

Climate-Smart Agriculture in Benin

Climate-smart agriculture (CSA) considerations

P Agriculture is the mainstay for Benin's national economy employing over 70% of the population. Agricultural practices are mainly rainfall-fed and characterised by small land holdings, low inputs with maize, sorghum, rice, cassava, yams, and groundnut as major food crops and cashew, shea nut and cotton as major cash crops. Major livestock include sheep, goat, cattle, pig and poultry.

P The agriculture sector is struggling to meet the food security needs of its growing population particularly in the face of highly variable weather and changes in climate. Factors such as declining soil fertility, poor financial services, land tenure complications, limited infrastructure and underdeveloped markets continue to hamper agricultural growth.

P Climate change is set to exacerbate the already existing challenges. Recent climate projections show both increasing and decreasing trends of rainfall depending on the agro-ecological zones. However, projections indicate that temperatures across the country will continue to increase (by 1 to 2°C on average per year depending on the GCM used), exposing smallholder farmers to serious challenges.

A Crop-based CSA practices and technologies such as the use of short duration crop varieties, zai planting pits, agroforestry, mulching, soil water conservation and erosion control are normally used among the farming population to avert climate-related risks. The use of crop rotations, intercropping and staggered/ relay cropping are common in a number of commodities, such as maize, groundnuts and sorghum.

P Livestock represents a major source of agricultural greenhouse gas emissions. Promising CSA options in the livestock sector include the introduction of high-value species or crossbreeding with local breeds, conservation of animal feed for the dry season, use of resistant varieties of fodder and seasonal livestock movement to find water and pasture.

I The potential for integrated agricultural systems and landscapes that incorporate crop, livestock and fish production, as well as forestry need further exploration and promotion in the country. Other off-farm services related to CSA also need to be enhanced, including climate-services, and index-based weather insurance. Enhancement of CSA-related input and output markets is also required.

I Various stakeholder institutions, strategies, policies and programs are implemented in the field of agriculture and climate change. Coordination among policies, sectors and institutions will be crucial for sustained adoption of CSA practices in Benin.

I Funding for climate-smart agriculture is generally limited and unfocused, although efforts are underway to ensure that Benin can access and utilise international climate finance from sources such as the Green Climate Fund (GCF), through readiness and capacity building programmes. At national level, the National Fund for Environment and Climate (FNEC), which targets reforestation, agriculture and livestock, is a useful mechanism for directing climate finance to CSA-related activities.

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

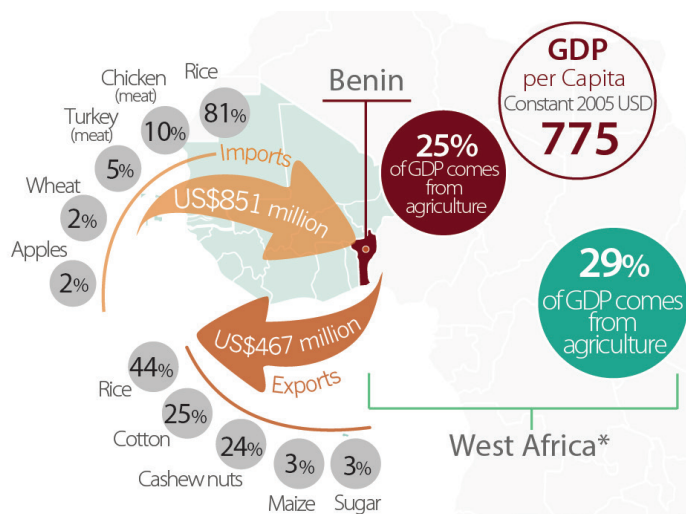
that address challenges in environmental, social, and economic dimensions across productive landscapes. While the concept is new, and still evolving, many of the practices that make up CSA already exist worldwide and are used by farmers to cope with various production risks [2]. Mainstreaming CSA requires 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.

National context

Economic relevance of agriculture

Benin's economy is based on agriculture with 45% of the population involved in primary production agriculture. Agriculture contributes about 25% of the national gross domestic product (GDP). Cotton accounts for 40% of agriculture's contribution to GDP and 80% of official exports [3]. Although the economic growth of the country is largely dependent on agriculture, fluctuations in rainfall amounts, declining soil fertility, limited access to high quality seeds, the high cost of agricultural inputs, and the low level of mechanization negatively affect the country's agricultural growth and food security. In this regard, Benin imports several food crops, particularly rice, representing 33% of the total value of imported products and 81% of the imported food products [3]; rice imports being imperative to meet the food demands of the country's rapidly growing population. Benin benefits significantly from Nigeria's anti-import policies and customs regulations as a huge proportion of exports to Nigeria enter through Benin. Major agricultural exports include palm oil, maize, cotton, cashew nuts, rice, pineapples, sugar and rice, with exports of unprocessed agricultural produce valued at USD 467 million annually [3].

Economic relevance of agriculture in Benin



*West Africa: Benin, Burkina Faso, Cape Verde, Ivory Coast, Ghana, Guinea, Guinea Bissau, Mali, Mauritania, Niger, Sao Tome and Principe, Senegal, Sierra Leone, Togo, Liberia, Gambia

Source: [3, 4]

People, agriculture and livelihoods in Benin

Demographics

10 million people live in Benin



Access to basic needs

Potable Water



Electricity



Education



64% of the youth are literate

■ of total population ■ of rural population

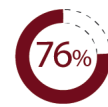
Jobs in agriculture

45% (1 768 000) people are employed in primary production agriculture



People living below

US\$3.10/day



US\$1.90/day



National poverty line



40% live in rural areas

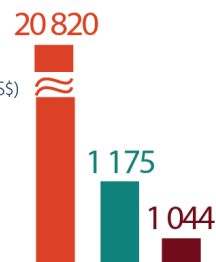
Gender inequality (Index)

0 = Absolute equality
1 = Absolute inequality



Agriculture productivity and incomes

Value added per worker in agriculture (Constant 2005 US\$)



Monthly earnings (Average)

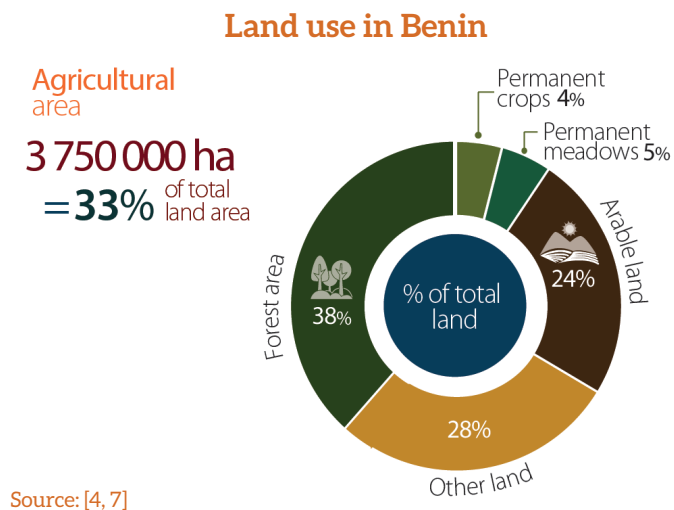


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Source: [3, 4, 5]

Land use

Benin has a total land area of 122 760 km² of which approximately 33% (3.75 million hectares) is classified as agricultural land and 38% is classified as forests [4]. Approximately 4% of the country's land area is under permanent crop production, while another 5% is used as permanent meadows and pastures. Approximately 550 000 agricultural households with an average farm size of 1.7 hectares occupy the agricultural land. Only 5% of household farms in the South and 20% in the North of Benin have more than 5 hectares. The country also has a 121 km long coastline, with abundant marine and fisheries resources, however coastal fishing is generally underdeveloped and characterised by small fleets [6].



Agricultural production systems

Benin can be divided into eight agroecological zones¹ based on relative homogeneity with the consideration of climatic and agro-soil parameters, cropping systems, population density, and vegetation cover. These zones include the following [8, 9]:

1) AEZ I: The northern zone with only one rainy season (of about 800 mm per year) and generally high temperatures. In this part of the country, the soil type is ferrosol on a crystalline base or fertile alluvial along the River Niger. The agro-ecological conditions are conducive to the cultivation of a wide variety of crops such as cotton (which is the main cash crop), maize, and sorghum (which are grown for household consumption).

2) AEZ II and AEZ III, found in the cotton zone of Northern Benin and the food-producing zone of Southern Borgou

respectively falls under the Sudan climate condition with a mean rainfall of 900 to 1 300 mm and a temperature range of between 28 to 40°C annually.

3) AEZ IV falls in the Sudan transition zone and experiences a mean annual rainfall of between 800 and 1 400 mm. It is also known as the West Atakora Zone.

