



Climate-Smart Agriculture in Grenada



Climate-smart agriculture (CSA) considerations

- A** Adoption of **no-burn agricultural practices** is essential for protection of soils against extreme climate events (e.g., erosion by extreme rainfall events).
- M**
- A** Drought-resistant systems and practices that **capture, store, and conserve water and watersheds** are important for responding to more frequent and intense drought and increasingly irregular rainfall patterns over large parts of the country. Priority options include **efficient irrigation systems, cut-and-carry stabling systems for dairy goats, nutmeg plantation recovery, beekeeping, and landscape restoration.**
- P**
- A** **Organic mixed cocoa plantations** are resistant to extreme weather events, increase economic security by incorporating diverse fruit species, and produce quality certified cocoa and chocolate for export, making them a priority CSA option for Grenada.
- P**
- A** **Landscape restoration and watershed protection** play an important role in contributing to the resilience of agricultural systems to extreme weather events.
- P**
- I** The identification of suitable CSA options can be enhanced by development and access to **Integrated Decision Support Systems** that compile and analyze weather, agronomic, and market information, and deliver results to a range of stakeholders and decision makers.
- I** Adoption rates of CSA practices among small-scale farmers can be increased by expanding **extension services** and investing in **research and development** to identify and validate “farmer-friendly” techniques.
- \$** Participation in **emissions trading schemes** would generate additional income from plantation agriculture and agroforestry that could be used to finance CSA initiatives. The formal adoption of a **climate change strategy** that incorporates CSA would provide a policy framework to facilitate access to additional international funding for CSA.

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 tradeoffs 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.

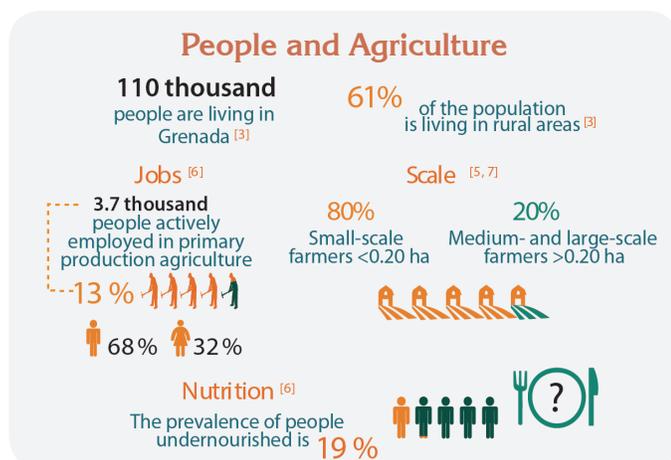
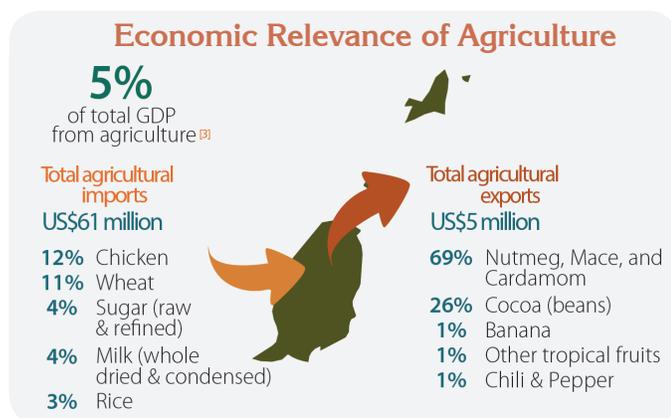
National context: Key facts on agriculture and climate change

Economic relevance of agriculture

Agriculture, including fisheries, currently accounts for 5% [3] of Grenada's gross domestic product (GDP) and employs 13% [4] of the economically active population. The sector contributes 2.4% and 11.2% [5] to the total value of the country's total exports and imports, respectively (2007–2011). Tourism is the mainstay of the country's economy and to some degree serves as a market outlet for agricultural products.

Despite its small size, the agricultural sector has experienced more growth over the past few years than other sectors, growing at 10% per year between 2009 and 2011 and with its share of GDP rising from 4% to 4.5% between 2010 and 2011 [5].

Grenada is known as the Spice Island, and historically, spices such as nutmeg and mace have been the country's principal export. However, hurricanes Ivan and Emily in 2004 and 2005 destroyed 90% of the nutmeg plantations on the island, and production has still not recovered to pre-hurricane levels. While nutmeg remains a principal export crop, it is currently second to fisheries as a source of export earnings. Cocoa, on the other hand, is a dynamic sector and is growing in importance as an export product [5].¹



Land use

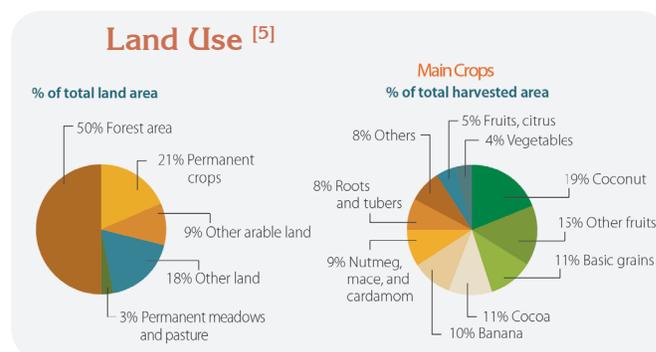
Grenada retains considerable natural forest cover in highlands, which is important for the protection of watersheds that serve as sources of irrigation in periods of water scarcity. Forest and protected areas cover 30% of the main island, with perennial crops (spice and fruit plantations) accounting for a further 31%. Annual crops cover just 5% of land area and there are no permanent pastures [8].² A notable feature of Grenadine land use is the large amount of unproductive land, i.e., abandoned cropland and shrub and grassland, which account for 20% and 5% of the total land area, respectively. On the second largest island, Carriacou, the climate is drier and almost 60% of the island is classified as shrub and grassland. Pasture and grazing accounts for almost 25% of land area, and forests only 5%.

