

COUNTRY REPORT ON THE STATE OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

GRENADA





GRENADA: COUNTRY REPORT ON THE STATE OF PLANT GENETIC RESOURCES

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Note by FAO

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CONTENTS

ACRONYMS	6
EXECUTIVE SUMMARY	8
INTRODUCTION TO GRENADA AND ITS AGRICULTURE SECTORS	10
CHAPTER 1	
THE STATE OF DIVERSITY	17
1.1 Analysis of major agriculture output prior to Hurricane Ivan in 2004	17
1.2 Forest biodiversity	18
1.3 Elfin Woodland and Palm Brake	25
CHAPTER 2	
THE STATE OF <i>IN SITU</i> MANAGEMENT	28
2.1 Vegetation types	28
2.2 Inventories and surveys	29
2.3 On-farm management and improvement of plant genetic resources for food	30
2.4 <i>In situ</i> conservation of wild crops relatives and wild plants	30
2.5 Need assessment for building capacity within agencies and stakeholders for eco systems management	31
CHAPTER 3	
THE STATE OF <i>EX SITU</i> MANAGEMENT	34
3.1 Needs assessment in summary, for <i>in/ex situ</i> management	36
CHAPTER 4	
THE STATE OF USE	37
4.1 Plant genetic resources	37
4.2 Distribution of plant genetic resources	37
4.3 Utilization and enhancement of PGR	37
4.4 Constraints affecting Improved use of PGR	38
4.5 Activities that enhance the use of PGR	38
4.6 Current priorities for PGR	38
4.7 Collection of PGR	39
4.8 Capacity in plant breeding	39
4.9 Constraints to achieving diversification of crop production	39
4.10 Seed supply systems and the role of markets	39
4.11 Crop improvement programmes and food security	39
CHAPTER 5	
THE STATE OF NATIONAL PROGRAMMES, TRAINING AND LEGISLATION	40
5.1 Education and training	42

CHAPTER 6	
THE STATE OF REGIONAL AND INTERNATIONAL COLLABORATION	44
6.1 Regional collaboration	44
6.2 International collaboration	44
6.3 National needs	46
CHAPTER 7	
ACCESS TO PLANT GENETIC RESOURCES AND SHARING OF BENEFITS ARISING OUT OF THEIR USE, AND FARMERS' RIGHTS	47
CHAPTER 8	
THE CONTRIBUTION OF PGRFA MANAGEMENT TO FOOD SECURITY AND SUSTAINABLE DEVELOPMENT	48
8.1 Contribution to agricultural sustainability	48
8.2 Contribution to food security	48
8.3 Contribution to economic development	48
8.4 Contribution to poverty alleviation	49
APPENDIX 1	
TABLE INDICATING LAND USE 1961, 1975, 2007	50
APPENDIX 2	
VEGETATION TYPE IN GRENADA	51
APPENDIX 3	
VEGETATION OF CARRIACOU	52
APPENDIX 4	
LIST OF MAIN TIMBER SPECIES IN GRANDETANG FOREST	53
APPENDIX 5	
LIST OF MANGROVE SITES IN GRENADA COMMON FRUITS & SPICES FOUND IN GRENADA	54
REFERENCES	60

ACRONYMS

ARD	Agency for Reconstruction and Development
ART	Agency for Rural Transformation
CEC	Carriacou Environmental Committee
CITES	Convention for International Trade in Endangered Species of Flora and Fauna
CBO	Community based organization
CCA	Caribbean Conservation Association
CCAP	Climate Change Action Plan
CEHI	Caribbean Environmental Health Institute
CERMES	Centre for Resource Management and Environmental Studies
CREP	Caribbean Regional Environment Project
BTL	Biotechnology Laboratory
EAD	Economic Affairs Division
EIA	Environnemental Impact Assessment
ESDU	Environment and Sustainable Development Unit
FEEM	Fond Francais de L'Environnement Mondial
FNPD	Forestry and National Park Department
GCA	Grenada Cocoa Association
GCNA	Grenada Cooperative Nutmeg Association
GCU	Global Coordination Unit
GEF	Global Environmental Facility
GIS	Geographic Information System
GOG	Government of Grenada
GRENCODA	Grenada Community Development Agency
IWCAM	Integrated Watershed and Coastal Area Management
LDC	Least Developed Countries
LDCA	Land Development Control Authority
LMU	Land Management Unit
MTESP	Medium Term Economic Strategy Paper
MTR	Medium Term Review
NaDMA	National Disaster Management Agency
NAP	National Action Plan
NAWASA	National Water and Sewerage Authority
NCSA	National Capacity Self Assessment
NEMS	National Environmental Management Strategy
NGO	Non governmental organization
NPDP	National Physical Development Plan
NTFP	Non Timber Forest Products
OAS	Organization of American States
OECS	Organization of Eastern Caribbean States
OPAAL	OECS Protected Areas and Alternative Livelihoods Project
PGR	Plant Genetic Resources
PGRM	Plant Genetic Resources Management

PM	Project Manager
PPU	Physical Planning Unit
PRI	Project Implementation Review
SIDS	Small Island Developing State
SDC	Sustainable Development Council
TOR	Terms of Reference
UNCBD	United Nations Convention on Biological Diversity



EXECUTIVE SUMMARY

Pursuant to the Commission on Genetic Resources for Food and Agriculture, Grenada has been mandated to identify the state of its Plant Genetic Resources. This study responds to a comprehensive assessment and analysis of the capacity needs, priorities and constraints relevant to the current contribution of Plant Genetic Resources to Food and Agriculture in Grenada. It also provided an opportunity to engaged or re-engaged and stimulated the interest of a wide range of stakeholders to reflect on what adjustments are required to achieved the conservation, sustainable use and development of plant genetic resources for food and agriculture.

1. Methodology

The methodology is based on the guidelines provided in the FAO document entitled "A Guide for Country Reports."

This country- driven project was undertaken by national experts, the experts were involved in literature reviews as a means of gathering historical and policy data and information at the country level. It also included the identification of bottlenecks and gaps that are inimical to the attainment of the national goals, objectives, commitments and obligations under International Treaty on Plant Genetic Resources for Food and Agriculture. A series of stakeholder consultations also formed part of the methodology.

2. The process included the following:

- The Ministry of Agriculture (MOA) was used as the main forum for ventilating issues related to the conduct and technical findings of the PGR.
- Following a series of stakeholder consultations, a National Steering Committee (NCSA) was formed. The Steering Committee comprised representatives from the various sectors that are associated with the implementation of the Convention on plant genetic resources.
- The currant contribution of plant genetic resources to food and agriculture;
- Thematic assessments on the state of plant genetic resources for food and agriculture and its role in production systems, including associated biodiversity factors driving change;
- Investigations into whether, or not, crop and agricultural production and productivity is increasing, decreasing or remaining the same;
- Analysis of identified cross cutting issues and synergies among them:
- An analysis into the contribution of plant genetic resources to food and agriculture and the identification of opportunities and obstacles- as well as strategies to realize the opportunities and overcome the obstacles:
- Identification of capacity building needs and priorities to support the conservation, development and sustainable use of plant genetic resources for food and agriculture.

3. Conclusions

The study found that the 'small island' character of Grenada provides special challenges/ constraints and opportunities for applying ecosystems management approaches to plant genetic resources management programmes.

3.1 Among the challenges identified were

- Small- sized and miniature watersheds constituting a forest ecosystem with the most significant naturally occurring plant genetic resources being found mostly on the upper- most altitude.
- Small and numerous multi-cropping, (mixed farming) units within the farm- zones which are generally found at the middle and lower altitudes (Agricultural Census, 1995).
- Pervasive fragmentation of land and dominant private ownership of such lands (Agricultural Census, 1995)
- Little physical separation between urban and rural and natural areas



3.2 Some of the major constraints identified are

- Lack of sufficient capacity to effectively and efficiently characterize and evaluate PGR;
- Insufficient capacity for plant breeding;
- Lack of integration between conservation and utilization programmes
- Lack of policy to make PGR an integral part of all agricultural programmes;
- Lack of human and financial resources;
- Lack of coordination of PGR programmes that adequately reflect agricultural needs / demands.

3.3 Among the opportunities identified were

- Relatively large well-defined spaces of forest cover on the upper altitudes of the island traditionally protected from human intervention by a mix of factors such as:
 1. Difficult access due to the nature of terrain.
 2. Considerable spaces existing as crown/state lands.
 3. A preference by persons for agriculture that uses flat or gently sloping lands.
 4. A deliberate Plan of Action by Government (and in more recent times endorsed by civil society) to reserve existing forested areas for managed consumptive and non-consumptive uses and non-uses.

4. Recommendations for effective and efficient plant genetic resource management

Emerging from the interactions between the consultant and stakeholders a wide range of recommendations was developed. Some of them are:

- Adopt a more customer oriented approach towards conservation and poverty alleviation
- Restoration of degraded forest due to natural disasters
- Greater stakeholder involvement in forest decision making process
- Co-management arrangements with stakeholders to sustainably manage private forest resources.
- Increased public awareness on forestry and related issues.
- Greater cooperation from other resource management institutions / agencies
- Increase the socio- economic benefits to stakeholders through more effective collaborative forest management.
- An updated forest policy to reflect current trends.
- Synergies among the Multilateral Environmental Agreements (MEA s)
- Legitimize planning implementation, monitoring and evaluation of institutions with similar resource management responsibilities.
- Foundation for sustained supply of forest products to satisfy the demands of local saw milling, handicraft and furniture industries.
- More rigorous and consistent adherence to regional and international conventions and agreements
- Upward mobility of staff flows naturally under a system where entire staff is well trained and subordinates are able to take up senior positions.
- Fill all vacant positions within the FNPD to satisfy the new forestry structure.
- Strengthen the capacity of FNPD to ensure effective and efficient implementation of the forest policy and strategic plan.
- Put mechanisms in place to ensure sufficient training and other support are available for all members of staff
- Increase the level of technical support to stakeholders (farmers, hunters, saw millers, NGOs, community groups, Government and private institutions, developers etc.)
- Strengthen relationship and commitment with regional and international conventions and agreements Legitimize planning and implementation arrangements for institutions within the Ministry of Agriculture with similar or overlapping mandates.
- Ensure administrative and financial support for the rehabilitation and maintenance of forest reserves

The sustained and effective implementation of these and other recommendations suggested in the Study is contingent on the extent to which the training and other capacity building needs as assessed are satisfied. The satisfaction of those needs will contribute to the reduction of the negative effects of the identified constraints that frustrate the management of PGR Initiatives.

INTRODUCTION TO GRENADA AND ITS AGRICULTURE SECTOR

1. Area and location

Grenada is the tri-island State of Grenada, Carriacou and Petit Martinique. The total area of Grenada is 378 km². Grenada is located at the southern end of the chain of Lesser Antillean islands, at latitude 11° 58' and 12° 13' N, and longitude 61° 20' and 61° 35' West. To the north lies the State of St. Vincent and the Grenadines and to the south lies the State of Trinidad and Tobago (see Figure 1).

TABLE 1
Area of Grenada, Carriacou and Petit Martinique

Island	Area (ha)	Population (1995 Census)
Grenada	31 200	94 000 200
Carriacou	3 400	8 000
Petit Martinique	230	600
Total	34 830	102 600

2. Population

Grenada has a population of approximately 102 600 (2005 estimate, Central Statistics Office) which includes 8 000 and 600 residents on Carriacou and Petite Martinique respectively. Analysis of data from the 2004 census shows that 49.5% of Grenada's population was less than 25 years of age. The rate of increase of the population is 0.6% and the population is expected to continue growing at a steady rate. Owing to the mountainous topography, the majority of the population is confined to settlements within the coastal areas.

The main settlements are St. George's and Grenville on mainland Grenada, and Hillsborough in Carriacou; they account for almost 60% of the total population. Settlements in the towns of Grenada are clustered, with grid patterns except in the cases of St. George and Sauteurs, which have concentric and linear patterns, respectively. In all other areas, settlement patterns are linear following the road network. The country is ranked 66th out of 177 countries in the human development index 2005 of the United Nations Development Programme (UNDP), which puts it in the "medium human development" band.

FIGURE 1
Map of the Caribbean



3. Geology and soils (see Figure 2)

Grenada is predominantly of volcanic origin, although some sedimentary rocks of the Tertiary and Quaternary periods are present. The islands of Carriacou and Petit Martinique are also of volcanic origin and represent the exposed summits of peaks on a single narrow bank of submerged volcanic mountains. The wetter areas of the island are dominated by the more intensely weathered kaolinitic-latosolic soils "Red earths" that are characterized by moderate to low base status. The drier areas are dominated by the montmorillinitic soils that are less weathered. The Brown earths are intermediate between the two groups. In the southeastern and eastern drier fringes of the island, there are some Red-earth's of high base status.

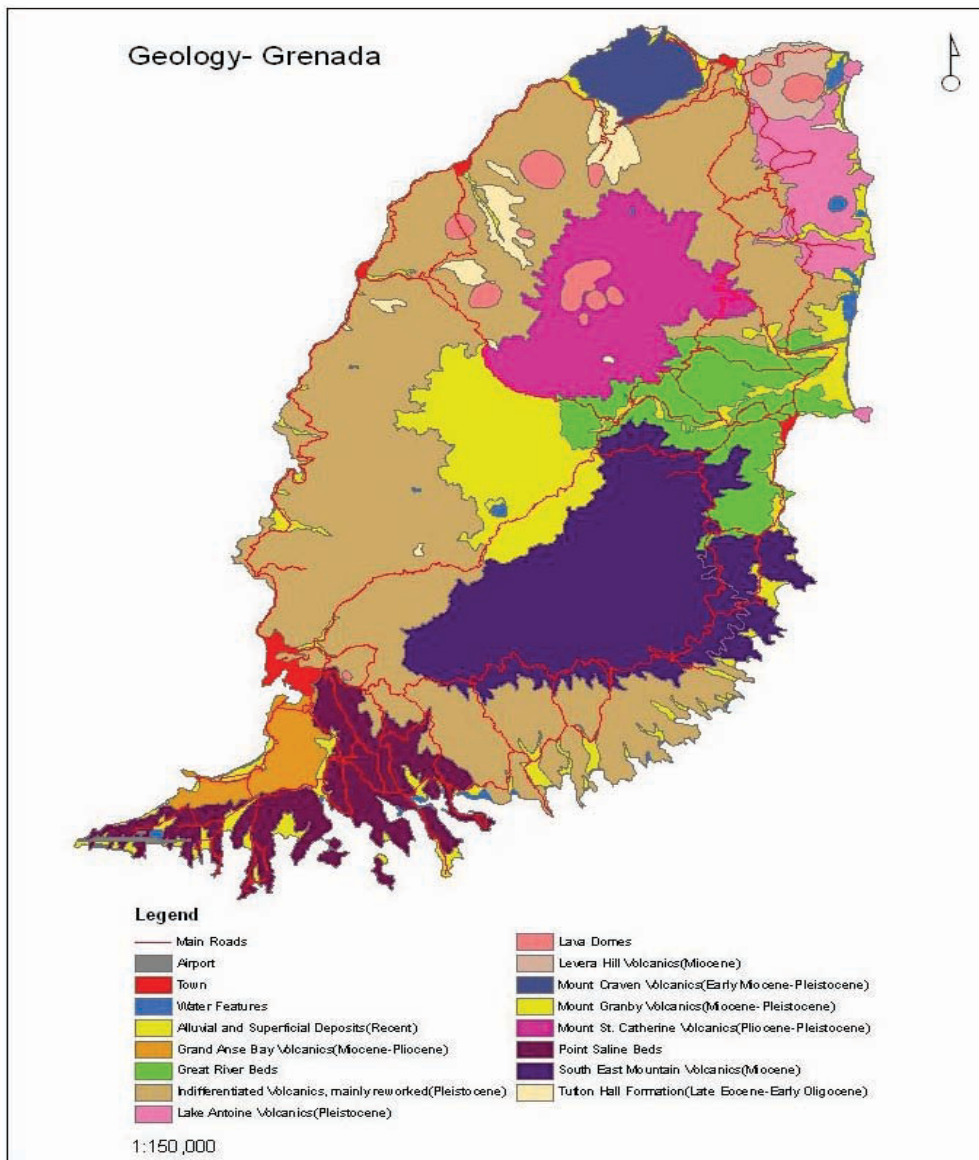
4. Climate

The climate of Grenada is humid-tropical-marine, with little seasonal or diurnal variation. It is influenced by a constant northeast trade wind. Average temperatures range from 24°C (75F) to 30°C (87F). Low temperatures occur between November and February.