4) AEZ V (Central Benin), AEZ VI (Zone of Bar Ground), AEZ VII (Zone of Depression) and AEZ VIII (Zone of Fisheries) characterized by two rainy seasons with annual rainfall of 1100 and 1 400 mm and mean annual temperatures of between 25 and 35°C. This area is also known as the tropical guinea savannah and has very fertile soils suitable for growing groundnuts and cereals.

Cotton is the principal cash crop in Benin accounting for 70% of export earnings [3]. Other cash crops include cashew, shea nut and shea butter, pineapple and oil palm. Maize, beans, rice, peanuts, cassava, yams, other tubers, and vegetables are the main food crops; being grown for local subsistence and for export to neighbouring countries through informal cross-border trading activities. Maize is widely cultivated throughout the country, representing 70% of the cereal produced [4].

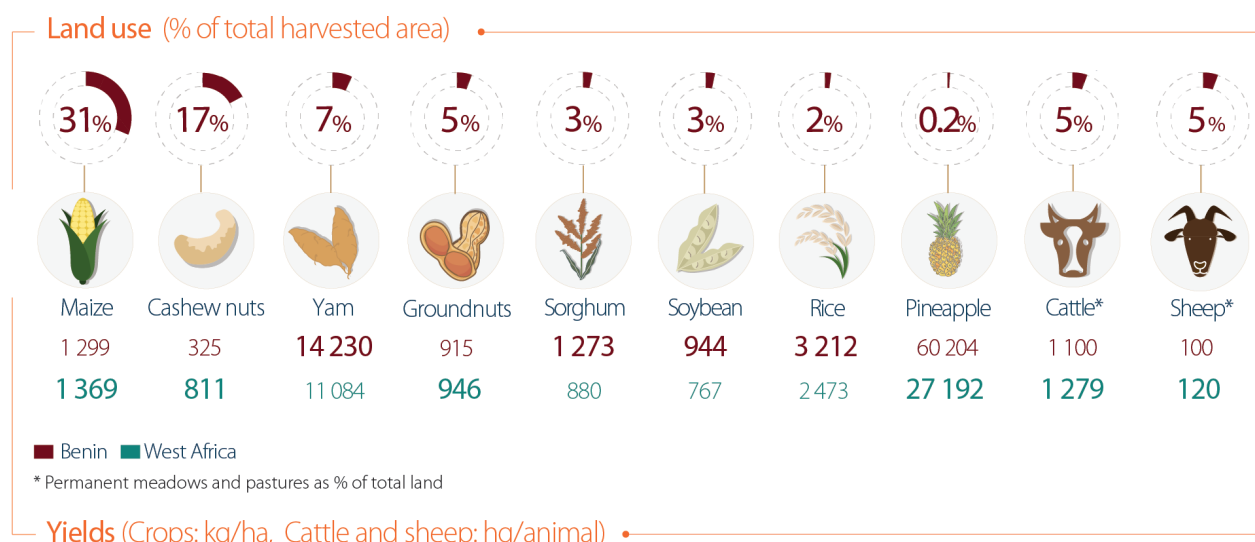
Livestock is an important component of agricultural production contributing about 6% of GDP from the husbandry of cattle, goats and sheep, pigs, poultry, grass cutter rodents, and snails. There are an estimated 2.2 million cattle, 2.6 million small ruminants, 0.4 million pigs and 18.7 million poultry [4]. About 36% of households (predominantly in the North of Benin) are engaged in livestock production with 87% of households in Alibori Department and 41% of households in Borgou Department depending on livestock as their main economic activity. Livestock production is also a very important economic livelihood activity in Donga, Mono, and Zou Departments [10].

The following infographic shows a selection of agricultural production systems considered key for food security in Benin. The selection is based on the production system's contribution to economic, productivity and nutrition quality indicators.

In Benin, 45% of water withdrawn is used for agriculture [7]. However, although the country has a potential of 322 000 ha of land suitable for irrigated agriculture, only 23 000 ha (about 0.61% of total agricultural land area) are currently equipped for irrigation with 75% of this currently being irrigated for agricultural purposes. Out of 17 200 hectares of currently irrigated land, only 2 180 hectares are cultivated.

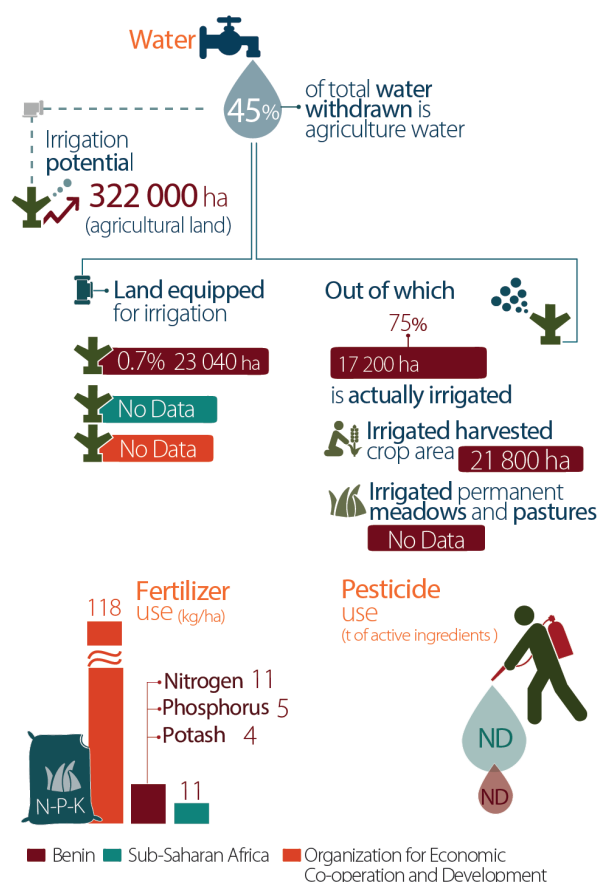
¹ As defined by the Ministry of Agriculture in the framework of the Integrated National Agricultural Statistics System project (SNISA)

Production systems key for food security in Benin



Source: [4]

Agriculture input use in Benin



Source: [3, 4, 7]

Food security and nutrition

About 36% of the population live below the national poverty line [3]. According to the World Food Programme (WFP), 2.3 million people or some 23% of households in Benin have limited food security, with another 11% suffering from moderate to severe hunger. About 1.1 million people in the country are considered food insecure, with the regions of Couffo, Mono, and Atacora being the most food insecure for reasons such as poor access to agricultural land and lack of irrigation infrastructure.

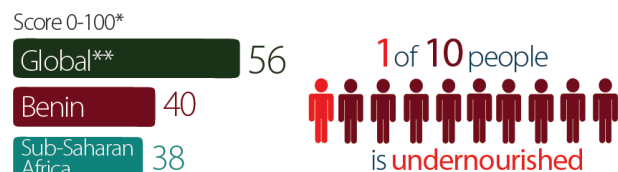
With regards to nutritional status, approximately 8% of the population (mainly in rural areas) is undernourished. In addition, in 2014, approximately 18% children under 5 years were estimated to be underweight while 4.5% were estimated to be stunted. Women's education and security have been a government focus, although a patriarchal society still exists. Although the HIV prevalence rate for the population over 15 years of age is relatively low at approximately 1.12%, 59% of these are women. The fertility rate among adolescents is also high at about 8.7% for women of 15 to 19 years old, while the infant mortality rate is estimated at 10.5% [3].

On the positive side, as of 2015, Benin has been recognised as one of twelve African countries that has been able to achieve Millennium Development Goal target 1C to halve the proportion of hungry people in the country by 2015² and has also been reported to be on course to achieve three of the five World Health Assembly nutrition targets by 2025 [11].

² The proportion of hungry in Benin reduced from 28.1% in 1990/92 to 7.5% in 2014/16 with the total number of hungry falling from 1.5 million people to 0.8 million in the same period.