Agriculture in Grenada is carried out mainly on small-scale, family-run farms, many on untitled informally occupied land [9]. The few large estates on the island of Grenada (over 100 acres or 40.5 hectares) were only partially dismantled and/or converted to Crown estates by the land reform program of the revolutionary government of 1979–83 [10].

Agricultural production systems

The principal permanent crops on Grenada in terms of production value and land-use coverage are nutmeg and mace, other spices, tropical fruits, and cocoa. In 2011, production of nutmeg was twice as high as in the aftermath of the hurricanes Ivan (2004) and Emily (2005), but still less than 15% of 2003–2004 volumes. In contrast, cocoa production had almost recovered to pre-hurricane levels by 2011 [11].³ The other principal agricultural products are fruits, vegetables, roots and tubers, and livestock. Livestock is the principal agricultural activity on the island of Carriacou.

Over 80% of farmers in the fruits, vegetables, and roots and tubers subsectors are considered small-scale farmers, i.e., farming on less than half an acre or 0.2 hectares [11]. Production of fruits, vegetables, and roots and tubers at this scale is primarily for subsistence and occasional sale in local markets, and there are just a few larger, commercial growers. Nutmeg and cocoa are commercial products, for export, and, in the case of cocoa, for the tourist market. These crops are cultivated, alongside tropical fruits in more extensive plantations in upland areas, typically 5 to 7 ha in size [12].



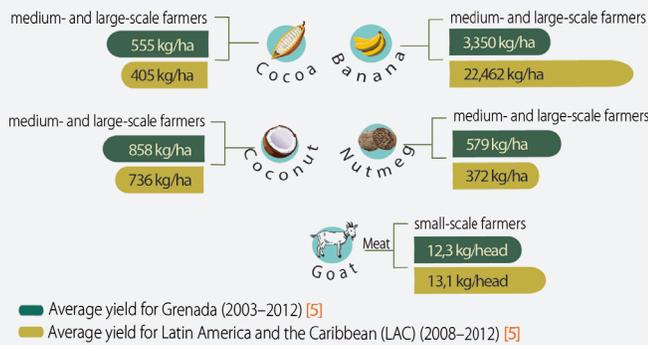
² See Annex III.

³ See Annex IV.

¹ See Annex II.

The area of agricultural land has fallen markedly since the 1960s due to conversion to manufacturing, tourism, and residential uses, as well as abandonment of lands owned by absentee landlords [13]. For many smaller landowners, farming is no longer their principal economic activity.

Important Agricultural Production Systems



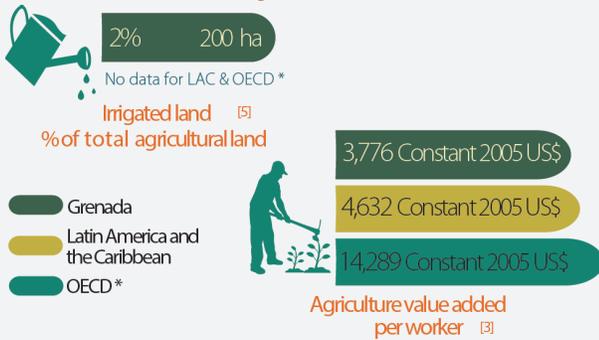
Agricultural greenhouse gas emissions

The main emissions contributing sector in 1994 was waste (93%) [14]. The agricultural sector makes a minor contribution to Grenada's GHG emissions, accounting for least than 1% of the total. Most of the agricultural emissions are from synthetic fertilizers (75%). By contrast, permanent crops, such as spices and fruits, are a store of carbon, thus agriculture is not considered a net emitter of GHG [14]. The 5% of total 1994 national emissions were mitigated by forests reserves, a 92 Gg carbon dioxide sink [14].

Challenges for the agricultural sector

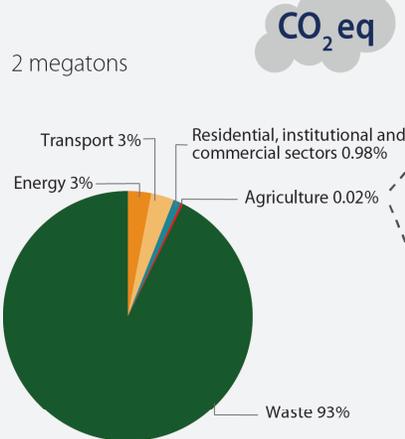
- Family farms predominate, but, outside of the spice sector, many are not economically viable. Among the multiple problems facing small-scale farmers are: lack of credit, fragmented and informal land tenancy, mountainous topography of the island that limits the use of machinery, small size of the local market, high costs of energy and other inputs, and widespread praedial larceny.
- The sector's lack of competitiveness is reflected in the large amount of land with agricultural potential that is currently underused or neglected entirely. Young people have little incentive to get involved in farming, and the population of active farmers in Grenada is aging [10, 12].
- Capacity building is required to improve skills in quality control, business management, and marketing, and to increase access to and use of climate information as a basis for informed decision making.
- In this context, a specific challenge for the sector is to develop the food processing industry, to increase value-added products, to stimulate demand for a more diverse range of agricultural produce, and to incentivize professionalization of the farming sector.
- The fruit and spice sectors remain competitive but have still not fully recovered from damage caused by hurricanes in 2004–2005. Recovery of the nutmeg sector is also threatened by the spread of the fungal disease, nutmeg wilt.

