

CLIMATE-SMART AGRICULTURE

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CLIMATE-SMART AGRICULTURE

**Andreita Mbuluku, An Ansoms, Tangara Mahamadou Bassirou
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Since 2010, the FAO has promoted climate-smart agriculture, which aims to reconcile productivity, adaptation, and climate change mitigation. Although it has been widely adopted by governments and donors, it remains highly controversial. Some authors view it as a repackaging of top-down modernization policies that marginalize small producers and favor technologies and market solutions. Political ecologists, on the other hand, emphasize the importance of equity, participation, and local knowledge for achieving true sustainability. In Rwanda, the Democratic Republic of the Congo (DRC), and Mali, implementation thus oscillates between standardized technocratic approaches and more inclusive, culturally rooted practices.

Concept

Over the past decade, climate-smart agriculture has emerged as an influential paradigm in international development policy. Promoted by the FAO, influential donors, and national governments, it is considered a comprehensive framework for addressing the dual challenges of food security and climate change. The appeal of climate-smart agriculture lies in its promise to address food security and climate change simultaneously. The term “*smart*” implies an innovative, scientific, and globally applicable approach to sustainability.

¹ The case study section was compiled based on various field experiences of the authors involved. The text has been edited using AI.

However, climate-smart agriculture is not a neutral or uncontested concept. It is deeply rooted in competing visions of agricultural development and is shaped by political interests, donor conditionalities, and struggles for knowledge and power. In other words, although it presents itself as a technical innovation, it also conveys implicit political choices. Nevertheless, as Hrabanski (2020) points out, climate-smart agriculture tends to depoliticize the profound issues it addresses, reducing complex debates related to agricultural adaptation and climate change to technical, consensual solutions.

The origins of climate-smart agriculture are closely linked to the 2010 policy framework of the FAO, which defined it as “an approach that aims to increase sustainable productivity, build resilience, reduce or eliminate greenhouse gases, and strengthen national food security and development goals” (FAO, 2010). This triple objective has given climate-smart agriculture broad appeal across policy areas, from ministries of agriculture to climate negotiations. The 2018 Guide to Climate-Smart Agriculture, published by the FAO, expanded the definition, presenting it as an approach that requires favorable policy, financial, and institutional conditions (FAO, 2018). In principle, climate-smart agriculture is intended to be flexible and adaptable to local contexts. In practice, however, this elastic definition has allowed governments, donors, and businesses to interpret it according to their own priorities, which explains both its popularity and its controversy.

One way to understand the ambiguities of climate-smart agriculture is to situate it within two intellectual traditions: ecomodernism and political ecology. Ecomodernism views agriculture through the lenses of science, technology, and market integration. It assumes that human ingenuity can overcome the limits imposed by nature and that technological progress will make it possible to decouple agricultural productivity from environmental damage (Symons, 2019). From this perspective, climate-smart agriculture involves the use of innovations such as drought-resistant crops, chemical fertilizers, irrigation

systems, agroforestry, and digital climate information services (Lin, 2011; Makate et al., 2016; Reppin et al., 2020; Kurgat et al., 2020). Farmers are portrayed as *smart* when they adopt these technologies and integrate them into market-based approaches. This vision resonates strongly with international donors, who favor interventions that produce quantifiable and scalable results, such as hectares of terraced land or tons of fertilizer applied. Governments also find this vision appealing because it allows them to demonstrate visible progress toward development and climate goals.

The Climate-Smart Agriculture (CSA) framework rests on three pillars—increased productivity, climate resilience, and emissions reduction—and is becoming a dominant benchmark for donors.

In contrast, political ecology approaches emphasize the social and political dimensions of environmental change.

These approaches argue that technologies are never neutral; rather, they are embedded in and reproduce power relations (Robbins, 2012; Plumwood, 1995; Coolsaet, 2020). From this perspective, climate-smart agriculture risks perpetuating the practices of the Green Revolution, which prioritized monoculture, standardization, and chemical inputs while marginalizing small-scale farmers and damaging ecosystems. Another issue is adapting climate-smart technologies to diverse socio-ecological contexts. Political ecologists emphasize that building resilience requires not only adopting new practices but also fighting against inequality, land insecurity, while protecting the rights of smallholder farmers. They highlight indigenous knowledge systems and local adaptation practices that are frequently overlooked in technocratic climate-smart frameworks, yet are essential to building resilience (Leal Filho et al., 2021; Leal Filho et al., 2022). Thus, political ecology shifts the focus from technical solutions to issues of justice.

