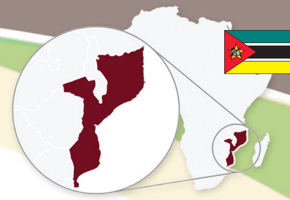

Climate-Smart Agriculture in Mozambique

Climate-smart agriculture (CSA) considerations

A The agriculture sector in Mozambique has high potential to contribute to poverty reduction and food insecurity alleviation. However, this has been significantly impaired by the absence of an agenda focused on equity in agricultural development and economic growth, as well as by the impact of climate hazards, bring about annual losses of US$ 790 million.

A P Mozambique ranks among the most susceptible and vulnerable countries in the world to weather variability, climate hazards such as droughts, floods and cyclones, and climate change. To cope with these threats, farmers have been taking up various low-input and cost-effective CSA measures, such as: small livestock rearing, crop residue management/mulching, intercropping, and manure/ animal waste.

M In agriculture, livestock production and savanna burning represent two main greenhouse gas (GHG) emitters from farming. CSA practices targeted at improved livestock and pastures management can contribute significantly to the growth of a low-emissions agricultural sector.

A P On-farm adoption of CSA practices and technologies by small-scale farmers is generally hindered by low access to knowledge and technology, high investment costs (especially in the case of multifunctional boreholes), as well as limited opportunities for credit and insurance access.

A M P I Limited evidence on the impact of various CSA investments on livelihoods and broader socio-economic and environmental goals impairs targeted programming and decision-making. Additional efforts are needed to include other practices of interest and dimensions of CSA, to help generate a stronger evidence base for CSA scale up and to ensure relevance of the interventions.

A M P I Despite efforts to mainstream climate change into the development agenda, mitigation actions remain highly embedded within the forestry sector. Since farming is an important contributor to the country's GHG emission and given the mitigation opportunities that many CSA practices and technologies bring (intercropping, mulching, direct seeding and manure/livestock waste management), there is a need to systematically integrate mitigation into agricultural development policy and programming, along existing adaptation and productivity goals.

A M P I Investments that have used an integrated approach to tackle climate challenges in agriculture, forestry and energy sectors, have proved successful in creating synergies and bringing additional benefits to smallholders, compared to plot interventions. The promotion of CSA in the country may need to go by a similar integrated approach to address adaptation, mitigation and productivity at a landscape rather than at plot level. A national CSA coordination mechanism that is founded on strong ownership and leadership by the public sector and enhances collaboration, learning and knowledge among CSA related institutions could support this.

I $ Involvement of the private sector in climate-smart agriculture is marginal, however opportunities exist to engage private sector organisations in CSA policy dialogue, input supply (including equipment manufacture and repair), value addition, microfinance, agricultural climate risk insurance, and climate-smart technology development.

A Adaptation **M** Mitigation **P** Productivity **I** Institutions **$** Finance

The climate-smart agriculture (CSA) concept reflects an ambition to improve the integration of agriculture development and climate responsiveness. It aims to achieve food security and broader development goals under a changing climate and increasing food demand. CSA initiatives sustainably increase productivity, enhance resilience, and reduce/remove greenhouse gases (GHGs), and require planning to address trade-offs and synergies between these three pillars: productivity, adaptation, and mitigation [1].

The priorities of different countries and stakeholders are reflected to achieve more efficient, effective, and equitable food systems that address challenges in environmental, social, and economic dimensions across productive landscapes. While the concept is new, and still evolving, many of the practices that make up CSA already exist worldwide and are used by farmers to cope with various production risks [2]. Mainstreaming CSA requires critical stocktaking of ongoing and promising practices for the future, and of institutional and financial enablers for CSA adoption. This country profile provides a snapshot of a developing baseline created to initiate discussion, both within countries and globally, about entry points for investing in CSA at scale.

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National context

Economic relevance of agriculture

Mozambique has experienced strong economic growth over the last two decades, with significant expansion of tertiary services and light industry and, to a lesser extent, commercial agriculture[1]. This has been driven in part by significant foreign direct investment, particularly for minerals and natural resource-related projects, as well as for large scale agricultural investments in vegetable oils, bio-fuels, tobacco, and cotton.

The agriculture sector is a mainstay of the country's economy, accounting for approximately 79% of total employment and contributing an annual average of 18% to the Gross Domestic Product (GDP) [3]. The sector also plays an essential role for women's livelihoods, as 90% of the economically active female population earn a living from agriculture. Moreover, women constitute 61% of the agricultural labour force.

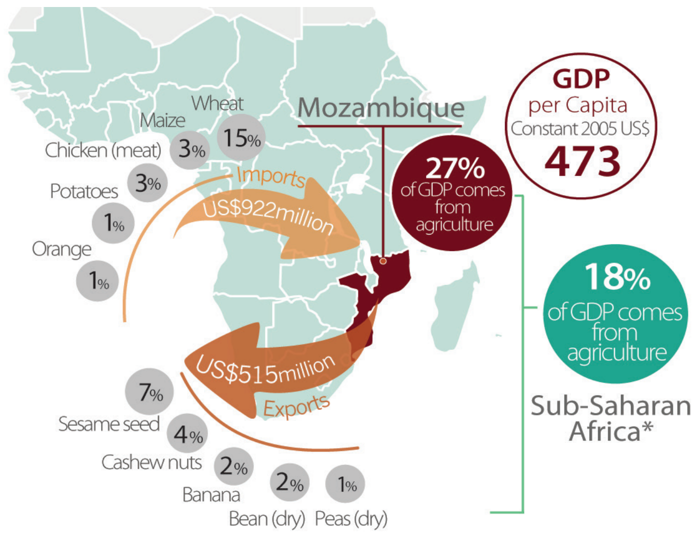
Agricultural trade deficit has been quite high. Between 2009 and 2013, the value of agricultural imports (primarily wheat and maize) averaged US$ 922 million per year, while revenues from agricultural exports (mainly from cashew nuts, sesame seed, fruits and cotton, shrimps) averaged US$ 515 million over the same period [4]. Shrimp and prawns from Mozambique's 2470km long coastline also make a significant contribution to the country's export revenues.

Over 80% of the cultivated land is used for production of staple crops [5]. A limited number of commercial farmers invest in export-oriented crops including tobacco, cotton, cashew nuts, prawns, sugar, and timber. Commodity price volatility and global market fluctuations have a significant impact on Mozambique's commercial agriculture and economy.
Economic relevance of agriculture in Mozambique [3, 4]

Mozambique's population is estimated at approximately 28 million people, 68% of whom live in rural areas. Despite steady economic growth over the last two decades, more than two-thirds of the population still live on less than US$ 1.90 a day and 55% live below the national poverty line[2] with rural poverty being more pronounced.

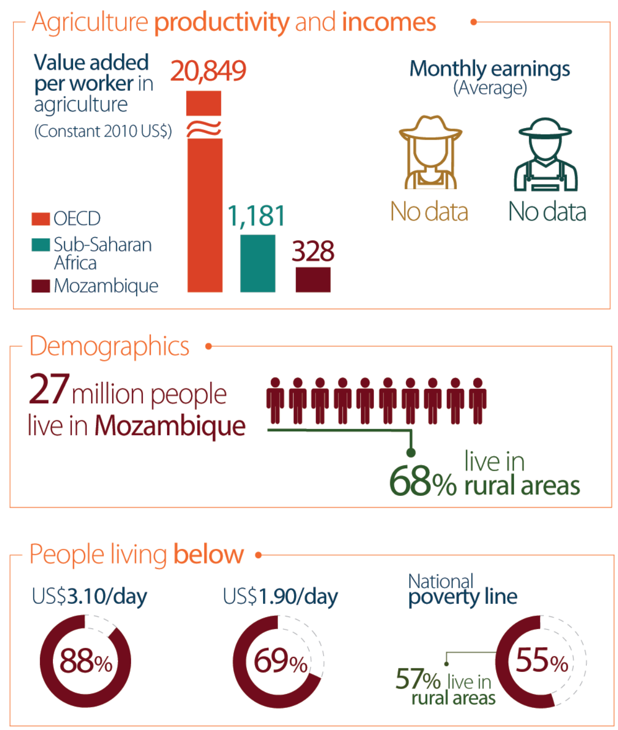
The low Human Development Index (HDI) (0.481), places Mozambique among the countries with the most unfavourable conditions for human well-being and prosperity (rank 181 out of 181 countries). The central, and to a lesser extent the northern parts of the country (Zambezia, Nampula and Sofala provinces), have experienced higher poverty rates compared to the southern parts. Marginal reductions in poverty levels, which have been inconsistent with the country's economic growth, are indicative of insufficient policies aimed at more inclusive, evenly distributed growth. Key factors include small farm sizes, low productivity, high post-harvest losses, limited investment and marginal growth in the agriculture sector. Lack of economic diversification, high reliance on extractive industries, dependence on imports and a small skilled labour force are also factors contributing to high poverty levels.

Economic relevance of agriculture in Mozambique [3, 4]



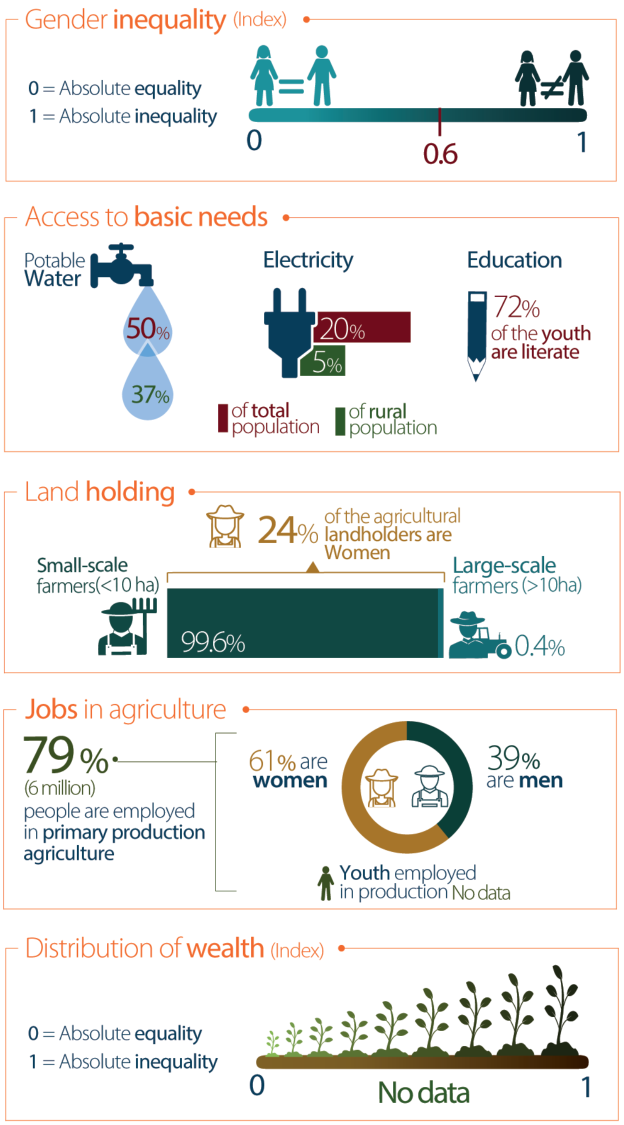
*Sub-Saharan Africa: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Brazzaville), Congo (Democratic Republic), Côte d'Ivoire, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Réunion, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Western Sahara, Zambia, Zimbabwe

People, agriculture and livelihoods in Mozambique [3]



1 Economic growth has averaged 7.9% per year between 1993 and 2014.

2 Studies show that between 1997 and 2009, for every percentage point of economic growth, poverty fell by only 0.26 percentage points, roughly half of what is observed in other sub-Saharan Africa countries [6]



Land use

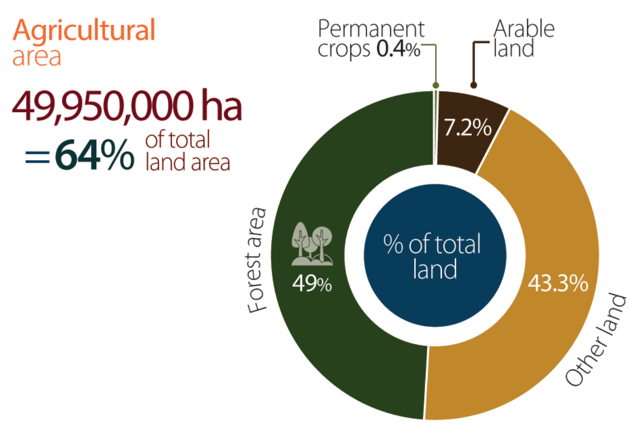
Mozambique has a total land area of 799,380 km^2, with a 2,470-km shoreline on the Indian Ocean. The country is endowed with a large natural resource base, with approximately 50 million hectares available for agricultural production. Analyses indicate that 220,000 hectares of Mozambique's natural forests are lost annually [7], with deforestation being largely driven by reliance on fuelwood for domestic energy[3], as well as expansion of land for agriculture.