Productivity Indicators

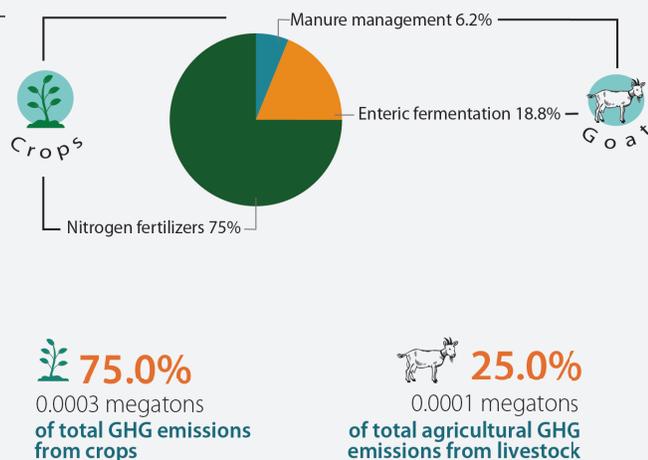


* Organization for Economic Co-operation and Development

GHG Emissions [14]



Agriculture GHG Emissions [14]



Agriculture and climate change

As a small island developing state (SIDS), Grenada is one of the world's most at-risk countries for climate change. A one meter sea level rise would destroy the country's airport, major ports, and 11% of the tourism infrastructure [15]. Rising sea levels are already leading to increased coastal erosion in some areas. Due to the mountainous topography, direct effects of rising sea levels on agriculture would be less severe; 3% of the agricultural land would be lost if sea levels rose by one meter [15]. However, more widespread damage to agricultural systems can be expected as a result of saline intrusions into coastal aquifers, a problem that is already being experienced in some areas.

Grenada is located to the south of the hurricane belt. However, the country was severely affected by two hurricanes in consecutive years (2004 and 2005), the first for more than half a century. Hurricane Ivan in 2004 caused a total of almost US\$900 million in damages [16], twice Grenada's GDP at the time. Grenada is expected to be increasingly vulnerable to hurricanes as a consequence of the increased intensity and changed distribution of tropical cyclones associated with rising sea temperatures.

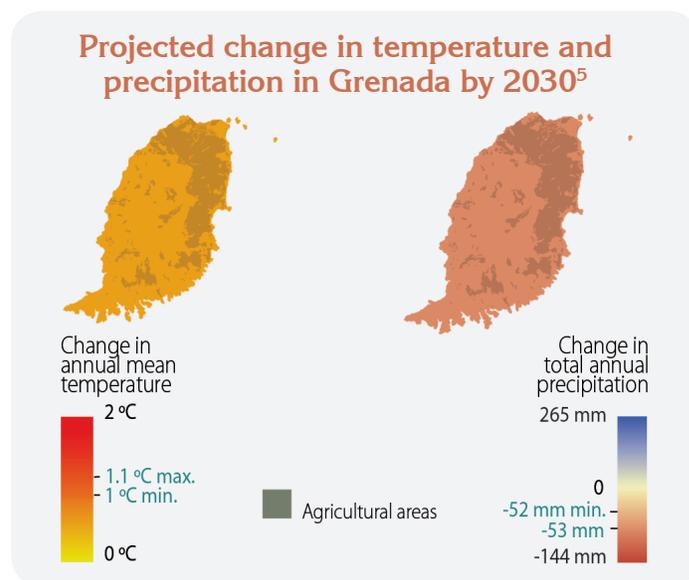
Grenada is also likely to be affected by changing and increasingly erratic temporal rainfall patterns and overall trends towards higher temperatures, higher evapotranspiration, and longer and more severe dry seasons.⁴ Carriacou and Petite Martinique, which have few surface water resources, will be severely impacted by these trends. In 2010, the country suffered the first drought in its history, with serious effects on agricultural production.

Both changes in precipitation and temperature raise concerns as to water availability for agriculture. The adoption of CSA practices by all sectors will be a key element in a successful response to the multi-faceted challenges outlined above.

CSA technologies and practices

CSA technologies and practices present opportunities for addressing climate change challenges, as well as for economic growth and development of agriculture sectors. For this profile, practices are considered CSA if they maintain or achieve increases in productivity 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 [2].

In Grenada, the largest agricultural production systems, namely nutmeg and spice production, are inherently "climate smart." These arboreal crops sequester carbon, make a vital contribution to soil and watershed protection in upland areas, and are relatively drought resistant. However, shallow-rooted nutmeg trees are vulnerable to hurricane damage. Farmers have responded to this threat by diversifying into alternative export crops, including cocoa and tropical fruits. Beekeeping is another promising option for productive use of lands occupied by forests and perennial crops.



For growers of fruits and vegetables, water scarcity is the most immediate challenge posed by climate change. Although interest in water capture and irrigation techniques, including the use of solar powered systems, is growing, adoption rates remain low for all but larger commercial producers. The difficulty of obtaining imported irrigation equipment is a major limiting factor.

Increasingly erratic rainfall patterns pose a number of challenges for Grenadine farmers. Heavy rains erode agricultural soils and damage crops. They can also increase fertilizer runoff, threatening the integrity of the island's protected marine areas. Droughts can lead to temporary food scarcity and reduced productivity of grazing pastures. On the other hand, favorable weather can result in a glut of produce that exceeds demand from the country's small domestic market.

