted:** 21 interviews (Aug-Nov 2025).
- **Selection criteria:** purposive sampling of respondents with ≥three years East African implementation experience, direct engagement in climate-smart agriculture (CSA), and representation across implementers, funders, private sector partners, and research institutions.
- **Geographic/project coverage:** 11 projects spanning Kenya, Uganda, Tanzania, Ethiopia, and Mozambique *(see table below).*

Key informant interviews (KII) — protocol:

- **Instrument:** semi-structured interview guide covering innovation identification, implementation context, scaling experience, financing/partnership models, policy environment, impact evidence, Kenya contextualisation, and lessons learned.
- **Format and logistics**: 60–90-minute interviews; all sessions recorded with consent and professionally transcribed.
- **Data security and ethics:** participants provided informed consent; transcripts stored in a secure master workbook for analysis.

PROJECT & COUNTRIES	FOCUS AREA
1. **DFCD** - Global	Climate finance initiative
2. **CRAFT** - Tanzania, Kenya, Uganda	Value chain development and climate resilience
3. **2SCALE** - Kenya, Uganda	Partnership-based inclusive agribusiness
4. **Pathways to Prosperity** - Kenya, Tanzania, Mozambique	Food systems transformation
5. **Acting Now** - Kenya, Ethiopia	Climate adaptation and disaster risk reduction
6. **Horti-Life** - Ethiopia	Horticulture value chain
7. **Moyee Coffee** - Kenya	Kenya Fair Trade coffee innovation
8. **One Acre Fund** - Kenya, Ethiopia, Uganda, Rwanda	Smallholder service delivery model
9. **ABC** - Kenya, Uganda	Biogas technology and market development
10. **Sustainable Livelihoods Development Programme (SLDP)** - Mozambique	Integrated rural development
11. **Mangwana** - Mozambique	Farmer-led irrigation

**Countries listed are relevant to this work and not exhaustive of the full country scope of each project*

Desk review and document analysis:

- **Selection:** 14 candidate projects were screened; 11 advanced to full review based on data availability and stakeholder engagement.
- **Review protocol:** standardised template capturing description, evidence quality, implementation timeline, policy context, barriers, and Kenya applicability.
- **Search strategy**: four keyword categories guided searches: (1) climate/innovation; (2) evidence/outcomes; (3) technical/policy enabling terms; (4) geographic scope.
- **Document tracking:** metadata recorded for each document (country, type, source, point of contact, review status).

Evidence scoring and priority assessment:

- **Desk-level scoring (3-point):** 3 = high (strong impact evidence; Kenya relevance; likely sustainable), 2 = medium, 1 = low.
- **Priority deep dive (5-parameter, 1-5 each):** power dynamics; incentives; investments; policy and enabling environment; collaboration, learning and adapting. Detailed evidence notes justify each score.

Analytical approach — KIIs:

We used a 10-step thematic analysis to ensure consistency and traceability:

1. First read for comprehension, 2-6. Systematic coding passes (technology, process, policy/market, partnerships, practices) using colour codes.
2. Trend analysis across six innovation types.
3. Annotation with shorthand tags (e.g., K+ = Kenya-suitable; HI = high impact; $ = cost concern).
4. Quote extraction for illustrative evidence.
5. Transfer of coded outputs to the Master KII Analysis Workbook for synthesis.

Double-coding and spot checks were completed to ensure inter-coder reliability.

Lessons learnt process framework from KII

For each interview, lessons were systematically documented across five dimensions: (1) what worked, successful practices and enabling factors; (2) what didn't work, challenges and barriers encountered; (3) would do differently-retrospective recommendations from implementers; (4) wish they knew-pre-project knowledge gaps; and (5) Kenya application—specific adaptation requirements for the Kenyan context. This approach captured not only what solutions and potential innovations exist, but also how they succeeded or failed and what this means for Kenya.

CATEGORISATION (2)

Solution tracking and database:

Each solution was assigned a unique identifier (Country-Type-Number, e.g., MOZ-EXT-001) and entered into a centralised tracking workbook. The inventory documents innovations with source references, evidence level, scoring, and notes on Kenya relevance.

Intervention categorisation framework:

Following this, a solution was classified firstly by an intervention categorisation; followed by an innovation potential, which was by its primary mechanism of change—practice (agronomic methods farmers apply), technology (physical inputs, tools, or digital systems), or approach (institutional models, delivery mechanisms, or financing arrangements).

