



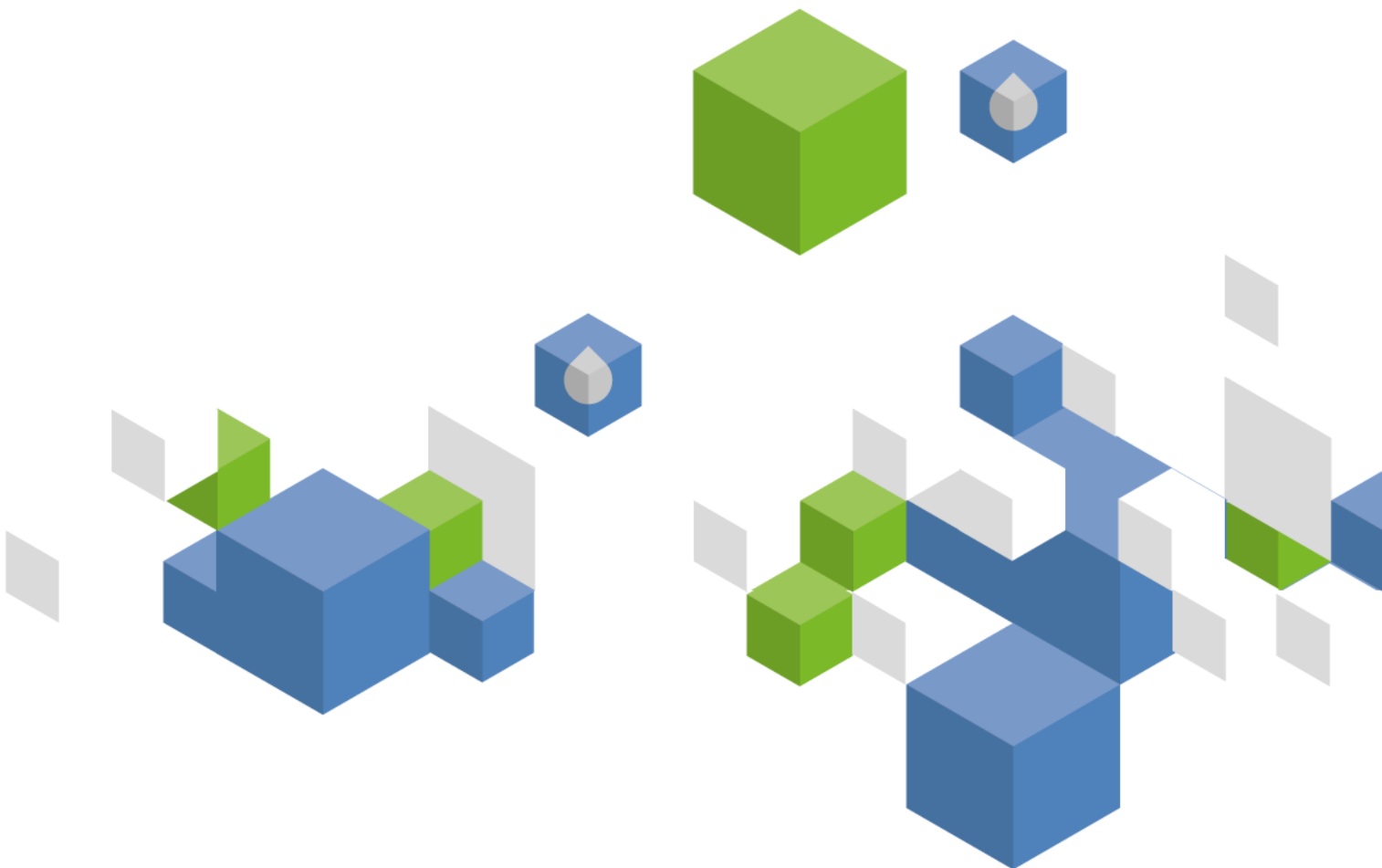
Food and Agriculture Organization  
of the United Nations

FAO  
AQUASTAT  
Reports

# Country profile – Grenada

---

Version 2015





Recommended citation: FAO. 2015. AQUASTAT Country Profile – Grenada.  
Food and Agriculture Organization of the United Nations (FAO). Rome, Italy

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned.

