Government of St.Lucia

United Nations Environment Programme

NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN OF ST. LUCIA

PROTECTING THE FUTURE

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FOREWORD

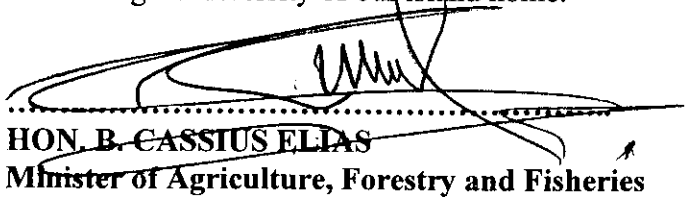
The preparation and release of this National Biodiversity Strategy and Action Plan (NBSAP), which was approved by the Cabinet of Ministers on September 14th 2000, are significant in many respects.

St. Lucia, as a young developing nation, is committed to international cooperation in the field of conservation and sustainable development, and this document is another testimony of this commitment. In accordance with the provisions of the Convention on Biological Diversity (CBD), we have outlined the policies and actions, which are needed to conserve our natural assets and use them sustainably. We have identified a number of programmes and projects, and we have begun to put in place the institutional mechanisms required for effective implementation. We look forward to the support and collaboration of our regional and international partners in making this NBSAP a reality.

This document is also important because it is another expression of our collective awareness of the fact that our future depends, to a very large extent, on our ability to manage our natural capital. Our quality and uniqueness as a tourism destination, our cultural identity, our agriculture, our fisheries and the health of so many other sectors rely on the maintenance of our biological diversity and on our ability to use it wisely, sustainably and creatively. This plan demonstrates that conservation is an integral part of development, and that development could not be lasting without the ecosystems, the species and the genes with which we have been endowed, and which we have the responsibility to manage.

The significance of this document is not only in its contents, but it is also, and perhaps more importantly, in the process by which it has been developed. Under the competent leadership of its Co-ordinator, Mrs. Dawn Pierre-Nathoniel of our Department of Fisheries, the NBSAP Team has facilitated an innovative consultative process, which has involved an impressive number of stakeholders from various horizons. Thanks to the support from the United Nations Environment Programme/Global Environmental Facility (UNEP/GEF), we have been able to mobilise our own national experts, and to build our own understanding of issues, needs and priorities. As a result, we have a document which reflects the views of all parties concerned, which has benefited from our own knowledge and expertise, and which provides a realistic path for action.

I express my gratitude to all those who have been involved in this unique and exciting process, and I call on every St. Lucian to participate in the urgent task of conserving and managing the rich biological diversity of our island home.



HON. B. CASSIUS ELIAS
Minister of Agriculture, Forestry and Fisheries

1. INTRODUCTION

In spite of its small size, St. Lucia is a diverse country. Surrounded by the Atlantic Ocean and the Caribbean Sea, its mountainous landscape and tropical location have endowed the island with a range of habitats on land and in the sea. Diverse communities of plants and animals live in these habitats, and several species -- such as the St. Lucia parrot, *Amazona versicolor* -- are found nowhere else in the world. St. Lucia is also diverse in the origin of its people. During the past four centuries of a sometimes turbulent history, the Amerindians were joined by peoples who came from Africa, South Asia, and Europe. St. Lucia's diverse environment and rich cultural history have combined to make it an unusually beautiful and distinctive country.

As in other countries, St. Lucia's biodiversity is threatened by a range of human activities. Agricultural, commercial and residential developments are transforming natural habitats. Freshwater and coastal ecosystems are stressed by high sediment loads and agricultural chemicals. The disposal of raw sewage and the inadequacy of many sewage treatment facilities pose significant risks to human health and natural systems. Some marine species -- especially reef fishes and conch -- show signs of over-exploitation in several areas. Habitat transformation, pollution, and over-harvesting are common factors contributing to the decline of biodiversity around the world.

St. Lucia's biological resources are part of its capital for development, and the health of the country's economy, especially in agriculture, tourism, and fisheries, is intimately tied to the health of its environment. These resources also form an intimate part of the country's natural and cultural heritage. St. Lucia, as all countries of the world, must therefore fashion its own strategy -- reflecting its unique social, economic, and environmental conditions -- to use sustainably and conserve its biological wealth. This is the purpose of the National Biodiversity Strategy and Action Plan (NBSAP).

WHAT IS BIODIVERSITY?

Biodiversity is the term used to describe collectively the various forms of life, namely the genes, species and ecosystems found within a country or region. Ecosystem diversity relates to the variety of different environments: these not only differ in species composition, but also in physical structures. Ecosystems found on the island include coral reefs, seagrass beds, mangroves, and various types of forests. Species diversity refers to the variety of different species which exist in a specific area. Plant species diversity in St. Lucia, for example, is relatively high - over 1,300 species - and many of these species are useful for food, timber and medicines, while others serve as ornamentals. Genetic diversity is the diversity of genetic information that exists in individual organisms. For example, the *Musa* genus (plantains and bananas) includes a number of sub-species and cultivars.

In June 1992, representatives of over 175 countries gathered in Rio de Janeiro, Brazil for the United Nations Conference on Environment and Development. One of the most important agreements to come out of this "Earth Summit" was the Convention on Biological Diversity (CBD). The Convention was designed to help member countries reduce the loss of biodiversity and share in the benefits arising from new uses of genetic resources. St. Lucia -- one of the first countries to sign the treaty at the Earth Summit -- ratified the agreement on 28 July 1993.

THE CONVENTION ON BIOLOGICAL DIVERSITY

The Convention on Biological Diversity (CBD) marks an historic commitment. It is a commitment by the nations of the world to conserve biological diversity, to use biological resources sustainably and to share equitably the benefits arising from the use of genetic resources. It is the first global agreement to address comprehensively all aspects of biological diversity – genetic resources, species and ecosystems. While the Convention does not tell member countries how to conserve and use sustainably their biological resources, it does express general goals that countries should strive to achieve with respect to genetic resources, species and ecosystems. For example, among other goals, it also calls upon nations to include all ecosystems within a network of protected areas and to establish the capacity to conserve economically important genetic resources. It calls upon developed countries to provide financial and technical assistance to help developing countries conserve and use their biological resources sustainably.

To assist in the complex task of using sustainably and conserving their biodiversity, the Convention, in its Article 6, requires all member countries to develop a national strategy and action plan. The purpose of these plans is to identify important problems, evaluate the most urgent and practical actions to remedy those problems, prepare a detailed plan of action to implement those remedies, and establish a mechanism for the on-going monitoring and review of the plan's implementation. While the CBD does not specify how these strategies and action plans should be developed, experience in other countries indicates that broad participation is likely to increase public support for proposed actions to use sustainably and conserve biodiversity.

In November 1997, a Steering Committee established by the Government of St. Lucia and comprising representatives from all relevant sectors began work on the development of the National Biodiversity Strategy and Action Plan. A National Steering Committee was assembled under the direction of a Coordinator to assess the status of biological resources in St. Lucia and to identify important management, policy, and information needs. National experts were commissioned to conduct country studies in six main sectors (forest ecosystems, fresh water ecosystems, coastal and marine ecosystems, agricultural biodiversity, tourism, and socio-economic factors) to assess the current status of biological diversity, and identify issues, needs, gaps and actions. Four public consultations were held involving a wide range of stakeholders, leading to two broad-based national consultative meetings held in March and

August 1999. It is on the basis of these studies and consultations, augmented by the contributions of individual experts and agencies and by the deliberations of the National Steering Committee, that the strategy and action plan has been prepared.

The present report should therefore be read against the background of and in conjunction with the Country Study Report, which provides detailed information on biological resources, issues and trends.

ST. LUCIA NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN (NBSAP) TEAM

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Technical and financial assistance was provided by UNEP/GEF

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2. THE VISION

The vision for the future of St. Lucia's biological diversity includes the following elements:

- the status of biological resources is known, the people of St. Lucia and visitors to the island are all aware of the value and importance of these resources, and respect for biodiversity is integrated within the nation's culture;

- governmental agencies, non-governmental organisations, the private sector and communities are conscious, active and responsible participants in the management of biodiversity, and the concerns for the management of biodiversity are taken into account within policy-making processes at all levels;

- the integrity of the country's biological diversity is maintained and, whenever possible, restored;

- biodiversity contributes optimally, through sustainable uses, to the social, economic and cultural development of the country, and to the physical, spiritual, and psychological well-being of all its people;

- national, regional and international efforts aimed at conserving biological diversity are consistent, mutually-supportive, and effective.

3. ISSUES AND TRENDS

St. Lucia's biological diversity and its current status can be characterised by the following:

- a relatively high diversity of species, as illustrated by the fact that there is a total of over 1,300 known species of plants (including seven endemics) and over 150 species of birds (including five endemics). Approximately 250 reef fish species and 50 coral species have been identified for the island;

- a genetic diversity which is largely the product of the country's history, with the introduction and use of a wide range of species, breeds and cultivars, and with the production of a number of cross-breeds;

- a high diversity of ecosystems, ranging from dry cactus scrubs to rainforest, and including mangroves and coral reefs;

- high natural fragility and vulnerability of these ecosystems, due mainly to their small size and to their scattered spatial distribution;

- high levels of natural productivity within most ecosystems;

- a significant contribution of this biological diversity to the local economy, with the possibility of increasing benefits in several areas, such as the use of plants for medicinal purposes and the development of heritage tourism;

- a diversity of property and management regimes, with all marine and many terrestrial ecosystems under public ownership, but with some terrestrial ecosystems placed almost entirely under private ownership (especially the dry forest formations);

- high levels of impacts from human activities, which have transformed many natural habitats and have resulted in the loss of some of the country's biological diversity;

- uneven distribution of impacts and threats among species and ecosystems;

- an insufficient knowledge of biological resources and their potential;

- the achievement of significant successes in several biodiversity conservation and management programmes (e.g. recovery of the St. Lucia parrot, protection of the Maria Islands Nature Reserve and its two endemic species, management of the Forest Reserve, and management of Marine Reserves).

Social, cultural and economic factors play a key role in shaping and determining the conservation, use and management of St. Lucia's biological resources. These factors can be summarised as follows:

Historical factors

Amerindian societies in the Caribbean were characterised by the diversity of indigenous plant and animal species upon which their systems of production were based. In contrast, the development of the plantation system in the 18th and 19th centuries was based on monoculture crops and on the use of many imported species. As a result, natural systems have been profoundly transformed, and rural landscapes bear little resemblance to the natural formations which existed prior to European colonisation. With the exception of the rainforest and montane forest formations, terrestrial environments have been radically transformed by human activity.

Economic factors

The economy of St. Lucia is built, and continues to depend to a large extent, on the production of goods and services for external consumption. Since the establishment of the plantation system, the main economic sector has been agriculture, with the production of cocoa and coffee, later replaced by sugar, and more recently by banana. Over the past twenty years, tourism has grown to rival agriculture as the largest sector of the economy. In the agricultural sector, bananas constitute the bulk of exports.

St. Lucia has shown slow but steady economic growth during the past decade. However, economic growth has not kept pace with population growth so per capita income has fallen slightly from US$2,653 to US$2,626 between 1993 and 1997. A decline in banana markets is a major factor in this slow growth, while rapid expansion in the tourism sector has kept declines in the agricultural sector from depressing the entire economy. Unemployment is relatively high (16.7% in 1996), especially among young people.

The relationship between economic development and biodiversity is complex. The tourism and fishing sectors depend, to a significant extent, on the maintenance of that diversity, and most sectors could benefit from a more systematic exploration and promotion of sustainable uses of species and genetic resources. But economic needs also generate substantial negative impacts on the resource base, because of the need to transform natural habitats for agriculture, residential and commercial construction, and public infrastructures.

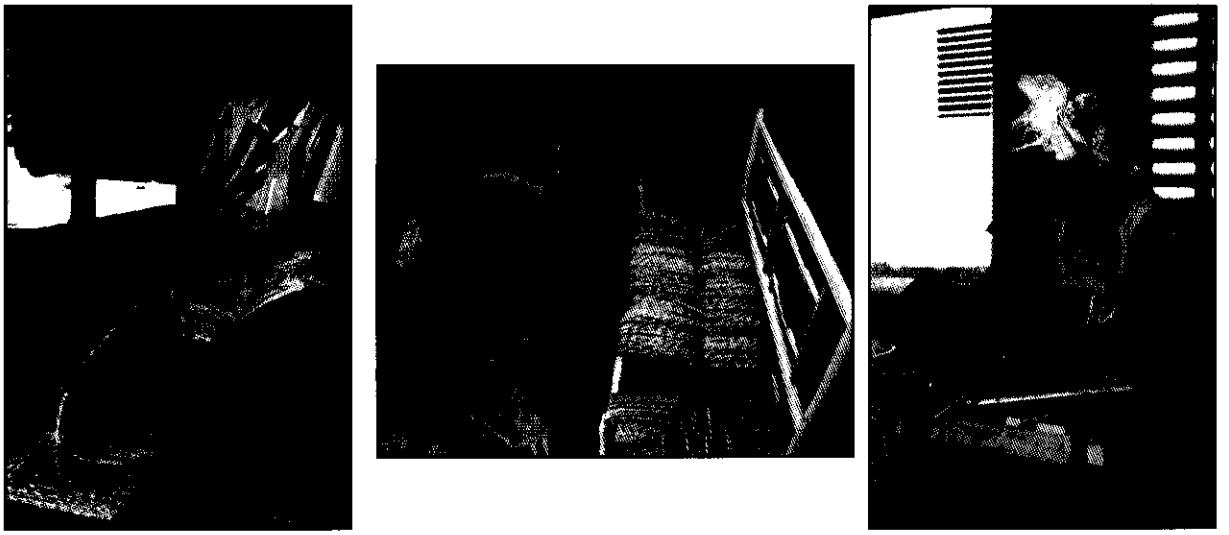
Cultural factors

St. Lucia has rich cultural traditions, and there is an important reservoir of traditional and popular knowledge, much of which is related to using and managing the country's biological resources. Several activities, including the production of charcoal, lumber, furniture, dug-out canoes and utensils, depend on an intimate knowledge of elements of local biological resources. Small farming systems have incorporated several cultural influences and are based on a wide variety of species and cultivars. Folk medicine makes extensive use of local plants. There are therefore a number of positive linkages between people and the biological diversity which they use and depend on.

