



GEO Saint Lucia

2006



State of the Environment

GEO



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Preface

This is the first State of the Environment Report for Saint Lucia. This was an effort of the Sustainable Development and Environment Section of the Ministry of Physical Development, Environment and Housing. The report was developed in consultation with public and private sector agencies, as well as non-governmental agencies (NGOs) and community based organization (CBOs). The report speaks to 3 Key Systems namely: Marine and Coastal Systems, Forest Systems and Fresh Water Systems and 5 Key issues; Land Use Management, Waste Management, Chemical Use, Climate Change and Air and Noise Pollution.

The State of the Environment Report for Saint Lucia seeks to provide objective environmental information to support decision-making for sustainable development in Saint Lucia, through the provision of credible environmental information and data. It presents data and trends on the 3 key systems and 5 key issues and their implications and impacts on ecosystems, human health and well-being and the economy.

The Government of Saint Lucia would like to express its gratitude to the United Nations Environment Programme (UNEP) Division of Early Warning and Assessment (DEWA) and the International Institute for Sustainable Development (IISD) for supporting and guiding this initiative. Special thanks goes to the Lead Authors, Editor of this report and the technical team at the Sustainable Development and Environment Section and the various agencies that contributed to this process.

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List of Acronyms

CBO	-	Community Based Organizations
CIDA	-	Canadian International Development Agency
CPU	-	Central Planning Unit
CZM	-	Coastal Zone Management
CITES	-	Convention on International Trade in Endangered Species of Flora and Fauna
DEWA	-	Division fo Early warning and Assessment
DOA	-	Department of Agriculture
DOF	-	Department of Forestry
DCA	-	Development Control Authority
EIA	-	Environmental Impact Assessments
GIS	-	Geographic Information Systems
GOSL	-	Government of Saint Lucia
GDP	-	Gross Domestic Product
IDP	-	Integrated Development Planning
IISD	-	International Institute of Sustainable Development
IPM	-	Integrated Pest Management
IPCC	-	International Panel on Climate Change
ISO	-	International Standards Organization
ISM	-	Island System Management
MAFF	-	Ministry of Agriculture, Forestry and Fisheries
MCWT&PU	-	Ministry of Communications, Works, Transport and Public Utilities
MCLC	-	Ministry of Community Development, Local Governments and Cooperatives
MOH	-	Ministry of Health, Human Services, Family Affairs and Gender Relations
MPDEH	-	Ministry of Physical Development, Environment and Housing
MEA	-	Multilateral Environmental Agreements
NEMS	-	National Environment Management Strategy
NEP	-	National Environment Policy
NCA	-	National Conservation Authority
NGO	-	Non-Governmental Organization

OECS	-	Organization of Eastern Caribbean States
POPs	-	Persistent Organic Pollutants
PCB	-	Pesticides and Toxic Chemicals Control Board
PROUD	-	Programme for the Regularization of Unplanned Development
PIC	-	Prior Informed Consent
SGD	-	Saint George's Declaration of Principles for Environmental Sustainability
SLASPA	-	Saint Lucia Air and Sea Ports Authority
SLSWMA	-	Saint Lucia Solid Waste Management Authority
SMMA	-	Soufriere Marie Management Authority
UNEP	-	United Nations Environment Programme
WASCO	-	Water and Sewerage Company
WTO	-	World Trade Organization



Introduction

Chapter 1

1. INTRODUCTION: SOCIO-ECONOMIC AND CULTURAL BACKGROUND

1.1 LOCATION AND HISTORY

Saint Lucia is a Small Island Developing State (SID) and is the second largest of the Windward Islands. It is situated south of Martinique and North of Saint Vincent and the Grenadines at 13° 53'N and 60° 68'W. It has a mountainous terrain, covers an area of 616 square kilometers (238 square miles, or 61,600 hectares) and its estimated population for 2005 was approximately 164 791¹.

For over 200 years the British and the French fought for Saint Lucia, during which time ownership changed fourteen times. Eventually Saint Lucia was ceded to Britain in 1814, under the Treaty of Paris. Although the British gained victory, the French remained on the island. The primary language of Saint Lucia is English. However, a large portion of the population also speaks a French-based kweyol.

Full adult suffrage was obtained in 1951. In 1958 the island became a member of the West Indies Federation, which collapsed in 1961. Thereafter, Saint Lucia became an Associated State with responsibility for its internal affairs while Britain retained responsibility for external affairs until 1979 when the Island gained full independence. Saint Lucia inherited a Westminster system of government with a 17-member Parliament and an 11-member Senate nominated by the Prime Minister, the leader of the Opposition and the Governor General, who represents the British Crown.

1.2 SOCIO-CONTEXT

1.2.1 POPULATION GROWTH AND DENSITY

Saint Lucia is divided into ten administrative districts. These are Castries, Anse-La-Raye, Canaries, Soufriere, Choiseul, Laborie, Vieux-Fort, Micoud, Dennery and Gros-Islet. Saint Lucia's population density for 2005 was 305.7 per square kilometer, or 792.6 per square mile, with Castries and Vieux-Fort having the highest populations.

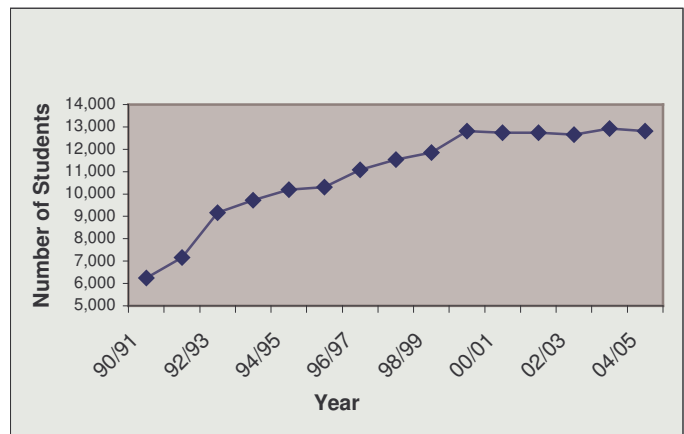
The relationship between human settlement and the environment is a complex one. Population growth places pressure on the environment because of the added demand on natural resources such as land and water. Population increase also causes further demand for infrastructure and utilities, whose development are intricately linked to the natural resource base.

1.2.2 HEALTH AND EDUCATION

Saint Lucia has made good strides in public health care. These include a low infant mortality rate of 18.9 for the year 2005. As of 2004, the life expectancy (provisional) for a male was 70.9 years and for a female was 75.9 years.

There have also been significant strides in education, with the number of students attending secondary school more than doubling over the past fifteen years (Figure 1-1).

Figure 1-1 Secondary School Enrolments for 1990-2005



Source: 2005 Economic and Social Review

1.2.3 INFRASTRUCTURE

Other areas of progress include increases in the availability of pipe-borne water in homes, access to modern toilet facilities and access to electricity. According to the 2001 Saint Lucia Census, 82% of the population had access to pipe-borne water in their homes, 61% had telephone facilities, 54% had access to modern toilet facilities, 14% had cell phones, 8% had an internet connection, and 99% of all homes were connected to the electricity grid.

The island has five main seaports, two of which (Castries and Vieux Fort) handle cargo and tourist arrivals. The remaining three at Soufriere, Marigot Bay and Rodney Bay are leisure ports.

¹ 2005 Economic and Social Review

1.2.4 ECONOMIC PROFILE

Saint Lucia is classified as a middle-income state with a Gross Domestic Product (GDP) in EC \$1340.5 million² in 2005. The majority of the island's population is employed in the wholesale and retail trade sector, followed by the agricultural sector, which is dominated by banana production. However, the dismantling of preferential trade agreements, by the World Trade Organization (WTO) for banana exports from the Windward Islands to Europe, has had a significant impact on the workers in the industry. Agriculture's contribution to GDP in 2005 was EC \$45.1 million, a contraction of 22% from the previous year.

The Tourism Sector currently the largest contributor to GDP. Saint Lucia recorded a 6.5% increase in "stay over" visitors from its major markets in the United States, Europe and the Caribbean in 2005. A total of 751,275 visitor arrivals were recorded on the island in that year, contributing a total of EC\$ 181.7 million to GDP³.

² EC \$1.00 = US \$0.37

³ 2005 Economic and Social Review



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State of the Environment

2. STATE OF THE ENVIRONMENT

2.1 MARINE AND COASTAL SYSTEMS

2.1.1 BACKGROUND

Saint Lucia is highly dependent on its coastal resources for the growth and sustenance of its main industries. However, while it is necessary to use these resources to generate income in the agricultural, fisheries, tourism and other sectors, it is essential that management efforts be aimed at developing an effective framework to facilitate their conservation and sustainable use.

As a small island, Saint Lucia's various terrestrial, coastal and marine components interact to form a complex of interconnected systems, often with the health of one closely depending on the health of another. Furthermore, with the shared nature of most marine biodiversity, the status of Saint Lucia's marine resources is not only influenced by activities occurring on the island, but also on activities occurring within the region.

2.1.2 STATE OF SYSTEMS

Habitats

Saint Lucia is surrounded by a fairly narrow island shelf which supports limited but diverse systems of coral reefs, sea grass beds and sandy plains, providing a home for a variety of vertebrates and invertebrates.

It is evident that the ecosystems within the coastal areas are under stress. Table 2-1 summarizes the status of the four main types of coastal systems found in Saint Lucia.

Table 2-1 Status of Coastal and Marine Ecosystems

Coastal/ Marine Ecosystem	Status
Beaches	<ul style="list-style-type: none"> • Number of beaches recorded: 60 on west coast; 42 on east coast. • Total beach cover: 16.78% of the shoreline. • Illegally sand mined beaches: 6.5% of west coast beaches; 14.3% of east coast beaches. • In 1990, 43% of beach length was recorded as being mined. This was reduced to 12.5% in 1996/1997. • Data shows that beaches are not recovering fully after major storms. • There is accumulation of solid waste on beaches, especially along the east coast

Mangrove Wetlands	<ul style="list-style-type: none"> • About 0.29% of the island's landmass is covered by mangrove wetlands. • Mangrove systems have not been mapped, and therefore, true coverage is unknown. • Five species of mangroves are found on the island. • Estimates show that over 50% of coastal wetlands have been lost. However, very little data exists on the overall status of mangrove systems in Saint Lucia.
Coral Reefs	<ul style="list-style-type: none"> • Coral reefs make up an area of 160km². • There continues to be an increase in macro algae cover on reefs, indicating high nutrient waters. • Coral cover is on the decline due to high sediment loading and smothering by macro algae. • An increase in coral diseases has been observed. • Bleaching of corals is still relatively low, but has increased over the years. • There has been a decrease in keystone species such as long spined black sea urchin (<i>Diadema antillarum</i>), which helps to control algal cover.
Seagrass Beds	<ul style="list-style-type: none"> • Seagrass beds have not been mapped, and therefore true coverage is unknown. • 3 species of seagrass are found on the island. • A decline in seagrass health has been observed, possibly due to high sediment loading. • Very little data exists on the overall status of seagrass beds around the island.

Adapted from Biodiversity Country Study Report of Saint Lucia; Nugues, 2002 and Spalding et al, 2001

Trends in Beach Movements

There was a steady loss of beaches during the 1990s against a baseline established in 1990. However, by 2001-2002, these beaches were showing signs of recovery. Notably, with the exception of one profile at one site, beaches did not recover back to baseline levels. The overall beach erosion noted in the 1990s was likely due, in part, to the impact of the tropical storms that affected the region during this period, namely Tropical Storm Debbie (1994); Tropical Storm Iris (1995); Hurricane Marilyn and Luis (1995); and Hurricane Lenny (1999).

However, the period from 2000-2002 was relatively calmer in terms of tropical storm activity and this likely facilitated the observed beach recovery.

Figure 2-1 Area Changes at Vigie Beach⁴ 1990-2002

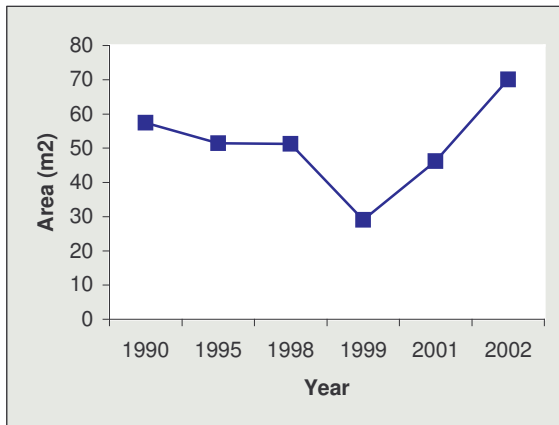


Figure 2-2 Area Changes at Fond D'or Beach⁵ 1994-2002

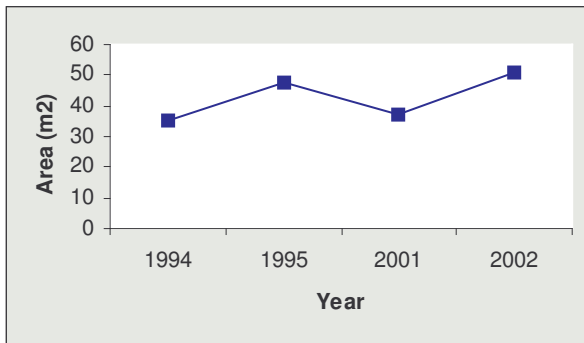
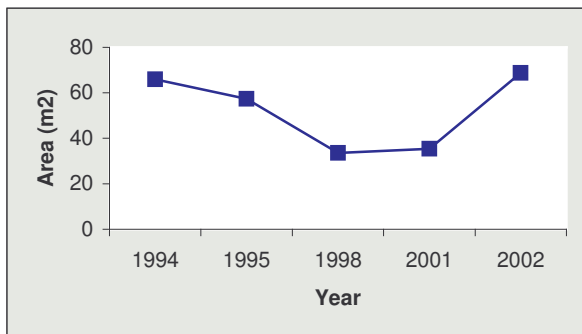


Figure 2-3 Area Changes at Reduit Beach 1994-10



Source: Department of Fisheries

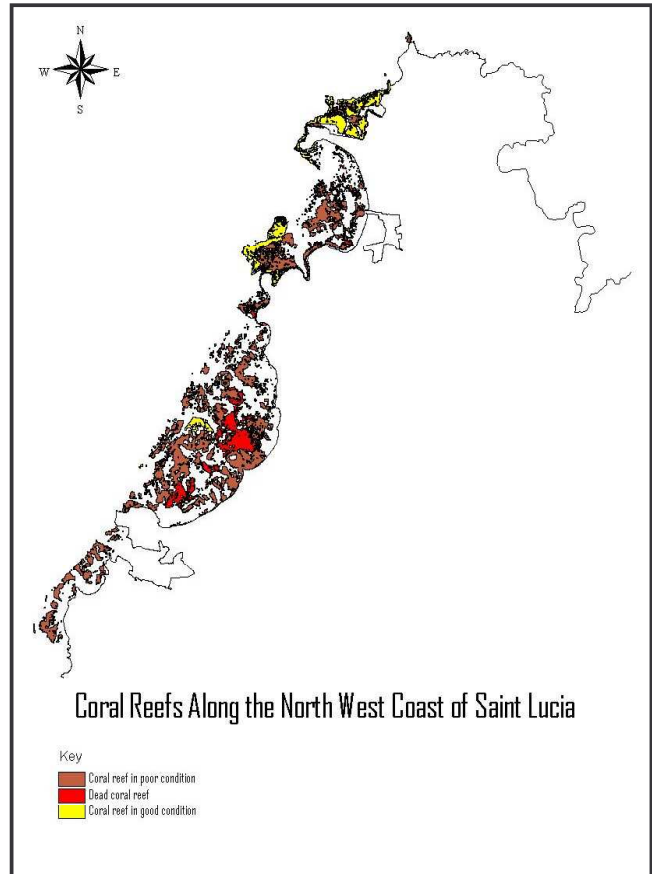
⁴ Vigie beach south

⁵ Fond D'or beach north

Reefs

Reefs along the North West Coast: The reefs along the North West coast are among the only ones that have been accurately mapped using remote sensing. The data show that approximately 82% of these reefs are either dead or in poor condition (Figure 2-4).