The views expressed in this information product are those of the author(s) and do not necessarily reflect the views or policies of FAO.

FAO encourages the use, reproduction and dissemination of material in this information product. Except where otherwise indicated, material may be copied, downloaded and printed for private study, research and teaching purposes, or for use in non-commercial products or services, provided that appropriate acknowledgement of FAO as the source and copyright holder is given and that FAO's endorsement of users' views, products or services is not implied in any way.

All requests for translation and adaptation rights, and for resale and other commercial use rights should be made via [www.fao.org/contact-us/licencerequest](http://www.fao.org/contact-us/licencerequest) or addressed to [copyright@fao.org](mailto:copyright@fao.org).

FAO information products are available on the FAO website ([www.fao.org/publications](http://www.fao.org/publications)) and can be purchased through [publications-sales@fao.org](mailto:publications-sales@fao.org).

© FAO 2015

# Grenada

## GEOGRAPHY, CLIMATE AND POPULATION

### Geography

Grenada is a tri-island state, located at longitude 61°4'W and latitude 12°4'N. It is situated 145 km north of Trinidad and Tobago and is the most southerly of the Windward Islands. The total area of the country is 340 km<sup>2</sup>. Grenada, which is 34 km long and 19 km wide, accounts for 89 percent of the area, and Carriacou and Petit Martinique account for 10 percent and 1 percent respectively. Grenada is mostly volcanic in origin, of steep rugged topography, with a main mountain chain running almost north-south in two main sections. The island is politically divided into six parishes, all of them on the island of Grenada (Saint Andrew, Saint David, Saint George, Saint John, Saint Mark and Saint Patrick), and 1 dependency (Carriacou and Petite Martinique together). The capital is Saint George's.

The Draft Land Development Policy of the Ministry of Agriculture (1995) classifies 74.9 percent of the total land mass, or 25 500 ha, as being suitable for agriculture. In 2012, the total physical cultivated area was estimated at 10 000 ha, of which 70 percent (7 000 ha) consisted of permanent crops and 30 percent (3 000 ha) of temporary crops. Permanent meadows and pasture cover 1 000 ha, which brings to total agricultural area to 11 000 ha (Table 1).

### Climate

The climate can be classified as semi-tropical with a marked dry season from January to May and a wet season running from June to December. Spatial variations in annual rainfall range from about 1 000 mm near the coast to more than 4 500 mm in the central mountains, with an average totaling 2 350 mm (Table 2).

### Population

In 2013, the total population was about 106 000 inhabitants, of which around 60 percent was rural (Table 1). Population density is 312 inhabitants/km<sup>2</sup>. The average annual population growth rate in the 2003-2013 period has been estimated at 0.2 percent.

In 2012, 97 percent of the total population had access to improved water sources (99 and 95 percent in urban and rural areas respectively) and 98 percent of the total population had access to improved sanitation (both in urban and rural areas).

## ECONOMY, AGRICULTURE AND FOOD SECURITY

In 2013, the gross domestic product (GDP) was US\$ 834 million. Agriculture accounted for 5 percent of GDP, while in 1992 it accounted for 11 percent. In 2013, total population economically active in agriculture is estimated at 9 000 inhabitants (20 percent of economically active population), of which 22 percent is female and 78 percent is male.