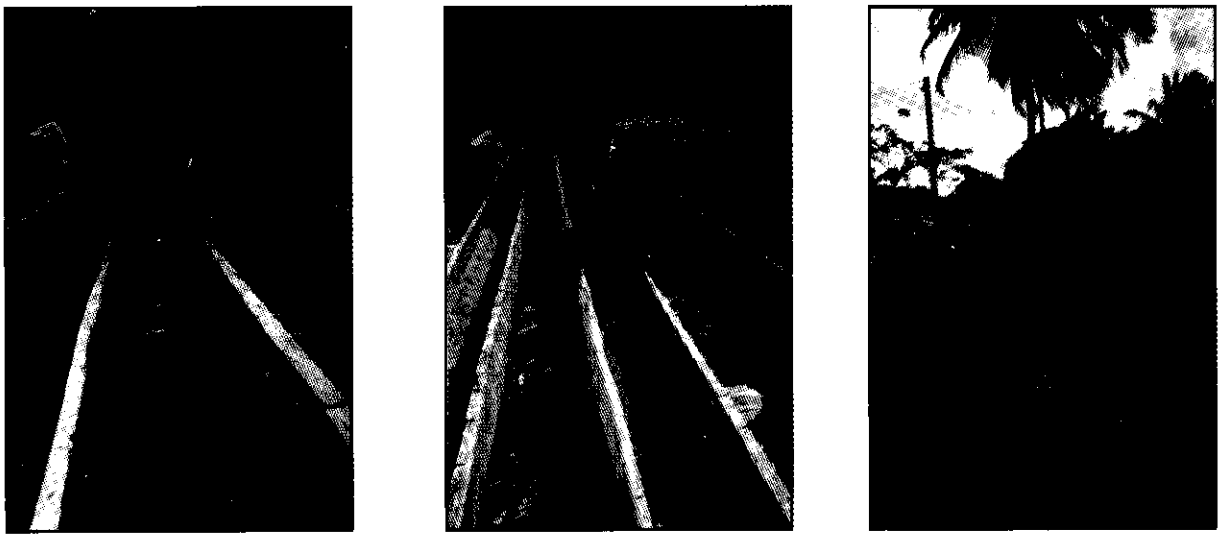
Cultural patterns and values have however evolved rapidly over the past decades, with a significant increase in consumption of imported goods, and the concentration of large sectors of the population in urban centres. Many St. Lucians appear not to be conscious of the importance of biological diversity, and of its current and potential impact on the quality of their lives. There are many cultural patterns, perceptions and attitudes which impact negatively on the natural environment, and on the quality of the relationship that people can develop with it.

Social factors

St. Lucia's population is growing at 1.64% annually, a rate slightly higher than the global average of 1.4%, and now totals approximately 154,540. The United Nations estimates that St. Lucia's population will be approximately 200,000 in 2025. Most of this population growth is concentrated in Castries, along the northwest coast, and in other coastal areas (where many endangered species occur). In fact, more than 50% of the population is now found in Castries and Gros Islet. The population density of this area (over 700 people per square kilometre) is extremely high and puts serious pressures on water supplies, transportation, sanitation and sewage, and solid waste disposal. This rate of population growth is increased by the migration of rural people to the capital city area in search of employment. Because of these growth patterns, remaining natural areas and processes are under severe pressure in the Castries and Gros Islet districts.



Craft making using natural plant materials



Construction of dug-out canoes—a less common but traditional activity

Resource tenure and access

Most agricultural lands, and a majority of forest lands, are privately owned. Two significant trends can be observed: on the one hand, many larger farms are being sold and broken into smaller holdings, while, at the lowest end of the scale, small farms between 2 and 4 hectares in size are increasing. Tenure is governed by the Napoleonic code in which all family members can lay claim to the land. This tenurial system fragments family lands, provides few incentives for long-term sustainable land management, and drives land-poor rural residents to clear steep slopes and forest areas. This has adverse impacts on people living, and activities occurring, in the lower parts of the catchment areas, and is a major threat to biodiversity.

There are however large areas of the forest which are under public ownership and management, and the government has embarked on a programme of land acquisition, for the purpose of protecting and managing important watersheds. This programme will have a positive impact on the ability of the forestry administration to conserve and manage the biological diversity contained in these areas.

All marine and most coastal ecosystems are under public ownership and management, and have suffered from a *de facto* situation of open access. This situation has however changed over the past two decades, with the establishment of new legislation for the management of marine resources and areas (1984), and with the strengthening of the agencies responsible for marine resource management, notably the Department of Fisheries in the Ministry of Agriculture, Forestry and Fisheries.

Institutional and legal context

The current institutional and legal context for biodiversity conservation and management is characterised by the following features:

- management responsibilities for biological resources are placed primarily within the Ministry of Agriculture, Forestry and Fisheries, but there is no formal mechanism for coordination among its various departments concerned with biodiversity issues;
- sectoral management agencies are strong, and have clear mandates for the management of biological diversity in specific sectors (forestry and wildlife, fisheries and marine resources, and agriculture);
- research and data management programmes and activities are insufficient to meet the information needs for biodiversity conservation and use in the country;
- legal instruments for the conservation and management of publicly owned resources appear generally adequate, but mechanisms for conservation and management of biodiversity on private property are weak;

- a new Physical Planning and Development Act is being considered, which will replace the existing legislation concerning physical planning and development control. The new Act will include Regulations governing the conduct of Environmental Impact Assessments;

- even when adequate legal instruments are in place, enforcement is often lacking;

- the country has established a small number of innovative participatory and collaborative natural resource management arrangements which provide examples of institutional arrangements which may be suitable to other areas.

Policy context

The policy context within which biodiversity conservation and management programmes are designed and implemented is characterised by the following:

- generally, low priority is given to biodiversity issues, which are not mentioned in the main national planning and policy making instruments. This reality is reflected in insufficient funding for biodiversity programmes;

- there is no overall policy framework to guide the conservation and management of biological diversity, except for the plan for a System of Protected Areas, which was prepared in 1992 under the auspices of the St. Lucia National Trust, but which has not been formally approved by government;

- there is no overall land and resource use plan. There are physical development plans, at various stages of formulation, for specific regions;

- policy guidance on biodiversity issues is provided, primarily, by the legislation governing individual sectors (Fisheries Act; Wildlife Protection Act; Forest, Soil and Water Conservation Ordinance), and by the relevant sectoral management plans (1992-2002 Forest Management Plan);

- there are a number of other sectors where policies impact significantly on the country's biodiversity. Indeed, it can be observed that the status of that diversity is determined, to a large extent, by prevailing policies in other sectors, namely:
    * agricultural development policies, which determine land use patterns as well as the use of selected species and varieties;
    * taxation policies and fiscal incentives, which have an impact on land use patterns and on technologies used in various sectors;
    * development control policies and procedures, which regulate many aspects of the construction and industrial sectors;
    * tourism development policies, particularly in relation to land use;

- regional and international agreements also provide policy guidance and direction, sometimes in very specific terms. Conventions of which St. Lucia is a contracting Party and which relate directly to biological diversity are as follows (see Country Study Report for detailed listing and description of status):
  * the United Nations Convention on Biological Diversity;
  * the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES);
  *the United Nations Convention on the Law of the Sea, and the Agreement for the Implementation of the Provisions of the UN Convention on the Law of the Sea Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks;
  * the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, known as the Cartagena Convention;
  * the Convention Concerning the Protection of the World Cultural and Natural Heritage;
  * the International Convention for the Regulation of Whaling;

- there exist some discrepancies between the national frameworks and instruments on the one hand, and the requirements of international agreements on the other.

A summary of issues, which are described in greater detail in the Country Study Report, is presented in the following appendices:

Appendix 1: trends affecting St. Lucia's biodiversity and causes of these trends;

Appendix 2: relationship between biodiversity and the main social and economic sectors.

4. AIM AND OBJECTIVES

The aim of the National Biodiversity Strategy and Action Plan (NBSAP) is to optimise the contribution of biological diversity to the sustainable economic, social and cultural development of St. Lucia.

The objectives of the strategy and action plan are to:

- conserve the country's diversity of ecosystems, species and genetic resources;

- promote sustainable uses of these resources in support of human development;

- encourage the equitable distribution of the benefits derived from the use of biodiversity;

- facilitate the participation of people and institutions in the management of biodiversity.

In order to achieve these objectives, the present strategy and action plan has been developed for the specific purpose of:

- providing a mandate and a set of policy directions to management authorities, developers and policy-makers;

- giving a reference point to government, non-governmental organisations, community-based groups and the general public to assist in the design and implementation of programmes and actions related to biodiversity;

- helping garner support, internally and externally, for the implementation of projects related to biodiversity.

5. APPROACH

An analysis of the issues and trends affecting St. Lucia's biological diversity reveals that they are the products of the patterns of development and management which have prevailed throughout the country's modern history. The vision for St. Lucia's biodiversity, as expressed in section 2 above, demands the adoption of a new approach to development, based on the principles of equity, sustainability and social justice.

A shift towards this new approach to development will require new management systems, at all levels, characterised by the following elements:

- *equity*: all stakeholders should have the opportunity to access the country's natural capital, and to generate benefits from the use of natural resources;

- *participation*: all sectors of society should have the opportunity to participate in the formulation and implementation of decisions which affect their lives and their future;

- *institutional collaboration*: management requires functional linkages and collaborative approaches among a wide range of institutions within government and civil society;

- *decentralisation and co-management*: whenever desirable and possible, management arrangements should be decentralised, and institutional collaboration should be governed by formal co-management agreements;

- *transparency*: the rationale for policies and decision, as well as the modalities of their implementation, should be accessible to all within society;

- *acceptance of change*: natural and human systems are constantly changing, and this reality must be accepted by all. There is no static condition, and change must be managed and built upon;

- *use of appropriate time frames*: management systems must recognise that the adoption of new management systems may take time, and that realistic time frames must be used in all interventions;

- *building of resilience*: there is need to build the capacity of systems and institutions to cope with and adapt to change;

- *enhancement of diversity*: in both natural and human systems, diversity is considered an asset and a guarantee of resilience and flexibility. It must therefore be maintained and enhanced whenever possible;

- *optimal sustainable use*: uses of biological resources must be sustainable. They must also be optimised, in order to ensure that they contribute as fully as possible to social and economic development;

- *increase in productivity*: in many instances, the conservation of biological diversity requires that systems be made more productive, to maximise benefits and reduce undesirable impacts;

- *respect for and reliance on experience and tradition*: in the design and implementation of new systems, there is need to build on the assets of the past, in a realistic manner;

- *innovation*: at the same time, there is need for new approaches and tools, and for technological innovation in all aspects of production and management;

- *flexibility in design and implementation*: management systems must not be rigid, and must be able to adapt to rapidly changing conditions;

- *provision of alternatives*: in cases where uses and practices are considered undesirable and may not be continued, there is need to offer realistic alternatives which guarantee, to the maximum extent possible, continued access to goods and services;

- *provision of benefits and incentives*: management must be based on voluntary compliance and self-enforcement, and is therefore helped by the provision of direct social and economic benefits and incentives to people;

- *initiative and use of forward planning*: management must not be reactive, it must be based on clear objectives and be able to anticipate issues and needs;

- *multi-disciplinarity and use of cross-sectoral approaches*: human and natural systems are so complex that their management needs to benefit from all skills and sources of knowledge, and should be based on an appreciation and understanding of that complexity;

- *preference for in situ conservation*: in all conservation activities, preference must be given, whenever possible, to maintaining species and genetic diversity in their natural state, rather than creating artificial conditions;

- *use of knowledge*: all management systems and activities must be based on the best available information, and appropriate measures must therefore be taken to ensure that such information is generated and made accessible;

- *precaution*: the management of natural systems must be guided by the precautionary principle, which demands that preference be given for uses and interventions which reduce risk and are least likely to provoke irreversible changes;

- *national interest, global responsibility*: all management systems must be guided by the national needs, but must also assume the country's responsibility to contribute to regional and international conservation objectives.

6. CONDITIONS AND REQUIREMENTS

The National Biodiversity Strategy and Action Plan must be part of a broader national initiative aimed at achieving environmental and economic sustainability, enhancing the quality of the lives of all St. Lucians, and preserving the nation's natural capital. It is recognised that the objectives outlined in section 4 above will not be met, and that the programmes described below will not be realised, in the absence of a radical shift in attitudes and approaches, and without the definition of a new policy framework for environmental management and sustainable development in the country.

This policy framework must recognise the critical role played by natural resources in supporting social and economic development, and should therefore integrate the conservation imperatives within the broader development agenda. It must accept that the quality and sustainability of all development processes will depend on the proper conservation and management of the country's fragile natural assets.

Effective implementation of the NBSAP will therefore require:

- the formulation, on the basis of previous studies and plans, notably the National Environmental Action Plan (NEAP), of a national environmental policy;

- the establishment of a national policy and coordinating body to guide implementation, monitoring and review of that national policy;

- the formulation, adoption and implementation of a comprehensive land policy to guide spatial development, land use and terrestrial resource allocation.