Despite attempts by the government to prohibit agricultural burning, the practice is still widespread among small farmers. As well as increasing the risk of soil erosion, burning is the cause of bush and forest fires that destroy beneficial habitats for bees and other pollinating insects. Moreover, bringing these fires under control places further strain on scarce water resources.⁶

CSA practices that could address these challenges include the cultivation of roots and tubers, intercropping, improved controls on agrochemical use, and cut-and-carry pastures for the livestock sector. Adoption rates for these practices are still relatively low, indicating the need to expand extension services, invest in research programs to identify and validate "farmer-friendly" techniques, and provide management and marketing support services.⁶

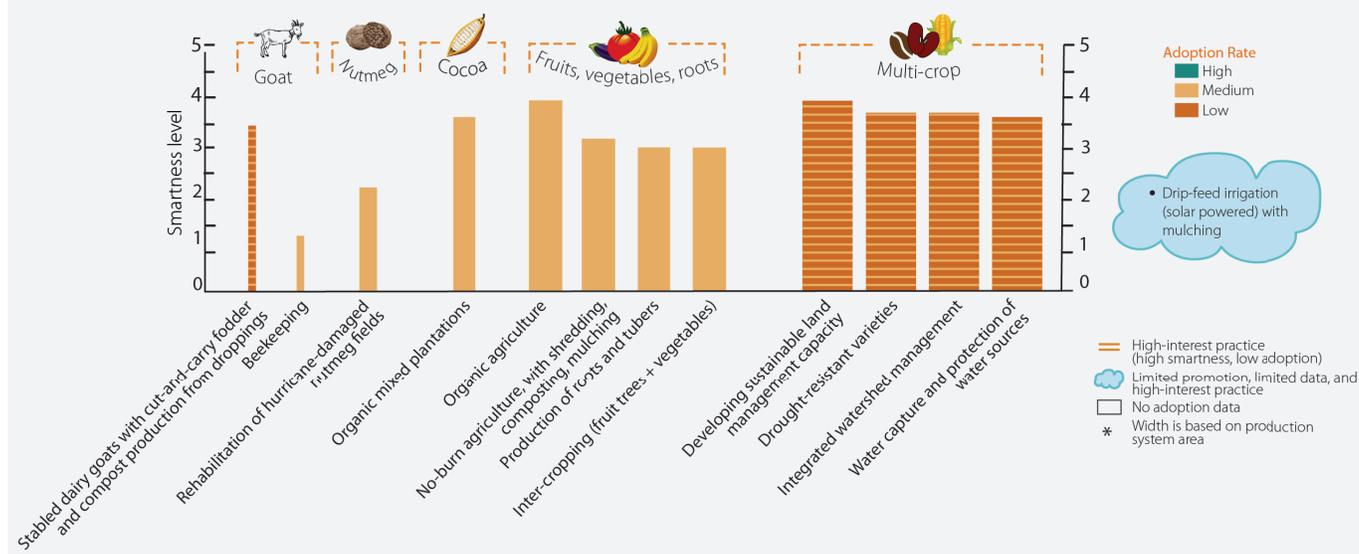
A key policy response to the variability of production and small size of the local market is the development of the food processing industry, where good progress is being made. There is potential to develop links with a growing number of organic agricultural producers in response to the demand for certified products from the tourism and export markets.

⁴ See Annex V.

⁵ Projections based on RCP 4.5 emissions scenario [17] and downscaled using the Delta Method [18], agricultural areas from [9].

⁶ See Annex VI.

Selected Practices for each Production System with high Climate Smartness



The graph above displays the smartest CSA practices for each of the key production systems in Grenada. Both ongoing and potentially applicable practices are displayed, and practices of high interest for further investigation or scaling out are highlighted. Climate smartness is ranked from 1 (very low positive impact in category) to 5 (very high positive impact in category).

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

The assessment of a practice's climate smartness uses the average of the rankings for each of six smartness categories: weather; water; carbon; nitrogen; energy; and knowledge. Categories emphasize the integrated components related to achieving increased adaptation, mitigation, and productivity.

	CSA Practice	Climate Smartness	Adaptation	Mitigation	Productivity
Goats 3% of land use are	Stabled dairy goats with cut-and-carry fodder and compost production from droppings ■ Low adoption (<30%)		Cut-and-carry fodder crops are resilient to droughts and provide erosion protection on the island's mountainous terrain.	Carbon capture through soil conservation, fodder tree planting, and composting of droppings.	Processing produces high-value products for export and sale to tourists.
	Beekeeping ■ Medium adoption (30–60%)		Productive use of forest areas required for watershed protection.	No direct benefits, but provides an incentive for forest conservation.	High-value product with export potential.
Nutmeg 9% of harvested area	Rehabilitation of hurricane-damaged nutmeg fields ■ Medium adoption (30–60%)		Nutmeg trees protect watersheds in upland areas.	Carbon capture through increased tree cover and soil conservation.	Productive use of otherwise marginal uplands; high-quality products for export.

	CSA Practice	Climate Smartness	Adaptation	Mitigation	Productivity
Cocoa 11% of harvested area	Organic mixed cocoa plantations ■ Low adoption (<30%)		Deep rooted cocoa plants + shade trees + organic mulch provides resistance to droughts, heavy rains and hurricanes.	Carbon capture through increased tree cover and soil conservation.	Certified organic cocoa is a quality export product with link to processing (chocolate production); diversity of fruit species increases economic security.
Fruit, vegetable & root crops More than 50% of harvested area	No-burn agriculture (with shredding, composting, mulching) ■ Medium adoption (30–60%)		Protection of soils against extreme climate events.	Conservation of soil carbon; reduced emissions from burning; reduced risk of forest fires.	Sustainable land use for production of staple foods.
	Production of roots and tubers ■ Medium adoption (30–60%)		Relatively resistant to irregular rainfall and hurricane damage.	No direct benefits.	Enhanced food security through production of staple foods.
	Intercropping (fruit trees and vegetables) ■ Low adoption (<30%)		Woody species intercept water and fertilizer runoff, protect soils against heavy rains; efficient use of rainfall and fertilizers.	Some carbon capture through soil conservation and tree planting; reduced nitrogen emissions through more efficient use of fertilizer.	Improved yields; economic security through diversification of production.
Multiple crops 100% of harvested area and pastures	Water capture and protection of water sources ■ Low adoption (<30%)		Resilience to drought and unpredictable rainfall patterns.	No direct benefits.	Increased quality and quantity of production; continuity of production.

