Priorities and Needs for Sustainable Soil Management in Grenada

Grenada At a Glance

- 340 square kilometers
- Population 110,000
- Population of predominantly African descent, with smaller ethnic groups of Indian, European, Arabs, Mixed Races.
- Economy is dominated by the Tourism and Agriculture Sectors.
- Prior to Hurricane Ivan, the island was the second largest producer and exporter of nutmegs (*Myristica fragrans*).

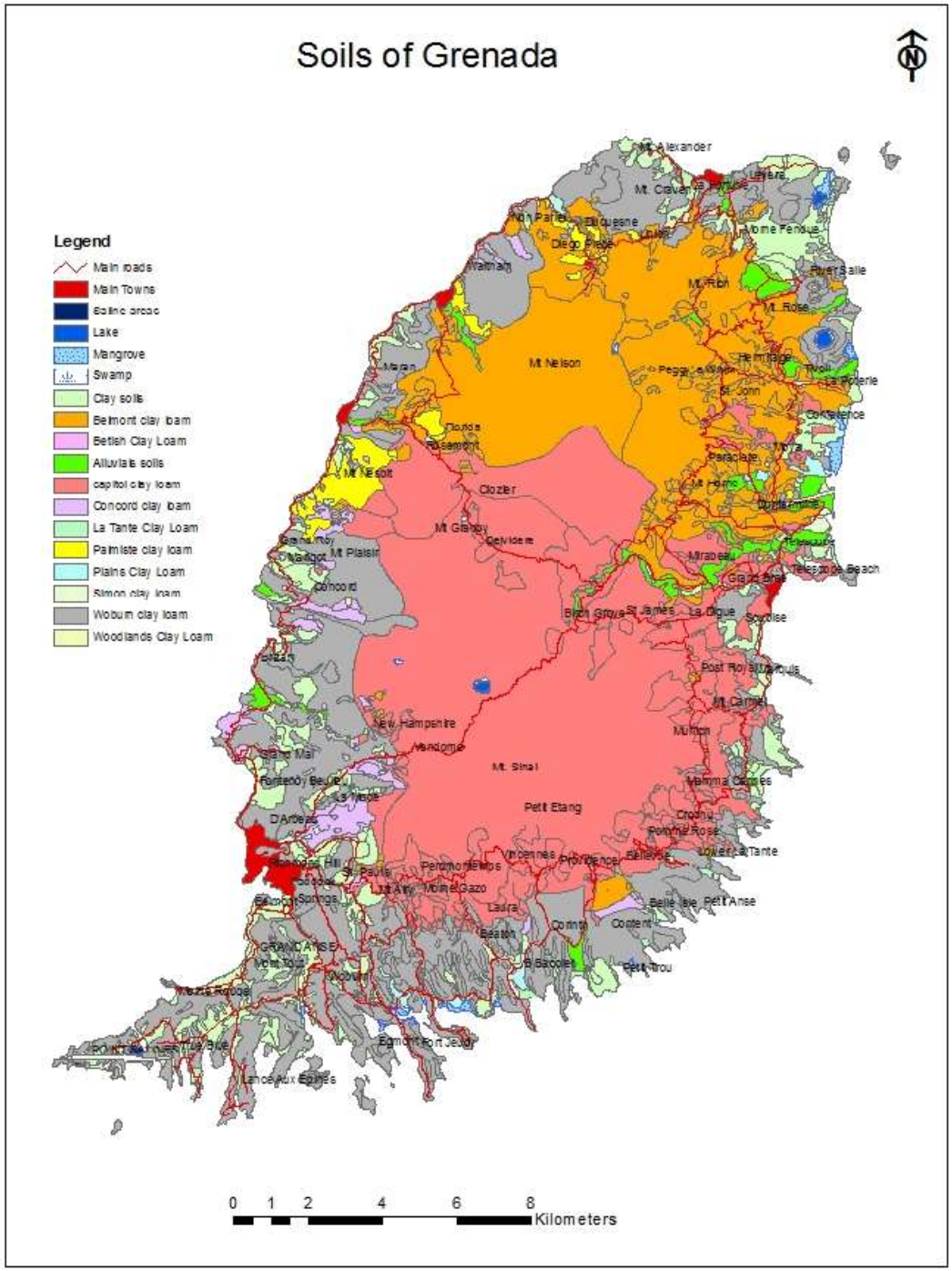
Grenada At a Glance

- Other important crops include; spices (clove, cinnamon, tonka bean etc.), cocoa, banana, roots and tubers, tropical fruit crops, vegetables, herbs, tropical cut flowers, etc.