In addition, the success of the NBSAP will depend on the simultaneous adoption and implementation of suitable policies and programmes in key sectors, notably:

- *watershed and water resources management*: there is need for a comprehensive national policy to guide the management of watersheds and water resources, and for the formulation and implementation of integrated management plans for critical watershed areas;

- *agriculture*: there is need for a progressive transformation of the agricultural sector, with the diversification of production, the reduction of negative environmental impacts, and the strengthening of linkages between agriculture and other sectors of the economy, notably tourism;

- *tourism*: as the fastest growing sector of the economy, tourism needs to be guided by policies which guarantee the integrity of the natural resource base, increase the sustainable use of natural and cultural resources in support of tourism development, create positive linkages with people and their culture, and enhance the relationship between tourism and other sectors;

- *fisheries*: there is need to manage and develop the sector through the modernisation of fishing techniques, facilities and gear, increased production, the advancement of the social status of fishing families and communities, and the enhancement of linkages with other sectors of the economy.

PROGRAMME

In order to achieve the aim and objectives of the strategy and action plan, action is needed in five broad programme areas, which are considered to be mutually reinforcing, and thus require simultaneous implementation.

Planning and policy formulation

The *objectives* of this programme area, which relates to the provisions of Articles 6, 15 and 19 of the CBD, are to:

- guide all actions in the field of biodiversity conservation and management;
- ensure that concerns for biodiversity conservation and management are properly integrated into other relevant policies and policy instruments.

Activities to be undertaken under this programme area are as follows:

- on-going assessment of needs, and formulation of programmes and projects to respond to these needs;
- review of policies and legal instruments related to or impacting on biological diversity, to minimise or eliminate negative impacts, and to contribute, whenever possible, to the conservation and management of biodiversity;
- review of copyright legislation, to ensure that it provides for the registration of patents and for the protection of Intellectual Property Rights (IPR). The Caribbean Task Force which comprises the Inter-American Institute for Cooperation in Agriculture (IICA), the Organisation of Eastern Caribbean States (OECS), the CARICOM Secretariat and governments of the region is currently in the process of developing a legal framework for IPRs in agriculture;
- review of issues associated with biosafety and the potential impacts from the introduction of genetically modified organisms, and participation discussions of the Biosafety Protocol under the CBD;
- formulation of new and specific policy instruments when needed;
- formulation of area and watershed management plans for all critical zones;
- identification and introduction of fiscal and other incentives in support of conservation and sustainable use.

Responsibility for coordination and implementation will rest with the Ministry of Agriculture, Forestry and Fisheries and the Department of Environment of the Ministry of Planning, Development, Environment and Housing (or its successor in title and authority for environmental matters), in collaboration with all other relevant agencies at the governmental and non-governmental levels. Responsibility for legal review, notably as it relates to patents and property rights, will rest with the Attorney General's Chambers.

Research and monitoring

The *objectives* of this programme area, which relates to the provisions of Articles 7 and 12 of the CBD, are to:

- assess the status of biodiversity and understand the causes of biodiversity loss;
- provide the information needed for the formulation of programmes, actions, policies and priorities;
- contribute to the development of new knowledge on biological diversity at the local, regional and global levels.

Activities to be undertaken under this programme area are as follows:

- study of the threats affecting, and likely to affect, biological diversity, and identification of conservation priorities;
- study, design and implementation of a comprehensive monitoring programme, focusing in particular on: populations of threatened, endemic and endangered species; area coverage and status of natural ecosystems; status and evolution of agro-ecosystems;
- design of a research programme identifying priorities for research, and defining guidelines and procedures aimed at maximising the benefits generated from research activities;
- liaison with scientific and research institutions, including universities, to guide the contributions of external researchers, develop collaborative scientific programmes, and ensure that the results of research by external agencies are always returned and made available to St. Lucia;
- maintenance and management of a computerised data base and library with all published materials relevant to the conservation and management of biological diversity in St. Lucia.

Responsibility for coordination and implementation will rest with the Ministry of Agriculture, Forestry and Fisheries and the Department of Environment of the Ministry of Planning, Development, Environment and Housing (or its successor in title and authority for environmental matters).

Conservation

The *objectives* of this programme area, which relates to the provisions of Articles 8 and 9 of the CBD are to:

- maintain and enhance the genetic diversity within species;
- preserve rare, endangered and other important species;
- maintain representative samples of all ecosystems;
- restore degraded ecosystems whenever desirable and feasible.

Many of the *activities* to be undertaken under this programme area fall within the framework of the national plan for a System of Protected Areas which was prepared in 1992 by the St. Lucia National Trust in collaboration with a wide range of governmental and non-governmental agencies. The implementation of this plan therefore remains the primary vehicle for the conservation and management of natural ecosystems and wildlife in the country.

Other activities related to the conservation of species and genetic diversity *in situ* will include:

- development of collaborative agreements with selected land owners to ensure the conservation of ecosystems and habitats under private ownership;
- development of collaborative agreements with selected farmers to ensure the conservation of breeds and cultivars;
- design and implementation of restoration programmes for critical habitats, notably mangroves;
- creation and management of artificial habitats, such as artificial reefs, whenever appropriate.

With respect to *ex-situ* conservation, the following activities will be undertaken:

- creation and management of gardens of trees as well as other medicinal, ornamental and other useful plants;
- creation of zoos and other facilities for breeding endangered fauna;

- collaboration with foreign institutions when additional skills and resources are needed to ensure that *ex-situ* conservation is effective;
- *in vitro* conservation of plant germplasm;
- where feasible, establishment of field gene banks;
- maintenance of livestock stations for breeding and distribution of animal germplasm.

Responsibility for coordination and implementation will rest with the Ministry of Agriculture, Forestry and Fisheries and the Department of Environment of the Ministry of Planning, Development, Environment and Housing (or its successor in title and authority for environmental matters). Responsibility for the design and implementation of specific activities will rest with each of the participating agencies. With respect to the establishment and management of protected areas, these responsibilities will be allocated as stipulated in the System of Protected Areas.

Sustainable use

The *objectives* of this programme area, which relates to the provisions of Articles 10 and 14 of the CBD, are to:

- generate revenue and benefits from the use of biological resources;
- ensure that patterns of resource use are sustainable;
- guarantee the equitable sharing derived from the access to and use of biological resources;
- maximise the contribution of biodiversity to the achievement of priority objectives of national development.

Activities to be undertaken under this programme area are as follows:

- implementation of the national plan for a System of Protected Areas;
- design and implementation of a programme on organic farming;
- design and implementation of a programme on nature-based tourism;
- design and implementation of a programme on the sustainable use of biological resources and products;

- provision of training, extension and capacity-building services to users of biological resources, particularly those who depend on such resources to sustain their livelihoods, in order to enhance their ability to access and use resources in a secure and sustainable manner.

Responsibility for coordination and implementation will rest with the various participating agencies as appropriate.

Education and awareness

The *objectives* of this programme area, which relates to the provisions of Article 13 of the CBD, are to:

- ensure that policy formulation processes make effective use of all available information;
- create full awareness of the value and contribution of biodiversity to human development;
- provide materials in support of formal and informal education;
- encourage public participation in biodiversity conservation and sustainable use.

Activities to be undertaken under this programme area are as follows:

- dissemination of information to technocrats and policy makers;
- public awareness campaigns;
- educational programmes with schools, including the preparation and dissemination of materials;
- training of trainers and media personnel;
- development and operation of a system to collect, process and disseminate information on biodiversity issues and activities to the media, policy-makers, government agencies, community groups, and other target groups.

Responsibility for coordination and implementation will rest with the Ministry of Agriculture, Forestry and Fisheries and the Department of Environment of the Ministry of Planning, Development, Environment and Housing (or its successor in title and authority for environmental matters), working in close collaboration with a range of partners, including the Ministry of Education, the Government Information Service, media houses and other partners.

8. IMPLEMENTATION

Institutional arrangements

In accordance with the provisions of Article 4, 6 and 18(4) of the CBD, the design and operation of improved institutional arrangements for the conservation and management of the use of biodiversity should be guided by the principles identified in section 5 above, and notably by the following directions:

- *coordination*: there is need for improved coordination of policies and activities relevant to, or impacting on, biological diversity, as many of the problems currently observed result from the fragmentation of policy instruments and from the absence of effective coordination among actors;

- *collaboration*: there is need to establish effective partnerships among governmental and non-governmental partners, in order to mobilise the resources available from the public and private sectors, and to decentralise management authority;

- *effectiveness*: effective coordination and collaboration demand that overlaps in institutional responsibilities be avoided, and that authority be clearly allocated. In addition, individual management agencies must be allowed to perform their responsibilities fully.

In order to meet the expressed need for improved coordination, the Government of St. Lucia will establish, under the auspices of the Ministry of Agriculture, Forestry and Fisheries and the Department of Environment of the Ministry of Planning, Development, Environment and Housing (or its successor in title and authority for environmental matters), a mechanism which will have the responsibility:

- to coordinate the implementation, monitoring and review of the National Biodiversity Strategy and Action Plan, including the mobilisation of funding;

- to oversee, support, and, whenever appropriate, conduct activities and programmes to study, and monitor the status of, biological diversity;

- to design and implement national awareness and education programmes;

- to provide support to governmental and non-governmental agencies participating in the implementation of the National Biodiversity Strategy and Action Plan.

This mechanism could be constituted as a permanent or *ad hoc* committee, and should comprise representatives of government agencies, non-governmental organisations, community-based organisations, scientific bodies and natural resource user groups.

In the event that a National Environmental Commission or similar body is established, the mechanism created to coordinate the implementation of this National Biodiversity Strategy and Action Plan should be placed under its umbrella.

Legal instruments

The implementation of the National Biodiversity Strategy and Action Plan will rest primarily on the appropriate and effective enforcement of existing legislation. This will be made possible through:

- a greater involvement of law enforcement institutions in matters of biodiversity management and conservation, through increased collaboration with natural resource management agencies;
- a greater awareness of and sensitivity to biodiversity issues on the part of the judiciary;
- the participation of communities and non-governmental organisations in selected activities in support of enforcement;
- the development of specific regulations whenever they are needed.

At the same time, the agencies involved in the implementation of the National Biodiversity Strategy and Action Plan will work towards the adoption of new instruments, including new legislation to address issues associated with the destruction of biological resources on private lands, and to govern the conservation and use of wild plants and animals. It will also study the desirability and feasibility of:

- preparing a comprehensive piece of legislation to address a range of environmental issues and rationalise environmental management;
- establishing an environmental court to deal with offenses related to the environment;
- establishing formal mechanisms for collaborative enforcement among two or more management authorities.

Another important instrument in the implementation of the National Biodiversity Strategy and Action Plan will be the development and adoption of standards to guide the use of biological resources and the conduct of activities which may impact on these resources.

These legal instruments will all be consistent with the provisions of the CBD.

Organisational development and capacity building

The implementation of this National Biodiversity Strategy and Action Plan requires that all partners in the process have the full capacity to play their role effectively, as stipulated by the CBD, notably in Articles 12(a), 18(4) and 18(5). There is also need to ensure access to appropriate technology, as provided in Article 16.

In many respects, the approach described above calls for a shift in the role of agencies, with government departments acting as facilitators and supporters of processes which involve a number of public and private sector partners.

There is also need for training activities aimed at:

- governmental agencies, notably in the areas of participatory planning, conflict management, protected area management, research and resource monitoring, and conservation;
- community-based and non-governmental organisations, notably in the areas of resource monitoring, technologies for sustainable use, enforcement and public education;
- the private sector, notably with respect to technologies for sustainable resource use.

Community-based and non-governmental organisations involved in biodiversity management and conservation must also have improved access to the technical expertise available within governmental agencies and academic institutions.

Financing

In accordance with the provisions of Articles 11, 20(1), 20(6) and 21(4) of the CBD, a number of principles will guide the financing of biodiversity conservation and management programmes:

- financing must be seen in the broader context of the economic policies and instruments that will be used to promote biodiversity conservation and sustainable use;
- user fees will constitute an important source of revenue, but will also be designed as incentives for conservation and sustainable use;
- all sectors and stakeholders have a role to play in contributing to the cost of biological diversity conservation and management;
- because of the status of these resources, the financing of biological diversity conservation and management however remains a very special responsibility of the state;

- the international community has a key role to play in supporting St. Lucia's effort to manage its biological resources.

A number of instruments will therefore be put in place and utilised, including fees, grants, licenses, permits and taxes. While the "polluter pays" principle may also be applied, with the imposition of fines, measures will be taken to prevent it from being used by offenders as a license to impact negatively on biological resources.

Agencies responsible for the implementation of the National Biodiversity Strategy and Action Plan will also explore the desirability and feasibility of establishing a funding mechanism, which could be devoted solely to biodiversity or could encompass a broader environmental mandate, which could assist greatly in the generation and management of resources for the implementation of the strategy and action plan.

The possibility of establishing a funding mechanism for community initiatives in biodiversity conservation will also be explored, with particular attention to the option of capitalising such a fund through a partnership between government, the private sector and donor agencies.

Monitoring and evaluation

As stipulated in Articles 7 and 14 of the CBD, monitoring and evaluation will be an integral part of the implementation of the National Biodiversity Strategy and Action Plan. The following elements will therefore be put in place:

- indicators of sustainability, equity, effectiveness and efficiency;
- a national data base on biodiversity, covering areas such as: geographic coverage of critical systems, habitats and species populations, trends and threats;
- monitoring programmes at the national and local levels;
- participation of communities and non-governmental partners in the design and implementation of monitoring programmes;
- periodic evaluation of impacts of management;
- periodic publication of reports on the state of the environment, with an identification of trends and issues for the future.

Regional and international cooperation

The implementation of the National Biodiversity Strategy and Action Plan will require effective collaboration with a range of regional and international partners, as recommended by Articles 5, 17, and 18 of the CBD.

The objectives of this collaboration will be:

- to guarantee the compatibility of St. Lucia's efforts with those of other countries and regions;
- to facilitate the sharing of skills and expertise;
- to generate support for national activities and institutions, notably in the areas of training, research and information management, and project implementation.