Food security, nutrition, and health in Benin

Food security



* Takes into account aspects of affordability, availability, and quality
 ** Refers to the 113 countries included in the Index

Food aid (2012)

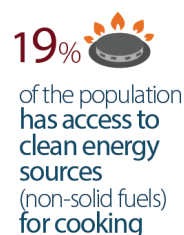


Food security indicators (selection)



Health

Access to clean energy sources



Child Mortality rate

Under-five mortality rate (per 1,000 live births):

105

Adolescent fertility rate

87 births per 1,000 women, ages 15-19

Prevalence of HIV infections



Source: [3, 4, 12, 13, 14]

Agricultural greenhouse gas emissions

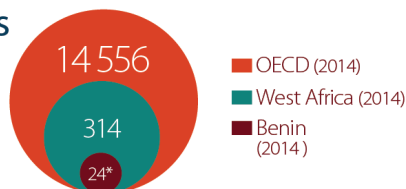
In Benin, agriculture contributes approximately 20% of greenhouse gases emissions (GHG) [4, 15], however it has been said that as a whole Benin is greenhouse gas sink [16]. Within the agriculture sector, livestock production accounts for 71.6% of agricultural GHG emissions, while crop production accounts for 28.4% of emissions. Most livestock emissions are associated with enteric fermentation and manure left on pastures, while crop-related emissions are mostly from burning of savannahs and to lesser extents to rice cultivation and burning of crop residues [4]. Although the use of synthetic fertilisers contributes only a small portion of total agricultural emissions (1.8%), some studies have reported that synthetic fertiliser application can be a large contributor within specific farming systems. For example, the application of synthetic fertilizers (particularly nitrogen fertilisers associated with the release of nitrous oxide (N_2O)), were estimated to contribute 87% of the total emissions in maize farming at 0.4 tons of CO_2 equivalent per hectare per season [17].

Combined mitigation efforts of the country's INDC project a reduction of the gas emissions in 2030 by around 21.4% from the business as usual scenario. The unconditional contribution will lead to a global reduction of 3.5%, while the conditional contribution will make a reduction of about 17.9% by 2030 compared to current policy projections under status quo. For agriculture, the measures envisaged to reduce emissions focus on the promotion of improved farming techniques in relation to rice cultivation, agricultural soils, burning of crop residues and fertiliser use, while also reducing methane emissions from livestock [16].

Greenhouse gas emissions in Benin

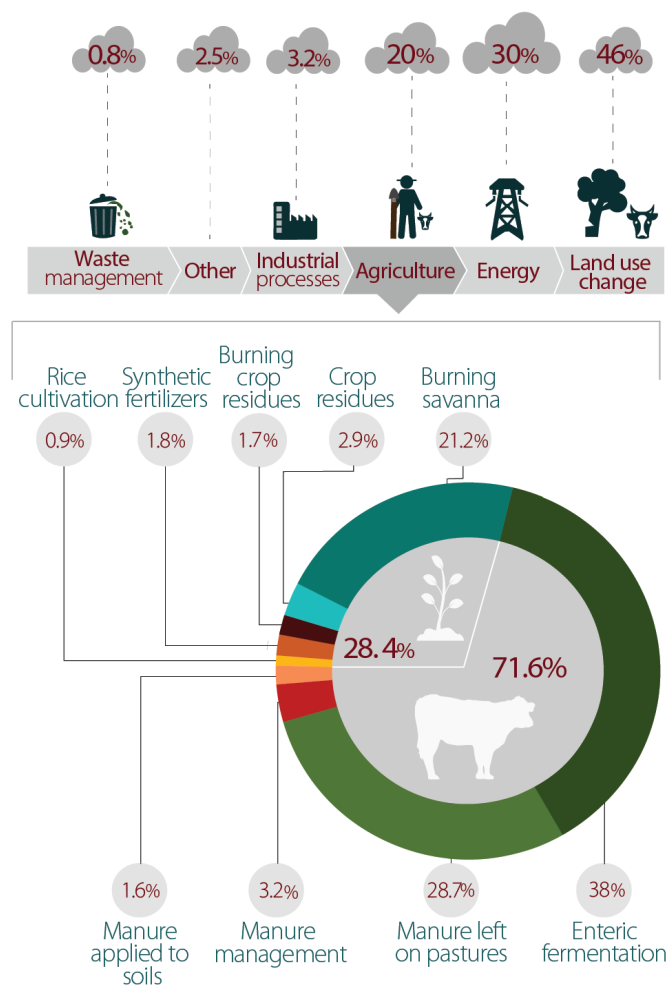
Total emissions

Mt CO₂eq



* Includes emissions from land use change and forestry

Sectoral emissions (2014)



Source: [4, 15]

Challenges for the agricultural sector

The agricultural sector of Benin faces many challenges. Limited access to land in the peri-urban production zones and in some regions such as Atacora and Couffo (where there is high pressure on land resource) is one of the problems to crop intensification. The lack of land titles by most smallholder farmers hinders the ability to invest in equipment such as irrigation facilities and on-farm machinery. Major agricultural challenges also include the poor agriculture credit system and market infrastructure, which limits market access to farmers.

Chemical fertilizers, like urea and NPK are expensive and not all farmers can afford the costs. Often, farmers utilize fertilizers and pesticides available for cotton on many other crops, as there are no alternatives. For example, the use of the unregistered pesticides on vegetables has been documented [18, 19]. Farmers still use only a little organic fertilizer and few phytosanitary products for crop cultivation, and few veterinary products or improved inputs for livestock production. This limited use of the essential inputs for production contributes to the considerable productivity gap between results obtained by producers and those obtained in research trials.

The production value chains are not competitive and, with the exception of cotton, the marketing channels for agricultural products have little or no formal structure with few productivity enhancing investments along the value chains. As a result, the adoption of innovations remains low while available technologies are not always suitable or affordable and/or are not known to farmers. Low adoption of technologies is compounded by low adult literacy rates, estimated at approximately 29% in 2013³ while youth literacy is estimated at approximately 64% [3]. There is also no national strategy for the promotion of new agricultural technologies.

The country's agriculture sector remains largely subsistence based and rainfed, while livestock rearing is not well integrated with crop production, factors that inhibit the resilience and sustainability of the production systems. Efforts to better integrate crop and livestock production, could support the adoption of climate-smart agriculture practices such as crop residue management and innovations such as biogas production. As a whole, fluctuations in the volume of rainfall, the high cost of agricultural inputs, and the low level of mechanization greatly affect the country's food security⁴.

³ https://www.unicef.org/infobycountry/benin_statistics.html

⁴ https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Agricultural%20Situation_Lagos_Benin_3-20-2014.pdf

Agriculture and climate change

Benin, as with many African countries, is exposed to the effects of climate change. The country is exposed to both droughts and floods that have a great impact on the countries agricultural production and food security. Projections of changes in climate by 2050 indicate the following:

- An increase in both rainfall and temperature mostly in the northern parts of the country, and possibly resulting in a shift of agroecological zones in the country [20].

- A probable decrease of runoff in 2050-2100 horizons across the Oueme river basin in a scenario of rainfall reduction in northern Benin and increased rainfall in the centre of the country. A significant decline in rainfall patterns in seasonal scale could introduce a shift of flood periods along the Niger River Basin [21].

- The yields of maize in the extreme north of the country by 2050⁵ are expected to increase by 5-25% compared to the baseline⁶ [20]. As for the centre and south of the country,

the models show significant reductions in maize yield by between 5-25% as compared to the baseline.

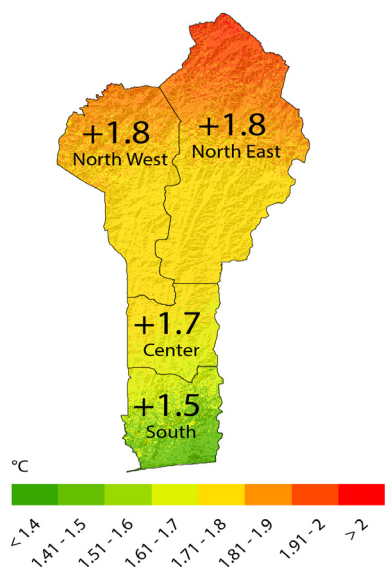
- In the livestock sub-sector, higher temperatures are expected to lead to serious disruption of the physiology of animals, specifically cattle for both milk and meat production. Increase in the incidence of diseases is also expected as increased temperature interacts with changes in humidity and rainfall [21].

- In the marine and inland fisheries sector, a rise of ocean temperatures is expected to lead to lower fish production for local consumption, and migration of many fish species to aquatic environments with optimal climatic condition [22].

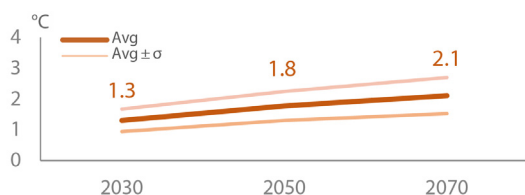
- The direct impacts of increasing temperatures on forestry include changes in natural ranges of plant species and risk of extinction of some species. Indirect impacts are the increased intensity of bushfires that may become widespread in Benin's forest ecosystems and contribute to their degradation [23].