In short, climate-smart agriculture is a concept with multiple meanings that is promoted by governments, donors, businesses,

and farmers. If implemented restrictively, it can reinforce inequalities, marginalize local knowledge, and be reduced to

Political ecology reminds us that technologies are never neutral. They are embedded in power dynamics and can reproduce the logic of the Green Revolution, by marginalizing small-scale farmers and weakening ecosystems.

technocratic greenwashing. However, it has real potential when it incorporates equity, participation, and local adaptation principles, recognizing agriculture as a cultural and political practice, not just a means of production. Thus, this contested concept reflects the conflicts within climate governance and future agricultural trajectories between pragmatism and the risks of exclusion (FAO, 2010; Hrabanski, 2020).

The different dimensions of climate-smart agriculture demonstrate that, despite its technical appearance, the concept is deeply political and multifaceted. To better understand these dynamics and variations in implementation, concrete cases are useful.

Case study

To better illustrate the concept, we will focus on the dynamics at play in three countries: Rwanda, Mali, and the Democratic Republic of the Congo (DRC). These countries have unique yet complementary approaches to implementing climate-smart agriculture.

The first country, located in the Great Lakes region, has pursued a dynamic of authoritarian modernization since the early 2000s, linked to a search for political legitimacy and technocratic efficiency (Chemouni, 2016; Booth & Golooba-Mutebi, 2012). The second, a Sahelian country heavily dependent on rainfall, has chosen inclusive modernization to strengthen rural resilience and integrate innovations adapted to local realities (Tangara et

al., 2021). The third country, located in the heart of Africa, proposes a hybrid approach linking conservation imperatives with ambitions for green growth and territorial stability.

In the three selected countries, climate-smart agriculture has become a central benchmark for public policy. However, implementing this concept under contrasting political and institutional frameworks highlights its ambiguities, as it lies at the intersection of development and climate resilience agendas (FAO, 2010, 2018; Symons, 2019).

In Rwanda, first of all, the post-genocide modernization project is based on the belief that centralizing and technifying agricultural processing is necessary to guarantee food security and national stability. Climate-smart agriculture is part of the continuity of intensification (*Crop Intensification Program*) and administrative performance (*Imihigo*) policies (Ansoms et al., 2018). It rearticulates an existing agenda—that of the Green Revolution—but with a new vocabulary linked to resilience and climate. This shift in discourse has attracted new funding and continues to legitimize the pursuit of a productivist model based on monoculture, chemical fertilizers, and export crops. The implementation of climate-smart agriculture in this case is based on measurable indicators such as hectares of terraced land, the number of trained farmers, and tons of distributed inputs. These measures are designed to provide donors with rapid, quantifiable results. Local authorities, subject to performance contracts, often impose these practices coercively, sometimes at the expense of peasant realities and their traditional crops (sorghum, bananas, and beans). Thus, agriculture has become a management tool for supervision, monitoring, and producing results (Ansoms et al., 2018; Heinen, 2022).

In this context, small-scale producers highlight the negative consequences of losing decision-making power over their crops. Even during the *Green Revolution*, technical standardization created regional inequalities and weakened local biodiversity. The forced adoption of imposed crop varieties and increased

dependency on imported inputs has fueled a sense of dispossession (Desiere, 2017; Ansoms et al., 2022; Heinen, 2022). Although some yields improved, soil erosion and a decline in food diversity have enhanced nutritional vulnerability. Nevertheless, many farmers developed forms of subtle resistance that could be characterized as bottom-up, climate-smart agriculture approaches. For instance, farmers adopted polyculture practices, cultivated unauthorized yet climate-resilient crops, used compost, and adapted official guidelines to their practices. These strategies, sometimes referred to as *induced failure*, demonstrate a local reappropriation of an imposed agenda (Clay & Zimmerer, 2020; Huggins, 2017).

In Mali, the climate-smart agriculture approach is also the result of a coordinated effort involving multiple stakeholders. The government and donors (World Bank, FAO, European Union) are guided by the *Climate-Smart Agriculture Investment Plan* (CSAIP) and the *Agricultural Orientation Law* (LOA) (World Bank, 2022; CSAIP Mali, 2019; Neate, 2013). These frameworks promote decentralization and community participation. The main objective is to increase productivity and build resilience to increased rainfall variability (Alliance Bioversity & CIAT, 2025). Malian modernization rhetoric supports inclusive rural development based on employment for youth and women through local management rather than strict administrative control. Climate-smart agriculture would be based on a variety of locally rooted projects. One example is the *Food System Resilience Program* (PRSA-Mali), which is funded by the World Bank. It combines irrigation, restoration of degraded land, crop diversification, and small-scale mechanization. Other initiatives, such as the *Shared Agricultural Zone* (ZAP) in Mofa, focus on training youth and women. These initiatives emphasize not only productivity, but also community resilience, water management, and the promotion of agroecology (Alliance Bioversity & CIAT, 2025; EU-APSAN, 2024).