The implementing agencies will therefore maintain and enhance their linkages with international institutions involved in biodiversity (for example IUCN - the World Conservation Union and the United Nations Environment Programme), bi-lateral agencies interested in supporting the conservation and sustainable use of St. Lucia's biodiversity, external non-governmental organisations, regional institutions and programmes, and research and academic institutions. They will also establish and maintain linkages with the national initiatives of relevant international organisations, notably UNESCO and its National Commission's Sub-Commission on Science and Technology.

9. PROJECTS [1$US=2.6882 Eastern Caribbean (EC) Dollars]

Project 1: Policy, institutional and legislative review

Rationale: As demonstrated by the studies and consultations carried out as part of the process of formulation of the NBSAP, there is need for a comprehensive policy framework to guide biodiversity conservation and management, there are critical gaps and overlaps in institutional arrangements, and the legal framework is inadequate to achieve the objectives of the strategy and action plan.

Objectives: The objectives of this project are to:

- provide an adequate and effective policy framework;
- identify the most appropriate institutional arrangements for effective biodiversity conservation and management;
- identify the legal requirements for effective policy implementation, including the harmonisation of laws, the preparation of new laws and regulations, and the refinement of enforcement mechanisms;
- enhance the capacity of relevant institutions to implement policy and to manage the use of biological resources effectively.

Activities: The main steps to be followed in this project are as follows:

- review of the National Environmental Action Plan (NEAP) and its recommendations, particularly as it relates to the establishment of the National Environmental Commission (NEC);
- study of the policy implications of the National Biodiversity Strategy and Action Plan;
- identification of policy issues requiring consideration or clarification;
- participatory formulation of specific policies when needed (including a policy on wildlife, for which a need has already been clearly identified);
- review of current institutional arrangements and formulation of recommendations, including the preparation of capacity-development plans for key organisations;
- study of the desirability and feasibility of establishing an institution or mechanism specifically dedicated to financing biodiversity programmes;

- review of current legal instruments, identification of gaps and overlaps, and formulation of recommendations;

- review of international conventions, their relevance to national needs, and the desirability of modifying St. Lucia's participation in these international instruments;

- determination of the feasibility and desirability of establishing a special court to deal with environmental offenses;

- consultation with land owners and other stakeholders, and identification of the most appropriate instruments to ensure the conservation of the biological diversity on private lands;

- development of new laws and regulations when needed (notably for the management of wild plants and animals).

Total estimated costs: EC$ 85,000/US$ 31,620.

Implementation and institutional arrangements. This project should be implemented under the auspices of the Ministry of Agriculture, Forestry and Fisheries and the Department of Environment of the Ministry of Planning, Development, Environment and Housing (or its successor in title and authority for environmental matters), by a broad-based committee established specifically for this purpose.

Project 2: Identification and selection of methods, tools, baseline variables, indicators and parameters needed for effective monitoring

Rationale: There is need for serious and effective monitoring of the status of biological diversity and the trends affecting its components, as this information is indispensable for management. Monitoring activities are typically based on carefully designed and selected instruments which provide the necessary information in the most effective and efficient manner. Considering this strategy and action plan's emphasis on participation, it is also essential to select parameters and indicators which can easily be understood and applied by non-scientists, and to devise mechanisms and activities which would document and use popular environmental knowledge.

Objectives: The objectives of this project are to:

- develop a national research focal point for biodiversity resource investigation;

- establish research protocols for investigations and the dissemination of information;

- implement mechanisms for the facilitation of coordination and collaboration between agencies concerned with biodiversity research.

Activities: The main components of this project are as follows:

- conduct a comprehensive review of research needs and compile current and proposed research initiatives in biodiversity investigations. This includes the identification of deficiencies and strengths within agencies, and the definition of areas of overlap between agencies concerned with data collection;

- identify research priorities and opportunities, with particular attention to the need to understand current and future threats to biological diversity, their root causes, and the measures required to manage them;

- draft a national policy on biological diversity research along with the development of research protocols, standards and mechanisms for dissemination of information;

- establish a national focal point for the coordination and streamlining of research initiatives between concerned agencies. This focal point will have strong institutional linkage with the Sir Arthur Lewis Community College and the University of the West Indies.

Total estimated costs: EC$ 900,000/US$ 334,797.

Implementation and institutional arrangements: This project will be a joint effort between facets of all local agencies concerned with research and will be spearheaded by the Ministry of Agriculture, Forestry and Fisheries and the Department of Environment of the Ministry of Planning, Development, Environment and Housing (or its successor in title and authority for environmental matters), working in collaboration with all other ministries and agencies concerned with scientific research and monitoring in relevant disciplines. The project will be phased over 4 years from initial assessments to development of research policy to establishment of the national research focal point.

Project 3: Comprehensive inventory of terrestrial biological resources

Rationale: There is a pressing need to compile data on local floral and faunal diversity and terrestrial ecosystems, with a view to assessing their status and identifying existing and potential threats to their survival. Little work has been carried out in this area and hence ecological relationships between species and the impacts of human interactions are poorly understood. Such a project will yield important baseline data upon which to develop effective management strategies, taking into account social and developmental issues and concerns.

Objectives: The objectives of this project are to:

- provide baseline data on the status of floral and faunal biodiversity on St. Lucia for monitoring and management;

- identify species and habitats that are currently endangered and develop management strategies to ensure population viability and habitat maintenance;

- expand the knowledge base on the uses and potential economic/social uses of local flora in their application in areas such as medicine, craft, soil and water conservation;

- increase public awareness on the need to conserve populations and habitats.

Activities: The main components of this project are as follows:

- identification of and consultation with relevant agencies and groups concerned with this data to assist in development of terms of reference for the project;

- development of the methodology for assessment of forest biodiversity; spatial characterization of vegetation types (aerial mapping) and on-ground survey assessment;

- setting criteria and standards, and identification of technologies for data capture;

- training of technicians and resource persons attached to the project;

- aerial mapping of all natural ecosystems on St. Lucia; subsequent conversion to digital (GIS) format for storage and analysis;

- ground survey for detailed assessment of ecological parameters;

- compilation of the active and latent social/economic importance of forest resources (medicinal, artisanal, etc.);

- processing and treatments of data and development of database on biological resources;

- dissemination of research results.

Total estimated costs: EC$ 1.5 million/US$ 557,994.

Implementation and institutional arrangements. This is a long-term initiative which will require a phased approach. It should be coordinated by the Department of Forestry, who should assume responsibility for the preparation of the project documents.

Project 4: Inventory of marine and coastal biodiversity

Rationale: In general, studies relating to biodiversity within coastal and marine areas focus on the wider Caribbean region rather than on specific islands. Hence, there is little, if any, information on the existence of indigenous, rare and endangered species in the coastal and marine areas of St. Lucia. In order to effectively protect and manage such biodiversity, there is first a need to conduct an inventory of biological resources in areas of potential interest. This inventory would provide baseline data essential to the monitoring and management of coastal and marine resources.

Objectives: The objectives of this project are to:

- provide a status report on all biological resources within the areas of focus;
- establish baselines required for effective monitoring and management of biological resources.

Activities: This project will be implemented as follows:

- acquisition of appropriate research team;
- identification of the extent of the study area;
- design and implementation of project;
- establishment of data base;
- production of document on findings;
- dissemination of research results.

Total estimated costs: EC$ 850,000/US$ 316,197

Implementation and institutional arrangements: This project will be coordinated by the Department of Fisheries.

Project 5: Assessment of the stocks of the Queen Conch, *Strombus gigas*

Rationale: The Queen Conch, *Strombus gigas*, locally known as lambi, is an important commercial species. Fish landing data and surveys conducted by the Department of Fisheries indicate that population density is declining and that the population may become threatened if a suitable management strategy is not implemented in the very near future.
It is thus necessary that the current status of the conch population, as well as the fluctuations over time, be determined island wide.

Objectives: The objectives of this project are to:

- determine the major conch habitats and population densities around the island;
- determine current and past fishing efforts;
- establish an effective management system.

Activities: The main activities to be implemented in this project are as follows:

- conduct, over an initial period of three years, quarterly underwater surveys of conch habitats, with emphasis on conch population locations and densities, impact of fishing effort, and environmental threats;
- conduct consultations with fishers and other stakeholders to review existing management arrangements and define new strategies.

Total estimated costs: EC$ 50,000 per year/US$ 18,600 per year.

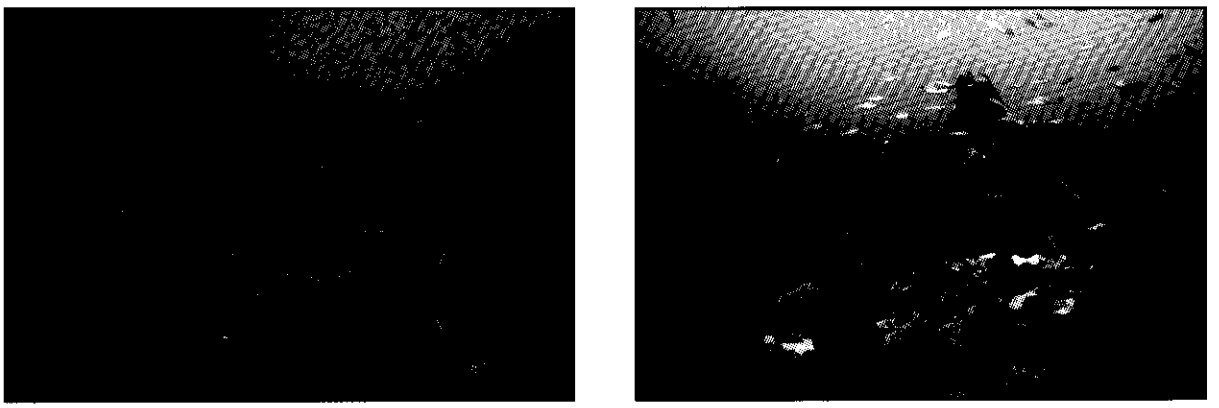
Implementation and institutional arrangements: This project will be implemented by the Department of Fisheries in collaboration with fishing communities. In the formulation of new management arrangements, the option of establishing formal co-management agreements will be considered.

Project 6: Assessment and management of wetlands

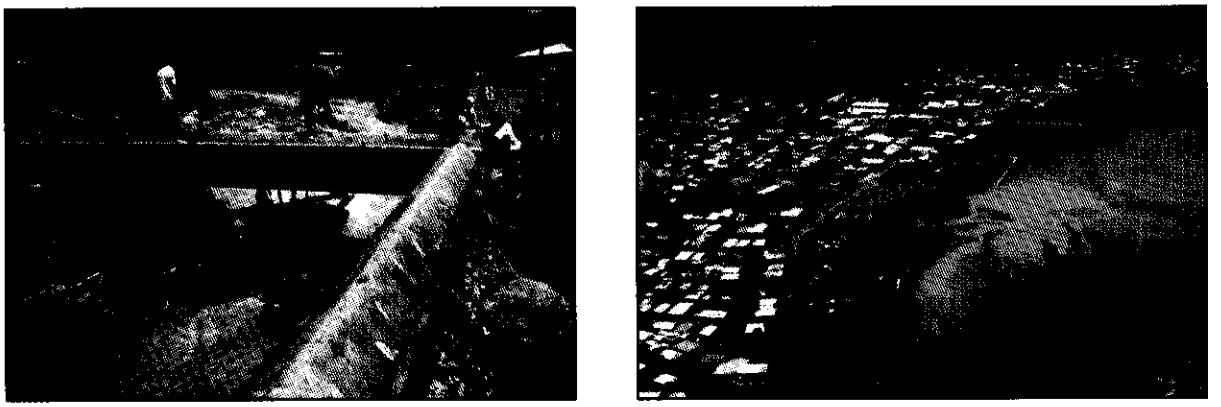
Rationale: Wetlands, including mangroves and other formations, are severely under threat from a variety of impacts, including changes in drainage patterns, land reclamation, waste disposal, coastal erosion and wood harvesting. There is need to conserve the remaining samples of these habitats, and this can only be achieved if there is a strong rationale for that conservation.

Objectives: The objectives of this project are to:

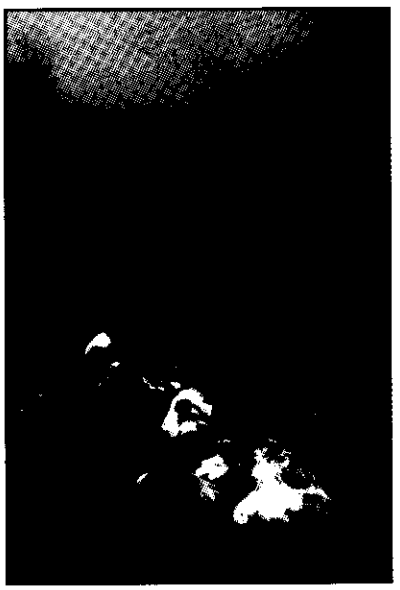
- assess the current status of wetlands in St. Lucia;
- identify the sources of impact and the issues requiring management;
- provide the basis for the development of conservation and management plans and arrangements for all remaining wetlands in St. Lucia;
- develop the economic and social argument to support policy decisions related to the future of wetlands.



A healthy marine environment



Activities on the land can have negative effects on the marine environment



Coral bleaching—an increasingly common phenomenon

Mangroves can help reduce the amount of sediment entering the marine environment

Activities: The main steps to be followed in this project are as follows:

- surveying and mapping of all wetlands;
- field surveys to assess status, identify stakeholders and management issues, and collect data on bio-physical conditions, uses and impacts;
- participatory planning processes to define management plans and establish new management arrangements;
- monitoring of the implementation of the mangrove management plans, and of the status of wetlands over time.

Total estimated costs: EC$ 80,000/US$ 29,760.

