

## Scoping study brief - Potential for adaptation and mitigation

### Introduction<sup>1</sup>

This brief presents the findings of a scoping study on potential for adaptation and mitigation in East Africa, conducted as a requirement for the Climate Resilient Agribusiness for Tomorrow (CRAFT) Project, under Work Stream 3 on Enabling Environment for Climate-Smart Agriculture (CSA). The purpose was to ascertain the potential for adaptation and mitigation under CRAFT.

### Background Information

Agriculture sector is critical to the economy of East Africa, contributing 24-44 % of GDP while also accounting for the livelihood of 80% of the population of Kenya, Tanzania and Uganda<sup>2</sup>. The smallholder subsector is characterized by untapped potential, specifically on productivity but also on the shift from subsistence to commercial modes of production. Across the region, smallholder farmers face increased climate risks that include more frequent and intense drought or prolonged dry spells, excessive rains and increased climate-induced pest and disease incidences, with negative impacts on agricultural production through increased environmental degradation (soil, water and agroecosystems). The adaptation and mitigation issues being addressed (extracted from policy documents) in the three countries are presented in Table 1. The official climate change policy position for the three countries is to prioritize resilience and adaptation, with mitigation expected to be a co-benefit *where possible* (EAC Secretariat, 2011). Strategies to transform agriculture in the region focus on ecologically intensifying the use of resources to increase efficiency, and on diversifying agricultural production to strengthen resilience and to capture niche markets<sup>3</sup>.

Table 1: Key adaptation and mitigation issues or challenges facing Kenya, Tanzania, Uganda

Kenya: issues/challenges	Tanzania: issues/challenges	Uganda: issues/challenges
1. Food insecurity/ low yields/ productivity;	1. Low yields/ low productivity	1. Food insecurity/ low yields
2. Increased land degradation	2. Land degradation	2. Increased land degradation.
3. Climate-induced drought, floods, pests, diseases	3. Low quality of farm produce	3. Increased pest and disease prevalence.
4. Water insecurity	4. Increased climate variability (droughts, floods, etc.)	4. Increased climate variability
5. Vulnerability of energy infrastructure serving agriculture	5. Increased incidence of pests and diseases;	5. Soil fertility decline
6. High energy costs	6. Increased heat stress/ shock;	6. Water stress
	7. High vulnerability	7. Declining natural capital assets
	8. Weak enforcement of laws and regulations	

### Methodology

This scoping study was conducted to establish the potential for implementing adaptation and mitigation in agricultural sector in East Africa. The study involved identification of opportunities, gaps and barriers to adaptation and mitigation in agriculture in Kenya, Tanzania and Uganda. Data was collected through desktop reviews, key informant interviews, focus group discussions and semi-structured questionnaires. Multi-Criteria Analysis (MCA) was used to prioritize the pipeline strategies listed for consideration – to get a sense of their potential to be addressed. Categories of respondents interviewed included academia, CBOs/ farmer organizations, financial institutions, government ministries, departments and agencies, insurance companies, corporations, regulators, meteorology departments/agencies/ NGOs/ CSOs/ special purpose vehicles, private sector (social, commercial etc.), programmes and projects, research organizations/institutes/centres, UN agencies, bilateral, and multilateral organizations.

### Findings

Adaptation actions summarised from various climate change policies e.g., National Adaptation Programme of Actions (NAPAs), National Adaptation Plans (NAPs), Nationally Determined Contributions (NDCs) and other relevant policy documents developed by the East African countries, to address the above issues, are presented in Table 2.

