

InfoNote

Beyond “reach” – advancing responsible pathways to impact at scale

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Key messages

- **Scaling must be inclusive and ensure equitable access and benefit, including in decision-making processes.**
- **Holistic climate-smart approaches – Integrate CSA, CIS, finance, and capacity-building to help farmers anticipate and adapt to climate challenges.**
- **Scaling is multi-dimensional – Beyond adoption, scaling requires policy change, behavioral shifts, and partnerships for sustainable impact.**
- **Context matters – Innovations must align with local needs, knowledge systems, and socio-technical conditions to be effective and responsible.**

Background

Agricultural innovations being designed, delivered and scaled by the global partnership for a food secure future (CGIAR), such as improved seeds, breeds and machinery, digital extension tools, and climate information service provision models, have the potential to transform agri-food systems by enhancing livelihoods, improving agrobiodiversity, and reducing greenhouse gas emissions. Having these solutions reach more people in broader geographies for greater impact at scale is increasingly prioritized across the agricultural research for development ecosystem.

Scaling agricultural innovations is often measured by how many farmers adopt a technology or how quickly an innovation spreads. But this approach overlooks crucial questions: for whom are we scaling, and how can we ensure equitable benefit? What are the unintended impacts of scaling, and how might these be minimized? Without inclusivity, scaling risks reinforcing existing inequalities rather than driving meaningful, sustainable change. Without strategic anticipation, scaling can unintentionally cause harm to the environment. Thus, responsible scaling ensures that marginalized groups, especially women, are not only recipients of innovation but also active decision-makers in shaping their agricultural future. Scaling processes are carefully planned and monitored and can be adaptively adjusted to fit new and changing contexts.

The Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) project [works in six countries](#) and with regional partners across the continent to address the pressing need for climate-smart agricultural innovations in a world increasingly challenged by climate change, environmental degradation, population growth, and resource scarcity. The project emphasizes the critical importance of adopting a holistic approach—one that integrates climate-smart agriculture (CSA) practices and technologies with critical climate information services (CIS) and leverages strategic partnerships to address broader enabling conditions such as access to finance, capacity building, and fostering social learning. With better access to innovative technology and advisory services—linked to information about effective response measures — farmers are enabled to better anticipate climate events and take preventative action that helps their communities safeguard livelihoods and the environment.

Scaling and Scalability

Scaling is the deliberate and planned effort to enable the broad use of innovations to have a positive impact for many people across broad geographies (Hartmann and Linn, (2008). Scaling is often equated with ‘reaching more people’ or ‘producing more of the same’ (scaling out). It is also used synonymously with ‘widespread adoption’ and ‘diffusion’ (Frake and Messina 2018; Schut et al. 2020) and is comparable with adding trees to an orchard (McLean and Gargani, 2022). However, scaling may also include institutional or policy change (scaling up) and, using the same metaphor, means moving from one tree to a bigger tree with more fruit (McLean and Gargani, 2022). It is nevertheless also about culture, behavioral, or relationship shifts (scaling deep) (Moore et al. 2015), affecting quality and character by providing new skills and increasing effectiveness or inclusion. See table 2 for this typology. Hartmann and Linn (2008) emphasize the role of effective scaling strategies, which are a set of coherent activities for deliberate planning and implementation to overcome one or more scaling bottlenecks by leveraging partnerships, resources and infrastructure.

Table 1 Common typology of scaling approaches (adapted from Moore et al., 2015)

Type	Definition
Scaling out	Refers to uptake and adoption by a larger number of people
Scaling up	Implies changes in the enabling environments, such as laws, policies, regulations and institutions. For AICCRA, scaling up also encompasses the context for financial investment
Scaling deep	Refers to efforts to shift relationships, values, or beliefs to enable new approaches such as co-design or participatory processes and gender and social inclusion

Notably, the number of people reached does not necessarily equate to uptake, particularly not over the long-term to generate impact. Table 2 outlines further definitions or classifications of scaling, as well as associated examples (Sartas, 2024).

Table 2. Diversity of scaling types

Scaling type:	Definition	Example
users	Expanding the solution's reach to a larger number of users within the same type of userbase and use case	A soil health app initially used by 100 farmers in a region expanding to serve 1000 farmers within that same region.
use cases	Expanding the potential applications or scenarios where the solution can be effective	A water-efficient irrigation system initially designed for crops being used for landscaping in drought-prone areas.
times	Increasing the frequency of use or engagement with the solution	A food safety certification program that required annual audits now offering more frequent assessments.
types, versions	Diversifying the features, variations, or iterations of the solution to meet differing needs	A climate adaptation toolkit providing resources tailored to farmers, policymakers, and community organizations.
geographies	Expanding the solution's presence across different regions or countries	A successful urban composting model piloted in one city being replicated across other cities facing waste management challenges

goals	Adapting the solution to address a wider range of problems or objectives	An afforestation project focused on carbon sequestration being expanded to include watershed protection and biodiversity conservation goals.
scaling behaviors of users	Focusing on changes in how users interact with, adopt, or spread the solution as scaling occurs	A community-based seed saving initiative scaling as farmers more actively participate in preserving and exchanging diverse crop varieties.
benefits generated	Focusing on the increased positive impact or outcomes	A reforestation project scaling as it sequesters a significantly larger amount of carbon.
used resource base	Considering the increase in financial investment, human resources, infrastructure, or partnerships required for scaling	Developing a larger network of collection points and transportation logistics for a food waste recycling program
capabilities to use	Focusing on enhancing the skills, knowledge, or access needed for successful adoption of the solution	farmers gaining advanced knowledge in interpreting data from precision agriculture tools.

