

Adaptation Research for Impact: The Role of Climate Risk Knowledge and Adaptation Evidence in Strengthening Rwanda's Adaptation Innovation Ecosystems and Entrepreneurship Support

Martin Rokitzki & Sudev Madhav Dileep

Climate Adaptation Research & Consulting (CARC) Rwanda, a PlanAdapt Affiliate

1. Background and Context

Rwanda's private sector is central to the country's economic transformation, job creation and future prosperity, with small and medium-sized enterprises (SMEs) forming a particularly important part of its economic fabric. At the same time, businesses and the communities they serve are becoming increasingly exposed to climate-related risks.

Climate change therefore represents not only a growing risk for Rwanda's private sector, but also an important opportunity for entrepreneurship and innovation. Locally rooted SMEs are uniquely positioned to understand the everyday climate risks faced by farmers, households and businesses and to translate these needs into accessible and context-appropriate adaptation innovations - from climate-resilient agricultural inputs, irrigation and water-management technologies to resilient construction materials, cooling solutions, insurance products and other new products and business models that strengthen climate resilience.

Yet adaptation and resilience (A&R) innovators often operate within fragmented entrepreneurship support systems and innovation ecosystems. Furthermore, they lack useful climate-risk evidence, adaptation impact measurement frameworks, patient capital and links to research institutions.

2. Research Questions and Objectives

The study examined how climate adaptation research and climate risk knowledge can strengthen innovation ecosystems for A&R enterprises in Least Developed Countries and Small Island Developing States, including in Rwanda. The guiding research questions were:

- Which design options and criteria determine suitable entrepreneurship programmes and innovation ecosystems that are focused on A&R?
- In which way can climate risk knowledge and adaptation research be integrated entrepreneurship programmes and innovation ecosystems that are focused on A&R?

3. Research Design

The study builds on two years of field-level learning generated through Climate-KIC's global Community of Practice (CoP) on MSME Incubation and Acceleration, convened under the GEF-financed, UNIDO-implemented CAIL project since 2024. Across nine convenings - in Nairobi/Kenya, Recife/Brazil, and seven virtual sessions - the CoP engaged over 526 practitioners across Africa, Asia and Latin America, surfacing a set of contested, field-tested questions on innovation ecosystem design, blended finance and locally led adaptation that the existing literature had not yet resolved.

The research took a mixed methods approach using a combination of (a) AI-agent (SciSpace) based systematic literature review of scientific and gray literature across theme adaptation finance, incubation and acceleration models, blended finance mechanisms, and gender and social inclusion; (b) semi-structured key informant interviews and (c) field visits to adaptation SMEs, providing evidence as to how these SMEs can be best supported in order to establish reliable, sustainable and measurable adaptation outcomes.

The analysis covered incubators and accelerators, Living Labs, the Quintuple Helix model, innovation ecosystem intermediaries, blended finance instruments, indigenous and local knowledge, and locally rooted scaling mechanisms, anchored throughout by the Adaptation SME Accelerator Project (ASAP) taxonomy.

4. Findings

4.1 Landscape of A&R Entrepreneurship Support Programming

The study revealed a wide spectrum of existing A&R entrepreneurship programmes.

Spectrum of Adaptation & Resilience Entrepreneurship Support Programmes

An overview of programme types ranging from early-stage venture formation to market creation, resilience support and ecosystem development.

Programme type	Primary purpose
1. Adaptation awareness and ideation	Identify climate problems and generate business ideas
2. Pre-incubation and venture formation	Turn ideas or informal activities into structured enterprises
3. Adaptation-focused incubation	Develop and test early-stage adaptation solutions
4. Cohort-based acceleration	Prepare established ventures for growth and investment
5. Sector-specific or value-chain support	Address adaptation challenges within a particular economic system or value chain
6. Place-based innovation clusters	Build innovation around the climate risks and needs of a specific geography
7. Market access and demand creation	Create customers, procurement pathways and deployment opportunities
8. Finance-linked acceleration	Connect enterprise development directly with suitable forms of capital
9. Technology validation and demonstration	Prove solution performance under real climate and market conditions
10. SME business-resilience support	Increase the resilience of ordinary SMEs to climate shocks and stresses
11. Inclusive and community-enterprise support	Reach entrepreneurs and enterprise forms excluded from conventional accelerators
12. Ecosystem-intermediary development	Strengthen the organisations and institutions that support adaptation entrepreneurs

The programme types are not mutually exclusive: integrated A&R entrepreneurship support initiatives may combine several of these functions.

not be able to pay its full cost. Entrepreneurship support therefore needs to connect climate-risk and adaptation analysis with questions of business-model innovation, public procurement, subsidies, blended finance, insurance, results-based finance or B2B/B2G models.

4.2 The Situation in Rwanda

The study found an ecosystem-level gap in Rwanda: there is considerable climate and adaptation knowledge in institutions such as RAB, Rwanda Meteorology Agency, REMA, universities and international research organizations, and there is considerable entrepreneurship infrastructure—but knowledge producers and ESOs are not consistently connected outside the agrifood sector. We found three levels of maturity:

Level 1 - Adaptation-integrated ecosystem: Agriculture/agrifood.

Level 2 - Climate-relevant ecosystem where adaptation entrepreneurship is emerging: water, NbS, urban resilience, productive energy/cooling.