Table 2: Proposed adaptation and mitigation actions in national policy documents in East African countries

Kenya: Climate actions	Tanzania: Climate actions	Uganda: Climate actions
1. Assessments (impacts, vulnerabilities)	1. Support research	1. Expand Research and implementation on Climate-Smart Agriculture; Climate information services; Access to markets and finance; Water harvesting;
2. Prioritizing evidence-based adaptation	2. Enhance community based Natural Resource Management (NRM)	2. Efficient water-use/ irrigation
3. Improve crop productivity	3. Promote measures that strengthen Climate Services, index insurance and safety nets	3. Increase Knowledge for adaptation; mechanization
4. Diversify livelihoods	4. Promote efficient energy use;	4. Integrated nutrient and soil fertility management
5. Increase water harvesting/ storage.	5. Coordinate climate change response	5. Conservation Agriculture/ soil and water conservation
6. Establish enabling environment for implementation.	6. Increase productivity and boost processing and strengthen resilience	6. Energy saving devices
7. Cascade climate policies to counties	7. Conduct trainings and sensitization	7. Farmer field school approaches
8. Adopt value chain approaches	8. Water harvesting/storage/ irrigation	8. Adaptive, short cycle/short cycle crop types/ varieties
9. Reduce post-harvest agricultural losses	9. Soil and water conservation	9. community-based adaptation
10. Increase access to climate safety nets.	10. Soil fertility management	10. Value chain development
1. Conservation agriculture,	11. Crop management (seeds, etc.)	11. Livelihood diversification
2. Agroforestry	12. Improved post-harvest management	12. Sustainable Land Management (SLM)/restoration
3. Sustainable Land Management		13. index insurance
4. Manure management		

<sup>1</sup> This brief has been prepared by CGIAR Research Program on Climate Change, Agriculture and Food Security as a contribution to the CRAFT project

<sup>2</sup> From Agriculture and Food Security in the East African Community <https://www.eac.int/agriculture>

<sup>3</sup> Messages on production focus on and emphasize more on sustainable intensification and productivity per unit area than on expansion of area under cultivation, in its efforts to address climate change impacts on agriculture. Such a strategy helps to avoid increased greenhouse gas emissions which will arise from opening more land for agriculture.

A perception-based multi-criteria analysis (MCA) was used to determine priority adaptation strategies as a proxy for the potential of CRAFT interventions strategies, according to current priority level for each country, based on a set of attributes or indicators provided to them in a Likert Scale Scoring matrix of 1 (Low priority) to 3 (High Priority). Combined results are presented in Figure 1. Climate change scenarios predict increased future shocks and stresses in agriculture in East Africa, threatening the long-term benefits of agricultural value chain investments. Hence, Multi-Stakeholder Platforms (MSPs) have been established for CSA in all three countries, in the Ministries in-charge of Agriculture to: develop, evaluate and implement CSA technologies and practices; coordinate CSA implementation; and to create awareness, identify opportunities, share lessons, and initiate partnerships.

