

Priority Areas for Action



CASE STUDIES

Land and Marine Management Strategy for Grenada

OCTOBER, 2011

Submitted by:



CASE STUDIES: Land and Marine Management Strategy for Grenada

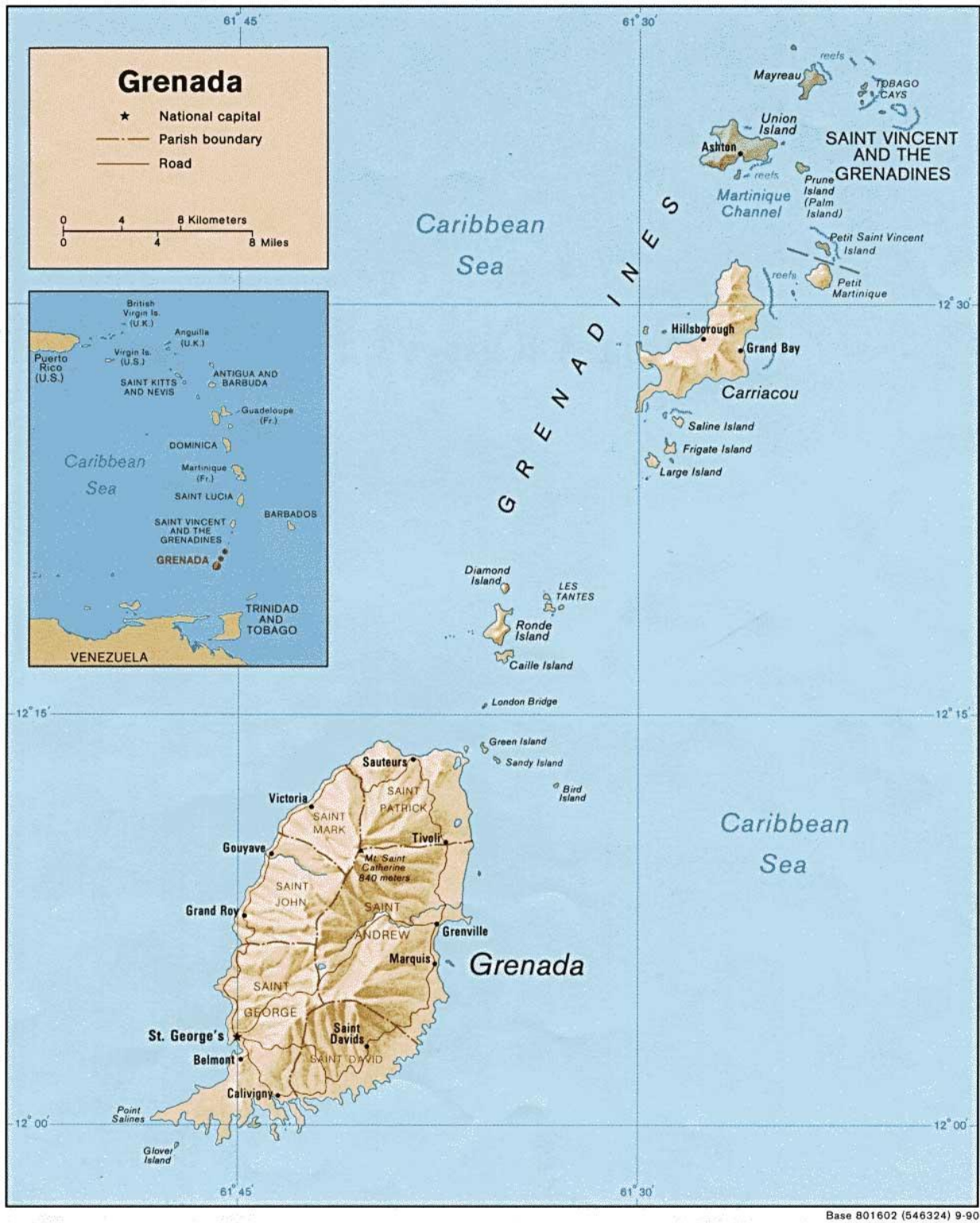


Figure 1-1 Map of Grenada Carriacou and Petit Martinique
(http://www.intute.ac.uk/worldguide/html/897_map.html)

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1.0 INTRODUCTION

This project involved a study of the policy, institutional, legislative and regulatory framework for land and marine management in Grenada and the preparation of a comprehensive and coherent strategy for land and marine management for Grenada¹ through a participative process with relevant stakeholders. The background strategy report and the strategy document which are companions to this document, provides a comprehensive situational analysis and framework with action for Land and Marine Management in Grenada. Here a series of case studies are presented for priority areas and issues that were identified by stakeholders during a series of consultations that were an integral part of the strategy formulation process. For this purpose the driving pressure state impact response (DPSIR) framework of analysis was utilized to map the current situation, identify gaps and present strategic options or policy responses. The review process involved three key steps as summarized in the process diagram below:

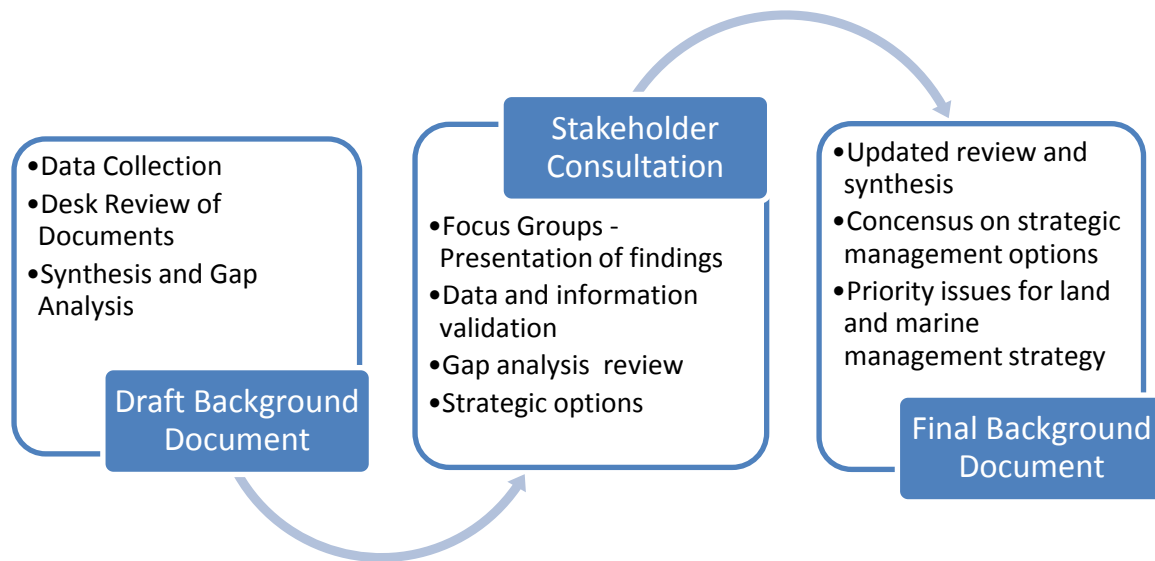
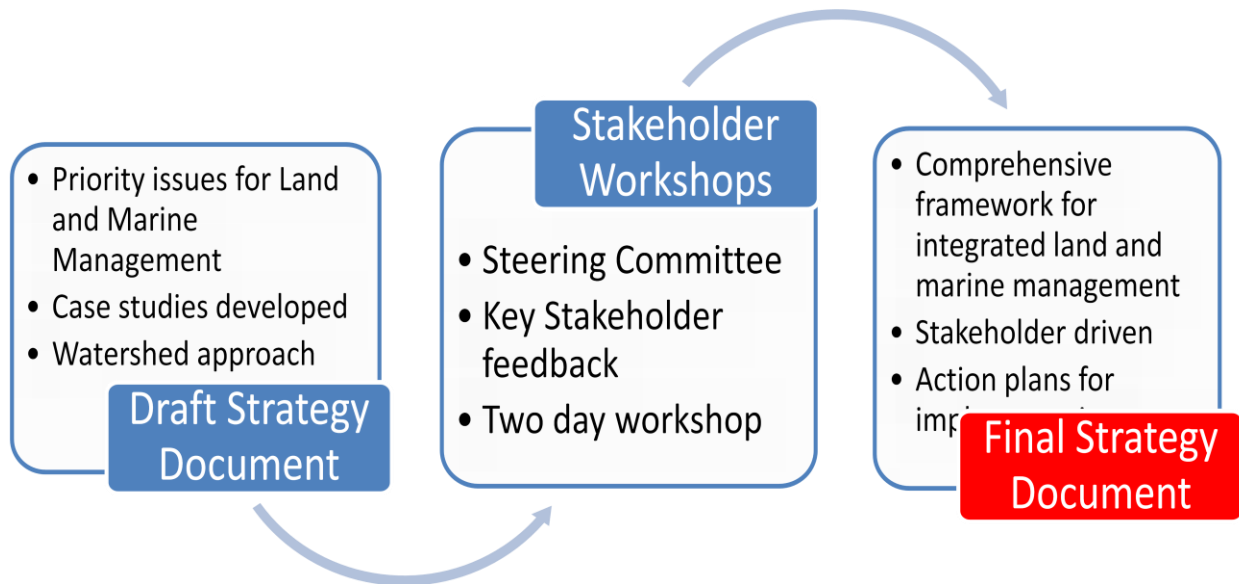


Figure 1-1 Review Process for Identification of Priority Areas for Action

¹ Here Grenada refers to the tri-island state of Grenada, Carriacou and Petit Martinique.

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Following from the series of focus groups meetings and the stakeholder consultation on the background document, consensus was achieved on priorities and areas for action to be elaborated in the strategy. Seventeen areas were identified and case studies were developed to address these issues using the strategy framework. This led to the second phase of the strategy formulation process outline in Figure 1-2 below.



The results from the strategy development process are:

1. A mapping of the current policy, legislative, regulatory and institutional framework and capacity for the integrated management of land, freshwater, coastal and the marine resources of Grenada; all related gaps are identified and a comprehensive set of strategic options are presented;
2. A broad-based consultative process for the drafting and finalization of the proposed strategy is engaged.; and
3. A comprehensive land and marine management strategy for Grenada is developed

2.0 STRATEGY FRAMEWORK

The case studies are presented within the boundaries of the Strategy framework which is outlined below. A full elaboration of the strategy for land and marine management in Grenada is contained in the final strategy document.

2.1 Overall Strategy Goal

The goal is to achieve integrated national development that is environmentally sustainable.

2.2 Specific Objective and Strategy Outcomes

The overall objective is that a coherent framework with an appropriate set of strategies is developed to foster the productive and optimal utilization of land, freshwater, coastal and marine resources in an environmentally sustainable manner

Strategy Outcome 1

- Legislative Policy Framework for Land and Marine Management Developed

Strategy Outcome 2

- Network Administrator Organization (s) Established

Strategy Outcome 3

- Tools for creation of a seamless integrated system for management of Land and Marine Resources