- Has an abundance of majestic land marks: stunningly gorgeous beaches, waterfalls, volcanic lakes, tropical rain forest, etc.

- Trinidad is the island's closest neighbour (90 miles)
- For many, the island is synonymous with Paradise, the Gem of the Caribbean.

Situation Analysis of Soils in Grenada



Dominant Soil Types in Grenada

Clay Loams

- Capital Clay Loam = 13,354 ha
- Belmont clay loam = 6,479 ha
- Woburn clay loam = 8,276 ha

- Capital Clay Loam, Belmont and Woburn = 26,089 ha
  or approximately 82.9 % of total soils

Soils of the uplands of variable depth mainly derived from volcanic materials on undulating to steeply dissected land.

Dominant Soil Types in Grenada

- **Capital Clay Loam** – fine textured moderately well to well drainage reddish soils of variable depth.

- **Belmont Clay Loam** – fine textured moderately well to well drainage brownish soils of variable depth.

- **Woburn Clay Loam** – fine to medium textured well to excessively drained dark brown to gray moderately deep soil.

- **Clay Soils** – very deep soils drowned from alluvial or colluvial deposits on mainly flat to undulating land.

Clay Soil = 2,665 ha or 8.4% coarse textured well-drained soils.

Information on Soils in Grenada

UNIT	FAMILY	PARENT MATERIAL	DEPTH	PARTICLE SIZE (30 CM)	PARTICLE SIZE (100 CM)	N	CEC	P	K	ORGANIC MATTER	SLOPE (MIN/ MAX)	DRAINAGE	SURFACE ROCKINESS	INTERNAL ROCK FRAGMENTS	COLOUR	D_PH_50	D_PH_150
1	Woodlands Clay Loam	Colluvium/ alluvium	>150 cm	Fine (c, SC, SiC)	Fine (C,SC,SiC)	Medium (0-50 cm)	.30 meq/100gr (0-50 cm)	High (0 – 50 cm)	Medium (0-50 cm)	1.5 – 2.5% (0 – 50cm)	0 – 2 deg.	Moderately well	Nil	Nil	Brownish-black	6.5 – 7.5	6.5 – 7.5
2	Plains Clay Loam	Colluvium/ alluvium	>150 cm	Medium (SL, SCL,SiL,SiCL,CL)	Medium (SL, SCL,SiL, SiCL,CL)	Medium (0-50 cm)	15-30 meq/100gr (0-50 cm)	Medium (0-50 cm)	Medium (0-50 cm)	1.5 – 2.5% (0 – 50cm)	0 – 2 deg.	Moderately well	Nil	>25%	Yellowish-brown	6.5 – 7.5	6.5 – 7.5
3	Plains Loamy Sand	Colluvium/ alluvium	>150 cm	Medium (SL, SCL,SiL,SiCL,CL)	Medium (SL, SCL,SiL, SiCL,CL)	Medium (0-50 cm)	15-30 meq/100gr (0-50 cm)	Medium (0-50 cm)	High (0-50 cm)	1.5 – 2.5% (0 – 50cm)	0 – 2 deg.	Well	Nil	Nil	Brownish-black	6.5 – 7.5	6.5 – 7.5
4	Plains Sandy Loam	Colluvium/ alluvium	>150 cm	Medium (SL, SCL,SiL,SiCL,CL)	Medium (SL, SCL,SiL, SiCL,CL)	Medium (0-50 cm)	15-30 meq/100gr (0-50 cm)	Medium (0-50 cm)	High (0-50 cm)	1.5 – 2.5% (0 – 50cm)	0 – 2 deg.	Well	Nil	Nil		6.5 – 7.5	6.5 – 7.5
5	Bonair Bouldery Sandy Loam	Colluvium/ alluvium	>150 cm	Medium (SL, SCL,SiL,SiCL,CL)	Medium (SL, SCL,SiL, SiCL,CL)	Medium (0-50 cm)	15-30 meq/100gr (0-50 cm)	Medium (0-50 cm)	High (0-50 cm)	1.5 – 2.5% (0 – 50cm)	0 – 2 deg.	Somewhat excessive	1 – 15%	>25%		6.5 –7.5	6.5 – 7.5
6	La Tante Clay Loam	Colluvium/ alluvium	>150 cm	Medium (SL, SCL,SiL,SiCL,CL)	Fine (C,SC, SiC)	Medium (0-50 cm)	>30 meq/100gr (0-50 cm)	Medium (0-50 cm)	High (0-50 cm)	1.5 – 2.5% (0 – 50cm)	0 – 2 deg.	Imperfect	Nil	Nil		6.5- 7.5	6.5 – 7.5
7	Hope Clay	Colluvium/ alluvium	>150 cm	Fine (C,SC, SiC)	Fine (C,SC, SiC)	Medium (0-50 cm)	>30 meq/100gr (0-50 cm)	High (0-50 cm)	High (0-50 cm)	1.5 – 2.5% (0 – 50cm)	0 – 2 deg.	Very Poor	Nil	Nil	Brownish-black	6.5 – 7.5	6.5 – 7.5