The country's agricultural potential is estimated at 62% of the total land area, yet only 7% of the land area is currently cultivated [5]. Of the 3 million hectares of land with potential for irrigated agriculture, only 118,000 hectares of land were equipped for irrigation in 2015 and just 62,000 ha (52%) of this were being utilized for irrigated agriculture [7][4]. Rice, maize and cassava represent the crops with the largest share of cultivated land, while livestock rearing is practiced on 55% of the total agricultural land area.

The country has a high potential to increase productivity and land under production, particularly in the Manica, Sofala and Tete provinces and in the large river basins of the Limpopo (south), Zambezi (centre) and Lurio (northern) Rivers, where irrigation potential is high and largely underexploited.

Notwithstanding the abundance of underutilized land, sustainable land management is challenged by population growth and pressure on natural resources, reliance on foreign investments, complex processes for formal land use rights acquisition, erosion, and deforestation. Climate-smart agriculture (CSA) investments which specifically target the sustainable management of the natural resource base present an opportunity to improve land productivity, production efficiency and resilience of the agricultural system while contributing to national food security.

Land use in Mozambique [4,7]



Agricultural production systems

Mozambique is categorized into ten agro-ecological zones (AEZs) and 26 livelihood zones [8]. A warm, rainy season occurs from October to April, while a cool, dry season follows between May and September. There are also two distinct climate regimes: the tropical and sub-tropical climate in the Central and Northern regions; and the arid and semi-arid climate in the southern region. Mean annual rainfall ranges between 600 and 1,000 mm along the coast, 1,000-1,200 mm in the central regions, and 1,000-2,000 mm in the northern regions.

Agriculture is mainly rain-fed and small-scale, with average farm size estimated at 1.2 hectares (ha) [9]. Roughly 72% of the farmers in the country work on farms that do not exceed 2 ha, using limited amounts of purchased inputs and practicing slash-and-burn extensively. Small-scale farms are concentrated in the province of Zambezia in the central region, which also has the largest land area under agriculture (approximately 1 million ha). A small minority of

3 Access to clean energy was estimated at 4.4% in 2014.

4 Other governmental sources claim that 181,000 ha are equipped for irrigation, 90,000 ha (50%) of which are currently under irrigation.

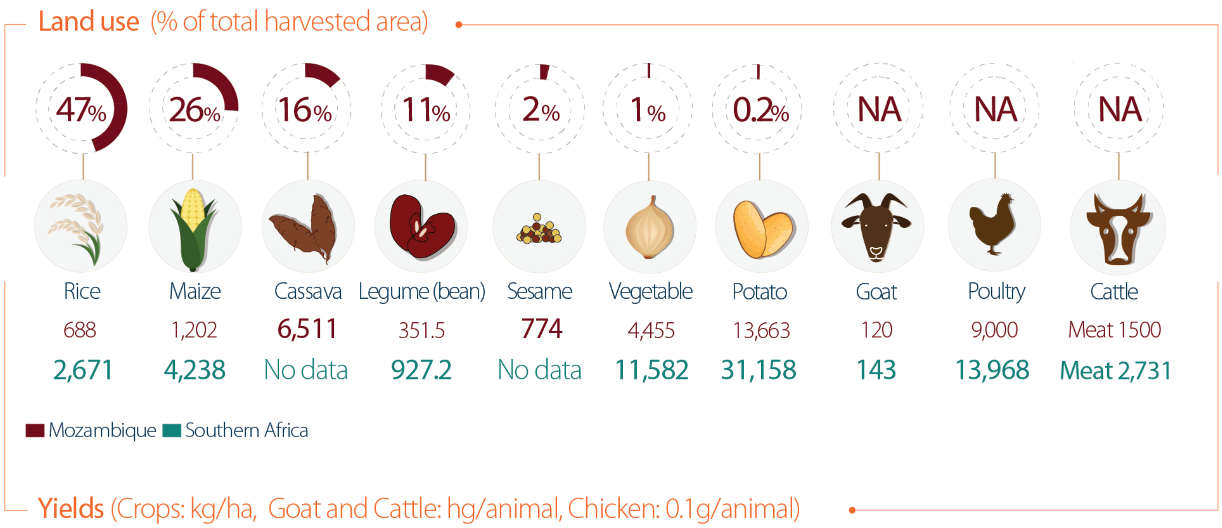
farmers (0.4%) cultivate big plots of land (more than 10 ha); mainly in the southern region (Maputo province).

Between 3 and 5% of the country's land holdings are registered [10] and only 3% of farmers have title deeds [11] According to Mozambique's land law, all land belongs to the state.

The major food crops produced in Mozambique include rice, maize, sorghum, and cassava; these crops cover over a third of the total cultivated land area. Maize production is most common in Tete province, while cassava is mostly grown in Nampula province. Irrigated farming is largely carried out along the river valleys in the Southern region.

Mozambique has some of the lowest cereal yields in southern Africa, barely reaching a third of their potential [12, 13, 14]. Low agricultural productivity and growth is linked with small farm size and limited investment in infrastructure and technologies for production efficiency, among others.

Production Systems Key for Food Security in Mozambique



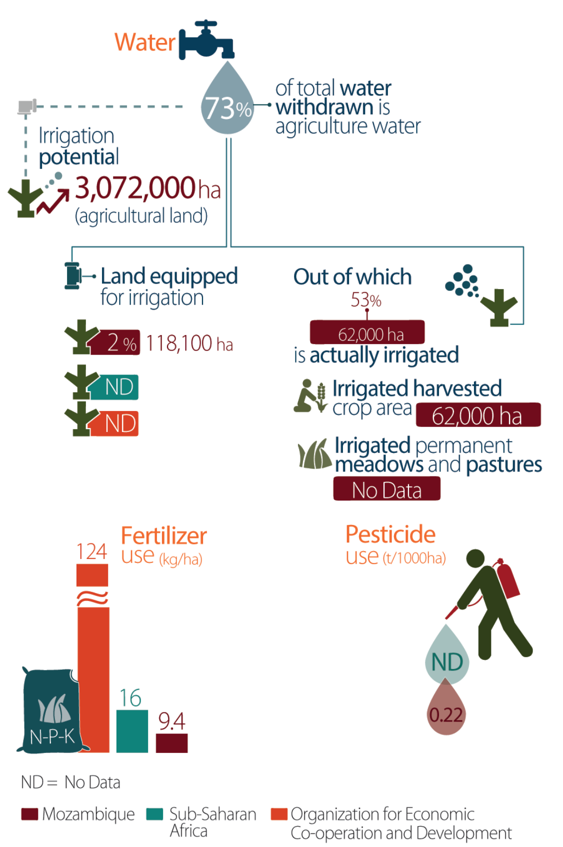
The major cash crops include sugarcane (grown especially in the Maputo province), tobacco, and cotton, mostly cultivated and processed by large multinational or state companies. Sugarcane productivity has increased remarkably over the past two decades, due to improvements in production practices and intensive government promotion of the crop.

Livestock production is also small scale and plays an important role in their livelihoods, food security and nutrition. The most common livestock types include cattle and goats, reared largely in Tete and Gaza provinces. Approximately 2.3 million households raise poultry. In the northern parts of the country, livestock production is challenged by animal disease incidence, such as African Animal Tripanosomiasis (AAT), which causes anaemia, weight loss, emaciation and sometimes death of cattle.

The fisheries sub-sector plays a crucial role in Mozambique's economy, supporting the livelihoods of about 380,000 small-scale, artisanal fishers. Only 2-3% of the 39,550 boats (39,550) owned by artisanal fishermen are motorized [15].

The following infographic shows a selection of agricultural production systems considered key for food security in Mozambique. The selection is based on the production system's contribution to economic, productivity and nutrition quality indicators and are aligned with the strategic crops proposed in the Strategic Plan for the Development of the Agriculture. For more information on the methodology for the production system selection, consult Annex 1.

Agriculture input use in Mozambique [4]

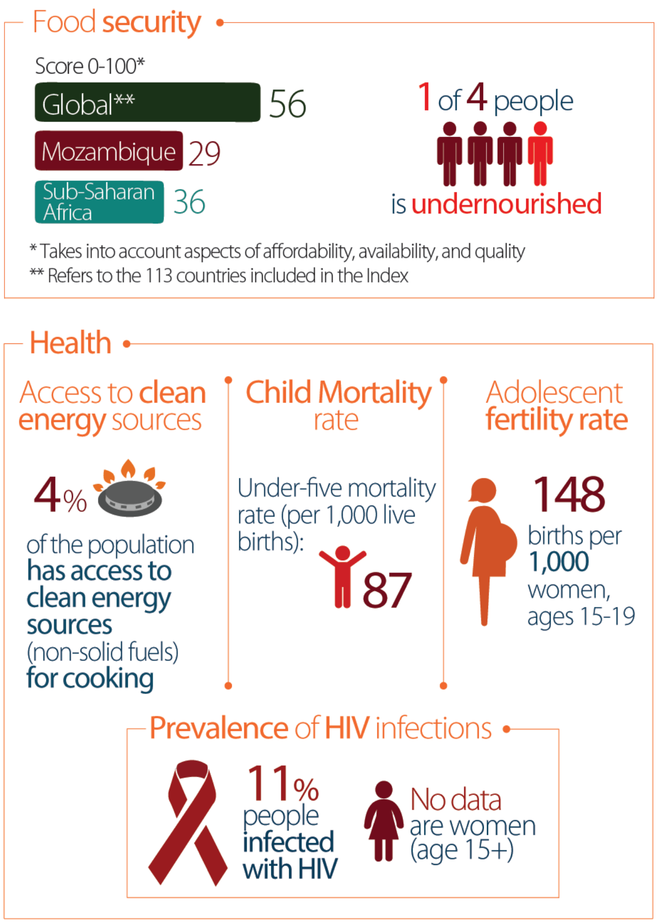


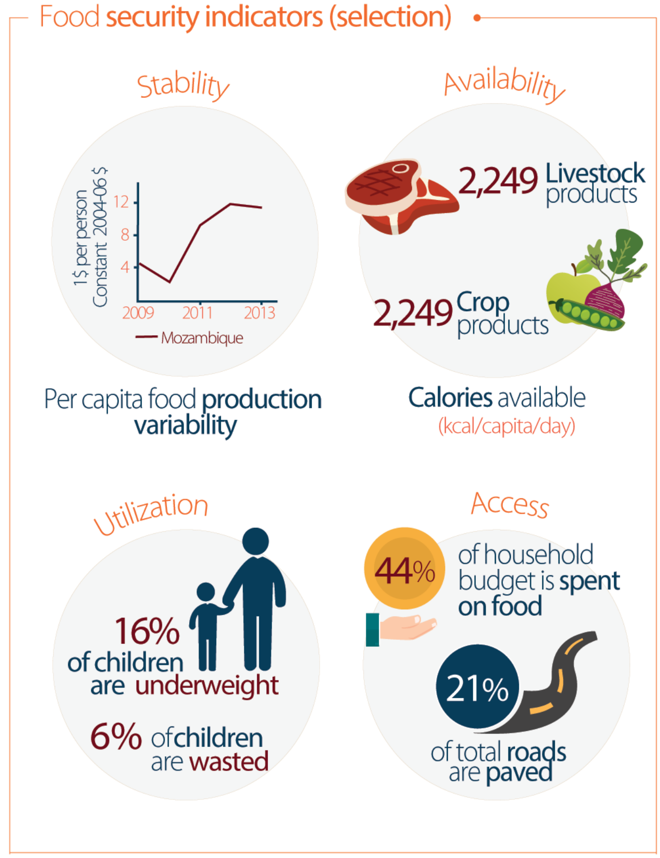
Food security and nutrition

Mozambique was one of seven to achieve the MDG 1c target of halving the proportion of people suffering from hunger and undernourishment by 2015 [17]. The prevalence of undernourishment declined from 56% in 1990/92 to 24% in 2014/16 [4].

