

POLICY BRIEF

PROMOTING CLIMATE-SMART AGRICULTURAL PRACTICES FOR RESILIENT RURAL COMMUNITIES IN KENYA



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Highlights

- Climate change is a global development concern, affecting both human and wildlife.
- Agricultural productivity is extremely threatened by climate change, resulting in low returns on investment from crops and livestock enterprises.
- Increase in food prices due to low agricultural yields subject many households to food insecurity and poverty in Kenya.
- Climate smart agricultural practices help farmers boost their productivity, food security and improve their living standards.
- Financial constraints, limited technical skills and overreliance on traditional agriculture limit CSA uptake.
- Policies should be directed towards climate financing, farmer capacity building, farmers' access to climate information and input subsidies.

List of Acronyms

CSA	Climate Smart Agriculture
GHG	GreenHouse Gas
SSA	Sub-Sahara Africa
WFP	World Food Programme
FAO	Food and Agriculture Organization
WHO	World Health Organization
MoALF	Ministry of Agriculture, Livestock and Fisheries
ASALs	Arid and Semi-Arid Lands

Climate Change, Food Insecurity and Poverty in Rural Kenya

Climate change is one of the top global development challenges (WHO, 2020). Climate change has not only affected humans but wildlife as well. The development sectors in Sub-Sahara Africa (SSA) such as health, education, agriculture, tourism and manufacturing continue to be heavily affected by climate change. As suggested by Abraham Maslow that everyone requires food (Abraham, 2020), the effects of climate change continue to affect African agricultural productivity, subjecting her citizens to acute food insecurity.

In rural Kenya, poverty and household food insecurity form the top challenges faced by many households as a result of climate change (MoALF, 2016). In 2025, approximately 2.1 million people in Kenya faced severe food insecurity, especially in the Arid and Semi-Arid Lands (ASALs) (IPC, 2026). Moreover, around 741,884 children were affected by malnutrition in the same year (IPC, 2026).

On the other hand, many households live below the poverty line (Eichsteller et al., 2022). As of the year 2022, approximately 40% of the population in Kenya were reported to be struggling to meet the basic needs (KNBS, 2022). Around 20 million people were categorized as poor (KNBS, 2022). The two top challenges have affected various sectors including health, education, manufacturing and agriculture (KNBS, 2024). Moreover, the productivity of labour force from these sectors keep on declining, which slows down economic development.

Climate Smart Agriculture and Agricultural Productivity

Climate smart agriculture practices can be defined as the agricultural production, management, and institutional approaches that simultaneously pursue three core objectives defined by the Food and Agriculture Organization (Kule et al., 2025). These include; Increase agricultural productivity and incomes (food security pillar), Enhance resilience and adaptation to climate variability and change, Reduce or remove greenhouse gas (GHG) emissions where possible (mitigation pillar) (FAO, 2018).

Adoption of climate smart agriculture is therefore one of the promising solutions to boosting and sustaining agricultural yields and food systems in Kenya in the face of climate change (Andati et al., 2022). The government of Kenya supports the adoption of CSA practices through the establishment of the CSA strategies such as the Kenya Climate Smart Strategy (KCSAS) 2017-2026 to guide investments and implementation of CSA actions to increase productivity, enhance resilience, and mitigate greenhouse gas emissions in agriculture; National Climate Change Action Plan (NCCAP), which promotes CSA as a tool for adaptation and mitigation, incorporates it into climate planning, but is broad and not fully action-specific for agriculture; National Adaptation Plan (NAP) 2015-2030, which provides broader guidance on adaptation including agriculture, but with limited specificity to CSA output targets. This policy brief highlights the types of climate smart agriculture practices, their impact on food security and provide the way forward for a sustainable food production and utilization in Kenya.

Major types of Climate Smart Agricultural practices in Kenya

Table 1 summarizes the different types of climate smart agricultural practices, how they promote household food security and the different types of crops for each CSA practice in rural Kenya. In summary, all the climate smart agricultural practices are associated with increased productivity of crops and livestock, resulting in household food security and high living standards of the farmers.

Through the National Climate Change Action Plan (NCCAP), the government of Kenya has been promoting the adoption of CSA practices such agroforestry, soil and water management practices such as minimum tillage, cover crops, irrigation systems and integrated soil fertility management practices that improves farmers' resilience to the adverse effects of climate change in Kenya.

Through the Ministry of Agriculture and Livestock Development, the government promotes CSA practices like inorganic fertilizers by subsidizing their prices so that farmers can timely access them. Adoption of these CSAs in Table 1 should therefore be highly promoted by the national and county governments in Kenya to propel national food security, improve urban and rural households' living standards and propel national economic stability and development.

Table 1: Major types of CSA and their impact on food security

CSA Practice	Impact on Food Security	Crops Suitable for
Hybrid seeds	Increases agricultural productivity through higher yields, improved disease resistance, and early maturity, resulting in improved household food availability and income stability.	Maize, rice, sorghum, sunflower, vegetables (tomatoes, cabbages)
Inorganic fertilizer	Increases soil nutrient availability (NPK), improves crop growth and yield, thereby enhancing food availability and market surplus.	Maize, wheat, rice, beans, horticultural crops
Pesticides	Reduces pre- and post-harvest losses from pests and diseases, protecting yields and ensuring food quality and safety.	Cotton, maize, vegetables, fruits, beans
Crop rotation	Improves soil fertility (especially with legumes), breaks pest and disease cycles, and increases long-term productivity and dietary diversity.	Maize-beans system, groundnuts-sorghum, wheat-legumes
Minimum tillage	Conserves soil moisture, reduces erosion, enhances soil carbon sequestration, and stabilizes yields under climate stress.	Maize, wheat, soybeans, sorghum
Cover cropping	Protects soil from erosion, improves soil organic matter and nitrogen fixation, and enhances resilience and long-term productivity.	Maize-based systems, horticultural crops, orchards
Agroforestry	Protects soil from erosion, encourages optimum land use, resulting in increase in food production	Maize-based systems, horticultural crops, orchards
Irrigation systems	Boosts water availability, increasing crop productivity and household food security	Maize-based systems, vegetables, fruits, beans
Crop insurance	Protects the crops against losses as a result of pest and diseases and climate change.	Maize-based systems, horticultural crops, orchards

