

PART III

INTERACTION OF NATURAL HAZARDS AND DEVELOPMENT-RECOMMENDED RESPONSES-GENERAL CHARACTERISTICS

<u>PROBLEM</u>	<u>CAUSE</u>	<u>EFFECT</u>	<u>REASONS</u>	<u>MINISTRY INVOLVED</u>	<u>RESPONSE AREAS</u>
Sedimentation, increased runoff of storm water.	Unplanned housing of moderate to high density and an increase of impermeable areas without adequate drainage.	Change in Riverine Ecosystem Health Impacts, Reef die-back.	Squatting on public lands and lack of subdivision planning.	Lands, Central Housing Authority, Land Registry, Central Water Commission.	<p><u>Organizational-Ministerial</u></p> <p>*Increase staff of Physical Planning Unit to regulate housing development in Zone 1 area (South-West Parish St. Georges).</p> <p><u>Technical</u></p> <p>*Assess government lands and design human settlements programs to offer lower income groups small 3,000 sq. ft. parcels with adequate subdivision planning.</p> <p><u>Policy</u></p> <p>*Facilitate low interest loans for low cost housing.</p> <p><u>Information</u></p> <p>*Mount an educational campaign to inform the public that squatting on public lands will not be tolerated.</p>
Flooding	Inadequate drainage systems in lower watershed. Blocked, clogged, or destroyed drains.	Real Estate destruction. Road deterioration. Hazard	Poor planning, lack of maintenance.	Ministry of works Physical Planning Unit	<p><u>Organizational</u></p> <p>*Increase budget of engineering Division of the Ministry of Works to upgrade human settlements and establish new ones.</p> <p>*Improve institutional capacity for solid waste management.</p> <p><u>Technical</u></p> <p>*Redesign drainage system in flood prone areas.</p> <p>*Form Community Development Committees to improve neighbourhoods.</p> <p><u>Policy</u></p> <p>*Impose fines on residents who block drains.</p> <p><u>Information</u></p> <p>*Mount educational campaign relative to community self-help to keep drains clean and clear of debris.</p>

Unauthorized Sand Mining	High demand for construction concrete blocks, paving (mixed material for the walls).	Coastal erosion. Destruction increased vulnerability to storm surge/wave action.	Beaches are formed by decomposition of coral and take decades to form.	Ministry of Works. Science & Technology	Organizational *Inform police and Extension Division of Policy and legal sandmining beaches. <u>Policy</u> Upgrade Beach protection Act of 1979 to impose stiffer fines. Technical *Adapt National Sandmining Policy *Dredge Harbour for source of sand *Crush red gravel for sand medium
Solid Waste	Discarding and littering of solid waste into the river systems and other unauthorized dumping.	Health hazard Quality life deterioration.	Lack of effective solid waste collection and disposal program.	Health/ Education	Organizational-Ministerial *Establish solid waste management autonomous company. <u>Policy</u> *Establish legislation relative to littering and solid waste making individuals bear the brunt of costs of solid waste disposal. *Technical Establish new sanitary land fills. *Arrange low interest loans for solid waste autonomous agency. Education *Mount educational campaign relative to the environmental quality and presenting littering as anti-social behaviour.
High nutrient counts in water	High population density, pit latrine. Lack of septic/soakaway systems. Poor design of pit latrines results in disease.	Health hazard Possible increase in productivity of marine environment	Lack of central sewage facility required for existing population density.	Health PPU CWC Housing	Organizational-Ministerial *Health Dept. should assess fiscal and total coliform counts in St. John's River to assess gravity of the nutrient problem. *Health & Works should assess feasibility of booking River Road, Queen's Park Gov't. facilities and industrial Areas into CIDA outfall. *Expansion of pit latrine program. *Health to design appropriate pit latrine system for settlements without adequate soils and area for septic soakaway systems.

