CO-CREATION FOR CLIMATE RESILIENT AGRICULTURE: CASE STUDY KENYA

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KEY MESSAGES:

- Achieving climate resilience in the agriculture sector in Kenya is key to safeguarding lives, livelihoods and food security.
- Co-creation leads to the most effective results in climate change adaptation intervention design and adoption.
- Aligning efforts across diverse stakeholders via co-creation processes minimizes duplication, reduces stakeholder fatigue, and amplifies the impact of agricultural climate resilience investments.

1.0 INTRODUCTION

1.1 Background

Climate resilience can be defined as the ability of a social, ecological, or socio-ecological system and its components to anticipate, reduce, accommodate, or recover from the effects of a climate related or induced hazardous event or trend in a timely and efficient manner (IPCC, AR5). In the agricultural sector building climate resilience would mean equipping, especially smallholder farmers with all the needed tools, information and support systems to anticipate, reduce, accommodate, or recover from the impacts of climate related or induced hazards in a timely and efficient manner. The smallholder farmers must build back better to reduce vulnerability to future climate risks, however, it is a major challenge in many cases for smallholder farmers in Africa. Building climate resilience becomes even more imperative as climate change takes a firmer hold on various regions especially in Africa with devastating impacts on the most vulnerable ones.

Kenya in East Africa is characterized in the latest Intergovernmental Panel on Climate Change (IPCC) reports as being one of the vulnerable regions to climate change (IPCC, 2022). Kenya's climate is highly variable both in time and space and as such it is prone to climate extreme events including floods, landslides, heatwaves and droughts. In the last decade alone, the frequency and severity of climate extreme events has increased with more devastating and cumulative impacts (KMD, 2024). Kenya is perennially water scarce and depends largely on rainfall for its agricultural production dominated by smallholder farming systems (Nying'uro *et al* 2024). The agriculture sector is one of the largest in Kenya and accounts for 20% of Gross Domestic Product (GDP). The sector also employs over 40 percent of the total population and more than 70 percent of the rural populace[1]. Out of approximately 12 million households in the counties of Kenya, 52.8%

[1] 1273062951_Agricultural Sector Survey January 2024 (CBK)

are smallholder farming households[2] contributing to ensuring the food security of the country.

Smallholder farmers make up the bulk of contributors to the agricultural sector in Kenya, with most practicing a mixed crop and livestock farming system as well as small-scale fishing in the many lakes in the country and the Indian Ocean bordering the country to the East. These smallholder farmers are at the front line of climate change impacts due to their limited access to resources, information and other anticipatory actions. Major crops such as maize, beans, and coffee are particularly affected by impacts of climate change. According to reports by the Intergovernmental Panel on Climate Change (IPCC, 2022), climate change could reduce maize yields in Kenya by up to 50% by 2030. Increasing degradation of their lands and the ecosystems in which they practice agriculture combined with dwindling natural resources contribute to their vulnerability. This trend further threatens their livelihood strategies, food and nutrition security and overall well-being.

Achieving climate resilient agriculture for smallholder farmers requires rethinking existing modes of engagement with them to better capture their intricate challenges and reflect these in science, policy and practice. Top down approach rarely capture local contexts and in many cases present options smallholder farmers may not be able to implement due to various technological and financial challenges. Co-creation has been hailed as one means of elevating smallholder farmer contexts into development of relevant climate services, climate relevant practices, policy development as well as in definition of adaptation interventions to cope with climate change(Van der Host *et al* 2022).[3]

2.0 The Co-creation Approach

Co-creation can be broadly defined as a collaborative process working with relevant stakeholders, to create, audit and/or improve a product or service[4] (Ertz, 2024). Quite similarly others have defined co-production as "*... the bringing together of different knowledge sources, experiences and working practices from across different disciplines, sectors and actors to jointly develop new and combined knowledge for addressing societal problems of shared concern and interest."*[5] In the agricultural sector, co-creation allows for the development of locally led farming solutions tailored to the unique needs of diverse smallholder farming typologies and agro-climatological regions. Co-creation could also be