However, the Global Food Security Index places the country at the lower end of the rank (108 out of 113 countries), with particularly low scores on food quality, safety, and affordability [16]. In 2011, stunting and underweight incidence among children below 5 years of age was estimated at 6% and 16% respectively [4]. High levels of rural poverty, low household purchasing power, limited access to markets, high post-harvest losses and weather-related hazards (droughts and cyclone-induced floods) continue to put significant pressure on food and nutrition security and of the population.
Access to clean energy for cooking is limited to only 4.4% of the population. Despite the associated health and environmental impacts, 78% of households use wood fuel as a main energy source, with average consumption estimated at 70 kilograms per week [18].

Food security, nutrition and health in Mozambique[3, 4, 19]



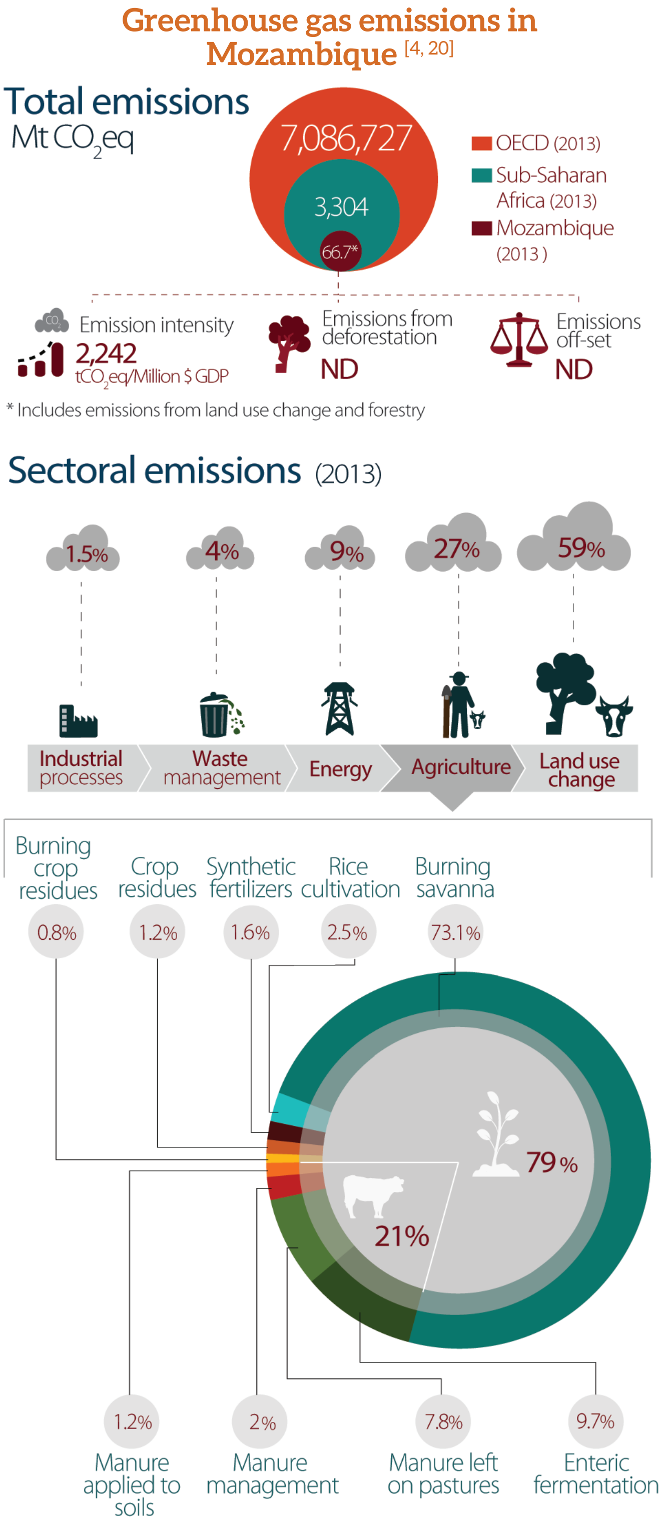


Agricultural greenhouse gas emissions

Mozambique's greenhouse gas emissions are estimated at 66.72 megatons of CO2 equivalent (MtCO2e) including emissions from land use change and forestry (LUCF) sector. This translates to per capita emissions of 2.5 tons CO2e. The LUCF contributes more than a half (59%, the equivalent of 39.26 tCO2e) to the country's total GHG emissions [20]. The agriculture sector is the second greatest contributor (27%), mainly through savannah burning for crop production and enteric fermentation and manure left on pastures for livestock rearing [4].

Mozambique's Intended Nationally Determined Contributions (INDC) acknowledges the forestry sector and associated REDD+ investments as key areas of intervention for achieving the country's GHG emissions reduction targets of about 76,5 MtCO2eq between 2020 and 2030 [21][5]. Agriculture, on the other hand, is mentioned only

5 More precisely, Mozambique's emissions reduction targets amount to 23,0 MtCO2eq by 2024 and 53,4 MtCO2eq from 2025 to 2030.



as a potential pathway for investment, yet no mitigation options for the sector were identified. This is despite research showing that practices to reduce agricultural emissions would likely facilitate equitable agricultural economic growth and livelihoods in the country through for example, improved agricultural yields and returns from practices such as agroforestry and conservation agriculture [22]. There is thus a need for the country to identify feasible mitigation options in agriculture that minimise the trade-offs between productivity, resilience and mitigation. Sustainable intensification of production, on farm tree planting, fire management, and improved pasture management could represent potential avenues for reducing agricultural GHG emissions. Addressing the root causes of deforestation, such as low access to clean energy sources and expansion of land for agriculture, will also play a key role in the country's mitigation efforts.

Challenges for the agricultural sector

While efforts to transform the agriculture sector and attract foreign direct investment are ongoing, agriculture in Mozambique is still dominated by poor, small-scale farmers producing mostly for subsistence. The majority of these farmers lack access to productive assets, agricultural finance, new technologies and markets, which could help them improve productivity and incomes.

Limited mechanization and the use of traditional tools for agriculture also hinder production and productivity. The majority of farmers still use hand hoes or ox-drawn implements in their daily farm activities.

Utilization of fertilizer, pesticides, improved varieties and other purchased inputs is low[6], mainly owing to the high costs and low availability of inputs on local markets, as well as to lack of knowledge on their use and benefits. Fertilizer, pesticide use, and irrigation are concentrated in the central and south regions [23]. Almost 90% of the fertilizer is used for sugarcane production [12].

Another major challenge is the underutilization of available irrigation infrastructure as well as of the irrigable land (estimated at 3 million ha). Irrigation infrastructure is mainly used by foreign commercial sugarcane and other export cash crop farms. As a result, 80% of the country's agriculture is rain fed and vulnerable to weather and climate related hazards.

Well-developed input and output markets are lacking, mostly owing to the poor road network. Around 20% (the equivalent of 6000 kilometres) of the country's national roads are paved [24]. The poor roads hinder market access and increase agricultural transport costs.

Moreover, annual agricultural surveys have shown that not more than 15% of farmers were estimated to have accessed formal extension services annually between 2000 and 2008 with only 8.6% accessing these services in 2009/10 [25]. There are currently 2,875 public and private extension workers in the country, far below the optimal number for the provision of effective extension services. This impairs farmers' access to technical advisory on new technologies and practices implementation, which could otherwise significantly improve productivity.

Agricultural credit service access is low, particularly in rural farming communities, hindering investments in

6 Fertilizer use in Mozambique is estimated at 9.4 kg/ha, while the average for Sub-Saharan Africa is at 15.7 kg/ha [3].

new technologies or the maintenance of capital-intensive practices.

Arguably, the greatest challenge to the agriculture sector is the country's exposure, vulnerability, and susceptibility to highly variable weather, as well as climate-related hazards, particularly droughts and cyclone-induced floods.

Agriculture and climate change

Mozambique is among the most vulnerable and least prepared countries with regard to natural disasters, ranking 153 out of 178 nations on the Global Adaptation Index (ND-GAIN), with a score of 38.6[7] [26]. The country's vulnerability is driven by an array of biophysical, climatic, and socio-economic factors.

Over the period 1996-2015, climatic hazards such as droughts, floods, and cyclones generated economic losses of approximately US$ 790 million. Mozambique's coastline, which extends over 2,700 km and where half of the country's population live, is affected by tropical cyclones which occur at varying intensity at least once a year. In 2000, Cyclone Eline brought about record levels of precipitation, resulting in floods which, cost the economy an estimated 20% of the GDP. A 2009 estimate of drought and flood costs, indicated average annual losses of maize and sorghum of 9% and 7% respectively [28].