Figure 2-4 Coral reefs along the North-West Coast



Source: Department of Fisheries

Other Reef Areas: In general, coral cover is on the decline and macro-algal cover is on the increase. For example, between 1999 and 2004, reefs near Anse Chastanet Bay in Soufriere, showed a decrease of 62.5% in hard coral cover in deep waters and an increase in algal cover of 45.45%. Reefs at Coral Gardens showed a decrease from 30.63% to 0% hard coral cover with algal cover increasing by 69.35% in shallow reefs, while a decrease of 76.71% in hard coral cover and increase of 90.91% algal cover was observed in deeper waters. These trends indicate that the nutrient levels in several areas of Saint Lucia's coastal waters are too high for optimal coral growth and settlement. Additionally, in 2005, Caribbean countries experienced mass bleaching of their coral reefs and surveys conducted in Saint Lucia show that fifty to eighty percent of corals along the west coast have been bleached (Table 2-2).

Table 2-2 Reef Bleaching in Saint Lucia, August 2005

Reef Area	Le Sport	Turtle Reef	Anse Chastanet	Coral Gardens	Vieux Fort
Percent Bleached	49.18	53.98	52.01	71.23	>1

Source: Department of Fisheries, 2006

Species

Fish: A total of 333 ray finfish species (includes reef and pelagic fishes) are present in the island's coastal waters (Biodiversity Country Study Report of Saint Lucia, 1998). Many of these are of commercial importance and include groupers, parrotfish, wrasses, snappers, grunts, squirrelfish, goatfish, boxfish, surgeonfish, jacks, sardines and ballyhoo. The degradation of reef systems results in the loss of habitat for many of these species. This threat is further compounded by inappropriate fishing activities, including the capture of juveniles.

Turtles: At least three (3) turtle species nest on the island's beaches: Green Turtle (*Chelonia mydas*), Hawksbill Turtle (*Eretmochelys imbricata*), and Leatherback Turtle (*Dermochelys coriacea*). The Loggerhead Turtle (*Caretta caretta*) is occasionally sighted in the waters of Saint Lucia.

According to reports by sea going persons (e.g. fishers, dive operators, sports fishing operators) and the general public, there appears to be increased numbers of foraging and nesting turtles in local waters and on beaches, respectively. However, no comprehensive baseline or other data on sea turtle stocks exist, making it difficult to verify these reports.

Invertebrates: Saint Lucia's coastal waters are teeming with different species of invertebrates, several of which are of commercial value. These include:

- White sea urchins (*Tripneustes ventricosus*) - These experienced a massive decline in the mid 1980s due to over fishing, and as such a moratorium on harvesting was put in place in 1987-1990. Following that period, the fishery again experienced low stocks due to a lack of recruitment, and as such the fishery was not opened in 1993-4 and 1996-1999. After 2000, a healthy recruitment of juveniles was observed, allowing annual harvest periods to be resumed. However, a no harvest period was declared in 2005 due to poor recruitment and low abundance, possibly related to the abnormally high sea temperatures in the region during that period, which caused extensive coral bleaching.
- Conch (*Strombus gigas*) - There are some clear indications that this species has declined in shallow waters. However, the status of stocks in deeper waters is believed to be in good condition. This remains to be confirmed with more recent assessment surveys.

- Lobsters (*Panulirus argus*) - A significant decrease of 52.2% from 2003 figures was noted in the estimated lobster landings for 2004. This may be an indication that the lobster resources are on the decline, or that there has been a change in the market distribution, resulting in a high amount of lobster landings being unrecorded.

- Terrestrial crabs (*Ucides* and *Cardisoma* species) and whelks (*Cittarium pica*) - From anecdotal data, terrestrial crabs and whelks appear to be on the decline. These species have, over the years, been heavily exploited and there are no regulatory systems in place for their conservation.

Marine Algae: A few species of marine algae (locally termed 'sea moss') are commercially exploited. Due to a decline in wild stock in the 1980s-90s, the Department of Fisheries (DOF) is promoting the cultivation of edible marine algae to alleviate pressures on natural stocks.

2.1.3 EXISTING PRESSURES

Water Quality

Preliminary findings show that there has been an improvement in coastal water quality (*faecal coliform* content) between the early 1990s and the early 2000s. However, the data also show that there are still some areas of concern. There is also evidence that bacterial counts increase in near-shore waters during the rainy season, indicating a threat from land-based sources of pollution.

Surveys in several coastal areas have also revealed that coastal water visibility (water clarity) ranges from a few inches to a few feet in many areas due to the high amount of fine particles suspended in the water column.

These observations are supported by findings from other studies that show that algal biomass is highest in the near-shore, especially in the vicinity of river mouths (Roberts et al., 1997). They also show that while some recovery of reef in deeper waters occurs after storms, there is no noticeable recovery in near-shore areas (Roberts et al, 1997).

Extractive Activities

Fishing: A number of fish species are of commercial value, including reef fish, coastal pelagics and ocean pelagics. The total number of fishermen currently registered at the DOF is 2154, with 61% of these being full-time (DOF, 2006). Table 2-3 shows the estimated fish landings for the period 2000-2005.

Table 2-3 Fish Landings for 2000-2005 (Tonnes)

Species	2000	2001	2002	2003	2004	2005
Shark	4.9	4.5	66.1	5.9	20.2	11.6
Dolphin	555.1	426.9	372.8	286.6	375.7	198.3

Wahoo/ Kingfish	243.1	214	246.2	169.3	238	168.9
Tuna	473.4	404.2	219.1	456.2	418.6	465.7
Flying Fish	98.5	323.3	170.1	75.5	10.6	71.5
Others	485.1	593.8	538.2	454.5	456.7	470.3
Total	1860	1967	1613	1448	1520	1386
Growth	8.5 %	5.7 %	-18 %	-10.2 %	5 %	-8.8 %

Source: 2005 Economic and Social Review

Sand Mining: Sand mining from beaches and stones from rivers continues to be a cause for concern. Furthermore, the practice of removing sand from river mouths rather than allowing it to be distributed naturally on beaches is contributing to slow beach recovery after storms.

Settlements

Unplanned and uncontrolled settlements foster a wide range of problems, including:

- Inadequate facilities to cater for effective sewage (including grey water) treatment, general waste disposal and setbacks.
- The vulnerability of settlements to events such as landslides, floods and storm surge impacts.
- Degradation of supporting coastal systems such as coral reefs (which serve as natural wave breakers); mangroves and beaches (coastline protectors); wetlands (protectors against flooding); seagrass beds (seabed sediment stabilisers); rivers and watershed areas (the main source of potable water).
- Shoreline erosion.

Ports and Marinas

The development and operation of ports and marinas have had significant negative impacts on coastal/marine resources. For instance, water circulation between the Rodney Bay Marina (created through the dredging and excavation of a wetland) and Rodney Bay is mostly due to wind-driven circulation and exchanges driven by temperature differences through the one access channel at the northern end of the lagoon. General surface inputs consist of two small seasonal rivers and surface runoff from the surrounding area. In general, marinas and ports do not allow for adequate water circulation between natural systems such as lagoons and bays. Amplifying this problem is the fact that there are no facilities for the collection or pumping out of sewage from yachts. Studies carried out by the Ministry of Health, Human Services, Family Affairs and Gender Relations [MOH] (1989-1992) and during the North West Coastal Conservation Project (1998-99) revealed high faecal coliform concentrations in the lagoon.

Disasters

Natural disasters also play a significant role in the destruction of coastal and marine resources, especially since Saint Lucia lies in the path of tropical storms and hurricanes. Such disasters increase the rate of sedimentation in coastal waters and often cause physical damage to coastal habitats and infrastructure. Furthermore, these impacts are often compounded by human activities such as poor land use practices which facilitate soil erosion. Other disasters may be human-induced, such as oil spills, which threaten the coastal and marine environment.

2.1.4 IMPACTS

The aforementioned pressures have many negative impacts on coastal and marine systems, which may prove difficult, maybe even impossible to reverse if not addressed in the very near future. Table 2-4 outlines some of these impacts.

Table 2-4 Impacts on Coastal and Marine Ecosystems

Impacts	Benefit/Cost	Consequences
Reef, mangrove and seagrass degradation	Estimated number of 110,000 dives done annually (Barker and Roberts, 2001); estimated value spent on dive activities annually is EC\$13,750,000. In 2005, the estimated landings contributed EC\$18.3 million to the GDP.	Loss in revenue; loss of fisheries; loss of livelihoods; decrease in food security.
Vulnerability to storms, wave action and flooding	Tropical Storm Debbie cost EC\$230 million in damages, while the Wave of '96 cost EC\$12 million (French, 1997). In 1999, the SMMA's coastal infrastructure sustained damage as a result of Hurricane Lenny; estimated at a total cost of EC\$ 540,653.13.	Increase in government expenditure.
Increased incidences of water borne diseases	Any related outbreaks would impact on the local population and could also prove detrimental to water-based tourism.	Increase in government expenditure.
Loss of species biodiversity	Nassau grouper is listed in the Biodiversity Country Study Report of Saint Lucia (1998) as being threatened.	Degradation of coastal systems due to loss of key species or guilds.
Loss in aesthetic and recreational value	As a Small Island State, coastal and marine systems are very important for recreational purposes.	Change in cultural and social behaviour.

Source: Department of Fisheries

2.2 FOREST SYTEMS

2.2.1 BACKGROUND

One of the most serious threats to the island's economic growth is the continued degradation of natural ecosystems. Local forests will never fulfill the national demand of timber. However, they do provide a wide range of products and services such as freshwater, a network of nature trails and biodiversity conservation. A reversal of the increasing degradation of this system will require better public knowledge and understanding of the island's unique environmental problems and their solutions. This would lessen and even prevent negative impacts on this fragile resource.

2.2.2 STATE OF SYSTEMS

Rain Forest

Forests are complex ecosystems requiring balanced and sustainable management. One of the main challenges is to reconcile conflicting priorities among those who depend on the forest for a range of goods and services. It is also necessary to take into account the ways in which forests affect, and are affected by policies outside the forest sector.

Forest Reserves

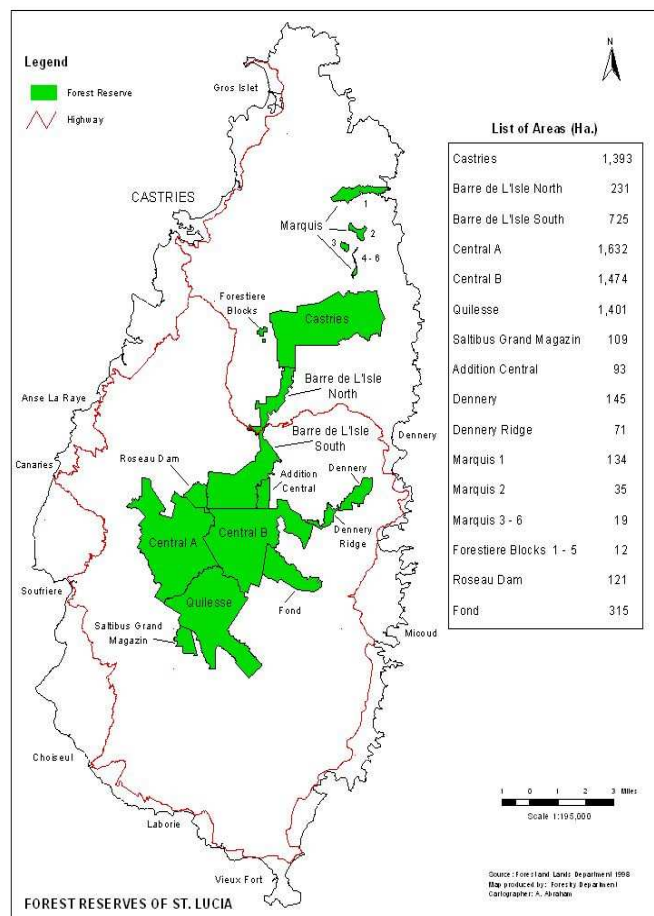
About 56% of the natural forests are found in forest reserves and 43% on private lands. Scrub forests and mangroves are mainly found on private lands. The forest reserve comprises 14 units covering 7,500 hectares, which are located mainly in the central ridge of the island (Figure2-5).

Of this, 88.1% is made up of natural forest; 6% plantation forest (mainly exotic species); 1.6% scrub forest and the remaining 4.3% is occupied by the John Compton Dam Reservoir (16.2 hectares) and squatters (342 hectares). Forest reserves are set aside for the protection of forest, soil, water and wildlife resources. These 14 units of forest reserves are under the management of the Department of Forestry (DOF) and are protected under the Forest, Soil and Water Conservation Act (1946; amendments 1957 and 1983).

Plantation Forest

There is a total of 256 hectares of plantation forest within the forest reserve, comprising three (3) main timber tree species; Blue Mahoe (*Hibiscus elatus*); Honduras Mahogany (*Swietenia macrophylla*) and Caribbean Pine (*Pinus caribaea*). Within these plantations, there is a standing volume of 27 960 m³ of wood. In addition, there are two (2) species of Christmas Trees: the Cypress (*Cupressus lusitanuca*) and the Araucaria (*Araucaria excelsa*). All the plantation species are exotic to Saint Lucia's landscape.