FIGURE 1  
Map of Grenada

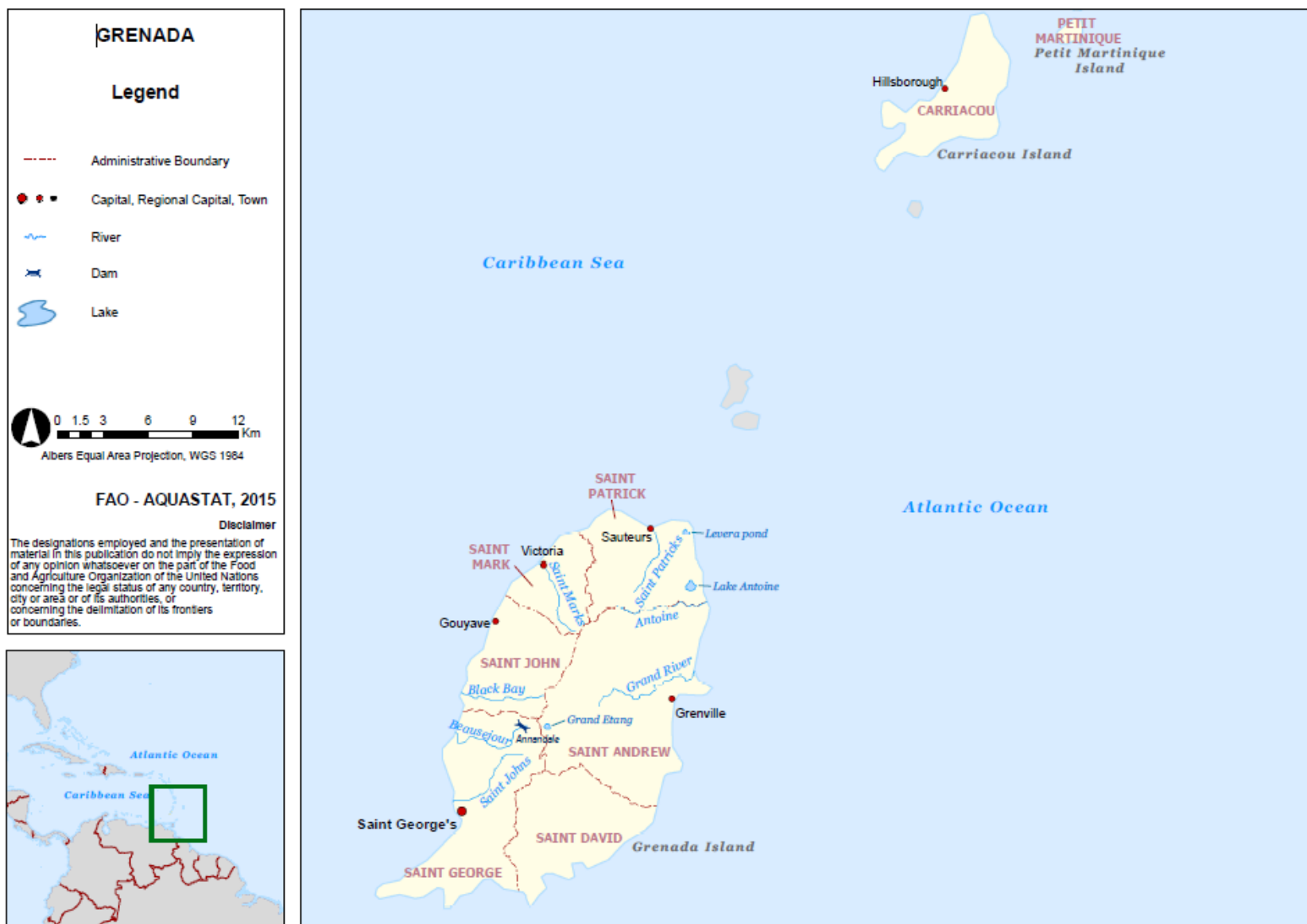


TABLE 1  
Basic statistics and population

Physical areas:			
Area of the country	2012	34 000	ha
Agricultural land (permanent meadows and pasture + cultivated land)	2012	11 000	ha
• As % of the total area of the country	2012	32	%
• Permanent meadows and pasture	2012	1 000	ha
• Cultivated area (arable land + area under permanent crops)	2012	10 000	ha
- As % of the total area of the country	2012	29	%
- Arable land (temp. crops + temp. fallow + temp. meadows)	2012	3 000	ha
- Area under permanent crops	2012	7 000	ha
Population:			
Total population	2013	106 000	inhabitants
- Of which rural	2013	60	%
Population density	2013	312	inhabitants/km <sup>2</sup>
Population economically active	2013	46 000	inhabitants
• As % of total population	2013	43	%
• Female	2013	40	%
• Male	2013	60	%
Population economically active in agriculture	2013	9 000	inhabitants
• As % of total economically active population	2013	20	%
• Female	2013	22	%
• Male	2013	78	%
Economy and development:			
Gross Domestic Product (GDP) (current US\$)	2013	834	million US\$/year
• Value added in agriculture (% of GDP)	2012	5	%
• GDP per capita	2013	7 869	US\$/year
Human Development Index (highest = 1)	2013	0.744	-
Gender Inequality Index (equality = 0, inequality = 1)	2013	-	-
Access to improved drinking water sources:			
Total population	2012	97	%
Urban population	2012	99	%
Rural population	2012	95	%