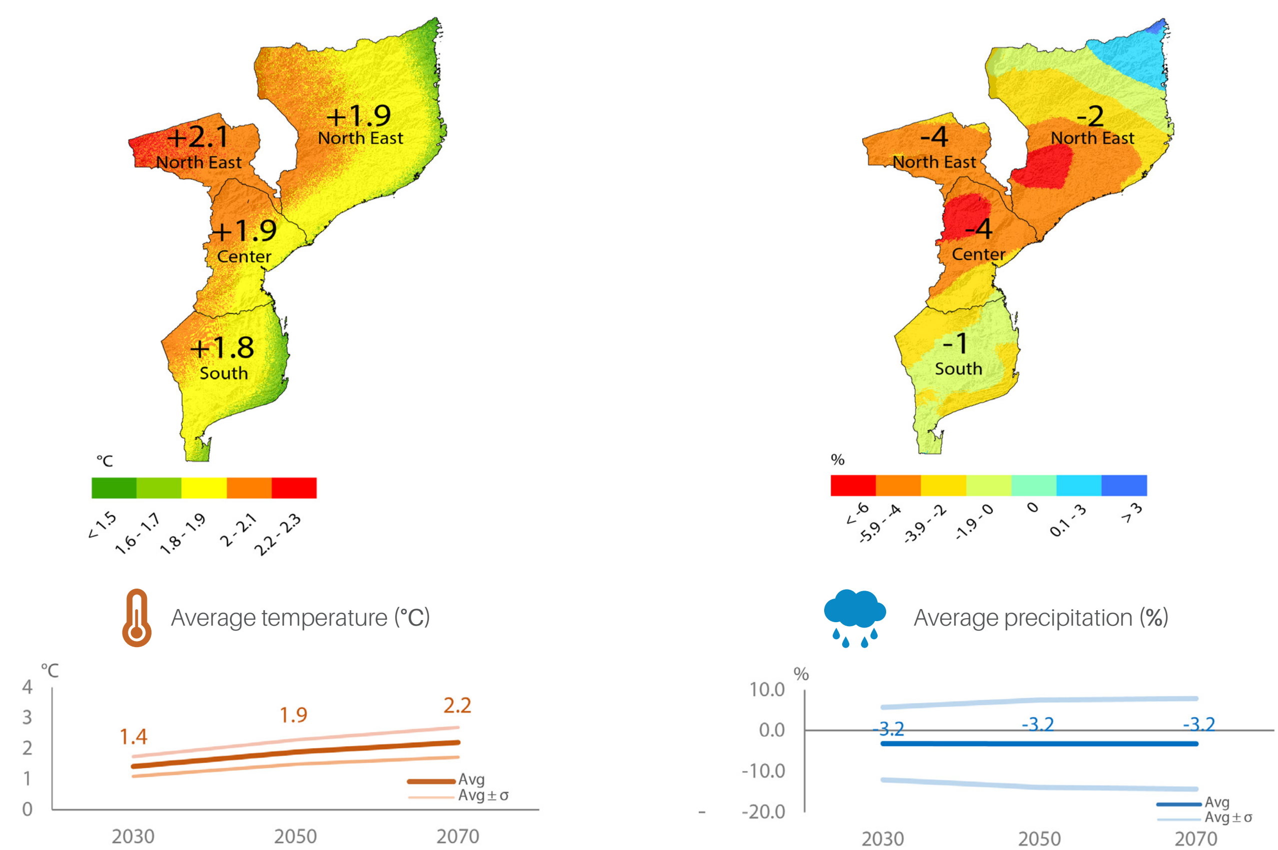
Changes in weather and climate are also visible in the form of sea level rise (inundation), increased incidence of wildfires, increases in mean annual temperature, increase in number of hot days, upsurge of crop and livestock pests and diseases, decreases in rainfall amounts, and shifts in seasons.

Climate projections for the country indicate an expected change in mean annual temperature by up to +1.4°C by 2030 and by +2.2°C by 2070, with the Northeast experiencing the highest increase. The greatest increases in temperatures are expected to occur between December and May. Total precipitation is not likely to decrease significantly, ranging from a 4% reduction in the north-eastern parts of the country to just 1% in the southern parts. However, negative impacts of climate change on agriculture will primarily be caused by the increased likelihood of extreme events such as cyclones and flooding [29].

Projected change in Temperature and Precipitation in Mozambique by 2050 [31, 32, 33]

Changes in annual mean temperature (°C)

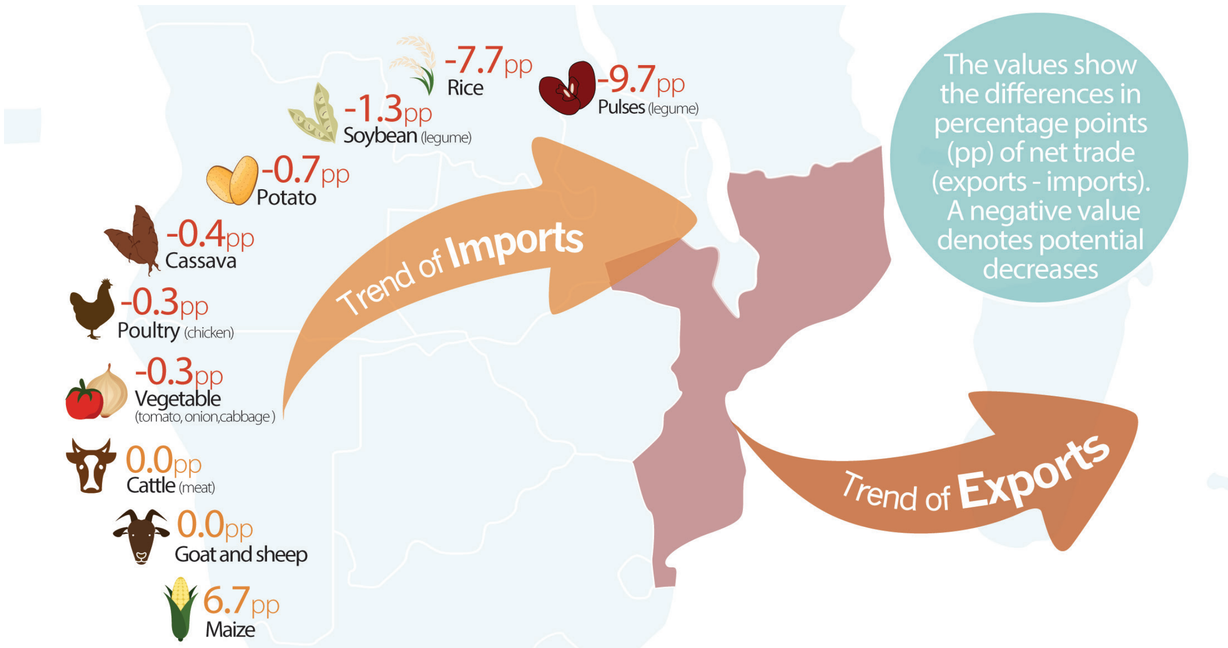
Changes in total precipitation (%)



7 ND-GAIN ranks 178 countries based on their vulnerability to droughts and other natural disasters (compiling indicators of exposure, sensitivity and adaptive capacity, each scored equally) and their economic, governance and social readiness to implement adaptation solutions (readiness indicators are weighted) [27].

Potential economic impacts of climate change

The impact of climate change on net trade in Mozambique (2020-2050) [33]



The International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) [33] enables the assessment of future changes in net trade, crop area (or livestock numbers) and yields under scenarios with and without climate change[8]. By and large, analyses show that maize, wheat, cattle, and poultry are the production systems likely to experience the most negative effects of climate change.

Independent of climate change, results indicate that by 2050, the country may become more dependent on imports of all major agricultural commodities. However, maize is likely to be particularly affected by climate change with net imports by 2050 expected to be 6.7 percentage points (pp) more under the scenario with climate change as compared to the scenario without climate change. The imports of rice and pulses, on the other hand, are projected to be 7.7 pp and 9.7 pp less under climate change than under the scenario without climate change.

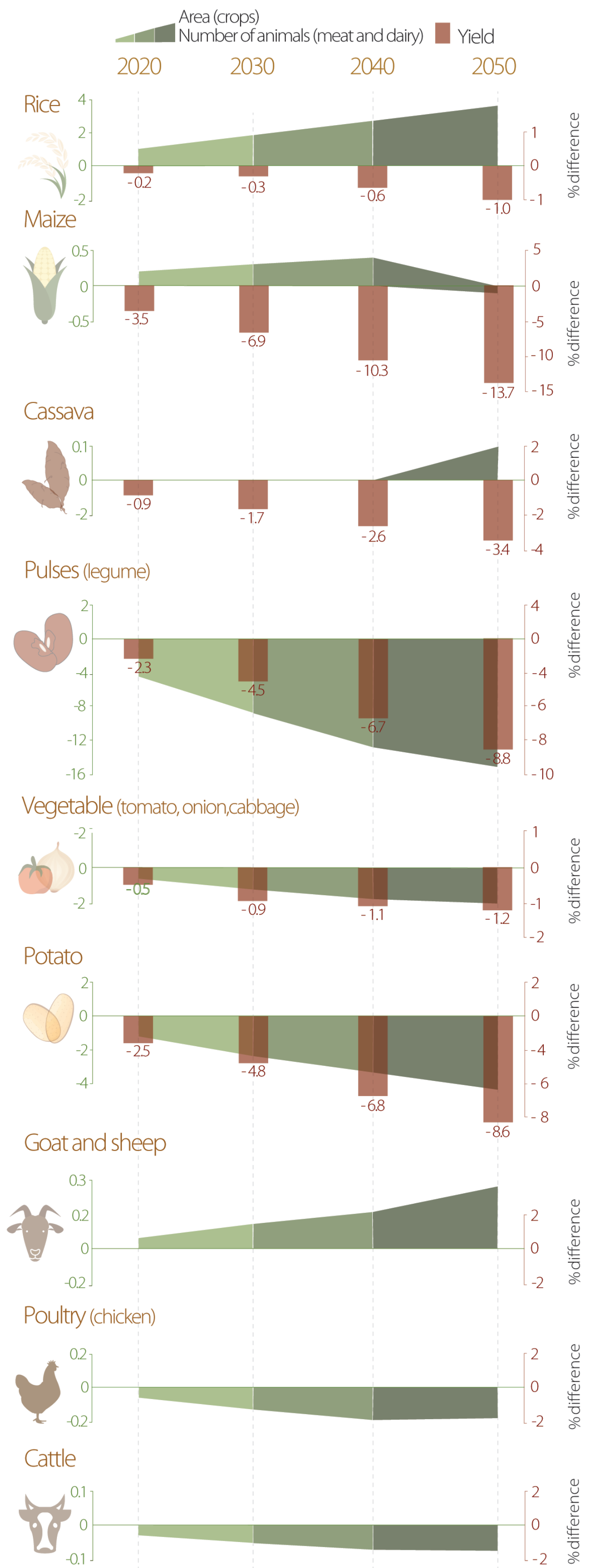
In terms of area under cultivation by 2050, most crops are expected to see increases; potato, however, is expected to have an overall reduction in area under cultivation by 2050. The analysis indicates that the area under rice production is expected to be 3.6 pp higher under the climate change scenario as compared to the no climate change scenario while there is little difference expected in the area under cassava cultivation in both scenarios. The most significant impact of climate change on the cultivated area of analysed crops is projected to be on legumes, which are estimated to cover up to 16 pp less area under the climate change scenario than under the scenario without climate change. The area under maize and vegetables is expected to be only lightly less under the climate change scenario than under the scenario without climate change.

In terms of livestock, cattle and poultry numbers are expected to be less under climate change compared to the scenario without climate change. On the other hand, goat and sheep numbers are expected to be higher under the climate change scenario compared to the scenario without climate change.

With time, all crops analysed, with the exception of cassava and potato, are predicted to experience increases in yields. However, these are likely to be less pronounced under a climate change scenario. The yields for maize, potato, rice and vegetables are expected to be 13.7 pp, 8.6 pp, 1 pp and 1.2 pp, respectively, lower under the climate change scenario than under the scenario without climate change. This is consistent with findings of similar studies which identified Mozambique as one of the countries likely to experience the largest reduction of maize yields as a result of climate change [34].

8 The IMPACT Model was parameterized by the second Shared Socioeconomic Pathway (SSP2), a conservative scenario that is typically considered "business-as-usual" [33].