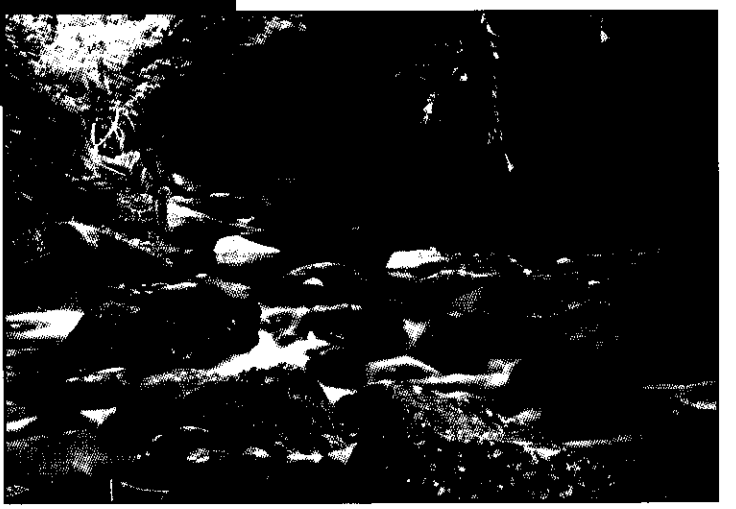
Implementation and institutional arrangements: This project will be implemented jointly by the Ministry of Agriculture, Forestry and Fisheries through its Departments of Fisheries and Forestry, working in collaboration with the St. Lucia National Trust, the Ministry of Communications, Works, Transport and Public Utilities, and the Ministry of Community Development, Culture, Local Development and Co-operatives. Communities living near wetlands and making use of these resources will also be involved.

Project 7: Assessment of freshwater biological resources

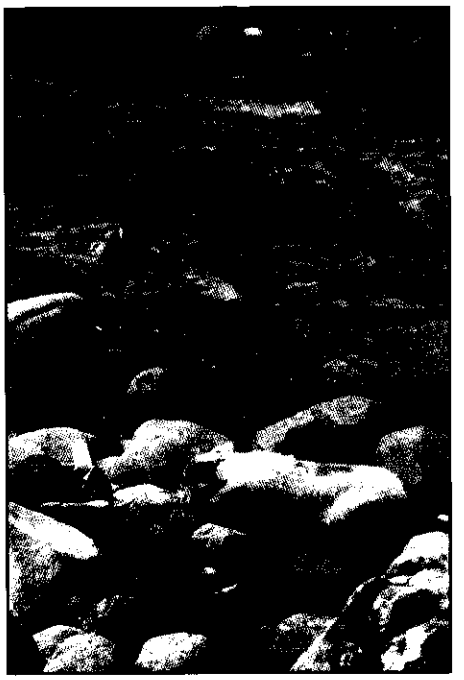
Rationale: Little is known about freshwater biological resources in St. Lucia, and freshwater ecosystems are possibly the most threatened on the island at this time. The real impacts of these factors (pollution, collapse or alteration of river banks, mining for sand and stones, sedimentation) are not properly documented and assessed, largely because of the absence of baseline data. There is a legitimate fear that biodiversity loss may only be realised when population numbers have fallen below those levels at which recovery remains possible.

Objectives: The objectives of this project are to:

- identify freshwater biological resources;
- establish a baseline of data (species distribution, migratory patterns, population densities, breeding patterns);
- establish management systems whenever required.



We need to protect our watersheds to safeguard our supplies of freshwater



Siltation of rivers after heavy and often only moderately heavy rainfall is becoming far too frequent

Activities: This project will involve:

- species collection and identification;
- mapping of habitats;
- field surveys to identify impacts and their sources;
- consultation with stakeholders;
- formulation of management plans and programmes.

Total estimated costs: EC$ 80,000/US$ 29,760 per year over three years.

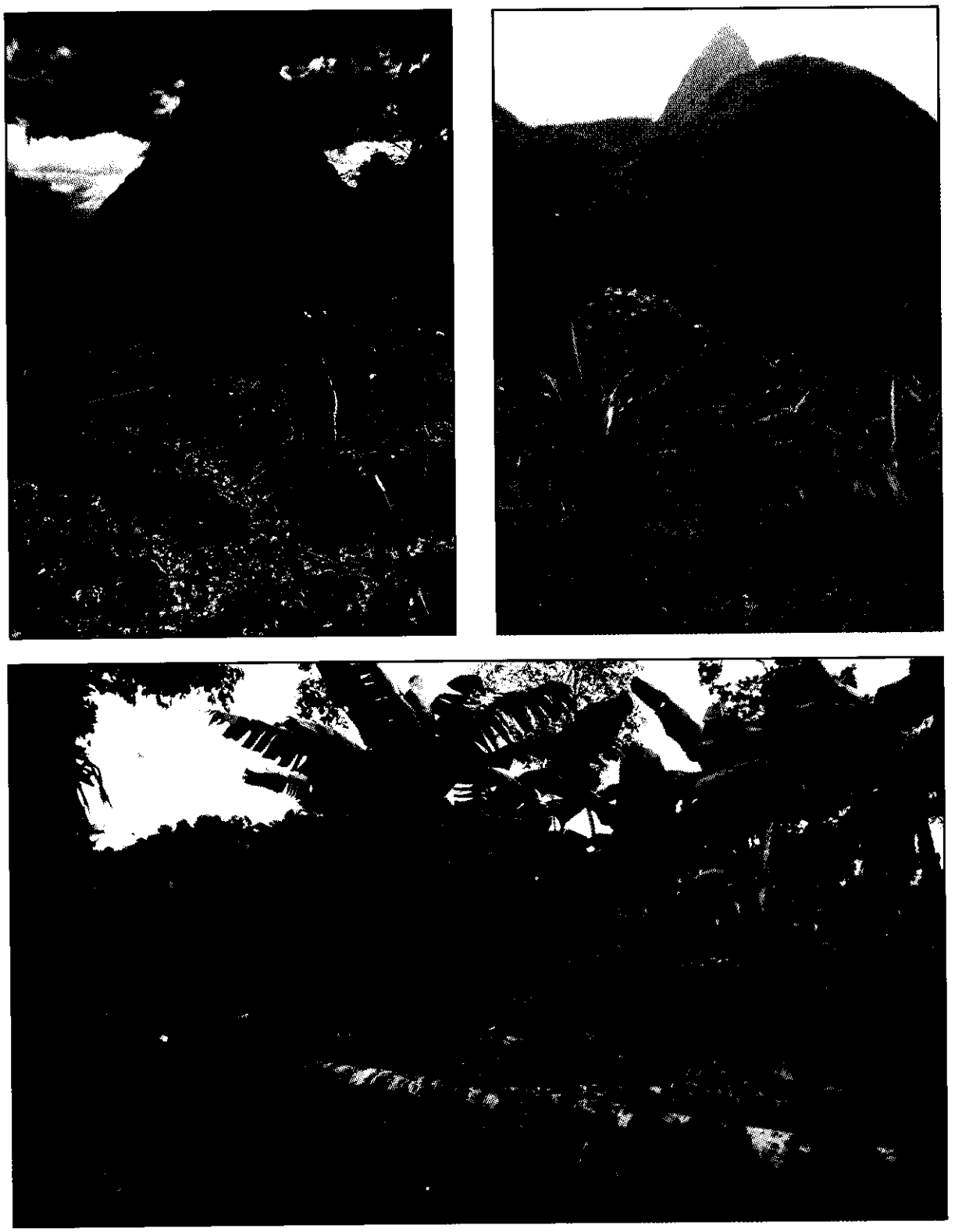
Implementation and institutional arrangements: This project will be implemented by the Department of the Environment of the Ministry of Planning, Development, Environment and Housing(or its successor in title and authority for environmental matters) in collaboration with the Departments of Fisheries and Forestry.

Project 8: Inventory of biological resources of importance to agriculture

Rationale: St. Lucia is rich in plant and animal genetic resources, many of which can be exploited for social and economic benefits. The island also has genetic resources that are in danger of being lost due to misuse. The conservation and sustainable use of these resources cannot be planned and organised in the absence of appropriate information . An inventory of plant genetic resources would enable the country to know the resources that are threatened and those that offer potential for economic uses. The island also has other flora and fauna that are of significance to various economic sectors, notably agriculture and health. These include arthropods and micro-organisms, many of which cause or transmit diseases. It is therefore essential that people be aware of the species present on the island.

Objectives: The objectives of this project are to:

- develop management systems for selected species of flora and fauna;
- provide the information base required for the design and implementation of conservation and sustainable use programmes;
- establish the baselines needed for monitoring.



Clearing and subsequent exposure of land for long periods and the practice of monoculture can have negative impacts on biodiversity

Activities: The main steps to be followed in this project are as follows:

- identification of specific targets (ornamental species, medicinal plants, root and tuber crops, herbs and spices, arthropods, and other beneficial and disease-causing organisms);
- design of data base system and research protocols;
- establishment of gene banks for evaluation of germplasm;
- establishment of *in vitro* gene banks and *in situ* sites for conservation of germplasm;
- collection and management of information;
- development of a plant and animal genetic resources management system

Total estimated costs: EC$ 1.4 million/US$ 520,795.

Implementation and institutional arrangements: This project will be coordinated by the Department of Agriculture, in collaboration with relevant regional and international agencies.

Project 9: Study and determination of the carrying capacity of critical areas used for tourism and recreation

Rationale: The environments used for land-based eco-tourism and recreation activities vary from the use of forest and hiking trails to visits to waterfalls. These activities create a variety of environmental and user management challenges. One such challenge is that of determining the carrying capacity of critical areas used for eco-tourism and recreation activities, in order to prevent or minimise environmental impacts. Given the growing need for diversification of the St. Lucian economy, the existing trend of upgrading and developing new sites for eco-tourism and recreation will surely be maintained in the short and medium terms. To ensure that the environmental quality of sites and attractions is maintained and that their use is sustainable over the long term, three basic and related components of carrying capacity must be considered. These are: (1) management objectives, (2) visitor attitude and demand, and (3) impact of visitation and other uses on resources.

Objectives: The objectives of this project are to:

- determine management objectives for specific eco-tourism/recreation sites;
- determine the appropriate level of use for specific eco-tourism/recreation sites;
- develop and apply the appropriate tools to determine visitor attitudes towards the product presented;

- develop and apply the appropriate methodology and tools to determine physical environmental degradation;
- conserve the natural environment, while allowing for visitor participation;
- generate revenue (optimize revenue).

Activities: The main steps to be followed in this project are as follows:

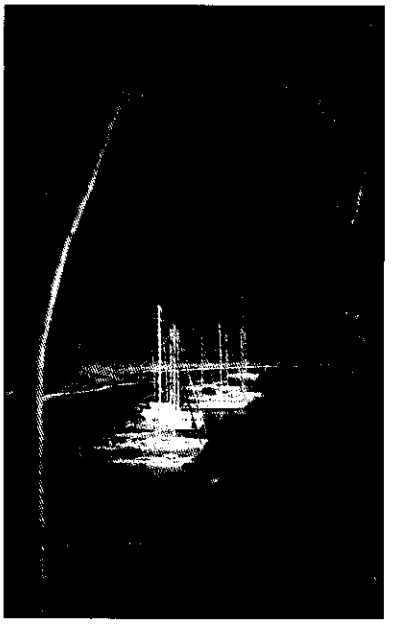
- identification of natural and cultural assets of each site, including flora and fauna as well as physical features that constitute its tourism and recreation potential;
- determination of the operational procedures and the interpretation skills required for the type of product provided;
- setting of standards and values for persons involved in the management of such sites;
- conduct of visitor surveys on a half yearly basis and provision of a monitoring system, including the conduct of surveys to determine the impact of trail management practices
- development of appropriate communication methods and programmes;
- review of management profiles, and assessment of management practices and inventories (methods);
- conduct of inventories of trails and other facilities;
- determination of user fees system adapted to the specific site.

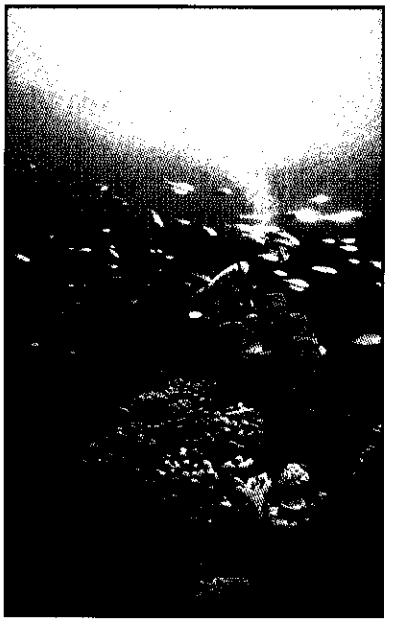
Estimated costs: This will be dependent on the number of sites covered.

Implementation and institutional arrangements: This project will be co-ordinated by the Department of Forestry, working in close collaboration with the Ministry of Tourism, the St. Lucia National Trust and the relevant NGOs and CBOs.

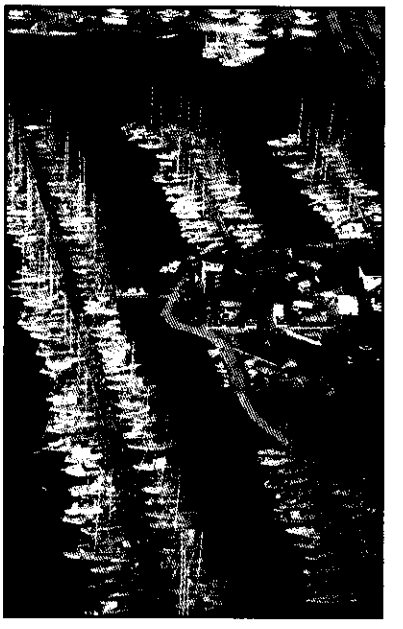
Project 10: Design of standards and guidelines of behaviour in nature tourism sites and attractions

Rationale: Human behaviour is the primary source of negative impacts on tourism sites and attractions in sensitive habitats. There is need to provide simple yet effective guidelines in order to guide behaviour and thus maintain a positive relationship between tourism and biodiversity.