Ever greater focus gets put on the ‘how’ of scaling, and there are various tools that have been developed to assess the scalability of innovations, including Scaling Scan (Woltering et al., 2024) and Scaling Readiness (Sartas et al., 2020). Yet, scaling is not neutral, and neither is the innovation process behind it. Science and technology are “not only technically but politically constituted” (Winner, 1977 in Stilgoe et al., 2013). Actors who are involved in scaling have their own incentives and goals, and these may not always align with each other or end up eschewing out smaller players or local priorities. As scaling is political, this also includes deliberations with and involvement of local partners, considering that their positions might be cooperative or competitive.

Optimum rather than maximum scale

Furthermore, not all innovations are scalable, and trying to reach ever higher numbers of people is not always the most desirable outcome (McLean and Gargani, 2022) or may lead to unintended social, economic, and environmental impacts (McGuire et al., 2024). Although many innovations thrive in pilot conditions, these innovations may not meet the needs and priorities of end-users across agro-ecological conditions (ibid.) and fail to generate expected outcomes (Woltering et al. 2024). McLean and Gargani (2022) emphasize that what matters when scaling “is the positive impact the innovation creates for people and the environment” (p. 19).

Importantly, the trade-offs between scaling magnitude and equity of outcomes need to be considered. The notion of optimal scale was introduced in an OECD Guidance on Scaling Development Outcomes that challenges the ‘bigger is better’ mantra. It argues instead for scaling to be defined as the process of increasing the impact of a proven solution corresponding to the size of the problem (OECD2024).

Yet we also need to consider the “what if” of scaling – assessing the compatibility of scaling processes with local institutions, anticipating carrying capacities and overshoot scenarios, potential scale mismatches (between intentions or mandates of scale agents and levels of change), and potential (negative) side effects (Wigboldus and Brouwers, 2016).

Additionally, trade-offs and net benefits need to be considered for socially differentiated groups to better include their priorities and needs. In addition, scaling strategies need to be responsive and flexible so that researchers can adapt pathways to scale, finding new ways for collaborating with local communities and stakeholders (Wigboldus and Brouwers 2016). This calls for greater responsible approaches.

Responsible Innovation and Scaling

Responsible innovation is defined by Stilgoe et al. (2013) as “taking care of the future through collective stewardship of science and innovation in the present”. The dimensions put forward within the normative governance framework they put forth (ibid) of responsible innovation that are increasingly applied in upstream technology development: **anticipation** (what might happen if we implement this intervention? What are potential positive outcomes and unintended risks?), **inclusion** (who is involved, being consulted, in the innovation process? Are all relevant voices being heard?), **reflexivity** (critically asking ourselves if we’re doing the right thing, and doing it right; and what our assumptions and biases are as researchers and practitioners), and **responsiveness** (how do we best respond to all these dimensions?), can be applied to scaling of agricultural innovations.

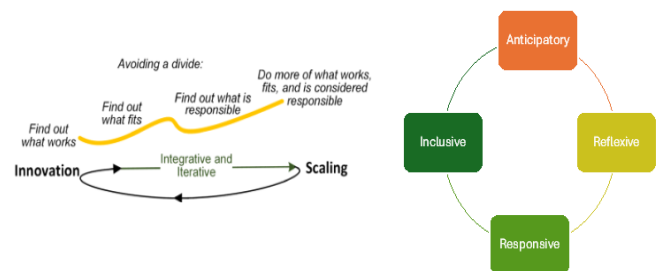


Figure 1 a) Integrative and iterative process of responsible innovation (Wigboldus et al., 2018) and b) responsible innovation dimensions (Stilgoe et al., 2013)

For example, land restoration and rangeland management efforts must be based on thorough stakeholder and power analyses and lead to outcomes that benefit both women and men of different ethnicities, ages, classes, and income levels. In doing so, we need to be aware of the trade-offs and consider potential negative unintended consequences in their context. Scholars have pointed to the lack of consideration of specific groups and actors' interests, values, and priorities at different scales as hindering inclusion in stakeholder engagement processes and their associated outcomes (see for instance Totin et al., 2021). While "it isn't possible to anticipate every bottleneck or opportunity", Marty et al. (2021) argue that more inclusive engagement translates to scenarios that are more plausible and acceptable, reflecting heterogeneous communities and diverse contexts, and thereby more useful for meaningful planning (see also McBride et al., 2017; Allan et al., 2022).