Figure 2-5 Forest Reserves of Saint Lucia



Source: Department of Fisheries, 2003

2.2.3 EXISTING PRESSURES

Saint Lucia's population of approximately 164,791⁶ is growing annually at 1.64%. The population is concentrated within the city of Castries and coastal areas. This growth rate and pattern place pressures on the remaining forested areas.

⁶ 2005 Economic and Social Review

Land Use and Land Tenure

Most agricultural lands and a majority of forestlands are privately owned. Overall large farms are being sold and subdivided into smaller holdings. Tenure is governed by the Napoleonic code in which all family members can lay claim to the land. This practice fragments family land, providing few incentives for long-term sustainable land management and drives persons to clear steep slopes and forested lands (Table 2-6). It also has adverse impacts on people living on, and activities occurring in lower parts of the catchment areas, and is a major threat to biodiversity.

Table 2-5 Establishment of Forest Reserves

Forest Reserve Name	Year Established	Area (hectares)
Castries Water Works	1916	1,393
Barre de L'isle North	1984	231
Barre de L'isle South	1984	725
Central A	1985	1,632
Central B	1984	1,474
Quillesse	1946	1,401
Saltibus Grand Magazin	1987	107
Additional Central B	1985	121
Dennery Water Works	1946	145
Dennery Ridge	1987	71
Marquis 1	1987	134
Marquis 2	1987	35
Marquis 3 - 6	1987	19
Forestiere Blocks 1 - 5	1987	12
Total		7,500

Source: GOSL 1996

Table 2-6 Types of Land Use and Coverage

Type of Land Use	% of Total Land Area
Natural tropical forest	19.60
Mangrove	0.30
Plantation forest	0.67
Scrub forest	12.45
Grasslands and open woodlands	2.04
Mixed farming	23.58
Intensive farming	26.37
Other farming	4.68
Rural settlements	3.86
Urban settlements	5.28
Rocks and exposed soils	0.70
Water	1.08
TOTAL	100.61

Source: GOSL 1996

Deforestation

Increasing population pressures coupled with a growing demand for agricultural lands have resulted in an accelerated rate of deforestation. Most recently, the problem has been exacerbated by the development of access roads into formerly inaccessible primary forest. Although the Forest, Soil and Water Conservation Ordinance prohibits activities prejudicial to forest management policies, implementation has been ineffective, particularly on private forests within close proximity to the reserve and in catchment areas.

Activities associated with banana cultivation also contribute to deforestation. After the 1950's, river valleys became the sites for large foreign-owned banana holdings, while small farmers resorted to clearing the forested hillsides. Squatting also became rampant in and around the forest reserve to support small-scale banana production. The introduction of the chainsaw, and its widespread importation after hurricane Allen in 1980, increased the rate at which forestlands were cleared for cultivation.

Charcoal has traditionally been the primary cooking fuel, and in the years preceding World War II the country was an important exporter of this fuel. In the early 1980's, concern about the contribution of charcoal production to deforestation led to several small-scale projects to improve fuel-wood productivity. Although several studies have provided demand/supply projections, there is little standardization of what has been surveyed, measured, and reported and thus, there is substantial inconsistency in the data generated and great confusion over the policy implications of the conclusions.

Current data suggest that Saint Lucia is capable of meeting domestic fuel wood requirements, primarily through scrub woodlands. However, due to weak public management, fuel wood harvesting contributes significantly to deforestation.

Figure 2-6 Deforestation



Source: Forestry Department

Tourism and the Forest Environment

The rapid development of eco-tourism comes with potential negative impacts on the environment through accelerated degradation of forest trails and pollution of water resources. Most of the forest trails in operation are not constantly monitored and there is no evaluation programme to determine their carrying capacity. The large number of users and the multiple uses of resources pose direct threats to the soil and to biodiversity. In addition, tourism can impose stresses on environmental services, such as the demand for water and disposal of liquid, solid and toxic waste (Table 2-7).

Table 2-7 Forest Trails and Visitors

Period	Trails Visited	No. of Visitors	Revenue (US\$)
April 1995 – March 1996	Barre de L'isle	1,654	15,316.70
April 1996 – March 1997	Barre de L'isle, Edmund Forest	4,978	46,098.27
April 1997 – March 1998	Barre de L'isle, Edmund Forest, Des Cartiers, Enbas Saut	8,254	76,435.34
April 1998 – July 1998	Barre de L'isle, Edmund Forest, Des Cartiers, Enbas Saut	3,167	29,327.69
Total		18,053	167,178.00

Source: GOSL 1996

Land Use Considerations

Problems relating to land use include: the lack of an integrated system of planning; inadequate legislation to control land development; inadequate capacity to monitor development; and limited ability to ensure compliance. Another problem is the tradition of family owned lands being shared among multiple heirs, leading to eventual fragmentation of larger parcels. Also, landlessness has driven people to a number of "solutions" ranging from the rental of land, to squatting on privately owned or publicly held Crown lands. These types of activities have been uncontrolled for over a century with no consideration for the impact on land use or biodiversity.

Encroachment

Shifting cultivation and deforestation: Several communities carry out shifting cultivation within lands adjacent to the Government Forest Reserves. This problem is compounded by the removal of large tracts of rainforest, particularly on private lands. Adverse effects of these practices include: loss of the protective function of forests for both soil and water conservation; loss of valuable timber; and destruction of the natural nutrient recycling systems. The most immediate effects of forest loss are the fragmentation or destruction of habitat types and forest ecosystems and a decline in wildlife populations.

2.3 FRESHWATER SYSTEMS

2.3.1 BACKGROUND

A freshwater system has many components, each intricately linked to the other. Saint Lucia's freshwater system centers around its watersheds, rivers, wetlands and rainfall, with the bulk of the supply coming from surface runoff. Consequently, the quality and quantity of the island's freshwater supply is significantly affected by the many natural and human factors which impact on rivers. Although some claims have been made with respect to the availability of ground water in certain parts of the island, to date, surface water serves as the island's main supply.

Over the years, tremendous pressures have been placed on freshwater systems because of the growing demand from the agricultural and tourism sectors, and a growing population. These are further compounded by the absence of an adequate policy framework, resulting in a haphazard approach to management of this resource.

2.3.2 STATE OF SYSTEMS

Watersheds

Watersheds serve as a natural and reliable rainwater storage and runoff regulation system. Of the island's 37 watersheds, seven are significant contributors to the island's freshwater supply (Table 2-8). These have their headwaters in the central, mountainous part of the island, where the highest rainfall is experienced. The runoff from the major watersheds feeds the seven main rivers on the island.

Table 2-8 Watersheds and Main Rivers

Name	Area (km ²)	Main River
Roseau	49.1	Roseau River
Fond D'Or	41.0	Fond D'Or River
Cul De Sac	40.9	Cul-De-Sac River
Troumassee	31.7	Troumassee River
Marquis	31.0	Marquis River
Vieux Fort	28.8	Vieux Fort River
Canelles	17.3	Canelles River

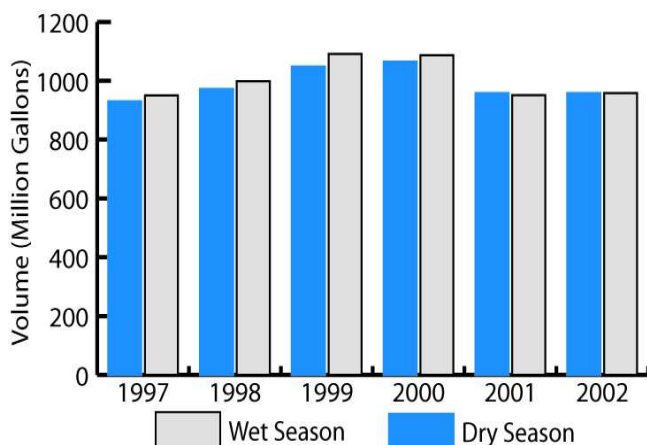
Table adapted from GOSL, Saint Lucia Environmental Profile 1991.

Despite their significance in the maintenance of the water supply, watersheds have been adversely impacted by human activity. Demand for land and the absence of land use policies have had serious negative implications on the watersheds. Large areas on unstable slopes have been indiscriminately cleared for agriculture and housing settlements. These practices have placed excessive stress on watersheds, resulting in a general decline in water availability, supply and quality.

Rivers

All water for domestic and agricultural use is extracted from rivers. The Roseau River is the most significant abstraction point, supplying the north of the island, where almost 65% of the population resides. Figure 2-7 provides the volume of water abstracted from the Roseau River between 1997 and 2002.

Figure 2-7 Average Yearly Production Figures at Theobalds Water Treatment Plant



Source: WASCO Theobalds Water Treatment Plant

Rivers, which are largely unprotected, have not escaped the impacts of human activities. The state of rivers, which can be characterized by two parameters - water quality and quantity - serves as a good indicator of the general condition of the freshwater system, particularly the watersheds. Most rivers generate water of good quality at the headwater but as they flow down the hills they become polluted with a myriad of substances including agro-chemicals and sewage. Although data is limited, there has been significant reduction in flow rates of rivers, as is noticeable during the dry season.

Table 2-9 Status of Major Rivers in Saint Lucia

River Name		Status of Catchment
Roseau	👉	The most important catchment area, possibly at risk from landslips
Fond D'or	👉👉	At high risk from intensive agriculture
Cul-De-Sac	👉👉	At high risk from agriculture and sewage discharges
Troumassee	👉	At risk from marginal agriculture
Marquis	👉👉	At high risk, water possesses high levels of chemicals and microbiological contaminants.
Vieux Fort	👉👉	The catchment area is almost completely farmed, water volumes and quality are no longer adequate for domestic water supply

Source: Adapted from Government of Saint Lucia, Biodiversity Country Study Report of Saint Lucia, 1998

The Biodiversity Country Study of Saint Lucia's paints the above picture of the status of some of the major rivers in Table 2-9.

Wetlands

Saint Lucia's wetlands are classified as either permanent or temporary, natural or constructed (Table 2-10). Due to seasonal variations in rainfall, a large number of wet regions become almost completely dry for part of the year. However, there are other areas whose water source may be a large river or underground spring and many of these remain wet throughout the year. Examples include the Cul De Sac Valley and Hewanorra Airport. Artificial wetlands have been built to perform specific tasks and functions such as irrigation and aquaculture ponds, sewage treatment ponds and water catchments (Biodiversity Country Study Report of Saint Lucia, 1998).

Table 2-10 Examples of Wetlands in Saint Lucia

Type of Wetland	Example
Forested Wetland	Desraches
Freshwater marsh	Hewanorra
Back Swamp	Roseau
Flood Plain	Cul de Sac
Freshwater Lake	Rabot
Freshwater Hole	Troumassee
Fish pond	Union

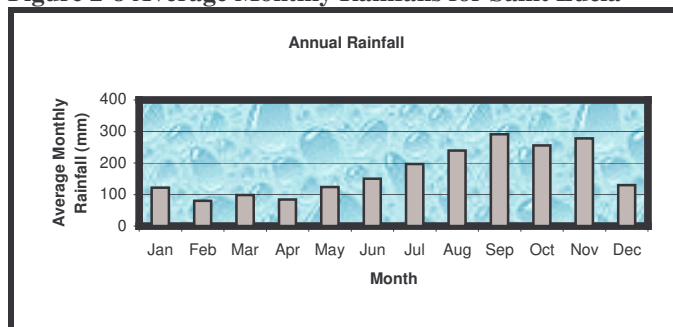
Source: GOSL, Biodiversity Country Study Report of Saint Lucia, 1998.

The importance of wetlands to Saint Lucia's freshwater system has been greatly underestimated because they are not used for freshwater extraction. Many of these wetlands served as natural filters for water pollutants and sediments and therefore play a significant role in maintaining freshwater quality in rivers. More than half of the island's wetlands have been transformed or seriously degraded. Some have also been reclaimed as lands for residential or commercial use, cleared for agricultural purposes or used as disposal sites.

Rainfall

Rainfall replenishes the water supply. Saint Lucia's rainy season runs from June to November, with more than 60% of the annual precipitation occurring between June and November (Figure 2-8). The wet season coincides with the hurricane season during which the island is subject to tropical cyclones. Following the passage of these cyclones, the island is often subject to flooding. It is estimated that the average annual rainfall is in the region of 35 billion gallons - a significant portion of which is retained in forest soils.

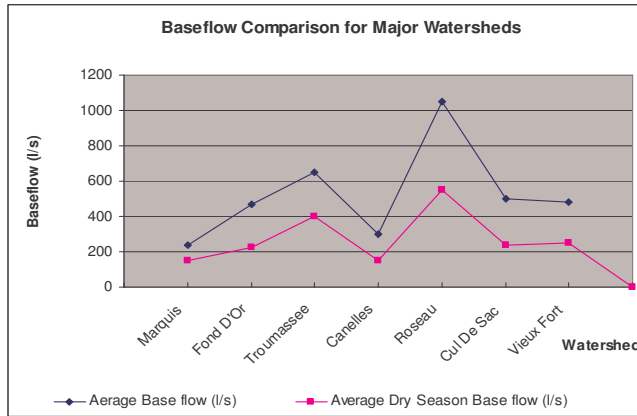
Figure 2-8 Average Monthly Rainfalls for Saint Lucia



Source: Ministry of Agriculture

It is not uncommon for Saint Lucia to experience water stress as a result of drought conditions during the dry season, which runs from December to April. Storage in the forest soil however, is rarely fully depleted as the high rainfall events during the wet season ensure that enough water is held in storage, which gradually makes its way down the mountainous slopes to the rivers. This runoff is directly responsible for base-flow in the main rivers.

Figure 2-9 Base Flow Comparisons at Major Rivers in Seven Watersheds



Source: Government of St. Lucia, Biodiversity Country Study Report of St. Lucia, 1998

2.3.3 EXISTING PRESSURES

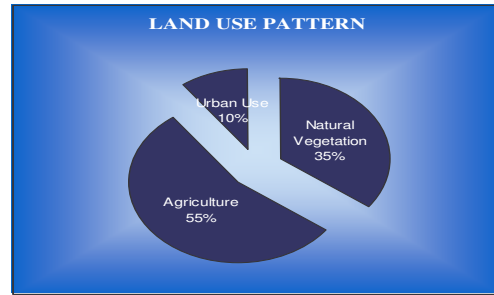
Land Use

The rapidly growing population and the associated demand for lands in the agriculture and housing sectors have led to significant encroachment on sensitive areas in Saint Lucia's watersheds. This problem is exacerbated by the scale of development of the available flat lands, which lie along the coast and in the north and south of the island. As a consequence, pressure is placed on hillsides and mountain slopes, with negative consequences on associated watersheds.