TABLE 2  
Renewable water resources

Renewable freshwater resources:			
Precipitation (long-term average)	-	2 350	mm/year
	-	799	million m <sup>3</sup> /year
Internal renewable water resources (long-term average)	-	200	million m <sup>3</sup> /year
Total renewable water resources	-	200	million m <sup>3</sup> /year
Dependency ratio	-	0	%
Total renewable water resources per inhabitant	-	1 887	m <sup>3</sup> /year
Total dam capacity	2014	0.022	million m <sup>3</sup>

## WATER RESOURCES

### Surface water and groundwater resources

Grenada has an average annual precipitation of 2 350 mm, or 799 million m<sup>3</sup> and renewable water resources are estimated at about 200 million m<sup>3</sup>/year (Table 2).

Water resources originate mainly from a system of permanent streams and rivers but there is some groundwater available from the limestone areas along the northwest coast. Most of the surface water originates from the high rainfall areas in the central mountain ranges of Grenada island. Overall, there are 71 river basins on the island, of which the eight largest are: Grand River (4 574 ha), Beausejour (3 793 ha), Pearls (1 500 ha), Saint Patricks (1 253 ha), Bailes Bacolet (1 233 ha), Antoine (1 102 ha),

Saint Johns (1 208 ha) and Saint Marks (835 ha). All major rivers have perennial flows, though these are significantly reduced during the dry season.

Rainwater harvesting was used widely in earlier times but it has declined with the improvement of public water supply. However, in some remote high elevation areas, where the public water supply is inaccessible, rainwater harvesting is often the main source of potable water. Rainwater harvesting ponds are used in livestock production and, in a few cases, for the provision of water for intensive vegetable production (UNDESA, 2012).

In 2014, total produced municipal wastewater in Grenada was estimated at 11.4 million m<sup>3</sup>.

### Lakes and dams

In 2014, total capacity of large dams (large dams in Grenada are those with a height of more than 4 m) was estimated at 22 000 m<sup>3</sup>. This capacity corresponds to the Annandale reservoir in the Beausejour river (5 000 m<sup>3</sup>), the Concord reservoir in the Black Bay river (4 000 m<sup>3</sup>), the Les Avocat reservoir in the Ballie's Bacolet river (6 000 m<sup>3</sup>), and the Mardi Gras reservoir in the St. Louis river (7 000 m<sup>3</sup>).

Grand Etang lake, with a surface area of about 8 ha, is within a basin of 86 ha of tropical rainforest. It is the only exploitable natural lake. Since the 1990s, during extreme dry seasons water from this lake has been used to supplement water supply.

Lake Antoine has a surface area of 6.5 ha. In the late 1990s, water from this lake was used for irrigation of organic bananas. The project was however unsuccessful due to the poor quality of the water, contaminated by agrochemical use.

Levera pond, with a surface area of 9.3 ha, is an ancient volcanic crater filled with a mixture of fresh and salt water. The pond is surrounded by red and white mangroves. Coconut palms, cactus and woody shrubs grow in the upland regions next to the pond. This lake holds no major importance for water supply, except for the occasional watering of livestock (UNDESA, 2012).