					<p>*Require closed pit latrines through legislation and fines.</p> <p><u>Technical</u></p> <p>*Proposed engineering drawings should be submitted to CIDA for funding appraisal-OAS can assist if requested.</p> <p>*Appropriate pit latrine design for suburban areas.</p> <p>*Depending on cultural acceptability, design appropriate pit latrine for suburban areas which recycles nutrients.</p> <p><u>Information</u></p> <p>*Health should mount an educational campaign about the benefits of appropriate pit latrine design to minimize gastro intestinal diseases, hepatitis, & typhoid.</p>
<p>Uplanned Deforestation</p>	<p>Squatting Charcoal production inappropriate land-use Farming on steep slopes</p>	<p>Silting of dams, loss of water quality, reduction in national water supplies, Killing of off-shore reefs. Increased run- off and flash flood hazards.</p>	<p>Shortage of land for small farmers. Population growth. Charcoal demand.</p>	<p>Ministry of Agriculture Forestry Extension Division</p>	<p><u>Organizational</u></p> <p>*Promote inforestation By strengthening Forestry and National Parks Division. Strengthen legislation of multiple- use areas both on private and public land.</p> <p><u>Technical</u></p> <p>*Monitor sediment local emanating from river- systems and pinpoint problem areas. *Increase nursery production economic plants.</p>
<p>Coastal Erosion</p>	<p>Increased wave energy from reef die-back, sea level rise, human inter- ference with beach revegetation, building too close to the HWM.</p>	<p>Beach erosion Loss of tourist potential. Loss of economic development potential.</p>	<p>Lack of Physical Planning regulations and enfor- cement of beach protection measures.</p>		<p><u>Organizational</u></p> <p>*Concrete Policy by Ministries of Health Agriculture, Tourism and Works that beach protection is No.1 priority.</p>

LIST OF CONTACTS

ANNEX I

Alphonsus Redhead	National Disaster Coordinator
Glenn A. Mignon	Prime Minister Office
Carlton Frederick	Physical Planning Development officer
Charles Francis	Head Land-use
George Fletcher	Communication and Work
Geraldine Pitt	Planning Consultant
James Pitt	Marine Pollution and Oil Science and Technology
Insp. A. Lyons	Hazardous materials and toxic waste Fire department
Leroy Neckles	Grenada Airport Authority
Mr. Walker	Physical Planning Unit
Patrick Moore	Environmental Health officer
Felix Murell	New Hampshire sub committee
Winston Slocombe	Chairman/South East
Victor W. Cenac	Water superintendent
Michael Neckles	Agricultural Officer
Ann Francis	Public Health Nurse
F. Mc.Intosh	Ministry of Education (Statistics)
Orgias Campbell	Ministry of Agriculture
Gregory Hagley	Agriculture assistant
Mr. Francis	Environmental Health Officer
Rosy Bhola	Health Education officer
Gilbert Massell	Head Surveys Department
Stephen O. Bender	Project Chief, Natural Hazards Project, OAS/DRD, Washington D.C.
Jan Vermeiren	Caribbean Coordinator, Natural Hazards Project, OAS/DRD, Washington D.C.
Richard Huber	Project Chief, OAS/DRD Integrated Development Project Grenada W.I.