According to the Biodiversity Country Study Report of Saint Lucia, 21,765 hectares (or 35%) of Saint Lucia's total land area is covered by natural vegetation. 7,500 hectares of this natural area is located in Government Forest Reserves. 55% of Saint Lucia's land area is under agriculture and 9.5% is urban use, surface water and exposed rock (Figure 2-10).

Any further intrusion in the upland forests and watersheds will result in compromised water quality and declining quantities.

Figure 2-10 Land Use Pattern in St. Lucia



Source: Government of St. Lucia, Biodiversity Country Study Report of St. Lucia, 1998

Water Pollution

Sediments, sewage and agro-chemicals are the main freshwater pollutants. In the past, these pollutants were not a threat to the potable water supply. However, as the level of human activity increases within the upper reaches of the watersheds, the threat to the domestic water supply increases, especially in instances where there is inadequate water treatment. Solid waste disposal is also posing a serious threat to the water supply.

Sediments

In the wet season, land slippage is a common occurrence in watersheds, resulting in a remarkable increase in river sediment loads. This is a major problem for the ecology of the rivers and a challenge for water treatment since it presents additional burdens for water purification.

Figure 2-11 Sedimentation in Roseau River after Heavy Rains



Source: Water Resources Unit, Ministry of Agriculture, Forestry and Fisheries

Most of the treatment facilities in Saint Lucia are not designed to deal with high sediment loads. Hence, raw water treatment, especially in villages and rural communities, is usually suspended after heavy rains to avoid overloading of the system. As a result, customers suffer water shortages. In many cases, they resort to using polluted river water for domestic purposes, making them vulnerable to water borne diseases. Figures provided by the MOH indicate an increase in the occurrence of water borne diseases over the last few years (Table 2-11).

Table 2-11 Confirmed Cases of Water Borne and Other Diseases

Disease	Number of Confirmed Cases		
	2004	2005	2006 (Jan – June)
Malaria	-	2	-
Schistosomiasis	1	5	2
Typhoid	-	2	-
Dengue	3	4	2
Gastroenteritis	448	1510	1834

Source: Ministry of Health, 2006

Increased sediment load is also a problem, especially during the rainy season. Light showers cause exposed topsoil to be washed away with surface runoff and negatively affect the infiltration process.

Sewage

There are two sewage systems in the north of the island and one in Vieux-Fort, in the south. However, septic tanks and pit latrines are the main forms of sewage treatment. Though data on raw water quality is limited, available data suggests that the bacteria count in rivers is on the increase.

Agro-chemicals

Whereas agro-chemical contamination is minimal in the upper reaches of the water system, there is evidence of this pollutant at the lower ends of the catchments. The Biodiversity Country Study Report of Saint Lucia indicates that five of the island's seven major rivers are at risk from agricultural practices. The Choc River, which was once a source for potable water has been highly contaminated by pesticides and has been abandoned.

As agricultural activities move further into the forested areas of the watersheds, improper use and disposal of agro-chemicals will become a major threat to the water supply.

Water Resource Management

Inadequate water resource management is a major contributing factor to most of the freshwater – related problems faced in Saint Lucia. This is largely due to the “piece-meal” approach taken to the management of this resource. Integrated water resource planning and development is critical for the sustenance and maintenance of freshwater systems in Saint Lucia.

Climate Change and Variability

Climate change and variability can have devastating impacts on the freshwater system. According to the Saint Lucia Country Paper on National Climate Change Issues, changes in rainfall patterns will cause concern from two standpoints: total precipitation and temporal distribution. If precipitation patterns are affected by climate change, it is possible for drought periods to become more frequent or for increased rains to cause flooding and increase river sediment loads. These will have obvious impacts on the water supply regime, which is already under stress.

2.3.4 IMPACTS

The quality and quantity of water in Saint Lucia faces the following challenges:

Depletion

Land use changes in upper watershed areas have resulted in reduced base flows in all primary river systems. As the infiltration capacity is reduced due to the loss of deep-rooted trees and the deterioration of catchment soils, rainfall/runoff relationships change and reduces the ability of forests to sustain river flows.

Pollution

Chemical Pollution: Pollution of the water supply arises from the in appropriate use of fertilizers, pesticides and herbicides, mainly as a result of unregulated agricultural activities.

Solid waste: Poor solid waste disposal practices result in ecological problems, as well as increased challenges in treating water for domestic use.

Sewage Disposal: Pollution from pit latrines and septic tanks impacts on the quality of water, evidenced by increased nutrients and micro- biological levels.

Natural Disasters

Storms bring about floods and landslides that result in destruction and contamination of water sources.

Climate Change

The following are some impacts climate change can have on the hydrological and water resources in Saint Lucia (adapted from Water and Climate Change in the Caribbean, 2002):

- Decrease in flow discharge of rivers and in some cases disappearance of rivers;
- An increase in irrigation demands due to higher temperature and higher crop evapotranspiration;
- An increase in flood magnitude and frequency;
- The degradation in water quality through higher water temperatures;
- Increased pollution load from run-off and overflows of waste facilities;
- A significant disruption of ecosystems and dependent life forms;
- Accelerated erosion, loss of wetlands and seawater intrusion into freshwater sources.

2.4 LAND USE AND MANAGEMENT

2.4.1 BACKGROUND

The Development Control Authority (DCA) is mandated by the Physical Planning and Development Act No.29 of 2001 and the Land Development Interim Control Act of 1971 to ensure the “orderly and progressive development of land and to preserve and improve the amenities thereof, for the grant of permission to develop land and for other powers of control over the use of land”. These Acts influence the wider development and management of land within Saint Lucia and allow for forward planning and development control, which directly influence land-use, human settlement and the natural landscape. Other Acts also influence the management of specific land resources by other agencies such as the Ministry of Agriculture, Forestry and Fisheries (MAFF), and the Ministry of Communications, Works, Transport and Public Utilities (MCWT&PU).

2.4.2 EXISTING PRESSURES

Of Saint Lucia’s 616 square kilometers, 10% has slopes of less than 5 degrees and is located primarily along the coast and in valley areas. This spatial and topographical constraint has tended to dictate the availability of lands to meet the demands of the growing populace. On the other hand, there is increasing demand for land for expansions in housing, agriculture, infrastructural development, tourism and the commercial and industrial sectors. These pressures are compounded as larger plots of land, originally under agriculture are subdivided, usually for residential purposes, thereby forcing the clearing of forest reserves and steep hillsides for agriculture. In addition, there is an ongoing encroachment of commercial activities into residential areas.

The pattern of land use and land management has evolved largely without the framework of a national land use strategy or policy. Instead, national property laws, registration practices, legislation and institutional capacities have dictated the direction of land use and management. In this context, the general inadequacies in legislative, institutional and technical capabilities have contributed to the limited effectiveness of forward planning and development control and this, in conjunction with other factors, has contributed to the present poor state of land-use management within the country.

2.4.3 STATE OF SYSTEMS

There is evidence of varying land-use conflicts between competing users, unplanned and unregulated settlement, poor housing construction, poor traffic management, inadequate drainage systems, indiscriminate garbage disposal, and a general degradation of the environment. Development trends that have largely shaped the landscape are driven by economic factors, giving limited consideration to aspects of social and environmental impacts.

Increasing pressures for the use of the natural environment to meet varied expansion pressures are evident through the encroachment on forested areas and sloping terrain for agricultural uses; traditional and usually prime agricultural lands being transformed to residential and other ancillary uses; and traditionally residential areas being converted to commercial and light industrial uses. Tourism development along the coast is exerting pressure on the marine environment and resources, and its traditional users.

2.4.4 CURRENT SITUATION

Issues

The combination of the absence of a national land use development strategy, a weak regulatory framework for development control, inadequate enforcement capabilities; and conflicting demands to meet the needs of a growing population have created significant negative impacts on land resources. These include:

- Reactive, rather than proactive land use planning;
- Sectoral approaches to land use planning;
- Increased vulnerability to natural disasters, such as floods, land slides and hurricanes;
- Loss of biological diversity;
- Reduced water supply levels, and contamination of rivers and the maritime environment;
- Poor construction practices which reduce the quality of the housing stock and make it more vulnerable to extreme events.
- Reduced ability to adequately enforce existing legislation and regulations; and
- Reduced ability to monitor development.

2.5 WASTE MANAGEMENT

2.5.1 BACKGROUND

The fact that all human activity generates waste necessitates its proper management at all levels of the society if health and environmental quality are not to be compromised.

Prior to 1996, the solid waste management portfolio fell within the purview of the Ministry of Community Development, Local Governments and Cooperatives (MCLC). Waste collection and disposal was managed through the town & village councils under the supervision of the MOH.

In 1996 governments of the Organization of Eastern Caribbean States (OECS), including Saint Lucia, embarked on the OECS Solid and Ship-generated Waste Management Project. Under this project, the Saint Lucia Solid Waste Management Authority (SLSWMA) was established with the mandate to provide coordinated and integrated systems for the collection, treatment, recycling and disposal of solid waste, including hazardous waste and to manage sanitary landfills.

Agencies such as the National Conservation Authority (NCA), the Ministry of Communication, Works, Transport and Public Utilities (MCWT&PU), the Water and Sewage Company (WASCO) and the Ministry of Social Transformation are also involved in waste management.

2.5.2 STATE OF SYSTEMS

Waste management refers to the administration of the reduction, collection, separation, storage, transportation, transfer, processing, treatment and disposal of wastes.

Solid Waste Management

Collection: Solid waste is not segregated at source. It is collected and transported to landfill/disposal sites. Since 1999, the collection of residential and institutional waste has been undertaken by the SLSWMA through private waste collection contractors. A minimum twice-weekly collection service is provided, as well as a monthly bulky waste collection service to 100% of households. The SLSWMA provides either a curbside or communal collection service.

The collection of commercial waste does not fall within the legal mandate of the SLSWMA. Commercial entities make provisions for the collection and transportation of commercial waste either through a licensed waste hauler or as part of their own operations.

Figure 2-12 Deglos Sanitary Landfill



Source: Saint Lucia Solid Waste Management Authority

Figure 2-13 Vieux Fort Solid Waste Management Facility



Source: Saint Lucia Solid Waste Management Authority

Derelict Vehicles: For 2004-2005, derelict vehicles amounting to 216.24 tonnes in Deglos and 69.06 tonnes in Vieux Fort were collected. The amount collected so far for 2005-2006 is 117.27 tonnes at Deglos and 59.83 tonnes at Vieux Fort.

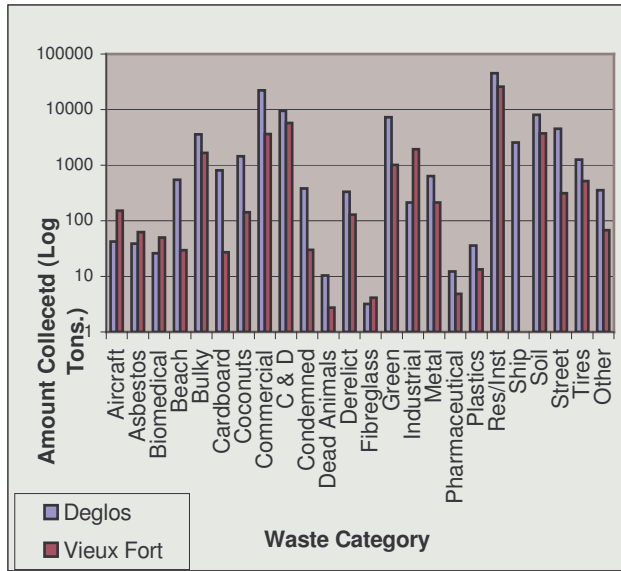
Waste Quantities: The waste received at the Northern and Southern facilities, as indicated by monthly records, vary in type and are categorized as:

- Residential/Institutional (waste from dwellings, schools, government offices and health establishments but not including clinical waste)
- Commercial (waste from the sale of goods and services)
- Industrial (waste from light industry and manufacturing)
- Green (wood and vegetation)

Between 2004 and 2006, residential waste accounted for the largest amount of waste received at both disposal sites. Both sites received a greater amount of commercial waste than industrial waste, with the Deglos disposal site receiving a larger amount of commercial waste, but less industrial waste than the Vieux Fort site. This is an indication that more commercial activity takes place in the north of the island which is home to the capital city, Castries. Vieux Fort on the other hand is an industrial town; hence the higher amount of industrial waste received.

Overall, the Deglos Sanitary Landfill received a higher tonnage of waste than the Vieux Fort Solid Waste Disposal Site. This was due to the higher tonnage generated in the northern part of the island, the most densely populated region of Saint Lucia (Figures 2-14).

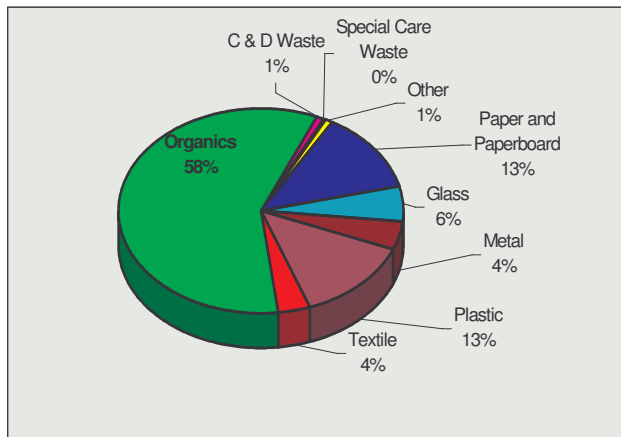
Figure 2-14 Waste Quantities for 2004-2006



Source: Saint Lucia Solid Waste Management Authority, 2006

Waste Characterization: The SLSWMA undertook a waste characterization exercise at the Northern and Southern Waste Disposal Sites in January and February 2002 respectively. Organic waste material represented the largest component (58%) of the waste stream. This was followed by paper & cardboard and plastic which both accounted for 13% (Figure 2-15).

Figure 2-15 Categories of Waste Collected in 2002

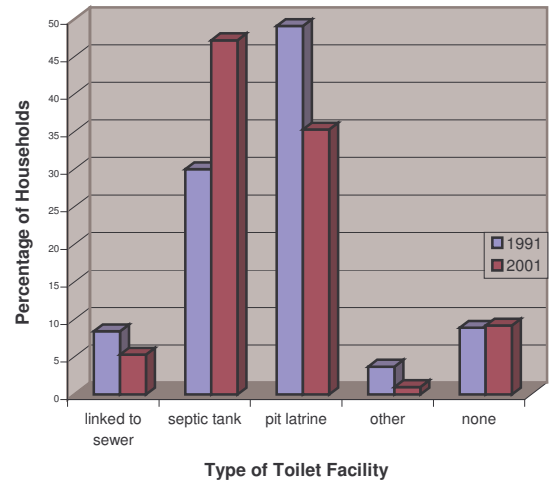


Source: Saint Lucia Solid Waste Management Authority

Liquid Waste Management

Toilet Facilities: Three types of facilities are available; the national sewer system, septic tanks and pit latrines with most households using the latter two. The use of septic tanks has increased from 30% in 1991 to 47% in 2001, while the use of pit latrines has decreased from 49% in 1991 to 35% in 2001 (Figure 2-16).

