GRENADA WATER RESOURCES

Environmental Resources (FDES Component 2, SDG 6 National experience on water statistics





National workshop on Environment and Climate Change Statistics

Prepared by Trevor Thompson Ministry of Agriculture

GRENADA OVERVIEW



GRENADA GENERALLY DOES NOT HAVE A LARGE WATER STROAGE CAPACITY BECAUSE OF **ITS STEEP SLOPES &** SHORT DISTANCE FROM MOUNTAIN TO COAST. LESS THAN 6 MILES IN **MOST CASES**

VARIATIONS IN RAINFALL TO ALTITUDE



Watershed Management Units on Mainland Grenada and Carriacou: (Source: Land Use Division, Ministry of Agriculture)





Grenada has 71 Watersheds, Carriacou has 20 Watersheds, Petit Martinique has 1. On Grenada the watersheds are characterized by a relatively dense network of permanent rivers, while the sister islands are dominated by intermittent streams.

ANNUAL RAINFALL



The average annual rainfall for Grenada ranges between:

- 1,000 mm and 1,500 mm along the coastal zone,
- To >4,000 mm in the interior, and supports surface stream flow and recharge of sub-surface aquifers.
- Due to the orographic effect contributed by the interior mountain ranges there is a marked spatial distribution in rainfall across the island which gives rise to the arid conditions experienced in the northern and southern extremes of the island



12 Kilometers

CLIMATIC ZONES

Mean Annual Temperature. 20 - 27. 5 Degrees.

Mean Number of Relative Dry Months Ranges From 0 - 5/6





GRENADA'S WATER RESOURCES





The National Water and Sewerage Authority (NAWASA) is the island's lone water utility provider. The Authority is divided into five Departments: Administration, Finance Production and Quality Planning Design and Construction Transmission and Distribution

GRENADA WATER RESOURCES

- The average annual rainfall supports surface stream flow and recharge of sub-surface aquifers.
- Water Resources of Grenada originate mainly from a systems of Perennial Streams and Rivers, with some Groundwater available.
- Surface water are the major source of fresh water for human consumption and Agriculture on the island. The entire population has access to domestic water supply. There are twenty three (28) surface and six (6) groundwater portable sources on the island.

Water Intake and Distribution Network



TREATMENT PLANT Brandon Hall (SSF) Mirabeau (SSF) Mt. Horne (SSF) Bellevue (SSF) Munich (SSF) Plaisance (unfiltered) Spring Garden (PF) Mamma Cannes (SSF)

CAPACITY (GPD) 230,000 230,000 190,000 20,000 90,000 80,000 275,000 400,000

TREATMENT PLANT Les Avocat (SSF) Petit Etang (SSF) Pomme Rose (PF) **Apres Toute** Peggys Whim (SSF) **Diego Piece** (Union Water Supply) (SSF) Tufton Hall (SSF)

CAPACITY (GPD) 235,000 252,000 150,000 15,000 450,000 25,000 350,000

TREATMENT PLANT Clozier (SS) Dougaldston (SSF) Grand Roy (SSF) Concord (MPF) Annandale (RSF) Vendomme (MPF) Vendomme (SSF)

CAPACITIES (GPD) 90,000 170,000 300,000 300,000 2.25mgd 400,000 150,000

TREATMENT PLANT Mardigras (RSF) Woodlands 3 Chemin 1 Chemin 2 **Baillies Bacolet 1 Baillies Bacolet 2** Radix Bon Accord

C&P&CITIES (GPD) 167,000 250,000 200,000 250,000

15,000 40,000

GRENADA SUPPLY & DEMAND

 Grenada yields 54,600 m³ 12,395,292gals per day in the rainy season & 31,800 m³ 7,219,236gals per day in the dry season.

• The water demand in the rainy season is 45,500 m³ per day and in the dry season 54,600 m³ per day.

 The higher water demand in the dry season is largely due to increased demand from the hospitality sector (peak visitors arrivals occur during this period).

WATER RESOURCES

Surface water sources are approx. 85%

Ground Water sources are approx. 15%

WATER RESOURCES(CONT'D)

97 % of the Urban and 92% of the rural populations have pipe borne or safe drinking water.







Rural

Grenada Projected Water Demand

WATER DEMAND

Year	Population	Demand (g)
2013	105,000	3,675,000
2014	106,050	3,711,750
2015	107,100	3,748,750
2016	108,150	3,785,250
2017	109,200	3,822,000
2018	110,250	3,858,750

Carriacou & Petit Martnique

Since there are no streams on the sister islands, drinking water demand is mostly satisfied by rainwater collection from roofs, ground water and concreted hillsides into tanks







RAINWATER CATCHMENT SIZE

Area Structure

- Beausejour
- Bellair/Hospital
- Belmont
- Belvedere
- Cherry Hill
- Dover
- Fort Hill
- Grand Bay
- Harvey Vale
- L'Esterre A
- L'Esterre B
- Meldrum
- Mt. Pleasant A
- Mt. Pleasant B
- Mt. Royal
- Six Roads
- Top Hill

Type and descript.

Concrete tank Concrete tank Concrete tank Concrete tank Metal tank 2 Concrete tanks Concrete tank Concrete tank

Capacity (imp.gals.) 82,000.00 30,000.00 25,000.00 22,000.00 50,000.00 82,000.00 52,000.00 44,000.00 75,000.00 34,000.00 28,000.00 70,000.00 47,000.00 41,000.00 35,000.00 46,000.00 29,000.00

RAINWATER HARVESTING STRUCTURES-CARRIACOU







RAINWATER HARVESTING STRUCTURES-CARRIACOU





WATER QUALITY

The surface raw water in Grenada is characterized by high coliform count indicating fecal contamination especially during the rainy season. Treatment renders it zero before consumption





WATER QUALITY (CONT'D)

During the dry season due to an increased presence of algae and organic compounds. The urban population is protected by treatment incorporating sedimentation, filtration, and chlorination.