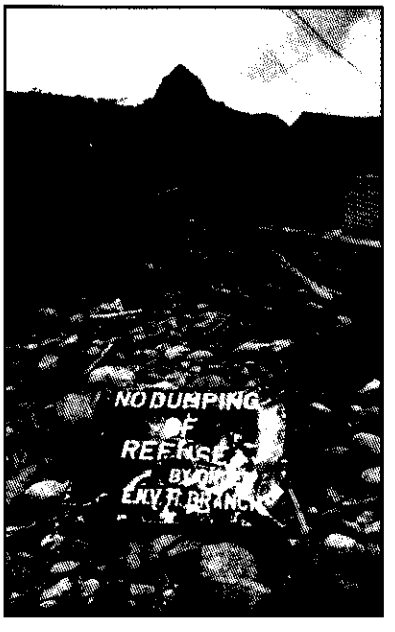


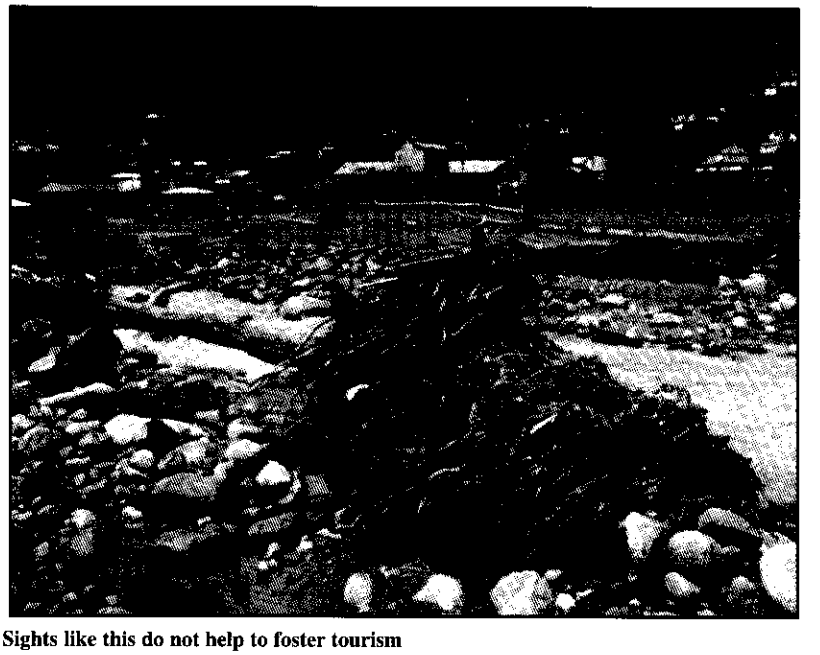


Water-based eco-tourism is an important revenue generator



Congestion is becoming increasingly apparent in some areas





Sights like this do not help to foster tourism

Objectives: The objectives of this project are to:

- conserve biodiversity in nature tourism sites and attractions;
- maintain the quality of tourism sites and attractions, and enhance visitor experience.

Activities: The activities to be undertaken under this project include:

- monitoring of behaviour and impacts in selected representative sites and attractions;
- identification and promotion of alternative behaviour when desired;
- training of managers of sites and attractions;
- development of brochures and other information materials.

Costs: To be estimated.

Implementation and institutional arrangements: This project will be implemented b the Ministry of Tourism in conjunction with relevant community groups, tour suppliers and destination management companies.

Project 11: Review of the national plan for a System of Protected Areas

Rationale: The national plan for a System of Protected Areas, which was developed in 1992, constitutes the most comprehensive planning instrument available in St. Lucia in the field of biodiversity conservation and management. It meets one of the main requirements of the CBD, and has served as an informal guide to many planning and natural resource management agencies and initiatives over the past few years. It can form the basis for the implementation of a significant portion of the NBSAP.

Objectives: The objectives of this project are to:

- revise the national plan for a System of Protected Areas to ensure that it meets current needs and takes advantages of all available resources and opportunities;
- strengthen linkages between the System of Protected Areas and socio-economic development issues and objectives;
- seek formal endorsement of the plan by the Government of St. Lucia;
- identify the elements needed for the full and effective implementation of the plan.

Activities: The main steps to be followed in this project are as follows:

- participatory review of the plan, identification of changes and adaptations needed, and submission of the conclusions of the review to the Cabinet of Ministers;

- identification of training, organisational development, funding and technical requirements for the implementation of the plan, and of specific measures needed to meet these requirements.

Total estimated costs: EC$ 75,000/US$ 27,900.

Implementation and institutional arrangements: This project will be implemented by the Ministry of Agriculture, Forestry and Fisheries, the Department of the Environment of the Ministry of Planning, Development, Environment and Housing (or its successor in title and authority for environmental matters) and the St. Lucia National Trust.

Project 12. The economics of biodiversity loss and conservation

Rationale: While it is acknowledged that non-measurable values provide an important rationale for biodiversity conservation, it remains useful to determine the quantitative values of that diversity. Such information can be critical in the design and implementation of advocacy and management programmes. It can also assist in guiding the identification of policy instruments, by determining and quantifying the economic causes of problems, as well as the measures that can assist in achieving conservation and management objectives.

Objectives: The objectives of this project are to:

- improve the effectiveness of biodiversity conservation and management programmes, through the use of appropriate economic instruments;

- assist in conflict management and conflict resolution, by providing data to assess the interests and needs of various parties.

Activities: The main steps to be followed in this project are as follows:

- study of the economic causes of biodiversity loss, with particular attention to: perverse incentives; insecure property rights; growth in demands for resources; inequitable access to resources and distribution of results;

- quantification of the value of the various components of biodiversity;

- identification and assessment of the economic instruments available to assist with biodiversity conservation, including incentives (user fees, taxes, permits, subsidies, compensation, liability and credit), controls (quotas as well as spatial and temporal limits to entry, use and access) and financing mechanisms (revenue generation, user fees, loans and debt-for-nature swaps);

- dissemination of results and application of fiscal and financial instruments identified during this study.

Total estimated costs: EC$ 85,000/US$ 31,620.

Implementation and institutional arrangements: This project will be implemented by the Ministry of Agriculture, Forestry and Fisheries and the Department of the Environment of the Ministry of Planning, Development, Environment and Housing (or its successor in title and authority for environmental matters), working in close collaboration with other relevant organizations..

Project 13: Training

Rationale: In order to implement the NBSAP and to meet the broader challenges of natural resource management and conservation in St. Lucia, there is need for a concerted effort to build, acquire and enhance the necessary skills among a range of organisations. When skills are needed but not available on-island, there may also be need to acquire them.

Objectives: The objectives of this project are to:

- strengthen the capacity of organisations to participate in the management and conservation of biological diversity;

- reduce the dependency of St. Lucian organisations on external expertise to conduct biodiversity-related work.

Activities: Domains and fields in which training will be given priority include the following:

- herbarium management;

- taxonomy;

- ecosystem management and restoration;

- research and monitoring techniques.

The project will involve the formulation of a detailed training strategy and the identification of implementation mechanisms.

Total estimated costs: EC$ 45,000/US$ 16,740 for the formulation of the training strategy; other costs to be determined on the basis of the contents of the strategy and specific needs identified.

Implementation and institutional arrangements: This project will be implemented jointly by the Ministry of Agriculture, Forestry and Fisheries, the Department of the Environment of the Ministry of Planning, Development, Environment and Housing (or its successor in title and authority for environmental matters) and the Ministry of Education, Human Resource Development, Youth and Sports.

Project 14: Establishment of management programmes for the protection of the endemic and rare species of birds

Rationale: There are a few threatened bird species in St. Lucia that require immediate and active intervention to ensure their survival. A major hindrance however is the fact that not enough is known about these species to make effective management recommendations. This situation is particularly difficult for species whose range occurs outside protected areas (forest reserves). The species to be studied include the White-breasted Thrasher (*Ramphocinclus brachyrus*), Rufous Nightjar (*Caprimulgus rufus*), St. Lucia Oriole (*Icterus laudabilis*), House Wren (*Troglodytes aedon*) and the St. Lucia Blackfinch (*Melanospiza richardsoni*).

Objectives: The objectives of the project are to:

- define and protect the habitats of these species;
- increase public sensitization on the status and need to conserve these species;
- enhance the contribution of endemic and rare bird species to St. Lucia's eco-tourism product and experience.

Activities: The main components to be carried out in this project are as follows:

- mapping of habitats and determination of land ownership and land tenure issues within rare bird habitats;
- consultations with relevant stakeholders;
- training of project personnel in applied wildlife research techniques, data acquisition and analysis;
- population censuses and monitoring;
- research on reproductive biology and habitat ecology;

- participatory formulation of management plans and interventions that include establishment of management areas, public education and monitoring and linking conservation to potential eco-tourism investment;

- establishment of Nature Reserves as appropriate.

Total estimated costs: EC$ 850,000/US$ 316,197.

Implementation and institutional arrangements: This project will be implemented by the Department of Forestry, working in close collaboration with local communities. The institutional arrangements for the management of the reserves will be determined as a result of the participatory planning process mentioned above.

Project 15: Establishment of a turtle monitoring programme

Rationale: For several years, there has been a moratorium on the harvesting of marine turtles in St. Lucia. In order to provide the basis for the formulation of future management programmes, there is need to continually monitor and evaluate marine sea turtle stocks. However, given the demands of fishers and some members of the general public for an open/close season, there is an urgent need to determine the status of the turtle population.

Objectives: The objectives of the project are to:

- assess the status of the marine turtle resources in St. Lucia and provide the information required for management;

- develop a management strategy for marine turtles.

Activities: The project will:

- assess population densities and the impacts of various human activities, including fishing, tourism, human settlements and agriculture;

- conduct a genetic analysis of turtle resources;

- identify and describe major nesting beaches on St. Lucia;

- identify the migratory patterns of the various species found in St. Lucia, using DNA markers;

- identify existing threats to the nesting of turtles;

- conduct a survey of communities that have traditionally harvested turtles and determine the socio-economic impact of various management regimes on these communities;

- conduct frequency surveys of nesting on major nesting beaches;

- determine peak nesting periods;

- conduct underwater surveys to determine feeding grounds, migratory patterns and fishing threats.

Total estimated costs: EC$ 150,000/US$ 55,799.

Implementation and institutional arrangements: This project will be implemented by the Department of Fisheries in collaboration with community groups.

Project 16: Establishment of a photographic and videographic data base on biodiversity

Rationale: Photography and videography are indispensable tools for monitoring and management. They also serve education and public awareness activities, providing the materials to illustrate and communicate information about biological diversity. The collection and management of photographic and videographic data require special facilities and skills which can best be provided if they are assembled in one location. In the absence of such skills and facilities, biodiversity-related programmes are less effective, and the quality of their outputs suffers.

Objectives: The objectives of this project are to:

- establish a photographic and videographic data base on biological diversity in St. Lucia;

- provide materials in support of monitoring programmes;

- provide materials in support of educational and promotional activities.

Activities: This project will be implemented in phases, as follows:

- identification of an agency to serve as coordinating and implementing body;

- establishment of facilities for storage, filing and retrieval, and training of staff as required;

- compilation of materials available from participating agencies;

- development of procedures and protocols for use and publication of materials by third parties;

- design and implementation of a project to develop a photographic documentation of all rivers, wetlands, forest types and marine ecosystems in St. Lucia

Costs: To be estimated.

Implementation and institutional arrangements: This project will be coordinated by the Ministry of Agriculture, Forestry and Fisheries and the Department of Environment of the Ministry of Planning, Development, Environment and Housing (or its successor in title and authority for environmental matters), working in close collaboration with other relevant organizations.

Project 17: Education, public awareness and participation

Rationale: The objectives of the National Biodiversity Strategy and Action Plan cannot be achieved in the absence of a full level of awareness among all members of the public. In addition, all citizens need to be equipped with the knowledge and skills that will allow them to contribute to the conservation and management of the country's biodiversity. Formal and informal means of education and communication must therefore be used.

Objectives: The objectives of this project are to:

- sensitise the general public, including visitors to the island, on the importance of biodiversity;

- generate appropriate behaviour;

- create support for biodiversity conservation and management programmes;

- encourage active community participation in biodiversity conservation and management;

- increase the effectiveness of biodiversity conservation and management programmes, as a result of a greater involvement of the public;

- stimulate community participation in biodiversity conservation and management.

Activities: The main steps to be followed in this project are as follows:

- conduct of advertising campaigns and media programmes;

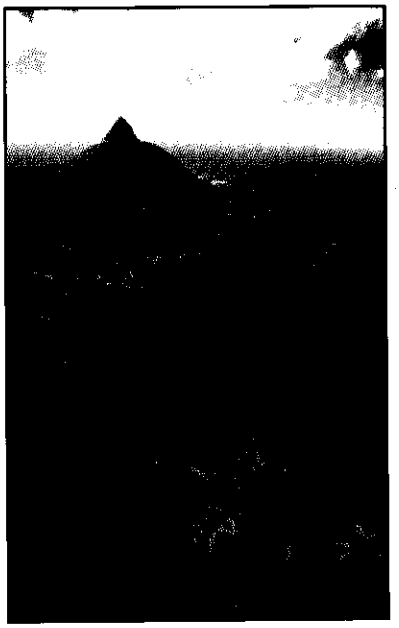
- formulate an action plan and strategy in collaboration with the Ministry of Education for the development, production and dissemination of educational materials;
- training of teachers in the use of these materials;
- strengthening of community groups involved or interested in biodiversity conservation and sustainable use;
- establishment of a small grants fund to support community-based activities in biodiversity conservation;
- provision of information to community organisations to enhance their capacity to participate in biodiversity conservation programmes;
- facilitation of networking among community groups through regular meetings, newsletters and joint activities;
- facilitation of local planning processes to formulate local-level responses to issues affecting biodiversity, and to design projects and actions aimed at conservation and sustainable use.