Strategy Outcome 4

- Framework for Monitoring, Enforcement and Review Developed

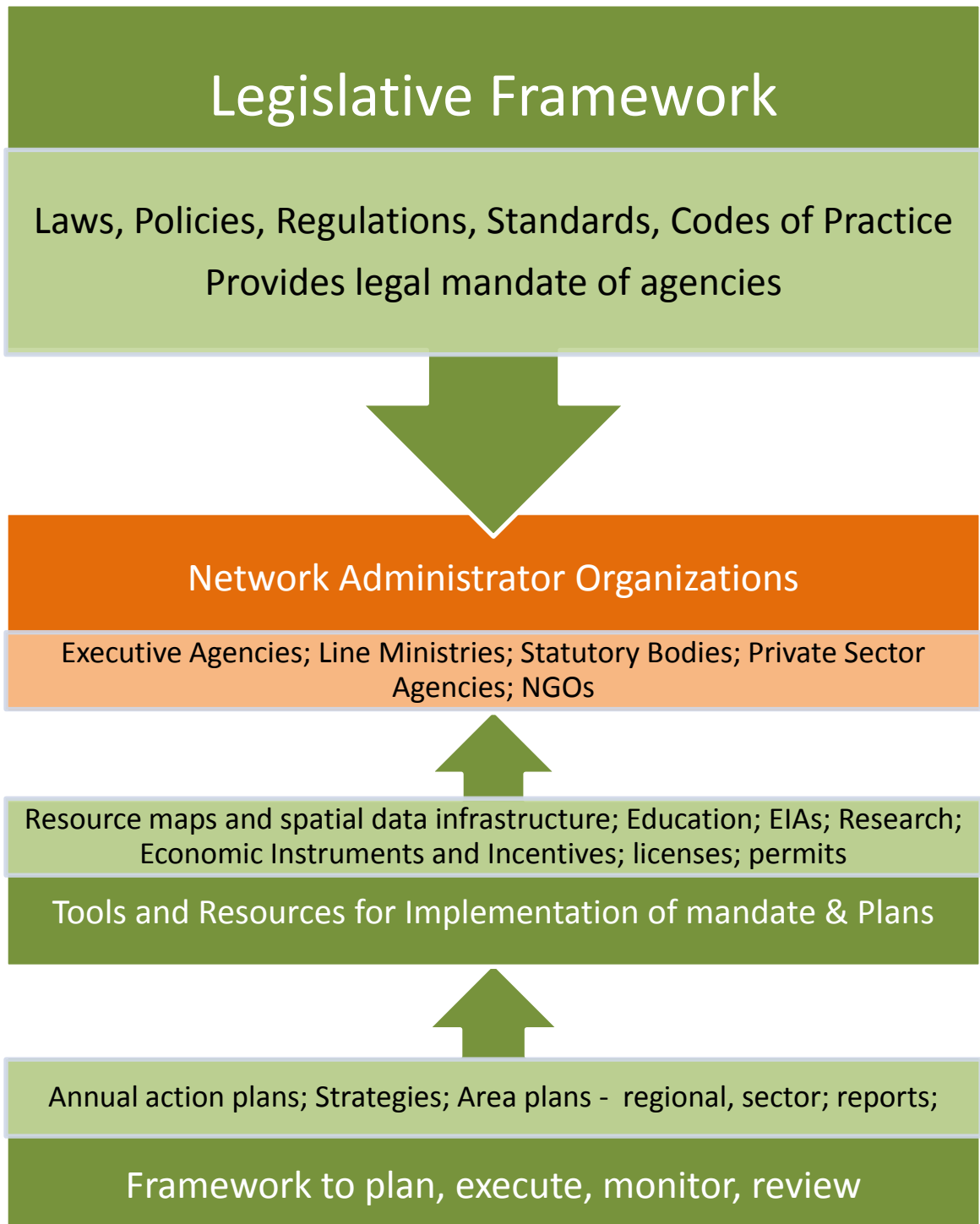


Figure 2-1 Strategic Framework for Land and Marine Management

3.0 Protected Areas & Watersheds - Beausejour

3.1 Situational Analysis

The Government of Grenada established the Moliniere/Beausejour Marine Protected Area (MPA) in 2001 and the Annandale Forest Reserve in 2006. Both protected areas lie within the Beausejour Watershed which covers an area of -- acres. A management plan was approved for the Annandale Forest Reserve in 2007 and one was developed for the Moliniere/Beausejour MPA in 2010. For the intervening watershed between these two protected areas, there are no special codes of practice or management plans to guide their use and development. Most of the lands in the Beausejour watershed are privately owned and the communities are residential farming villages, namely Granton, Willis, New Hampshire, Grenville Vale and Beausejour. The larger estates of Grenville Vale and Beausejour were very productive sugar cane plantations with industrial works however these have been abandoned and are rapidly being sub-divided into residential communities. To effect the protection envisaged for both protected areas, in particular the MPA, there must be best practices for conservation and development of private lands. Already there are signs that nutrient rich fresh water with heavy sediment loads can have severe impacts on the MPA. At present there is no management system for integrated watershed management. The following presents recommendations for addressing management of the watershed from ridge to reef and can be replicated for other watersheds on the Island.

3.2 Legal and Policy Framework

There does not exist a clearly articulated policy for watershed management in Grenada. While there are several laws which contain limited provisions for resource utilization in forest reserves there is need for an integrated policy framework that addresses the dual goals of sustained development and protection of natural resources. With respect to protection and utilization of the resources within the Beausejour Watershed, the relevant legislation and policies are:

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- Grand Etang Forest Reserve
- Protected Forest Rules, 1952
- National Parks and Protected Areas Act (1990),
- Fisheries Act 1986,
- Fisheries (Marine Protected Areas) Regulations, 2001
- Physical Planning and Development Control Act, 2002
- National Heritage Protection Act, 1990
- Forest, Soil and Water Conservation Act, 1947
- Forestry Policy (1999) and Strategy (2000),
- Public Health Act 1925, and regulations 1958
- Solid Waste Management Act, 1995
- Pesticides Control Act, 1973

Most of the legislation above are outdated and it is necessary that they are modernized to address the current realities, particularly as it relates with changing land ownership and shifts from agricultural to residential uses of watershed. Given the importance of the Moliniere MPA the entire watershed should be declared a conservation area and given special attention for management of development activities. The existing legislation must be made implementable with supporting regulations and codes of practice and address contemporary issues such as:

- Organic farming and use of natural/biodegradable agro-chemicals
- Silvi-culture best management practices and soil conservation to reduce input of sediment into waterways and the marine environment.
- Land development guidelines to include road access, site clearing, soil banks and the management of storm and waste waters from households.

3.3 Network Administrator Organizations

A management system for national parks and protected areas is not yet fully developed and there are inherent challenges with enforcement of best practices on private lands. Responsibility for management of forested areas lie with the Forestry Division within the

Ministry of Agriculture and there is overlap in jurisdiction for management of national parks and protected areas with the Ministry of Tourism. The Fisheries Division within the Ministry of Agriculture has dedicated officers and wardens for managing the MPA. There are no arrangements in place for coordination of the functions and objectives of the various task force from each Ministry. A huge gap exists for the management of the land space between the protected forest reserves and the marine protected area, and only limited control is exercised by the physical planning unit. The capacity of the watershed management unit within the Forestry Division must be developed to enable monitoring especially in critical watersheds that are adjoined by protected habitats. Also, Agriculture Extension officers must be included within the framework for watershed management as they perform a vital frontline role with resource users and can have influence on the adoption of best management practices

3.4 Tools for Implementation

The tools and resources that are required to enable improved watershed management have been articulated in Section 4.3 of the Land and Marine Management Strategy and in the Action Plan for the same. Key points to be noted here include the need for:

- Annual State of the Environment Report and Natural Resource Assessment
- Standards and Codes of Practice for land development
- Organic farming and best farm management standards
- Economic incentives and instruments for investment in best management practices and resource conservation these may include:
 - concessions for land owners to keep lands in agriculture and for farmers to invest in best practices
 - public education and tax relief for home owners to invest in non polluting environmental solutions
- GIS and spatial planning to enable best use of the watershed
- Information management

3.5 Framework for Planning, Monitoring and Review

It is recommended that the entire Beausejour watershed, from the Annandale Forest Reserve to the Moliniere reefs, be declared a *Special Conservation Area*. Together with the community of land owners, farmers and residents, the Ministries should establish a Conservation Committee and create a management plan with agreements on the type of activities and practices that are best suited for the watershed. This plan which take into account sensitive ecosystems with migratory corridors for wildlife, and will become the guideline for approving housing, agriculture and development projects in the Beausejour watershed. Tradeoff analysis must be utilized to arrive at the optimal set of choices to meet the needs of all stakeholders.

3.6 Recommendations for Action

1. Declare the entire Beausejour a Special Conservation Area
2. In consultation with land and property owners develop watershed management plan from ridge to reef
3. Develop economic incentive regime to encourage voluntary investment in best management practices for environmental protection
4. Implement public education program on organic farming, soil conservation best practices, land development guidelines.