Examples of Responsible Scaling Pathways from AICCRA Implementation

1. Use of radio dissemination for inclusive uptake of climate information and agro-advisory services

The use of radio programs to disseminate agro-advisories and climate services is an approach that unlike several digital tools and even in-person trainings, can facilitate reaching disadvantaged groups, particularly among rural women. This dissemination strategy is used across the AICCRA project country clusters. A study in Kitui, Makueni, and Taita Taveta Counties in Kenya showed that [radios were perceived as the most-accessed, easiest-to-access, and most reliable source of information](#) for both women and men. The radio programs were co-developed following an inclusive approach of stakeholder dialogue and aired by local radio stations in the local language. The same applies for the localized radio programs offered by FarmRadio International, which is a key partner of AICCRA in Ghana.

2. Participatory scenario planning for locally-led climate action

In Kenya's Baringo County, pastoralist communities like the Ilchamus, Pokot, and Tugen rely on seasonal rains for survival, traditionally predicting weather by examining goat intestines. As climate patterns become erratic, [Participatory Scenario Planning \(PSP\)](#) helps bridge indigenous knowledge with scientific forecasting. PSP workshops enable farmers and pastoralists to assess climate scenarios, select suitable crops and livestock, and develop adaptation strategies.

Small groups focus on specific precipitation ranges or localities, using personal devices for reference. Agrometeorological advisories are compiled and disseminated via emails, social media, and community meetings (Barazas). A digital PSP platform streamlines workflows, combining indigenous knowledge with decision-tree algorithms for data-driven planning. Investment in digital tools, capacity-building, and public-private collaboration will expand PSP's impact, supporting Kenya's adaptation goals and serving as a global model.

3. Village savings and loans associations supporting financial inclusion, equitable access to CSA innovations, and collective empowerment

Women farmers face greater climate vulnerabilities due to limited access to climate information services (CIS) and climate-smart agriculture (CSA). Village Savings and Loans Associations ([VSLAs](#)) serve as key platforms for women's collective action, fostering financial independence, knowledge-sharing, and resilience-building. AICCRA Ghana's "VSLA Plus" initiative leverages VSLAs to enhance women's access to CIS-CSA innovations, selecting lead farmers to host demonstrations and integrating training into VSLA meetings. This approach strengthens women's decision-making, financial capacity, and climate adaptation. Supporting VSLAs as gender-responsive interventions empowers women, scales CSA adoption, and enhances resilience in Ghana's rural communities.

4. Participatory Climate Smart Agriculture Investment Plan (CSAIP) Development

The CSAIP process follows a structured, participatory approach to developing climate-smart agricultural investment plans for [Kenya](#), [Ethiopia](#), Zambia, and [Senegal](#). Through multi-stakeholder engagement—including governments, research institutions, farmers, and private sector actors—each CSAIP is [tailored to national priorities](#). The process begins with a comprehensive analysis of agricultural and climate challenges, followed by scenario planning to assess investment needs under different climate risks. Prioritized investments focus on resilience, productivity, and emissions reduction. Rigorous monitoring ensures adaptability and effectiveness. By integrating foresight and stakeholder collaboration, CSAIPs drive sustainable agricultural transformation across these countries, strengthening long-term food security and climate resilience.

Conclusion

Scaling is complex, and heterogeneous contexts call for diverse and dynamic approaches that respond to local challenges and priorities responsibly. We should anticipate potential risks early and collaboratively define visions of success with those we are trying to 'impact' in order to design not singular but pluralistic and socio-technical innovation bundles that can best respond and enable relevant and inclusive change. It is also necessary to be reflexive – and look in the mirror – as researchers and question our own biases and assumptions. Responsible pathways such as those described above are not new but need to be planned intentionally and executed in a participatory manner with diverse stakeholders to meet their needs and interests while minimizing unintended impacts and facilitating sustainable impact on a scale. Facilitating sustainable impact on a scale.

Key Principles for Responsible Scaling:

1. **Anticipating Trade-offs:** Navigating potential social, environmental, and economic trade-offs early in the scaling process.
2. **Understanding and Responding to Local Contexts:** Innovations must align with the unique needs and dynamics of local communities to ensure responsiveness to socio-ecological conditions.
3. **Engaging Diverse Stakeholders and Users:** Collaborating with farmers, researchers, policymakers, and disadvantaged groups fosters legitimacy and inclusiveness.
4. **Embedding Reflexivity:** Continuously reflecting on and adapting strategies to foster learning and effectively address unintended consequences and ensure equitable outcomes.

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ABOUT AICCRA



AICCRA
Accelerating Impacts of CGIAR
Climate Research for Africa



Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) is a project that helps deliver a climate-smart African future driven by science and innovation in agriculture. It is led by the Alliance of Bioversity International and CIAT and supported by a grant from the International Development Association (IDA) of the World Bank. Explore our work at aiccra.cgiar.org