Carbon smart
 Water smart
 Weather smart
 Nitrogen smart
 Energy smart
 Knowledge smart

Case Study:

Organic cocoa plantations in Grenada

Organic cocoa plantations are established in association with banana to provide shade. The bananas are retained as a component of the mature plantation, alongside other fruit and shade-producing species. Leaves and flowers that drop from shade trees as well as undergrowth that is cleared at the end of the dry season and left *in situ* act as a mulch. Because it is a permanent plantation, organic cocoa captures carbon and is relatively resistant to drought. Cocoa is a deep-rooted species that is resilient to tropical storms. The organic mulches help prevent soil erosion and retain soil moisture. The fruit trees provide a diversity of produce over the course of the year, including export crops, such as cashew nut, cinnamon, golden apple (*Spondias mombin*), and soursop (*Annona muricata*). Thus organic cocoa is an



integrated, climate-smart farm system that provides benefits related to production, adaptation, and mitigation.

Organic cocoa production also has benefits for the wider economy and helps raise awareness of climate change issues. The Grenada Organic Cocoa Farmers Co-operative Society consists of about 12 farmers who have received organic certification through the German company Ceres. They have formed a strategic partnership with the Grenada Chocolate Company, using local labor to make premium quality dark organic chocolate for export and to supply the tourism

industry. Cocoa production and processing facilities are themselves a tourist attraction and are becoming part of the wider agritourism experience offered on some Grenadine estates.

Institutions and policies for CSA

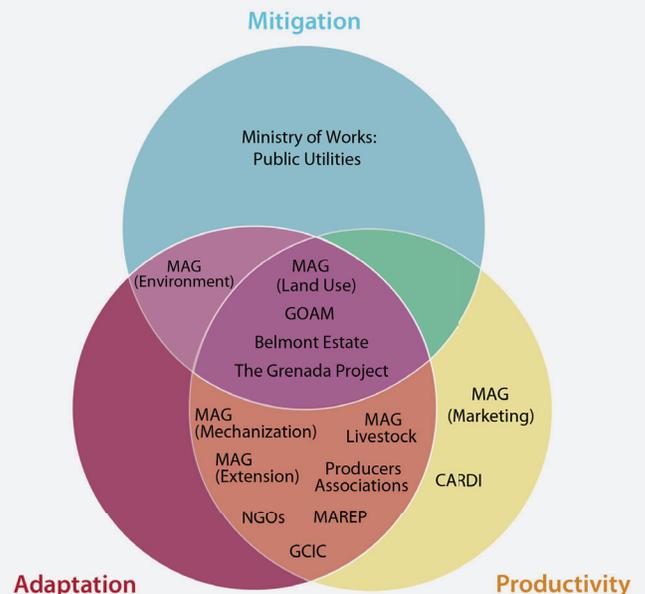
Climate change is a cross-cutting issue that influences all aspects of policy and much of daily life in Grenada. Institutional stakeholders in the agricultural sector and elsewhere have no doubt that climate change poses significant and imminent threats to both human livelihoods and the environment. Thus almost all CSA-related institutions are contributing to adaptation efforts. Less emphasis is placed on the mitigation pillar, given Grenada's limited potential as a small island economy to contribute to global mitigation efforts.

Key national institutions for CSA are shown in the following diagram, along with their principal areas of activities among the three CSA pillars: production, adaptation, and mitigation.

At a national level, the key state institution is the Ministry of Agriculture, Lands, Forestry, Fisheries, and the Environment (MAG). This Ministry is responsible for both agriculture and the environment, thus avoiding possible conflicts of interest between these two sectors. However, the multitude of tasks assigned to this Ministry, in combination with complex decision-making structures, can act to slow down policy development.

Overall, climate change policy is coordinated by the recently created Environment Division within MAG. The Division's focus is on coastal and marine areas under the guiding principle of Ecosystem-Based Adaptation, and a multi-sectoral National Climate Change Committee has been set up but is not yet fully functional.

Primary Focus of Institutions Engaged in CSA



Within MAG, responsibility for agriculture is shared among the Land Use, Extension, Farm Machinery/Mechanization, and Veterinary and Livestock divisions, all of which support both production and adaptation activities. Within the Land Use division, the Irrigation Management Unit is a key agency for adaptation to drought risk and water scarcity. Support for production and marketing is provided by state-run purchasing agencies: the Marketing and National Importing Board (MNIB), the Grenada Cocoa Association (GCA), and the Grenada Co-operative Nutmeg Association (GCNA). Responsibility for watershed protection, which responds to both adaptation and wider mitigation objectives, is shared between the Land Use division and the Physical Development and Public Utilities division of the Ministry of Works.

An important ongoing initiative that supports CSA activities (production and adaptation) is the Market Access and Rural Enterprise Development Program (MAREP), operated jointly by MAG and the Ministry of Works. This initiative provides support for sustainable agriculture and livestock investment proposals, including technical and business appraisals and recommendations to credit agencies. It also coordinates a rural road-building program.

Grenada's business community, including agriculture and agro-processing, is represented by the Grenada Chamber of Industry and Commerce (GCIC). For CSA, two key partner organizations in the private sector are the Belmont Estate and The Chocolate Factory, producers of organic cocoa and organic chocolate, respectively.