Climate change impacts on yield, crop area and livestock numbers in Mozambique [33]



*A negative value denotes potential decreases in area and yield expressed as percentage change in a climate change scenario vs. non climate change

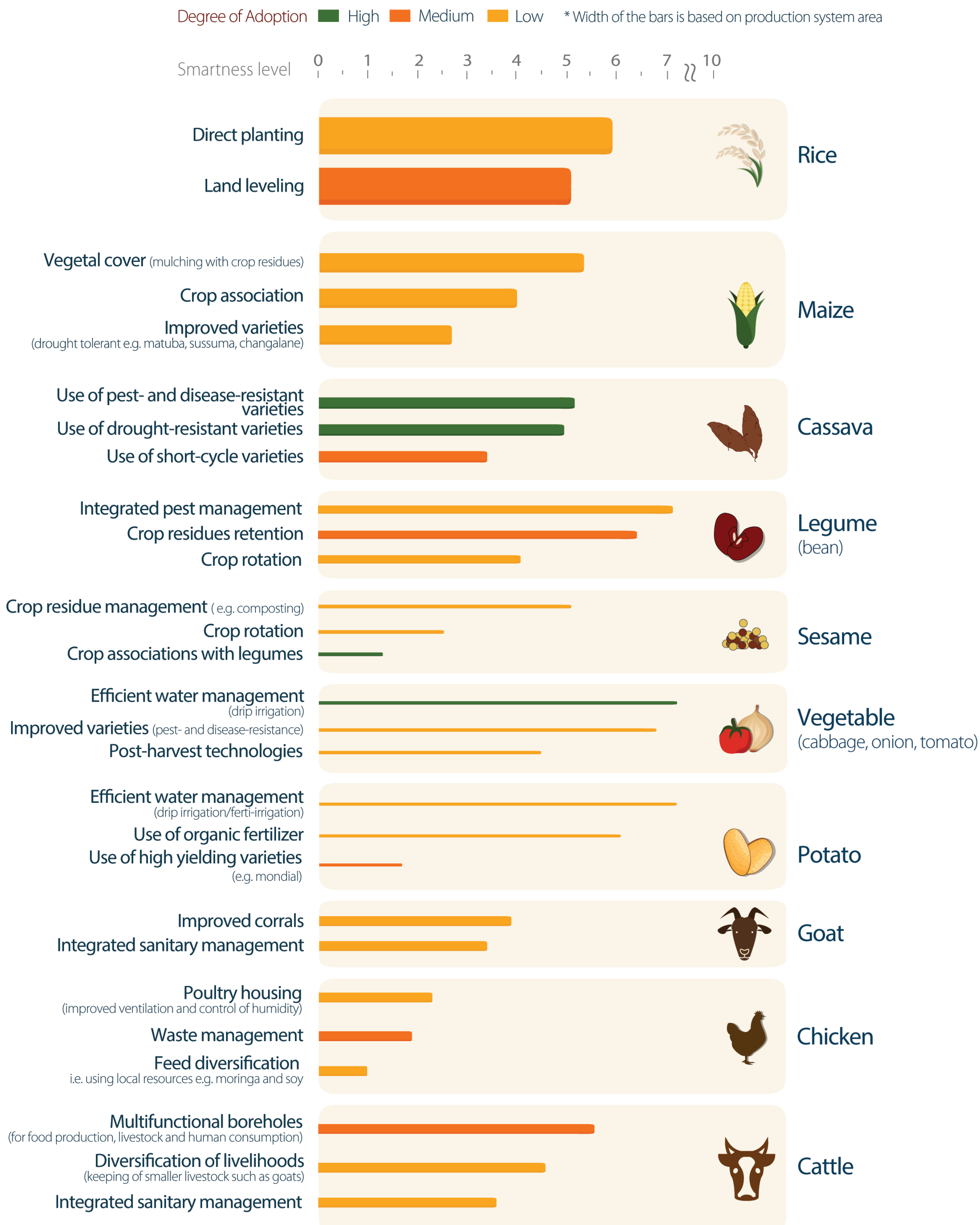
CSA technologies and practices

CSA technologies and practices present opportunities for addressing climate change challenges, as well as for economic growth and development of the agriculture sector. For this profile, practices are considered CSA if they enhance food security as well as at least one of the other objectives of CSA (adaptation and/or mitigation). Hundreds of technologies and approaches around the world fall under the heading of CSA. Mozambique's National Adaptation Programme of Action (NAPA) laid a foundation for prioritization of options to bolster farmers' resilience to climate change [35] and identified key adaptation areas related to agriculture, water resources management and land use [36]. Since then, a number of CSA-related initiatives led by governmental and non-governmental actors have been implemented, including conservation farming, agroforestry, organic farming, sustainable soil fertility management, and integrated pest management (IPM) [37]. Crop residue management, mulching, composting, and rotations are some of the key climate-smart practices that are being adopted across several production systems in Mozambique. Crop residue and IPM are particularly important in legume, potato and vegetable production. The use of short season varieties and small grained crops such as sorghum have also emerged as key adaptation strategies for farmers. The country's vulnerability to drought and the underdeveloped irrigation potential has led to the uptake of many water harvesting and management related CSA practices, especially for potato and vegetables cultivation. Some of the key CSA practices for livestock identified are water harvesting, diversification of livestock breeds and species, and supplementary feeding. Given their adaptability to drought conditions, small livestock such as goats are increasingly kept by farmers as a resilience measure. Most of the CSA practices identified in this study are implemented on small-scale farms, with little guidance and using rudimentary tools. Results from a 2014 survey revealed that 52% of the respondents (small-scale farmers) were not adopting CSA practices due to lack of knowledge and lack of financial capacity to invest in on-field interventions [38].

There is also limited quantified evidence on the impact of the various practices on the CSA pillars, which makes investment prioritization and implementation even more difficult. Improved information on the different impacts, costs, and benefits of CSA practices, through field trials and monitoring systems, can help build the evidence base for strengthening the appropriateness of different agricultural adaptation and mitigation options in different regions of the country.

A practice can have a negative, positive or zero impact on a selected CSA indicator, with ±10 indicating a 100% change (positive/ negative) and 0 indicating no change. Practices in the graphics have been selected for each production system key for food security identified in the study. A detailed explanation of the methodology can be found in Annex 2.

Selected CSA practices and technologies for production systems key for food security in Mozambique



Case study: Climate-smart livelihoods diversification

Chicualacuala District in Gaza Province of southwest Mozambique (Limpopo Basin) is one of the driest and most isolated parts of the country and is highly prone to droughts and floods. The district is relatively flat and low-lying and receives between 500 and 600 mm of rainfall per year. Over the past years, the district has experienced erratic rainfall and prolonged dry spells, which have greatly affected the food security and incomes of the largely agriculture-dependent households. Water scarcity for humans and livestock has become a constant occurrence. Limited options for alternative income sources exacerbates households' high vulnerability to climate hazards.

The Joint Programme on Environmental Mainstreaming and Adaptation to Climate Change[9] for Mozambique (2008-2011) sought to increase farmers' climate resilience and improve food and nutrition security in the region. The programme used an integrated approach to crops, livestock, water, forests, and fisheries management, with a focus on diversification of farmer livelihoods. The programme supported 4 farmers' associations (with a total of more than 175 members) and individual farmers located in drier parts of the district.

The initiative consisted of various activities, including: the establishment of boreholes and solar-powered water pumping infrastructure to support livestock watering and vegetable production, farmers trainings on value addition, agro processing, as well as the establishment and management of on-field soil and water conservation structures and community water management committees. Livestock farmers benefited from trainings on grazing management, supplementary animal feeding, improved animal housing, and use of manure in crop production. The initiative also facilitated the elaboration of a community-based forestry management plan to support the management of 47,000 ha of forest land, which also allowed for the integration of apiculture as an additional income source. Agroforestry was intensively promoted and tree seedling nurseries established to facilitate access to appropriate tree species. In addition, the Programme contributed to the creation of ponds for aquaculture.

An independent evaluation of the Programme indicated that "the combination of irrigation, crop diversification and use of agricultural inputs immediately show results", but practices related to use of manure and integration of forestry still had low adoption rates [39]. Households indicated that as a result of the programme, they were more food secure than before and had increased their incomes (particularly for beekeepers). Other aspects of the programme had mixed success. For instance, beekeeping is highly dependent on access to water and good management of the hives, and it thus turned out to be less successful in drier parts of the district.

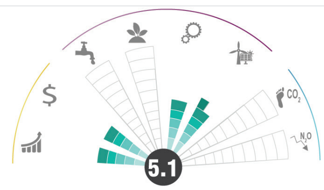
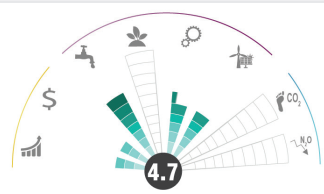
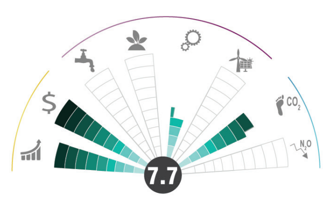
No quantification of the activities' contribution to mitigation has been conducted; however, it is expected that the forest management plan, in addition to the grazing management, manure utilization, and livestock feeding components, contribute to a reduction in GHG emissions in the farming system. The experience in Chicualacuala District also demonstrates the value of a landscape approach to CSA, which, unlike individual practices, can seize synergies across sectors and address challenges that go beyond climate threats, to food security and poverty alleviation.

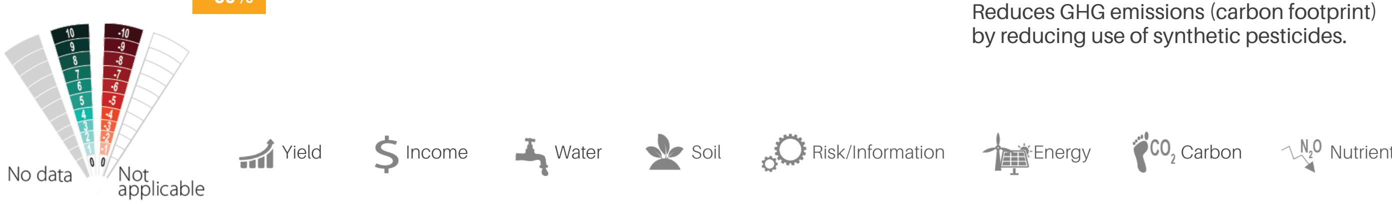
For more information on the programme, please visit the MDG Country Fact Sheet for Mozambique [40]

9 This was an initiative financed by The MDG Fund and implemented jointly by various UN agencies, Save the Children Fund (SCF), the International Union for Conservation of Nature (IUCN), the Mozambican Ministry of Agriculture and Food Security (MASA), the Ministry of Energy, the National Institute of Disaster Management, the Ministry of Energy and Mozambique Institute for Agricultural Research (IIAM), among others.

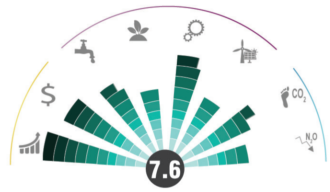
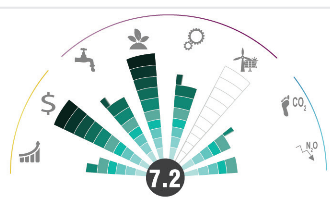
Table 1. Detailed smartness assessment for top ongoing CSA practices by production system as implemented in Bangladesh.