The dry season is between the months of January and May, while the rainy season occurs between the months of June to December. An analysis of historical data indicated that rainfall varies directly with elevation. In the mountainous interior, annual rainfall averages about 153 inches (3 880 mm) where as lower areas along the northern and southern coastlines averages 44 inches (1 125 mm) annually. The driest month is March, and the wettest, November. The northeastern and southern parts of the mainland island receive the lowest rainfall, and have the longest dry periods.



FIGURE 2
Geology of Grenada



Source: Land Use Division, Ministry of Agriculture

5. The flora environmental context

Years of deforestation and commercial crop farming in Grenada have led to the current character of forest ecosystems. A significant proportion of the vegetation on the island is secondary re-growth or cultivation with the exception of isolated areas on steep mountain slopes, and the Grand Etang forest reserve which contain primary forests. Seven distinct forest types can be observed in the island of Grenada. Shrub and mangrove forests are dominant in the coastal areas. These areas cover 10.9 km² (3.5%) and 5.3 km² (1.7%) respectively. Low-lying areas are vegetated by deciduous seasonal forests which cover 70.2 km² (22.5) of the island. Evergreen and semi-evergreen forests which account for 70.8 km² or 22.7% of forested lands vegetates the middle latitude area.

6. Patterns of land use

The most recent documentation of main types of land use and their areas in Grenada (including Carriacou and Petit Martinique) was conducted during the agricultural census of 1995. The land use classification from the 1995 census is summarized in the table below. The Land Use Division within the Ministry of Agriculture and the Physical Planning Unit are both working on initiatives which will result in an updated land use map.

TABLE 2
Land Use Classification according to the 1995 Agriculture Census

Land Use	Area (ha)	Percentage
Temporary Crops	1 500	4.3
Fallow < 1 year	300	0.9
Fallow 1-3 years	600	1.7
Permanent Crops	22 300	63.7
Pastures	1 600	4.6
Forest	7 300	20.9
Non-agro Land	1 400	4.0
TOTAL	35 000	100.0

The small size of Grenada, coupled with climatic and relief variations, soil-type and land tenure systems, limits the area available for various land use types. The natural resource base is under extreme pressure from human settlements, tourism development and agriculture. This competing demand for the limited land area results in land degradation which is manifested through deforestation and loss of biodiversity, increased soil erosion, chemical misuse, decrease in agricultural productivity, instability of water supply, and coastal erosion.

Changes in land use patterns have been dominated by the conversion of lands from agriculture into other uses in response to the relative decline in the agricultural sector in Grenada. Some of the larger estates are in varying states of abandonment and many of these are being converted to housing settlements and commercial uses. It must be noted however that many of the smaller agricultural land holdings continue to be farmed. The country has not carried out recent detailed land use cover change assessments and, as a consequence, the precise extent of land use changes is not well known.

It is expected that land use changes will continue if the agricultural sector continues to decline and lands are converted to tourism development activities and residential sub-divisions. This trend is also favored by the absence of a national land use policy and control measures to regulate development.

The tourism sector has overtaken agriculture as the main contributor to foreign exchange earnings, and has increased its relative share in GDP. Investment in the tourism and other service sectors has led increasingly to the alienation of once-agricultural lands for touristic purpose and settlement. This trend is causing some concern as loss of arable lands presents challenges in the context of national food security, and will likely continue in the absence of a national land use policy that seeks to realize optimal land utilization. Expansion of intensive land utilization particularly in environmentally sensitive areas is usually accompanied by the increased occurrence of environmental problems such as desertification, siltation of rivers and coral reefs, and pollution of waterways.

7. Socio-economic context and agriculture

7.1 General economic situation

The present socio-economic situation of Grenada must be viewed within the context of the reconstruction efforts following two major hurricanes which severely affected every sector of society, and external development pressures of changing global trade arrangements and geopolitics. Economic growth has fluctuated sharply since 2001, unemployment and poverty have risen, and effective policy implementation has been hampered by several events namely: September 11, 2001 attacks in the United States which triggered a recession in 2001-02, Tropical Storm Lili in 2002, Hurricane Ivan in September 2004 (causing an unprecedented 200% of GDP damage), and Hurricane Emily in July 2005 (which caused additional 12% of GDP damage).



Real GDP growth of 6–6½ percent is projected for 2009. Beyond 2010–11, growth of 4 percent would need to be sustained through growth-enhancing reforms. Average inflation for 2009 is expected to be 4½ percent, on account of the recent fuel price increase.

7.2 Agriculture: its contribution to foreign exchange earnings

Agriculture is a major contributor to Grenada's economy averaging 8% of GDP between 2002 and 2006, with primary agricultural exports accounting for approximately 57% of domestic exports between 2002 and 2006. Values of agricultural exports stood at US\$15.2 million in 2002, but declined to US\$8.3 million by 2005, having suffered major impact from Hurricane Ivan in September 2004. Grenada's commercial agricultural output has been dominated by exports of nutmeg (and mace), cocoa and bananas. The sector saw a boost in output in the late 1980s due to favourable market prices for nutmeg and mace. Prior to Hurricane Ivan, Grenada contributed a quarter of the world output of nutmeg, earning an estimated EC\$28.5 million annually. Grenada now accounts for approximately 13% of the world output of nutmeg.

Cocoa has enjoyed relative success due to the high quality of the crop (used to blend into bulk cocoa for flavouring) but the potential growth has been stymied by the effects of Hurricanes Ivan and Emily, little and poor levels of investment.

Agricultural revenues have seen a downward trend since 1989 due in part to price declines (mostly for nutmeg, and to a lesser extent cocoa), and declines in production (banana and cocoa). This follows the general trend in agriculture in many of the OECS countries driven by factors such as the gradually aging population of farmers and the concomitant rise of the hospitality and services sectors that have been drawing human resource capacity away from agriculture, among other factors.

Bananas, which was one of the main agricultural commodities up until the early 1990s, has seen a relatively rapid decline in importance due to falling prices and the new challenges in terms of market access into the United Kingdom under the recent World Trade Organization (WTO) trade regime reforms. This has mainly impacted the smaller, more marginally productive holdings. Other impacting factors include pests and disease occurrences and escalating production costs. Export volumes have declined from 15 000 tonnes in 1992 to 498 tonnes in 2005. Today the bulk of the production is consumed locally or sold within the region (Trinidad) with a small percentage still going to the UK. The government is currently promoting the prospect of transforming the industry to an organic production system.

The passage of Hurricane Ivan dealt a significant blow to agricultural production in Grenada, with nutmeg and cocoa production particularly being severely hard-hit. Ivan was estimated to have caused damages of approximately US\$ 37 million to the agriculture sector. Recovery to former output levels will be slow but the government, through international assistance is facilitating the process of recovery.

7.3 Tourism

The tourism sector has been the main driver of the economy since the 1980s. Tourism accounted for approximately 8.9% GDP in 2003 a trend that has been steadily growing. An estimated 132 860 stay-over visitors was recorded in 2004. The cruise industry has been increasing with just fewer than 227 000 passengers visiting in 2004. This has been facilitated by the development of modern facilities in St. George's that accommodate up to two 980-foot mega cruise ships. The estimated expenditures by visitors into the sector amounted to US\$ 157 million in 2004. Although Hurricane Ivan caused massive damage to the sector there has been a relatively rapid recovery.

Grenada shares the Grenadine islands, an internationally recognized haven for yachting, with neighbouring St. Vincent. Evidence of the yachting potential is evidenced by the major growth in marinas that has been taking place over the years

The island's tourism product is a mix of the traditional sun-sea-sand product, a rapidly developing yachting sub-sector along with eco-tourism initiatives. The major tourism centre is around Grand Anse Bay (just south of St. George's) and its environs. Several sites across the country have been developed for eco-tourism which offers hiking and other recreational activities in the more bio-diverse forested areas - The Grand Etang Lake, Mt. Quaqua Trail, the Fedon Camp Hike, Mt. St. Catherine Hike, the Annandale and Concorde Falls are among the premier attractions. More recently kayaking and river tubing (on Balthazar River) are being offered. Some 28 dive attractions are found off the Grand Anse Bay and Carriacou (named after the Arawak Indian title 'island of reefs').



7.4 Poverty issues

From the last poverty assessment survey it was deduced that at least 36% of Grenada's population can be considered as being poor. The communities that have the highest percentage of persons living below the poverty line are rural, with high dependency on common property environmental resources. Degradation of watersheds after the passage of Hurricanes Ivan and Emily has seriously affected households who depend on non-timber forest products (NTFP) such as fruits and wild meat to supplement their diet and income. Poor households heavily utilize mangroves and dry forests for timber for charcoal production. Increasing costs of petroleum based fuels could push these resource dependent communities to further degrade hurricane damaged areas. While poor communities exert a high demand on natural resources they are the hardest hit due to environmental degradation.

The poverty eradication and fiscal consolidation programmes that were initiated before Hurricane Ivan struck have also been derailed. Reconstruction needs remain substantial, while fiscal imbalances, financing gaps and the public debt burden are high. With the reconstruction activity proceeding, output is expected to recover over time.

Social conditions have deteriorated in the aftermath of Hurricane Ivan. The unemployment rate stood at 19% in July, 2005, and was especially high among women (above 25%) and youth (with about a third of them unemployed). While data collection on social indicators needs strengthening, preliminary indications are the poverty rate is likely to have risen in the post-Hurricane Ivan period. To reverse these trends and guide the national social development agenda in the coming years, the Government of Grenada recently prepared a comprehensive poverty reduction strategy paper which will focus on introducing social safety nets for the poor and vulnerable of the society, particularly those worst hit by the increase in domestic fuel prices due to high world market price levels.

7.5 Land tenure and ownership

Citizens were given the right to own lands very early in the post colonial history of Grenada. Most of the land in Grenada is privately owned with the exception of Grand Etang, Mt. St. Catherine and a few agricultural estates. Private ownership means clear transferable rights, which resulted in land being sub-divided among family members and passed on through generations. This has resulted in the dominance of very small holdings, generally, throughout the landscape of the country.

Regulation of land use and development activities is hindered by property rights, since private owners have little restrictions to develop or sell their property. It is therefore not uncommon to find agricultural and livestock projects in residential areas, or agricultural lands converted to tourism and residential use. Concentration of development and economic activities in the parish of St. George has encouraged rural to urban migration and problems with squatting, especially on state-owned lands. An example is the Grand Anse Valley sugar cane belt, which was transformed into a residential squatting community. The cultural trends are further reinforced by the lack of a land policy or land use code with regulations for land development, zoning of land use, a land tax and pricing/value structure.

Land management issues can be divided into two major categories based on land ownership:

- **Public (crown lands)**
 - Lack of a land registry - limits the availability and access to information on state land assets. This hampers planning processes with respect to land allocation;
 - Limited data on status of watersheds - impediment to the design and execution of appropriate watershed management interventions;
 - Sub-optimal management of forest reserves – current resource use is below the potential outputs to the nation that can be realized with sound management regimes (through eco-tourism, minor forest products and other sustainable industry);
 - Abandoned agricultural lands – underutilized resource that can be of benefit to the country if appropriately developed and managed; and,
 - Squatting (for agricultural and residential purpose) – this is typically accompanied by land degradation due to slash and burn agriculture, and pollution as a result of inappropriate solid and liquid waste disposal.
- **Private lands**
 - Unplanned development – in cases where existing legal and regulatory provisions do not make specific provisions for SLM, private land owners may develop their lands unencumbered and in an unplanned manner, to sometimes deleterious outcomes;
 - Clearing of vegetation, loss of protective cover and soil erosion – these are the outcomes that typically result from poor management regimes. For the most part land owners are not obligated by law to implement

proper land management practices. On Carriacou and Petit Martinique the problem of land degradation associated with overgrazing is acute as there are no appropriate controls over livestock (sheep and goats) management. During the dry season herds are allowed to roam freely in search of pasture;

- Conversion of agriculture lands into residential sub-divisions – this issue arises in the absence of a policy on agricultural land security. This is of concern, as some of the most arable lands are being converted to alternative uses with little or no possibility of reversion to agriculture; and,
- Poor stormwater management – the inappropriate modification of the landscape particularly in upland areas without proper drainage can have disastrous downstream impacts in terms of increased flood and landslide risk with potential loss of life.

THE STATE OF DIVERSITY

Hurricanes Ivan in 2004 and Emily in 2005 severely devastated the plant genetic resources in Grenada. The island lost 90% its nutmeg (*Myristica fragrans*), its most important agricultural export. Prior to Hurricane Ivan, Grenada was the second largest producer of nutmeg, accounting for 23% of world production. Severe losses were experienced in the cocoa and banana industries, forest lands, vegetables production, roots and tubers crops, citrus and minor fruit orchards, ornamental horticultural crops, and minor spices.

1.1 Analysis of major agriculture output prior to Hurricane Ivan in 2004

Banana, cocoa and nutmeg have always been considered as the major (traditional) crops grown on the island (table 3). These three crops have been a critical source of foreign exchange earnings over many decades.

TABLE 3

Volume of production for the major agricultural commodities (2000-2004) (000 lbs)

Crops	2000	2001	2002	2003	2004
Nutmeg	5 719	5 358	4 796.8	6 614.7	6 445
Cocoa	1 760	1 657	1 710.3	1 507.4	1 830
Banana	2 800	2 980	2, 676	2 464	2 224

Roots and Tubers

In addition to the traditional crops highlighted above, a number of other crops including various roots and tubers: dasheen, tannia, cassava, yams and sweet potato were produced extensively in Grenada prior to Hurricane Ivan and the island was self sufficient in those crops. The area under roots and tubers was approximately 400 acres and the average yearly production of this category of crops was around 800 000 pounds.