Among non-government agencies, the regional NGO Caribbean Agricultural Research and Development Institute (CARDI) has an office in Grenada. Its activities are focused on research for productivity of the fruit, vegetable and livestock sectors, but without an explicit focus on adaptation to climate change. The regional NGO CARIBSAVE (part of the global INTASAVE partnership), whose focal areas include climate change adaptation and governance, as well as green growth and the blue economy, currently operates three projects in Grenada and Carriacou. The Grenada Project, an NGO with offices in Grenada and the USA, supports a range of CSA activities.

The NGO sector also contains many of the agricultural producers associations on the island, including locally based groups and national organizations, such as the Grenada Community Development Agency (GRENCODA), the Grenada Agricultural Forum for Youth (GAFY), and the Grenada Network of Rural Women Producers (GRENROP). The principal objective of these associations is to support agricultural production and livelihoods. Local NGOs with a more explicit orientation towards CSA include the Grenada Organic Agriculture Movement (GOAM), the Grenada Association of Beekeepers (GAB), and the Grenada Goat Dairy Project.

The small island states of the Caribbean have established a number of regional organizations to coordinate policy and

facilitate participation in global initiatives, including climate change initiatives. Grenada is one of the nine members of the Organization of Eastern Caribbean States (OECS), a regional group that coordinates several important climate change projects funded by multilateral and bilateral aid agencies. Grenada is also a member of the Caribbean Community (CARICOM), which has established a number of agencies to coordinate the regional response to climate change, including the Caribbean Community Climate Change Centre (CCCCC) and the Caribbean Catastrophe Risk Insurance Facility (CCRIF). Another regional group that is relevant for CSA is the Caribbean Meteorological Organization (CMO), which is responsible for the operations of the Caribbean Institute for Meteorology and Hydrology (CIMH).

As a member of CARICOM, Grenada has played an active role in the development of regional climate change policy, as set out in the Regional Framework for Achieving Development Resilient to Climate Change (2009–2015).

Also at the regional level, important progress has been made towards the development of comprehensive policies for climate risk insurance through the CCRIF, which offers member countries, including Grenada, the option of purchasing insurance against earthquakes, hurricanes and, most recently, excessive rainfall. The insurance coverage will increase the climate resilience of agriculture along with other sectors of the economy.

At the national level, a Climate Change Policy and Action Plan was developed for the years 2008–2011, but this time-limited policy document has not been renewed or updated. More recently, the Grenada Strategic Program for Climate Resilience (SPCR) was prepared for the Pilot Program for Climate Resilience (PPCR) in 2011. The First Programmatic Resilience Building Development Policy Credit currently under consideration by the World Bank will include support to enhance the country's resilience against natural disasters. Neither of these two recent policy documents considers agriculture in detail or contains proposals for CSA.

Overall, policy for agriculture is set out in the FAO Country Program Framework (CPF) 2011–2016. The Grenada Nutmeg Sector Development Strategy (GNSDS) 2010–2015 is a detailed policy proposal for the recovery of this key production system. The CPF identifies climate change as a priority area, but contains no specific proposals for CSA; the GNSDS contains proposals for climate risk management but does not consider the wider impacts of ongoing climate change on the nutmeg sector [12].

As noted above, policy initiatives have so far tended to consider agriculture and climate change separately. They have not yet brought these two key issues together in a way that provides a comprehensive strategic framework for CSA development. However, the Annual Agricultural Reviews published by MAG provide evidence of the growing importance of climate change adaptation in ongoing policy development. The most recent annual review, covering the years 2010–11, provides details of two major landscape-scale projects that will contribute to CSA

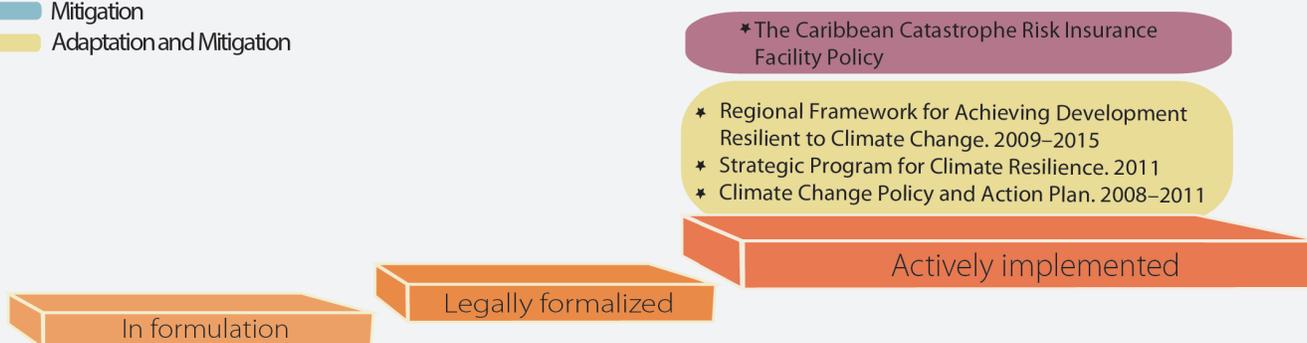
by restoring and protecting watersheds that supply agricultural areas: the Land Degradation Project and the Sustainable Land Management Project. These projects encompass a wide range of activities including GIS development, capacity building, landscape restoration, and demonstration projects.

A new project, Integrated Climate Change Adaptation Strategies (ICCAS), funded by the German Agency for International Cooperation (GIZ), will provide support for strategic climate change adaptation planning and help develop the operational capacity of the National Climate Change Committee.