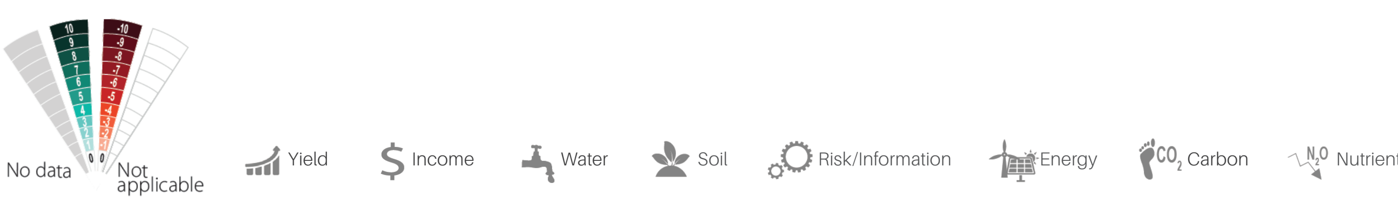
CSA practice	Region and adoption rate (%) <30 30-60 60>	Predominant farm scale S: small scale M: medium scale L: large scale	Climate smartness	Impact on CSA Pillars
Rice (47% of total harvested area)				
Direct planting	Chokwe <30%	S		**Productivity** Increases yield by maintaining optimum conditions for plant development. It is faster and is less labour-intensive than transplanting. Increased land and crop unit of water **Adaptation** Optimizes the use of available soil moisture contributing to avoid crop loss. Increases water use efficiency. **Mitigation** Reduces methane emissions due to a shorter flooding period, and decreased soil disturbance compared to transplanting.
	Zambezia <30%	S		
Land leveling	Chokwe <30%	S, M		**Productivity** Increases the yield per unit area. Reduces time and input use, hence reducing production costs. **Adaptation** Enhances water use efficiency. Allow uniform germination and facilitates irrigation process. Can be combined with alternate wetting and Drying (AWD) method. **Mitigation** Provides moderate reduction GHG emissions per unit of food produced. Increases nutrient use efficiency reducing fertilizer applications.
	Zambezia <30%	S, M		
Maize (26% of total harvested area)				
Vegetal cover (mulching with crop residues)	Central zone <30%	S		**Productivity** Organic inputs can enhance long-term productivity and reduce production costs. **Adaptation** Promotes soil and water conservation. Increases soil health upon decomposition of organic matter and improves soil structure/aeration. Prevents erosion. **Mitigation** Increases carbon storage in soils. Reduces use of synthetic fertilizers and related GHG emissions.
	Southern zone <30%	S		
Crop association	Central zone <30%	S, M		**Productivity** Increases total production and productivity per unit of land. Harvests of multiple crops increase income and food security. **Adaptation** Reduces the risk of total crop failure during unfavourable climatic conditions, due to a diversified production system. **Mitigation** Improves soil structure, increases above-ground biomass and when leguminous species are used reduces nitrogen-based fertilizers and related GHG emissions.

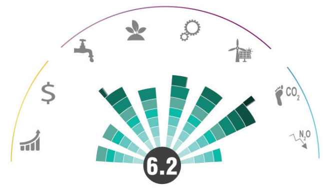
CSA practice	Region and adoption rate (%) <30 30-60 60>	Predominant farm scale S: small scale M: medium scale L: large scale	Climate smartness	Impact on CSA Pillars
Maize (26% of total harvested area)				
Crop association	Southern zone <30%	S M		**Productivity** Increases total production and productivity per unit of land. Harvests of multiple crops increase income and food security. **Adaptation** Reduces the risk of total crop failure during unfavourable climatic conditions, due to a diversified production system. **Mitigation** Improves soil structure, increases above-ground biomass and when leguminous species are used reduces nitrogen-based fertilizers and related GHG emissions.
Cassava (16% of total harvested area)				
Use of pest- and disease-resistant varieties	Nampala 60%>	S M		**Productivity** Promotes crop productivity and quality, hence potential increases in income. **Adaptation** Reduces crop losses even during moisture stress conditions. Promotes biodiversity conservation. **Mitigation** Reduces GHG emissions (carbon footprint) by reducing use of synthetic pesticides.
	Inhambane 30-60%	S		
Use of drought-resistant varieties	Nampala 30-60%	S		**Productivity** IIncreases the yield per unit area, especially during dry periods, hence income for the farmers. **Adaptation** Enhances water use efficiency. Increases resilience to moisture stress and other climate shocks. **Mitigation** Provides moderate reduction GHG emissions per unit of food produced.
	Inhambane 60%>	S		
Legumes (11% of total harvested area)t				
Integrated pest management	Central zone (Manica, Tete, Sofala, Zambezi); (Northern zone (Niassa) Southern zone (Gaza) <30%	M		**Productivity** Promotes crop productivity and quality. Reduces production costs, hence potential increases in income. **Adaptation** Reduces crop losses even during abiotic-stress conditions. Promotes biodiversity conservation. **Mitigation** Reduces GHG emissions (carbon footprint) by reducing use of synthetic pesticides.

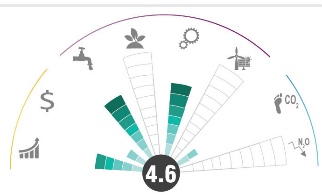


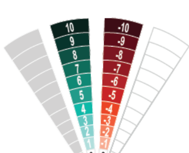
CSA practice	Region and adoption rate (%) <30 30-60 60>	Predominant farm scale S: small scale M: medium scale L: large scale	Climate smartness	Impact on CSA Pillars
Legumes (11% of total harvested area)				
Integrated pest management	Southern zone (Maputo, Gaza); Central zone (Sofala, Zambezi) <30%	M		**Productivity** Promotes crop productivity and quality. Reduces production costs, hence potential increases in income. **Adaptation** Reduces crop losses even during abiotic-stress conditions. Promotes biodiversity conservation. **Mitigation** Reduces GHG emissions (carbon footprint) by reducing use of synthetic pesticides.
Crop residues retention	Central zone (Manica, Tete, Sofala, Zambezi); (Northern zone (Niassa) Southern zone (Gaza) 30-60%	M L		**Productivity** Increases productivity as a result of enhanced soil structure, health and fertility **Adaptation** Promotes soil structure conservation. Reduces erosion and enhances in-situ moisture conservation. **Mitigation** Maintains or improves soil carbon stocks and organic matter content. Long-term reduction in nitrogen-based fertilizers.
	Southern zone (Maputo, Gaza); Central zone (Sofala, Zambezi) <30%	M L		
Sesame (2% of total harvested area)				
Crop residue management (e.g. composting)	Northern region <30%	S		**Productivity** Higher profits due to increased yield and reduced production costs. **Adaptation** Improves soil health by increasing organic matter content and biological activities. Increases possibility of farming in degraded soils. **Mitigation** Promotes reduction requirement of synthetic Nitrogen-based fertilizers, hence reduce nitrous oxide emissions. Conserves Soil Organic Matter (SOM).
	Southern region <30%	S		
Crop rotation	Northern region <30%	S		**Productivity** Increases total production and productivity per unit area. Harvests of multiple crops increase income and food security. **Adaptation** Reduces the risk of total crop failure under unfavourable climatic conditions due to crop diversification. Reduces incidence of pests and diseases. **Mitigation** Increases soil organic matter content. Legume integration can reduce the use of synthetic nitrogen-based fertilizers.
	Southern region <30%	S		

CSA practice	Region and adoption rate (%) <30 30-60 60>	Predominant farm scale S: small scale M: medium scale L: large scale	Climate smartness	Impact on CSA Pillars
Vegetables (Cabbage, onion, tomato) (1% of total harvested area)				
Efficient water management (drip irrigation)	Southern zone (Maputo and Gaza); Central zone (Zambezia, Sofala) and Northern Zone 60%>	S		**Productivity** Increases yield and quality of produce. Allows continuous production throughout the year. **Adaptation** Minimizes water use per unit of food produced, increasing water use efficiency. Reduces soil erosion. **Mitigation** Reduces energy required for irrigation, hence reduced GHG emissions related with bumping and transporting of water.
	Khyber Southern zone (Maputo and Gaza); Central zone (Zambezia, Sofala) and Northern Zone 60%>	S		
Improved varieties (pest- and disease-resistance)	Southern zone (Maputo and Gaza); Central zone (Zambezia, Sofala) and Northern Zone <30%	M L		**Productivity** Promotes crop productivity and quality. Reduces production costs, hence potential increases in income. **Adaptation** Reduces crop losses even during abiotic-stress conditions. Promotes biodiversity conservation. **Mitigation** Reduces GHG emissions (carbon footprint) by reducing use of synthetic pesticides.
	Southern zone (Maputo and Gaza); Central zone (Zambezia, Sofala) and Northern Zone <30%	M L		
Potato (0,2% of total harvested area)				
Efficient water management (drip irrigation/ferti-irrigation)	Southern region <30%	M		**Productivity** Increases yield and quality of produce. Allows continuous production throughout the year. **Adaptation** Increases farmers' capacity to limit the crop exposure to climate risks. Minimizes water and nutrient use per unit of output, increasing water and nutrient use efficiency. Reduces soil erosion. **Mitigation** Reduces energy required for irrigation, hence reduced GHG emissions related with bumping and transporting of water.
	Northern region (Niassa); Central region <30%	M		



CSA practice	Region and adoption rate (%) <30 30-60 60>	Predominant farm scale S: small scale M: medium scale L: large scale	Climate smartness	Impact on CSA Pillars
Potato (NA)				
Use of organic fertilizer)	Southern region <30%	S		**Productivity** Increases productivity and income through increased product quality. **Adaptation** Enhances soil health, water retention and soil functions, increasing the system's potential to overcome climate shocks. **Mitigation** Reduces use of synthetic fertilizer, thus reducing related GHG emissions. Contributes to reduced methane emissions upon aerobic composting
	Northern region (Niassa); Central region <30%	S		
Goat (NA)				
Improved corrals	Tete <30%	S		**Productivity** Increases in farmer's income and profit due to greater animal production. **Adaptation** Reduces the risk of diseases transmission. Promotes the use of natural material available. **Mitigation** Provides moderate reduction GHG emissions per unit of output. Facilitates adoption of practices such as manure management, increasing mitigation potential.
	Manica <30%	S		
Integrated sanitary management	Tete <30%	L		**Productivity** Increases animal growth rate (productivity). Reduces mortality rate. **Adaptation** IReduces environmental degradation. Increases biodiversity on the farm as well as in the soil. Reduces transmission of diseases. **Mitigation** Reduces GHG emissions (carbon footprint) by reducing use of synthetic agrochemicals.
	Manica <30%	L		
Poultry (NA)				
Poultry housing (improved ventilation and control of humidity)	Tete, Sofala, Zambezia <30%	S M		**Productivity** Faster growth and higher feed conversion ratio. Reduces costs of production and hence increases farmer profit. **Adaptation** Reduces exposure to adverse climatic conditions, reducing animal's stresses. **Mitigation** Reduces methane emissions, and can be integrated with other practices such waste management and bio-digesters.

CSA practice	Region and adoption rate (%) <30 30-60 60>	Predominant farm scale S: small scale M: medium scale L: large scale	Climate smartness	Impact on CSA Pillars
Poultry (NA)				
Poultry housing (improved ventilation and control of humidity)	Maputo <30%	S M		**Productivity** Faster growth and higher feed conversion ratio. Reduces costs of production and hence increases farmer profit. **Adaptation** Reduces exposure to adverse climatic conditions, reducing animal's stresses. **Mitigation** Reduces methane emissions, and can be integrated with other practices such waste management and bio-digesters.
Cattle (NA)				
Multifunctional boreholes (for food production, livestock and human consumption)	Maputo, Inhambane 30-60%	L		**Productivity** Increases farm productivity, hence increases profit from agriculture. Allows round-year production. **Adaptation** Facilitates diversification of livelihoods. Reduced human-wildlife conflicts. Frees up time for women. **Mitigation** Reduces GHG emissions (carbon footprint) per unit of output. Potential energy savings through the use of solar powered water pumping methods.
	Gaza 30-60%	L		
Diversification of livelihoods (keeping of smaller livestock such as goats)	Maputo, Inhambane <30%	L		**Productivity** Increases total production. Rearing of different livestock species expands the sources of income and food security. **Adaptation** Reduces exposure to adverse climatic conditions. Diversifies the production. . **Mitigation** Provides moderate reduction in GHG emissions per unit of output.
	Gaza <30%	L		



No data Not applicable

Yield Income Water Soil Risk/Information Energy CO_2 Carbon N_2O Nutrient

Institutions and policies for CSA

There are numerous institutions working on CSA-related activities in Mozambique. These include Government, UN agencies, NGOs, private sector and farmer's organisations among others. Their CSA related work includes farmer capacity building through trainings and extension services (especially in the fields of conservation agriculture, agroforestry, water harvesting and irrigation), policy advocacy, and awareness raising.