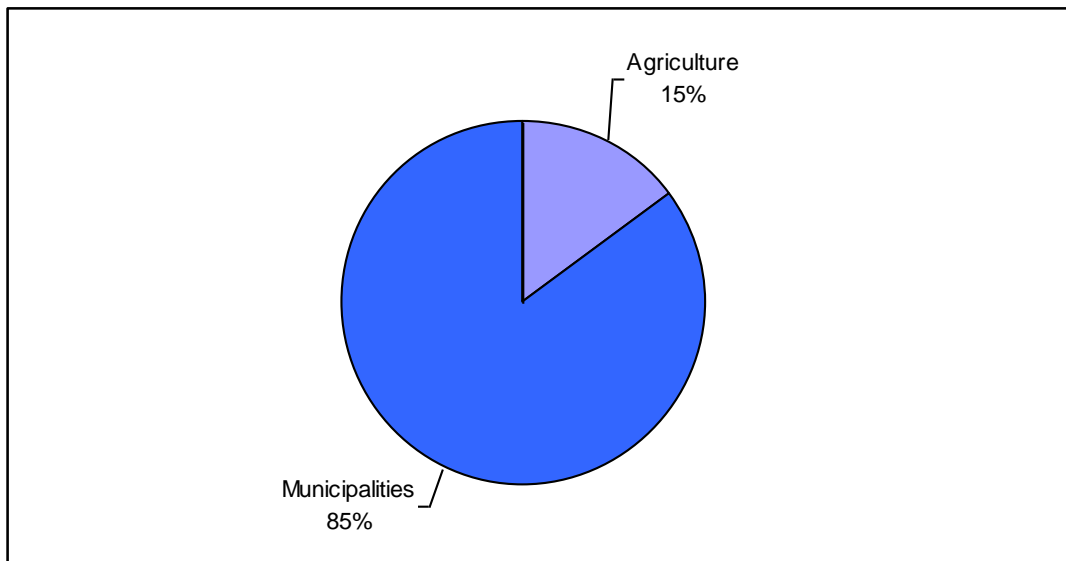
## WATER USE

In 2014 total water withdrawal was estimated at 14.1 million m<sup>3</sup> of which 12 million m<sup>3</sup> (85 percent) for municipalities, and 2 million m<sup>3</sup> (15 percent) for agriculture (Table 3 and Figure 2).

TABLE 3  
Water use

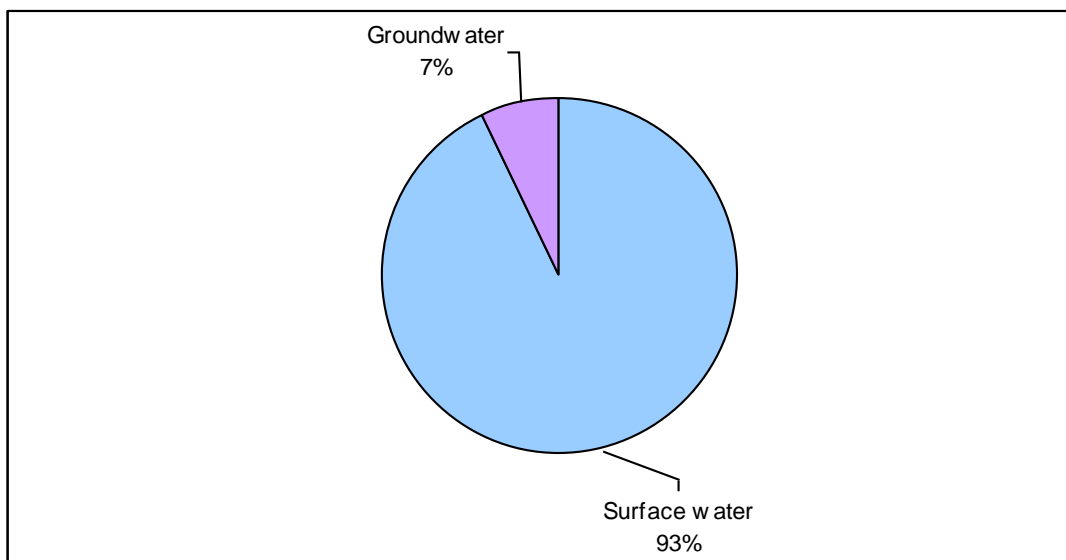
Water withdrawal:			
Total water withdrawal	2014	14.1	million m <sup>3</sup> /year
- Agriculture (Irrigation + Livestock + Aquaculture)	2014	2.1	million m <sup>3</sup> /year
- Municipalities	2014	12	million m <sup>3</sup> /year
- Industry	2014	0	million m <sup>3</sup> /year
• Per inhabitant	2014	133	m <sup>3</sup> /year
Surface water and groundwater withdrawal (primary and secondary)	2014	14.1	million m <sup>3</sup> /year
• As % of total actual renewable water resources	2014	7	%
Non-conventional sources of water:			
Produced municipal wastewater	2014	11.4	million m <sup>3</sup> /year
Treated municipal wastewater	-	-	million m <sup>3</sup> /year
Direct use of treated municipal wastewater	-	-	million m <sup>3</sup> /year
Direct use of agricultural drainage water	-	-	million m <sup>3</sup> /year
Desalinated water produced	-	-	million m <sup>3</sup> /year