MATRIX A

RISK ASSESSMENT OF HAZARDS RELATED TO TOWN AND VILLAGES OF GRENADA

Country: Assessment date: Assessor:		HAZARD		CAUSE-EFFECT LINK		FREQUENCY PATTERN		RESPONSIBLE AGENCY	
District: Location:									
INFRASTRUCTURE									
Transpntn									
Communt.									
Health									
Education									
Service									
Roads		Windstorm							
Bridges		Rainstorm							
Airport		Tidal surge							
Seaport		Flood							
Postal		Landslide							
Telephone		Rockslide							
Radio		Fire							
Beacon									
Hospital		Poor drainage							
Health center		Silting							
Care centre		Over loaded road							
Public lav.		Faulty pump							
Medical stat.		Proximity to sea							
Infant		Wood rot							
Primary		Erosion							
Combined		Decayed rafters							
Secondary		Damage							
Technical		Steep embankment							
Police		Low lying land							
Fire		Flash flood							
Ambulance		Bottom of water shed							
Water		Old bridge remain							
Sewerage		Toppling of antennas							
Community Hall		Elevated road							
Play field		Rotting poles							
Market		Damaged seawall							
Church		Overhanging trees							
		River overflow							
		Poles topple over							
		Debris piles NR							
		Cracked retaining wall							
		Decayed rafters							
		Blocked culvert							
		Heavy rainfall							
		Hurricane season							
		Daily							
		At high tide							
		Ministry of Health							
		Ministry of Education							
		Min. of Finance and Planning/Physical Pl.							
		Planning Department							
		Community Development							
		Communication + Works							
		Sea Ports Authority							
		Fire Department							
		Local Authority							
		Police							

MATRIX B FACTORS TO BE NOTED		CONDITIONS : No 4-Excellent 3-Fair 2-Good 1-Poor 0-Basic		REMARKS
Districts Locations	SOCIATION	Location of buildings away from areas subject to flood, erosion or landslide		
		Proximity to settlements		
		Proper & regular maintenance of building		
		Adequate toilet facilities		
		Basic amenities of water & electricity		
		Emergency exits		
		Adequate space around building to avoid stampede in emergency		
Districts Locations	Roads	Proximity to cliffs and shoreline		
		Drainage		
		Building lines in relation to width surface condition and maintenance		
Districts Locations	Bridges	Age and structural stability		
		Load capacity		
		River banks		
		Tree trunks		
		Obstructions in river bed from boulders		
Districts Locations	Airport	Protective fencing		
		Security		
		Obstructing within curtilage		
		Distracting near lights		
		Unmarked hills and tall buildings		
Districts Locations	TRANSPORTATION	Ocean depths		
		Damage wharves		
		Erosion of shoreline		
		Absence of navigational beacon		
		Siltation from drains		
		Debris and floats from heavy rains		
		Jetties		
Districts Locations	Seaport/Marinas	Storage sheds		
		Sea walls		
		Toxic pollution		
		Markers buoys		
		Wrecks		
		Dock equipment		
Districts Locations	Postal	Location		
		Security		
Districts Locations	Telephone	Location of poles		
		Condition of poles and stays		
		Siting of public boxes		
		Height of overhead lines		
		Over hanging trees and foliage over transmission lines		
Districts Locations	Radio	Location of station, masts and stays		
		Quality of transmission: emergency		
		Power supply		
		Security		
Districts Locations	HEALTH	Hospital etc.		
		Location of structure to be away from flood areas		
		Easily accessible to community by motor vehicles		
		Buildings to be in good state of repair		
		Equipment to be serviceable		
		Proper disposal of wastes		
		Pleasant landscaping		
Districts Locations	Fire	Adequately staffed station		
		Equipment to include life saving		
		Police to provide free flow of traffic in emergency		
		Regular checks of equipment		
		Location and maintenance of fire hydrants		
Districts Locations	Police	Immediate response to fires & criminal disturbances		
		Carry out regular check of industrial and commercial premises		
		Advice on location of gasoline stations		
		Maintenance of dams, reservoirs & service lines, public and domestic supply lines		
		Eliminate waste		
Districts Locations	Water	Monitor outfalls of public discharge		
		Check private disposal systems		
		Maintain good upkeep of vehicles		
Districts Locations	Sewers	Improve scheduled operations		
		Clearly define bus stops		
		Drivers to pass proper test		
		Check vehicles regularly		
Districts Locations	Transit	Faulty electricity poles		
		Sagging lines		
		Interruptions of service		
		Load shedding		
		Location of poles near roadway		
		Transformer location and maintenance		
		Tree cropping		
Districts Locations	ENERGY	Retail gas stations in built-up areas and proximity to schools, hospitals and community halls		
		Location of bulk storage tanks retail outlets for gas cylinders		

Country:
Assessment date:

Assessor:

The Administrative Map of Grenada.