Projected changes in temperature and precipitation in Benin by 2050

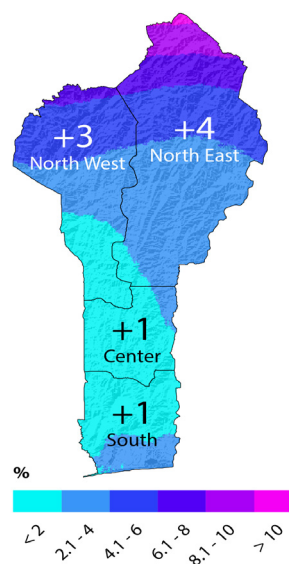
Changes in annual mean temperature (°C)



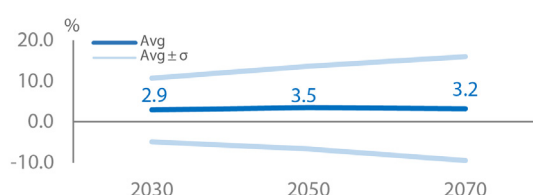
Average temperature (°C)



Changes in total precipitation (%)



Average precipitation (%)



Source: [25, 26]

⁵ Obtained using DSSAT modelling-with the GCM climate 2050

⁶ Baseline is defined as a "stable" climate

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.

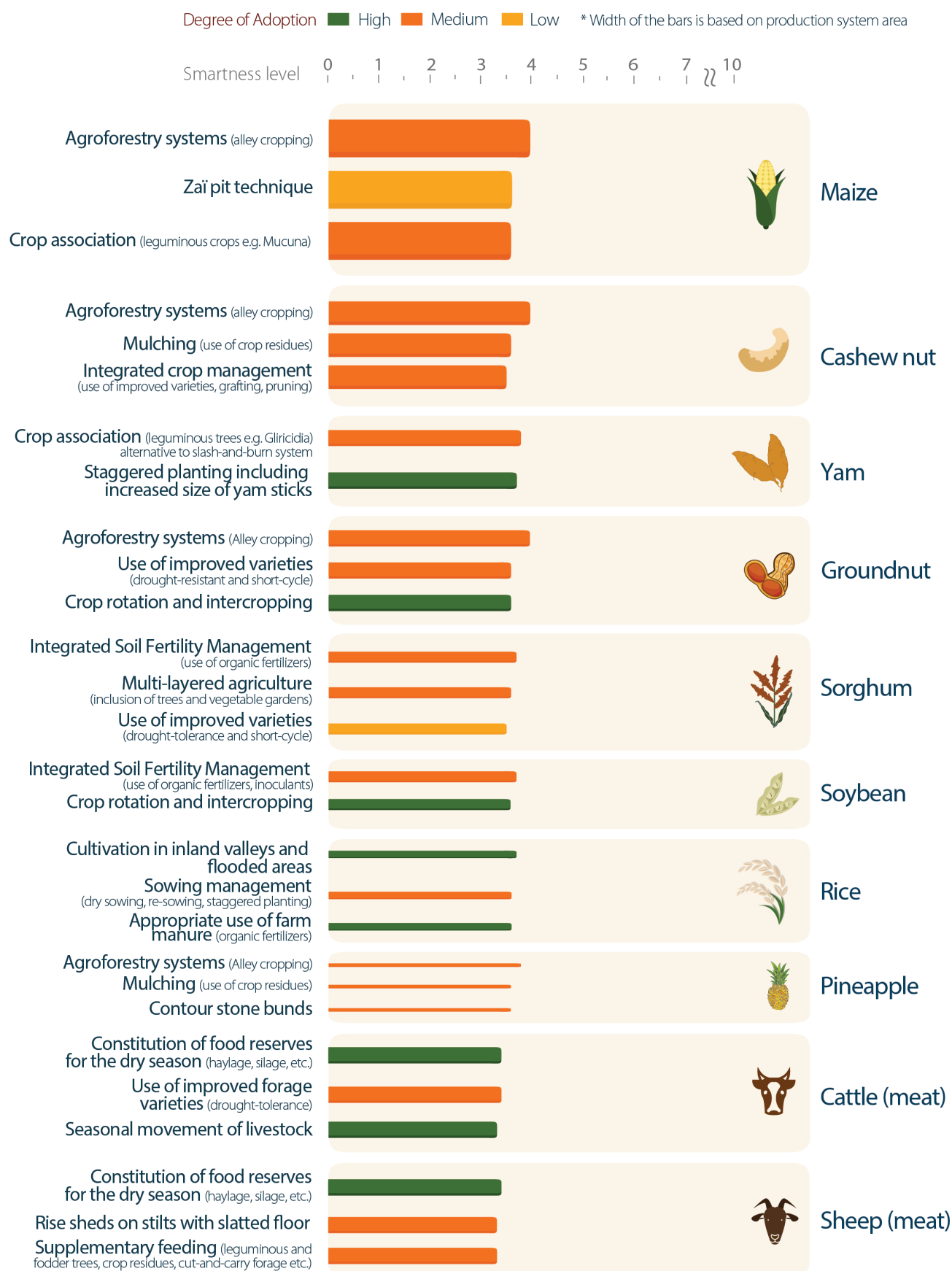
In crop production, CSA practices identified in Benin include the use of improved varieties, soil mulching (use of crop residues), polyethylene films, water harvesting and small-scale irrigation (drip or micro actor) and efficient sowing practices. The use of crop rotations, intercropping and staggered/ relay cropping are common in a number of commodities, such as maize, groundnuts and sorghum. For rice production, common climate-smart practices include production in inland valleys and flooded areas as well as staggered planting, both of which largely focus on increasing productivity and resilience. The use of flood irrigation in rice cultivation is however, one of the major sources of methane production in the country and needs to be addressed if the rice cultivation system is to become truly climate-smart.

CSA practices in animal production largely aim at improving reproduction and animal feeding without compromising the environment. Promising CSA options in the livestock sector include the introduction of high-value species or crossbreeding with local breeds, conservation of animal feed for the dry season, use of resistant varieties of fodder and seasonal livestock movement to find water and pasture. Although, fish production was not explicitly assessed for climate-smartness, various CSA practices/technologies for fish production exist. These largely aim at maintaining the productivity in the sector and include practices such as use of fishponds, tanks and floating cages; introduction of short-cycle fish species; and fishponds fertilization.

The CSA practices in the forestry sector aim to rationalize the use of natural resources, and fight deforestation. These practices include improved forest management, agroforestry, and the planting of local fruit trees adapted to climate. Off-farm CSA-related practices include the use of clean energy (biogas), the use of organic matter for domestic energy, and the use of improved traditional stoves. The potential for integrated agricultural systems and landscapes that incorporate crop, livestock and fish production, as well as forestry need further exploration and promotion in the country. Other off-farm services related to CSA also need to be enhanced, including climate-services, and index-based weather insurance.

The following graphics present a selection of CSA practices with high climate-smartness scores according to expert evaluations. The average climate smartness score is calculated based on the practice's individual scores on eight climate smartness dimensions that relate to the CSA pillars: yield (productivity); income, water, soil, risks (adaptation); energy, carbon and nitrogen (mitigation). 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.

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



** Unidentified production system area

Case study: Field schools' to promote the use of climate information in agriculture in Benin

For *Initiatives pour un Développement Intégré Durable* (IDID)-ONG, a local NGO operating in the field of climate change in Benin, adapting to climate change will depend on improving farmers' access to climate information. A climate simulation exercise in Benin shows that by 2025, yields of maize, peanuts, cassava, cowpeas, and rice, may fall by six per cent and production of all-important cash crops such as cotton could decline by almost one-third. An action research project⁷ engaging a broad spectrum of relevant stakeholders to strengthen rural Benin's capacity to adapt to climate change is looking into (1) how farmers can access information that would enable them plant and harvest on time under varying climate conditions; and (2) how farmers could be involved in the information gathering process and in developing measures to address climatic upheaval.

The project brings together researchers, farmers, and local decision-makers in 'farmer field schools (FFS) to discuss and disseminate climate information (meteorological forecasts). Key partners were in the Ministry of Agriculture (MAEP), the National Agricultural Research System (INRAB), National Universities, and the National Meteorological Service (Meteo Benin). The project operated through multi-stakeholder meetings, which normally take place between January and March, before the planting season in early April to determine what the coming rainfall season is expected to be like. The 'field schools' offer the opportunity for farmers to interact with meteorologists and research actors, and help farmers make informed choices about when to sow and harvest crops. During the rainy season from farmers together with researchers, also use the field schools as a means of testing and sharing knowledge on different CSA practices, which could improve their resilience and productivity given the expected rainfall scenario. Climate-smart options that have been tested include mulching, planting pits, and use of organic fertilizers/ manure. As part of the initiative, more than 300 farmers were enrolled in sixty 'field schools' across six districts in the country to test the use of climate information in agriculture.