4.0 Solid Waste Management

4.1 Situational Analysis

For Grenada and Carriacou there is only one municipal solid waste landfill on each island, one at Perseverance and one at Dumfries respectively. Solid waste from Petit Martinique is transported to Carriacou and for both islands ship generated waste is also disposed off at these landfills. Grenada has a population of approximately 100,000 inhabitants and receive over 360,000 cruise and stay over visitors annually. There is no recycling and the entire waste stream including toxic and hazardous waste is disposed off at Perseverance and Dumfries. Studies have revealed that over 50% of the waste is biodegradable organic matter and the average individual generates 3 lbs of waste per day. The landfills were constructed after 1996 and there are already concerns about their useful life, management of leachate, diversion of recyclable materials away from the waste stream and finding new sites.

Establishing landfill sites is a politically sensitive issue given the limited availability of suitable land, proximity to sensitive habitats and to residential areas, and demands for land for tourism development. For Perseverance in particular expansion of the present site is constrained by the proximity to protected habitat for the endangered Grenada Dove. Forward planning is required to develop an integrated waste management program, to design closure and reclamation plans and to set aside lands for future landfills.

4.2 Legal and Policy Framework

The legislative framework for waste management is not yet fully developed and in order to address the present challenges there is need to update existing laws and promulgate regulations to effect their implementation. Existing laws that contain provisions for solid waste management include:

- Public Health Act and regulations

- Solid Waste Management Act
- Environmental Levy
- Waste Management Bill

Supporting regulations must be developed to address issues such as handling of waste oil and liquid waste, recycling, composting and other waste reduction and minimization strategies. Pollution monitoring and control is not covered by existing legislation and present trends in air and pollution is unabated as a result. As such there is also need for an integrated waste management policy and strategy that provides for development of landfills to include closure and reclamation plans and land banks.

4.3 Network Administrator Organizations

Responsibility for solid waste management is under the jurisdictions of the Ministry of Health and day to day operation by the Grenada Solid Waste Management Authority. There has been consideration to shift the legal mandate from the Ministry of Health to the recently established Ministry of Environment, however this will require new legislation to formalize the roles of this new ministry. Under the provisions of the Waste Management Bill it is the responsibility of the Minister of Health to develop waste management plans as well as regulations to address specific issues such as the handling of liquid wastes. To subsume the new role, the Ministry of Environment must provided with the appropriate legal framework, technical and human capacity. Plans for pollution monitoring and control of the existing landfills required support from the Caribbean Environmental Health Institute (CEHI). To date CEHI has not conducted any monitoring of the landfill and there are plans underway to merge this organization into the Caribbean Public Health Agency (CARPHA) and moving the offices from St. Lucia to Trinidad. This transition will undoubtedly further impede monitoring of the landfills and to ensure that there is unchecked pollution of the surrounding environment. Addressing the challenges of waste management thus requires streamlining and formalizing the roles of organizations involved in the administrative network.

4.4 Tools for Implementation

The guidelines presented in Section 4.3 and 6 of the Land and Marine Management Strategy apply. Of particular mention to address the present challenges with waste management are:

- Environmental Education and Public Awareness on: anti-litter campaign, waste minimization, composting and general environmental protection
- Economic incentives to encourage private sector investments in waste management including recycling.
- GIS and spatial planning to set aside land space for future landfills
- Environmental Assessments to monitor the state of the environment and abate pollution resulting from landfills

4.5 Framework for Planning, Monitoring and Review

Given present development trends and the rapid rate at which the landfills are being utilized, long range planning is needed across all sectors to arrive at an integrated waste management program. The need for landfill space must be linked with the need for rock quarries to take advantage of the requirement for closure and reclamation of both types of sites at the end of their useful life. Tradeoffs must be made between utilizing the degraded Grenada Dove Habitat at Perseverance and improvement of the higher value site at Mt. Hartman Estate through closure of the rock quarry. A new rock quarry can be established at Perseverance which can create additional landfill space as well as material for daily cover. Relocation of the rock quarry and expansion of space for landfill will meet dual objectives and allow for future tourism development at Mt. Hartman.

4.6 Recommendations for Action

The Grenada Solid Waste Management Authority together with the appropriate regulatory agency must undertake the following:

1. Conduct monitoring of leachate and pollutants from the landfills and implement abatement actions

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2. Collaborate with agricultural extension workers to educate the public to separate biodegradable matter from the waste stream and undertake backyard composting
3. Together with the Physical Planning Unit and other relevant agencies, develop spatial plans to earmark sites for future landfills
4. Strategic Environmental Impact Assessments include tradeoff analysis must be conducted to finalize sites for landfills
5. Provide economic incentives for private sector investment in recycling and waste management.

5.0 Integrated Watershed Management

5.1 Situational Analysis

The St. John's Watershed is used as the classic case requiring an aggressive forward thinking integrated watershed management plan. Over the past twenty years or so rapid unplanned residential development on the upper slopes of the watershed have resulted in increased storm-water runoff and flash flooding in low lying areas. The immediate response has been to address the symptom of the problem, that is flooding in the low lying area of River Road, through hard engineered structures. Strategies for improving land development and flood water control in the upper watershed have not been considered as part of flood management initiatives. In addition wastewater from industries are discharged into waterways without treatment and likely to pose significantly negative impacts on the marine environment.

5.2 Legal and Policy Framework

There is no articulated policy framework to guide integrated watershed management in Grenada. The Physical Planning and Development Control Act, the Grenada Building Code, regulations from the Town and Country Planning Act and the Forest Soil and Conservation Act do not provide guidelines for land development, specifically for management of storm water and wastewater. The cultural practice is for developments on steep slopes to route runoff and wastewater into the nearest watercourse. Strict regulations and development guidelines are needed requiring soil conservation, storm and waste water management to be integrated into planning approval.

5.3 Network Administrator Organizations

While there is a burgeoning integrated watershed management unit within the Forestry Division it does not have the requisite technical and human capacity, nor the supporting regulatory framework to undertake its intended mandate. Likewise the capacity of the Physical Planning Unit must be enhanced in order to deal with the challenges of poor

land development planning and management of the resultant environmental impacts. These two agencies must also work in tandem with the Ministry of Communication and Works which has the legal mandate for issues dealing with drainage, road development, mining and physical development works in general. While the Ministry of Environment has yet to emerge into a strong agency, one of its key function is intended to be that of monitoring ensuring that best practices are implemented.