Total estimated costs: EC$ 200,000/US$ 74,399.

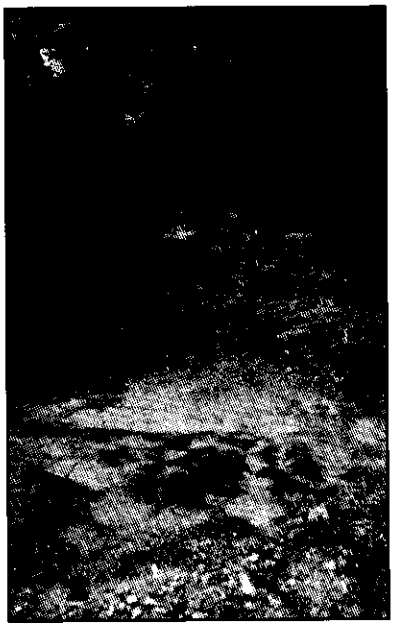
Implementation and institutional arrangements: This project will be implemented jointly by the Ministry of Agriculture, Forestry and Fisheries, the St. Lucia National Trust, the Department of Environment of the Ministry of Planning, Development, Environment and Housing (or its successor in title and authority for environmental matters) and other relevant agencies.

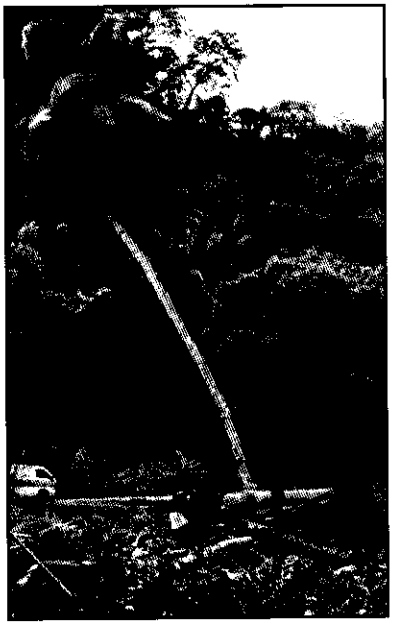
Project 18: Upgrading of national herbarium, and creation of sub-collections

Rationale: The National Herbarium of St. Lucia is administered by the Department of Forestry. It presently has a collection at least 1,300 species of native flora species which are stored in four metal filing cabinets in an air conditioned room. The herbarium also has a medium sized deep freezer which is used for storage of field collected flora samples. There is no separation between the floor area where the filing cabinets are located, the freezer and the working and drying area. Presently, the herbarium is managed by a forest officer who has no formal training in herbarium management, but has learnt through experience. This same officer acts as curator, technician and collector, and therefore is the custodian of the collection. There is no other significant plant collection on the island, neither does St. Lucia have its own published flora. The main reference work are regional studies which are incomplete and somewhat outdated, especially as some of the botanical names used are no longer valid. The National Herbarium will become an invaluable source of information on St. Lucia's indigenous flora to a wide range of user groups from schools to research institutions.



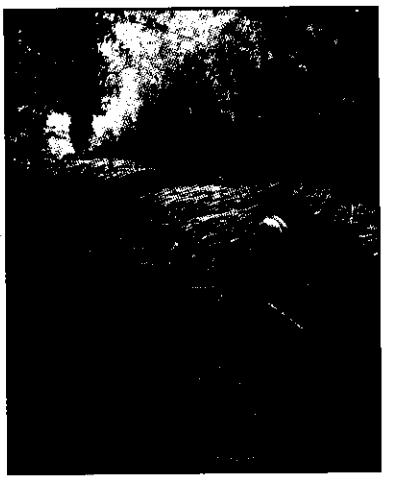
A healthy forest environment





Clearing of forest lands for lumber and agriculture—a common practice

Trail through forest



Mangroves can be harvested in a sustainable manner for charcoal production as in the case of the Mankoté Mangrove

Objectives: The objectives of this project are to :

- catalogue and establish a database for specimens compiled in the national herbarium;
- establish a management structure for the national herbarium;
- add new flora specimens to the present collection, also, to include non-vascular plants;
- improve on the existing physical conditions in the herbarium;
- establish a protocol for the operational functioning of the herbarium;
- develop a tool for monitoring and updating the status of all flora species in the different life zones;
- develop the staffing required for the full time management of the herbarium;
- dissemination of all relevant information to research institutes and the general public.

Activities: The main steps to be followed in this project are as follows:

- conduct an inventory and sample all natural vegetation types in all recognized life zones of the island;
- collection of three samples of each species of St. Lucia's flora;
- partitioning of the herbarium to include the following - filing room, storage room, drying room and laboratory room;
- purchasing of all necessary equipment, tools, materials and literature required for smooth operation of the national herbarium;
- procurement of the services of a plant taxonomist to spearhead the collection and cataloguing process, and identification of the various flora species (taxon of the species);
- collaboration with the Sir Arthur Lewis Community College and the University of the West Indies, St. Augustine Campus, for setting up a center to house the second and third sub-collections;
- training persons in the following fields - general botany, economic botany, ecology, ethno-botany, field methodology and herbarium management techniques;

Total estimated costs: EC$ 850,000/US$ 316,197.

Implementation and institutional arrangements: This project will be co-ordinated by the Department of Forestry in close collaboration with the relevant NGOs, the Sir Arthur Lewis Community College and the University of the West Indies, St. Augustine Campus.

Project 19: Development of artificial habitats for coastal and marine resources

Rationale: There is need to replace lost habitats and thus prevent or halt the loss (by death, migration, and loss of fecundity) of certain threatened and important marine species such as lobsters, reef fish, conch, sea urchin and coastal pelagics.

Objectives: The objectives of this project are to:

identify critical marine areas and ecosystems under threat;

- research, identify and establish environmentally suitable artificial habitats which will improve and if necessary replace threatened or lost habitats.

Activities: This project will involve the following activities:

- conduct of relevant surveys in coastal and offshore areas to determine habitats under threat of destruction;
- establishment of samples of artificial habitats (e.g. lobster house and artificial reefs) to determine their impact on biodiversity conservation;
- conduct of relevant public education and awareness programmes, especially among fishing communities;
- formulation of a comprehensive programme for the development of artificial habitats.

Total estimated costs: EC$ 150,000/US$ 55,799.

Implementation and institutional arrangements: This project will be implemented by the Department of Fisheries.

Project 20: Evaluation of the medicinal and culinary properties of herbs

Rationale: A number of herbs have traditionally been used for medicinal and aromatic purposes. There are other species which are not currently used in the country, but which are known to other societies for their medicinal and culinary uses. There would be much to gain from a systematic investigation of the current and potential uses of these herbs.

Objectives: The objectives of this project are to:

- foster greater awareness of the uses of local herbs;
- promote small-scale business activities based on the sustainable use of these resources;
- contribute to agricultural diversification.

Activities: The main steps to be followed in this project are as follows:

- surveys of current knowledge about uses of herbs in the country;
- collection of information from other countries;
- preparation of a technical package to guide processing and commercial uses;
- dissemination of information to farmers and processors;
- provision of technical assistance for processing and producing.

Total estimated costs: EC$ 76,000/US$ 28,272.

Implementation and institutional arrangements: This project will be implemented by the Department of Forestry, in collaboration with the St. Lucia National Trust and other relevant organisations.

Project 21: Promotion of organic farming

Rationale: The use of organic methods has a positive impact on biodiversity, as it reduces the negative impacts associated with the use of agro-chemicals, and encourages the use of more local species and varieties, thus increasing the chance of contributing to the conservation and dissemination of cultivars. Produce from organic farms are known to be better for human health. Organic farming offers the additional benefit of using organic waste in the production system.

These methods are relatively well known, but there are a number of obstacles to their acceptance by a larger number of farmers, including the lack of awareness of the benefits of organic farming, the absence of a strong demand from the consumer, and the weakness of marketing arrangements.

Objectives: The objectives of this project are to:

- support the growth of organic farming;
- reduce the negative impacts of agricultural production on biodiversity.

Activities: The main activities to be implemented in this project are as follows:

- public awareness campaign on the value and benefits of organic farming, and on the qualities of organic produce;
- sensitisation of the farming community, and extension of organic farming methods to interested farmers;
- provision of funding and technical assistance to pilot projects;
- liaison with public and private sector interests to improve marketing arrangements;
- conduct of a study to establish the feasibility of a programme of certification of organic farmers and produce.

Costs: To be estimated.

Implementation and institutional arrangements: This project will be implemented under the auspices of the Department of Agriculture, acting in collaboration with the Ministries of Education and Commerce and with relevant community organisations, notably the National Council for the Advancement of Rastafari.

Project 22: Increasing and managing plant diversity for sustainable rural livelihoods

Rationale: There are a number of plant species which provide useful goods and services to people, as well as the basis for sustainable uses that can bring benefits to people while maintaining diversity. The propagation of these species can bring the additional benefits of enhancing the use of marginal lands, assisting in the beautification of public areas and landscapes, and improving soil conservation.

Objectives: The objectives of this project are to:

- conserve important species and cultivars;
- sustain the production of goods which contribute to local production and subsistence systems;
- generate revenue and employment for small-scale producers;

- enhance St. Lucia's tourism product by improving the quality and diversity of craft and art work offered to visitors.

Activities: The main steps to be followed in this project are as follows:

- identification of the plant species that are the best candidates for a propagation programme (Latanier, *Cocothrynax barbadensis*, used in the making of brooms; spices; cashew trees; indigenous timber species; etc.);

- identification of potential partners at the community level;

- establishment of community-based nurseries, and propagation of plants in established government nurseries;

- provision of training and technical assistance to community groups.

Costs: To be estimated.

Implementation and institutional arrangements: This project will be co-ordinated by the Department of Forestry, working in close collaboration with the Department of Agriculture and with relevant NGOs and community groups.

Appendix 1: TRENDS AFFECTING ST. LUCIA'S BIODIVERSITY AND CAUSES OF THESE TRENDS

Ecosystems	Threats	Causes
Forests and Terrestrial Wildlife There are five forest types (rainforest, lower montane rainforest, montane elfin woodland, secondary forest, and dry scrub woodland) covering approximately 35% of the land area. 1/3 of the forest area is in government forest reserves, including one protected area (the Parrot Sanctuary). There are at least 1,310 plant, cycads and gymnosperms belonging to 143 families, plus 119 fern species; 150 bird species; 14 reptiles; 9 mammals and 4 amphibians.	22.5% loss of forest between 1977 and 1989 - losses high in both rainforest and scrub forest 27 endangered plant species, 4 endangered bird species 2 endemic species, the St. Lucia muskrat (mammal) and the mountain chicken (amphibian), thought to be extinct	agricultural conversion, especially for bananas deforestation for charcoal production removal of vegetation cover for housing and infrastructural development loss of habitats critical to endangered species

Ecosystems	Threats	Causes
Coastal and Marine Ecosystems Coastal and marine ecosystems are diverse, including coral reefs, seagrass beds and mangroves, which provide home to a wide array of species of fish, invertebrates, birds and sea mammals. Most coastal and all marine natural areas are under public ownership.	patch and narrow fringing reefs seriously affected by sedimentation and land-based pollutants approximately 12.5% of beach length currently mined for sand approximately 40% of mangroves lost, remainder under stress stocks of most commercially important benthic species diminishing and potentially threatened	possible excessive harvesting of commercially important species, particularly some groupers and shallow reef snappers, the conch and the white sea urchin inadequate disposal and treatment of liquid waste unregulated construction and dredging in coastal areas soil erosion from poor agricultural practices on steep slopes mining of sand for construction purposes conversion and reclamations of mangroves, and illegal use of these areas for waste disposal illegal trade in coral and other protected species illegal exploitation such as unauthorized foreign fishing and fishing in marine reserves illegal and destructive fishing methods

Ecosystems	Threats	Causes
Freshwater Ecosystems Freshwater habitats include 37 rivers and water catchments, and a small number of marshes, swamps, underground springs, flood plains and inland mangroves. There are also constructed systems such as the Rodney Bay sewage treatments ponds, the Roseau dam and aquaculture ponds. All these systems provide habitats for the maintenance of flora and fauna. Relatively little is known about the species present, but recent studies have identified at least 13 species of shrimp, many micro-invertebrate families, a few fish and several bird species.	50% of the wetlands already lost, and decline still continuing increase in the incidence of water poisoning with undetermined effects on freshwater and possibly marine biota increases in siltation and pollution above water intakes increases in human demands for freshwater (for drinking, irrigation, washing, bathing, industry, recreation) with demand exceeding supply in some catchments, particularly during the dry season transformation of water courses and systems to facilitate urban development and flood control	conversion and reclamation of mangroves, and illegal use of these areas for waste disposal increased use of toxins for fishing, and absence of control deliberate and indiscriminate disposal of agro-chemicals and industrial wastes continuing expansion of banana cultivation and other crop production on steep slopes in catchments above water intakes rapidly growing population, particularly in Castries and Gros Islet rapidly growing tourism industry changing patterns of consumption and recreation expansion of settlements into water catchment areas inappropriate river management schemes and techniques river sand mining, river bank cultivation and deforestation