The 'field schools' are a good example of a joint multi stakeholder's process to scaling climate information. Based on information, dialogue, and trial of climate smart technologies, the project has strengthened farmers' capacity. It supported the introduction of innovative agricultural practices that retain soil moisture, as well as the introduction of drought-adapted varieties, and better management of rainwater runoff practices. Crucial information garnered through this project will also help local leaders to better realize the agricultural potential in their communities; be better able to plan agricultural production choices (such as variety choice and timing of planting); and make targeted investments in agricultural storage and marketing infrastructure.

For more information, visit: www.idrc.ca/ccaa

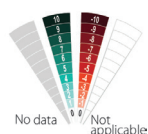
<https://www.idrc.ca/sites/default/files/sp/Documents%20EN/informing-and-involving-farmers-benin.pdf>



⁷ The project on "Strengthening the Capacity to Adapt to Climate Change in Rural Benin," led by Initiatives pour un développement intégré durable (IDID-ONG), is supported by the Climate Change Adaptation in Africa (CCAA) research and capacity development program. The CCAA program is jointly funded by Canada's International Development Research Centre (IDRC) and the United Kingdom's Department for International Development (DFID).

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

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 (31% of total harvested area)				
Agroforestry systems (alley cropping)	30-60%	S		Productivity Increases the yield per unit area. Diversifies farm activities and income (fruit, fodder, timber, fuelwood etc.). Adaptation Reduces maize heat stress and other climatic shocks. Maintains soil moisture and fertility. Promotes gender equity. Conserves wildlife habitat. Mitigation Reduces emission of methane and other GHG related with excessive use of fertilizers. Increases atmospheric carbon capture above- and below-ground.
Crop association (leguminous crops e.g. Mucuna)	<30%	S		Productivity Crop diversification can improve yields, with potential benefits for food and nutrition security and income. Adaptation Promotes soil structure conservation and minimizes erosion. Direct benefit on soil and on-farm biodiversity. Contributes to spread crop failure risk due to a pests or diseases attack. Mitigation Allows reduction in nitrogen-based fertilizers. Maintains or improves above- and below-ground carbon stocks and organic matter content.
Cashew nuts (17% of total harvested area)				
Agroforestry systems (Alley cropping)	30-60%	S		Productivity Increases household income. Organic inputs from the system itself can enhance long-term soil productivity and reduce production costs. Adaptation Promotes soil and water conservation. Increases soil health and biodiversity upon decomposition of organic matter. Promotes empowerment of women. Minimizes erosive processes. Mitigation Increases carbon storage above- and belowground. Reduces use of synthetic fertilizers and related GHG emissions/ carbon footprint.



 Yield

 Income

 Water

 Soil

 Risk/Information

 Energy

 CO₂ Carbon

 N₂O Nutrient

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
Integrated crop management (use of improved varieties, grafting, pruning)	30-60%	S	3.5	Productivity Potential increases in profits due to increased crop yield and produce quality. Potential of byproducts generation. Adaptation Increases farmers' capacity to limit the crop exposure to crop damage caused by pest, diseases and climate shocks. Favor aeration and microclimate conditions. Mitigation Maintains or improves soil carbon stocks and organic matter content. Serves as alternative source of fuelwood.
Yams (6.7% of total harvested area)				
Crop association (leguminous tree species e.g. Gliricidia) alternative to slash-and-burn system	30-60%	S	3.8	Productivity Enhances production per unit area. Diversifies income and food sources. Reduces use of external inputs hence reducing production costs. Adaptation Contributes to spread crop failure risk, improves soil water retention. Reduces exposure to adverse climatic conditions, reducing animal's stresses. Promotes ecosystem health. Mitigation Increases above- and below- ground carbon capture and storage. Reduces methane emissions and other GHG emissions associated with nitrogen-based fertilizers.
Staggered planting including increased size of yam sticks	60%	S	3.7	Productivity Increases crop yield stability and produce quality hence household income. Adaptation Promotes soil structure and moisture conservation. Contributes to make efficient use of rainwater and other agricultural inputs. Reduces losses due to changing weather patterns. Mitigation Allows medium- to long-term increases in soil carbon stocks.
Groundnuts (5.2% of total harvested area)				
Agroforestry systems (Alley cropping)	30-60%	S	4.0	Productivity Higher profits due to increased crop yields and reduced production costs. Diversifies income sources. Adaptation The inclusion of trees in fields can provide shade for alleys reducing heat stress and preserving soil moisture. Promotes ecosystem health and welfare of people. Mitigation Increases above- and below- ground carbon capture and storage. Crop residues can be composted and used as organic fertilizers, therefore reducing the 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
Use of improved varieties (drought-resistant and short-cycle)	<30%	S		Productivity Promotes high yields per unit area, hence potential increase in income due to reduced production costs. Adaptation Increases farmers' capacity to limit the crop exposure to climate risks. In the long term, increases in soil biomass accumulation can enhance soil fertility. Mitigation Promotes above- and below-ground carbon sinks and soil organic matter content. Long-term reduction in nitrogen-based fertilizers.
Cattle (meat) (NA)				
Constitution of food reserves for the dry season (haylage, silage, etc.)	30-60%	S		Productivity Increases animal yield and production stability in dry seasons hence maintains income throughout the year. Adaptation Can be done manually by any type of farmer. Animal production less weather-dependent. Provides higher feed quality bale through leaf preservation and possible nitrate reduction. Mitigation Removes GHG such as carbon dioxide from the atmosphere. High-quality feed reduces methane emissions from ruminants.
Use of improved forage varieties (drought-tolerance)	<30%	S		Productivity Increases in productivity stability due to increased resilience to stress caused by drought. Adaptation Increases resilience to biotic stress and climate shocks. Enhances water use efficiency. Mitigation Provides moderate reduction in GHG emissions per unit of food produced. Long-term accumulation of dry matter in the soil.



Yield

Income

Water

Soil

Risk/Information

Energy

CO₂ Carbon

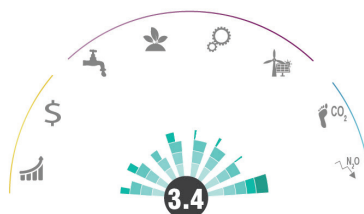
N₂O Nutrient

CSA practice	Region and adoption rate (%)	Predominant farm scale S: small scale M: medium scale L: large scale	Climate smartness	Impact on CSA Pillars
	<30 30-60 60>			

Sheep (NA)

Constitution of food reserves for the dry season (haylage, silage, etc.)

30-60%



Productivity

Increases total production and productivity per unit area during the year. Increased income stability and food security.

Adaptation

Decreases drought vulnerability and feed scarcity for animal production. Increases preservation and retention of nutritional forage characteristics compared to dry seasons. Minimizes hay barn structures required.

Mitigation

Removes GHG such as carbon dioxide from the atmosphere. High-quality feed reduces methane emissions from ruminants.

Supplementary feeding (leguminous and fodder trees, crop residues, cut-and-carry forage etc.)

<30%



Productivity

Reduces costs of production through reduction in external input use. Increases in income through high quality food.

Adaptation

Builds soil fertility by improving physical and bio-chemical soil characteristics. Promotes biodiversity conservation. Provides alternative food source, increasing adaptive capacity to dry season. Reduces soil erosion.

Mitigation

Reduces GHG emissions (carbon footprint) by reducing consumption of energy, synthetic fertilizers and other agricultural inputs. High-quality feed reduces methane emissions from ruminants.

Sorghum (3.3% of total harvested area)

Integrated Soil Fertility Management (use of organic fertilizers)

30-60%



Productivity

Increases productivity. Reduces costs of production through reduction in input use. Increases in income through high quality and healthy produce.

Adaptation

Enhances soil health, water retention, dynamic functions of soil's biology and long-term fertility, increasing the system's potential to overcome climate shocks.

Mitigation

Reduces use of nitrogen-based synthetic fertilizer, thus reducing related GHG emissions. Contributes to minimize methane emissions upon aerobic composting.

CSA practice	Region and adoption rate (%)	Predominant farm scale S: small scale M: medium scale L: large scale	Climate smartness	Impact on CSA Pillars
	<30 30-60 60>			

Multi-layered agriculture (inclusion of trees and vegetable gardens)

30-60%



Productivity

Increases and diversifies household income. Reduces production costs.

Adaptation

Promotes soil and water conservation. Increases soil health and biodiversity upon decomposition of organic matter. Promotes empowerment of women. Minimizes erosive processes.

Mitigation

Reduces the need for nitrogen fertilizer application when leguminous crops are introduced. Reduces GHG emissions (carbon footprint) by reducing use of synthetic agrochemicals. Maintains and/or improves soil carbon stocks.