FIGURE 2  
**Water withdrawal by sector**  
Total 14.1 million m<sup>3</sup> in 2014



Surface water and groundwater withdrawal account for 13.1 and 1 million m<sup>3</sup> respectively (Figure 3). Groundwater is used mainly during the dry season, since surface water yields can then drop by 25 percent (UNDESA, 2012).

FIGURE 3  
**Water withdrawal by source**  
Total 14.1 million m<sup>3</sup> in 2014



## IRRIGATION AND DRAINAGE

### Evolution of irrigation development

The irrigation potential has been quantified at 894 ha (Table 4). The limiting factor to the development of irrigation is that in many cases suitable land is and available water resources are located in different places.

Between the 1950s and 1960s, irrigation practices increased particularly for banana growing. Sprinklers were widely used on estates such as Paradise, Grand Bras, River Antoine and Mt. Rueil where water



was sourced through river diversion or pumped directly from the rivers. The decline of the plantation system during the 1970s reduced the irrigation areas. From 1979 to 1983, emphasis was placed on irrigation as a way of increasing productivity on the state farms using Eastern European and Cuban sprinkler irrigation systems. After 1983, many of the state farms were divided into small units and the government made efforts to improve irrigation technology including micro sprinklers and drip irrigation. Notwithstanding the availability of water, the success of the irrigation programme was low due to poor implementation (UNDESA, 2012).