5.4 Tools for Implementation

Recommendations from the Land and Marine Management Strategy apply; in particular to address the challenge of integrated watershed management there must be:

- Codes and best practice for land development including guidelines for land clearing, storm water management, creation of infiltration trenches, french drains and diversion along roadways for runoff
- Site evaluation, audits and Environmental Impact Assessment for all development projects including residential units, the scale determined by the size and type of undertaking.
- Economic instruments to create incentives for voluntary compliance by industries
- Standards and regulations for discharge and pollution control; discharge permits and fee structure for same.

5.5 Framework for Planning, Monitoring and Review

Given the limitations of human resources and difficulty to monitor activities on private lands, the best approach for integrated watershed management should be stakeholder driven with mechanisms for voluntary compliance. The Forestry Division together with the PPU can devise spatial plans and identify critical habitats and areas for implementation of best practices. Benefit cost analysis and tradeoff analysis are techniques that can be used to rank options and promote alternatives. Through public education and one-to-one engagement land owners, farmers and resource users can

become involved in ensuring the options with the highest social, economic and environmental benefits are implemented.

5.6 Recommendations for Action

1. Update the Forest and Soil Conservation Act to include regulations for land clearing particularly on steep slopes; re-vegetation of degraded lands and creating of buffers along streams;
2. Develop regulations to enhance implementation of the Physical Planning and Development Control Act; guidelines should include minimum standards for diversions and infiltration trenches to manage storm water, requirements for access roads and percent impermeable surface per lot size;
3. Basic standards for wastewater management systems (septic tanks and soak away) must be informed by site-specific soil type and hydrology. The PPU and Ministry of Health must make site evaluation a mandatory requirement for planning approval of all housing and development projects which utilize that system of wastewater treatment;
4. Discharge permitting and monitoring must be conducted for all industries that generate waste water. Standards promulgated by CEHI, WHO and World Bank can be adopted as national standards for specific sectors. For the St. John's watershed these industries include: Laundry, flour mill; soft drink plant; power plant; garages and vehicle service centers;
5. Tax incentives and concessions should be given for investments into technologies for environmental protection such as oil-water separators and recycling containers; grass pavers for access roads; wastewater treatment plants.

6.0 Sustainable Agriculture - Silviculture and Best Practices

6.1 Situational Analysis

Traditional practices for agriculture have not evolved to embrace technological advancements and is compounded by the fact that the average age of the farmer is over 60 years. While there are policy driven directives to vitalize this sector which is key for employment and sustainable livelihoods of rural households, this is done against a backdrop of old farming systems and tree crop agriculture. There are many environmental goods and services to be derived from permanent tree crop agriculture especially when combined with land development. Modern permanent agriculture systems have developed sustainability guidelines that integrate human settlement and food production systems in design spaces. The historical trend for agriculture is to cultivate steep slopes without land preparation resulting in downstream problems with soil erosion and siltation of waterways and marine habitats. Planned agricultural systems employ silvi-culture and best land use practices that reduce impacts on the environment, increasing both the economic and social benefits derived. To achieve the goals of sustainable land management the agriculture system must be modernized.

6.2 Legal and Policy Framework

There are insufficient regulations and guidelines for shaping the agricultural industry. Reviews conducted for the development of this Strategy revealed that existing regulations are limited to those for control of pests and noxious weeds and pesticide use. There are no stated policies and legislation to actually guide the direction at which this sector develops. Areas that must be addressed in agricultural development legislation and policies include:

- Methods for land clearing and slope preparation
- Slash and burn agriculture
- Development of buffers and migratory corridors for conservation of biodiversity, stream protection and pollinators for tree crops

- Best practice for constructing drainage systems and access roads
- Organic and natural farming systems
- Livestock farming including waste management
- Trade and control of exotic and invasive species
- Research and development of cultivars suited to local environmental conditions

6.3 Network Administrator Organizations

The Extension Division within the Ministry of Agriculture is largely responsible for shaping the framework for sustainable agriculture and for implementation of best practices by farmers. Development of farm feeder roads is undertaken by the Ministry of Works and it is therefore incumbent upon the Ministry of Agriculture in consultation with the PPU to provide guidelines for ensuring efficient control of runoff and soil protection. There are several farmer organizations which serve specific interests and types of agriculture, each is guided by their industry guidelines. The main limitations that exist centers around building networks and linkages between organizations, linkages with private sector and capital markets, trade and sustainable export markets.

6.4 Tools for Implementation

Section 4.3 of the Strategy apply. From consultations held with extension officers and farmers it seems that evident that education is a key requirement to addressing present concerns. Here distinctions must be made between public awareness campaigns and direct education programs across all levels. Demonstration projects and training are required to implement best practices such as:

- Land clearing, slope preparation and contouring
- Drainage systems and access road development
- Organic and natural farming
- Pesticide and waste management

6.5 Framework for Planning, Monitoring and Review

The recently launched Grenada Organic Agriculture Movement creates the impetus for improved agricultural practices since organic certification hinges on implementation of best practices with spinoffs for environmental protection. While only limited sectors will seek to achieve this level of certification, there are positive benefits to be derived from the system of monitoring that will be required. An improvement in sustainable agricultural practices will contribute to efforts for land management and protection of the marine environment. Agriculture extension workers form an integral part of the network for meeting these dual goals. Annual reviews and reporting will create benchmarks and a system for tracking progress.

6.6 Recommendations for Action

1. A national agriculture and land use policy is needed to guide development of the sector so that it is sustainable.
2. Current initiatives such as the Sustainable Land Management and Land Bank Project must develop practical initiatives that can be continued and replicated beyond the funding cycle of these projects and lead to long term change in the manner in which land is utilized.
3. Industry standards for sustainable agriculture must be developed and promoted as the blue print for regeneration of the sector.

7.0 Land Development Guidelines - Drainage & Stormwater Management

7.1 Situational Analysis

The challenges associated with land development, drainage and storm-water management are inter-related with those address under the previous discussion on integrated watershed management. However stakeholders singled out this issue as one that requires special attention given the significant impact of land based activities on the marine environment. It is recognized that sub-division of watersheds impacts on existing drainage patterns often creating conflicts with downstream property owners. This case was highlighted with small farmers who have difficulty in accepting natural runoff from other farm lots, a problem created due to poor subdivision planning. Division of watersheds for residential purposes also present similar conflicts especially given that the construction of buildings and roadways, and residential wastewater result increased runoff. While it is a statutory requirement that EIAs be conducted for sub-division of 10 acres and larger, there are no regulations to inform the development approval process and implementation of projects.

7.2 Legal and Policy Framework

Regulations must be promulgated to enhance the Physical Planning and Development Control Act and the Grenada Building Code. These should include:

- Restrictions on land which can be subdivided
- Protection of water catchments
- Mitigation banking and creation of buffers along streams and rivers
- Guidelines for road development to include distances and minimum design water turnouts and infiltration trenches so that runoff is not directly routed to drains and watercourses.