Vegetable

Wide arrays of vegetables were grown on the island during the period preceding Hurricane Ivan. Except for some periods in the year when production plummeted because of adverse environmental conditions.

Non-traditional fruit crops

The citrus crops prior to Hurricane Ivan were cultivated on approximately 120 acres where oranges, grapefruits and mandarins were the dominant crops.

The minor fruit sub-sector has always been an important area of agricultural production in Grenada. It is estimated that the annual turnover of that sub-sector was around 6 million dollars annually. The main fruits cultivated under that category are avocados, mango, golden apple, sugar apple, as shown in table 4.



TABLE 4
Damage assessment to the crop sub-sector

Crop	Damage (000) Ec dollars	% of total crop damage
Nutmeg	29 834	63.45
Cocoa	5 673	14.13
Banana	1 440	3.06
Vegetable	2 792	5.93
Citrus	2 611	5.6
Roots and tubers	837	1.78
Minor fruits	2 792	5.94
Minor spices	392	0.83
Anthuriums	644	1.37

1.2 Forest biodiversity (See Map 3)

The Island harbors remnants of Cloud forests (Mountain thicket Elfin woodlands and Palm Brake), Montane rain forests, Evergreen and Seem-evergreen forests, Deciduous forests and Cactus Scrub and Littoral woodlands. Small pockets of mangroves form fringes along the north eastern and southern eastern coastlines. Remaining natural forests are found mainly in the steep, inaccessible, unproductive mountainous interior. Table 5 shows the area of forests and woodlands in Grenada and Carriacou.

TABLE 5
Forest and woodland area in Grenada and Carriacou

Forest Type (Grenada)	Area (ha)	land area in ha 31 335
Forests	9 317	
Other woodlands	1 730	
Sub total	11 047	
Carriacou		
Deciduous Forests	295	3 178
Other woodlands	1 819	
Sub total	2 114	

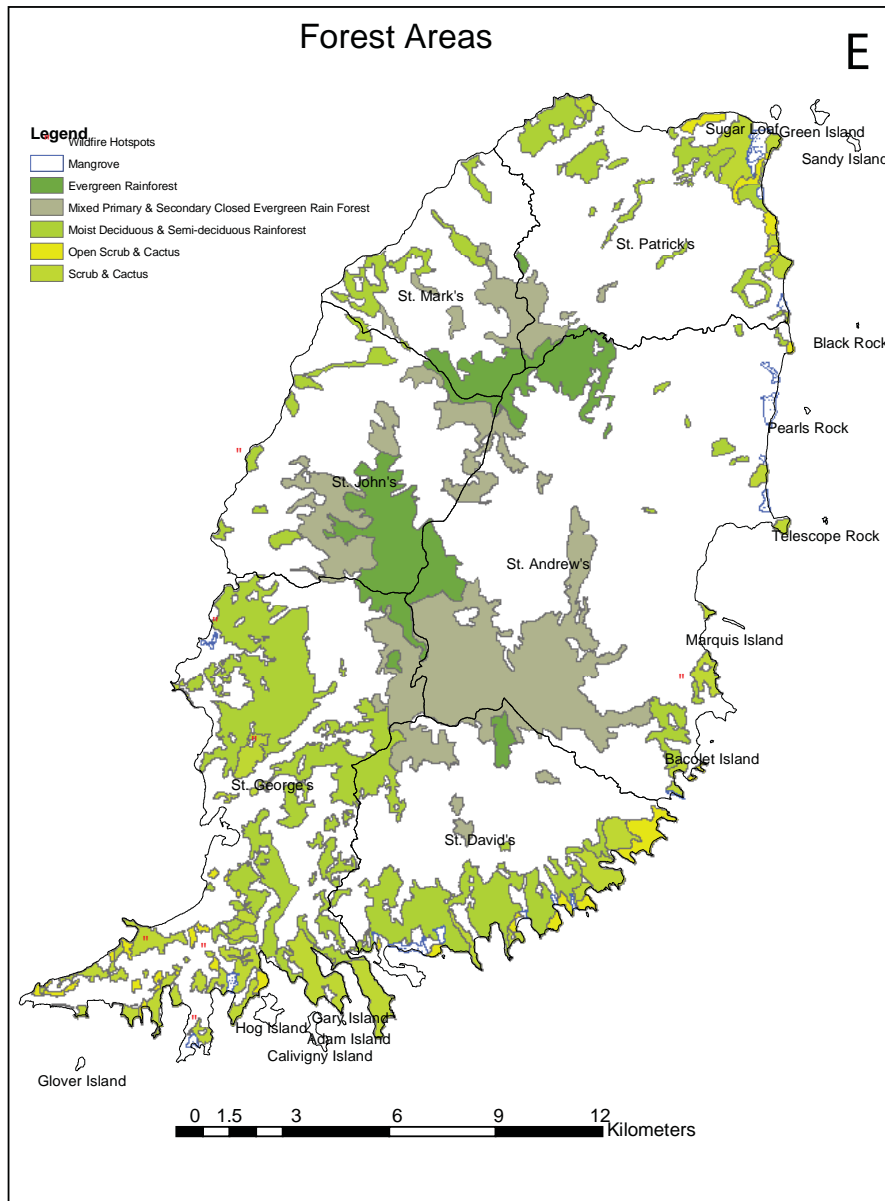
Source: Land Use Division (MOALFF), 2004.

Hurricane Ivan in September 7, 2004 caused significant damage to Grenada's forests resources.

Cloud forests

Cloud forests exist on the upper summits of the highest mountains, mainly on the upper regions of Grand Etang and Mt. St. Catherine, where precipitation is above 4 000 mm per year and relative humidity and exposure increases. The formation consists of mountain thicket and Elfin Woodlands in association with Palm Break and scattered tree ferns.

MAP 3

Forest types in Grenada**Montane thicket**

It covers the summit of the main watershed from Mount Qua Qua in the south towards Mount Sinai and lesser ridge tops in the north-central areas. *Micropholis chrysophylloides* is dominant and forms 40 per cent of the crop. Associated species are principally 'goyavier' (group of *Myrtaceae* sp.) 19 per cent, *Licania ternatensis* 11 per cent, *Euterpe globosa* 9 per cent, *Dacryodes excelsa* 5 per cent., and *Richeria grandis* 4 per cent. Less commonly *Euterpe*, sp., *Rapanea guianensis*, *Oxythece pallida*, and *Ilex sideroxyloides* are found.

Elfin Woodland and Palm Brake

These forests exist for the most part in rather intimate relationships. The steep slopes of St. Catherine and the windward sides of Qua Qua and Fedon's Camp are covered with a patchy growth seamed with the traces of landslides, running up and down the slope. The typical elfin species: *Charianthus purpureus* var., *Weigeltia antillana*, *Didymopanax attenuatum*, *Ilex sideroxyloides*, *Rondeletia stereocarpa*, *Rapanea ferruginea* and *R. guianensis*, *Myrcia berberis*, *Byrsonima martinicensis*, *Stylogyne lateriflora*.



Hurricane damaged cloud forests at Grand Etang



Rain forests at Grand Etang after Ivan



Remnants of deciduous forests and thorn woodlands occupy the lower elevations. Rainfall, in these areas, range from 1 000 mm to 2 000 mm for five months of the year. They exist in the north and south in a degraded condition. Housing development is the major threat to the lost of dry forest, while in the north charcoal burning and grazing. The major dry forest areas are Levera in the north, Perseverance in the West and Mt. Hatman in the South.

The Deciduous forest is about 10 – 15 m height on varying slopes composed of Naked Indian (*Bursera simaruba*), *Albizia*, *Cordia*, *Collococca*, *Tabebuia heterophylla*, *Genipa americana*. The under storey is composed of *Guetarda*, *Chomelia*, *Randia Erythroxylon*. Thorn forest is 5 – 10 m height and occurs on severely degraded and eroded slopes. Main species include *Acacia*, *Leuceaena*, and *Pithecellobum*.

Most of *Levera* forests have been lost to development Most of the area has already been excavated to accommodate the gulf course. The forests around the lake remain due to negotiations with FNDP and the Developers. Presently operations have ceased due to problems by the developers.

Road construction at Levera



Clearing of levera hill before Ivan





The Mt. Hatman Dry forest is one of the two main habitats for the Grenada Dove. 164 acres have been declared a national Park. The area has suffered some damage by hurricane Ivan. The crowns of most of the emergent trees were broken off. Some were blown down, and some uprooted blocking all access to the area. Presently trees in some areas have been invaded by vines which could have some impact on the structural habitat requirements of the dove.

Blanket of Vines after Ivan at Mt. Hatman

Mt. Hatman After Ivan



Perseverance, located on the western side of the island is the other main habitat of the Grenada Dove

Perseverance dry-scrub woodland

Invasion of vines at Perseverance after Ivan



Very little remains of this formation in Grenada. At Levera in the north-east the littoral hedge is formed of *Conocarpus erectus*, *Jacquinia barbasco*, and white cedar *Tabebuia pallida* (in its monophyllous form). The woodland behind contains also sea grape *Coccolobis uvifera*, mapou *Pisonia fragrans*, manchineel *Hippomane mancinella*, *Erithalis fruticosa*, *Bourreria succulenta*, *Pithecelloboi unguis-cati*, and *Rheedia lateriflora*. On the Point Saline peninsula some sandy raised beaches carry pure groves of *Hippomane mancinella* up to 50 feet in height.

Littoral woodlands (Manchinnel trees)

Carriacou Levera littoral woodlands being cleared



Mangroves

Grenada contains 21 pockets (190 ha) of mangroves (Appendix 2) along the Eastern coastline from Levera to Telescope, and along the eastern coastline from Requin to True Blue. They form a thin fringe at Mt. Hatman Bay, Worburn Bay and Calivigny. The largest areas are at Levera, Conference, Upper Pearls, Westerhall and Calivigny.

Four species of mangroves are found - Red mangrove (*Avicennia racemosa*), Black mangrove (*Conocarpus erectus*), the Button mangrove (*Rhizophora mangle*) and White mangrove (*Laguncularis racemosa*).

Some of the mangroves, especially in the northeast, occur on private lands, where they suffer from exploitation for charcoal and firewood. Areas of mangroves on crown lands are not surveyed, demarcated, gazetted or managed. In fact, there is no policy or legislation specific to mangroves.

Felling of Mangroves for Charcoal production at Levera



Levera Lake before Ivan



Major Forest Regions

The major forest regions in Grenada: Grand Etang Forest Reserve, Mt. St. Catherine, Mt. Hope/Claybony water catchment (private), Levera, Morne Delice, Annandale watershed, and High North Forest Reserve in Carriacou. The location, State, area are shown in table 6.

TABLE 6
Major forest regions in Grenada and Carriacou

Location	State Area (ha)	Private Area (ha)	Total Area (ha)
Grand Etang Forest Reserve	1 526	222	1 748
Annandale watershed	236	-	202
Concord Watershed	-	96	96
Mt. St. Catherine	573		573
Clabony Watershed	-	262	262
Proposed Levera National Park (Development)	48	172	220
Carriacou Forest Reserve	136	-	136
Petit Martinique	0.6	-	0.6
Total	2 485.6	962	3 447.6



Mt. St. Catherine after Ivan



Mt. St. Catherine

Mt. St. Catherine lies in the north, between 400 m and 840 m, and covers 573 ha of forests. The area is relatively inaccessible owing to the steep and rugged topography. All three major forest types – cloud forests, montane and lower montane forests are represented in this area. About half of the reservoirs and water intakes on Grenada derive their water supplies from the region. The region also contains the highest waterfall on the island and thermal springs. The area has been recently surveyed and demarcated. Arrangements for gazettelement into a forest reserve is underway.

Annandale

Annandale watershed (236 hectares) is an old agricultural estate purchased by Government during the 60's for water conservation. The area was placed under the management of the Forestry Department. Present management is geared towards water and soil conservation and agroforestry.

Annandale Watershed after Ivan



Morne Delice

Morne Delice forest, (40 ha), lies in the south of the country, between 230 m and 340 m. The forests appears to be secondary seasonal and contains several species of trees, including white cedar (*Tabebuia pallida*), Bullet (*Manilkara bidentata*), and marauba (*Simaruba amara*). The area has been enhanced for recreation. Several trails have been established. There have been other developments such as a watch-tower, car park and restaurant. The area is legally protected.

Morne Delice Forest



Grand Etang Forest Reserve

The Grand Etang forests were declared a Forest Reserve in 1906. The region is concentrated between 450 – 760 m elevations. In the approximate centre of the reserve is the Grand Etang Crater Lake. The reserve contains the best remnants of Rain and Lower Montane rain forests found on the island.

Grand Etang Forest after Ivan



Two inventories occurred in the reserve. In 1978, the entire natural forest area (about 1 000 ha) was inventoried (Potter and Potter, 1979). An area of 575 ha from this inventoried area in the Great River Basin was proposed for intensive forest management (FAO, 1981), the area was estimated to contain 50 000 cubic meters of recoverable timber. Another inventory was conducted in 1985 in an effort to correct some of the deficiencies of the 1978 inventory.

An area of 546 ha, south of the St. George's to Grenville road was inventoried (Johnson, 1985). This area was divided into an exploitable zone (< 30 degrees slope) and a non-exploitable zone (>30 degrees slope). One hundred and fifty nine hectares, containing 84% of rain forests, fall in the exploitable zone. Gommier (*Dacryodes excelsa*) is the dominant species, accounting for a standing volume of 128 cubic meters per hectare out of a total for all species of 144 m³/ha in trees over 40 cm dbh. The following gross volumes of timber were found:

- over 10 cm dbh: 33 600 m³ (Gommier - 23 400m³)
- over 40 cm dbh: 23 100 m³ (Gommier - 20 600 m³)
- over 50 cm dbh: 20 500 m³ (Gommier - 18 800 m³)

Forest Plantations

The GrandEtang Forest Reserve contains approximately 166 ha of exotic plantations established from 1957. Plantations are located at St. Margaret's, GrandEtang, Vendome, Les Avocats, Panama and Petit Etang.

Blue mahoe (*Hibiscus elatus*), is the main species which occupies about 75% of plantations. Pines (*Pinus Caribaea*), account for about 20%, and mahogany and *cupressus lusitanica*, 5%. Most of the plantations are located on steep slopes with poor accessibility.

The results of an inventory in 1989 indicated that pines are capable of achieving yields of 15 – 20 m³/ha/yr, on better sites and 11 – 15 m³/ha/yr on poorer sites over a 25 year rotation. Blue mahoe, on sheltered, fertile sites, yields 9 m³, and 6



m/ha/yr, on poorer sites. Rotation ages of 20 – 25 years for pines and 30 – 35 years for blue mahoe have been estimated. About 40 ha of blue mahoe plantations had been salvaged and replaced by pines. The value of planting pines however, had been questioned and the practice had been discontinued.