Figure 2-16 Distribution of Toilet Facilities for 1991 and 2001



Source: Caribbean Environmental Health Institute

National Sewage Facilities: Approximately 6.7% of the population is serviced by the national sewage systems. The remainder utilizes either septic tanks, pit latrines or have no facility. Three sewage systems currently exist:

- The facility in Castries is a collection network that allows pumping of untreated sewage out to sea. It serves approximately 13% of the population of the area. 31% of the remaining population uses septic tanks, 49% utilize pit latrines and the remainder has no facility.
- The Rodney Bay treatment facility has a capacity of 70,000 m³ and serves 13% of the population of Gros-Islet. Of the remaining Gros-Islet population, 43% uses septic tanks, 45% utilize pit latrines and the remainder has no facility. Twelve hotels in the area are also connected to the system.
- The collection system in Vieux-Fort serves approximately 200 households. Of the remaining population 29% use septic tanks, 53% utilize pit latrines and the remainder has no facility.

Hazardous Waste Management

The SLSWMA is currently unable to manage all hazardous waste streams because of the absence of adequate disposal facilities.

Biomedical Waste Management: Biomedical waste from around the island is collected and then treated by steam sterilization using an autoclave system, before final disposal at the Deglos Site. Between 2004 and 2006, 25.99 tonnes of biomedical waste were collected at the Deglos Sanitary Landfill, while 50.34 tonnes were collected at the Vieux Fort facility.

Used Lead Acid Battery Management: There are no plants undertaking the recycling of used lead acid batteries. Rather, at least three private companies collect them for shipment to Venezuela. As of December 2003, 3,750 used lead acid batteries were collected for shipment. Of these, 1000 were shipped for recycling. Trade data obtained from a used lead acid battery survey provide an estimation of the national lead supply (Table 2-12).

Table 2-12 Yearly Statistics For Lead Acid Batteries

Item	1998	1999	2000
Lead Acid Accumulators for starting piston engines	13315	16549	11277
Other lead acid accumulators	-	2	6460
Lead acid batteries from imported vehicles	5230	4546	3952

Source: Technical and Desktop Study, St. Lucia, January 2003.

Waste Oil Management: At least two local companies are known to use waste oil as supplementary fuel: Saint Lucia Linen Services Limited and Saint Lucia Distillers Limited. Both obtain this oil mainly from ships, with the rest coming from local sources. Water and other impurities are separated from the oil before use and Saint Lucia Linen also adds diesel to improve its burning ability. Saint Lucia Linen reports a consumption rate of 500 to 600 US gallons (or 1.89 to 2.27 m³) a day⁷, while Saint Lucia Distillers estimates 130,000 imperial gallons (or 591 m³) used per year⁸. The OECS Strategy on the Management of Used Oil, (November, 2002), estimates the annual volume of used oil generated to be 410 m³.

Asbestos Waste Management: Final disposal of asbestos waste takes the form of deep burial at disposal/landfill sites. Between 2004 and 2006, 38.75 tonnes of asbestos were collected at the Deglos Sanitary Landfill and 62.29 tonnes at the Vieux Fort facility.

2.5.3 EXISTING PRESSURES

While Saint Lucia has made great strides in improving waste management services consistent with internationally recognized standards and practices, many challenges remain.

Unplanned Development

Unplanned development particularly within the city of Castries has resulted in densely populated communities with little or no road access to facilitate a door-to-door collection service. As a result, residents resort to dumping waste in waterways and on vacant lots instead of utilizing communal bins provided along the collection routes.

⁷ Saint Lucia Linen Services Limited, 2006

⁸ Saint Lucia Distillers Limited, 2006

Inadequate Support Services

Inadequate support services such as poor road conditions and the inadequacy of toilet facilities have placed constraints on the level and quality of waste management services offered to some residents. Curbside collection service has ceased in some communities due to poor road conditions. Limited access to toilet facilities indicates poor sewage management and impacts negatively on the collection service offered as waste receptacles are often utilized for disposal of human excreta.

Inadequate Public Compliance

While increased levels of public compliance to waste management standards have been recorded, negative attitudes and behaviors are still prevalent. This is exemplified in the high incidences of illegal dumping.

The public reported One hundred and thirteen (113) complaints of illegal dumping during the period 2005 to 2006. In addition, households continue to place waste out for collection on days when no collection service is scheduled, resulting in unnecessary overflowing of bins and littering of roadsides.

New Waste Streams

The emergence of new waste streams, particularly hazardous waste streams requiring special disposal methods that are currently unavailable, is cause for concern. For example, technological development has brought with it e-waste while the cellular telephone industry has introduced increasing numbers of batteries to be managed and disposed.

Standards, Guidelines and Legislation

Adequate waste management requires support systems to ensure that facilities such as landfills and sewage treatment facilities are provided and managed to acceptable standards. The absence of standards and legislation to govern the quality of discharged effluent places additional stress on the environment.

2.5.4 IMPACTS

The impacts of the pressures identified could have serious implications for the quality of human health and the environment. These include:

- Indiscriminate dumping of waste would result in water and land based pollution. Contamination of land degrades its potential for development.
- Negative impacts of pollution on fresh water and marine resources not only destroy habitats but impacts on the population who are dependent on fresh water and marine resources for survival.
- The blockage of drains and watercourses increases the incidences of flooding.

- Indiscriminate disposal of solid waste creates breeding grounds for insects, pests and rodents. The proliferation of these would, in turn, impact negatively on human health.
- Inadequate management of sewage increases incidences of illnesses in persons who come into contact with this waste.
- Community cleanups divert resources from other development programmes.
- The life of disposal sites would be shortened and additional pressure placed on limited land resources for new locations for disposal sites. Operational cost of waste diversion initiatives would increase to accommodate increasing quantities of waste.

2.6 CHEMICAL USE

2.6.1 CURRENT SITUATION

The Pesticides and Toxic Chemicals Control Board (PCB) undertakes the management and administration of pesticides.

The Board considers applications for registration of pesticide products and issues import licenses for pesticides with approved uses in Saint Lucia.

In August 2001, the Pesticides and Toxic Chemicals Control Act No. 15 of 2001 was passed into law. It is the result of an attempt of the countries of the OECS to modernize and harmonize their respective and in many instances, outdated legislation regarding pesticides and toxic chemicals. Provision is also made for implementation of, and adherence to the Chemical Weapons Convention, which is administered by the Organization for the Prohibition of Chemical Weapons (OPCW).

During January to February 2002, an island-wide inventory of unwanted, obsolete or expired agrochemicals was conducted. Approximately six metric tons of material was identified and need to be disposed of at the earliest opportunity.

2.6.2 EXISTING PRESSURES

- Bananas are cultivated under a mono-cultural system that depletes natural nutrients, resulting in the need for fertilizer application.
- Banana cultivation on steep slopes encourages soil erosion and the movement of pesticides, such as paraquat and glyphosate through soil transport mechanisms.

- Nematicides have been identified as potential water pollutants, given the water-solubility of their active ingredients.
- The majority of farms are on steep slopes with mostly acidic and low fertility soils, making them more prone to pest infestations and therefore high pesticide use.
- Few studies of the fate of agrochemicals and their environmental impact exist, but evidence of significant environmental pollution arising from agrochemicals highlights the need for long-term monitoring and additional research.
- There has been a decrease in the number of medium to large farms (>200 hectares) and a corresponding increase in the number of small-holdings (<10 hectares) since the 1960's.
- Pest and disease control is done almost entirely by chemical applications.
- There is little or lack of knowledge on the use of fertilizers and other chemicals in the farming community and general public.
- The system of administration does not provide for the regulation of end-users of pesticides.
- There is no full time staff on the PCB, resulting in a lack of consistent enforcement of the regulations.
- The absence of a regional harmonization mechanism for chemicals management makes the sharing of information and best practices difficult.
- The absence of a pesticides database makes decision-making difficult.

2.7 CLIMATE CHANGE

2.7.1 BACKGROUND

Climate Change is a global issue. Consequently, national considerations must be grounded in the global agenda, which actively assesses the science of climate change, vulnerability to its impacts, and mitigation and adaptation options. The following are some of the conclusions of the Third Assessment Report of the International Panel on Climate Change [IPCC] (2001).

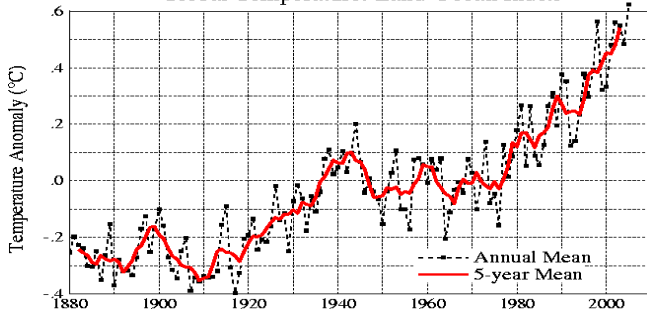
- An increasing body of observations gives a collective picture of a warming world and other changes in the climate system;
- Emissions of greenhouse gases and aerosols due to human activities continue to alter the atmosphere in ways that are expected to affect the climate throughout the 21st century;

- Human induced climate change will persist for many centuries;
- Global average temperature and sea level are projected to rise under most projection scenarios;
- Small islands and low-lying states contribute the least to the greenhouse effect, but are the most vulnerable to its consequences.

2.7.2 CURRENT SITUATION AND PROJECTIONS

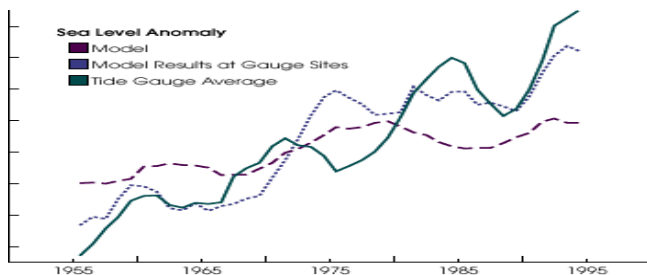
- Global average surface temperature has increased in the 20th century by about 0.6°C and will continue to increase throughout this century and beyond (Figure 2-17).
- Snow cover and ice extent have decreased
- Global average sea level has risen (Figure 2-18) and ocean heat content has increased.
- All models predict greater intensity and possibly frequency of tropical storms;
- Precipitation and rainfall patterns will change.

Figure 2-17 Global Temperature Rise
Global Temperature: Land-Ocean Index



Source: NASA Goddard Institute for Space Studies, New York, 2006

Figure 2-18 Rise in Sea Levels



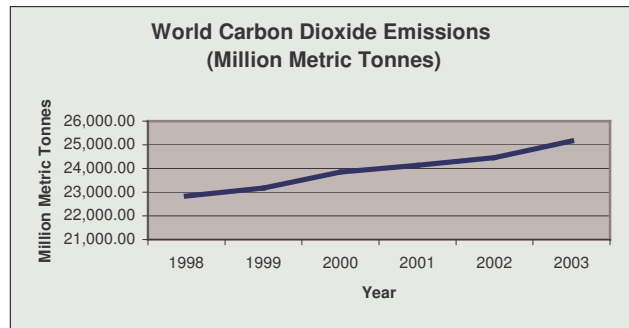
Graph adapted from Cabanes, C. et. al., Sea Level Rise During Past 40 Years Determined from **Satellite** and **in Situ** Observations, Science, October 26, 2001, Vol 294, pp. 840

2.7.3 PRESSURES

Climate change is the consequence of global warming. This, in turn, is caused by the greenhouse effect of so called greenhouse gases that reduce the amount of heat reflected from the earth. The gases that contribute to this phenomenon are: carbon dioxide; methane; nitrous oxide; hydrofluorocarbons; chlorofluorocarbons; hydrochlorofluorocarbons; perfluorocarbons; and sulphur hexafluoride.

In 2003, the total global emission of Carbon Dioxide, which is the main greenhouse gas, was 25,162 million tonnes, of which Saint Lucia's contribution was 0.36 million tonnes (0.0014% of global emissions). Figure 2-19 and Table 2-13 show the increase in carbon dioxide emissions over the past few years in the World and Saint Lucia, respectively.

Figure 2-19 World Carbon Dioxide Emissions 1998-2003



Source: "International Energy Annual 2003", Energy Information Administration, July 2005.

Table 2-13 Saint Lucia's Contribution to Carbon Dioxide Emissions (Million Metric Tonnes)

Source: Energy Information Administration, July 2005.

Year	1998	1999	2000	2001	2002	2003
CO ₂	0.20	0.20	0.33	0.35	0.35	0.36

Recent (2206) studies indicate a relatively high level of awareness of climate change. However, much needs to be done to mainstream climate change into the national developmental process, despite Cabinet's approval, in 2002, of a National Climate Change Adaptation Policy and Plan. Resources therefore need to be allocated at the sectoral level to implement the required initiatives. Further, with respect to mitigation, there is need to ensure the timely implementation of the Sustainable Energy Plan and the adoption of a National Energy Policy.

Sources of Greenhouse gases

The consumption of fossil fuels is the major contributor of greenhouse gases, both as a result of combustion and from fugitive emissions associated with extracting, processing, transporting and distributing fossil fuels. Deforestation is the second largest source of carbon dioxide. Other sources of greenhouse gases include fertilizer use, waste treatment, animal husbandry, agricultural processes such as rice cultivation and a wide range of industrial processes, including chemical manufacture.

2.7.4 IMPACTS

Although the impacts of climate change will be global, they must be considered in the local context so that analyses of the consequences and adaptation measures will be relevant to local circumstances. The possible impacts are discussed in detail in Saint Lucia's Initial National Communication on Climate Change (2001) and in the National Climate Change Policy and Adaptation Strategy (2001). The following local influences are summarized from those documents:

Coastal and marine resources

- Possible inundation of coral reefs, sea grass beds and mangrove swamps as a result of sea level rise;
- Erosion of beaches and coastal lands due to sea level rise and changing coastal processes;
- Loss of fishery production due to increased sea temperatures and sea level rise;
- Fish kills and coral bleaching due to increased sea temperatures.