7.3 Network Administrator Organizations

The lead agency for developing for enforcing land development guidelines is the Physical Planning Unit. Other agencies in the network who should play a vital monitor and control function are the Ministry of Agriculture and the Ministry of Environment. Plans to form a land agency will provide a framework for administration of the development process and increase the capacity of relevant agencies to perform their mandate.

7.4 Tools for Implementation

- Environmental impact assessments are already a prerequisite for granting approval for large scale land development projects. It must become a minimum requirement that drainage and storm water management plans form part of the design requirement for permitting all development projects.
- The use of GIS and spatial planning tools must be employed for sub-division of watersheds and to ensure that the downstream habitats are protected from potentially negative impacts of land development.
- For smaller undertakings and agricultural projects there are no policy guidelines to ensure proper drainage and storm water management systems are constructed. In this case public education and awareness programs including printed materials must be used to promote voluntary compliance and adoption of best practices.

7.5 Framework for Planning, Monitoring and Review

As for issues related to watershed management, the lead agency to guide this process will be the Physical Planning Unit and soon to be formalized Land Agency. The national physical development plan, legislation and building code forms the framework for monitoring land development. However these must be updated to address present realities and adopted as national policy documents.

7.6 Recommendations for Action

1. Regulations for Land development must be promulgated under the Physical Planning and Development Control Act 25 of 2002;
2. Requirements for approval of land sub-division plans must include 1:5 feet topographic maps, detailed drainage and storm water management plans and details for access roads to include water turnouts and infiltration trenches;
3. It must be mandated that all runoff and wastewater from households be diverted into infiltration trenches and soak away systems to reduce the volume and speed of runoff during rain events. This promotes groundwater recharge, treats wastewater before discharge into receiving water bodies and reduce flash flooding in low lying areas.

8.0 Housing and Human Settlement - Gouyave

8.1 Situational Analysis

The town of Gouyave was singled out for special mention since it exemplifies the current need for a national housing policy. There is a historical vector to the political economy of Gouyave that resulted in the present low-income housing with poor environmental health infrastructure. Most of the lands in the town are owned by the Anglican Church and lots are rented to tenants. In a few cases members of the Church were able to purchase their lots. Conditions of the lease precludes homeowners from constructing permanent structures such as bathroom facilities. Most households do not have potable water. Public facilities and the surrounding environment thus serve as bathrooms and laundry for the residents. The situation is highly vulnerable both from the potential for outbreak of communicable diseases and exposure to natural hazards.

This situation is similar in many low-income housing communities in that homeowners do not own the land and due to lack of or restrictive tenancy agreements are precluded from investment in permanent structures and bathroom facilities. There is however a pull factor for persons who chose to reside in Gouyave that is their fishing dependant livelihood. The poor expectations for low income housing is also revealed in the new settlements that were created in Beausejour and La Sagesse to relocate residents from the Port Louis project site. Recent relocation of housing settlements have been in response to natural disasters or displacement to allow for tourism development projects. However none of these new settlements were developed with critical infrastructure and minimum environmental health infrastructure. Thus there is need for a housing policy, political will and social intervention to address the manner in which these low income human settlements are established.

8.2 Legal and Policy Framework

All of the legal provisions that deal with the issue of housing are outdated and must be revised to suit present circumstances. While there is a legal framework to address the issue of housing development, there seems to be a lack of political will to implement the provisions contained in several of these laws. The Slum Clearance and Housing Act 1946 provides a legal framework for addressing the issue of Gouyave and other substandard housing settlements. This Act gives powers to the Central Authority and Planning Authority established under the Town and Country Planning Act to adequately address housing and human settlement issues. The Physical Planning and Development Control Act of 2002 has repealed the previous and as such the responsibility for dealing with housing development lies jointly with the Land Development Control Authority and the Housing Authority. The Ministry of Housing and Health as have roles to play in the development of habitable communities for the low income and working class. The Public Health Act contains limited provisions for addressing environmental health and sanitation for housing settlements. The Act that established the Housing Authority makes mention of the conditions that must be observed by the Authority in the letting of houses. However the trend for low income households is to setup their own structures either as tenants or as squatters.

8.3 Network Administrator Organizations

As noted above the organizations that are responsible for addressing issues related to housing and human settlement include:

- Land Development Control Authority and Physical Planning Unit
- Ministry of Housing and Lands
- Housing Authority
- Ministry of Health, Department of Public Health

8.4 Tools for Implementation

All of the best practices recommended for land development and integrated watershed management apply in this case. In updating the national physical development plan

suitable land must be earmarked by the relevant authority to develop housing settlements for low income and work class groups. These developments must meet basic requirements for human habitation as well as provide for environmental protection.

8.5 Framework for Planning, Monitoring and Review

There is need for a national housing policy framework to provide the basis and forward plan for development of housing with respect to low income households and persons of working classes. Issues that must be addressed include tenancy agreements for life tenants versus tenants for a term and the minimum standards for habitable housing, particularly in cases such as Gouyave where the land is privately owned. The relevant legislation should also be updated to be consistent with the Physical Planning and Development Control Act and regulations.

8.6 Recommendations for Action

1. A national housing policy must be developed as a matter of priority
2. Regulations that provide minimum standards of habitable housing both life tenants and tenants for a term must be promulgated;
3. New housing development projects must be designed with best practices recommended for land development and must have adequate infrastructure for wastewater management, drainage and storm water management
4. Sub-standard housing settlements such as those at Gouyave, Beausejour, La Sagesse among others must be regularized and basic environmental health infrastructure improved.

9.0 Wastewater Management

9.1 Situational Analysis

Current practice for wastewater management has evolved in keeping with land settlement patterns so that collection systems are limited to the densely populated areas within the town of St. George and the tourism belt in Grand Anse. Individual households, commercial facilities and industries outside of that service area have stand alone septic tank and onsite in ground treatment systems. In many cases wastewater that is not diverted into septic tanks are discharged into drains and waterways eventually ending up in rivers and the sea. Wastewater that is collected is disposed off by marine outfall without any pre-treatment at two locations, St. George's Harbour and Point Salines. The access point to the outfall at St. George's Harbour is in a busy roadway and there is exposure to commuters and passerby especially when sewerage trucks are disposing waste. Further the infrastructure within the town is failing so that wastewater often backs up into the streets. These points of exposure presents serious public health risks and is particularly sensitive given the busy cruise tourist traffic in the town of St. George's.

There is water quality data and visual evidence which show that there are negative ecosystem impacts due to the current practice. Recent studies provide irrefutable evidence that human wastewater destroys coral reefs and if the current practice continues it is predicted that the marine life within the location of the marine outfalls will be severely affected.