Key barriers to adoption of CSA practices in Kenya

- **Financial constraints**

The process of implementing climate smart agriculture practices in the farms require significant capital (Mwanzia et al., 2025). CSA techniques such as inorganic fertilizers and hybrid seeds are directly purchased from the local agrovets, which require readily available finances. Strikingly, financially constrained farmers may not embrace such practices. Moreover, farmers located far from the local agrovets may also be reluctant to adopt them due to the transportation costs.

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▪ **Traditional agriculture**

Traditional agriculture does not appreciate the roles of climate smart agriculture in boosting farm productivity (Midamba et al., 2023; Miljatović & Vukoje, 2022). It is the type of agriculture, which incorporates the traditional methods of production, which does not guarantee optimum production output. Farmers who are deeply rooted in the traditional agriculture such as trial and errors methods do not embrace climate smart agriculture. This limits and result in sub-optimal agricultural productivity.

▪ **Limited technical skills**

Climate smart agricultural practices require modern production techniques (Autio et al., 2021). For example, adoption of inorganic fertilizer requires skills on how to mix and apply different fertilizer types in the same field. In addition, the rate of application is also a skill that many farmers should have in order to effectively adopt inorganic fertilizers. Other CSA practices such mulching and cover cropping also require technical skills to adopt in the farms. Farmers, especially traditional agriculture ones, who lack such skills may be reluctant to adopt climate smart agricultural practices (Autio et al., 2021).

▪ **Limited weather information**

Access to weather information determines the types of climate smart agricultural practices that farmers need to adopt in their farms (Mabhaudhi et al., 2025). For example, timely planting and harvesting require access to weather information such as the dates when rainfall is expected by the farmers. Farmers who have untimely access to weather information may not practice timely planting and harvesting as climate smart agricultural practices. Due to the association between access to weather information and adoption of CSA, Mabhaudhi et al. (2025) advocated for linking farmers to weather information to promote adoption of CSA.

▪ **Inadequate extension service delivery**

Agricultural extension play key roles in disseminating CSA practices adoption to the smallholder farmers. When farmers do not timely access the extension services, they tend to be unaware of the possible CSA practices that they can adopt in their farmers. Those located in the farther inaccessible areas tend to be left out when offering extension and advisory services by the extension agents.

- **Gender disparities in access to farm resources**

Households headed by male and females are characterized by skewed and unequal access to farm resources. Male-headed households have significant access and services to resources such as land, capital, extension and advisory services more than the ones headed by females. This results in slow-paced adoption of climate smart agricultural practices among the female-headed households in Kenya.

Actionable recommendations

- **Farm input subsidies and price regulation**

The Kenyan Government, through the Ministry of Agriculture and Livestock Development should support farmers by subsidizing high-cost farm inputs such as hybrid seeds and inorganic fertilizers. They should also regulate the prices that the local markets charge to support farmers. This will result in easy and timely access to these CSA practices among the farmers. In addition, institutionalization of the CSA in county budgets should be promoted for input subsidies.

- **Strengthening agricultural extension centres**

Strengthening and setting up additional agricultural extension centres will increase the rate of dissemination of climate smart agricultural practices among the farmers. The government should therefore set aside a budget to strengthen the agricultural extension services.

- **Offering gender-sensitive technical support**

It is imperative to support female headed households through gender-sensitive services such as capacity building, extension services, field demonstrations, exchange programs. This should be done by the County governments in Kenya. This will boost adoption of Climate Smart Agricultural practices among the female-headed households.

- **Farmer-centered capacity building**

One-off training on climate smart agriculture is not adequate to propel adoption of CSA practices among the farmers. The extension agents should fill the skills inadequacy gap among the farmers by offering continuous training on CSA adoption. The capacity building will ensure that farmers have the required technical skills to apply the CSA in their farmers.

▪ Linking farmers to weather information

Linking farmers to weather information should be highly promoted. This can be done by scaling up digital weather advisory. Climate information is available from multiple sources such as the agricultural extension programmes, Radio & Televisions, agricultural extension agents, community meetings, among others. Farmers should also be encouraged to attend such programs and meetings for timely access to the weather information.

Monitoring and Evaluation framework

To ensure measurable progress, the following indicators are recommended. The adoption of climate smart agricultural practices is expected to bring positive economic changes to the farmers as highlighted in Table 2. Measuring the percentage of farmers who adopt at least one CSA practices is important since it sheds more lights on the rate of uptake of CSA technologies. Consequently, adoption of CSA is expected to reduce yield variability. Thus, this indicator is important in the monitoring and Evaluation framework. Other indicators such as increase in farm income, percentage of female farmers accessing extension services, post-harvest loss reduction and household food security are all stemming from the key actionable recommendations.

Table 2: Target indicators

Indicator	Target
% of smallholder farmers adopting at least one CSA practice	Increase/High
Yield variability reduction	Decrease/Low
Increase in farm income among CSA adopters	Increase/High
% of female farmers accessing extension services	Increase/High
Reduction in post-harvest losses	Decrease/Low
% of food secure farmers	Increase/High

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