Enabling Policy Environment for CSA

Policies listed are related to enhancing **agricultural productivity** and:

- Adaptation
- Mitigation
- Adaptation and Mitigation



Financing CSA

National finance

A number of specific incentives and support schemes for CSA are in operation in Grenada, directed by the Ministry of Agriculture:

- Plant propagation programs for distribution of nutmeg, cocoa, and fruit plants to producers.
- The Farm Labor Support Program, which provides free labor to rehabilitate nutmeg and cocoa fields.
- Donation of equipment, loans, and technical and financial advice for irrigation installation. Water harvesting and irrigation are priorities on Carriacou and Petite Martinique [8].

As yet there are no more generally applicable financial mechanisms in place for scaling up CSA.

International finance

As a SIDS, Grenada is a priority country for multilateral climate change adaptation funding. The Caribbean Regional Climate Centre of the United Nations Framework Convention on Climate

Change (UNFCCC-CRCC) is located on the island. Grenada also participates in and receives funding for regional group memberships, including the OECS and the African Caribbean and Pacific Group of States (ACP).

Finance for climate-change-related activities over the past ten years (including regional initiatives in which Grenada has participated) has focused on coastal ecosystems, disaster risk reduction, and economic resilience. Key sources of finance have included: the UN's Economic Commission for Latin America and the Caribbean (ECLAC), UNFCCC's Global Facility for Disaster Reduction and Recovery (GFDRR), the multilateral PPCR, the World Bank, and the German International Climate Initiative (IKI).

Grenada has been allocated a total of US\$4.6 million from Global Environment Facility 5 (GEF-5) funding under these focal areas: biodiversity protection, land degradation, and climate change mitigation and adaptation.

Historically, mainstream financial aid for the agricultural sector has been sourced from the Food and Agriculture Organization of the United Nations (FAO) and the European Union (EU). The Inter-American Institute for Cooperation on Agriculture (IICA) provides

technical support, working closely with NGOs and producers associations to promote sustainable agricultural development, food security, and rural prosperity. For a number of years the Chinese Agricultural Technical Mission (CATM) has provided ongoing material and technical support. A number of more recent initiatives, at both regional and national scales, include components that either explicitly or implicitly support CSA development.

Potential finance

At present, Grenada does not participate in international carbon markets. Nevertheless, given the preponderance of plantation-based agriculture and the extent of forest cover on the island, carbon markets represent a major opportunity to increase income generation from forestry and perennial agriculture. Funds generated could be used to incentivize CSA adoption by small-scale producers.

Increased participation in certification schemes for cocoa and other products, such as tropical fruits, could provide further economic incentives for CSA adoption, and for further development of the key food processing sector.

A potential source of funding for innovative CSA initiatives by the private sector is the “Compete Caribbean” development program, funded by the Inter-American Development Bank (IDB), the UK Department for International Development (DFID) and the Canadian government, in association with the Caribbean Development Bank (CDB).

The formal adoption of a comprehensive climate change strategy that explicitly incorporates CSA would provide a policy framework to facilitate access to additional international funding, e.g., from

the UNFCCC’s Adaptation Fund (AF) and the International Fund for Agricultural Development (IFAD)’s Adaptation for Smallholder Agriculture Program (ASAP).

Outlook

As a SIDS, Grenada is one of the world’s most vulnerable countries to the impacts of climate change, especially rising sea levels, increasingly erratic rainfall patterns, and a likely increase in the frequency and severity of extreme weather events. A coordinated response to these multiple challenges is required on the basis of a comprehensive climate change strategy that incorporates CSA. Appropriate measures to promote the adoption of CSA practices include incentive schemes, capacity building, improved access to climate information as the basis for informed decision making, expanding extension services, and investing in research programs to identify and validate “farmer-friendly” CSA techniques for the island. Development of the food processing sector is an essential component of CSA in Grenada in response to the variability of production and the small size of the local market. There is potential to develop links between food processing and organic agricultural producers to meet demand for certified products from the tourism and export markets.

The plantation-based agriculture typical of Grenada’s producers predisposes the sector towards eligibility for carbon financing and trading mechanisms and the broad international donor network that accompanies them. Most importantly, the formal adoption of a climate change strategy that incorporates CSA would provide a policy framework to facilitate access to additional international funding to make the widespread adoption of CSA feasible in the Grenadine context.

Funds for Agriculture and Climate Change

Funds for Agriculture and Climate Change

ACP African, Caribbean, and Pacific Group of States
AF Adaptation Fund **CARDI** Caribbean Agricultural Research and Development Institute **CATM** Chinese Agricultural Technical Mission **CBD** Caribbean Development Bank
CDM Clean Development Mechanism **CDKN** Climate and Development Knowledge Network **CEPF** Critical Ecosystem Partnership Fund **CIF** Climate Investment Funds **EU** European Union **FAO** Food and Agriculture Organization of the United Nations **GCCA** Global Climate Change Alliance **GCF** Green Climate Fund **GDB** Grenada Development Bank **GEF** Global Environment Facility **GIZ** German Agency for International Cooperation **ICF** UK’s International Climate Fund **IDB-MIF** Inter-American Development Bank - Multilateral Investment Fund **IFAD** International Fund for Agricultural Development **IICA** Inter-American Institute for Cooperation on Agriculture **IKI** German International Climate Initiative **JICA** Japan International Cooperation Agency **MAG** Ministry of Agriculture **NICFI** Norway’s International Climate and Forest Initiative **OAS** Organization of American States **OECS** Organization of Eastern Caribbean States **SAIP** Sustainable Agriculture Initiative Platform **SCF** UNFCCC Strategic Climate Fund **UNDP** United Nations Development Programme **UN-ECLAC** United Nations Economic Commission for Latin America and the Caribbean **UN-REDD** United Nations Programme for Reducing Emissions from Deforestation and Forest Degradation



Private sector · Credit sector · NGOs

National Funds

★ Accessed Funds ★ Financing opportunities



AF · CDKN · CDM · CIF · Ford Foundation · GCF · ICF · IDB-MIF · JICA · NICFI · SAIP · UN-REDD ·