9.2 Legal and Policy Framework

The legislation framework for managing wastewater is weak and there are no policies and future plans to change the status quo. The Public Health Act and the National Water and Sewerage Authority Act contain provisions for *marine outfall* as the means

for disposal of municipal wastewater. There are no regulations requiring any form of treatment before disposal. Basic designs for septic tanks and onsite treatment have been provided by the Ministry of Health and is included in applications for development planning approval, as required by the Physical Planning Act. As recommended in the Land and Marine Management Strategy the following must be addressed:

- Treatment systems for processing wastewater prior to marine disposal;
- Regulations and standards for wastewater quality that can be disposed off into the environment;
- Standards and regulations for bathing water quality;
- Regulations requiring site evaluation for all onsite treatment systems so that the design are suited to local soil hydrogeology;
- Ongoing water quality monitoring program and analysis of data to track trends in ecosystem health.

9.3 Network Administrator Organizations

The National Water and Sewerage Authority has responsibility for providing the disposal service and collects revenue from the residences and commercial facilities that are connected to the collection system. It is important the Ministries of Health, Environment, Tourism and Agriculture (Fisheries), collaborate to address this chronic situation.

9.4 Tools for Implementation

All of the tools for implementation of the Strategy can be applied to address the current situation including the need for: annual state of the environment reports; marine resource assessment; water quality standards; use of economic instruments to finance investments in environmental technology; environmental impact assessments to guide best practical options to solve the problem.

9.5 Framework for Planning, Monitoring and Review

Development of a robust legislative framework and use of tools prescribed will form the boundaries for planning and improvements in current practice. The Ministry of Environment is expected to perform the critical function of monitoring and review and act as the watch dog to protect environmental quality.

9.6 Recommendations for Action

1. The Ministries of Health and Environment need to form a task force to immediately address the following issues:
 - a. Assessment of water quality data collected at marine outfalls
 - b. Feasibility study for wastewater treatment system
 - c. Reduction of public exposure to wastewater in the streets of St. George's
2. Incentives should be provided to industries and the tourism sector to invest in package wastewater treatment plants and to reuse treated water for irrigation and other low end uses.
3. Physical Planning regulations must be promulgated for improvements in site evaluation and design of onsite treatment systems
4. A national policy on the management of wastewater to include grey water must be articulated
5. The regulatory framework must be updated to address present environmental and socio-economic realities. particularly the need to protect the tourism industry which is the main-stay of the economy.

10.0 Coastal Zone Management

10.1 Situational Analysis

Given the topography of the Islands most of the physical infrastructure is located within the coastal belt and consequently it is the most densely populated region. Variability in natural bio-geophysical processes are greatest in the coastal zone so that populations are exposed to extreme wave and tidal events, tsunamis, hurricanes and sea level rise. The coastal zone also contains critical habitat that forms the ecotonal boundary between the land and sea, act as a buffer and first line of defence against wave erosion and provide habitat for vulnerable flora and faunal species. Mangroves, coastal flats and tidal wetlands are under pressure and being loss to tourism development particularly marines and boatyards. Waste disposal from industries such as the rum distilleries exert heavy biological oxygen demand on mangroves and coastal wetlands resulting in their eventual death.

The forestry Division has made some efforts towards establishing a mangrove unit and to setup co-management arrangements with resource users to ensure that these systems are not depleted. In spite of the national commitment made to protect at least 20% of the Islands mangroves, there is no framework for implementing this possible and there is potential to have significant losses if many of the coastal tourism projects that have been approved come underway. When cast within the framework of future risks due to changing environmental regimes, there is need for a comprehensive coastal zone management strategy which discounts for a minimum period of fifty years.

10.2 Legal and Policy Framework

There are only a few laws that provide for coastal zone management and the current land use zoning concept and tourism trends favor development in coastal areas. The beach protection act is limited to sand mining and the forest policy and strategy provides some protection for mangrove forests. Legal provisions for land and property

boundaries must be clarified so that wetlands, mangroves and coastal systems remain the property of the State and receive protection from infrastructure development projects.

10.3 Network Administrator Organizations

One of the proposals put forward in the *Strategy* is the need for the formation of a Marine Management Agency (MMA). The functions of coastal zone management (CZM), which at present is not clearly defined within the existing administrative framework, will be facilitated through that agency. It is envisioned that the MMA will work with Fisheries Division, Ports Authority, Ministry of Environment, Physical Planning, NADMA and other agencies to forward the agenda for comprehensive CZM.

10.4 Tools for Implementation

A critical element to facilitate CZM is a seamless spatial data platform that integrates the land and the sea. At present GIS data for the land does not integrate that for the coastal and marine spaces. This integration is of paramount importance to allow for planning and management of coastal areas.

10.5 Framework for Planning, Monitoring and Review

An effective CZM Plan must include tradeoff analysis under varying environmental and hazard risk scenarios and futures. At present there is limited scientific basis for making informed long term decisions and a rigorous monitoring program that includes the seismic monitoring of the underwater volcano is required. As such there must be involvement of regional agencies as part of the framework for undertaking effective coastal zone management.

10.6 Recommendations for Action

The recommendations presented in the *Strategy* apply; mention is made of the following:

1. Enact legislation to provide protection for wetlands, mangroves and coastal ecosystems
2. Develop task force to spearhead formation of the Marine Management Agency
3. Update GIS database to include data for coastal and marine systems.
4. Revise and update the land use concept to redirect major development away from coastal areas
5. Update the Beach Protection Act and expand its scope to provide for protection beyond the sand mining issue.
6. Develop systems for monitoring and tracking changes in the coastal zone including tidal and sea level data.

11.0 Code of Practice for Marinas and Boatyards

11.1 Situational Analysis

Grenada is promoted as a hub for the yachting sector given its location at the southern end of the hurricane belt. The development of marinas and boatyards has been featured as a focus of the tourism strategy for the country, yet there is not a code of practice for directing the development and operation of these facilities. This code is important so that the sector remains buoyant and that there is environmental protection at the same time.

11.2 Legal and Policy Framework

The Yachting Act needs to be supported by regulations and codes of practice for the sector. A code of practice for marinas and boatyards in the Caribbean has already been developed by the International Maritime Organization (IMO) and must be adopted into national legislation. There are several international conventions and multi-lateral environmental agreements which Grenada is party to and have significance for the sector but have not been adopted into national legislation. These are listed in the *Strategy* and must form part of the framework for managing the marine and yachting tourism sector.

11.3 Network Administrator Organizations

There is no single agency with responsibility for managing and regulating the marine and boating sector. The Physical Planning Unit play a role in granting approval for their development and the Grenada Ports Authority gets involved in the process where the project occurs within a Port and thus in the granting of water use rights. For ongoing operations the customs department maintains a presence at these facilities and the Grenada Board of Tourism has a Cruise and Yachting Officer. The Marine and Yachting Association of Grenada is a strategic private sector sub-grouping which can champion efforts for interagency coordination. Proposals for the creation of an MMA are

therefore important in establishing the appropriate legal and administrative framework and for protection of the environment.