Soybean (2.8 % of total harvested area)

Integrated Soil Fertility Management (use of organic fertilizers, inoculants)

30-60%



Productivity

Increases yields due to fertility restoration. Diversification of farm incomes.

Adaptation

Reduces environmental degradation. Increases biodiversity in the soil as well as on the farm. Reduces transmission of diseases and break down pest cycles.

Mitigation

Reduces the need for nitrogen fertilizers application when inoculants are introduced. Reduces GHG emissions (carbon footprint) by reducing use of synthetic agrochemicals.

Crop rotation and intercropping

30-60%



Productivity

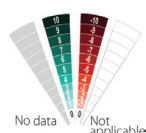
Enhances production per unit area. Diversifies income and food sources. Allows constant production throughout the year.

Adaptation

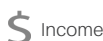
Enhances production per unit area. Diversifies income and food sources. Allows constant production throughout the year. Increases farmers' capacity to limit the crop exposure to climate risks. Reduces soil erosion. Increases water and nutrient use efficiency per unit of output.

Mitigation

Introduction of leguminous crops increases the efficient use of Nitrogen-based fertilizers, and reduces related nitrous oxide emissions. Maintains or improves above- and below-ground carbon stocks.



Yield



Income



Water



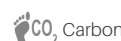
Soil



Risk/Information



Energy



CO₂ Carbon



N₂O Nutrient

CSA practice	Region and adoption rate (%)	Predominant farm scale S: small scale M: medium scale L: large scale	Climate smartness	Impact on CSA Pillars
	<30 30-60 60>			

Rice (2% of total harvested area)

Cultivation in inland valleys and flooded areas

30-60%



Productivity

Increases in household income and profit due to harvesting of multiple areas. Increases production per unit area.

Adaptation

Minimizes water use per unit of product, increasing water use efficiency. Promotes resilience to climate conditions.

Mitigation

Maintains or improves soil carbon stocks and soil organic matter content.

Sowing management (re-sowing, staggered planting)

<30%



Productivity

Reduces cost of production and increases profit.

Adaptation

Reduces soil degradation and erosion. Increases water availability. Improves soil health by enhancing soil structure and fertility. Frees up time for decision-making.

Mitigation

Reduces GHG emissions related with soil ploughing. Allows medium- to long-term increases in soil carbon stocks when implemented comprehensively.

Pineapple (0.2% of total harvested area)

Agroforestry systems (Alley cropping)

<30%



Productivity

Increases yield and quality of produce. Allows round-year production.

Adaptation

Increases farmers' capacity to limit the crop exposure to climate risks. Facilitates diversification of livelihoods. Reduces soil erosion. Increases water and nutrient use efficiency per unit of output.

Mitigation

Reduces GHG emissions (carbon footprint) by reducing use of synthetic agrochemicals. Maintains and/or improves soil carbon stocks.

Mulching (use of crop residues)

30-60%



Productivity

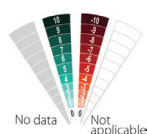
Increases productivity and income through increased product quality.

Adaptation

Builds soil fertility by improving physical and bio-chemical soil characteristics. Increases moisture retention due to mulching. Reduces soil erosion.

Mitigation

Provides moderate reduction in GHG emissions per unit of output. Maintains and/or improves soil carbon stocks and soil organic matter.



Yield

Income

Water

Soil

Risk/Information

Energy

CO₂ Carbon

N₂O Nutrient

Institutions and policies for CSA

Since 2008, the Government of Benin has been actively involved in strengthening agricultural development and the staple crop value chains for ensuring food security, including strengthening resilience to climate change. At national level, the Ministry of Environment and Sustainable Development (MCVDD) is responsible for development and implementation of national environmental policies, ensures that programs and projects are implemented under legal requirements. It works in partnership with other sectorial ministries, local communities, private sector and civil society organizations with the support of Technical and Financial Partners. The mission of the Directorate-General of the Environment and Climate (DGEC) is focused on development, implementation and monitoring-evaluation of policies and strategies for managing the effects climate change and green economy promotion. The National Committee on Climate Change (CNCC), a platform of all stakeholders in Benin to effectively address national concerns related to climate change, aims to improve Benin's institutional framework for climate change. It provides support for definition of national and local policies and strategies for combating adverse effects of climate change and promotes activities related to implementation of policy directives, global, regional and national programs to combat climate change through the three components of mitigation, adaptation and capacity building. Created by Decree No. 2012-541 of December 17, 2012, determining its attributions, its organization and its functioning, the Ministry of Agriculture, Livestock and Fisheries (MAEP) ensures: (i) definition and analysis of agricultural policies, (ii) information generation and technological innovations, (iii) coordination, capitalization and dissemination of agricultural research (iv) smart agricultural technologies dissemination, (v) program development, monitoring evaluation.

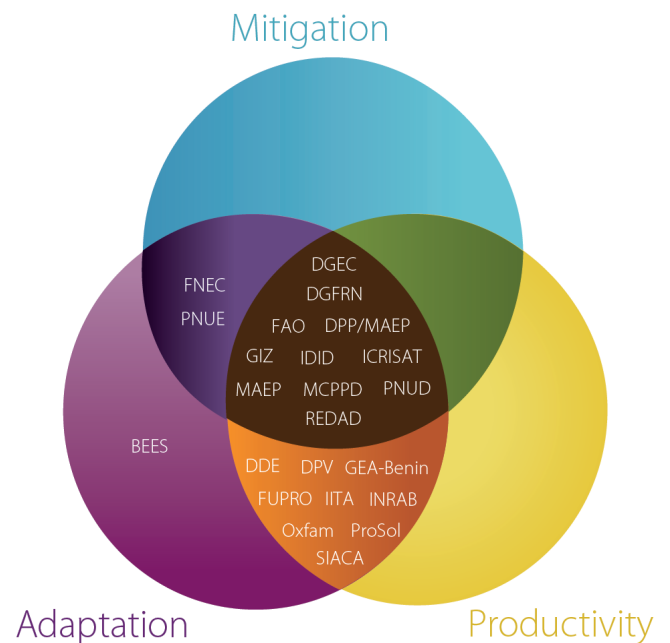
In terms of research, The Benin National Institute of Agricultural Research (INRAB) is involved in implementation and dissemination of new technologies for agricultural productivity improvement. This work is supported by international agricultural research organisations such as the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).

Several other technical and financial partners (such as international development agencies, United Nations agencies and NGOs) are also involved in the CSA-related activities. Although the focus of most of the organisations involved in CSA is related to adaptation and productivity, there is still some effort to integrate mitigation into their work. For instance, the Department of Vegetable Production (DPV), Federation of Producers Unions (FUPRO), and MAEP all work across the three pillars of CSA in agricultural research and extension and the dissemination of climate smart technologies. IDID, a local NGO is proactive in climate resilient practices, although these also contribute to efficiency in production and hence GHG mitigation. In addition many of the organisations involved in CSA-related work in the country, are involved in value chain and off-farm related activities such as information sharing, agricultural insurance systems, input subsidies, micro-credit, marketing,

technology development, and policy support to facilitate the adoption of CSA technologies. In addition, there are many organizations working in different sectors with a relation to CSA. For example, the Department of Vegetable Production (DPV), Federation of Producers Unions (FUPRO), and the Sustainable Agriculture Development Network (REDAD) work directly in the agriculture sector; while organisations such as the Benin Environment Education Society (BEES) and the Directorate of Forest and Natural Resources (DGFRN) work more on sustainable natural resources management. As a result, coordination of actors both within the agriculture sector and across sectors is important for ensuring the sustainability of CSA-related interventions.

The following graphic highlights key institutions whose main activities relate to at least one of the three CSA pillars (adaptation, productivity and mitigation).

Institutions for CSA in Benin



BEES Benin Environment and Education Society DDE Department of Livestock DGFRN Directorate of Forest and Natural Resources DPP/MAEP Department of Programming and Planning DPV Department of Vegetable Production DGEC Department of Environment and Climate FAO Food and Agriculture Organization of the United Nations FNEC National Fund for Environment and Climate FUPRO Federation of Producers Unions in Benin GEA-Benin Agricultural Operators Association GIZ German Agency for International Development ICRISAT International Crops Research Institute for the Semi-Arid Tropics IDID Initiative for Integrated Sustainable Development IITA International Institute of Tropical Agriculture INRAB National Institute for Agricultural Research MAEP Ministry of Agriculture, Livestock and Fisheries MCPPD Ministry of Planning, Forecasting and Development PNUD United Nations Development Programme PNUE United Nations Environment Programme ProSol Soil Protection and Rehabilitation Project to Improve Food Security REDAD Sustainable Agriculture Development Network SIACA Agricultural Council Support/Service Innovation

In Benin, different strategies and programs are implemented in the field of agriculture and climate change. Key policies dealing with CSA can be grouped into three categories: *Policy under formulation* (in phase of designing - writing/consulting), *legally formalized policies* (enacted) and *policies actively implemented* (implemented policies and evidences are already visible).