Over the years, the Forestry Department has been selectively harvesting blue mahoe Les Avocats, and Vendome, for timber, split-fence, and posts production. Several blue mahoe plantations at Les Avocats, St. Margaret’s and Vendome have been replaced with pines. In 1994, blue mahoe trees at Les Avocats and Annandale were severely affected by the pink mealy bug. Many trees at Les Avocats died as a result of the attack.

Les Avocats blue mahoe plantation

Pine plantations at Grand Etang after Ivan



1.3 Agricultural biodiversity

Grenada’s agro-ecosystems are one of mixed cultivation primarily on small farms. The main crop units is shown in Table 6.

TABLE 6
Main agricultural crops grown in Grenada

CATEGORY
GRENADA
Food crop and vegetables
Food crops, vegetables with fruit trees
Mixed cultivation
Sugar Cane
Banana
Banana mixed with cocoa and / or spices
Cocoa mixed with banana and or spices
Coconuts
Nutmegs
CARRIACOU
Food crops
Fruit trees
Coconuts
Citrus

Source: Land Use Division, MOALFF

Cocoa, Bananas and Nutmegs were Grenada’s three main traditional crops. Hurricane Ivan has seriously affected nutmeg plantations and to a lesser extent Cocoa and Bananas. In addition to the main economic crops listed in Table 7, a wide variety of spices and fruits are found on the island. Appendix

TABLE 7
Outline of Grenada's Biodiversity

Forest type	Representative Species	Botanical Name
Rainforest and Lower Montane Rain Forest	Gommier	<i>Dacryodes excelsa</i>
	Chataignier grandes feuilles	<i>Slonea caribaea</i>
	Bois	<i>Micropholis chrysophylloides</i>
	Marouba	<i>Simarouba amara</i>
	Balata laite	<i>Oxythece pallida</i>
	Figuier	<i>Ficus</i> spp.
	Chataignier petites feuilles	<i>Slonea truncara</i>
		<i>Maythenus grenadensis*</i>
Montane Thicket Elfin Woodland and Palm Brake	Goyavier	<i>Myrtaceae</i> sp
		<i>Licania ternatensis</i>
		<i>Euterpe globosa</i>
		<i>Dacryodes excelsa</i>
		<i>Richeria grandis</i>
		<i>Rapanea guianensis</i>
		<i>Oxythece pallida</i>
		<i>Ilex sideroxyloides</i>
		<i>Charianthus purpureus</i>
		<i>Weigeltia antillana</i>
		<i>Stylogyne lateriflora</i>
Secondary Tropical Rain Forest		<i>Nectandra antillana</i>
		<i>Guarea macrophylla</i>
		<i>Euterpe globosa</i>
		<i>Cecropia peltata</i>
		<i>Ocotea martinicensis</i>
		<i>Manilkara bidentata</i>
Dry scrub Woodlands		<i>Swietenia mahagoni</i>
		<i>Tabebuia pallida</i>
		<i>Guettarda scabra</i>
Littoral Woodland	White cedar	<i>Tabebuia pallida</i>
	Sea grape	<i>Coccolobis uvifera</i>
	Manchineel	<i>Hippomane mancinella</i>
Mangroves swamps	Red mangrove	<i>Rhizophoramantle</i>
	Button mangrove	<i>Conocarpus erectus</i>
	White mangrove	<i>Laguncularia racemosa</i>
	Black mangrove	<i>Avicennia germinans</i>

* endemic

1.4 Public awareness

The current national capacity is not fully conducive to effectively accomplish the requirements for public awareness in Plant Genetic Resources. The following capacity building needs must be prioritized if planned actions in the future are expected to create the preferred outcomes anticipated.

- Develop and implement an integrated multi-dimensional public awareness (PA) strategy that addresses the linkages among the three multilateral environmental agreements.
- The following approaches should be considered during the development and implementation of the awareness strategy:
 - A multi-stakeholder public awareness task force should be commissioned to provide guidance for the development and implementation of this strategy;

- Training of the multi-stakeholder task force in the dynamics of public awareness, social marketing, programme evaluation etc which should predate major planning and implementation activities;
 - Research, monitoring and evaluation must be integral aspects of the project cycle;
 - The strategy should be informed by social marketing and sustainable livelihood principles;
 - The NGO community should be a major collaborative agent in this process to facilitate community/grass root awareness needs;
 - Active involvement of the media, young people, women and Community Based Organizations in the planning and implementation phases is highly encouraged;
 - Consideration should be given to the establishment of an award for excellence in environmental public awareness programming.
- Develop and implement a human resource strategy designed to strengthen leadership, advocacy and negotiation skills, and fulfill the technical deficiencies
 - Elaborate the development of an environmental education programme for primary and secondary schools based on the comparative analysis of the convention needs and the degree of environmental information already infused within the schools' curricula.
 - Develop and implement a community base project that encourages academic and grass root involvement in finding and implementing solutions for environmental problems.
 - Elaborate and develop a framework for stakeholder participation in national environmental decision making using lessons learnt from successful initiatives such as the National Forest Policy development process.
 - Develop a policy that guides the maintenance, preservation and utilization of traditional ecological knowledge in environmental programming.



THE STATE OF *IN SITU* MANAGEMENT

In situ management of plant genetic resources is carried out primarily in protected areas and forest reserves. The Forestry and National Parks Department (FNPD), within the Ministry of Agriculture and Fisheries, aims to ensure that the goods and services derived from the forest meet present-day needs while at the same time securing their continued availability and contribution to long-term development. In its broadest sense, forest management encompasses the administrative, legal, technical, economic, social and environmental aspects of the conservation and use of forests. It implies various degrees of deliberate human intervention, ranging from actions aimed at safeguarding and maintaining the forest ecosystem and its functions, to favoring specific socially or economically valuable species or groups of species for the improved production of goods and services.

Ultimate responsibility for the Management of terrestrial protected areas lies with the Forestry and National Parks Department, Ministry of Agriculture, Lands, Forestry and Fisheries. Management of the forestry resources are guided by a new Forest Policy, which was developed in a highly consultative a participatory manner, ensuring active involvement of all stakeholders. From the new policy a new forest structure was derived (see units below) and consequently a ten (10) years strategic plan to implement the forest policy. The Chief Forestry Officer and head of Units are responsible for the effective and efficient implementation of the forest policy. Units within the Forestry and National Parks Department are as follows:

- Recreation;
- Education;
- Mangrove;
- Forest Conservation;
- Upland Watershed Management;
- Tree Establishment;
- Wildlife Management.

The main objective of the Forestry and National Parks Department is to facilitate and provide strategic leadership and management of forestry resources for sustainable social, economical and environmental benefits for all stakeholders.

2.1 Vegetation types

Vegetation Types in Grenada

The vegetation of Grenada is classified (Beard, 1949) under the following vegetation types:

Climatic type

- Rain Forest and Lower Montane Rain Forest: This is a *Dacryodes-Licania* association and most of this has been exploited. Only small sectors remain in the virgin state and are presently in Grand Etang Forest Reserve, Mt. Qua Qua and Fedon's Camp.
- Montane Thicket: Species in this vegetation type includes *Micropholis chrysophylloides*, *Licania ternatensis*, *Euterpe globosa*, *Dacrydes excelsa* and *Richeria grandis*. This vegetation type is well represented in peaks over 600m (Grand Etang and Mt. St. Catherine. The vegetation quantity is adequate and the quality is excellent.
- Elfin Woodlands: *Cyathea* spp., *Heliconia bihai*, *Euterpe globosa*, *Chorizanthe purpureus* and *Weigeltia antillana* are the species found in this vegetation type. These species are confined to summits of peaks in the Grand Etang and Mt. St. Catherine areas. The quantity is adequately represented and in excellent condition.
- Deciduous Seasonal Formation
 - Middle Belt: This vegetation type includes *Tabebuia pallida*, *Swietenia mahogoni* and *Guettarda scabra*. The area (Marquis River) representing such vegetation is minute and it's condition is fair

- Dry Coastal Belt: Species found are *Bursera simaruba*, *Albania caribaea*, and *Spondias mombin*. Representation of this faciation is fair and the quality is good. Areas representing this vegetation type are Canoe Bay, La Sagesse and Lake Antoine.
- Dry Evergreen Formation, Littoral Woodland, Seaside Grape, Manchineel association: This vegetation type is relatively well represented in areas such as Canoe Bay, La Sagesse, Levera, Hog Island, Calivigny and southern seascape. Species present are *Conocarpus erectus*, *Tabebuia pallida*, *Coccolobia uvifera* and *Hippomane mancinella*. This vegetation type is of excellent quality.

Edaphic Type

- Herbaceous Swamp and Papyrus Bog Association, which is, represented by small caldera lakes (Lake Antoine and Grand Etang Lake). In addition there is mangrove woodland which is represented by species such as red *Rhizophora mangle*, black *Avicennia gerimans*, white *Laguncularia racemose* and button mangroves *Conocarpus erectus* in Levera, Hog Island, northern and southern seascape.

Vegetation Type in Carriacou

The vegetation of Carriacou was classified (Howard, 1950) as follows:

Climatic type

Deciduous Seasonal Formation (Dry Woodland): This association is badly affected by grazing and found only in the north and forest reserves (e.g. High North Forest Reserve). Species present in this association are *Bursera simaruba*, *Brosium alicastrum*, *Pisonia fragrans*, *Ficus lentiginosa*, *Lonchocarpus* spp. and *Swietenia mohogani*. The species are adequately represented and the quality is good.

Dry Thorn-Cactus Scrub: Species in this vegetation type are *Opuntia dillenii*, *Randia* sp. and *Piscidia* sp. This association is represented in High North, Limlair, Thiboud, Saline/White Islands and Sabazan. The quality of vegetation is good and adequately represented.

Edaphic type

Mangrove Woodland: This is well represented in High North, Lauriston, Mabouya and Tyrrel Bay. The species are same as the mangrove woodland in Grenada.

Forest Types and acreage in mainland Grenada (Eschweiler, 1982)

In Grenada, Cloud Forest covers an area of 1 688 ha or 5.3 % of the mainland total area. The Lower Montane occupies an area of 2 278 ha (7.2 % of the island). Deciduous Forest and Dry Woodlands accounts for 5.6 % (1752ha) of the area of mainland Grenada. Grenada has 1 226ha of Littoral Woodlands, representing 3.9 % of the island total area. Mangrove Forest accounts for 0.6%(190) of the total area of the island. The forest types cover a total of 7 134ha (22.6%) of mainland Grenada.

Forest Types and acreage in Carriacou (Howard, 1950)

As it relates to Carriacou, Dry Thorn-Cactus Scrub, Deciduous Seasonal Formation and Mangroves amounts to 1 219ha or 30 % of the total area of the island.

2.2 Inventories and surveys

As it relates to wild plants resources that are important for food, comprehensive inventories were not carried out. Consequently, quantitative data regarding particular food species per given forest area is not available. However, the species that are used for food and managed *in situ* are well known. Inventories conducted by The Nature Conservancy (TNC) were more broad based and not specifically relates to species used for food consumption. TNC implemented a Gap Assessment Analysis study of protected areas to determine, protected areas in Grenada, present management systems and recommended sustainable resources management systems. The OECS is also about to undertake an inventory of species to satisfy activities for a project under the bio-diversity component of the OECS projects. Table 8 shows the forest species managed *in situ* for food.



TABLE 8
Forest species managed *in situ* for food

Local Names	Botanical Names	Relative Abundance
Hog Plum	<i>Spondias mombin</i>	Found mainly on forest boundaries. Few mature trees left after Hurricane Ivan
Balata	<i>Manilkara bidentata</i>	Found mainly in climax forest. Low population levels.
Leucaena	<i>Leucaena leucocephala</i>	Use mainly as an animal feed. High population levels on forest edges.
Penny piece	<i>Pouteria multiflora</i>	Low population levels
Stinking toe	<i>Hymenae coubaril</i>	Low population levels
Yam	<i>Yam spp</i>	Relatively high levels

2.3 On-farm management and improvement of plant genetic resources for food

The Forestry and National Parks Department in collaboration with the Extension Division from the Ministry of Agriculture and the Produce Chemist Laboratory are working along with farmers, landowners and other key stakeholders to ensure improved management of plant genetic resources on farms. The objective of the approach is to empower the stakeholders and give them the opportunity to own the initiative. This participatory approach towards plant genetic conservation will improve the existing status of both local indigenous food species and exotics. A component of the initiative is the provision of planting material by the different divisions of the Ministry of Agriculture and making them available to farmers. Rendering of technical support to farmers is also an important aspect of the farm plant genetic resources improvement and management programme.

2.4 *In situ* conservation of wild crops relatives and wild plants

Management for the conservation of wild plants is through the forestry department under the direction of the new forest policy. The rules and regulations for the new forest legislation is in the draft stage and is awaiting funding for the development of final copy. The Education Unit under the forestry department contributes to the conservation of wild plants through a series of environmental education and awareness programmes. Presentation of relevant conservation topics is an integral part of the awareness programme.

In addition, the forestry department ensures conservation through the surveillance and control functions of forest rangers. Forest rangers are responsible for the following:

- Patrolling (ensure compliance with rules and regulation related to protection and conservation in forest reserves and protected areas)
- Fire prevention and control
- Control of illegal harvesting

Recommendations for effective and efficient plant resource conservation:

- Adopt a more customer oriented approach towards conservation and poverty alleviation
- Restoration of degraded forest due to natural disasters
- Increase in FNPd human and technical capacity to facilitate the implementation of the policy.
- Greater stakeholder involvement in forest decision making process
- Co-management arrangements with stakeholders to sustainably manage private forest resources.
- Increased public awareness on forestry and related issues.
- Greater cooperation from other resource management institutions / agencies
- Increase the socio- economic benefits to stakeholders through more effective collaborative forest management.
- An updated forest policy to reflect current trends.
- Synergies among the Multilateral Environmental Agreements (MEA s)
- Legitimize planning implementation, monitoring and evaluation of institutions with similar resource management responsibilities.
- Foundation for sustained supply of forest products to satisfy the demands of local saw milling, handicraft and furniture industries.

- More rigorous and consistent adherence to regional and international conventions and agreements
- Upward mobility of staff flows naturally under a system where entire staff are well trained and subordinates are able to take up senior positions.
- Fill all vacant positions within the FNPDP to satisfy the new forestry structure.
- Strengthen the capacity of FNPDP to ensure effective and efficient implementation of the forest policy and strategic plan.
- Put mechanisms in place to ensure sufficient training and other support are available for all members of staff
- Legitimize planning and implementation arrangements for institutions within the Ministry of Agriculture with similar or overlapping mandates.
- Ensure administrative and financial support for the rehabilitation and maintenance of forest reserves
- Increase environmental awareness programmes to sensitize the general public on the importance of a sustainable environment.
- Increase the level of technical support to stakeholders (farmers, hunters, saw millers, NGOs, community groups, Government and private institutions, developers etc.)
- Strengthen relationship and commitment with regional and international conventions and agreements
- Continued consultation, participatory planning and implementation with stakeholders.
- Increase proposals to fund essential FNPDP conservation, ecological and biodiversity projects.
- Strengthen the capacity of the nursery to propagate seedlings that will significantly satisfy the demands of all stakeholders.