CATEGORY	DEFINITIONS AND EXAMPLES
Technological Innovations	New or improved technologies, tools, and equipment. Includes: improved seeds; irrigation systems (drip, solar powered); digital tools (SMS, apps, mobile money); processing equipment; renewable energy; biodigesters; mechanisation (threshers, plows); soil testing kits; hermetic storage.
Process-Based Innovations	New approaches to knowledge transfer, service delivery, and organisational methods. Includes: Farmer Field Schools; Lead Farmer/Trainer-of-Trainers models; demonstration plots; farmer-to-farmer learning; extension methodologies; cooperative formation; aggregation models; value chain coordination.
Policy-Driven Innovations	Enabling environment changes through policy, regulation, and standards. Includes: government adoption of FFS approach; organic fertiliser standards; seed regulations; multi-ministry coordination; county climate action plan integration; certification schemes; public procurement linkages.
Market-Based Innovations	Financial mechanisms and market system changes. Includes: blended finance; results-based financing; contract farming; crop insurance; bottom price guarantees; cooperative financing circles; revolving funds; digital payment systems; off-taker linkages; value addition and processing.
Partnership and Institutional Innovations	Multi-stakeholder collaboration models and institutional arrangements. Includes: public-private partnerships; research-extension-farmer linkages; NGO-private sector consortia; DFI-fund manager structures; university partnerships; regional learning platforms; cross-sector coordination.
Climate-Smart Agricultural ractices	Field-level practices that enhance resilience, reduce emissions, or improve adaptation. Includes: agroforestry; intercropping; mulching; composting; crop rotation; conservation agriculture; water harvesting; drought-tolerant varieties; integrated pest management; diversification strategies.
Note: Many innovations span multiple categories (e.g., a biodigester programme involves technology, market finance, and climate-smart practice). Classification reflects the primary mechanism of change.	

Innovation potential categorisation:
Followed by an innovation potential which was by its primary mechanism of change—practice (agronomic methods farmers apply), technology (physical inputs, tools, or digital systems), or approach (institutional models, delivery mechanisms, or financing arrangements). This categorisation enables systematic analysis while recognising that many solutions span multiple categories.

CATEGORY	DEFINITION	EXAMPLE
Practice	An agronomic or farm-level method, technique, or behaviour that farmers apply to their land, crops, or farming system to build climate resilience. Practices are actions or routines that modify how farming is done, typically requiring knowledge and behaviour change rather than physical inputs. They directly contribute to climate adaptation.	Intercropping; crop rotation; mulching; composting; agroforestry tree planting; staggered planting; raised beds; erosion control; integratedpest management; lime application; cover cropping; organic fertiliser production; water harvesting structures.
Technology	A physical input, tool, equipment, improved variety, or digital system that farmers acquire or access to strengthen climate resilience. Technologies are tangible assets or platforms that enable climate-smart outcomes.	Solar irrigation pumps; drip kits; soil moisture sensors; drought/flood-resistant seed varieties; hermetic storage bags (PICS); cold storage facilities; weather forecast SMS/apps; digital platforms; remote sensing; biodigesters; improved cookstoves; moisture meters.
Approach	An institutional model, delivery mechanism, partnership structure, financing arrangement, or extension methodology that enables the adoption and scaling of climate-smart practices and technologies. Approaches address systemic barriers to climate action—building capacity, mobilising finance, creating market incentives, and influencing policy for climate-smart agriculture.	Farmer Field Schools; lead farmer/ToT models; climate-smart market linkage models; crop insurance schemes; climate finance mechanisms; public-private partnerships; policy frameworks; cooperative strengthening; innovation hubs; blended finance mechanisms; aggregation models.

SCREENING (3)

Solutions were assessed for evidence quality, Kenya relevance, and data completeness. 38 solutions were excluded with documented reasons, leaving 191 for detailed analysis.

Collaborating, Learning and Adapting (CLA) framework

Solutions were assessed through a CLA lens examining: (1) Collaboration Mechanisms—quality and diversity of partnerships including public-private arrangements, farmer organisation engagement, and cross-sectoral linkages; (2) Learning Systems—structured knowledge management, regional exchanges, and peer-to-peer transfer; and (3) Adaptive Capacity—evidence of flexibility, responsiveness to feedback, and successful adaptation across contexts. Strong CLA performance indicated systemic characteristics necessary for sustainable scaling.

SCALING READINESS SCORING (4)

Innovation prioritisation process

The prioritisation process involved two stages. First, all solutions were assessed against six scaling readiness dimensions:

Contextualised scaling factors assessment

Each solution was scored across six critical dimensions (25 points each, 150 points total):

SCALING FACTOR	SUB-CRITERIA (5 POINTS EACH)
Participatory and Inclusive (25)	- Farmer engagement and co-design - Gender inclusion - Youth participation - Marginalised groups inclusion - Community ownership
Leadership and Institutional Support (25)	- Government policy alignment - Institutional champion - Private sector engagement - Farmer organisation leadership - Multi-level governance
Adaptive and Flexible (25)	- Adaptation evidence - Learning mechanisms - Farmer feedback responsiveness - Climate resilience - Scalable adaptation process
Potential to Achieve Scale (25)	- Design for scalability - Demand/market pull - Geographic replicability - Cost-effectiveness - Scaling trajectory evidence
Sustainable Funding Models (25)	- Business model viability - Diversified funding - User affordability - Value proposition clarity - Financial sustainability pathway
Partnerships and Networks (25)	- Partnership ecosystem quality - Public-private-community strength - Regional/international networks - Knowledge sharing - Value chain engagement

Scoring categories: HIGH Priority (120-150): strong readiness with clear Kenya scaling potential; MODERATE Priority (90-119): substantial merit requiring specific strengthening; LOW Priority (60-89): promising but significant barriers; NOT SCALABLE (<60): fundamental redesign needed or unsuitable for Kenya.