Level 3 - General entrepreneurship or green-growth ecosystem where adaptation knowledge is largely absent: much of energy, circular economy, tourism, construction and mainstream digital entrepreneurship.

Rwanda: Sectors and Ecosystems for Adaptation Entrepreneurship

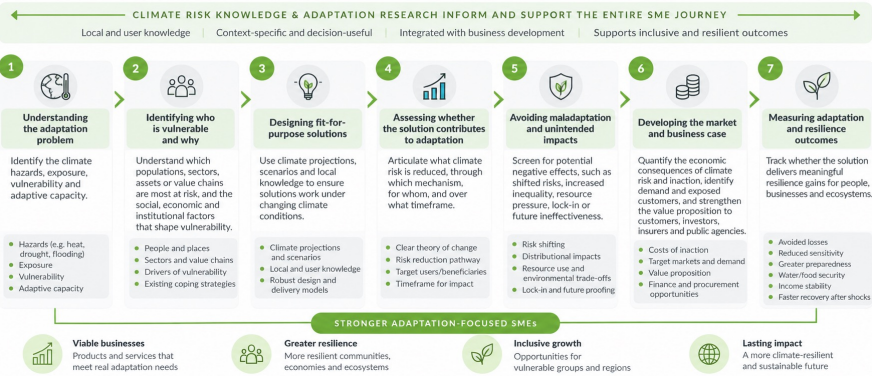
Strength of ESO programming and integration of climate risk knowledge

Sector	Strength of ESO / innovation ecosystem	Integration of climate-risk & adaptation knowledge	Key observations
Agriculture & agrifood	Strong	Strong	Most mature adaptation entrepreneurship ecosystem.
Agri-tech / digital agriculture	Strong / emerging	Moderate - strong	Strong innovation infrastructure; adaptation increasingly explicit.
Agricultural finance & insurance	Moderate - strong	Strong	Important enabling ecosystem around risk transfer and finance.
Water / WASH / irrigation	Moderate	Moderate	Strong sector programmes, but relatively weak adaptation-enterprise integration.
Forestry, landscapes & nature-based solutions	Emerging	Strong (knowledge), weaker (entrepreneurship)	Significant potential for SME development.
Urban resilience / flood management	Emerging	Strong (risk), weak - emerging (entrepreneurship)	Interesting new frontier.
Circular economy / waste	Moderate	Weak - moderate	Innovation ecosystem exists, but predominantly green-growth/mitigation oriented.
Energy / productive use / clean cooking	Strong	Weak - moderate	Strong entrepreneurship support, but mainly mitigation/access focused.
Tourism	Weak - emerging	Weak	Climate vulnerability recognized, little adaptation-specific ESO programming.
Construction / resilient infrastructure	Weak - emerging	Weak - moderate	Significant adaptation need but limited SME innovation support.
Climate information / weather services	Emerging	Very strong (in principle)	Major opportunity; still limited dedicated entrepreneurship ecosystem.

Strength / level of integration: Strong Moderate Weak

Greater innovation, stronger businesses, a more climate-resilient Rwanda.

Integrating Climate Risk Knowledge & Adaptation Research into SME Entrepreneurship Support



Source: author's own elaboration

Key cross-cutting considerations to embed climate risk knowledge and adaptation research in entrepreneurship support programmes:

- the sophistication of climate knowledge should be proportionate to the enterprise and decision being made. A small agricultural enterprise usually does not need a complex climate model. It may need a robust understanding of changing rainfall patterns, farmer vulnerability and plausible future scenarios. Entrepreneurship programmes should therefore translate climate science into decision-useful knowledge;
- climate knowledge needs to be combined with local and user knowledge. Adaptation is unusually context-dependent. Scientific risk data can indicate increasing drought probability, for example, but farmers, water utilities or local businesses may know much more about how that risk actually manifests, existing coping mechanisms and why previous interventions have failed. Effective innovation therefore often requires co-design and iterative testing.
- adaptation SMEs frequently operate where there is a gap between social value and private willingness to pay. The populations that benefit most from an adaptation solution may

5. Conclusion

The study has found that entrepreneurs in LDCs and SIDS routinely lack access to downscaled and robust climate risk knowledge, adaptation research evidence, and testing facilities needed to validate a concept, a service or a product before it becomes a business. Where this information gap exists, it does not just slow entrepreneurs down - it constrains which adaptation problems get identified and pursued at all, since climate information services sit alongside finance, technology and policy as one of the external factors that enable or constrain adaptation action in the first place.

Research institutions are positioned to close this gap, but the study finds their role in practice remains narrow: applied R&D and knowledge production, with weak translational linkages to entrepreneurs and adopters. Innovation systems in LDCs and SIDS, including Rwanda, are often fragmented, marked by limited domestic R&D capacity, weak university-industry linkages, and inadequate technology transfer mechanisms. The more effective models move researchers beyond this narrow function into orchestration, facilitation and co-production - working directly with entrepreneurs and communities in climate adaptation contexts to co-design and validate solutions against local risk, for instance in Living Labs.

For more info:



2ND

RWANDA CLIMATE SCIENCE SYMPOSIUM 2026
Where Rwanda's Climate Research Meets Policy