2.5 Need assessment for building capacity within agencies and stakeholders for eco systems management

The needs assessment seeks to identify avenues, ways and means by which existing capacity may be enhanced with the overall goal of building greater competence in ecosystems management and towards biodiversity conservation and sustainable use.

Firstly, an assessment is made for Protected Areas Ecosystems (*in situ*) management using the cross –sectorial (cross-agency/ stakeholder) approach where needs / constraints are categorized as infrastructure, institutional, technological and collaborated (co-ordination). Table 9 below is a presentation of principal agencies, needs and constraints regarding ecosystems management.

TABLE 9
Principal agencies, needs and constraints regarding ecosystems management

Principal agencies	Needs	Constraints
Institutional		
Ecosystems Management Agencies Forestry Dept (FNPDP) Fisheries Division Physical Planning Development Control Authority (PPDC)	Training for ecosystems. Management agencies (Personnel) in skills competencies and knowledge supported by equipment and enabling facilities for the community education and awareness.	Lack of sufficient training and enabling support equipment and other ways/ means within existing agencies.
FNPDP FD PPDC LU	Resources support and training for ecosystems Management Plans (LAMPs) as a mostly unfulfilled requirement of current law.	LAMP's require skills, equipment and a protracted process for implementation; Enabling resources lacking at this time.
All NGO's especially those with community focus and with some institutional capacity.	Training Non - Governmental Organizations (NGO's) with skills, competencies, knowledge for interpreting Ecosystems management issues that are important to their community outreach (Technical skills).	Extended period for effective uptake of training is required for the subject.
All NGO's	Training of NGO's with skills competencies, knowledge for education/public awareness on Ecosystems Management.	Knowledge training and enabling facilities needs to be inputted in NGO's.



Principal agencies	Needs	Constraints
Institutional		
Land use Physical planning Development control Authority	Training and support equipment and computer software for enabling Ecosystems management agencies to popularize Ecosystems Management by digital technology.	Full Satellite image of the Grenada Island not available to land use Division. Enhancement and enabling materials not yet available.
Land use Pest Manager Unit Commodity Boards	Special programme of biodiversity focus targeted at Government ecosystems management agencies without direct protected areas management functions.	Agencies currently having very little focus on Ecosystems Management and with already limited staff/resources for current main activities.
Government Departments with administrative responsibilities for Ecosystems management Land Use Division (MOA) PPDCA(MOF)	Expose administrators and policy makers to key issues on Ecosystems Management and values of biodiversity using enhanced digital technology for input.	Difficulties of providing high impact illustrations on the issues within timely bits providing Grenada-relevant information.
Principal		
Institutional (in situ)		
All Government Ecosystems Management agencies NGO's	Training on common property issues relating to protected areas management and requiring public/private partnerships.	Qualified and skilled trainers difficult to source. Significant inter-agency collaboration for sharing past experience as required but difficult to set up.
All Ecosystems management Agencies Community members with local knowledge	Expose all agencies to TEK, IK, CBK that are of relevance and sufficient importance to Ecosystems Management.	TEK, IK, CBK although important yet, since most is undocumented, difficulties could be expected in exposure at focused workshops, for example.
FNPDP MPA/FD Agencies with projects	Streamline delivery systems Management especially ongoing projects on Ecosystems Management	All Government financial cash flows must pass the Treasury where items compete for priority except those with special status.
Forestry (FNPDP)	Establish a co-management relationship with the GWGCS, by negotiating special conditions for community-based regulations supported by statute law in order to conserve wild game.	Lack of cohesion in the GWGCA community. An interest by GWGCA in the use of guns is a negative factor. Co-management is still a new and untried formula for conservation.
FNPDP MPA/FD Agencies with projects	Training for members of GWGCA, GHS, GSPCA with knowledge etc. related to Ecosystems Management so that they may act as focal points for the purpose.	Finding Ecosystems Management agency personnel able and willing to provide selective training as requested by recipients.
Forestry (FNPDP)	Establish a "Public Hearing Systems" with law and administrations i.e. procedures for submissions, qualifications of applicants etc, for dealing with biodiversity issues related with biodiversity issues to large-scale development	Administrations of procedures etc could be plentiful for an already limited Physical Planning Development Control Authority/Legal Department A protracted consultation process for establishing protocol is required.
Principal agencies		
Technological (in situ)		
FNPDP FD PPDCA LU Division	Computer Enhanced avenues for engaging the interest of community on the ecosystems issues.	Equipment, software appropriate as means for applying computer enhanced avenues are unavailable.
Land use PPDCA Fisheries Division	Satellite imagery of Grenada computer enhanced extensions to the existing Land information system for popularizing Ecosystem Management using digital technology.	Satellite imagery of the Grenada-island is expensive to secure. Land information systems software appropriate to task are unavailable at this time.
Land use Division PPDCA Fisheries Division	Adapt computer enhanced and user- friendly applications for easy use by managers and administrators and policy makers on aspects on Ecosystems Management and informed decision making.	In-house technician with relevant information need to be equipped with skills for presentation and for holding the interest of non-technical persons; such skills are not as yet sufficient.
Environmental affairs PPDCA	Computer adaptable environment monitoring equipment.	Functions of agency not yet confirmed.

Principal agencies	Needs	Constraints
Infrastructure (in situ)		
FPND	Establish local areas Management plans with marked zones (and with law and administration for management).	Lack of prerequisites various Facilities and conditions for establishment of most LAMPs of areas already identified for protection.
Land use Division PPDCA	Establish data capture Network in the full for the purpose of enhancing and updating the existing land information system used in mapping and informed decision-making for Ecosystems Management.	Personnel existing in the Field need to develop a focus on systems management as part of their work. Most officers are not yet trained for contributing to a computer-enhanced network.
Environmental affairs (MOH) PPDCA Land use Division	Establish an environmental Monitoring Network that will contribute to Ecosystems Management with standards/ criteria measurements and for satisfying legal requirements.	Specialized training required for making the system useful. Protocols need to be established and tested. Linking such an initiative with legal provisions takes much time
Collaborative (in situ)		
Principal agencies	Needs	Constraints
Collaborative (in situ)		
FNPD Farms Extension Services Division	Establish linkage with community persons and groups sharing TEK and CBK for the purpose of enhancing the knowledge-base of Ecosystems management-planning personnel.	Persons required making and maintaining effective contacts with community-base persons are lacking Persons with knowledge are often apprehensive concerning how their shared knowledge will be used.
NGO's FNPD PPDCA	Establish joint training workshops for skills training of community outreach agents promoting Ecosystems Management.	Expert and specialized trainers of trainers or multiagency personnel promoting Ecosystems Management are difficult to source.
Government Institutions Department (Personnel) IAGDO	Establishment of formal institutional mechanisms for facilitating collaboration of Government agencies with NGO's in ecosystems and Protected Areas Management/ Planning.	Agreement on "Terms of Engagement" between Government agencies and negotiations, trust and compromise.



THE STATE OF *EX SITU* MANAGEMENT

The management of *ex situ* plant genetic resources is non-existent in the Grenadian context. Thus, the evaluation of existing capacity and identification of needs and constraints of various agencies in this regard really points to the existing technical, financial and resource gaps that need to be addressed. The development of the National Biotechnology Laboratory which is currently under phased development potentially could satisfy partially the role of a national herbarium.

It must be kept in mind, however, that establishment and maintenance of a National Herbarium could be a prohibitively expensive proposition for a small state as Grenada. One route for consideration is the networking of existing community practices and the preservation of indigenous knowledge as a proxy for the herbarium. Table 10 is a presentation of the recommended principal agencies, identified needs and constraints for the development of a herbarium/institutional network for herbarium related functions.

TABLE 10
**principal agencies, identified needs and constraints for the development of a herbarium/
institutional network for herbarium related functions**

Principal agencies	Needs	Constraints
Infrastructural (<i>ex situ</i>)		
National Science and technology council (NTSC) having only a few pieces of relevant equipment and document. Proposed National Herbarium	A three-component National Herbarium requiring minimum cost of operations.	Absence of a national Herbarium past and with limited skills, knowledge and competencies for such a facility existing within the community.
Biotech Lab Produce Chemist Lab CARDI Agreement Centres National Herbarium (NH) does not yet exist.	A network facility linking the National Herbarium with existing institution such as the Biotech Lab, Produce Chemist Lab and Agronomic institution and (with support) equipment to facilitate joint activities.	Functional linkages require Built up interest and substantial institutional strengthening at the end of the collaborating institutions; such elements do not yet exist.
Proposed national Herbarium (NH) Community-based groups or individuals and NGO,s	Needs a network facility linking community-based group and persons having TEK, IK and CBK with propose National Herbarium and with support equipment for maintaining such a network.	The appreciation of a National Herbarium will have be built within the community with time in order to tap the fullest support of rural knowledge system within the Grenada community.
PCL BTL Agronomic Units Community-base person/ agencies	Equipment and support facilities within collaborating and participatory institutions (e.g DTL/ PCL for identifying and encouraging community-base bioprospecting (options).	Owenship of bio-prospects and results of joint work-development require protocols and trust among parties.
National Herbarium (to be established)	In-house National Herbarium lab facilities for visiting and or resident scientist ect to conduct work and base their activities.	Significant capital required for sufficient physical support facilities within a National Herbarium.
Principal agencies		
Technological (<i>ex situ</i>)		
National Herbarium (to be established)	Equipment and technology for enabling NGO,s and relevant governance agencies such as FNPD to communicate and promote the value/ work of the National Herbarium to the community (Education and public awareness).	Time needed to build interest and commitment of NGO,s and government agencies. Substantial facilities required and with a system for sharing facilities dedicated for other purposes with work programmes of existing agencies.



Principal agencies	Needs	Constraints
Institutional (ex situ)		
FNPD Farms Extension Services Division Proposed National Herbarium	Linkages among agencies responsible for controls on trade threatened and endangered species of flora/ fauna for satisfying the obligations to CITES. Involved Customs services and PMU as critical collaborative contro agencies.	The draft CITES law not yet adopted in local law. Provisions in existing laws are not adequate to deal with aspects of new WTO free trade regime recently taking effect.
FNPD Farms Extension Services Division Proposed National Herbarium	Established within the proposed National Herbarium a system of linkages with community agencies/ individuals with CBK, IK and TEK.	Working linkages require field worker(s) within the context of built-up interest in the National Herbarium.
PCL BTL Agronomic Units PMU Proposed National Herbarium	Governments commitment and Support for system providing the services of agencies such as PCL, BTL, Agronomic Units etc to contribute to community-base efforts in identifying bio-prospects.	Government agencies, even With dedicated support for enabling special projects/initiatives, could yet place greater focus on the normal main activities at the expenses of ,biodiversity activities.
Agronomic Units Farmer- Cultivator BTL GHS Individuals proposed National Herbarium	(Create) a register of field gene banks and resource persons having custodial biodiversity capital and establish collaborative relationships to benefit.	Built interest in National Herbarium as yet not in place and will take time institutional support to build.
Reginal Herbaria and relevant Centres of excellence TAMCC SGU BTL Community-based knowledge sources Proposed National Herbarium	(Build) knowledge base on Taxonomy and basic ecology of indigenous and valued biodiversity with the ecosystems and Protected Areas in Grenada. Collaborate with the build expertise within local agencies such as TAMCC and SGU.	Expert assistances supported by local facilities in place is needed for initiation and maintenance of this knowledge base; such support is not yet available.
Legal Affairs Department Proposed National Herbarium	(Establish) appreciate legal Provisions/ instruments for establishment and maintenance of a National Herbarium.	Legal provisions must come after the concept, structure and organization of the National Herbarium is decided upon.
Principal agencies		
Collaborative (ex situ)		
Farms Extension Services Division Agronomy Division Scientist GNSMC PCL WGCA Community-base persons with CBK, IK and TEK	Generate interest in and focus on <i>ex situ</i> ecosystems management in the context of a three- component National Herbarium with explicit recognition of potential contribution that may be made by community- based knowledgeable resource persons, local and external scientist, agencies with custodial biodiversities capital and other technical support agencies.	Locally available infrastural capital for NH is scare. Interest in the idea if a NH is currently minimal in certain sectors. Sustainability of a NH having not been a historical institution would depend on substantial collaborative action and commitment from sereval source, chief of which is the Government.
Community-base persons Minor Spices Marketing Co-op Herbal Medic ine Praticianers PCL WGCA A proposed National Herbarium	(Promote) an association ofcommunity- based resource knowledge persons and – or agencies as a valued contributor to ecosystems management.	Community-based knowledge sources with respect to <i>in situ</i> Ecosystems Management must first build confidence NH as a networking institution of which they are respected partners

3.1 Needs assessment in summary, for *in/ex situ* management

Training- required within various agencies, NGO's (community focused) and other societies and associations.

- Knowledge enhancement sources available to ecosystems management agencies and collaborating stakeholders; such knowledge identified as Traditional ecological/Indigenous and community-based; also enhancing scientific knowledge.
- Involvement/ Recognition of CBK, IK, TEK within the rural and urban community held by community-based persons with considerable potential in contributing to Ecosystems and Protected Areas Management (*in situ* and *ex situ*).
- Technological Enhancement of existing agencies/stakeholders applying satellite imagery and computer enhanced land (mapping and use) information systems for engaging stakeholder (Government Agencies, NGO's, Civil Society etc) ecosystems management and informed decision-making.
- Provision of enhanced or new Infrastructural facilities as resource centers or as network support for both *in situ* and *ex situ* ecosystems management.
- Creation and enhancement of coordinating/collaborative mechanisms where by existing capacity may be more effectively used for the purpose of facilitating innovative ways and means of establishing and maintaining new capacity areas as identified in this report.
- Alignment of management capacity with legislative reform is dealt with in the context of consolidation of existing legislation in support of current government policy and for efficiency in the application of law by relevant management agencies.
- Means for implementing government's public policy of participatory/consultative management (co-management) suggested in proposals on formal systems NGO's to engage Government towards ecosystems management planning e.g. " Public Hearings System", Government and NGO joint management relationships (co management).

THE STATE OF USE

This chapter describes the state of use of Plant Genetic Resources that contribute most to food and agriculture in Grenada. In addition, it will also highlight the future needs and priorities for PGR.

4.1 Plant genetic resources

The PGR that are most significant to food and agriculture in the tri-island state of Grenada is presently on a recovery path following the devastating impact of Hurricane Ivan and Emily in 2004 and 2005 respectively. Prior to the passage of the Hurricanes, the main agricultural crops were Cocoa, Nutmeg and Banana. With the collapse of the Banana market for the Windward Islands, banana production is now mainly for local consumption and emphasis is being paid to the revitalization of the Cocoa and Nutmeg industry for export and local consumption.