Terrestrial Resources, Terrestrial Biodiversity and Agriculture

- Changes in the composition of natural vegetation due to changing climatic and hydrological conditions;
- Increased vulnerability of threatened ecosystems
- Increased soil fragility and hence increased erosion;
- Alterations in plant - plant and plant - animal associations;
- Increased water demand due to increased temperatures;
- Changes in water supply due to changes to the hydrological cycle;
- Increased occurrence of agricultural pests;
- Reduced agricultural production due to modified agro-climatic conditions.

Human Settlements

- Damage to coastal property, utilities and infrastructure due to storm surges;
- Damage to buildings, businesses, utilities, infrastructure etc due to increased intensity and possibly frequency of cyclonic events.

Water Resources

- Changes in temporal and spatial distribution due to increased climate variability and occurrence of severe events such as cyclones and droughts;
- Contamination of ground water due to salt-water intrusion arising from sea level rise;
- Sedimentation of dams, catchment areas and reservoirs due to increased soil erosion from greater frequency of extreme rainfall events;
- Water shortage due to drought conditions.

Tourism

- Destruction or damage to hotels and other tourism infrastructure located in coastal areas;
- Loss of economic returns due to possible changes in, or loss of coral reefs, beaches, natural forests and other natural resources and attractions;
- Reduced visitor arrivals as a result of greater frequencies of extreme weather events, as well as declining inducement to travel due to higher temperatures at traditional tourism centers.

Financial Sector

- The effects of increasing frequency of catastrophic events such as hurricanes on lending institutions, insurers, re-insurers and property owners;
- The diversion of financial resources from productive investments to restorative activities.

Health Sector

- Increased incidence of mosquito and other vector-borne diseases;
- Higher occurrences of heat and stress-related illnesses and conditions;
- Increase in water-related diseases, particularly water borne diseases, especially following extreme rainfall events

2.8 AIR AND NOISE POLLUTION CONTROL

2.8.1 BACKGROUND

Current trends in human activities are contributing to a gradual degradation in both indoor and outdoor air quality, as well as an increase in noise generating activities.

Other sources include decomposing garbage in disposal sites that emit methane, household products that give off volatile organic compounds, fires, dust particles, and the dispersion of suspended particles from the Sahara desert across the Atlantic Ocean.

Unlike air pollution, noise pollution can be easily identifiable and it is technologically feasible to control excessive noise in the vast majority of cases by applying the appropriate controls.

2.8.2 CURRENT SITUATION

Factors contributing to air and noise pollution in St Lucia are:

- Human population and urbanization
- Transportation
- Industrial and agricultural activities, and
- Power Generation

Table 2-14 Major Sources and Types of Air Pollution

Pollutants	Major sources	Notes
Carbon monoxide (CO)	Motor vehicle exhaust, some industrial processes. Indoor cigarette smoking.	Health standards: 10mg/m ³ (9 ppm) over 8 hr; 40 mg/m ³ over 1hr (35 ppm)
Sulphur Dioxide (SO ₂)	Heat and power generation facilities that use oil and or coal containing sulphur;	Health standards; 80 ug/m ³ (0.03 ppm)
Particulate matter	Motor- vehicle exhaust; industrial processes, refuse incineration; heat and power generation reaction of pollutant gases in the atmosphere; construction	Health standards: 50 ug/m ³ over a year; 150 ug/m ³ over 24 hr. comprising carbons, sulphates, nitrates and many metals including lead, copper, iron, zinc
Lead (Pb)	Motor vehicle exhausts, open burning	Health standards: 100 ug/m ³ (0.05) over three months
Nitrogen dioxide (NO ₂)	Motor vehicle exhaust; heat and power generation	Health standards: 100 ug/m ³ (0.05 ppm) reacts with hydrocarbons and sunlight to form photochemical oxidants
Ozone (O ₃)	Formed in the atmosphere by reaction of nitrogen oxides, hydrocarbons and sunlight	Health standards: 235 ug/m ³ (0.12 ppm) over 1 hr

Source: Article by Canadian Hearing Society: "Noise and Your Hearing"

Table 2-15 Sound Levels and Effects

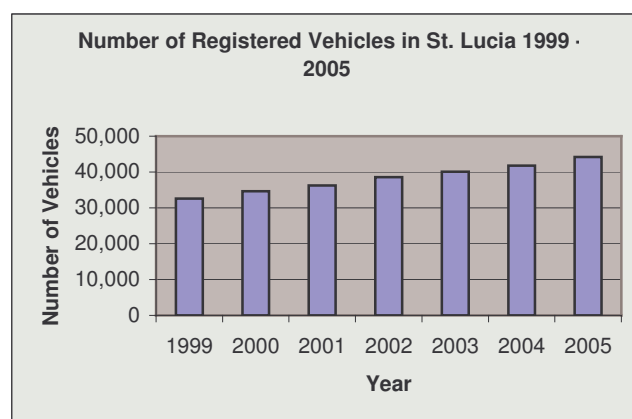
Common sounds	Noise level (dB)	Effects
Jet take off (100-200 ft)	130	Threshold of pain about 125 dB
Discotheque (Near)	120	Threshold of sensation
Power saw, Pneumatic drill, music band	110	Regular exposure of more than 1 minute, risk permanent hearing loss
Garbage truck	100	No more than 15 minutes of unprotected exposure recommended
Lawn mower, motorcycle	90	Very annoying
Electric razor, industrial workplaces	85	Level at which hearing damage (8 hrs) begins
Average city traffic noise	80	Annoying, interferes with conversation
Vacuum cleaners, hair dryer, inside a car	70	Intrusive, interferes with telephone conversation
Normal conversation	60	
Quiet office, air conditioner	50	Comfortable
Whisper	30	Very quiet
Normal breathing	10	Just audible

Source: Article by Canadian Hearing Society: "Noise and Your Hearing"

Automobile Traffic

Figure 2-20 reveals that there has been a steady increase in the number of registered vehicles over the past seven years, presenting one of the main sources of air and noise pollution in Saint Lucia

Figure 2-20 Vehicles in Saint Lucia



Source: 2005 Economic and Social Review

GEO



Policy Responses

3. POLICY RESPONSES

3.1 MARINE AND COASTAL SYSTEMS

Numerous policies and legislative instruments addressing various aspects of sustainable use and management of coastal and marine resources have been put in place over the years. Responsibility for implementation and/or enforcement of these instruments is shared by a number of governmental, non-governmental and community-based bodies. The following outlines some of the more pertinent policy responses:

- The DOF has made substantial progress in the area of fisheries management. For example, the development and implementation of comprehensive fisheries legislation; development of a Fisheries Management Plan; and the establishment of Local Fisheries Management Authorities assist in the management of selected fisheries resources. Furthermore, new fisheries legislation to update these and incorporate other aspects to address issues that have arisen in more recent times is in the final stages of review.
- The Physical Planning and Development Act (Number 29 of 2001) addresses the issue of environmental impact assessments for coastal and other developments.
- Policies on coastal zone management, water and agriculture.
- Saint Lucia has ratified a number of Multilateral Environmental Agreements (MEA's). This helps to frame national policies and actions in a global context. In this context, the Convention on International Trade in Endangered Species of Flora and Fauna (CITES) legislation, which seeks to incorporate the various aspects of the CITES into national law is currently under review and expected to be finalized before the end of 2006.
- Marine reserves have been established to allow for the conservation and protection of critical coastal and marine ecosystems.
- Several agencies have data collection and management programmes in place to facilitate appropriate decision-making.
- Most agencies with responsibility for resource management conduct public awareness activities on the management of coastal and marine resources.

SMMA CASE STUDY

To alleviate conflicts that were occurring between traditional fishers and water based tourism, and to halt the degradation of marine resources in the Soufriere area, a system of zoning was implemented. This management system, called the Soufriere Marine Management Area (SMMA) comprises five zones: marine reserves, fishing priority areas, recreational areas, mooring areas and multiple use areas. As of 2001, this management system resulted in a quadrupling of exploited fish species in marine reserves, and a tripling of these species in adjacent fishing grounds. Despite this positive impact, the reefs off Soufriere are being negatively impacted on by land-based sources of pollution, resulting in decreases of about 15% – 35% in coral cover between 1999 and 2004. This shows that more comprehensive policies need to be established to consider the broader issues related to environmental management.

Figure 3-1 SMMA Zoning Map



3.2 FOREST SYSTEMS

The first forest policy, developed by J.S Beard in 1944 did not recognize the role of the forest in soil and water conservation, nor did it address the need to protect and secure unique species of fauna under a system of national parks and protected areas.

Following independence in 1979, the demand for agricultural lands increased and policy shifts were introduced to afford greater overall protection to the remaining forest resource. A new forest policy (1984-1994) was developed under the Forest Management Project as part of the technical assistance package between Canadian International Development Agency (CIDA) and GOSL. The main goal of the Plan is to protect and conserve the natural resources and to obtain maximum utilization of forest resources, consistent with sustainable development and the welfare of communities.

The key objectives of the policy are:

- To protect and conserve the actual forest reserves and protected areas and expand where deemed necessary for wildlife, soil and water conservation
- To protect and conserve the natural resources (wildlife, soil and water) on private and Crown lands, within watersheds and catchments, and buffer zones around forest reserves and river banks island wide
- To sustainably manage the remaining natural forest resources for the benefit of communities adjacent to the forest reserves
- To establish plantations of fast growing species on currently unproductive lands so as to supply fuel wood and lumber
- To educate the public on the value of sound forest practices, undertake research and develop the human capacity of the staff of the Forestry Department

The management of Saint Lucia’s forest system is governed by the following legislative instruments:

- Forest, Soil and Water, Conservation Act (1946, amended in 1957 and 1983)
- Wildlife Protection Act (1980).

3.3 FRESHWATER SYSTEMS

Existing policies and legal instruments relating to the development and management of freshwater in Saint Lucia are still fragmented, resulting in a compartmentalized approach to freshwater management. Notwithstanding, the GOSL has enacted important laws for the protection and management of the freshwater system. The existing instruments listed in Table 3-1, empower various agencies to exercise certain levels of responsibility in the general management of freshwater systems.

Over the last two years, some concerted effort has been made to take a more holistic approach to environmental management. To this end, a number of policies have been developed, viz the Coastal Zone Management Policy and National Environmental Policy and Management Strategy. The National Water Policy, Land Policy, and Agricultural Policy are at varying stages of development. It is expected that these, when ratified will play a major role in discouraging the isolated approach to water management in Saint Lucia.

Table 3-1 Legislation Impacting Freshwater Systems

Enabling Legislation	Scope	Agency
Forest Soil and Water Conservation Act 1946	Management of forest resources; Establishment of forest reserves and protected forest; Protection of forest, soil, water and wild life resources; Management of water catchments	DOF
Wildlife Protection Act 1980	Conservation of wildlife; Designation of wild life reserves	DOF
Land Development Act No. 29 of 2001	Regulation of development	DCA
Agricultural Small Tenancies Act 1983	Enforcement of regulations requiring sound soil and water conservation practices on small holdings	Department of Agriculture (DOA)
Land Conservation and Improvement Act 1992	Provision for better land drainage conservation	MAFF
Pesticides Control Act 1975. Pesticides and Toxic Chemicals Control Act No.15 of 2001	Regulation of toxic chemicals importation and use	DOA, PCB
Public Health Act 1975	Regulatory oversight of sewage, industries and solid waste disposal; Regulatory oversight of domestic water supply	MOH
St. Lucia Solid Waste Management Act 1999	Responsible for solid waste disposal	SLSWMA
Water and Sewerage Act 1999	Regulation of the granting of licenses; Development and control of water supply and sewerage facilities and related matters	National Water and Sewage Commission

Source: GOSL

3.4 LAND USE AND MANAGEMENT

- The Physical Planning and Development Act No 29 of 2001 was passed in July 2003 and supercedes the outdated Land Development (Interim Control) Act of 1971. This Act now provides for “the development of land, the assessment of the environmental impacts of development, the grant of permission to develop land and for other powers to regulate the use of land, and for related matters”. It addresses the requirement for environmental impact assessments (EIA’s) of developments as well as the preparation of development plans, and greater incorporation of public input into the planning approval process.
- Under the Act, Physical Planning and Development Regulations have been enacted and Environmental Impact Assessment Regulations are being drafted.
- The new legislation seeks to establish the Building Code and Guidelines to guide construction in an effort to foster better construction practices and achieve safer building constructions.
- The Act also outlines the need for preparing land use or development plans. It is expected that this will direct and generate the production of such plans on a more regular basis to guide land management.
- The Ministry of Physical Development, Environment and Housing (MPDEH) has prepared a draft of a National Land Policy to guide the use of land within the country. This policy, when finalized, will establish a set of formal and informal rules, agreements, measures, guidelines, and programmes to govern the use, management, and development of land in Saint Lucia.
- In 2000, Government initiated the Programme for the Regularization of Unplanned Development (PROUD), which rationalizes unplanned settlements, provides title to property, and upgrades the living conditions of the persons within these settlements.
- In addition to the evolving regulatory framework, there are a number of programmes and initiatives aimed at conservation and sustainable use of land and coastal resources. These include the policy initiatives outlined earlier as well as the National Biodiversity Strategy and Action Plan, and the Systems Plan for Protected Areas.
- Saint Lucia is Party to a number of regional and international conventions aimed at sustainable development and environmental protection.

3.5 WASTE MANAGEMENT

Legislative instruments, policies, strategies and plans that address and facilitate the management of solid waste have been developed. The following are some of the existing and proposed policy responses:

- The Saint Lucia Waste Management Act No. 8 of 2004 is the principal piece of legislation, which governs waste management in Saint Lucia. It supports the operations of the SLSWMA.
- The Public Health Act (1975) makes provisions for regulations related to public health. It addresses waste management as an aspect of public health management while the Public Health Nuisances Regulations (1978) regulates the collection of garbage.
- WASCO’s Act governs the management of water resources and supply as well as the protection of surface water supply intakes. It also speaks to the development and control of sewage systems.
- The Fisheries Act (1984) speaks of “prohibition against pollution of the aquatic environment”. It is enforced through the DOF.
- The Marine Pollution Management Act (draft) will establish administrative and operational requirements for the management of ship generated waste and will ban the disposal of waste into the territorial waters of Saint Lucia.
- The Returnable Containers Act (draft) will place a value on returned/collected beverage containers thereby eliminating the proliferation of plastics along roadsides, in public places and in waterways.
- The National Waste Management Strategy is a five-year plan that when implemented will offer direction for the management and operations of the SLSWMA over a five year period.
- The Cabinet of Ministers has adopted a comprehensive shore-generated waste management policy.
- The Medical Waste and other Bio-hazardous Wastes Management Plan sets the minimum requirements for the safe handling, transportation, treatment and disposal of bio-hazardous waste. It addresses waste generated in the healthcare industry, veterinary hospitals and funeral parlors as well as condemned meats and quarantined foodstuffs.
- The Agrochemical (Pesticide) Hazardous Wastes Management Plan sets minimum requirements for safe handling, transportation, treatment, and disposal of chemical hazardous wastes. The plan is however limited to addressing pesticide /agrochemical wastes.

