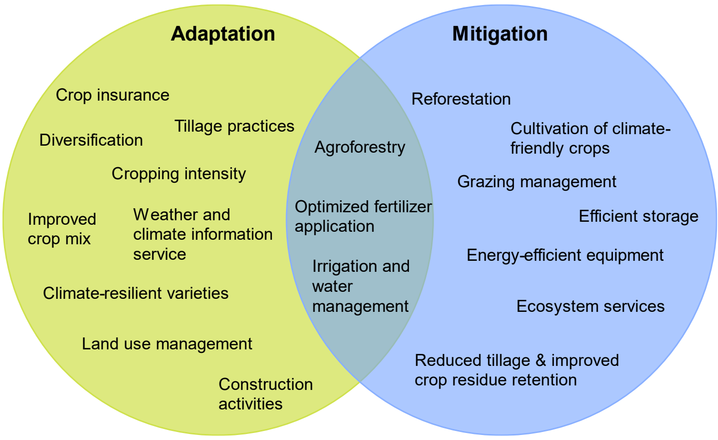

Climate Smart Agriculture for Low Emission and Climate Resilient Value Chains

Climate change impacts on agriculture in the OACPS member states

Agriculture remains the backbone of the economies of the 79 Member States of the Organisation of African Caribbean, and Pacific States (OACPS). In Africa only, it accounts for a third of the Gross Domestic Product and employs two-thirds of the labour force. In addition to its importance for food security and sustainable economic growth in the OACPS member states, the agricultural sector is also crucial for climate action:

The agricultural sector in the Global South is disproportionately affected by the adverse impacts of climate change, such as increasing temperatures and climate variability, invasive crops and pests, and more frequent extreme weather events like droughts, floods, and strong winds. Climate change can be described as a change in the average climatic conditions in a region for an extended period, typically decades or longer. It may be due to natural processes or attributable to human activities. While the poorest countries are most heavily reliant on the agricultural sector, they are at the same time most vulnerable to the effects of climate change.

In many African regions[1] temperatures have increased more rapidly than the global average. Climate change has already negatively impacted crop production and productivity growth in many African countries. Lower fodder availability and quality as well as availability of water, heat stress and the prevalence of livestock diseases are anticipated to further affect the livestock sector. Agriculture in Africa will remain particularly vulnerable to climate change as agricultural activities are mainly rainfed and subsistence.

The Caribbean small island developing states depend heavily on their limited natural resources, with the largest sectors generally being agriculture, fisheries, and tourism. Agriculture is also dominant in the developing Pacific Island countries in relation to other economic sectors: more than 75% of the population live in rural areas and mostly depend on agriculture for their livelihoods (with exception of Fiji). At the same time, the Caribbean and Pacific regions are the most environmental hazard-prone regions and particularly vulnerable to climate change-driven impacts, including natural disasters

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and extreme weather events as well as droughts and sea-level rise.

Overall, this has brought about reduced crop yields and quality, lower marketability of products, and decreased livestock productivity and resulted in negative consequences for food security and livelihoods. Due to insufficient adaptive capacities, resilience of actors along agricultural value chains, in particular agricultural Micro, Small and Medium Enterprises is low, while climate change related impacts are further reinforcing their vulnerability.

Climate vulnerability describes the likelihood or predisposition to be adversely affected by the impacts of climate change. Climate resilience in agriculture, on the other hand, refers to the capacity of agricultural systems, communities, and ecosystems to prepare for, respond to, and recover from the impacts of climate change in a way to maintain their productivity, functionality, and sustainability and keep damages minimal. This also requires understanding climate risks and the capacity to adapt, learn, and transform accordingly.

In addition, to its importance for food security and sustainable economic growth in OACPS member states, the agricultural sector is also crucial for action towards climate change mitigation, i.e., reducing or removing greenhouse gas emissions[2] generated by agricultural activities. In this context, it is also key to address food loss and waste[3] to contribute to more sustainable production, help meet climate goals and reduce stress on environment.

Enhancing climate resilience through climate smart agriculture

In this context, working towards low emissions as well as climate resilient practices and value chains is crucial to fully exploit the potential of the agricultural sector and contribute to food security, increased income, and employment generation.

Building on climate smart agriculture (CSA) can serve as a guideline for doing so. According to the Food and Agriculture Organization of the United Nations (FAO), CSA is an integrated approach that focuses on three interlinked objectives: First, sustainably increasing agricultural productivity and incomes (food security); second, adapting and building resilience to climate change (adaptation); and third, reducing and/or removing greenhouse gas emissions (mitigation), where possible.

Adaptation to climate change in agriculture comprises proactive adjustment measures and strategies to actual or expected climate and its effects with the aim to reduce the vulnerability of ecosystems and rural communities. Mitigation of climate change summarizes the efforts to prevent or reduce emissions of greenhouse gases (GHG) or to enhance their removal from the atmosphere by sinks such as forests, vegetation or soils that can reabsorb GHG. In this context, low emissions agriculture aims to reduce GHG emissions while improving livelihoods[4].

As such, CSA is describing a way forward for the transformation of agri-food systems in the context of climate change towards more climate resilience. Developing and enhancing the capacities of actors along agricultural value chains is key to prepare smallholder farmers and rural communities to cope with the uncertainty created by changing climatic conditions. This will allow them to fully participate in the transformation of the agricultural sector towards modernisation and sustainable expansion.

Examples of climate smart agriculture practices

In more concrete terms, climate smart agriculture practices that contribute to build adaptive capacities and climate resilience while also allowing to better contribute to climate change mitigation, can look as follows[5]:

With regard to **soil management**, conservation agriculture (minimum to no tillage), cover cropping (crop residues an/or cover crops), organic or green manure, and nutrient management (integrated soil fertility management) can be low emissions strategies to keep soils healthy and soil carbon levels high while using nutrients and water efficiently.