Additionally, the role of other food sources such as Coconut, Mangoes, Paw-Paw, Cassava, Yams, Dasheen, Tania, Sweet Potato and Beans cannot be overemphasized, as they are major contributors to food security and income generation. Indigenous PGRs are gradually giving way to exotics that were introduced by the Taiwanese and now by the Chinese Mission. Introduced species in most instances are more prolific than the indigenous and consequently seem to be favored by farmers for their financial advantage.

In addition to the above food and agricultural crops, PGR used for food and medicine can be found in the forest (uncultivated / wild). These resources include *Penny Pease*, *Pawdo*, *Balata*, *yams* and *bois bande* (*aphrodisiac*).

4.2 Distribution of plant genetic resources

Currently, there is no established mechanism in place to effectively record the distribution of PGR. However, the Ministry of Agriculture is in the process of developing a plan that will ensure the conservation and sustainable use of PGR. The main objective of the plan is to effectively and efficiently map PGR throughout Grenada. However, the distribution of PGR that is important to food and agriculture in Grenada can be generally represented as follows (see Table 11):

TABLE 11

Distribution of PGR for Food in Grenada

Category	Locality	Remarks
Forest Species		
Balata (<i>manilkara bidentata</i>)	Rain forest in the south and central parts of the island	This species does not grow under plantation condition (requires climax condition) Population levels are low
Penny pease	Throughout Grenada in forest with elevation above 1000 feet above sea level.	
Pawdo	All rain forest and middle belt areas	The species is very well established
Agricultural Species		
Cocoa	On farm lands throughout Grenada, with exception	Significant decline due to development and neglect of agricultural farms in the aftermath of Hurricane Ivan
Nutmeg	Mainly on farms in high elevation throughout Grenada	Plantations significantly reduced due to the Hurricanes (Ivan & Emily)
Banana	Grown Throughout the entire island, but mainly in the middle and mountainous farm areas	Grown mainly as an intercrop (few uniform plantation can be found in upland areas)
Dasheen	Found mainly in areas where rainfall is above average.	Grows best in wet conditions



Category	Locality	Remarks
Yams	On agricultural farms and forest reserves throughout Grenada	Increased significantly after Hurricane Ivan and Emily
Tania	On farms throughout Grenada but mainly in mountainous regions in the central parts of the island.	Populations levels have reduced
Cassava	On farms throughout Grenada	
Fruits / Citrus	Throughout Grenada	Its importance as a source of food is becoming more and more recognized
Vegetables	On farms throughout Grenada	Increased in production in the aftermath of Hurricane Ivan and Emily

4.3 Utilization and enhancement of PGR

The need for prolific crops that are tolerant to a wide range of pest and disease challenges, have always been the desire of farmers. However, it's the policy of the Ministry of Agriculture that systems and mechanisms are put in place to ensure that these plants promote sustainable, productive systems that maintain ecosystem productivity and ecological functions while contributing directly to environmental, economic and social well-being of all stakeholders.

The Taiwanese and Chinese Mission are credited for some recent examples of improvement in crop production through the introduction of particular fruit varieties. For example, the Wax Apple introduced by the Taiwanese is very prolific, resistant to local pest and disease and very tasty. Other recent examples include the Juliana Carrot and a special variety of Tomato (produced by the Peto Seed Company), that are high yielding and resistant to many pest and disease. These crops have the potential to impact positively on the socio-economic life of farmers and the country.

Other examples of introduced high yielding crops with great levels of tolerance include Cabbage, Cauliflower, and Beans recently introduced by the Chinese Mission.

4.4 Constraints affecting improved use of PGR

There are a number of factors that directly limits the improved use of PGR. Among these are the following factors:

- Lack of sufficient capacity to effectively and efficiently characterize and evaluate PGR;
- Insufficient capacity for plant breeding;
- Lack of integration between conservation and utilization programmes
- Lack of policy to make PGR an integral part of all agricultural programmes;
- Lack of human and financial resources;
- Lack of coordination of PGR programmes that adequately reflect agricultural needs / demands.

4.5 Activities that enhance the use of PGR

The enhancement of PGR in Grenada was brought about by the implementation of programmes under the Ministry of Agriculture and in particular the National Bio-Safety Authority (NBA). The NBA has embarked on initiatives that sensitized farmers and the general public on the use of PGR. Other initiatives of the Ministry of Agriculture and NBA include the following:

- Improved training in plant breeding;
- Increased collaboration among institutions and farmers that deal with PGR;
- Increased breeding operations in PGR particularly so in the field of tissue culture using plants such as Banana Spp and Pine Apple.

4.6 Current priorities for PGR

Current priorities for PGR include the need for implementing participatory approaches to plant breeding initiatives. In order for a breeding programme to be successful, there must be stakeholder involvement at all phases. It is fundamentally



important and necessary that stakeholders be empowered to own the programme. Other priorities include the exploration for new marketing opportunities for products of local varieties, increased collaboration among managers, researchers and farmers to better integrate conservation and use of PGR.

4.7 Collection of PGR

Collection of PGR has been practiced by farmers from time immemorial to satisfy planting requirements. There has been no strategic plan or guidance mechanism in place in Grenada to inform appropriate collection of germplasm. The Ministry of Agriculture in collaboration with the Plant Genetic Authority (PGA) is embarking on a participatory approach to collect planting materials. This initiative will involve schools, farmers, breeders, researchers and other relevant and key stakeholders. From this programme, it is intended to derive a PGR database and map that will inform resource distribution and abundance.

4.8 Capacity in plant breeding

The Biotechnology Laboratory, The Caribbean Agricultural Research Development Institute (CARDI), the Forestry and National Parks Department (FNPD) and private nurseries throughout Grenada participate in plant breeding activities.

4.9 Constraints to achieving diversification of crop production

Problems associated with crop diversification are largely due to lack of sufficient quantities in required planting varieties, insufficient incentives for farmers and inadequate marketing opportunities. Farmers can if given the appropriate incentives and marketing opportunities, produce in the right quality to meet the requested demands.

4.10 Seed supply systems and the role of markets

Seed production and distribution are both functions of the private and public sectors. The availability of good quality non-vegetable type planting material is seriously affected by the production and distribution of seeds particularly so since the passage of Hurricanes Ivan and Emily. Consequently the Tissue Culture Laboratory in the Ministry of Agriculture has embarked on an intensive tissue culture programme to help fill the gap in availability for quality seeds in a wide variety.

CARDI and the Taiwanese Mission are very instrumental through their effort to increase the availability of a number of improved varieties of plants. The role of private farmers and nursery managers in this initiative is also crucial. At present, the Ministry of Agriculture is in the process of putting a strategic plan in place that will integrate seed propagation and distribution of planting materials. It is the intention of the Ministry that the plan incorporates / reflects the needs of farmers / stakeholders. It is intended that the plan will be developed, using a process that is highly consultative and participatory, thus ensuring the active involvement of all concerned. Networking among stakeholders will be an integral part of the programme and a feedback mechanism will foster continual upgrading of the initiative. The NBA and Pest Management Unit of the Ministry of Agriculture ensure that imported PGR does not pose a threat to the environment.

4.11 Crop improvement programmes and food security

There are institutional entities formal (The Tissue Culture Laboratory, Cocoa and Banana Associations, CARDI, among others), in place to address the food security challenges. Banana varieties together with Cocoa and Nutmeg are presently benefiting most from the programmes. Other crops receiving significant attention are Tannia, Pine Apples and a wide range of vegetable varieties. The main objective of the programmes is to increase yields and resistance of plants to pest and diseases.

THE STATE OF NATIONAL PROGRAMMES, TRAINING AND LEGISLATION

Following Grenada's ratification of the UNCBD in 1994, programming began in 1997 as part of the GEF enabling activities programme. Through the enabling activities programme, Grenada during the period 1997 to 2003 completed its National Biodiversity Strategy and Action Plan (NBSAP), the First and Second National Reports to the Convention and a series of capacity building initiatives.

Through the enabling activities project specific focus areas included the following:

- Implementation of General Measures for *In situ* and *Ex situ* Conservation Measures and Sustainable Use of Biological Diversity
- Methodologies to Evaluate and Mitigate Threats to Biological Components through Implementation of EIAs
- Use of Economic Incentives and Instruments for Biodiversity Conservation
- National Capacity to Preserve and Maintain Traditional Knowledge, Innovations and Practices Embodying Traditional Lifestyles

TABLES 12

Highlight the priority issues, gaps and constraints of PGR programming in Grenada. Gaps and Weaknesses in Capacity

Issues Identified with Gaps / Weaknesses in Capacity	Manifestations of Gaps / Weakness in Capacity	Specific Capacity Constraints	Root causes of Capacity Constraints
1. Government's policy and emphasis with respect to allocation of scarce resources among competing needs	Disproportionate allocation of resources to economic development and social welfare versus issues of conservation and sustainable use of PGR	Lack of interest by policy-makers in applying greater resources toward implementing existing or enhanced policy instruments for the purpose of conservation land sustainable use of PGR	Government's perception that their constituency is more interested in economic and social development than in the longer term benefits of conservation and sustainable use of PGR
2. Fragmentation in the agri-sector disenabling sufficient ecosystems management within farming eco-spaces	Traditional commodity crop-based management applied: each commodity marketing agency applying its own management system, sacrificing the integrated farms ecosystems management, and failing to accommodate conservation and sustainable use of wild and cultivated Biodiversity as a single package	Lack of sufficient economy of scale at each commodity agency so as to sustain an interest in applying long term investments such as conservation and sustainable use for the enhancement of farm production	A public policy, agreed upon between Governments and farming interest over the years, that allowed commodity agencies to exercise the role of delivering most farm services (especially marketing) to farmers and with little interest in conservation of natural areas within farm areas
3. (Government) Maintaining leverage for livelihood options of rural peoples in a large informal economic sector as exists	A traditional environment of open access / free entry to common property resources in the form of subsistence and semi-subsistence hunting of wild game, harvest of raw materials e.g. bamboo and fishing in rivers and the sea	Even while having law and some institutional capacity, a lack of willingness by individual statutory agencies to enforce limits / use controls at public / private eco-spaces Inability to consistently apply the multi-stakeholder approach that would reduce or avoid conflicts in the application of policy objectives	Insufficient livelihood options and employment in the formal sectors Government policy allowing much leverage to rural people to maintain subsistence livelihood opportunities

Issues Identified with Gaps / Weaknesses in Capacity	Manifestations of Gaps / Weakness in Capacity	Specific Capacity Constraints	Root causes of Capacity Constraints
4. Inconsistent use of the multi-stakeholder consultative mechanism between Government management agencies and non-Governmental agencies with relevant vested interest in conservation and sustainable use of Biodiversity_	Mostly sector by sector approach for satisfying mandates given in statutory and administrative requirements for the management of respective dimensions of the Biodiversity Lack of capacity at the NGOs to relate to Government's initiatives Biodiversity	Lack of: - A sufficiently institutionalized consultative mechanism - joint and formal inter-sectoral management mechanisms - Clearing house mechanism - Interest in participatory management	Government delegates powers and responsibilities through Ministries Ministries regarding their mandate Cabinet reinforces separation of functions (assigned mandates) among Ministries and Departments
5. The more integrated response to management of Biodiversity	Responses to CITIES, WTO/SPS, IPPC and other non-Rio-based Conventions and Protocols that are closely related to UNCBD, are administered separately by different Government agencies	Existing administrative capacity for managing most responses to Bio-based Conventions and Protocols reside in the Ministry of Agriculture, Lands, Forestry and Fisheries A formal consultative mechanism among relevant agencies is lacking or absent	Government reinforcement of the separation of mandates among Ministries. The convenience of Government operating in the context of a critical mass of resources residing within one implementing agency.
6. Controls for trans-boundary movement of bio-products	Inadequate and insufficient risk analyses for imports Mostly broad-based MCS measures are applied; insufficient inter-agency collaboration	Inability to conduct sufficient risk-analysis Lack of Laboratory facilities and field network to adequately respond to international requirements	The small scale of MCS system on island and the relatively high cost of inter-sectorial collaboration
7. Application of non-coercive / incentives –based regulatory instruments toward conservation and sustainable use of Biodiversity	Public unaccustomedness with non-coercive input / out control measures; weaknesses in the capacity of agencies to enforce even coercive measures; inconsistent and un-integrated application of chosen policy instruments for ensuring compliance	Insufficient and inappropriate policy instruments Lack of dedicated staff resources for ensuring compliance High cost of applying incentives-based measures	Accustomedness of both Government and the public with coercive versus non-coercive measures for resource management Incentives-based measures are often difficult to attribute cause of impact to
8. Challenges of applying public education and awareness as a tool for fostering conservation and sustainable use of Biodiversity	Absence of appreciation within the community for the multi-values of the biodiversity Lack of awareness within the community for links between wild and cultivated biodiversity A growing disconnection between the community and its local Biodiversity caused by urbanization.	Experts in public education within the community are usually lacking in a Biodiversity focus Absence of a consensus between community educators and persons knowledgeable in Biodiversity	An absence of consensus among competent and NGO agencies so as to facilitate a cross-fertilization of skills knowledge and competences for the purpose Bias toward formal education and a disinterest and lack of value for popular education
9. Eco-tourism with its opportunities and threats – unmanaged eco-tourism in both terrestrial and marine areas	Considerable free access to and use of terrestrial habitats; lack of confidence for applying access control measures Virtual free access to sensitive marine habitats by yachts, sports-based cruise tourism, dive operators Lack of confidence for applying site-specific access control measures Insufficient licensing and MCS measures to control: - Local growth over-fishing at specific sites - Over fishing by persons accessing from nearby jurisdictions - Overuse of remote habitats	Lack of a needed inter-sectorial and formal mechanism for administering a MCS system for eco-tourism management e.g. Tourism / Fisheries, Ports Authority / Police services providers for marine Tourism/Forestry services- providers and Police for terrestrial Lack of MCS capability at agreeable costs	Lack of sufficient awareness by authorities for the potential and current use of eco-tourism target sites especially in the marine areas