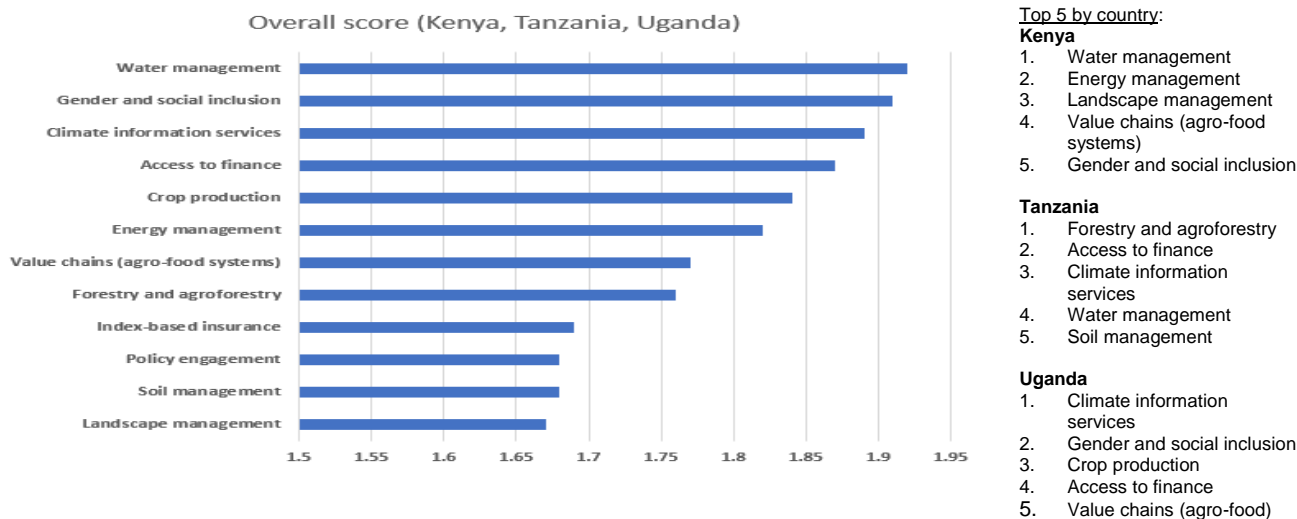


Figure 1: Priority ranking of potential for adaptation and mitigation strategies in East Africa. Highest priority is on strategies for water management, followed by social inclusion, climate information and access to finance

**Note: The study revealed inadequate awareness in many of the available strategies. So even those strategies that score low may not have been out of informed opinion.**

### Potential for Adaptation, with Adaptation Co-Benefits: Opportunities and Options for Innovation with CSA

Potential for adaptation and mitigation is assessed in terms of readiness for climate action. Climate action is considered in terms of capacity, technology, finance and delivery mechanisms. *Weighed on that scale, there is a high potential for current policies to support adaptation and mitigation in all the countries covered. However, limited access to finance for implementation poses a barrier (Figure 2).*

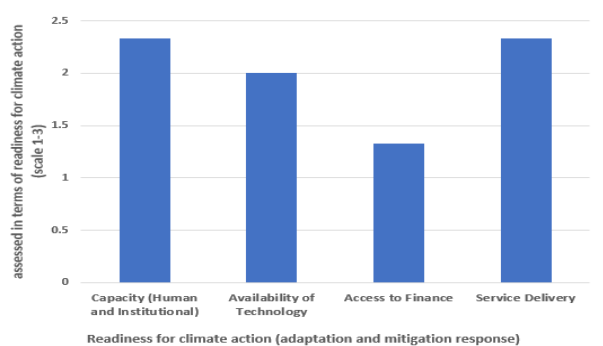


Figure 2: Readiness for climate action (adaptation and mitigation response)

CCAFS East Africa has been assessing the potential for adaptation and mitigation of CSA in the three countries through Climate Smart Villages (CSVs), the results of which are used to influence policy at the sub-national and national level in the region (Neufeldt et al., 2011; CCAFS, 2017; Solomon et al., 2017; Aggarwal et al., 2018; Westermann et al., 2018). CCAFS East Africa has also been working with stakeholders in the three countries to identify best bet transformative innovations for adaptation and mitigation in agriculture, which can help achieve food security under a changing climate while also delivering co-benefits for environmental sustainability, nutrition and livelihoods. The interventions vary depending on the agro-ecological features of the locality, level of development in the area, local capacity and the interests of farmers and local agency partners. The result is a portfolio of interventions (weather-smart, water-smart, seed/breed-smart, carbon/nutrient-smart, and institutional/market-smart) instead of single technologies. The following adaptation and mitigation options have been used by CCAFS and its partners in East Africa to demonstrate how communities can test, co-develop and adopt integrated technologies and practices, and to help them understand the enabling environment that facilitates the adoption of CSA practices (Table 3).