- The Industrial Hazardous Waste Management Plan sets minimum requirements for safe handling, transportation, treatment, and disposal of industrial hazardous wastes. It is limited to addressing asbestos containing materials and waste oils.
- Principle 10 of The St. Georges Declaration of Principles for Environmental Sustainability in the OECS addresses the prevention, reduction and control of waste generation and disposal as well as the pollution of land, rivers, sea and the air.
- The ratification of relevant international conventions further strengthens the policy framework for waste management. Some of these include:
 - The MARPOL 73/78, which speaks to the prevention of marine pollution by ships from operational or accidental causes
 - The Basel Convention on the Transboundary Movement of Hazardous Waste and their Disposal
 - The London Convention (1972), which addresses the prevention of marine pollution by dumping of wastes and other matter
- Establishment of a Hazardous Waste Management Committee to serve as advisory body to the SLSWMA on the management of hazardous waste.

3.6 CHEMICAL USE

The policy responses to the adverse impacts of chemical use include the following:

- Enactment of the Pesticides and Toxic Chemicals Act No. 15 of 2001.
- Saint Lucia signed (March 24, 1983) and ratified (November 20, 1984) the Cartagena Convention and is signatory to the United Nations Environment Programme Protocol on Land based Sources of Pollution, which requires plans for the control of agricultural runoff and the implementation of agricultural education programmes within five years of adoption.
- The OECS has recommended that member states adopt and implement the voluntary FAO Code of Conduct on the Distribution and Use of Pesticides (2002).
- The adoption of the Food and Agricultural Organization (FAO) Prior Informed Consent (PIC) Procedures, made legally binding through the Rotterdam Convention.

In addition, Saint Lucia is a Party to, and is meeting its obligations under:

- The Organization for the Prohibition of Chemical Weapons (OPCW), whose provisions are now included as part of the Pesticides and Toxic Chemical Control Act No. 15 of 2001;
- The Montreal Protocol on Substances that Deplete the Ozone Layer;
- The Stockholm Convention on Persistent Organic Pollutants (POPs), through which the National Implementation Plan for Saint Lucia will be implemented; and
- The Rotterdam Convention on the PIC Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

3.7 CLIMATE CHANGE

There are two basic responses to Climate Change. These are:

Mitigation: Human activities that reduce the sources or enhance the sinks of greenhouse gases; and

Adaptation: Adjustments in natural or human systems in response to actual or expected stimuli or their effects, which moderate harm or exploit beneficial opportunities.

In considering Saint Lucia's options and strategies to address Climate Change, the Cabinet of Ministers, in 2001, approved Saint Lucia's National Climate Change Policy and Adaptation Strategy, which is based on the following principles:

- Continued involvement in international Agreements, Conventions, Protocols and Processes designed to address Climate Change research, mitigation and adaptation, to the extent that they will meaningfully impact on Saint Lucia's ability to address climate change related impacts on its development generally;
- Collaborate with other states and organizations that pursue confluent agendas on climate change;
- Foster or create appropriate institutional, administrative and legislative environments to engender and support the effective implementation of climate change adaptation activities;
- Promote and support research at the national, regional and international levels on aspects of climate change and its impacts relevant to Saint Lucia;

- Ensure that adequate planning (physical, social, economic) is undertaken on a continual basis to address the impacts of climate change; and
- Ensure that society at all level and in all sectors is adequately informed on climate change and its implications for the nation and the role that it must play in this respect.

Based on these principles, the following policy responses have been approved:

3.7.1 MITIGATION

Government's response to Climate Change mitigation is contained in the Sustainable Energy Plan, which was approved by the Cabinet of Ministers in July 2001. The overall goals of the plan are to:

- Reduce the demand for fossil fuels by 15% by 2010; and
- Deliver 15% of total electricity demand from renewable sources by 2010.

Specific policy options to achieve these goals include actions to:

- Establish Energy Portfolio Standards
- Encourage auto-generation and co-generation;
- Encourage independent power producers to enter the market;
- Establish renewable energy regulations and a regulatory authority;
- Promote greater use of solar water heaters;
- Encourage the exploitation of wind and geothermal energy;
- Encourage the establishment of Energy Service Companies; and
- Maintain a public education and awareness campaign to encourage conservation.
- The National Energy Policy, when finalized, will also provide options for militating against the negative effects of climate change.

3.7.2 ADAPTATION

All adaptation policy directions and measures have two common elements, viz:

- Research and information gathering to strengthen the basis for sound decision making, and

- Public education and awareness programmes to inform all publics about the consequences of climate change and the policies and actions necessary to adapt to them.

Sector-specific policy responses include:

Coastal and marine resources

- Strengthen coastal monitoring and data collection to improve decision making;
- Assess coastal areas at risk;
- Adopt measures to protect coastal lands and infrastructure, and restore them as necessary;
- Develop national land use plans that incorporate Climate Change concerns;
- Identify and promote alternative fishery resources and activities.

Agriculture

- Develop a sound basis for decision making by conducting research into the impacts of climate change on crop and soil productivity, water availability and pest-crop interactions;
- Develop short, medium and long-term adaptation strategies.

Human Settlements

- Undertake an assessment of human settlements and infrastructure at risk from the impacts of Climate Change for inclusion in land use and development planning;
- Develop and implement plans for the relocation or protection of settlements and infrastructure at risk;
- Foster the incorporation of climate related issues in national emergency plans;
- Promote the development and enforcement of appropriate building codes;
- Encourage the financial sector to develop mechanisms aimed at assisting human settlements affected by Climate Change.

Water resources

- Develop and/or improve the basis for sound decision making by developing the capacity to undertake research into, and analysis of relevant climate processes;
- Undertake a comprehensive inventory of all water resources;

- Promote strengthening of national water management agencies;
- Develop a national water management plan;
- Encourage reforestation and other measures to increase resilience of watersheds and catchments to maximize water availability and reduce soil erosion;
- Assess and address storage needs and distribution infrastructure to ensure availability during drought conditions.

Tourism

- Conduct the necessary research to strengthen the basis for sound decision-making;
- Ensure appropriate physical planning guidelines such as coastal setbacks are enforced;
- Develop a strategic plan incorporating climate change, and general sustainability considerations.

Financial Sector

- Implement fiscal and financial measures to achieve equitable distribution of the economic burden among stakeholders;
- Ensure the adoption and enforcement of appropriate building codes and other standards to minimize risk from climate related events;
- Develop appropriate risk management measures and regimes to address the impacts of Climate Change.

Human Health

- Ensure that health related climate change issues are incorporated into the National Health Plan;
- Ensure that to the extent possible, preventative measures and curative resources such as vaccines are available as needed.

- The prevention, treatment, limitation and suppression of disease, including the conduct of investigations and inquiries in respect thereof;
- The publishing of reports, information and advice to the government and education of the public on the preservation of health; and
- The abatement of nuisances and removal or correction of any condition that may be injurious to health.

3.8.2 THE PESTISIDE CONTROL AND TOXIC CHEMICALS BOARD

This board functions as an advisor to the Minister of Agriculture on matters relevant to the making of regulations and to carry out the provisions of regulations under the act.

These institutions, as well as those listed in Table 3-2, are provided with the institutional capacities to inspect, seek compliance, audit and monitor processes that may emit pollutants or trading in any material that may or can have an effect on human health or the environment.

Table 3-2 Regulatory Bodies

Legal and regulatory instruments	Institutional responsible Agency	Regulatory instruments	Enforcement capability	Notes
Pesticide Control Act	Minister of Agriculture	Yes	Low	No enforcement programme
Public Health Act	MOH	Yes	Low	No enforcement programme
Oil in Navigate Water Ordinance	Saint Lucia Air and Sea Ports Authority (SLASPA)	Yes	Low	No enforcement programme
Employees: Occupational Health and Safety	Labour Department	No	Low	Lack of skilled personnel, require technical resources
Maritime Act, Fisheries Act	SLASPA DOF	Yes	Low to Moderate	New law caters for regulatory instruments

Source: GOSL

3.8 AIR AND NOISE POLLUTION CONTROL

The laws of Saint Lucia do not address air and noise pollution and control specifically, neither is there any technical specification for air quality. As a result, responses to related environmental concerns take on a multi-sector, inter-disciplinary approach under two main mechanisms:

3.8.1 THE PUBLIC HEALTH BOARD

Established under the Public Health Act, it advises the Minister of Health on such matters as:

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Outlook

4. OUTLOOK

4.1 MARINE AND COASTAL SYSTEMS

4.1.1 BUSINESS AS USUAL

Based on current trends it is clear that while numerous activities aimed at sustainable development of coastal and marine resources have been undertaken, they are not based on a holistic plan of action. For example, integrated coastal zone management has been advocated for over a decade. Such an approach would include the integration of agencies, issues and sectors, and strengthening approaches to dealing with the land-sea interface. This approach would make it possible to more effectively achieve sustainable development by managing the country and all its components as a single entity; a concept termed 'Island System Management' (ISM).

Currently, there is no comprehensive, coordinated institutional and legislative framework in Saint Lucia for coastal zone management, and most activities/initiatives continue to be reactive responses to various events, as opposed to proactive responses. This has allowed existing links among planning and management agencies to remain weak and adhoc, and address only a narrow range of issues.

This present reactionary approach has contributed to the continued poor health of coastal and marine ecosystems being observed. It is likely that if the current approach to development and use of these resources is not changed, the negative trends will continue and ultimately reach critical levels, making it difficult, if not impossible to reverse them.

4.1.2 SUSTAINABILITY FIRST

Sustainability first would mean that the sectoral approach to the management of resources must give way to an institutional framework that fosters the integration of agencies, issues and sector policies, and give priority to land-sea interface issues. The National Environmental Policy (NEP) and National Environmental Management Strategy (NEMS), along with the Coastal Zone Management (CZM) Policy, would be implemented with support from all stakeholders. With such an approach, it is likely that while the damage done to many coastal and marine systems may not be completely reversed, their degradation might be arrested, and with remedial works some systems might recuperate. Such a reversal would, in the long term, likely lead to increased fish stocks, improved natural coastal defenses, greater economic gains from water-based tourism and fishing industries, and a decrease in expenditure to mitigate the impacts arising from degraded coastal and marine systems.

4.2 FOREST SYSTEMS

4.2.1 BUSINESS AS USUAL

Forest systems, and indeed the island's terrestrial biological diversity are under tremendous pressures from agriculture, commercial and residential developments, harvesting of forest products, fuel wood and charcoal production and more recently, from tourism related activities. Uncontrolled exploitation will lead to further land degradation, threaten river and forest ecosystems and affect the island's ability to provide fresh water for agricultural, industrial and domestic uses. There will also be direct negative impacts on ongoing efforts to promote nature tourism. In the long term, soil fertility will be affected and current sedimentation of near shore marine resources will be accelerated.

4.2.2 SUSTAINABILITY FIRST

These biological resources are part of the country's development capital and form an integral part of the country's natural and cultural heritage. Given their importance to national development, under this scenario, a concerted effort will be made to reverse the observed negative trends. Enhanced data gathering and processing capabilities would be acquired to better analyse the trends and develop prediction capabilities. The now outdated Forest Management Plan is being updated and supporting actions will be taken to implement it. Among the issues that would be addressed are improved agricultural practices, especially on steep lands, more effective enforcement of relevant laws, expansion and protection of forest reserves. This would include the strategic acquisition by Government of forest lands adjacent to the existing reserves and the provision of alternative livelihood opportunities for those who depend on forest products for their livelihood. Finally, the NEP and NEMS would be the guiding instrument for environmental management with support from all stakeholders.

4.3 FRESHWATER SYSTEMS

4.3.1 BUSINESS AS USUAL

The island's freshwater system is under immense pressure from a variety of sources that come together to create a situation of increasing demand and diminishing supplies. Under current conditions the freshwater system may reach a stage where there will be little left to manage. The main threats come from contamination from agrochemicals, illegal abstraction, deforestation and degradation of river ecosystems. These have started to, and will continue to affect the integrity and water-yielding capacity of water catchment areas. Business as usual will not only prove disastrous to the freshwater system but will eventually endanger the economic, social and environmental stability of the nation.

4.3.2 SUSTAINABILITY FIRST

Preserving the integrity of the fresh water system requires sound environmental policies and adequate operational and regulatory mechanisms. Under this scenario, an integrated approach to water resource planning and management would be applied and would become a part of the development planning process. Further the Water Policy would be the guiding instrument for the management of fresh water systems.

4.4 LAND USE AND MANAGEMENT

4.4.1 BUSINESS AS USUAL

Inappropriate land use and management is the central factor contributing to environmental degradation in Saint Lucia. As a consequence of current practices, stresses on natural resources and biodiversity will escalate. This in turn will contribute to diminished food and water productive capacities through degradation of the terrestrial and marine environments. In addition, the absence of effective forward planning, coupled with the ineffective enforcement of existing laws, will contribute to growth in unplanned settlements, increased incidence of settlements in unsafe areas such as steep hillsides and flood plains, deforestation, and poor building standards.

4.4.2 SUSTAINABILITY FIRST

Effective land use planning and management is integral to achieving sustainable development. This scenario will lead to an integrated approach to national development planning as the platform for land use planning and management and wider national development planning would have been established. This will ensure that all dimensions of the planning spectrum are factored into the planning process. In addition, the Physical Planning Act and all other laws that impact on the use of the limited land space available will be implemented and enforced. Public education and awareness regarding the impacts of improper land use practices and the mitigative options available will be pursued to help secure public support for this effort. This scenario will also see the approval and implementation of the National Land Policy.

4.5 WASTE MANAGEMENT

4.5.1 BUSINESS AS USUAL

While the SLWMA remains the lead agency with the mandate to manage solid waste, some other agencies also have a legal mandate to provide similar services. The "business as usual" scenario will have resulted in a fragmented service, little coordination among service providers, a duplication of efforts and, in some instances, an absence of responsibility for some aspects of waste management. The variations in the quality of operations and capacity of participating agencies will perpetuate the varying levels in the quality of the service offered to the public.

The inadequacies in compliance by waste generators who have not viewed themselves as important stakeholders does not augur well for this sector. Current attitudes among the negligent and ill advised will continue to result in illegal dumping near roadsides, on vacant lots and in waterways, thereby impacting negatively on the limited natural resources and the quality of human health and the environment.