Issues Identified with Gaps / Weaknesses in Capacity	Manifestations of Gaps / Weakness in Capacity	Specific Capacity Constraints	Root causes of Capacity Constraints
10. Sharing management of trans-boundary stocks habitats and sea-space that are important to Biodiversit	<p>Pouching and other encroachments by fishers and other sea users from neighboring states</p> <p>Over fishing of trans-boundary recruits into the fish stocks</p> <p>Uncontrolled use of habitat and sea-space at locations remote to the authorities of adjoining states</p> <p>Non-implementation of agreed-upon measures to control with local and foreign fishing vessels based on a regional plan of action</p>	<p>Lack of willingness to devote sufficient resources to the management of common property resources, especially in the ocean environment</p> <p>Lack of political will and institutional and economic resources to implement agreed upon plan of action</p>	A traditional regime of "freedom of the seas" and inspite of a new regime of Law of the Sea, MCS of ocean resources is still at the incipient stage
11. A local appetite for imported / processed bio-products and processes versus locally grown food and other preparations from the local Biodiversity	<p>Growing proportion of food consumption coming from imported foods, lack of taste for local foods</p> <p>A general disconnection between the community and the local Biodiversity</p> <p>Absence of sufficient local substitutes for imported food products</p>	Difficulties in creating sufficient "economies of scales" and other economic advantages for enabling local derived food products to compete well with foreign food preparations; and even with foreign raw food products	<p>The strong influence of commercial food preparations</p> <p>The inability of the small island community to match the competition posed by foreign goods economy</p>
12. Depletion of the farming and wild Biodiversity and specifically the impact of Hurricanes Ivan and Emily – resources devoted to rehabilitation	<p>Depletion of upper, middle and coastal forests including mangrove ecosystems</p> <p>Depletion of farming vegetation especially nutmegs and tree crops</p> <p>Depletion of wild life</p>	<p>Lack of enabling resources to rehabilitate critical zones in the forest, with over-dependence on natural regeneration</p> <p>Lack of resources to make long-term investments for rehabilitating tree crops</p>	<p>Primary focus is for rehabilitating human habitation and depending on natural regeneration at this time</p> <p>Rehabilitation of agriculture depends on long-term investments having calculated risks</p>
13. Depletion of the Biodiversity and scarce resources devoted to recovery at this point in time	Current disinterest in replenishing agro-forest e.g. fruit trees in urban areas	Lack of strong demand for seedlings of fruit trees	Rehabilitation of farming by investment requires Government and farming community in tandem; investment by both is measured currently
14. The challenges of using close areas and reserves as instruments toward conservation and sustainable use of the local Biodiversity	<p>Successful management of reserves manifested only in forest reserves that are remote to the public</p> <p>Depletion of habitat at popular marine dive sites</p> <p>An absence of a system for MCS of marine protected areas and other targeted eco-sites</p>	Lack of awareness by Government authorities of the extent to which eco-sites are targeted and their potential for enhancing the tourism package especially in the marine zone	Unclarified and conflicting policy applications for multi-use of common property resources targeted by different communities e.g. the "fish-for-food" community versus the "fish habitat for satisfying tourism client opportunity" community

5.1 Education and training

Individual Capacity

On the individual level there is a dearth of expertise working consistently to advance the objectives of the PGR programs in Grenada several individuals have been trained in the various technical aspects over the years but the system does not retain the experts. The Forestry Department serves as a typical example. The Department is now also totally void of capacity on the individual level even after a period of intense training which saw several persons attaining up to masters level degrees in several technical areas. Throughout the various ministries there are trained individuals but the critical mass is not present and the present compliment is stretched to the limit thus reducing their effectiveness and their ability to focus on Conventions objectives.

Institutional Capacity

At the institutional level, there exist several institutions across the government departments that are responsible for various aspects of the Conventions' mandates. In the main, the institutions, individually or collectively, lack the capacity to adequately address the three Conventions. The activities are conducted in an adhoc and uncoordinated manner leading to duplication and inefficient resource allocation and use. As it currently stands the Ministry of Agriculture



implement activities in relation to PGR where as the Ministry of Finance has the pivotal role for the UNFCCC and the UNCBD while the Ministry of Agriculture handles the UNCCD and the Biosafety Protocol under the UNCBD. Within recent months there was move to centralize some coordination functions within the Ministry of Health and the Environment.

A National Environment Committee has been established in the Ministry of Health and the Environment. This committee is headed by the Minister and includes senior officials of stakeholder ministries. While the committee is in its infancy it is expected to address the environmental coordination issue.

Further, there are concrete proposals on the table to establish a semi autonomous environmental management authority to be charged with the management of environmental activities. An alternative proposal now also under active consideration is the restructuring of the ministerial portfolios and to locate the current environmental unit now attached to the Ministry of Health and the Environment to another Ministry.

The Sustainable Development Council (SDC) also assists in environmental coordination. The SDC is a broad based voluntary organization which meets on a regular basis and acts as a forum for the ventilation of environmental issues and other issues of national development. The SDC constitutes the only non-public sector institution that addresses environmental concerns.

Systematic Capacity

At the systematic level, the national capacity to treat with the Rio Conventions was seriously compromised due to the lack of a structured approach and the absence of the mainstreaming of environmental considerations in national development planning programme. This has been even more critical in the wake of the reconstruction and development following the impacts of recent hurricanes.

The Government has since elaborated a National Environmental Policy (NEP) and a National Environmental Management Strategy (NEMS) which sought to place environmental concerns as a main pillar in the development process. The two referenced documents are to be complemented by an action plan, which will seek to institutionalize legal and administrative frameworks for environmental management.

The capacity building workshop held in Grenada on PGR. To encourage expediency and effectiveness of the campaign, the target audience, the public is subdivided into seven distinct groups. They include:

1. Youths/students
2. Educators and educational institutions
3. Policy makers
 - politicians
 - ministry of Agriculture (Pest Management Unit, Extension Officers, veterinary officials)
 - Ministry of Health and the Environment (Health care providers, doctors, nurses, health educator, environmental health officers etc)
 - Ministry of Foreign Affairs and International Trade
 - Ports and Customs (customs officials, dock workers, traffickers, shipping agents and in house quarantine and environmental health officers)
 - Institutions (Taiwanese and French missions, IICA and CARDI)
 - Commodity boards (cocoa, nutmeg and banana)
4. Media
5. Private sector
 - commercial farmers
 - supermarket owners
 - pharmacists
 - wholesale agents
 - owners of nurseries, plant and seed shops, live birds, bee houses, etc)
6. Consumers
7. NGOs/CBOs

THE STATE OF REGIONAL AND INTERNATIONAL COLLABORATION

6.1 Regional collaboration

CARDI and UWI have been involved in assisting Grenada in training and provisions of Germplasm, major benefits include cost effective multiple site research, development, information access and exchange and strengthening of inter and intra sectoral linkages.

6.2 International collaboration

FAO has been the prime facilitator of national crop germplasm conservation and improvement activities through the provision of training opportunities, the hosting of conferences and workshops, information and documentation support, commodity research and development.

The executing agencies of such programmes include the International Plant Genetic Resources Institute (IPGRI), CIAT, IITA, IICA, CIP, and the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT).

Grenada is a member of the Plant genetic resources for food and agriculture (PGRFA) in the Americas. The Global Crop Diversity Trust (the Trust) aims to support the long-term maintenance of an efficient and effective arrangement for the *ex situ* conservation of the most important crop collections around the world. A first filter for eligibility is provided by the eligibility principles of the Trust. Meeting these principles is the minimum requirement for a collection to be eligible for support.

Grenada has been involved with FAO project relating to germplasm conservation and the CGIAR commodity centers have made much contribution to the Grenada Plant Genetic Resources by provision of Germplasm, Technical assistance and training.

The Government of Grenada has embarked upon the preparation of its Biological Diversity Strategy and Action Plan (GBSAP) in fulfillment of its obligation under the Convention on Biological Diversity and as part of the Government's renewed commitment to sustainable management of the country's PGR .

An assessment of key sectors, as well as an identification of the gaps in effective management of natural resources, provided the basis for developing the Strategy and Action Plan. Effective national action depends on developing an institutional, policy and legal framework that supports effective planning and management of biodiversity. National decision-makers must be cognizant of the benefits gained from conservation and sustainable use of biological resources and the environmental, social and economic costs associated with the loss of these resources.

The actions recommended in this Strategy and Action Plan are not a wish list of all the policies, legislation, plans and programmes that are needed for improvement in the various sectors of the country. A practical and easily measurable set of objectives with supporting activities for implementation over a 5 year period is proposed. Key objectives short listed are to:

- Provide broad-based support for conservation and sustainable use of PGR.
- Protect key ecosystems from negative human induced impacts on PGR.
- Develop and encourage sustainable utilisation of biological resources that are essential to the livelihood of local communities.
- Maintain, recover and promote genetic resources necessary for sustainable agriculture.
- Ensure a fair and equitable sharing of the benefits arising out of the utilisation of genetic and ecosystem resources.
- Provide information on key ecosystems for incorporation into national accounts and decisions on national development projects.

Several activities were identified in fulfillment of these objectives. Many of these activities were developed as priority project concepts and are recommended for implementation. These project concepts include:

- Building Awareness on PGR in Grenada
- Drafting a National Land Use Policy for Grenada
- Strengthening Management of Key Ecosystems
- Promoting Sustainable Use of Biological Resources
- Capacity Building for Germplasm Conservation
- Strengthening Biological Pest Control
- Incorporating Ecosystem Valuation into National Accounting
- Strengthening Existing Legislation for Biodiversity Protection

Towards the end of the 5-year period, a review of the GBSAP should be undertaken and a new action plan for further activities should be developed to continue safeguarding Grenada's biodiversity.

TABLE 13

A summary of obligations, responsibilities, entitlements and privileges of states party to the UNCBD

Obligations and Responsibilities of Individual State Parties	Relevant Articles (Provisions)	Entitlements and Privileges of State Parties
Respect the interests (resources, activities) of states beyond individual national jurisdiction; to cooperate for the purpose of conservation and sustainable use of shared biodiversity	First Principles with respect to jurisdiction, cooperation and their scope. Art. # 3 - # 5	Sovereign use of resources (and processes) of the biodiversity within the jurisdiction of the individual state
To formulate and maintain multi- sectoral strategies, plans and programs: (i) Adopting <i>in situ</i> and <i>ex situ</i> conservation methods with an ecosystem's approach; (ii) Promoting sustainable use of various components of biodiversity.	General and specific measures for conservation and sustainable use. Art. # 6 - # 10 (the resource) Art. # 5 (the cooperation)	To adopt locally appropriate strategies, plans and programmes compatible with conditions and means available. See assistance and cooperative mechanisms to achieve the purpose where local resources are lacking.
To adapt socio-economically sound incentive measures for fostering conservation and sustainable use.	Appropriate Incentive Measures Art. # 11	In soliciting assistance and cooperation for the area of scientific advancement and for participation in the activities set up for the purpose.
To collaborate with other states parties for the purpose of: (i) Research / Training (ii) Public Education and Awareness	Collaboration among contracting parties. Art. # 12 - # 13	In soliciting assistance and cooperation in the area of scientific advancement and participation in the activities of entities set up for the purpose.
To adopt systems and methods for accessing and minimizing adverse impact on the biodiversity.	Special measures for conservation and sustainable use. Art. # 14 (EIAs / EISs)	Requiring neighbouring jurisdictions to cooperate and implement agreed-upon compliance control measures for the purpose.
To control access to genetic resources within their own jurisdictions. Also to share biotechnology within and across jurisdictions	Access to Control of Genetic Resources and Biotechnology. Art. # 15, # 16 Art. # 16	To set conditions with respect to utilization of genetic resources accessed by other contracting parties. Developing countries to access bio-technology on fair and favourable terms.
To share information and cooperate with respect to technical and scientific know-how; monitor, control and surveillance, the handling / use of bio-technology and for distribution of benefits	Facilitation of exchanges among parties. Art. # 17, 18, 19	To cooperation in the context of national interests.
To provide financial resources for facilitating the UNCBD both on the national and international levels.	Unique and appropriate financial mechanisms. Art. # 20 / 21	Developing states to make use of special privileges; developing states favoured by a system of graduated contributions and incremental cost-sharing.
To seek synergies with provisions of other International Conventions.	Relationship with other international Conventions. Art. # 22	Endowment of leverage in implementing related International Conventions.
To participate intimately in the process of orientating the implementation of the CBD through institutions available to the COP	Establishment and operation of the conference of the Parties (COP). Art. # 23	Fullest involvement in implementation and orientation of the CBD.



Obligations and Responsibilities of Individual State Parties	Relevant Articles (Provisions)	Entitlements and Privileges of State Parties
To collaborate with and participate in key institutions of the CBD.	Establishment and maintenance of subsidiary bodies such as: - the Secretariat - A SBSTTA Art. # 24, 25	Access to technical assistance and support from CBD subsidiary bodies.
To update the CBD Secretariat on measures taken in implementing the CBD.	Reporting to the CBD Secretariat. Art. # 26	To formally input information on achievements and limitations observed in implementing the CBD.
Fully participate in the various avenues and mechanisms for administration of the CBD.	Management and administrative conditions. Art. # 27 - # 42	Participate as fully-fledged parties in the operation of the CBD.

6.3 National needs

Adequate maintenance, management, use and research with the diverse germplasm in Grenada are needed. Research has not come to grips to exploit these in response to agriculture development and productivity

There is a need to:

- Examine the germplasm at our disposal
- To document these and keep the necessary records.
- Political awareness and support
- Increased awareness of the need for a specific focus on plant genetic resources conservation and utilization
- Sufficient funding to maintain and support the personnel and work required to obtain the needed information at the local level (Governmental agencies and NGO's)
- Development of a cadre of competent and dedicated professionals to implement sustainable PGRM
- The establishment of appropriate legislation to effect sustainable PGRM
- Financial support
- Guidelines and Legislation related to Intellectual Property Rights, Biotechnology and Genetic Engineering

ACCESS TO PLANT GENETIC RESOURCES AND SHARING OF BENEFITS ARISING OUT OF THEIR USE, AND FARMERS' RIGHTS

Access to Plant Genetic Resources has reduced significantly following the passage of Hurricane Ivan and Emily (2004 and 2005 respectively). There are presently no policy / legislation in place pertaining to sharing of benefits as it relates to the use of PGR. Farmers rights with respect to sharing of benefits deriving from PGR are presently not legislated but are regulated by the Ministry of Agriculture. Grenada is a signatory to the Convention on Biological Diversity (CBD), and consequently benefit from the international agreement with respect to access of genetic resources and sharing of benefits arising out of their use. The following table shows the major institutions that deal with the propagation of PGR and access to farmers.

TABLE 14
Showing PGR and access to farmers

Propagating Institutions	Plant Genetic Resources	Access to Farmers
Ministry of Agriculture - Produce Chemist Laboratory - Fruit Propagating Nurseries - Forestry Nursery	Banana , Pine Apple, Mangoes, Citrus, Nutmeg, Sour sop, Breadfruit, Wax Apple, Golden Apple and Forest species such as Mahogany, White Cedar, Blue Mahoe , Red cedar	Farmers are presently unable to source required quantities. (This is mainly due to the fact that most plantations were completely destroyed by the two Hurricanes as indicated above and demand for replanting automatically increased as a result).
Cocoa and Nutmeg Associations	Cocoa and Nutmeg	Although not in sufficient quantities, farmers are able to source planting materials.
Caribbean Agricultural Research Development Institute	A wide range of vegetables (Cabbage, Eggplant, Tomato, Papers, Lettuce etc.)	Farmers are able to obtain requested quantities (farmers have to order the required species and quantities)
The Chinese Mission	Introduced species of fruit and vegetable	Limited access to farmers

The situation with respect to obtaining PGR is gradually improving. Some farmers are now able to partially meet their planting needs by sourcing planting materials on their own farms. Typical examples are the removal of Banana and Pine Apple suckers from previously established plants to plant else ware on the same or other farms.