Government ministries and departments working on CSA topics include line ministries such as the Ministry of Agriculture and Food Security (MASA), the Ministry of Land, Environment and Rural Development (MITADER), Mozambique Agriculture Research Institute (IIAM), Ministry of Economy and Finance (MEF), National Council on Sustainable Development (CONDES), National Metrological Institute (INAM), National Institute of Disaster Management (INGC) and National Institute of Irrigation (INIR)[10] among others. The National Directorate for Monitoring and Evaluation of the Ministry of Economy and Finance - is the country's current Nationally Designated Authority (NDA) to the Green Climate Fund, while the Ministry of Land, Environment and Rural Development (MITADER)[11] are the focal points for the United Nations Framework Convention on Climate Change (UNFCCC) and Global Environment Facility (GEF). MITADER and MASA are the main government ministries responsible for promotion of rural development and agriculture, and both have mainstreamed CSA related investments into their programming, though this is not always branded as CSA.

International research institutions engaged in CSA-related research in Mozambique include the World Agroforestry Centre (ICRAF), the International Centre for Tropical Agriculture (CIAT), International Centre for Insect Physiology and Ecology (ICIPE) and the International Livestock Research Institute (ILRI), among others. Together with the National Directorate of Agricultural Extension (DNEA)[12] and IIAM, ICRAF has been actively promoting agroforestry systems throughout the country, while ICIPE and CIAT have been working extensively on IPM methods and technologies and conservation agriculture. Other research actors include the International Institute for Tropical Agriculture (IITA) and the International Maize and Wheat Improvement Centre (CIMMYT), also supportive of projects on conservation agriculture.

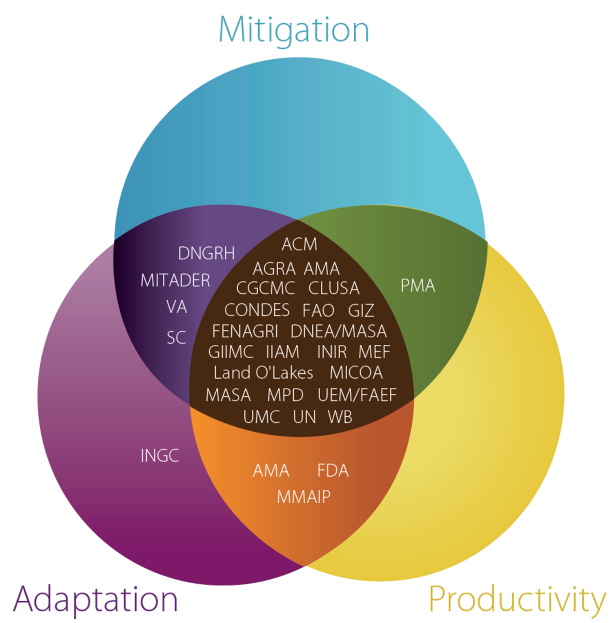
United Nations agencies working on CSA include the Food and Agriculture Organization (FAO), the United Nations Development Programme (UNDP), International Fund for Agriculture Development (IFAD) and the United Nations Environment Programme (UNEP). FAO has specifically promoted CSA, while other UN agencies have been involved in broader agricultural climate change adaptation projects and programmes. UNDP supported the formulation of the National Climate Change Adaptation and Mitigation Strategy (ENAMMC) and the National Climate Change M&E framework.

Other institutions involved in CSA in one way or another include farmers' associations (such as The National Farmers Union – UNAC), universities and NGOs.

CSA-related work in country is rather uncoordinated. Although a Climate Change Unit does exist, the establishment of a national CSA coordination mechanism would be beneficial and would likely enhance the promotion and scaling up of CSA across the country.

The following graphic highlights key institutions whose mandated actions and investments promote — directly or indirectly — one, two or all CSA pillars (productivity,

Institutions for CSA in Mozambique



ACM Academy of Sciences **AGRA** Alliance for a Green Revolution in Africa **AMA** Associacão Mocambicana de Avicultores **AMACD** Environment Association of Cabo Delgado **CGCMC** The Knowledge Management Centre for Climate Change **CLUSA** Cooperative League of the USA **CONDES** National Council for Sustainable Development **DNEA/MASA** National Directorate of Agricultural Extension **DNGRH** National Directorate of Water Resources Management **FAO** Food and Agriculture Organization of the United Nations **FDA** Agricultural Development Fund **FENAGRI** National Federation of Agricultural Associations of Mozambique **GIIMC** Inter-Institutional Group for Climate Change **GIZ** German Federal Enterprise for International Cooperation **IIAM** Mozambique Agricultural Research Institute **INAM** National Meteorology Institute **INGC** National Institute for Disaster Management **INIR** National Institute of Irrigation **MASA** Ministry of Agriculture and Food Security **MEF** Ministry of Economy and Finance **MICOA** Ministry for Coordination of Environmental Affairs **MITADER** Ministry of Land, Environment and Rural Development **MMAIP** The Ministry of Sea, Inland Waters and Fisheries **MPD** The Ministry of Planning and Development **PMA** World Food Program **SC** Save the Children **UEM/FAEF** Eduardo Mondlane University/Faculty of Agronomy and Forestry Engineering **UMC** Climate Change Coordination Unit **UN** United Nations **VA** Green Blue **WB** World Bank

10 Formerly, this role was shared with the Ministry for the Coordination of Environmental Affairs (MICOA) which no longer exists.

11 DNEA is a government directorate within MASA

12 This excludes multi-country projects.

adaptation and mitigation). While most of the organizations surveyed and mentioned above invest in productivity and/or adaptation activities, mitigation is seen as a co-benefit of their interventions, rather than a target as such. A more systematic integration of GHG emissions mitigation efforts into agricultural development programming, including accounting methods and reporting, would help create a framework for more coordinated inter-sectoral work and contribute to the strengthening of information systems essential for CSA scale up.

Mozambique ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1992, signed the Kyoto Protocol in 2005, and has to date submitted one national communication to the UNFCCC. As a Least Developed Country (LDC), Mozambique developed its National Adaptation Programme of Action (NAPA) in 2007 to address urgent and immediate adaptation needs. The programme had a key action on "Strengthening capacities of agricultural producers to cope with climate change" and identified strategic areas of investments such as: increasing adaptive capacity of producers, strengthening early warning systems, promotion of sustainable use of water resources and reduction in soil degradation especially erosion.

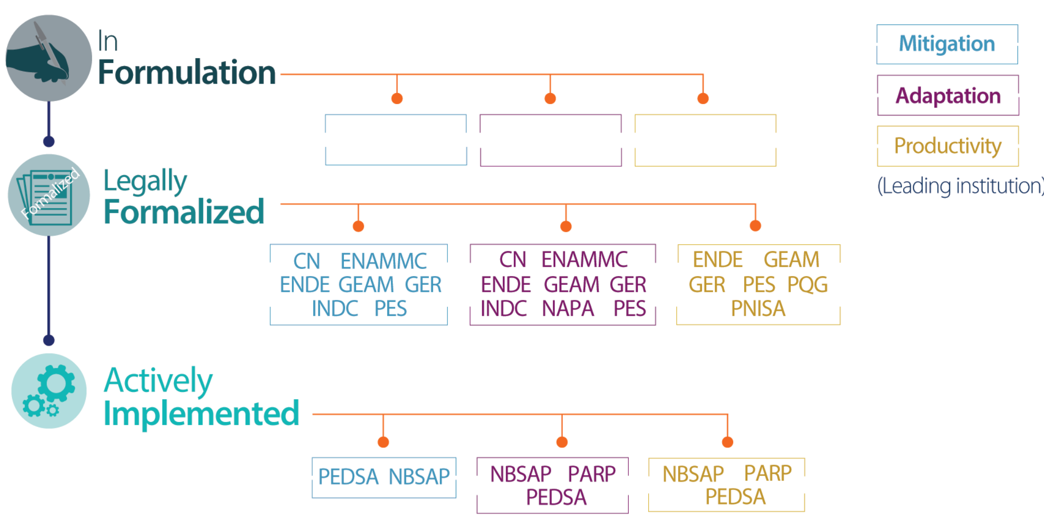
In 2015, Mozambique submitted its Intended Nationally Determined Contribution (INDC), which recognized the contribution of investments in the forestry sector (through REDD+) to climate change mitigation. Agriculture, however, was only identified as a focus area for adaptation actions and only indicated as a "potential" area for climate change mitigation. Mozambique was also among the first countries to sign the Paris Agreement and deposited their instrument of ratification at the Ceremony for the Opening for Signature, on 22 April 2016.

In addition to these policy instruments that represent the backbone of the country's commitments to global climate action, other national policies and strategies relevant for CSA in Mozambique are described below.

Mozambique's Agenda 2025 (2003) was an early attempt to chart the countries' long-term development agenda and emphasized climate related hazards as a key threat to Mozambique's development but did not comprehensively address the means of tackling this threat.

The Strategic Plan for the Development of the Agriculture Sector (PEDSA) aims at improving the competitiveness of the agriculture sector through, among others, improved use and management of natural resources (land, water and forests), and enhanced food security and productivity. Anecdotal evidence indicates that the use of purchased inputs and agricultural productivity in general have improved since the elaboration of the Plan in 2010. The National Agriculture Investment Plan (PNISA) of 2014 was meant to operationalize PEDSA and re-emphasizes the goal of increasing productivity of major food crops, reducing by half the people affected by hunger and reducing malnutrition. One component of the PNISA is on natural resource management, a key entry point for the implementation and scale out of CSA practices.

Policies for CSA in Mozambique



CN National Communications to the UNFCCC (2003) (MICOA) **ENAMMC** National Strategy on Adaptation and Mitigation of Climate Change (2015) (MITADER) **ENDE** National Development Strategy 2015-2035 (2015) (MPD) **GEAM** Green Economy Action Plan (2013) (MPD) **GER** Green Economy Roadmap (2012) (MICOA) **INDC** (Intended) Nationally Determined Contribution (2015) (MITADER) **NAPA** National Adapation Programmes of Action (2007) (MICOA) **NBSAP** National Biodiversity Strategy and Action Plan (2015) (MITADER) **PARP** Poverty Reduction Action Plan (2011) (MPD) **PEDSA** Strategic Plan for the Development of the Agriculture Sector (2011) (MASA) **PES** Economic and Social Plan (2016) (MPD) **PNISA** National Investment Plan for the Agriculture Sector (2014) (MASA) **PQG** Five Year Plan (2015) (MEF)

The National Strategy for Adaptation and Mitigation of Climate Change (NCCAMS) includes targets related to climate change adaptation and mitigation in agriculture, water and forestry management, biodiversity conservation, and social protection. The NCCAMS is planned to serve as the basis for a revised National Adaptation Plan (NAP) that will mainstream adaptation actions across various sectors over the next years (2015-2030).

The National Irrigation Strategy (2011) aimed at doubling the amount of land under irrigation and thus would play an important role in creating an enabling environment for climate-smart practices related to water harvesting and efficient irrigation systems for small-scale farmers.

Mozambique's Comprehensive Africa Agricultural Development Program (CAADP) Compact specifically mentions the need to "promote actions that reduce emission of gases with green house effects and support communities and producers in adoption of mitigation measures and adaptation to climate change". This could be a crucial entry point for large-scale promotion of CSA investments, as the CAADP Compact is an important resource mobilization tool for the country.

Overall, even though policies and strategic plans that specifically target CSA promotion and scale up are lacking, there is a significant body of sectorial (agriculture, environment and forestry) policies that are likely to create a favourable environment and serve as an entry point for CSA related work in the country. However, this requires further inter-sectorial dialogue and institutional and human capacity to support programming and on-farm implementation of CSA interventions, ensuring that synergies are tapped into and efforts are not duplicated.
The graphic shows a selection of policies, strategies and programs that relate to agriculture and climate change topics and are considered key entry points for CSA in the country.