[2] https://statistics.kilimo.go.ke/sw/KenyafarmingHH/

[3] Van der Horst, S., Goosen, H., Van Selm, M., Koomen, I., Matsaba, E.O., Wesonga, J., Koge & J., Klein, H. M (2022) Co-creation of a Scalable Climate Service for Kenyan Smallholder Farmers. Frontiers in Climate, VOLUME=4 DOI=10.3389/fclim.2022.859728 ISSN=2624-9553

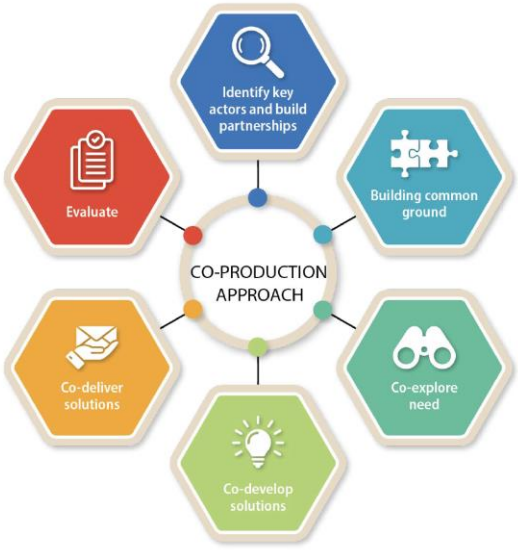
[4] *Encyclopedia* **2024**, *4*(1), 137-147; **https://doi.org/10.3390/encyclopedia4010012**

[5] http://www.braced.org/contentAsset/raw-data/cbca239a-a485-47dc-9dfc-fe07d811afd1/attachmentFile

leveraged to identify and design action-oriented research projects, for climate change adaptation in the agriculture sector. The co-creation approach which is inclusive in nature ensures that resulting solutions from the consultative processes with all concerned stakeholders are relevant, effective and are locally led. The approach also addresses the differentiated needs of those that will benefit from the process. Central to this co-creation process is that all stakeholders involved in the consultations bring with them their different perspectives and experiences of their contexts to the process, strengthening the inclusiveness and diversity throughout the process.[6] With respect to climate services like in any smallholder agricultural systems, co-creation would mean bringing together producers' information, users of the various climate services, innovations and technologies; researchers and other relevant stakeholders in the agricultural sector. The value of co-creation of agricultural innovations and technologies for various sectors has widely been researched and evidence shows the benefits are manifold. The usefulness of these co-produced innovations and technologies is best evaluated by the extent to which the intended users reduce impacts of climate risks on their farming systems. Co-creation ensures that climate services and co-produced information are fit for purpose and are adapted to specific audiences and contexts as opposed to generic blanket services aimed at a broad audience [7].

2.1 Building blocks of co-creation

Carter, *et al* in a 2020[8] policy brief suggest 6 building blocks for co-production which we explore. This is illustrated in Figure 1 below.



[6] CGIAR (2024) Fostering Innovations through Co-Creation: A Journey Towards Farmers Inclusion, Accessed on https://www.cgiar.org/news-events/news/fostering-innovation-through-co-creation-a-journey-towards-farmer-inclusion-2/

[7] https://doi.org/10.1016/j.cliser.2023.100435

[8] *Carter, S., Steynor, A., Vincent, K., Visman, E., and Waagsaether, K. L. (2020) Building blocks for co-producing climate services for better policy outcomes in Africa. Policy brief, Cape Town: Future Climate for Africa and Weather and Climate Information Services for Africa*

Figure 1: Building blocks of co-creation

A. Identify key stakeholders and build partnerships

Stakeholder mapping using appropriate techniques, weighting interest, influence, power, capacity and such like dimensions is key to identifying all relevant stakeholders[9] especially in the agriculture sector. This is a crucial first step in ensuring no key stakeholders are left out or added at too late a stage of the co-creation process and supports early building of partnerships. With the aim of ensuring climate resilient agriculture, stakeholders would include but not be limited to relevant government Ministries, Departments and Agencies, Local Authorities (county governments), Non-Governmental Organisations (NGOs), research institutions (e.g. Universities), private sector actors (i.e. financial institutions) and local community representatives including smallholder farmers.