UNIT	FAMILY	PARENT MATERIAL	DEPTH	PARTICLE SIZE (30 CM)	PARTICLE SIZE (100 CM)	N	CEC	P	K	ORGANIC MATTER	SLOPE (MIN/MAX)	DRAINAGE	SURFACE ROCKINESS	INTERNAL ROCK FRAGMENTS	COLOUR	D_PH_50	D_PH_150
8	Pearls Clay	Colluvium/ alluvium	>150 cm	Fine (C,SC, SiC)	Fine (C,SC, SiC)	Medium (0-50 cm)	15-30 meq/100gr (0-50 cm)	Medium (0-50 cm)	High (0-50 cm)	1.5 – 2.5% (0 – 50cm)	0 – 1 deg.	Very Poor	Nil	Nil		6.5 – 7.5	6.5 – 7.5
9	Simon Clay Loam	Colluvium/ alluvium	>150 cm	Medium (SL,SCL,SiL, SiCL,CL)	Fine (C,SC, SiC)	Medium (0-50 cm)	>30 meq/100gr (0-50 cm)	Medium (0-50 cm)	High (0-50 cm)	1.5 – 2.5% (0 – 50cm)	1 – 4 deg.	Imperfect	Nil	Nil		6.5 – 7.5	6.5 – 7.5
11	Hillsborough Loamy Sand	Colluvium/ alluvium	>150 cm	Coarse (S, LS)	Coarse (S, LS)	Low (0-50 cm)	15-30 meq/100gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	<1.5 -% (0 –50 cm)	0 – 2 deg.	Excessive	Nil	Nil		5.5 – 6.5	5.5 – 6.5
12	Lauriston clay	Colluvium/ alluvium	>150 cm	Fine (C,SC, SiC)	Fine (C,SC, SiC)	Medium (0-50 cm)	>30 meq/100gr (0-50 cm)	Medium (0-50 cm)	High (0-50 cm)	>2.5 -% (0 –50 cm)	0 – 1 deg.	Very Poor	Nil	Nil	Dark-grey	>7.5	> 7.5
20	Sabizan Clay Loam	Colluvium/ alluvium	>150 cm	Fine (C,SC, SiC)	Fine (C,SC, SiC)	Medium (0-50 cm)	>30 meq/100gr (0-50 cm)	Medium (0-50 cm)	Medium (0-50 cm)	1.5 – 2.5% (0 –50 cm)	2– 5 deg.	Moderately Well	Nil	1 –10 %	Brown	6.5 – 7.5	6.5 – 7.5
21	Woburn Clay Loam	Ash and agglomerate	30 – 100 cm	Fine (C,SC, SiC)	Medium (SL, SCL,SiL, SiCL,CL)	Medium (0-50 cm)	>30 meq/100gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	<1.5 -% (0 –50 cm)	10 – 20 deg.	Well	Nil	1 – 10%	Yellowish-brown	5.5 – 6.5	6.5 – 7.5
22	Woburn Clay Loam (stony/bouldery phase)	Ash and agglomerate	30 – 100 cm	Fine (C,SC, SiC)	Medium (SL, SCL,SiL, SiCL,CL)	Medium (0-50 cm)	>30 meq/100gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	<1.5 -% (0 –50 cm)	10 – 20 deg.	Well	>15%	>25%	Yellowish-brown	5.5 – 6.5	6.5 – 7.5