**Table 3: Adaptation and mitigation technologies and practices tested in CCAFS Climate Smart Villages**

<p>1. <u>Climate information services</u></p> <ul style="list-style-type: none"> <li>Seasonal weather forecasts</li> <li>Climate analogues</li> <li>Downscaled agro-weather advisories</li> <li>Blended scientific and indigenous mix of climate information services</li> <li>Climate-informed farm planning</li> <li>CIS delivery models</li> </ul> <p>2. <u>Soil Management</u></p> <ul style="list-style-type: none"> <li>Socio-ecological considerations (land degradation surveillance)</li> <li>Site-specific nutrient management (supply soil nutrients to actual needs of crops)</li> <li>Applications of indigenous practices and knowledge to soil and land management</li> <li>Conservation agriculture (minimum tillage, crop residue recycling, soil cover, regular fallow periods)</li> <li>Integrated soil fertility management (judicious use of fertilizers together with well-adapted, disease- and pest-resistant germplasm, and good agronomic practices)</li> <li>Contour farming and terracing</li> </ul> <p>3. <u>Water management</u></p> <ul style="list-style-type: none"> <li>Rainfall capture and retention</li> <li>Improved techniques for rainwater harvesting</li> <li>Improved, low cost irrigation practices</li> <li>More efficient use of agricultural (on-farm) water</li> <li>Supplemental irrigation – additional to rainwater sources</li> </ul>	<p>4. <u>Crop management:</u></p> <ul style="list-style-type: none"> <li>Breeding of more resilient, more adapted crop varieties/establishment of seed banks</li> <li>Diversification (changes to crops cultivated)</li> <li>Intensification (intercropping)</li> <li>Crop rotations</li> <li>Improved storage and processing technologies</li> </ul> <p>5. <u>Agroforestry</u></p> <ul style="list-style-type: none"> <li>Multi-purpose trees to deliver multiple benefits</li> <li>Natural regeneration based on indigenous knowledge</li> </ul> <p>6. <u>Energy management</u></p> <ul style="list-style-type: none"> <li>Energy-saving devices and practices</li> <li>Access to modern, renewable energy services</li> </ul> <p>7. <u>Index-based agricultural insurance</u></p> <ul style="list-style-type: none"> <li>To enable farmers to find where to start again in case of a bad season</li> </ul> <p>8. <u>Institutional arrangements</u></p> <ul style="list-style-type: none"> <li>Cross-sector linkages</li> <li>Local institutions</li> <li>Financial services</li> <li>Market linkages</li> <li>Off-farm risk management – e.g., prices</li> </ul>
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Potential is also found in business incubation centers, such as the Kenya Climate Innovation Center (KCIC) in Strathmore University, for product development, business model refinement and market entry.

### Gaps in adaptation and mitigation

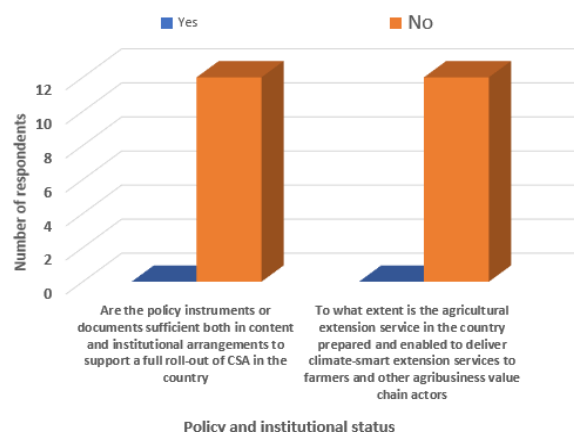
A review of the different gaps shows the following:

- Institutional arrangements are currently neither properly prepared nor sufficiently enabled to undertake the anticipated scaling;
- Research-extension-farmer (R-E-F) linkages are weak, yet CSA is knowledge-intensive, requiring a strong R-E-F Framework.

**Table 4 – Adaptation and mitigation gaps.**

Kenya: Gaps	Tanzania: Gaps	Uganda: Gaps
<ul style="list-style-type: none"> <li>Low crop yield/ productivity</li> <li>Deficiencies in the production (quality) and supply (quantity) of seeds and other planting materials</li> <li>Inefficient (un-smart) use of resources</li> <li>Market linkages are weak</li> <li>Weak institutional coordination</li> </ul>	<ul style="list-style-type: none"> <li>Low crop yield</li> <li>Low technology adoption</li> <li>Climate applications and agro-weather advisories are not currently incorporated in agricultural extension information.</li> <li>Participation levels are low</li> <li>Limited awareness among stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Low crop yield/ productivity</li> <li>Information quality and timeliness</li> <li>Limited knowledge and skills to implement climate change actions</li> <li>Limited awareness</li> <li>Low exposure to agricultural and market information</li> </ul>