Crop rotations and intercropping, the use of traditional and improved drought or pest resistant crop varieties as well as improved crop, nutrient and integrated pest management are CSA practices that can be used for **crop production**. These measures can increase resilience to climate change impacts such as heat stress or droughts and have the potential to also reduce GHG emissions.

Water conservation is key to address the impacts of climate change, in particular for rainfed farming systems. It comprises techniques such as rainwater harvesting, (drip) irrigation, including improved watering times, or measures such as mulching or using drought resistant crop varieties.

Building on improved feed management, including feed quality, feed-water productivity, and selection of feed, as well as better integration of livestock in smallholder mixed production systems are CSA practices with regard to livestock. Furthermore, data-driven practices (such as animal tracking health monitoring, or nutrient balancing), as well as improved breeding, housing, vaccination and medication management can result in better productivity, but also higher animal welfare. In addition, enhanced manure management (i.e., how manure is captured, stored, managed, and used), as well as grazing approaches, such as rotation, can be considered for climate **smart livestock management** and better climate change adaptation and mitigation.

Using **respectful agro-forestry practices** is an integrated manner to strengthen climate resilience and contribute to reduce and remove GHG. They include the agricultural use of trees (e.g., fruits) and tree-crop production, such as in the context of cocoa, or in the form of integration of perennial woody species for shade or windbreak, for fodder or fuel production.

Exploring ways for **renewably energy** production as well as more sustainable biomass and biofuel alternatives, including by using crop residues or by-products (see example on cocoa briquettes) can contribute to reduced emissions and increased availability of time and income.

Besides production levels, climate resilient practices can be identified along the **entire value chain** and focus on energy-efficient harvest equipment, alternative supply chain routes and logistics plans, improved and adapted preservation, and processing as well as storage and packaging that decrease food losses and therefore contribute to reduction or removal of GHG emissions.

Maize

The production of maize, one of the main staple crops in many developing countries, is becoming more constrained by increasing temperatures and limited and unregular water availability, especially in rainfed production systems. In this context, productivity levels of smallholder farmers are highly variable and often not viable.

Conservation agriculture describes a set of farming and soil managing techniques that can manage maize production in the context of climate change impacts. It builds on minimum soil disturbance (i.e., no tillage), maintenance of permanent soil cover with living or dead plant material, and crop diversification through rotation or intercropping. Often, it is combined with the use of high yielding and drought tolerant varieties and integrated pest management. It can contribute to protect soils from degradation and improve their quality, to increased nutrient and water use efficiency, and to improved and sustained crop production[6].

Mulching, halfmoon pits and permanent planting basins, for example, have not only resulted in increased maize yields, but also improved soil water storage and enhanced resilience to drought in Southern African countries[7]. Adapted capacity development, including on conservation agriculture, can help overcome limited knowledge about the practices while considering farmers' preferences and existing practices which are among the main obstacles for its adoption.

Cocoa

For more information on how cocoa pods as by-product of cocoa bean production can be processed into briquettes for fuel and create additional income while reducing GHG emissions, scan the QR code.

Livestock

Rising temperatures and related heat stress or lower rainfall and water scarcity reduce livestock productivity and effect the growth of fodder crops. Livestock production, however, is not only affected by the impact of climate change, but also contributes to it. For example, GHG emissions are released during the digestive process of ruminants, storage and application of manure, and fodder production.

Ensuring that animals have sufficient, good-quality feed is one strategy to maintain or even improve livestock productivity, while keeping GHG emissions low.

In Ethiopia[8], for instance, farmers have prepared homemade feed concentrate for sheep fattening from a mixture of crop leftovers and immature crops by chopping and grinding them to a powder to replace market-bought feed during the dry season. The powder is either mixed with crop residues or used to make kita, a kind of roasted flat bread, to use as feed. Making feed themselves cuts the costs and ensures fodder quality. In addition, the farmers have also constructed separate barns and feed troughs from iron sheets and wood for fattening their sheep. This cuts feed wastage, permits proper feeding, and reduces the need for labour.

The agricultural sector remains critical to the growth and development of the economies of the OACPS member states. With the impacts of climate change having become a reality all over the African, Caribbean, and Pacific regions, making climate smart agriculture practices an integral part of your projects is key.

It will not only allow you to make an impactful contribution to improving smallholder farmers' livelihoods, increasing income and creating employment opportunities, but also to unlocking the potential of the agricultural sector: Building on climate-smart and climate-resilient practices can create opportunities to sustainably increase agricultural productivity and ensuring food security, while building adaptive capacities and resilience, and reducing or even removing greenhouse gas emissions.

Sources

[1] For more information on the climate change impacts on the different regions see IPCC, 2022: *Climate Change 2022: Impacts, Adaptation, and Vulnerability.* Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA.

[2] Greenhouse gases (GHG) comprise those gases that trap heat from the Sun in the atmosphere, acting like the glass walls of a greenhouse and consequently warm the Earth's surface. Increasing emissions (i.e., production and discharge of GHG) due to human activities, such as burning fossil fuels or destruction of forests, result in higher concentrations of GHG in the atmosphere- This has led to global warming that causes climate change.

[3] According to FAO, food loss refers to the decrease in edible food mass at the production, post-harvest, and processing stages of the food chain mainly due to inefficiencies, but also extreme weather events. Food waste refers to the discard of food appropriate for human consumption at the retail and consumer levels, due to spoilage, oversupply or individual consuming or eating habits.

[4] For further information, see CGIAR/CCAFS. About Low Emissions Agriculture, About Low Emissions Agriculture (cgiar.org).

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