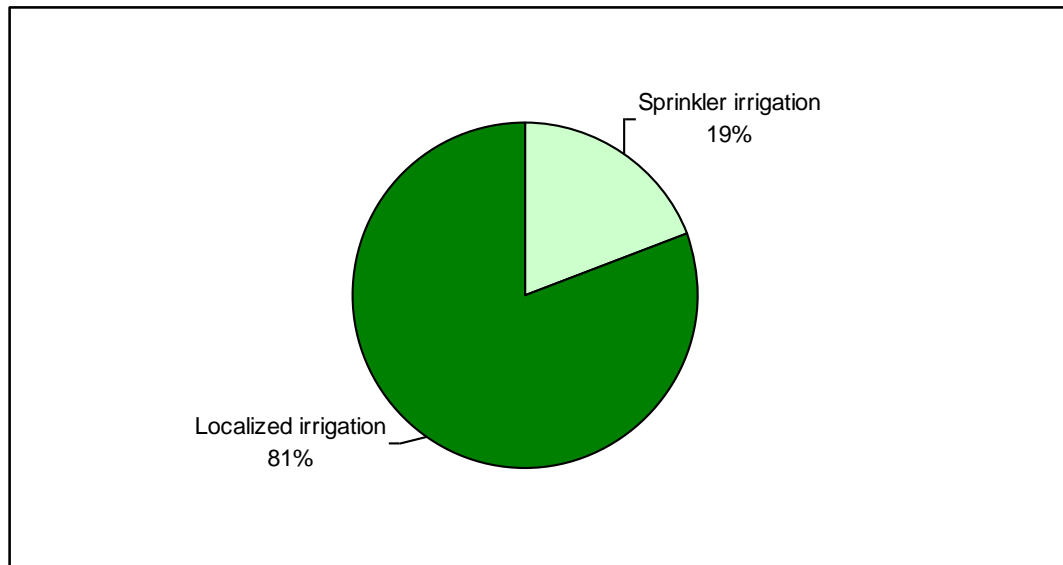
TABLE 4  
Irrigation and drainage

Irrigation potential		-	894	ha
<b>Irrigation:</b>				
1. Full control irrigation: equipped area	2008		365	ha
- Surface irrigation	2008		0	ha
- Sprinkler irrigation	2008		71	ha
- Localized irrigation	2008		294	ha
• Area equipped for full control irrigation actually irrigated	2008		365	ha
- As % of area equipped for full control irrigation	2008		100	%
2. Equipped lowlands (wetland, ivb, flood plains, mangroves)	-		-	ha
3. Spate irrigation	-		-	ha
<b>Total area equipped for irrigation (1+2+3)</b>	<b>2008</b>		<b>365</b>	<b>ha</b>
• As % of cultivated area	<b>2008</b>		<b>4</b>	<b>%</b>
• % of area irrigated from surface water	2008		100	%
• % of area irrigated from groundwater			-	%
• % of area irrigated from mixed surface water and groundwater			-	%
• % of area irrigated from non-conventional sources of water			-	%
• Area equipped for irrigation actually irrigated	2008		365	ha
- As % of total area equipped for irrigation	2008		365	%
• Average increase per year	1997 - 2008		5	%
• Power irrigated area as % of total area equipped for irrigation			-	%
4. Non-equipped cultivated wetlands and inland valley bottoms	-		-	ha
5. Non-equipped flood recession cropping area	-		-	ha
<b>Total agricultural water managed area (1+2+3+4+5)</b>	<b>2008</b>		<b>365</b>	<b>ha</b>
• As % of cultivated area	<b>2008</b>		<b>4</b>	<b>%</b>
<b>Size of full control irrigation schemes:</b>		<b>Criteria:</b>		
Small schemes		< 809 ha	2008	365 ha
Medium schemes		> - ha and < - ha	2008	0 ha
Large schemes		> - ha	2008	0 ha
Total number of households in irrigation			-	-
<b>Irrigated crops in full control irrigation schemes:</b>				
Total irrigated grain production				metric tons
• As % of total grain production				%
<b>Harvested crops:</b>				
Total harvested irrigated cropped area	2008		365	ha
• Temporary crops: total	2008		365	ha
- Vegetables	2008		365	ha
• Permanent crops: total	2008		0	ha
Irrigated cropping intensity (on full control area actually irrigated)	2008		100	%
<b>Drainage - Environment:</b>				
Total cultivated area drained	-		-	ha
• Non-irrigated cultivated area drained	-		-	ha
• Area equipped for irrigation drained	-		-	ha
- As % of total area equipped for irrigation	-		-	%
Area salinized by irrigation	-		-	ha
Area waterlogged by irrigation	-		-	ha

In 1997, on the island of Grenada 219 ha was under irrigation, compared to 5 ha in 1973. Localized irrigation was used on more than 90 percent of the area, the remaining area being under sprinkler irrigation. Less than 1 percent of the irrigation area obtained water from river diversion, 6.5 percent from reservoirs and the remainder from direct pumping from rivers.

In 2008 the area equipped for irrigation was estimated at 365 ha, which represents 4 percent of the cultivated area (Table 4). Of the total area, 71 ha or 19 percent uses sprinkler irrigation and 294 ha or 81 percent localized irrigation (Figure 4).

FIGURE 4  
Irrigation techniques on area equipped for full control irrigation  
Total 365 ha in 2008



### Role of irrigation in agricultural production, economy and society

In 1997, crops grown under irrigation included mainly vegetables (90 percent), fruit trees and grapes (5 percent), cut flowers (2 percent) and maize, roots, tubers and pulses (3 percent).

In 2008, it is estimated that vegetables account for 100 percent of the total irrigated harvested area of 365 ha (Table 4).