WATER QUALITY (CONT'D)

During high turbidity, aggressive coagulation/flocculation, sedimentation, rapid or slow-sand filtration and disinfection is the method of treatment that allows continuous distribution.





WATER QUALITY (CONT'D)

In Carriacou, disinfection of several public rainwater tanks and cisterns is carried out routinely by NAWASA's personnel.





WHO GETS WHAT? WATER RESOURCE

AGRICULTURE: 20%?
TOURISM: 15%?
MANUFACTURING: 5%?
PUBLIC: 40%?
PRIVATE: 5%?
HEALTH: 5%?
ENERGY:

DO WE REALLY HAVE ACCURATE FIGURES?

WHO MANAGES WHAT?

- **AGRICULTURE:**, River, Irrigation, Livestock, Pest Management
- FINANCE: Physical Planning, Investments,
- CLIMATE RESILIENCE: Forest, Fisheries, Domestic Pollution
- **TOURISM:** Beaches, National Parks,
- **PORT AUTHORITY:** Coastal Water, Swamps, Mangrooves?
- NAWASA: Domestic Distribution/Supply,
- HEALTH: Environment- Which? Quality, Terrestrial, Chemical Usage?
- WOMEN: Home Usage, Conservation, Farming
- NADMA:, Nuclear Contamination, Oil Spills?
- Eduction: Training?

Grenada's Principal Water Resources Legislation

	Law / Regulation	Responsible Govt. Agency
	Forest, Soil & Water Conservation Act, Cap. 116	MOA – Forestry/Land Use Division
	Grand Etang Reserve Act, Cap. 124	MOA – Forestry Division
	National Parks & Protected Areas Act, Cap. 206, as amended	MOA – Land Use Division
	Pesticides Control Act, Cap. 238	MOA – Management Unit
C I SU	Crown Lands Act, Cap. 73	MOA – Lands & Surveys Division
	National Water & Sewerage Authority Act, Cap. 208, as amended	NAWASA
AD LUNK	Nat. Water & Sewerage Authority Sewerage Regulations, 40/1993	NAWASA
	Water Quality Act, 2005	MOH – Environ. Health Division
10 M M	Solid Waste Management Authority Act, 1995	GSWMA
	Waste Management Act, 2001	GSWMA
	Public Health Act, Cap. 263	MOH – Environ. Health Division
	Public Health Regulations, 9/1990	MOH – Environ. Health Division
	Standards Act, Cap. 310	MOF
	Physical Planning and Development Control Act, 2002	PDA - MOED

GRENADA-PRESENT STATUS

GRENADA NATIONAL WATER POLICY

It's implementation shall be guided by the following with respect to Water Resources:

- Integrated Water Resources Management(IWRM) with equitable regard to quantity, quality required for human needs and ecological functions, and to ensure national food security;
- The coordination of water resources planning and development taking into account the needs of all water users, including water users in other water catchments in the case of inter-catchment transfers;
- Sufficient water must be retained in order to meet environmental requirements;
- Better data gathering, monitoring and public provision of information;
- The integration of water resources management in particular but not exclusively to Environmental, Land Use Management, Agriculture and Forestry.

CARIBBEAN PRECIPITATION OUTLOOK



IP ADDRESS www.cariwin.gd

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Grenada Water Information System

🜈 Grenada - Water Info...



CARIWIN is a project on Integrated Water Resources Management (IWRM) in the Caribbean, led by the Brace Centre for Water Resources Management at McGill University and the Caribbean Institute for Meteorology and Hydrology (CIMH), Barbados.

Grenada Water Information System (WIS) uses up-to-date Web technologies to provide reliable and easy access to water related data. The core component of the Grenada WIS is the WebMap Application, facilitating data retreival through an user-friendly interface.

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The Ministry Of Agriculture, Fisheries and Forestry



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Raster Images:	Soils	*				
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Contact <u>Kenton Fletcher:Kenflet@hotmail.com</u> or <u>Trevor</u> Thompson:trevort_lud@yahoo.com						
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Links to Regional Initiatives Caribbean Drought and Precipitation Monitoring Network (CDPMN)

 Centralized information base makes it easier for the CDPMN to monitor holistically the occurrences of drought in particular across the Region



 NWIS can provide not only rainfall data, but also information on streamflow, reservoirs and groundwater levels, along with water quality information for both Marine and Freshwater

LINKS TO REGIONAL INITIATIVES

Caribbean Agrometeorological Initiative (CAMI)

- Provision of meaningful information to the farming and wider agricultural communities
- Access to information related to water loss and irrigation needs

 Other climate-related activities e.g. Pest and disease predictability, crop weather modeling



DATA COLLECTION EXPANSION





PROPOSED STRUCTURE FOR WATER RESOURCES MANAGEMENT



ACKNOWLEDGEMENTS

- Grenada National Water policy. 1998
- Grenada Framework for Water Policy Implementation
- National Rainwater Harvesting Programme for Grenada: CEHI/ UNEP
 - UNEP-CC IWRM 2005 project and support to Grenada-Henrik Larsen, UNEP CC
- CapNet Tutorial on Integrated Water Resources Management An Introduction
- Global Water Partnership Caribbean- GWP-C.
- Global Water Partnership Organisation.
- Water Resources Impacts and Adaptation: USEPA

THANK YOU