11.4 Tools for Implementation

The tools contained in the Strategy and in previous sections on wastewater and coastal zone management apply. Other recommendations include:

- Environmental education on the impact of the sector on the marine environment and best practices for facilities and their customers
- Standards for handling solid and liquid wastes including waste oil
- Best practices and standards for management of chemicals used in the industry and safe handling and disposal of the same
- Marine spatial planning to guide development of future projects

11.5 Framework for Planning, Monitoring and Review

Formation of the MMA and supporting regulatory structure will create the framework for monitoring and managing developments within the sector. Environmental change and future scenario analysis must be utilized in planning and execution of projects. The strategic principles outlined in section 4.4.4 of the *Strategy* must be applied to the marina and boating tourism sector. Annual sector plans and reports must be produced in collaboration with the Marine and Yachting Association of Grenada.

11.6 Recommendations for Action

1. Adopt the IMO Code of Practice for Marinas and Boatyards as a national standard
2. Establish an interagency task force to spearhead the setting up of the MMA
3. Marine spatial planning must be integrated into national development plans to guide development of the sector
4. International conventions and multi-lateral environmental agreements must be adopted into national legislation.

12.0 Hazard Mitigation and Adaptation for Climate Change

12.1 Situational Analysis

Grenada like the rest of the Caribbean Small Islands is vulnerable to natural hazards and all forward plans must integrate strategies for hazard mitigation and vulnerability reduction to ensure sustainable development. Predictions for climate change are uncertain however the precautionary principle of resource utilization must apply so that decision making leads to adaptation and increase resilience to change. Experiences from Hurricanes Lenny, Ivan and Emily drives home the reality that disaster management must be part of integrated development planning. No strategy is complete if it cannot be applied to managing inherent risks. All the case studies and sector strategies contribute towards improving environmental management and the utilization of natural resources so that ecosystem value is maintained. This is an important strategy in natural hazard mitigation as degraded systems are more susceptible to damage due environmental factors and take longer to recover.

12.2 Legal and Policy Framework

Grenada has a disaster management plan and a hazard mitigation policy and plan. However these must be mainstreamed and comprehensive disaster management promoted by all sectors. International conventions such as that on climate change must be adopted into the national legislative framework.

12.3 Network Administrator Organizations

There is a well developed regional system for disaster management coordinated by the Caribbean Disaster and Emergency Management Agency (CDEMA) and for climate change coordinated by the Caribbean Adaptation to Climate Change Program. At the national level there is limited integration between the National Disaster Management Agency (NADMA) and other sectors as NADMA tends to focus mainly on preparedness and response during the hurricane season. Climate change is dealt with as a project by project basis and coordinated from the Ministry of Finance. NADMA and the Physical

Planning Unit needs to increase their capacity to address the issues related to natural hazard mitigation and planning for climate change and must ensure that strategies for addressing these two challenges are infused into planning across all sectors.

12.4 Tools for Implementation

Section 4.3 of the *Strategy* apply; in addition the following must be utilized:

- Vulnerability assessment as part of resource assessment
- GIS to map highly vulnerable areas.

12.5 Framework for Planning, Monitoring and Review

The DPSIR framework provides a useful planning tool to ensure that decisions are not mal-adaptive and lead to long term development and adaptation. This framework provides a tool for integration of hazard assessment and mitigation strategies into planning for all sectors. Further guidelines and strategic principles provided in the *Strategy* must be utilized for hazard mitigation and planning for adaptation to climate change.

12.6 Recommendations for Action

1. The national hazard mitigation policy and plan must be revised and updated to address present development needs. Continuous reviews and updated must be undertaken every two years to ensure that the policy and plan are current.
2. Vulnerability assessment maps that identify critical social, ecological and physical infrastructure must be developed to enable effective forward planning for all sectors.
3. The legislative framework must be updated to include international conventions and multi-lateral environmental agreements that address climate change, hazard mitigation and disaster management.
4. Adopt Caribbean Development Bank guidelines for include natural hazard impact assessment into the planning and environmental impact assessment process.

13.0 Fisheries and Marine Resources

13.1 Situational Analysis

The fisheries and marine resources of Grenada are vital for the economic growth of the country and provides sustainable livelihoods for a wide cross section of households and income levels from the sale of fish to dive tourism. The rich biodiversity and ecosystem quality is under threat from land based sources of pollution including sediments from agricultural activity, polluted storm water, wastewater and solid wastes. Marine generated pollution also endanger the fisheries and marine resources and there is inadequate capacity to monitor and control these impacts. Although required under the Fisheries Act, annual resource assessment reports are not produced by the Chief Fisheries Officer and there is only anecdotal information on the status of fisheries and marine resources.

13.2 Legal and Policy Framework

The Fisheries Act and subsidiary regulations provide an adequate framework for regulating the use of marine resources including provisions for establishing marine protected areas. Issues related to licenses, permits and access needs to be improved and made more robust and fees allocated based on status of the resource exploited as well as the level of attraction by the user. Regulations to address marine pollution and protection of the environment are not sufficiently addressed and the *Strategy* provides recommendations to fill these gaps.

13.3 Network Administrator Organizations

There is need for increased collaboration between land based resource managers and marine resource managers given that activities on the land exert a large influence on the quality of coastal and marine resources. The proposed MMA will seek to perform that role and integrate the work of the Fisheries Division with that of other agencies.

13.4 Tools for Implementation

The tools presented in the *Strategy* apply and specific focus must be put on:

- annual resource assessment reports
- information management
- marine spatial planning
- economic instruments and incentives for managing the rate of resource depletion
- environmental education

13.5 Framework for Planning, Monitoring and Review

A strategic management plan is needed for the management of fisheries resources however this must be guided by quality data on the status of the species, habitats and water quality. Focus should not be placed only on species of economic importance but on the entire web that sustains the diversity and quality of the ecosystems. As such an up to date resource assessment report is needed which will create the benchmark for monitoring. Standards for water quality and biological indications of environmental quality must be developed so that monitoring and review will result in trend analysis and opportunities for intervention to correct degradation.

13.6 Recommendations for Action

1. Prepare annual resource assessment reports and revitalize procedures for data capture and sharing with all resource users;
2. Revise and increase costs of licenses and permits for fishing and marine resource use to reflect state of environmental assets and marine stock;
3. Develop standards for water quality and discharge of pollutants into the marine environment;
4. Enact legislation and regulations including the marine and coastal access act, marine pollution act and bathing water and coastal water quality act.