Financing CSA

Financing is critical for incentivizing farmers and communities and private sectors to invest in CSA adoption and scale up. The graphic highlights existing and potential financing opportunities for CSA in Mozambique.

Mozambique is the third largest recipient of climate funds in Sub-Saharan Africa, with approximately US$ 147.3 million approved in 2016 from multilateral recipients for adaptation and mitigation projects[13] [41]. A key international source for climate financing has been the Global Environment Facility (GEF), from which Mozambique has so far accessed an estimated amount of US$ 70 million for projects related to agriculture, forestry, and adaptation in coastal areas[14]. Of these funds, US$19 million were accessed through the Least Developed Countries Fund (LDCF). Likewise, the World Bank represents another of the major funders of CSA-related programmes in the country and has supported initiatives related to forestry, natural resources management, agricultural intensification, as well projects related to climate policy, including the First and Second Climate Change Development Policy Operation Project for Mozambique, which aimed to strengthen national policy and institutional frameworks for climate resilient planning [41]

The country has also accessed funding from the Adaptation for Smallholder Agriculture Programme (ASAP), the Global Climate Change Alliance (GCCA), the MDG Achievement Fund, the Pilot Programme for Climate Resilience (PPCR), the Special Climate Change Fund (SCCF), and the Forest Carbon Partnership Facility (FCPF). A large amount of financing is also accessed through bilateral funding. In 2015 for example, the Government of Ireland contributed approximately €1,282,187 in climate finance to Mozambique [42]. The Netherlands Embassy planned to contribute €16.44 million to climate change adaptation and mitigation in Mozambique from 2015-2017, through its food security and water activities, with 15% of this specifically meant for mitigation and 85% for adaptation activities. [43].

UN agencies also provide a channel for accessing agricultural climate change funds particularly the United Nations Development Programme (UNDP), the Food and Agriculture Organization (FAO) and the International Fund for Agricultural Development (IFAD).

The National Environment Fund (FUNAB), now known as the National Sustainable Development Fund (FNDS), functions under MITADER and is generally responsible for mobilizing and managing funds for various sustainable, rural development technologies and programmes, including climate change adaptation and mitigation

Foreign agricultural investment in Mozambique's agriculture sector has grown significantly[15] and while this is good for the economy, greater effort targeted at encouraging the development of smallholder CSA value chains is required.
Climate change-related funding from the national government remains relatively low. National public expenditure on environment and agriculture was estimated at 3.1% and 7% , respectively in 2010, much below the minimum of 10% for agriculture agreed upon in the Maputo Declaration.

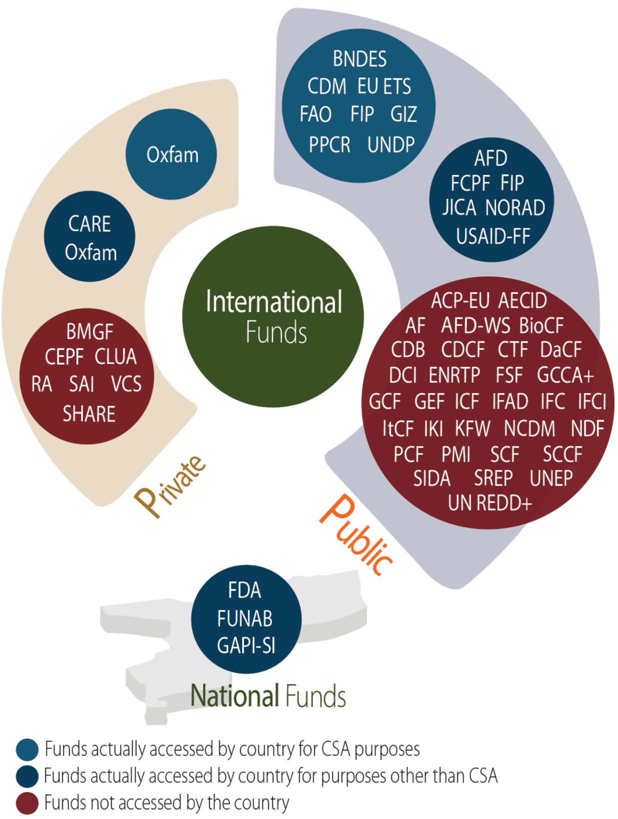
The Agricultural Development Fund (FDA), a financial institution under the Ministry of Agriculture and Food Security (MASA) is responsible for the promotion of public-private investment in agriculture and mobilising resources for the promotion of financial services for sector. The Gapi Investment Society, a public private partnership, funds agricultural value chain development projects. Both of these funds do not have a specific focus on CSA and more could be done to ensure that they mainstream climate change into their areas of work.

13 In total, Mozambique has been a part of US$ 525 million-worth of GEF projects, although many were multi-country projects.

14 Since the 2007/2008 the number of agricultural investments in Mozambique has more than doubled.

15 From total national budget.

Financing opportunities for CSA in Mozambique



ACP-EU African, Caribbean and Pacific-European Union Energy Facility **AECID** Spanish Agency for International Development **AF** Adaptation Fund **AFD** French Development Agency **AFD-WS** French Development Agency- Water and Sanitation **BioCF** World Bank BioCarbon Fund **BMGF** Bill and Melinda Gates Foundation **BNDES** Brazilian Development Bank **CARE** Cooperative for Assistance and Relief Everywhere **CDCF** Community Development Carbon Fund **CDB** China Development Bank **CDM** Clean Development Mechanism **CEPF** Critical Ecosystem Partnership Fund **CLUA** Climate and Land Use Alliance **CTF** Clean Technology Fund **DCI** Development Cooperation Instrument **DaCI** Danish Carbon Fund **ENRTP** Environment and Sustainable Management of Natural Resources Thematic Programme **EU ETS** European Emissions Trading System **FAO** Food and Agriculture Organization of the United Nations **FCPF** Forest Carbon Partnership Facility **FDA** Agricultural Development Fund **FIP** Forest Investment Program **FSF** Japan's Fast-Start Financing **FUNAB** National Environment Fund **GAPI-SI** GAPI Investment Company **GCCA** Global Climate Change Alliance **GCF** Green Climate Fund **GEF** Global Environment Facility **GIZ** German Society for International Cooperation **ICF** United Kingdom International Climate Fund **IFAD** International Fund for Agricultural Development **IFC** International Finance Corporation **IFCI** Australia's International Forest Carbon Initiative **IKI** International Climate Initiative **ItCF** Italian Carbon Fund **JICA** Japan International Cooperation Agency **KfW** German Development Bank International Climate Initiative **NCDM** The Netherlands Clean Development Mechanism **NDF** Nordic Development Fund **NORAD** Norwegian Agency for Development and Cooperation **PCF** Prototype Carbon Fund **PMI** Partnership for Market Initiatives **PPCR** Pilot Program for Climate Resilience **RA** Real Assets Forest Investment **SAI** Sustainable Agriculture Initiative Platform **SCF** Spanish Carbon Fund **SCCF** Special Climate Change Fund **SHARE** Sending Help and Resources Everywhere **SIDA** Swedish International Development Cooperation Agency **SREP** Scaling Up Renewable Energy in Low Income Countries Program **UBSDGF** Union Bank of Switzerland Dutch Green Fund **UNDP** United Nations Development Programme **UNEP** United Nations Environmental Programme **UN REDD** United Nations Programme on Reducing Emissions from Deforestation and Forest Degradation **USAID-FF** United States Agency for International Development – Feed the Future **VCS** Verified Carbon Standard

Potential Finance

Mozambique is currently negotiating access to the Green Climate Fund (GCF), after establishing the Nationally Designated Authority (NDA) under the National Directorate for Monitoring and Evaluation of the MEF. FUNAB/FNDS has also been proposed for accreditation to the Green Climate Fund. This would open opportunities for large-scale climate funding in the country, including CSA-related initiatives.

Further work on assessing and showcasing the benefits and costs of various CSA interventions promoted by different policies and strategies (including PNISA) will be an important step towards ensuring that CSA receives priority in national agricultural budget allocations. This would also help identify gaps in financing, as well as new avenues for investments in practices, technologies, and regions that had not been prioritized in previous programs and projects.

While disaster insurance mechanisms do exist and some pilot projects have been implemented in the country, the absence of data on agricultural risk has been cited by domestic insurers as a limiting factor for expansion into rural smallholder farming areas [28]. Agricultural credit has remained expensive for smallholder farmers, and even when credit is made available, as with insurance, uptake by farmers is often low.

To strengthen access to and appropriate use of finance for investments in CSA technologies, additional efforts need to be put into capacity building of farmers on issues such as entrepreneurship, value addition and financial management. The continued organization of farmers into cooperatives could aid in collective bargaining and enhance access to credit for common needs such as irrigation infrastructure development. Sensitizing and capacity building of microfinance institutions on different CSA practices and their costs and benefits will also help to reduce the perception that investments in smallholder farmers is risky.

Outlook

To address the country's high vulnerability to climate change and hazards, the Government of Mozambique has taken several steps to incorporate and institutionalize climate action into the development agenda, by ratifying climate-related international agreements and developing national strategies and plans for operationalizing commitments. Likewise, many actors have already taken up efforts to improve resilience and productivity in the agriculture and forestry sectors, key for addressing climate challenges. However, many of the smallholder farmers remain shut out of basic services and opportunities for development, and poverty and food security rates are still high among rural farming communities. In light of the country's economic growth, harmonization of sectoral policies is thus paramount to achieve equitable and sustainable development of the society.

Furthermore, increased budgetary allocation to the agriculture sector would not only enable the government to realize its commitments under the CAADP framework, but also contribute to increased productivity and competitiveness of the agricultural sector, which represents a catalyst for economic growth. Key areas of investment include, among others: increasing the capacity and reach of extension services, strengthening of information systems to allow for evidence-based decision-making on climate adaptation and mitigation, and establishment of a national CSA coordination mechanism to support knowledge sharing, avoid duplication, and add value to ongoing work. Such measures can help CSA take up and scale out throughout the country.

Increased engagement of the private sector in promoting CSA is highly important for on-field uptake of practices, especially there where CSA practices and technologies are too knowledge- and capital-intensive for farmers to afford implementation. This requires institutional dialogue, joint planning of interventions, as well as availability and access to accurate farm data to allow for analysis and further prioritization of interventions and pathways for scale up.

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For further information and online versions of the Annexes

Annex 1: Selection of agricultural production systems key for food security in Mozambique (methodology)
Annex 2: Methodology for assessing climate-smartness of ongoing practices
Annex 3: Institutions for CSA in Mozambique (methodology)
Annex 4: Policies for CSA in Mozambique (methodology)
Annex 5: Assessing CSA finances in Mozambique (methodology)

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The document complements the CSA Profiles series developed between 2014 and 2016 by CIAT, CCAFS, the World Bank, and USAID for countries in Latin America, Asia and Africa. The document was prepared under the co-leadership of Evan Girvetz (CIAT), Andrew Jarvis (CIAT) and Sebastian Grey (CIAT). It is based on a methodology prepared by CIAT, the World Bank and the Tropical Agricultural Research and Higher Education Center (CATIE) in 2014 and revisited in 2015 and 2017 by Andreea Nowak, Caitlin Corner-Dolloff, Miguel Lizarazo, Andy Jarvis, Evan Girvetz, Godefroy Grosjean, Felicitas Roehrig, Jennifer Twyman, Julian Ramirez, Carlos Navarro, Jaime Tarapues, Steve Prager, Carlos Eduardo Gonzalez (CIAT/CCAFS), Charles Spillane, Colm Duffy and Una Murray (National University Ireland Galway).

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