B. Build common ground/shared understanding + co-exploration of needs

Identified stakeholders all need to have the same understanding regarding needs, desires, existing/current services and different capabilities for collaboration. A shared understanding amongst the stakeholders would adequately support development of relevant and context specific solutions that cater to identified needs within the existing capacities. With the focus being on smallholder farming systems facing the adverse impacts of climate change, understanding constraints associated with their adequately adapting to these impacts would support a robust understanding of how to address the challenges faced by the farmers.

C. Co-develop solutions

While appreciating the diversity of perspectives from different stakeholders in the agriculture sector including gender disaggregated ones and there is need to foster trust and mutual respect, solutions and innovations surface[10]. Smallholder farmers would identify their needs while the providers of services, researchers and other stakeholders would identify ways to incorporate these in their operations so as to fill the needs in the most efficient way[11].

D. *Co-deliver solutions*

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[9] https://documents1.worldbank.org/curated/zh/842721467995900796/pdf/106395-WP-PUBLIC-PPD-Stakeholder-Mapping-Toolkit-2016.pdf

[10] https://doi.org/10.1175/WCAS-D-20-0114.1

[11] Carter, S., Steynor, A., Vincent, K., Visman, E., and Waagsaether, K. L. (2020) Building blocks for co-producing climate services for better policy outcomes in Africa. Policy brief, Cape Town: Future Climate for Africa and Weather and Climate Information Services for Africa

Crucial to the utilization of developed innovations and technologies is delivery to maximize reach and hence utilization for strengthening smallholder agricultural systems. Co-identifying the most efficient ways to communicate the output to ensure that it is accessible and that all necessary considerations have been taken into account including cultural, social and equity.

E. Evaluation

Co-creation is by no means a linear process. For co-creation to be successful it needs to be highly iterative to allow for continued evaluation of the innovations and technologies through receipt of constant feedback and subsequent improvement[12]. These feedbacks will result in continuous engagements with stakeholders to revise existing and/or further co-develop new innovations and technologies appropriate to address climate risks in different settings.

2.2 What is the value of co-created solutions to smallholder farmers?

- **Shared sense of ownership** - since the smallholder farmers are involved in developing solutions to their plight and action-oriented research areas for further understanding, there is increased ownership of the outcomes and higher probability of adopting the innovations and technologies.
- **Aligning efforts across similar but separately implemented initiatives** serves to leverage synergies and reduce stakeholder engagement fatigue. In most cases various development initiatives and projects would focus on the same thematic area but with different stakeholders and beneficiaries. This compartmentalized/siloed approach serves to detract from progress. Additionally different organizations may interact with the same group of stakeholders on a similar thematic area creating fatigue. Co-creation with varied stakeholder representation would identify and possibly support alignment of complementary projects and initiatives thereby maximizing the potential for collective impact.
- **Incorporation of local knowledge -** The co-creation process makes it possible to incorporate local knowledge from the smallholder farmers who possess contextually relevant operational and scientific knowledge. This knowledge is conducive to producing robust local solutions based on local needs and resources.
- **Enhanced adoption and sustainability**- Involving smallholder farmers in the design and implementation of climate action leads to higher adoption rates and long-term sustainability of the interventions[13]. Smallholder farmers are more likely to adopt that which speaks to their challenges and based on local resources,

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[12] *Carter, S., Steynor, A., Vincent, K., Visman, E., and Waagsaether, K. L. (2020) Building blocks for co-producing climate services for better policy outcomes in Africa. Policy brief, Cape Town: Future Climate for Africa and Weather and Climate Information Services for Africa*

[13] https://doi.org/10.1016/j.agsy.2020.102949

and moreso, that which comes from them as custodians of the knowledge and innovations.