In 2008, average costs for sprinkler and localized irrigation systems are US\$3 684 and US\$3 813 per ha respectively.

### Women and irrigation

The Caribbean Policy Development Centre (CPDC), with the support of UN Women, has led a project focused on women agricultural producers' role in sustainable development in Grenada that aims to reduce women's lack of access to resources (UN Women, 2014).

## WATER MANAGEMENT, POLICIES AND LEGISLATION RELATED TO WATER USE IN AGRICULTURE

### Institutions

The National Water and Sewerage Authority (NAWASA) is responsible for the development of drinking water supply as well as the sanitary disposal of sewage.

The Ministry of Agriculture's Forestry Division is responsible for the protection of water catchments.

## Water management

In Grenada the timing and duration of periods of high and low precipitation are not predictable particularly during the dry season and droughts. In the past water management has concentrated mainly on the supply of water for domestic uses. At present, there are growing concerns about the need to manage the water resources in an integrated manner (UNDESA, 2012). The conversation on integrated water resources management (IWRM) in the country is at an advanced stage.

The first significant plan for the whole island on potable water supply, 'A plan for water development in Grenada 1965-1990', was developed in the 1960s. As a result of the plan, a number of projects were implemented including treatment plants at Annandale, Peggy's Whim, Douglaston and Petite Etang.

## Policies and legislation

A recent draft water policy sets out a framework for the governance of the water sector and the allocation of duties, responsibilities and powers as well as the respective roles of the public and private sectors. The policy objectives include (UNDESA, 2012):

- The provision of a framework for integrated use, management and regulations of water resources and associated services
- The establishment of an institutional framework for IWRM

## ENVIRONMENT AND HEALTH

Very little data are available on the quality of the water resources in Grenada. There have been several reports about the washing of equipment laden with agricultural chemicals in rivers, which has resulted in frequent fish kills. In some cases, the use of chemicals and explosives to catch fish in the rivers in large quantities has been reported (UNDESA, 2012).

The impact of agriculture on water quality was evident in the production of bananas, which required intense applications of agrochemicals. Banana production also prompted deforestation and soil degradation as farmers moved to higher and higher forested areas in the watershed. These negative impacts were subsequently diminished after the collapse of the banana industry (UNDESA, 2012).

## PROSPECTS FOR AGRICULTURAL WATER MANAGEMENT

The demand for water is expected to increase in the near future due to an increase in the population and irrigation areas and the expansion of the tourism sector (UNDESA, 2012).

Constraints on sustainable water management, due to increased levels of pollutants and catchment degradation, water shortages during the dry season, lack of distribution infrastructure, inadequate financial and technological resources and poor human resources capacity, have to be considered for future water management plans.

## MAIN SOURCES OF INFORMATION

**Ministry of Agriculture - Madramootoo, C. A.** 2001. *Hydrological analysis of potential irrigation Sites in Grenada*. Ministry of Agriculture, Government of Grenada. Report funded by the United Nations Collaborating Centre for Water and the Environment.

**CEHI, GEF/IWCAM Project.** 2007. *Road map toward integrated water resources management planning for Grenada*. Caribbean Environmental Health Institute, GEF/IWCAM Project. Report funded by the United Nations Collaborating Centre for Water and the Environment.

**Government of Grenada.** 2007. *Grenada water sector review*. Report funded by FAO. Companion “Draft National Water Policy” endorsed by Cabinet of the GoG Nov. 2007 .

**Gansu Research Institute for Water Conservancy, Ma Chengxiang, Zhou Luwen.** 2008. *Feasibility study on rainwater harvesting for agriculture in Grenada*. Gansu Research Institute for Water Conservancy, China. Report funded by the Caribbean Development Bank.

**Ministry of Agriculture, Puebla, J. H.** 2008. *Report on irrigation work May 2005-July 2008*. Ministry of Agriculture, Government of Grenada.

**UNDESA.** 2012. *Climate change adaptation in Grenada: Water resources, coastal ecosystems and renewable energy*. United Nations Department of Economic and Social Affairs.

**UN Women.** 2014. *Protecting their crops through green technologies, Caribbean women fend for themselves*