KENYA CONTEXTUALISATION (5)

High-scoring solutions were further assessed against Kenya's enabling environment, including policy alignment, financing landscape, and implementation feasibility.

FACTOR	STRONG/HIGH/MINIMAL	MODERATE/MEDIUM	WEAK/LOW/ UNSUBSTANTIAL
Policy Alignment	Directly referenced in Kenya CSA Strategy 2017-2026; clear government mandate or existing programme support.	Broadly aligned with CSA Strategy pillars but not explicitly referenced; no conflicting policies.	Limited alignment; may require policy advocacy or face regulatory barriers.
Climate Financing	Clear pathway to Kenya climate funds (e.g., KCSAP, county climate funds, Kenya Climate Innovation Center).	Potential access to climate finance but pathway not yet established; may require proposal development.	No obvious climate financing pathway; would depend on project-based donor funding.
Last-Mile Delivery	Compatible with Kenya's ward-based extension system; can work through existing county agricultural officers or established FFS networks.	Requires some adaptation to extension system; may need additional training or parallel delivery channel.	Requires new delivery infrastructure or significant extension system changes.
Public Infrastructure	Minimal infrastructure requirements; or existing infrastructure adequate (roads, storage, markets).	Some infrastructure gaps but workarounds exist; partial coverage sufficient.	Significant infrastructure investment needed before solution can function.
Adaptation Required	Ready for direct replication with minimal contextual adjustments.	Requires contextual adjustments (e.g., crop varieties, financing terms, institutional partners).	Needs significant redesign for Kenya context (agro-ecology, market systems, institutional arrangements).
Risk Level	Low implementation risk; proven in similar Kenyan contexts; supportive enabling environment.	Medium risk; some uncertainties around adoption, financing, or institutional support.	High risk; significant barriers to overcome; untested in Kenya; political economy challenges.
Opportunity Level	High potential impact; addresses priority gap; strong farmer demand; scalable across multiple counties.	Medium impact potential; addresses real need but narrower application or slower scaling pathway.	Low impact potential; niche application; limited scalability.
Priority for Kenya	High Priority: Score 120+ on scaling readiness AND strong Kenya context fit.	Moderate Priority: Score 90-119 OR mixed Kenya context scores.	Low Priority: Score 60-89 OR weak Kenya context fit.

INNOVATION CLASSIFICATION (6)

Priority and innovation identification:
These high-priority solutions were then reviewed against the agreed definition of innovation to determine which represent genuinely transformative approaches—whether through creating something entirely new, adapting existing solutions to different contexts, or achieving breakthrough improvements in efficiency, effectiveness, or reach. This distinction ensures that the final shortlist of innovations reflects not only scaling readiness but also the novelty and transformative potential that distinguish true innovation from the replication of established practices.

Triangulation and integration:
Desk review findings and KII evidence were triangulated through cross-validation and gap analysis. Quantitative counts (e.g., number of adopters) and qualitative insights (e.g., implementer lessons) were combined to produce a balanced assessment of scaling readiness for Kenya.

Limitations and quality assurance:
Key limitations include purposive sampling bias, variable documentation quality across projects, and the time-bound nature of interviews (Oct-Nov 2024). Quality assurance steps: professional transcription, double-coding of a sample of interviews, and validation checks with project focal points where possible.

Complementary policy mapping

The policy mapping systematically reviewed key documents, including National Climate Change Acts, Nationally Determined Contributions (NDCs), Climate-Smart Agriculture Strategies, National Adaptation Plans for Agriculture, irrigation policies, digital economy strategies, and carbon market regulations. Analysis focused on eight critical dimensions: (1) CSA strategy coherence and climate mainstreaming; (2) Policy alignment and inter-ministerial coordination; (3) Institutional frameworks supporting CSA implementation; (4) Carbon market frameworks and MRV systems; (5) Capacity building and extension service provisions; (6) Private sector engagement and partnership mechanisms; (7) Sub-national localisation and implementation structures; and (8) Financing mechanisms and incentive frameworks.

For each country, the analysis produced policy briefs that synthesized the enabling conditions and systemic barriers to CSA innovation.

This policy analysis directly informed the Kenya contextualisation assessment by identifying specific regulatory enablers and barriers relevant to the replication of innovation. It revealed that while all target countries possess comprehensive CSA policy frameworks, translating these into scaled innovation is consistently constrained by financing gaps, institutional capacity limitations, coordination challenges, and a disconnect between national policies and sub-national implementation. These findings shaped the limitations assessment and recommendations for Kenya-specific adaptation requirements.

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