### Barriers to Scaling Resilient Climate-smart Investments in Agriculture



**Figure 3: Institutional arrangements for implementing adaptation and mitigation in East Africa**

Much as the policies, strategies, frameworks and plans have been put in place to indicate high potential in (=readiness of) the countries for adaptation and mitigation actions, all respondents interviewed across the three countries indicated that the instruments, in and of themselves, are not enough to enable adaptation and mitigation. Results showed that institutional arrangements are neither properly prepared nor sufficiently enabled to undertake the anticipated adaptation and mitigation interventions without external help (Figure 3). Agricultural extension service in the region is also not well-prepared and not well-enabled to deliver climate-smart extension services to farmers and other agribusiness value chain actors. Reasons given include barriers such as technology, capacity, information and finance, etc., Despite mainstreaming efforts in the three countries, “climate change” and “agriculture” are still treated in silos, with climate-smart agriculture being treated as if it is different from mainstream agriculture, thereby impeding the potential for adaptation and mitigation to go to scale.

In most cases each department or section or unit has its own operating document and separate officers. This silo-style operations in the Counties, Ministries, Departments and Agencies (CMDAs) have relegated CSA to a separate, parallel function from mainstream Agriculture. Further, there is a weak knowledge and information base on adaptation and mitigation, scarcity of expertise, low capacity, weak governance, inadequate funding and unclear delivery (information flow) mechanisms.

Table 5: Barriers

Kenya: Barriers	Tanzania: Barriers	Uganda: Barriers
<ul style="list-style-type: none"> <li>Limited               <ul style="list-style-type: none"> <li>✓ awareness</li> <li>✓ technology development</li> <li>✓ capacity (awareness, knowledge and skills)                   <ul style="list-style-type: none"> <li>➢ access to (1) market linkages, (2) information, (3) finance</li> </ul> </li> </ul> </li> <li>Burdensome taxation and bureaucratic procedures</li> <li>Economies of scale: size of enterprise (volumes/turnover)</li> <li>Partner organizations may have conflicting goals and visions</li> <li>Scarcity of reliable policy incentives</li> <li>Tariffs and non-tariff barriers</li> <li>Low quality/counterfeit inputs, e.g., seeds</li> </ul>	<ul style="list-style-type: none"> <li>Inadequate knowledge</li> <li>Low quality farm inputs</li> <li>Limited               <ul style="list-style-type: none"> <li>✓ human resource/ expertise                   <ul style="list-style-type: none"> <li>○ access to finance, information, markets</li> </ul> </li> </ul> </li> <li>Economies of scale</li> <li>risk appetite low</li> <li>Tariff/non-tariff barriers</li> </ul>	<ul style="list-style-type: none"> <li>Limited               <ul style="list-style-type: none"> <li>✓ coordination</li> <li>✓ knowledge and skills,</li> <li>✓ technical and business skills &amp; capacity                   <ul style="list-style-type: none"> <li>➢ access to information, technology, (e.g., seed), credit/finance, extension, information/limited awareness</li> </ul> </li> <li>✓ non-consistency of services</li> </ul> </li> <li>quality of information provided</li> <li>high marketing costs</li> <li>non-consistency of services</li> <li>unregulated distribution of free inputs</li> </ul>

## Implications of the Findings for Adaptation and Mitigation Policy

Some suggestions to address gaps and barriers are presented in the table below.