These projects are often designed in collaboration with local communities, with the implication of cooperatives and community structures. The involvement of farmers, national experts,

and NGOs promotes local crops, such as millet, sorghum, and legumes, and encourages sustainable livestock farming and the preservation of traditional knowledge (Houessionon et al., 2021; EU-APSAN, 2024). However, doubts about the sustainability of agricultural practices arise from the fact that funding comes mainly from outside sources and industrial fertilizers are increasingly being used. This creates tensions because a balance must be struck between modernizing agriculture and preserving community autonomy. Failure to build on local knowledge and existing sustainable networks risks exacerbating inequalities (CSAIP Mali, 2019; Alliance Bioversity & CIAT, 2025).

In the DRC, the situation is even more complex. In 2025, the Congolese president presented his flagship initiative, the *Kivu-Kinshasa Green Corridor* (CVKK), as the world's largest protected area. It covers more than 100,000 km of primary forest and 60,000 km of peatlands (Léni, 2025). The CVKK is based on the concept of green and inclusive growth, aiming to combine ecological security, social cohesion, and post-conflict reconstruction. Climate-smart agriculture is a strategic tool for achieving these goals as agricultural activities surrounding the corridor are presented through a value-chain architecture. Villages and surrounding areas focus on crops already present in the region (maize, rice, palm oil, cassava, etc.); harvests are aggregated in an industrial hub where a first stage of agro-processing takes place (e.g., cocoa fermentation, crude palm oil production); products are then transported to a special economic zone for a second transformation (e.g., table oil, chocolate, soap); and finally, once local consumption has been satisfied, finished products are distributed and exported to the country's main markets. The illustrative example is palm oil: palm fruits are cultivated in fields, transformed into crude

The success of Climate-Smart Agriculture depends on the ability of local actors to negotiate with institutional frameworks that claim to be neutral but are deeply political.

palm oil, then processed into soap (and table oil), before being shipped to the main markets of the DRC.

At the World Economic Forum in Davos, the Congolese head of state stated his ambition to make the DRC a climate solution country (Makal, 2025). However, this ambition has a strong political dimension. The corridor would reorganize a region long affected by war and transform forests into areas useful for storing carbon, establishing peace, and strengthening economic control (Makal, 2025). The DRC has adopted the CVKK as a new governance tool (Decree No. 25/01 of 15 January 2025), which regulates the establishment of the corridor as a *community reserve* and its surroundings as agricultural production zones. Official rhetoric places rural communities “at the core.”

However, despite the inclusive rhetoric, local communities seem to be underrepresented (Mukulu, 2025). Bindu (2022) addresses the risks associated with this territorial reorganization in his analysis, namely the exclusion of the Batwa indigenous people and local communities that depend on natural resources. The Batwa fear being marginalized in terms of land ownership, which echoes the precedents set by traditional protected areas (R-EDH, 2025). Additionally, there is a high risk of climate greenwashing. The ecological corridor is hailed as a breath of fresh air for the planet; however, its objectives clash with extractive interests (Bankable Africa, 2025). This raises the question: Will the corridor serve as a tool for ecological transition, or will it become an economic system based on green rent, in which biodiversity is transformed into a commercial product via the carbon market? Makal (2025) mentions in his article for Mongabay Afrique that this type of project, “as ambitious as it is inspiring,” often faces challenges related to sovereignty, symbolism, and financial dependence.

In short, the concept of climate-smart agriculture can be incorporated into a variety of governance models. In Rwanda, for example, it is a centralized state policy and a technocratic steering instrument, while in Mali, it is a jointly developed strategy supported

by coalitions of institutional and community actors and designed as a tool for socioeconomic transformation. The DRC, particularly through the CVKK, occupies an intermediate position between these two models. In all three cases, however, structural dependence on external aid favors importing standardized frameworks strongly oriented toward performance measurement.

This comparative analysis of Rwanda, the DRC, and Mali sheds light on the theoretical criticisms of the climate-smart paradigm and the diversity of African approaches in this area. The analysis highlights three types of resilience: directed, centralized, and technocratic in Rwanda, where institutional success is accompanied by peasant alienation; concerted in Mali, based on local cooperation but with strong financial dependence; and territorial in the DRC, where climate becomes a geopolitical issue of reterritorialization between green promises and geoeconomic paradoxes. Thus, the ecological transition appears less as a simple technological problem and more as an issue of political and institutional sovereignty for countries dependent on external financing. In these three contexts, the success of climate-smart agriculture depends on the ability of local actors to negotiate institutional constraints and incorporate their priorities and innovations into largely imposed action frameworks.

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