International Funds

Works Cited

- [1] **FAO. 2010.** “Climate-Smart” Agriculture. Policies, practices and financing for food security, adaptation and mitigation. Rome: Food and Agriculture Organization of the United Nations (FAO).
- [2] **FAO. 2013.** Climate-smart agriculture sourcebook. Rome: FAO.
- [3] **The World Bank. 2012.** World Development Indicators. Washington, D.C.: The World Bank. (Available from <http://data.worldbank.org/data-catalog/world-development-indicators>) (Accessed on 2 April 2014).
- [4] **CARDI. 2014.** Grenada: country profile. St. Augustine, Trinidad and Tobago: Caribbean Agricultural Research and Development Institute (CARDI). (Available from: <http://www.cardi.org/country-offices/grenada/>)
- [5] **FAOSTAT. 2014.** FAOSTAT database. Rome: FAO Statistics Division. (Available from <http://faostat3.fao.org/faostat-gateway/go/to/home/E>) (Accessed on 2 September 2014).
- [6] **CCDP. 2001.** 2000 National Census Report: Grenada. Greater Georgetown: CARICOM Secretariat.
- [7] **IFAD. 2014.** Rural poverty in Grenada. International Fund for Agricultural Development (IFAD). (Available from: <http://www.ruralpovertyportal.org/country/home/tags/grenada>)
- [8] **MAG. 2009.** Land use map of Grenada. St. George’s: MAG.
- [9] **UN-HABITAT. ND.** Scoping Report: Addressing Land Issues after Natural Disasters, 48 p.
- [10] **Lewis P. 2010.** Social policies in Grenada. London: Commonwealth Secretariat and United Nations Research Institute for Social Development (UNRISD).
- [11] **MAG. 2013.** 2010–2011 Annual Agricultural Review Grenada W.I. St. George’s: Ministry of Agriculture, Lands, Forestry, Fisheries & Environment (MAG).
- [12] **Government of Grenada. 2010.** Grenada Nutmeg sector 2010–2015 Development Strategy.
- [13] **William AN. 2003.** Country experience in land use issues: Grenada. Trinidad and Tobago: Ministry of Agriculture, Land and Marine Resources.
- [14] **Government of Grenada. 2000.** Grenada’s Initial Communication to the UNFCCC. St. George’s: Government of Grenada.
- [15] **Simpson M; Scott D; Harrison M; Sim R; Silver N et al. 2010.** Quantification and Magnitude of Losses and Damages Resulting from the Impacts of Climate Change: Modelling the Transformational Impacts and Costs of Sea Level Rise in the Caribbean (Full Report). Barbados, W.I.: United Nations Development Programme (UNDP).
- [16] **OECS. 2004.** Grenada: Macro-socio-economic Assessment of the Damages caused by Hurricane Ivan. Castries, St. Lucia: Organization of Eastern Caribbean States (OECS).
- [17] **Collins M; Knutti R; Arblaster J; Dufresne JL; Fichefet T; Friedlingstein P; Gao X; Gutowski WJ; Johns T; Krinner G; Shongwe M; Tebaldi C; Weaver AJ; Wehner M. 2013.** Long-term Climate Change: Projections, Commitments and Irreversibility. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker TF; Qin D; Plattner GK; Tignor M; Allen SK; Boschung J; Nauels A; Xia Y; Bex V; Midgley PM. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1029–1136, [doi:10.1017/CBO9781107415324.024](https://doi.org/10.1017/CBO9781107415324.024).
- [18] **Ramírez J; Jarvis A. 2008.** High-Resolution Statistically Downscaled Future Climate Surfaces. International Center for Tropical Agriculture (CIAT); CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Cali, Colombia.

For further information and online versions of the Annexes, visit:
<http://dapa.ciat.cgiar.org/CSA-profiles/>

Annex I: Acronyms

Annex II: Agriculture and foreign trade in Grenada

Annex III: Land use in Grenada

Annex IV: Nutmeg and cocoa production in Grenada

Annex V: Climate change projections for Grenada

Annex VI: CSA practices in Grenada: a detailed list

This publication is a product of the collaborative effort between CIAT, lead Center of the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS); CATIE; and the World Bank to identify country-specific baselines on CSA in seven countries in Latin America: Argentina, Colombia, Costa Rica, El Salvador, Grenada, Mexico, and Peru. The document was prepared under the co-leadership of Andrew Jarvis and Caitlin Corner-Dolloff (CIAT), Claudia Bouroncle (CATIE), and Svetlana Edmeades and Ana Bucher (World Bank).

The main author of this profile is Andrew Halliday (CATIE) and the team was comprised of Claudia Medellín (CATIE), Andreea Nowak (CIAT), Miguel Lizarazo (CIAT), Pablo Imbach (CATIE), Beatriz Zavariz-Romero (CIAT), Rauf Prasodjo (CIAT), María Baca (CIAT), Karolina Argote (CIAT), Chelsea Cervantes De Blois (CIAT), and Bastiaan Louman (CATIE).

This document should be cited as:

World Bank; CIAT; CATIE. 2014. Climate-Smart Agriculture in Grenada. CSA Country Profiles for Latin America Series. Washington, D.C.: The World Bank Group.

Original figures and graphics: Fernanda Rubiano

Graphics editing: CIAT

Scientific editor: Caitlin Peterson

Design and layout: Green Ink and CIAT

Acknowledgements

Special thanks to the institutions that provided information for this study: GIZ, ICCAS, MAG, MAREP, UNFCCC RCC, TGD, and The Belmont Estate.

This profile has benefited from comments received from World Bank colleagues: Willem Janssen, Marc Sadler, and Eija Pehu, as well as from Eli Weiss.