UNIT	FAMILY	PARENT MATERIAL	DEPTH	PARTICLE SIZE (30 CM)	PARTICLE SIZE (100 CM)	N	CEC	P	K	ORGANIC MATTER	SLOPE (MIN/MAX)	DRAINAGE	SURFACE ROCKINESS	INTERNAL ROCK FRAGMENTS	COLOUR	D_PH_50	D_PH_150
23	Hartman	Colluvium/alluvium	>150 cm	Fine (C,SC, SiC)	Fine (C,SC, SiC)	Medium (0-50 cm)	>30 meq/100gr (0-50 cm)	Medium (0-50 cm)	High (0-50 cm)	1.5 – 2.5% (0 – 50cm)	2 – 10 deg.	Imperfect	Nil	1 – 10%	Brownish-black	> 7.5	> 7.5
24	Limlair Clay	Colluvium/alluvium	>150 cm	Fine (C,SC, SiC)	Fine (C,SC, SiC)	Medium (0-50 cm)	>30 meq/100gr (0-50 cm)	Medium (0-50 cm)	High (0-50 cm)	<1.5 -% (0 –50 cm)	2– 6 deg.	Moderately Well	Nil	Nil	Dark-brown	> 7.5	> 7.5
25	Clay Loam	Ash and agglomerate	>150 cm	Medium (SL, SCL,SiL,SiCL,CL)	Fine (C,SC, SiC)	High (0-50 cm)	>30 meq/100gr (0-50 cm)	Medium (0-50 cm)	High (0-50 cm)	>2.5 -% (0 –50 cm)	10 – 20 deg.	Moderately Well	Nil	10 – 25%	Reddish-brown	6.5 – 7.5	6.5 – 7.5
26	Clay Loam (stony/ bouldery phase)	Ash and agglomerate	100 – 150 cm	Fine (C,SC, SiC)	Fine (C,SC, SiC)	High (0-50 cm)	>30 meq/100gr (0-50 cm)	Medium (0-50 cm)	High (0-50 cm)	>2.5 -% (0 –50 cm)	10 – 20 deg.	Moderately Well	>15%	>25%	Reddish-brown	6.5 – 7.5	6.5 – 7.5
27	Clay	Ash and agglomerate	>150 cm	Fine (C,SC, SiC)	Fine (C,SC, SiC)	High (0-50 cm)	15-30 meq/100gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	>2.5 -% (0 –50 cm)	2– 8 deg.	Imperfect	Nil	1 - 10	Greyish-brown	5.5 – 6.5	4.5 – 5.5
28	Perseverance Clay	Ash and agglomerate	>150 cm	Fine (c, SC, SiC)	Fine (C,SC,SiC)	Medium (0-50 cm)	>30 meq/100gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	1.5 – 2.5% (0 – 50cm)	5 – 20 deg.	Imperfect	1 – 15%	1-10%	Greyish-brown	6.5 –7.5	6.5 – 7.5
29	Perseverance Clay (Stony boulder phase)	Ash and agglomerate	100 - 150 cm	Fine (c, SC, SiC)	Fine (c, SC, SiC)	Medium (0-50 cm)	>30 meq/100gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	1.5 – 2.5% (0 – 50cm)	5 – 20 deg.	Imperfect	>15%	>25%	Greyish-brown	6.5 – 7.5	6.5 –7.5
30	Capital Clay Loam	Basic igneous rock	>150 cm	Medium (SL, SCL,SiL,SiCL,CL)	Fine (c, SC, SiC)	High (0-50 cm)	<15 meq/100gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	>2.5% (0 –50 cm)	15 – 30 deg.	Moderately Well	Nil	Nil	Dark-reddish-brown	4.5 – 5.5	4.5 – 5.5