4.5.2 SUSTAINABILITY FIRST

A holistic approach that fosters the integration of the efforts of the agencies involved, or the establishment of a single entity with responsibility for the overall management of solid waste is required for effective solid waste management. Either approach must have as a key component, the development, implementation and enforcement of legislation, standards, guidelines, and policies to guide the management and operations of all waste management entities. This would assure a more comprehensive and coordinated approach to dealing with waste management and would engender greater accountability and a better quality of service. This approach must include greater sensitization and involvement of stakeholders at all levels in the design, planning and execution of waste management systems to ensure better protection for human health and the environment.

4.6 CHEMICAL USE

4.6.1 BUSINESS AS USUAL

In a "business as usual" scenario, the issues identified by the PCB with respect to the use of agrochemicals will endure. These include: illegal imports; repackaging by vendors and removing of original labeling; incorrect application (over-use, wrong application rate or timing, wrong pesticide for the problem identified, use of chemical cocktails); inadequate application equipment and protective clothing and the inability of some users to read instruction labels. Additionally, the re-entry period after pesticides application in the field will remain unobserved. This scenario will also include poor education and awareness programmes and inappropriate legislation and enforcement.

4.6.2 SUSTAINABILITY FIRST

Under the 'sustainability first' scenario, the Pesticides and Toxic Chemicals Control Act No. 15 of 2001 will be improved, implemented and fully enforced. The Regulations under the Act will permit the monitoring and regulation of the importation, advertisement, storage, handling, sale and disposal of pesticides and toxic chemicals. Under the regulations, licenses will be issued to qualified entities under several categories, including: dealers' license, general license, pest control operator's license, premises license and import license. This system would be supported by a comprehensive training programme for licensed persons and entities. A public education campaign to sensitize all stakeholders would be implemented to ensure that the issues surrounding the storage and use of pesticides and toxic chemicals are clearly outlined and understood by the majority. It is also expected that supportive systems such as the FAO Voluntary Code of Conduct on the Distribution and Use of Pesticides (2002) will be implemented. With these measures, there would be greater control over the importation, storage, use and disposal of pesticides and toxic chemicals, and by extension, better protection of human health and the environment.

4.7 CLIMATE CHANGE

4.7.1 BUSINESS AS USUAL

The anticipated impacts of climate change on Saint Lucia are attributable to two of its primary consequences namely, temperature increase and sea level rise. Whereas there is awareness of these impacts generally, little is being done either at the policy or planning levels to incorporate climate change considerations into national development programmes. Under this scenario, the country will continue to operate under a 'reactionary' mode rather than a 'proactive' approach to dealing with the impacts of climate change as they evolve, at tremendous social, economic and environmental cost.

4.7.2 SUSTAINABILITY FIRST

Sustainability first will result in actions that are taken on board on a priority basis, as the rate of changes projected to occur is likely to be too rapid for natural and economic systems to adapt. Consequently, development planning, defined in its broadest sense, will urgently incorporate climate change issues to ensure that the impacts are considered and accounted for in designing development programmes. To this end, the National Climate Change Policy and Adaptation Strategy would be used to inform policy and programme design at all levels of the public and private sectors. Further, a public education campaign would be launched to increase public awareness of the expected impacts of climate change and the response options available to them.

In addition to adaptive responses, a National Energy Policy, with an accompanying revised Energy Action Plan would be developed to serve, inter alia, as the basis for the mitigative actions to be pursued to reduce emissions of greenhouse gases.

4.8 AIR AND NOISE POLLUTION CONTROL

4.8.1 BUSINESS AS USUAL

If the present developmental trend continues the result will be unregulated growth patterns, expanding urban developments, high traffic density and a general degradation of the environment which, when combined, impact negatively on human health. The social and economic cost of air and noise pollution comes in the form of: increased health care costs; productivity losses due to time lost from work through pollution-related illnesses; expenditure incurred for the restoration of buildings; and losses from reduced productivity of natural and managed ecosystems.

Under this scenario, there will continue to be inadequate regulation of emissions and noise levels in the workplace as well as the institutional capacity to address matters relating to air and noise pollution.

4.8.2 SUSTAINABILITY FIRST

Effective policies are necessary to address the growing impact of air and noise pollution, and the related impacts on human health and the environment. Under this scenario, Government would undertake new initiatives at the national, regional and international levels to meet agreed standards and obligations. Government will review current laws and regulations and develop new programs to enhance the quality of the environment. Industries will get onboard as part of their competitive strategies to acquire more efficient and less polluting technologies, and redesign their production systems in ways that will reduce air and noise pollution. This would be evident by an increase in the number of industries gaining International Standards Organization (ISO) certification, which requires production systems that meet stringent international standards. An improved regulatory framework with systems in place to monitor and enforce standards would support these developments.





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Way Forward

5. WAY FORWARD

5.1 MARINE AND COASTAL SYSTEMS

While the Government of Saint Lucia recognises the need for a more comprehensive approach to the management of coastal and marine resources, implementation of such an approach has been slow, and as stated earlier, efforts continue to be reactionary and adhoc. Given that many of the problems being experienced in coastal areas result from land-based activities, an Island Systems Management (ISM) approach must be taken to effectively address these problems. Notably, this approach should also be flexible, providing direction for overall sustainable development, and should be guided by a national vision for development, an economic development strategy and a comprehensive national land use plan.

The following provide for some key areas of focus in the development and implementation of a comprehensive management plan for coastal and marine resources:

- Development and implementation of a strategy and action plan to facilitate the implementation of the coastal zone management policy.
- Implementation of the NEP and NEMS that subscribes to the ISM concept.
- Building on lessons learnt and replicating relevant successes of past and present coastal and marine resource management efforts, such as the establishment of the SMMA.
- Ensuring that the roles of regulatory and other agencies with management responsibilities are comprehensive and clear, and that all stakeholders are informed and sensitised to the issues surrounding management of the coastal and marine resources in a small island context.
- Development and enforcement of comprehensive environmental guidelines and standards as they relate to the coastal and marine environments.
- Strengthening the management and enforcement structures for protected areas and other ecologically sensitive areas and systems.
- Development and implementation of programmes for restoration and/or rehabilitation of critical coastal and marine systems.
- Research to inform the sustainable use of coastal and marine resources.
- Development of standards and standard methodologies for data collection, management and analysis.

- Enhancement of availability and use of information and knowledge relevant to planning and management.
- Establishment and enforcement of appropriate contingency plans and mitigation measures to balance the possible impacts of increased storm activities associated with climate change.
- Widespread and long-term public education programmes to alter public perceptions of limitless natural resources.

5.2 FOREST SYSTEMS

The forestry sector in Saint Lucia has a wide range of unique biological resources. However, assessments have shown that this limited natural resource is being destroyed. For successful and sustainable management of the forest resource, an effective management system, which includes the collaboration and participation of multi-sectoral and inter-institutional organizations must be effected. The main actions proposed to achieve this include:

- **Water:** enhanced and enforceable management regimes for forested watersheds, pollution control, waste management, water treatment and waste disposal.
- **Soil:** maintenance and improvement of soil fertility through better management of natural and agricultural vegetation in accordance with sound land use practices.
- **Flora and Fauna:** Actions to protect endangered or threatened species, controls over the rate of exploitation of economically useful species and maintenance of the habitats of plants and animals in designated protected areas such as water-producing forest reserves.
- **Legislation and Regulation:** Strengthen and enforce the regulatory and administrative frameworks to ensure that the above are achieved.

5.3 FRESHWATER SYSTEMS

The sustainable exploitation of freshwater resources requires urgent strengthening of the existing regulatory, operational and institutional frameworks. This should utilize a collaborative approach with participation from multi-sectoral groupings as well as civil society.

If sustainability is to become a reality in Saint Lucia the following areas must be given attention:

- The development and implementation of policies to holistically address environmental management, with an emphasis on water resource management;
- The promotion of an understanding and awareness of the issues related to environmental management;
- Development of an institutional framework for water resource management including a coordinating mechanism for policy and program implementation;
- Increased involvement of civil society in sustainable development initiatives, and
- The strengthening of human resource capacity in water resources management.
- Geographic Information Systems (GIS) must be used as a planning and decision support tool in the planning and land management process.
- Relevant databases and information must be disseminated among organizations through an integrated environmental management information system.
- The draft National Land Policy must be finalized and adopted.
- The Forestry Management Plan was for the period 1992 to 2002 and now needs reviewing and updating.

5.4 LAND USE AND MANAGEMENT

A comprehensive, enforced land use and management plan is central to addressing current environmental challenges. The development of such a plan must draw on existing policies, plans and strategies, including some key elements such as the National Environmental Policy, the Coastal Zone Management Policy, the Biodiversity Report, the Climate Change Policy and Adaptation Strategy, the Forestry Management Plan. Given the need to integrate such a wide range of issues, the following are proposed as the way forward:

- The concept of Sustainable Development must permeate all planning and land management initiatives.
- The Integrated Development Planning (IDP) Process must be institutionalized.
- The relevant elements of the environmental conventions and agreements to which the island is Party, must be respected and put into action.
- A comprehensive National Land Use Plan should be developed utilizing the IDP process.
- Comprehensive Regional (strategic) and local area development plans should be developed utilizing the IDP process and be implemented.
- There must be a review of all land / environmental management legislation and statutory responsibilities in an attempt to minimize “grey areas” and streamline functions.
- Relevant legislation and regulations should be enacted and enforced to guide sustainable land management.
- The establishment of one agency responsible and held accountable for waste management.
- Sustained public education, awareness, and sensitization programmes to foster sustained change in attitudes and behaviours
- Implementation of a cost recovery programme to ensure sustainability of the SLSWMA
- Greater involvement of the MOH as the regulatory agency for the SLSWMA
- Incorporation of waste management in all development plans.
- Implementation of a full-fledged waste diversion programme designed to divert organic wastes, paper and plastic etc. away from the disposal sites supported by a reuse, reduce, recycle and recovery programme.
- Enforcement of relevant legislation to ensure compliance.
- Development and implementation of economic instruments that encourage the public to participate in waste management.
- Enactment of ship and shore generated waste legislation.
- Institutional arrangements to delineate the roles and responsibilities of the agencies involved in waste management.

5.5 WASTE MANAGEMENT

Saint Lucia has realized significant improvements in the collection service offered, as well as in the management of sanitary landfills. Despite the successes, many shortcomings continue to hinder the ability of the country to provide the highest quality of service possible. The following are some key areas for intervention.

- Formulation of standards, policies and legislation to ensure adequate treatment of effluent before discharge into the environment.
- Design and construction of adequate sewer systems for the major communities.

5.6 CHEMICAL USE

Inappropriate chemical use continues to pose grave threats to human health and the environment both through direct contact and through polluted ecosystems. To address this threat, the following are proposed:

- Mandatory stewardship of agrochemical products by their manufacturers, suppliers and retailers.
- Establishment of long-term environmental monitoring programmes and targeted research activities.
- Promotion of an indigenous agrochemical industry which develops alternative natural chemicals through local or regional research, development and production
- Integrated Pest Management (IPM) systems which reduce pesticide use on crops and promotion of pest control by non-chemical methods
- Development of a comprehensive electronic database on chemical use and the health status of agricultural workers and the general public exposed to chemicals and contaminated foods
- Studies on the impact and fate of fertilizers and chemicals and their residues in the environment and on food crops
- Implementation of Saint Lucia's National Implementation Plan under the Stockholm Convention on POPs.

5.7 CLIMATE CHANGE

Climate change is expected to result in more intense extreme events such as hurricanes and droughts. At the national level, this could exacerbate existing problems such as the destruction of mangroves and beaches, degradation of coral reefs, and water shortages. Higher temperatures are also likely to result in the increased use of energy for cooling. From the human health perspective, higher temperatures could influence the occurrence of vector-borne diseases

The potential impacts of climate change are perhaps the greatest threat to the long-term sustainability of island systems generally. Given current levels of contribution to the phenomenon, there are insignificant mitigation options available. Efforts in this direction must therefore focus on the few mitigation options available, more as a demonstration of concern and commitment to addressing the problem. More importantly, participation in the international negotiations to address the causes of climate change should remain a priority. Notwithstanding, there are specific actions to be pursued to adapt to the inevitable consequences of climate change. These are laid out in detail in Saint Lucia's National Climate Change Policy and Adaptation Strategy and are based on the following principles:

- Fulfill to the extent possible, Saint Lucia's commitments under the UNFCCC;
- Participate in the international negotiating processes;
- Ensure that society, at all levels and in all sectors is adequately informed on climate change and its implications for the nation and the role that it must play in this respect;
- Encourage the involvement and participation of all stakeholders in addressing issues related to climate change;
- Foster institutional, administrative and legislative environments which engender the effective implementation of climate change adaptation activities;
- Promote and support research and information gathering at all levels on aspects of climate change as they pertain to Saint Lucia;
- Ensure that adequate planning is undertaken on a continual basis to address the impacts of climate change; and
- Develop the national human and institutional capacity in all aspects of climate change research, response and planning.

5.8 AIR AND NOISE POLLUTION CONTROL

The threat of air and noise pollution to human health and the environment is an emerging phenomenon that is not adequately addressed in current policy, legislative and institutional arrangements. Further, adequate data does not exist to measure the extent of the problem and to guide policy responses. As a consequence, near to medium term actions to address air and noise pollution should be addressed at three levels and should include:

5.8.1 POLICY

Government should formulate appropriate policy on Environmental Pollution to include the following principles:

- Appropriate pollution control standards and measures should be part of the planning approval requirements for new entities
- Air and noise pollution considerations should be incorporated in policies dealing with workers' occupational health and safety; and
- Policies should be developed in consultation with relevant stakeholders.

5.8.2 LEGISLATION

Clear and consistent legislation addressing both the wider issues of environmental quality, of which air and noise pollution is one component, will be developed. Such legislation and regulations should:

- Codify pollution control measures;
- Define emission and ambient standards based on relevant international standards
- Set control measures that must be applied and penalties for non-compliance; and
- Take into consideration existing and emerging cleaner production technologies and practices.

5.8.3 INSTITUTIONAL

Current institutional arrangements are inadequate to effectively implement the proposed policy and enforce regulatory controls. To this end, government should:

- Establish a standing inter-sectoral policy coordinating body;
- Re-establish the National Environmental Commission
- Designate one or more executing agencies for the enforcement and monitoring of pollution control measures; and
- Undertake field research necessary to better understand the impact of air and noise pollution on productivity, human health and the environment.

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The ability of a country to meet the challenges that development presents, requires the availability of reliable data. It is essential that this data integrates the environmental, social, economic and technical situation of the country, to facilitate sound decision-making.

The State of the Environment Report (SOE) or Global Environmental Outlook (GEO) provides an assessment of our environment and through an integrated approach seeks to meet Saint Lucia's development goals. The report highlights key issues and systems that are negatively affected by our activities and makes recommendations for policy action.

The SOE/GEO is a non-technical document intended for use by the decision-makers and the general public as it underscore the dependence of sustainable development on a healthy environment.