Benin signed and ratified the United Nations Framework Convention on Climate Change (UNFCCC) in June 1994. It submitted its Initial National Communication to the UNFCCC in 2002 and its second National Communication in 2011 [21]. The Third National Communication is being developed, with identified priorities including energy, industrial processes, agriculture, waste, and land use (including forestry). Benin has shown a strong commitment to issues relating to the environment and sustainable development. The core elements of the national communications relate to information on carbon emissions and the removal of greenhouse gases (GHGs) through a reduction in emissions and the use of carbon sinks. The country also signed and ratified the Kyoto Protocol in February 2002, and ultimately submitted its Nationally Determined Contribution (NDC) to the UNFCCC in August 2015 [16]. The initial actions demonstrated a willingness to adapt to climate change through complying with international policies on the subject, while the more recent submission of the INDC demonstrated the willingness to also contribute to GHG mitigation where possible, including in the agriculture sector. The compliance with these commitments involves actions to protect the environment while exploring options to intensify agricultural production.

At the national level, one of the most important climate change policy instruments is the National Long-Term Outlook for 2025 [27]. Through the support of several strategies and plans, it aims to make Benin an economically prosperous and competitive country with a pledge to the welfare of the people. In that frame, The National Strategy for Implementation of the UNFCCC from 2003 contains measures for sectoral mitigation and adaptation to climate change.

In 2008, Benin's NAPA was formulated, identifying the agriculture, livestock, fisheries and forestry sectors as being particularly vulnerable to climate change. The NAPA identified priority five areas of work including climate information and early warning for food security; promotion of renewable energy; and use of surface water for climate change adaptation⁸ and specifically identified activities/ practices such as promotion of small livestock, integrated watershed management, community forestry, wood saving stoves, agroforestry and improved irrigation water management. The NAPA led among others to the development of the USD 11 million Global Environment Fund (GEF) Least Developed Country Fund (LDCF) project on Integrated Adaptation Programme to Combat the Effects

of Climate Change on Agricultural Production and Food Security in Benin⁹ [27]. The NAPA is also considered a sub-programme of the National Environmental Management Programme (PNGE) and the Growth and Poverty Reduction Strategy Paper (SCRCP) of Benin.

Many other policies and programs related to climate change have been implemented in order to strengthen the resilience and adaptation capacity of food systems and water control.

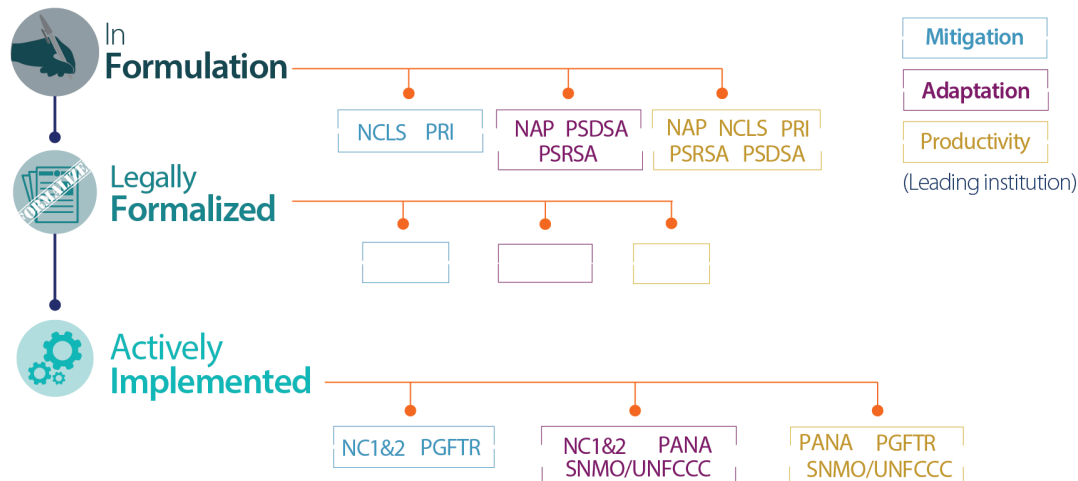
- The Environmental Action Plan (EAP) defines the national environmental policy and strategy. It focuses on changing behaviour and better management of natural resources.
- The National Action Plan for the Fight against Desertification, within the framework of the Convention to Combat Desertification (UNCCD) aims to identify the factors contributing to desertification and identifies practical measures necessary to combat desertification and mitigate the effects of droughts. The plan focuses largely on forestry related initiatives.
- The National Forest Policy seeks to improve the conservation and management of forests with the participation of local communities.
- The Strategic Orientation Development Plan (2006-2011) provides an orientation for different sectors to achieve a “balanced development and sustainable national space”.
- The National Strategy and Action Plan for Conservation of Biological Diversity, within the framework of the Convention on Biological Diversity (UNCBD), aims to contribute to national development and poverty reduction through biodiversity management, including management of plant, forest, livestock and fish resources.
- Benin's Low Carbon and Climate Resilient Development Strategy, 2016 – 2025.

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.

⁸ <http://unfccc.int/resource/docs/napa/ben01f.pdf>

⁹ https://www.uncclearn.org/sites/default/files/inventory/gef58_0.pdf

Policies for CSA in Benin



NAP National Adaptation Plan (DGIEC) **NC1&2** National Communications to the United Nations Framework Convention on Climate Change (2012) (DGEC) **NCLS** National Climate Change Learning Strategy (2013) (DGEC) **PANA** National Adaptation Programme of Action (2008) (DGEC) **PANA** National Adaptation Programme of Action (2008) (MAEP) **PGFTR** Programme for the Management of Forests and Adjacent Lands (2010) (DGEFC) **PRI** Programme for Intensive Reforestation (2017) (DGEFC) **PSDSA** Strategic Plan for the Development of the Agriculture Sector (2017) (MAEP) **PSRSA** Strategic Plan for the Revival of the Agriculture Sector (2015) (MAEP) **SNMO/UNFCCC** National Strategy on the UNFCCC (2010) (UN)

Financing CSA

Although various international climate-funding opportunities exist, it is a major challenge for Benin to access climate finance, due largely to limited capacity to both develop and implement these projects. Nevertheless, Benin has accessed international climate finance through instruments such as the GEF, for which Benin has accessed funds for projects related to forest management, agricultural resilience building, climate information, sustainable energy, flood management and water management among others. These projects have been implemented and cofinanced by various United Nations agencies such as The United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP) as well as multilateral development banks such as the World Bank (WB) and the African Development Bank (AfDB). Benin has also accessed funds for Green Climate Fund (GCF) readiness, directed at strengthening the capacity of the country's NDA, the Directorate General of Climate Change Management of the Ministry of Environment in charge of Climate Change Management, Reforestation, and Protection of Natural and Forest Resources.

At national level, the National Fund for Environment and Climate (FNEC) is an important source of finance for climate-smart agriculture related projects, targeting reforestation, agriculture and livestock. Bilateral funding agencies such as GIZ, the French Development Agency (AFD), Canada's International Development Research Centre (IDRC) and the United Kingdom's Department for International Development (DFID) also support Benin's CSA-related efforts. For example, the recent Project for Soil

Protection and Fertility Management (ProSol) was funded by the BMZ/GIZ. The project is implemented in collaboration with REDAD- an NGO working to support the dissemination of CSA innovations. Other projects funded by BMZ/GIZ in relation to CSA include:

1. Agricultural Promotion Project (ProAgri GIZ) whose objective was to improve social and environmental standards, added value of four important sectors for the poverty reduction (cashew, rice, shea, soy). Thus, more than 70,000 farmers producing cashew nuts have seen their yields increase by nearly 80% in the last four years.
2. Agriculture Adaptation to climate change project (PACC), funded by the German Federal Ministry for Economic Cooperation and Development (BMZ), aims to improve adaptation of agriculture to climate change through sustainable management of natural resources, particularly rainwater and soil in northern Benin. This project has improved agro pastoral systems resilience and catchment farms to climate change.

United Nations agencies also play a key role in mobilising climate finance. For example, UNDP has been working in Benin since 1974, with its most recent cooperation framework focusing on food security, environmental management, and climate change and disaster management. The International Fund for Agricultural Development (IFAD) has also invested significantly in Beninese agriculture in areas including artisanal fisheries development. FAO assistance in Benin is also centred on diversifying crop and livestock production and sustainable natural resource management. FAO has supported projects such as the:

1. The Integrated Production and Pest Management programme which is supporting Beninese farmers to practice balanced fertilization, crop rotations and optimal plant spacing, to boost cotton, rice and vegetable production.