There are restrictions to entry of certain types of Plant Genetic resources. The National Biosafety Authority (NBA) is the regulatory body that ensures the safety of planting materials coming into Grenada. This is fundamental as it relates to the capability of Genetic Modify Organisms (GMOs) to introduce modify genes into wild population by accidental crosses and to endanger local biodiversity. In addition, restriction to entry also ensures that the capacity of GMO to become invasive and displace natural stands or convert into a difficult to control weed. Furthermore, there is a possibility of harming beneficial organisms (e.g. insects which are not pest), if restriction measures are not taken. There is also the possibility of increasing social imbalance if a poor farmer has no access to the utilization of the GMO. Only GMOs that prove to be safe for the environment are authorized and can therefore be cultivated by the farmers.

Maintaining or enhancing access to Plant Genetic Resources is key and consequently derives the following advantages:

- Contribute significantly to food security and poverty alleviation;
- Reduces the level of unemployment;
- Conservation of biodiversity and environmental stability.



THE CONTRIBUTION OF PGRFA MANAGEMENT TO FOOD SECURITY AND SUSTAINABLE DEVELOPMENT

8.1 Contribution to agricultural sustainability

The Ministry of Agriculture in its effort to revitalize the agricultural sector (particularly after the passage of Hurricane Ivan and Emily), has initiated a number of initiatives geared towards sustainable production of Plant Genetic Resources. The Food and Agricultural Organization (FAO) played a fundamental role in collaborating with Grenada to provide farm tools, equipment (chainsaws, spades, forks, hoe etc.), planting materials and funds through the Ministry of Agriculture for the development of farm projects. As a result of this initiative, farmers were not only able to prepare their farms but were also able to replant them. USAID in collaboration with the Ministry of Agriculture also implemented a project whereby key farmers were given planting materials (yams, pine apple), and crates for packaging of farm produce.

Additionally, the Ministry of Agriculture has an ongoing farm incentive programme, whereby planting materials (yam, ginger, corn, beans etc) are distributed to farmers to ensure sustainable production of agricultural produce. Other projects towards agricultural sustainability by the Government of Grenada includes grants up to EC\$50 000.00 on low interest rates to farmers for agricultural project implementation. The Extension Unit (EU) within the Ministry of Agriculture has a monitoring and evaluation mechanism in place to ensure that planting materials obtained by farmers are not only planted but also properly managed. The EU will provide the farmers with technical support when necessary.

8.2 Contribution to food security

As indicated in previous chapters, the Produce Chemist Laboratory, Government nurseries, CARDI and a number of private nurseries, contribute significantly towards food security by intensifying plant propagation operations. Farmers are also encouraged by the Ministry of Agriculture to grow what they eat and eat what they grow. Farmers have also been introduced to the concept of eco-physiology (interaction within same and different plants species. And production of monoculture compared with production under intercropped condition).

This approach, comes with the realization that agricultural lands are limited and in competition for various uses, therefore lands must be utilized to optimal capacity. Forestry and National Parks Department provide technical support to farmers for the development of agro-forestry initiatives (planting of forest trees among agricultural crops). Best practices are also encouraged by the Forestry Department to ensure soil conservation and water retention greater and sustained crop production. Windbreak establishment is encouraged on farms to reduce adverse negative impact on plants (reduction in pollination etc.). In addition to increasing pollination and fruit set, windbreak also contributes significantly towards food security by protecting farms during adverse weather conditions such as storms.

8.3 Contribution to economic development

The Agro-processing sector is a small developing sector with great potential and importance in the development of agriculture and agro industry in Grenada. The sector is mainly comprised of a number of small and a medium-sized enterprise, which produces a unique blend of jams, jellies, condiments, spice products, flour, rum, water and pasta products for local and export market. The Grenada Co-operative Nutmeg Association is a supplier of nutmeg, mace and

nutmeg oil. This sector generates substantial amount of funds and also creates a number of jobs. Consequently this sector plays a fundamental role in the economic development of Grenada.

8.4 Contribution to poverty alleviation

The poverty rate for Grenada, a Small Island Developing State (SIDS), has been estimated at 32 percent in 2002 while approximately five percent of the population was estimated to be living in extreme poverty. Unemployment was estimated at 12.2% in 2002. In addition, 64% of the population did not have formal education certification and more than 25% of students leaving primary school had no access to secondary school education. While the Government increased spending on education from 5.3% of GDP in 2000 to 6.3% in 2002, low teacher qualification remains endemic. Urban migration and urban squatting have increased demand for safety nets for the poor and made a streamlined poverty reduction programme crucial for Grenada.

The 2004 Human Development Report placed Grenada in the medium human development range. However, the impact of Hurricane Ivan would have significantly reduced the island's ranking overnight. The livelihood of every Grenadian was disrupted and serious damage done to the country's economy. Prior to the Hurricane, the majority of the 102 000 inhabitants of Grenada made their living from tourism and agriculture. Poverty alleviation is at the heart of the Government's development strategy. It will be important to the success of the strategy that appropriate systems are established for monitoring its implementation and for measuring impact of various components on the lives and livelihoods of the population- particularly the poorest. Without such a mechanism it will be impossible to measure progress and to learn from mistakes and improve the effectiveness of Government planning

The Government of Grenada has set as its medium term goal the return of the economy to sustained growth through macroeconomic stability and poverty reduction. Specifically, the objective is to create a diversified and flexible economy capable of adapting and responding positively to the changes in the international economic environment through strengthening the operations of central government and increased emphasis on poverty reduction. Once goals are set, the levels of achievements must be monitored to track economic progress and changes in poverty levels. Agricultural diversification programmes through support mechanisms can contribute positively to poverty alleviation.



TABLE INDICATING LAND USE 1961, 1975, 2007

Land Use	Total acreage (1961)	Total acreage(1975)	Total acreage(2007)*
Tree crops	28 091	23 153	13 544
Arable land	13 101	12 765	26 344
Grasslands			Na
1. cultivated	705	391	
2. uncultivated	5 939	1 703	
Forest/woodland	9 504	7 635	12 955
Other Agriculture land	2 857	930	Na
Total agriculture land	60 197	46 577	Na
Total land area	85 120	85 120	77 768

Source: Statistical office, Land Use Division, Ministry of Agriculture

* 2007 information taken from GIS data base, Land Use Division

APPENDIX 2

VEGETATION TYPE IN GRENADA



Type	Species	Acreage	Comment
Climatic Type			
1. Rain forest and lower Montane rain forest	Dacryodes-Licania	1,688 ha, 5.3% of mainland area	Small sector present in Grand Etang Forest reserve between Mt Qua Qua and Fedon's camp. Vegetation damaged by hurricane and under threat.
2. Montane thicket	<i>Micropholis chrysophylloides</i> , <i>Licania ternatensis</i> , <i>Euterpe globosa</i> , <i>Dacrydes excelsa</i> and <i>Richeria grandis</i> .	2,278 ha. or 7.25% of mainland area	Vegetation occur at peaks over 600m at Grand Etang and Mt St Catherine. Vegetation is damaged and recovering.
3. Elfin Woodlands	<i>Cyathea spp.</i> , <i>Heliconia bihai</i> , <i>Euterpe globosa</i> , <i>Chorizanthe purpureus</i> and <i>Weigeltia antillana</i>	1,752 ha. or 5.6% of mainland area	Vegetation confined to the summits of peaks such as Mt St Catherine and Grand Etang. Vegetation is damaged and recovering
4.a Deciduous Seasonal Formation i) Middle Belt	<i>Tabebuia pallida</i> , <i>Swietenia mahogoni</i> and <i>Guettarda scabra</i>	NA	Vegetation (Marquis River) Vegetation is minute and it's condition is fair
ii) Dry Coastal Belt:	<i>Bursera simaruba</i> , <i>Albania caribaea</i> , and <i>Spondias mombin</i>	NA	Vegetation type found in Canoe Bay, La Sagesse and Lake Antoine. Vegetation in fair condition
5. Dry Evergreen Formation. Littoral woodland	<i>Conocarpus erectus</i> , <i>Tabebuia pallida</i> , <i>Coccolobia uvifera</i> and <i>Hippomane mancinella</i>	3.90%	Vegetation type well represented in areas such as Canoe Bay, La Sagesse, Levera, Hog Island, Calivigny
Edaphic Type			
Edaphic Type 1. Herbaceous Swamp and Papyrus Bog Association	<i>Rhizophora mangle</i> , black <i>Avicennia gerimans</i> , white <i>Laguncularia racemose</i> and button mangroves <i>Conocarpus erectus</i>	190 ha or 0.6% of mainland area	Vegetation found at Lake Antoine, Levera, Grand Etang, Hog Island

NA – not available

VEGETATION OF CARRIACOU

Type	Specie	Acreage	Comment
Climatic Decidious Seasonal Formation (Dry Woodland)	<i>Bursera simaruba</i> , <i>Brosium alicastrum</i> , <i>Pisonia fragrans</i> , <i>Ficus lentiginosa</i> , <i>Lonchocarpus spp.</i> and <i>Swietenia mahogani</i>	NA	Vegetation is badly affected by grazing and found only in the north and forest reserves (e.g. High North Forest Reserve). The species are adequately represented and the quality is good.
2. Dry Thorn-Cactus Scrub:	<i>Opuntia dillenii</i> , <i>Randia sp.</i> and <i>Piscidia sp.</i>	NA	Vegetation found in High North, Limlair, Thiboud, Saline/White Islands and Sabazan. The quality of vegetation is good and adequately represented.
Edaphic Mangrove Woodland	<i>Rhizophora mangle</i> , black <i>Avicennia gerimans</i> , white <i>Laguncularia racemose</i> and button mangroves <i>Conocarpus erectus</i>	NA	Vegetation found in High North, Lauriston, Mabouya and Tyrrel Bay.

Source: Beard (1949), Howard (1950), Eschweiler (1982), Forestry department

APPENDIX 4

LIST OF MAIN TIMBER SPECIES IN
GRANDETANG FOREST

Common Name	Scientific Name
Almomd	<i>Terminalia catappa</i>
Bois Agoutie	<i>Maytenus grenadensis</i>
Bois Bande	<i>Roupala montana</i>
Bois Pini	<i>Amyris elemifera</i>
Bullet	<i>Manilkara bidentata</i>
Galba	<i>Calophyllum antilianum</i>
Gommier	<i>Dacryodes elcelsa</i>
Laurier spp	<i>Phoebe elongata & Ocotea spp</i>
Maruba	<i>Simarouba amara</i>
Mauricif	<i>Byronima martinicensis</i>
Penny Piece	<i>Pouteria multiflora</i>
Tapana	<i>Hieronyma caribea</i>
Bois Rouge	<i>Guarea macrophyla</i>
Caca Poule	<i>Illex sideroxyloides</i>
Chataignier	<i>Slonea spp</i>
Crappo	<i>Carapa guianensis</i>
Bois Gris	<i>Licania ternatensis</i>
Bois Lait	<i>Rouvolfia nitida</i>
Cacolie	<i>Ingia spp</i>

LIST OF MANGROVE SITES IN GRENADA COMMON FRUITS & SPICES FOUND IN GRENADA

Local Name	Scientific Name
Almond	<i>Terminalia catappa</i>
Avadaco	<i>Presea americana</i>
Betel nut palm	<i>Areca catechu</i>
Black pepper	<i>Piper nigrum</i>
Bluggoe	<i>Musa paradisiaca</i>
Brasil nut	<i>Bertholletia excelsa</i>
Breadfruit	<i>Artocarpus communis</i>
Breadnut	<i>Brosium alistrum</i>
Cashew	<i>Anacardium occidentale</i>
Calabash	<i>Crescentia cujete</i>
Chili plum	<i>Lutea</i>
Cinnamon	<i>Cinnamomum zeylanicum</i>
Calalu	<i>Colocasia esculenta</i>
Citron	<i>Citrus. medica</i>
Clove	<i>Eugenia aromatica</i>
Coconuts	<i>Cocos nucifera</i>
Corn	<i>Zea mays</i>
Custard apple	<i>A. reticulata</i>
Damsel	<i>Phyllanthus acidus</i>
Dasheen	<i>Colocasia esculenta</i>
Genip	<i>Genipa americana</i>
Golden apple	<i>Spondias cytherea</i>
Ginger	<i>Zingiber officinale Rosc</i>
Governor plum	<i>Flacourtia indica</i>
Granadilla	<i>Passiflora quadrangularis</i>
Grape fruit	<i>Citrus. paridisi</i>
Ground nut	<i>Arachis hypogaea</i>
Grugru	<i>Acrocomia aculeata</i>
Guava	<i>Psidium guajave</i>
Hogplum	<i>Spondias mombin</i>
Jamaica plum	<i>Spondias purpuea</i>
Kola nut	<i>Cola acuminata</i>
Lemon	<i>C. limonia</i>
Lime	<i>Citrus aurantiifolia</i>
Mammee apple	<i>Mammea americana</i>
Mandarin	<i>C. nobilis</i>
Mango	<i>Mangifera indica</i>
Mangosteen	<i>Garcinia mangotana</i>
Nutmeg	<i>Myristica fragrans</i>
Ochra	<i>H. esculentus</i>

Local Name	Scientific Name
Orange Seville	<i>Citrus aurantium</i>
Papaw	<i>Carica papaya</i>
Pashion fruit	<i>Passiflora vitifolia</i>
Penny piece	<i>Pouteria multiflora</i>
Pimento	<i>Pimenta oficianlis</i>
Pineapple	<i>Ananas comosus</i>
Plantain	<i>Musa paradisiaca</i>
Pomegranate	<i>Punica granatum</i>
Pois doux	<i>I. laurina</i>
Pomme rose	<i>E. jambos</i>
Purple Allamanda	<i>Cryptostegia grandiflora</i>
Sorrel	<i>H. sabdariffa</i>
Tannia	<i>Xanthosoma sagittifolium</i>
Sapote	<i>Pouteria sapota</i> (Jacq.)
Sapodilla	<i>Manikara zapota</i>
Seaside grapes	<i>Coccoloba uvifera</i>
Soursop	<i>A. muricata</i>
Sour orange	<i>C. aurantium</i>
Star apple	<i>Chrysophyllum cainito</i>
Stinking toe	<i>Hymenaea courbaril</i>
Sugar apple	<i>Annona glabra</i>
Sugar cane	<i>Saccharum officinarum</i>
Sweet orange	<i>C. sinensis</i>
Sweet potato	<i>Ipomoea batatas</i>
Tamarind	<i>Peltophorum ferrugineum</i>
Water cress	<i>Nasturtium officinale</i>
Water lemon	<i>Passiflora laurifolia</i>
Wax apple	<i>Syzygium javanicum</i>
Wild coffee	<i>C. occidentalis</i>
Yams	<i>Dioscorea</i>
Yellow star apple	<i>Pouteria caimito</i>



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