- **Cross learning among stakeholders**- the collaborative and inclusive approaches allow farmers to share their experiences and best practices on specific and shared challenges in their farming systems. This enhances scaling out[14] of innovations and technologies to tackle shared climate risks.

2.3 Opportunities to leverage the Co-creation approach in the agricultural sector

Co-creation as a bottom-up approach supports the identification of specific entry points for adaptation planning in agriculture for smallholder farmers. It leads to aggregate action to strengthen Kenya's systems to improve management of current and future climate risks. Co-creation can also be used as a tool to identify areas where gaps in knowledge (science), policy and practice exist so as to design future research to have better impact.

Recognizing the importance of building climate resilience in the agricultural sector in Kenya is imperative and moreso, through a co-creation process. The World Bank funded Kenya Climate Smart Agriculture Project (2017-2023) was one such implementation driver to strengthen climate resilience building amongst smallholder farmers in the country. Even though the project did not use a typical co-creation approach working with the actual smallholder farmers, the lowest unit used was the county government working with wards to improve climate resilience. The objective of the Climate Smart Agriculture Project for Kenya which ended in 2023 was "to increase agricultural productivity and build resilience to climate change risks in the targeted smallholder farming and pastoral communities in Kenya[15]". The County Governments were the executing agencies at the county level highlighting the need for consideration of local contexts in implementing interventions.

Kenya's 3rd National Climate Change Action Plan (NCCAP) outlines what the country has in place to achieve climate resilience in the agricultural sector in the subsectors of crop, livestock and fisheries through the following strategies;

- Allocation of 10% of public expenditure to the agriculture sector.
- Enhance the uptake of climate smart agriculture (CSA) techniques and technologies

[14] https://mcconnellfoundation.ca/wp-content/uploads/2017/08/ScalingOut_Nov27A_AV_BrandedBleed.pdf

[15] *Kenya - Climate Smart Agriculture Project (English)*. Washington, D.C. : World Bank Group.http://documents.worldbank.org/curated/en/440241486868444705/Kenya-Climate-Smart-Agriculture-Project

- Incorporate gender considerations in provision of agricultural services particularly for smallholder farmers
- Enhance climate information services for the sector
- Increase adoption of sustainable land management
- Develop, review and finalize climate resilient policies
- Support access to climate finance for implementation of CSA

Incorporating co-creation in the development of such interventions would result in more context specific considerations that address the actual needs of smallholder farmers towards achieving climate resilient agriculture.

CASE STUDY: ACCELERATING ACTION RESEARCH FOR SMALLHOLDER AGRICULTURE ADAPTATION IN KENYA

Recognizing that Agriculture is a critical sector relevant for food security and livelihood in Kenya, and that it is highly susceptible to the impacts of climate change, robust evidence based adaptation measures are imperative. To surface local level and context specific action oriented research needs in agriculture adaptation in Kenya, a series of co-creation workshops were designed.

The aim of the workshops was to prioritize action-oriented research that can play a pivotal role in informing and guiding adaptation efforts at national, sub-national and community levels. Through rigorous investigation and local engagement, action-oriented research can generate evidence-based and context specific insights into the specific vulnerabilities and resilience strategies needed to address the impacts of climate change on smallholder farmers and communities.

The Co-creation process:

A total of six (6) co-creation workshops were conducted:

Two at the **national level** - engaged stakeholders across agriculture-linked sectors, government agencies, and organizations to establish national climate adaptation priorities and ensure alignment with policy brought together stakeholders working at the national level, for various sectors linked to agriculture, government agencies, and organizations to provide a comprehensive overview of national climate priorities and adaptation needs for smallholder farmers. The national workshops aimed to set the stage for a coordinated and inclusive engagement approach allowing feedback loops from sub-national workshops. They also provided the stage for prioritization of identified research areas in line with national policy priorities.