UNIT	FAMILY	PARENT MATERIAL	DEPTH	PARTICLE SIZE (30 CM)	PARTICLE SIZE (100 CM)	N	CEC	P	K	ORGANIC MATTER	SLOPE (MIN/MAX)	DRAINAGE	SURFACE ROCKINESS	INTERNAL ROCK FRAGMENTS	COLOUR	D_PH_50	D_PH_150
31	Capital Clay Loam (Stony boulder phase)	Basic igneous rock	100 - 150 cm	Medium (SL, SCL,SiL,SiCL,CL)	Fine (c, SC, SiC)	High (0-50 cm)	<15 meq/100gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	>2.5% (0 –50 cm)	15 – 30 deg.	Moderately Well	Nil	Nil	Dark-reddish-brown	4.5 – 5.5	4.5 – 5.5
32	Capital Clay Loam (very steep shallow phase)	Basic igneous rock	0 - 30 cm	Medium (SL, SCL,SiL,SiCL,CL)	Fine (c, SC, SiC)	High (0-50 cm)	<15 meq/100gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	>2.5% (0 –50 cm)	25 – 90 deg.	Well	>15%	>25%	Dark-reddish-brown	4.5 – 5.5	4.5 – 5.5
35	Capitol clay loam (drier areas)	Basic igneous rock	100 - 150 cm	Medium (SL, SCL,SiL,SiCL,CL)	Fine (C,SC, SiC)	High (0-50 cm)	<15 meq/100gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	>2.5% (0 –50 cm)	15 – 30 deg.	Moderately Well	Nil	Nil	Reddish-brown	4.5 – 5.5	4.5 – 5.5
36	Capitol Clay Loam (stony bouldery phase in drier areas)	Basic igneous rock	100 - 150 cm	Medium (SL, SCL,SiL,SiCL,CL)	Fine (C,SC, SiC)	High (0-50 cm)	<15 meq/100gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	>2.5% (0 –50 cm)	15 – 30 deg.	Moderately Well	>15%	>25%	Reddish-brown	4.5 – 5.5	4.5 – 5.5
37	Capitol Clay Loam (very steep and shallow phase in drier areas)	Basic igneous rock	0 – 30 cm	Medium (SL, SCL,SiL,SiCL,CL)	Fine (C,SC, SiC)	High (0-50 cm)	<15 meq/100gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	>2.5% (0 –50 cm)	15 – 30 deg.	Well	>15%	>25%	Reddish-brown	4.5 – 5.5	4.5 – 5.5
40	clay loam	Ash and agglomerate	>150 cm	Medium (SL, SCL,SiL,SiCL,CL)	Medium (SL, SCL,SiL, SiCL,CL)	High (0-50 cm)	15-30 meq/100gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	>2.5% (0 –50 cm)	10 – 25 deg.	Moderately well	Nil	Nil	Reddish-brown	5.5 – 6.5	5.5 – 6.5

UNIT	FAMILY	PARENT MATERIAL	DEPTH	PARTICLE SIZE (30 CM)	PARTICLE SIZE (100 CM)	N	CEC	P	K	ORGANIC MATTER	SLOPE (MIN/MAX)	DRAINAGE	SURFACE ROCKINESS	INTERNAL ROCK FRAGMENTS	COLOUR	D_PH_50	D_PH_150
41	clay loam(stony and bouldery phase)	Ash and agglomerate	100 - 150 cm	Medium (SL, SCL,SiL,SiCL,CL)	Medium (SL, SCL,SiL, SiCL,CL)	High (0-50 cm)	15-30 meq/100 gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	>2.5% (0 –50 cm)	10 – 25 deg.	Well	>15%	>25%	Reddish-brown	5.5 – 6.5	5.5 – 6.5
42	clay loam(very steep and shallow phase)	Ash and agglomerate	0 - 30cm	Medium (SL, SCL,SiL,SiCL,CL)	Medium (SL, SCL,SiL, SiCL,CL)	High (0-50 cm)	15-30 meq/100 gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	>2.5% (0 –50 cm)	25 – 90 deg.	Well	>15%	>25%	Reddish-brown	5.5 – 6.5	5.5 – 6.5
43	Palmiste Clay Loam	Tuffeceous shales	100 - 150 cm	Fine (C,SC, SiC)	Fine (C,SC, SiC)	Medium (0-50 cm)	>30 meq/100 gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	1.5 – 2.5% (0 –50 cm)	10 – 20 deg.	Moderately Well	Nil	Nil	Yellowish Brown	5.5 – 6.5	5.5 – 6.5
44	Palmiste Clay Loam (very steep and shallow phase)	Tuffeceous shales	0 – 30 cm	Fine (C,SC, SiC)	Medium (SL, SCL,SiL, SiCL,CL)	Medium (0-50 cm)	>30 meq/100 gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	1.5 – 2.5% (0 –50 cm)	10 – 20 deg.	Moderately Well	>15%	>25%	Yellowish-brown	5.5 – 6.5	5.5 – 6.5
50	Tophill Stony Clay	Limestone	0 - 30 cm	Fine (C,SC, SiC)	Medium (SL, SCL,SiL, SiCL,CL)	Medium (0-50 cm)	>30 meq/100 gr (0-50 cm)	Low (0-50 cm)	Medium (0-50 cm)	>2.5 -% (0 –50 cm)	10 – 30 deg.	Somewhat excessive	>15%	>25%		6.5 – 7.5	6.5 – 7.5