Table 6: Suggested interventions for addressing barriers to CSA investment

Barriers	Suggested interventions
<b>Inadequate knowledge and information on CSA</b>	Conduct action research to inform and awareness/educational programs on CSA Disseminate currently available information on CSA: extension workers to promote CSA across counties
<b>Inadequate expertise and human capital on CSA agribusiness</b>	<ul style="list-style-type: none"> <li>• Training, mentoring, business incubation programs</li> <li>• Facilitate extension services to mainstream CSA criteria into existing production and service standards</li> </ul>
<b>Weak linkages to markets</b>	<ul style="list-style-type: none"> <li>• Strengthen commodity aggregation models by strengthening contractual obligations to improve reliability of supply for the market, to make aggregation more viable and more attractive</li> <li>• Support aggregation model investment through enhanced provision of guarantees and other risk-mitigation instruments</li> <li>• Offer fiscal incentives for businesses offering aggregation services and CSA technical training</li> </ul>
<b>Scarcity of investment-ready opportunities</b>	<ul style="list-style-type: none"> <li>• Simplify policy to improve ease of doing business. Steps needed to establish a standard/certification scheme, in close cooperation with regulators, for CSA products</li> </ul>
<b>Prohibitive bureaucratic procedures</b>	<ul style="list-style-type: none"> <li>• Work with government to reduce bureaucracy, to remove barriers and to make aggregation more attractive</li> <li>• Simplify procedures to improve ease of doing business;</li> <li>• Explore the possibility of developing a certification standard for CSA products</li> </ul>
<b>Prohibitive financial policies</b>	<ul style="list-style-type: none"> <li>• Introduce environmental taxation to generate revenue for subsidizing CSA scaling, to promote private investment in CSA (e.g., co-finance, grants, risk-guarantees)</li> <li>• Review tax policies to exempt or zero-rate CSA products and CSA-destined raw materials</li> <li>• Develop/introduce incentives for the banking sector to better integrate climate risks in their loan products</li> </ul>

Most of the potential, gaps and barriers to adaptation and mitigation cut across all three countries. Potential for adoption of adaptation and mitigation is high but hampered by several factors, as given in the gaps and barriers. Governments of Ke, Tz and Ug have made good progress on integrating adaptation and mitigation into policies, thereby raising the potential to implement them. Much as the policies have been put in place to indicate the readiness of (=high potential in) the countries, the policy instruments, in and of themselves, are not enough to trigger adaptation and mitigation actions. Further potential lies in fostering climate-resilient investments. Critical success factors necessary for adaptation and mitigation will be knowledge/information (e.g. research, alerts and notifications), technology (e.g. correct seeds) and capacity building (e.g. expertise and physical assets) and finance (a blend of financial instruments). A Climate-Resilient Farmer Field School (CR-FFS) Methodology has been adopted to integrate these factors. The innovation model will be applied in the context of FFS to build local capacity and to generate local knowledge for local adaptation and mitigation. Results will be used to inform policy.

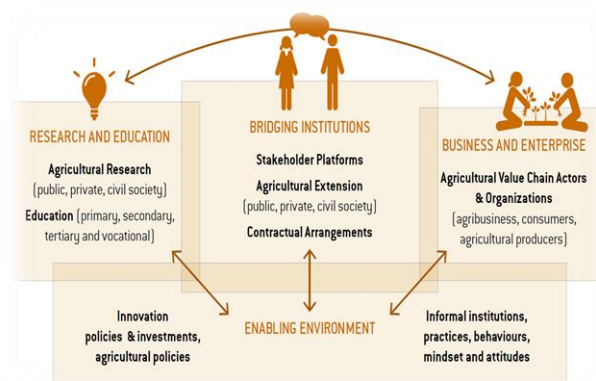


Figure 4: Agricultural knowledge and innovation system - to promote adaptation and mitigation (Source: FAO, 2018)

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## Project information:

The Climate Resilient Agribusiness for Tomorrow (CRAFT) project (2018 - 2023), funded by the Ministry of Foreign Affairs of the Netherlands, will increase the availability of climate smart foods for the growing population in Kenya, Tanzania and Uganda. The CRAFT project is implemented by SNV (lead) in partnership with Wageningen University and Research (WUR), CGIAR's Research Program on Climate Change, Agriculture and Food Security (CCAFS), Agriterria, and Rabo Partnerships in Kenya, Tanzania and Uganda.

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