Four at the **sub-national level** - organized by regional selection, focused on region-specific agricultural challenges, incorporating perspectives from counties representing diverse agroecological and socio-

economic contexts. ensured that localized smallholder agriculture issues and priorities were highlighted. Different stakeholders engaged in workshop format characterised by breakout groups, plenary sessions guided by a set of questions and agenda points and post-workshop feedback iterations.

This bottom-up approach provided valuable insights into how national strategies could be adapted and tailored to specific regional contexts; explored different challenges faced and surfaced actionable research needs. covering key strategic regions selected to represent diverse geographical, agroecological regions and socio-economic contexts for smallholder farmers within the country.

Stakeholder mapping - leveraged on Kenya Meteorological Department (KMD) and AGNES networks, which ensured a wide representation that included: government agencies, local authorities, Non-Governmental Organisations (NGOs), research institutions (e.g. Universities), private sector actors, and local community representatives. Two levels of stakeholders were identified, primary and secondary.

Primary stakeholders: Farmers and farmer groups who are directly impacted by climate change; are affected by agricultural policies and practices; and are crucial for the implementation of adaptation actions.

Secondary stakeholders: County Extension Officers are key in translating policies to practice and influencing farmer behavior. County Meteorological Officers provide crucial climate data influencing decision-making.

In the **crop sub-sector** the actionable research area prioritized were;

a. Research on emerging pests and diseases - since these have been recognised as a major challenge in smallholder farms across the counties exacerbated and directly attributable to climate change (Alfizar & Nasution, 2024). However significant gaps remain, particularly in understanding how climate change affects pest behaviour and the effectiveness of management strategies including indigenous and local knowledge as well as organic and non-chemical based techniques.
b. Research on value addition - in agricultural production as a strategic approach to reducing post-harvest losses; address market access challenges by extending the shelf life of perishable goods and increase farmer revenue. This is crucial since postharvest losses amount to over 100 billion Kenya shillings annually threatening food security and livelihoods.
c. Research on Drought Tolerant Crops & Varieties
d. Research on Cost-effective modern farming methods
e. Re-classification of agro-climatic zones
f. Research on Local methods of enhancing soil health

In the **livestock sub-sector** the actionable research area prioritized were;

a. Augmenting animal nutrition
b. Improving and maintaining animal health
c. Water conservation techniques
d. Research into new breeds and breeding best practices

In the **fisheries sub-sector** the actionable research area prioritized were;

a. Research into sustainable feeds for aquaculture fisheries
b. Scaling of best management Practices of fish farming
c. Research on emerging technologies in fisheries to enhance production
d. Fast growing fish adaptable to specific regions

Cross-Cutting Research

a. Research on knowledge sharing, dissemination and capacity building
b. Research into scalable climate adaptation strategies across landscapes

3.0 Conclusion and recommendations

3.1 Conclusion

Collaborative, inclusive approaches like co-creation workshops are essential for tailoring interventions to smallholder farmers' unique circumstances. Enhanced research, investment, and knowledge-sharing mechanisms will support sustainable agricultural development and climate resilience.

3.2 RECOMMENDATIONS:

1. Institutionalize co-creation in climate resilience and adaptation intervention frameworks across government and non-government led action in the agricultural sector.
2. Apply co-creation approaches to strengthen links between communities or farmers, climate service providers, academia and research institutions, county and local governments and Promote Gender Equity and Social Inclusion (GESI) through gender-sensitive policies and targeted support to women, children and youth.
3. Downscale and disseminate user driven agro-meteorological information and extension services at the grassroot ward level. Incorporate user needs in designing dissemination methods.

4. Elevate local needs through co-creation into the scaling up and scaling out of innovative climate smart practices to achieve transformational adaptation. Invest in co-creation to improve the connections amongst science, policy and practice to ensure that the linkages speak to the challenges and contexts of the communities in need.