UNIT	FAMILY	PARENT MATERIAL	DEPTH	PARTICLE SIZE (30 CM)	PARTICLE SIZE (100 CM)	N	CEC	P	K	ORGANIC MATTER	SLOPE (MIN/MAX)	DRAINAGE	SURFACE ROCKINESS	INTERNAL ROCK FRAGMENTS	COLOUR	D_PH_50	D_PH_150
51	Belair Stony Clay	Limestone	30 - 100 cm	Fine (C,SC, SiC)	Fine (C,SC, SiC)	Medium (0-50 cm)	>30 meq/100 gr (0-50 cm)	Low (0-50 cm)	High (0-50 cm)	>2.5% (0 – 50cm)	10 – 30 deg.	Moderately well	>15%	>25%		6.5 – 7.5	6.5 – 7.5
52	Betish Stony Clay	Limestone	0 –30 cm	Fine (C,SC, SiC)	Fine (C,SC, SiC)	High (0-50 cm)	15-30 meq/100 gr (0-50 cm)	Medium (0-50 cm)	High (0-50 cm)	<1.5 – 2.5% (0 –50 cm)	10 – 30 deg.	Well	1 – 15 %	Nil	Dark-brown	> 7.5	> 7.5

Major Issues of Sustainable Soil Management in Grenada

1. Poor practices by farmers contribute to serious soil erosion

- Lack of implementation of effective anti-erosion techniques such as terracing/strip cropping/contour ploughing etc.
- Serious drainage problems..farmers do not take the pain to do as much drains as in the past
- Unnecessary burning especially during the dry season lead to serious soil erosion
- Overgrazing

Major Issues of Sustainable Soil Management in Grenada

- Burning of unwanted vegetation
- Excessive use of agro chemicals contribute to impoverished soils and serious water pollution both in the fresh water and marine environments
- Sand mining for the construction industry is accelerating beach erosion in which the sea continues to encroach more and more inland
- Illegal dumping of garbage is a major challenge in soil management
- Construction of building on what should be protected hill sides are contributing to acute problems of soil erosion and water catchments

An area in Carriacou showing acute erosion

An area denuded of any vegetation as a result of overgrazing

An area highlighting serious drainage problem contributing consequently to erosion

A denuded hill side. Years of acute erosion has left the area very impoverished

Illegal dumping continues to be a challenge in in soil management

Frequent bush fires (predominantly caused by farmers) are contributing significantly to major soil erosion and fertility depletion

A major fire on a hillside in Grenada

Land slides a frequent occurrence following heavy rainfall

Beach erosion caused largely as result of sand mining is a major threat to soil loss as the sea continues to move inland

Sand Mining is positively correlated with beach erosion which is impacting on soil erosion also (the eastern part of the island and Carriacou are particularly impacted negatively). Road infrastructure is also affected significantly

Priorities and Needs For Sustainable Soil Management in Grenada

Why The Need For Sustainable Soil Management In Grenada?

A Sustainable Soil Management approach would ensure:

- Maintenance of soil fertility
- Implementation of soil Conservation practices
- Adoption of more sustainable agriculture production systems
- More prudent management of agriculture inputs especially agro chemicals
- More universal adoption of best practices especially by farmers as far as it relates to management of soil resources
- Less pollution of soil, fresh water and marine ecosystems
- Reduction of soil erosion

All the benefits derived from a sustainable Soil Management System would guarantee and facilitate:

- The incessant development of a vibrant agri-food sector which is crucial to Grenada's socio economic development
- Improvement of the livelihoods and quality of life especially of the rural folks
- Grenada's Food and Nutrition Security
- Rural stability
- Increase in the output of the agri-food sector
- Higher levels of contribution to GDP
- More secure future for incoming generations

Priorities For Sustainable Soil Management In Grenada

- Conduct a new national soil survey of the entire country
- Implement a comprehensive soil fertility analysis programme of soil type/land use systems combination
- Implementation of a National Soil Conservation programme
- Development of a protocol for monitoring land/soil degradation
- Development of policy, legislative and institutional framework and standards for sustainable land/soil management in Grenada

Recent Initiatives Implemented To Address Soil Related Challenges

Land & Marine Management Strategy

Objectives

- o To update and modernize existing legislation that provide for management of land, water and marine resources;
- o To develop regulations, standards and codes of practice for existing legislation;
- o To adopt international conventions and multi-lateral environmental agreements into the national legislative framework;
- o To formulate a national land use policy statement; and
- o To promulgate new legislation and regulations to address emerging trends and priority issues.

Recent Initiatives Implemented To Address Soil Related Challenges

- **Sustainable Land Management Project**
- **Land Degradation Project**
- **Land and Coastal Resources Management**
- **Launch of Grenada Organic Agriculture Movement**

Thank You!!