2. The USD 373 000 “Promotion of Urban and Peri-urban Agriculture Project (PAPU)”, which aims to contribute to updating of technical manuals for production of vegetables currently produced in the country.

3. Supporting Development of Maize Seed Sector project (2013 to 2015) aims to boost the maize seed sector through diversification. It has strengthened the capacity of stakeholders along the value chain, facilitating farmers’ access to quality maize seeds and develop breeding systems seed quality control, actions which support resilience to climate change.

NGOs are active in Benin; however, they largely rely on funding from and act as implementing partners to UN agencies and multilateral development agencies. For example, Initiatives pour un développement intégré durable (IDID-ONG) is implementing the project on “Strengthening the Capacity to Adapt to Climate Change in Rural Benin,” in the framework of the Climate Change Adaptation in Africa (CCAA) research and capacity development program, funded by Canada’s International Development Research Centre (IDRC) and the United Kingdom’s Department for International Development (DFID).

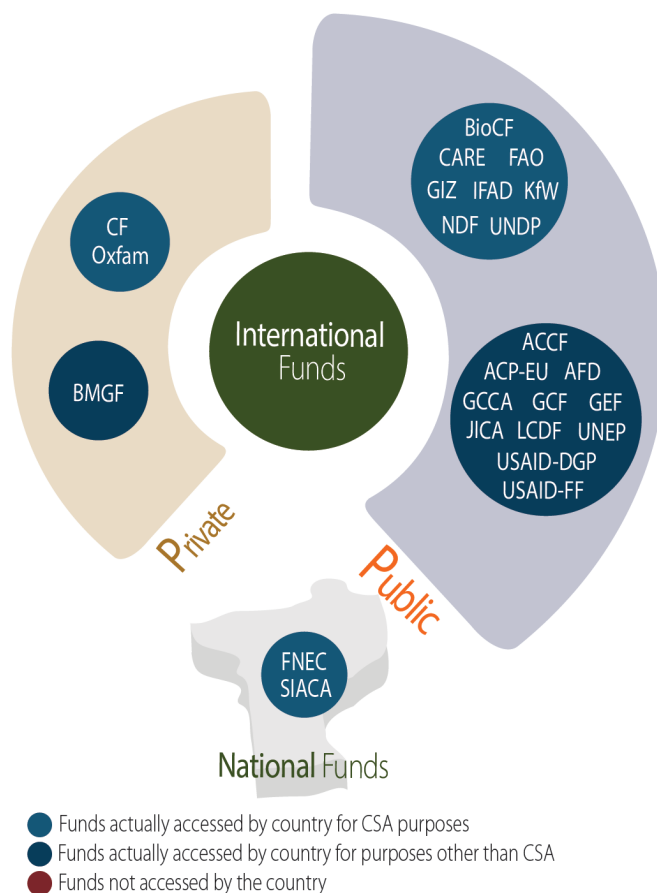
Potential Finance

While the country has been stepping up efforts to access international climate finance, local level climate financing has also been emphasised. In May 2013, a Cabinet decision on the transformation of the National Environmental Fund (FNE) into the National Fund for the Environment and Climate (FNEC) was passed and its statutory instruments were then revised to enable the FNEC to mobilize climate finance resources from the GCF and other international funding sources. FNEC presents a great opportunity to mobilize climate finance and direct it to climate-smart practices.

Although Benin has not yet accessed GCF funds, the country has benefitted from a GCF Readiness Programme with financial support from German’s Federal Ministry of Environment, Nature Conservation and Nuclear Safety, implemented by UNDP, UNEP and the World Resources Institute (WRI).

In August 2014, the Directorate General of Climate Change (within the Ministry of Environment in charge of Climate Change Management, Reforestation, and Protection of Natural and Forest Resources) was nominated as the National Designated Authority (NDA) for the GCF and started engagement with the GCF Secretariat. The Green Climate Fund (GCF) Readiness and Preparatory Support Programme activities will contribute to strengthening the country’s technical and coordination capacity to mobilize and utilize climate financing.

Financing opportunities for CSA in Benin



ACCF Africa Climate Change Fund AFD French Development Agency ACP-EU African, Caribbean and Pacific-European Union Energy Facility BioCF World Bank BioCarbon Fund BMGF Bill and Melinda Gates Foundation CARE Cooperative for Assistance and Relief Everywhere CF The Clinton Foundation FAO Food and Agriculture Organization of the United Nations FNEC National Fund for Environment and Climate GCCA+ Global Climate Change Alliance GCF Green Climate Fund GEF Global Environment Facility GIZ German Society for International Cooperation IFAD International Fund for Agricultural Development JICA Japan International Cooperation Agency KfW German Development Bank International Climate Initiative LCDF Least Developed Country Fund NDF Nordic Development Fund SIACA Agricultural Council Support/Service Innovation UNDP United Nations Development Programme UNEP United Nations Environmental Programme USAID-DGP United States Agency for International Development – Development Grants Program USAID-FF United States Agency for International Development – Feed the Future

Outlook

Agriculture is the mainstay for Benin's national economy employing over 70% of the population. Agricultural practices are mainly rainfall-fed and characterised by small land holdings, low inputs with maize, sorghum, rice, cassava, yams, and groundnut as major food crops and cashew, shea nut and cotton as major cash crops. Major livestock include sheep, goat, cattle, pig and poultry. Yet the agriculture sector is struggling to meet the food security needs of its growing population particularly in the face of highly variable weather and changes in climate. Factors such as declining soil fertility, poor financial services, land tenure complications, limited infrastructure and underdeveloped markets continue to hamper agricultural growth. In addition, the negative consequences climate change are expected to result in increases in the frequency and intensity of droughts and floods, changes in agroecology, changes in pests and diseases and changes in the productivity of key agricultural commodities.

However, Benin has made efforts to enhance the resilience of the agriculture sector to climate change and the ongoing development of the National Adaptation Plan (NAP) of Benin is thought to set the country on the path towards minimizing climate change vulnerability and safeguarding

its development gains against climate change. In addition, Benin has shown commitment in contributing to global mitigation goals, through its INDC, which identifies agriculture as a sector for both adaptation and mitigation.

Various crop, livestock and forest based CSA practices exist however, the potential for integrated agricultural systems and landscapes that incorporate crop, livestock and fish production, as well as forestry need further exploration and promotion in the country. Off-farm services related to CSA also need to be enhanced, including climate-services, and index-based weather insurance. Enhancement of CSA-related input and output markets is also required.

Funding for climate-smart agriculture is generally limited and unfocused, although efforts are underway to ensure that Benin can access and utilize international climate finance from sources such as the Green Climate Fund (GCF), through readiness and capacity building programmes. At national level, the National Fund for Environment and Climate (FNEC), which targets reforestation, agriculture and livestock, is a useful mechanism for directing climate finance to CSA-related activities.

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For further information and online versions of the Annexes

Annex 1: Benin's agro-ecological zones

Annex 2: Selection of agriculture production systems key for food security in Benin (methodology and results)

Annex 3: Methodology for assessing climate smartness of ongoing practices

Annex 4: Long list of CSA practices adopted in Benin

Annex 5: Institutions for CSA in Benin (methodology and results)

Annex 6: Policies for CSA in Benin (methodology and results)

Annex 7: Assessing CSA finances

This publication is a product of the collaborative effort between the International Center for Tropical Agriculture (CIAT) – lead Center of the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), and The Food and Agriculture Organization of the United Nations (FAO) to identify country-specific baselines on CSA in West Africa (Benin, the Gambia, Niger and Côte d'Ivoire). The publication is based on data collected by FAO in collaboration with CSA stakeholders and partners in Benin and on previous work commissioned and led by the World Bank Group to identify country-specific baselines and entry points for scaling out CSA, through data analysis and series of dialogues with national stakeholders. The work complements the CSA Profiles series developed since 2014 by the World Bank, CIAT and CCAFS for countries in Latin America, Asia, Eastern and Central Europe, and Africa (<https://ccafs.cgiar.org/publications/csa-country-profiles>).

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This document should be cited as:

FAO; ICRISAT; CIAT. 2018. Climate-Smart Agriculture in Benin. CSA Country Profiles for Africa Series. International Center for Tropical Agriculture (CIAT); International Crops Research Institute for the Semi-Arid Tropics (ICRISAT); Food and Agriculture Organization of the United Nations (FAO). Rome, Italy. 22p.

Acknowledgement

This document has benefitted from comments received from: P. Irénikatché Akponikpe (Consultant/FAO).

The fieldwork that supported the preparation of the CSA country profile for Benin was funded by the Government of Norway



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