Ecosystems	Threats	Causes
Agro-ecosystems A wide variety of fruit, vegetable and other crops are grown in St. Lucia. Banana cultivation is usually conducted in a monoculture system and is considered the largest and most significant agricultural production activity on the island. Land races, old crop varieties and wild relatives of crops are an important, although poorly documented, component of the nation's biodiversity. There are approximately 24 varieties of *Musa* species. Livestock production has been increasing and new genetic material is being introduced. Agro-ecosystems contain a number of other useful species, including medicinal plants.	although the status of many local varieties is not well documented, some are likely to be threatened by the introduction of new hybrids and by the clearing of agricultural lands non-propagation of important genetic material, resulting in loss of varieties and cultivars which could play a role in future crop improvements	conversion of agricultural lands for other uses abandonment and displacement of local varieties reduction in demand for local species, varieties, hybrids and breeds

Appendix 2: RELATIONSHIP BETWEEN BIODIVERSITY AND THE MAIN SOCIAL AND ECONOMIC SECTORS

Sector	Contribution of biodiversity to the sector	Impact of the sector on biodiversity	Measures to improve linkages
Tourism Tourism is the country's largest economic sector, and it is growing rapidly (from 212,000 visitors in 1988 to 564,000 visitors in 1997). Tourism infrastructure is concentrated on the north west coast of the island. Nature and heritage attractions currently constitute a relatively small part of the tourism product, but there are efforts currently underway to develop these resources and to involve communities in their management.	nature trails and bird watching in forest areas snorkeling and diving on coral reefs bathing, yachting, recreational fishing and other water sports wild seafood in local cuisine wild materials for handicraft and souvenirs attractiveness of landscapes	*Positive impacts*: source of revenue and employment source of revenue for conservation and environmental management provision of incentives and creation of demand for conservation and environmental management *Negative impacts*: generation of solid and liquid waste, with impact on ecosystems and species demand for seafood which often exceeds productive capacity potentially negative impact on plants used for handicraft and souvenirs illegal trade in corals and other protected marine species physical damages to reefs conversion of sensitive areas for construction of tourism facilities	adoption of policy to channel revenue from tourism uses of biodiversity for conservation and management determination of the carrying capacity of the island as a whole, and of specific sites and communities increase in the revenue generated from tourism uses of biodiversity adoption and enforcement of measures to control the impact of tourism uses on biodiversity research and monitor the economic, social and environmental impacts of tourism improvement of water quality monitoring near tourism plants

Sector	Contribution of biodiversity to the sector	Impact of the sector on biodiversity	Measures to improve linkages
Agriculture Agriculture has long been the mainstay of St. Lucia's economy. Banana remains the single most important crop, but markets and production have declined in the past five years. Approximately 34% of the lands are currently under agricultural production.	formation and retaining of soils, absorption and filtering of water, provision of natural pollinators, and control of pests increase in the genetic resistance of crops and livestock species wild resources with potential for commercial uses value of genetic material for future crop improvements provision of food and feed for livestock	*Positive impacts*: source of revenue and employment provision of incentives and creation of demand for the maintenance and use of important breeds, varieties, hybrids ano species *Negative impacts*: destruction and conversion of natural habitats for agriculture damages to ecosystems from erosion and sedimentation caused by agricultural activities contamination of ecosystems by run-off and leaching of fertilizers, pesticides and herbicides impacts of pesticides on beneficial, non-target organisms	establishment and improvement of monitoring systems (soil erosion, cropping patterns, water quality and land use) provision of training on the use of pesticides and on integrated pest management review and reform of land use and land tenure policies to encourage sustainable practices

Sector	Contribution of biodiversity to the sector	Impact of the sector on biodiversity	Measures to improve linkages
Fisheries The fisheries sector is important, for economic, social and cultural reasons. Fish provides a reliable source of protein for many inhabitants, and fishing supports economic activities in a number of coastal communities.	commercially important species of reef fishes, conch, lobster and sea urchin supply of food and reduction of food imports	*Positive impacts*: source of revenue and employment provision of justification and incentives for conservation and natural resource management *Negative impacts*: unsustainable harvesting of certain species impacts of harvesting on the ecosystems and on other species	development of a national education and public awareness programme on environmental issues affecting fisheries and coastal and marine ecosystems establishment and improvement of systems for monitoring of fish stocks and environmental conditions enforcement of fisheries laws and regulations

Sector	Contribution of biodiversity to the sector	Impact of the sector on biodiversity	Measures to improve linkages
Forestry Forest products make significant contributions to the lives of St. Lucians, with the provision of raw material for construction, furniture-making, canoe-building, handicraft and a number of other uses.	timber production, in small volumes, from the natural forest important source of timber provided by plantations (exotic species) and dry scrub forest, utilized locally for furniture-making, building and interior decoration charcoal and firewood raw materials for handicraft production provided by commercially valuable native palm and grass species	*Positive impacts*: source of revenue and employment reduction in the rate of harvesting of valuable rainforest timber species *Negative impacts*: over-exploitation of timber plantation and commercially important local species over-exploitation of the mangrove ecosystem risk of habitat destruction from charcoal production threats to important species such as the *Latannyé*	development of a silviculture prescription for all timber plantations development of a management regime for valuable dry land timber species and other commercially valuable species

Sector	Contribution of biodiversity to the sector	Impact of the sector on biodiversity	Measures to improve linkages
Construction and Manufacturing Construction has grown rapidly due to population increases, tourism development, and slow but steady economic growth. Manufacturing remains a small but important part of the economy. Much of this activity is concentrated in the north west of the island.	availability of raw products, particularly timber, for construction	*Positive impacts*: provision of alternatives to forms of resource use which can be detrimental to biological diversity *Negative impacts*: conversion of sensitive coastal and terrestrial habitats for commercial, residential and infrastructural uses sand mining for construction sedimentation of rivers, wetlands and nearshore marine environments from construction activity and road cuts pollution from manufacturing activities	formulation and adoption of a land use policy and of zoning procedures and guidelines revision of planning legislation and inclusion of requirements for EIAs use of bioengineering technologies for erosion control demarcation and effective management of existing protected areas development of alternative sources of construction aggregates identification of sensitive terrestrial and coastal habitats, and zoning for protection or compatible uses improvement of water quality systems and programmes near manufacturing facilities enforcement of legislation against industrial dumping

Sector	Contribution of biodiversity to the sector	Impact of the sector on biodiversity	Measures to improve linkages
Education Education is a very critical sector. In the formal education systems, there are currently 88 primary schools, 21 secondary schools and one tertiary education institution. Environmental education is part of the formal system, and is also provided by natural resource management agencies through a variety of media and programmes.	availability of a wide range of ecosystems which can be used for educational purposes in a number of disciplines	*Positive impacts*: increased awareness and commitment, as a result of better education	continuation and expansion of formal and non-formal education and awareness programmes on biodiversity, for the benefits of all sectors

Sector	Contribution of biodiversity to the sector	Impact of the sector on biodiversity	Measures to improve linkages
Health Physical and mental health care is an essential requirement for the well-being of a nation and its citizens. Formal health care delivery is provided in community health centres, public hospitals (5 in all), one private hospital, and the private practice a large number of medical doctors. Informal and traditional health services remain important sources of health care, particularly in rural communities. Environmental health is an essential component of the sector. It forms the basis of any Primary Health Care (PHC) strategy, providing services of a primarily preventative nature to communities and institutions.	species which are or can be used for medicinal purposes production of clean air and water provision of useful organisms for biological control improved food safety and reduction in food-borne illnesses reduction in vector proliferation and infestation	*Positive impacts*: provision of incentives and rationale for research on the medicinal properties of local flora *Negative impacts*: destruction of beneficial, non-target species contamination from bio-medical wastes	continuation and improvement of monitoring of environmental quality (e.g. water and air) dissemination of relevant information to all concerned conduct of research on biological control of mosquitoes, especially *Aedes aegypti* continued joint action and consultation inclusion of environmental health studies within school curricula inclusion of environmental health issues in popular media and educational programmes increased collaboration between public and private sector agencies concerned with environmental health

Sector	Contribution of biodiversity to the sector	Impact of the sector on biodiversity	Measures to improve linkages
Recreation Recreational activities, whether active or passive, are often based on the natural environment: bathing and swimming, hiking, relaxing and meditating, observing wildlife and landscapes, visiting sites and attractions, diving and snorkeling are all important sources of recreation. In recent years, the country has witnessed a growth in the demand for such outdoor and nature-based recreational activities	provision of resources, sites and attractions for various forms of recreation	*Positive impacts*: increased awareness of the benefits of biodiversity, and of the need to conserve and manage *Negative impacts*: pollution and physical damage caused by recreational uses of sensitive areas	adequate planning of recreational sites to control and minimize negative impacts on biodiversity monitoring of impacts of activities

Appendix 3: PARTICIPANTS IN CONSULTATIVE MEETINGS

Ministries of government

Ministry of Agriculture, Forestry and Fisheries
- Hon. Cassius Elias, Minister
- Dr. James Fletcher, Permanent Secretary
- Brian James, Chief Forestry Officer
- Horace Walters, Chief Fisheries Officer
- Rhikki Alexander, Department of Forestry
- Michael Andrew, Department of Forestry
- Donald Anthony, Department of Forestry
- Vaughn Charles, Department of Fisheries
- Christopher Cox, Department of Forestry
- Marie-Louise Felix, Department of Fisheries
- Cornelius Fevrier, Department of the Environment
- Paul Francis, Agriculture Extension Division
- Alicia George, Agriculture Research Division
- Cornelius Isaac, Department of Forestry
- Williana Joseph, Department of Fisheries
- Joan Norville, Agriculture Research Division
- Dawn Pierre-Nathoniel, Department of Fisheries
- Alfred Prospere, Department of Forestry
- Susanna Scott, Department of Fisheries
- Laverne Walker, Department of Fisheries

Ministry of Planning, Development, Environment and Housing
- Marcathian Alexander
- Crispin d'Auvergne
- Elizabeth Charles-Soomer
- Christopher Corbin
- Donovan Williams

Customs and Excise Department
- Anthony Louis

Ministry of Community Development, Culture, Local Government and Cooperatives
- Norma Herman
- Urania Joseph
- Jahto Mahal
- Brenda Wilson

Ministry of Tourism, Civil Aviation and International Financial Services
- Jacqueline Alexander
- Sharmon Jules

St. Lucia Heritage Tourism Programme
- Sylvester Clauzel

Ministry of Legal Affairs, Home Affairs and Labour
- Lenita Joseph

Attorney General's Chambers
- George Charlemagne

Ministry of Health, Human Services, Family Affairs and Gender Relations
- Harold Andrew
- Joseph Medard
- Ricardo Nelson

Ministry of Education, Human Resource Development, Youth and Sports
- June Sifflet

National Commission for UNESCO
- Sherry Alexander Heinis

Sir Arthur Lewis Community College
- Julia Bird
- Hilary Charlemagne

Ministry of Commerce, Industry and Consumer Affairs
- Francis Raphael

Ministry of Communications, Works, Transport and Public Utilities
- Lester Arnold
- Cornelius Daniel

Rural Economic Diversification Incentives Project
Jerome Jules

Mabouya Valley Development Project
Evestus Augustin

Office of Disaster Preparedness
Dawn French

Royal St. Lucia Police Force
Isidore Brisefert
Cyrus Fauckner
Anthony Lubin
Adon Marcion
George Modeste
Michael Smith
Frederick Stanio

Fire Service
Olson Peter

Statutory boards and corporations

Bureau of Standards
Thomas Edmund

Housing and Urban Development Corporation
Karlene Ellis-Vitalis

National Development Corporation
Dainea Augier
Trissa Charles

Parks and Beaches Commission
Ed Leopold

Solid Waste Management Authority
Carleen Jules
Alison King-Joseph

St. Lucia Air and Sea Ports Authority
Adrian Milaine
Solace Myers

St. Lucia Livestock Development Company
Leton Lawrence

St. Lucia Electricity Services
Cuthbert Duncan

St. Lucia Water and Sewerage Authority
Amatus Hamilton

Town and Village Councils

Atrinson Alcide, Castries
Egbert Lucien, Gros Islet
George Regis, Anse la Raye

Community and non-governmental organisations

Anse la Raye Fishermen's Co-operative
Christopher Evans

Association of Professional Engineers
Cornelius Edmund

Dennery Watershed Management Action Force
Alfred Prospere

Derniere Riviere Water Catchment Group
Millines Herman

Folk Research Centre
Leslie Charles

Gros Islet Fishermen's Cooperative
Finbar Delicette

Laborie Conservation Group ECHO-LAB
Augustine Dominique

Micoud Water Catchment Group
Justina Toussaint

National Council for the Advancement of Rastafari
Fred Alcindor
Paul Francis
Edwin Joseph

National Council for Transportation
Guy Joseph

National Farmers Association
Patrick Ernest

National Research and Development Foundation
Bryan Walcott

National Youth Council

Rhikki Alexander

Soufriere Fishermen's Cooperative
Julian Alexis
Edwin Mongroo

Soufriere Marine Management Area
Angela Lamontagne
Kai Wulf

Soufriere Regional Development Foundation
Ervin Alexis

Soufriere Water Taxi Association
Caroline Aimable

Southern Taxi Association
Albert Pierre

St. Lucia Agriculturists Association
Marylane La Corbiniere

St. Lucia Animal Protection Society
Maria Grech
Jane Tipson

St. Lucia Arts and Crafts Association
Sabinus Thomas

St. Lucia Chamber of Commerce, Industry and Agriculture
William Yarde

St. Lucia Day Boat Charters Association
Ricardo Theobalds

St. Lucia Dive Association (Anbaglo)
Anthony Leonce
Thomas de Nobrega
Kai Wulf

St. Lucia Game Fishing Association
Francis Compton

St. Lucia Horticulturists Society
Gloria Greenwood

St. Lucia Hotel Vendors Association
Evans Stanislaus

St. Lucia National Trust
Maria Grech
Charmaine Nathaniel

St. Lucia Naturalists Society
Lenita Joseph

St. Lucia Teachers' Union
Virginia Albert
Lucius Prescott

St. Lucia Whale and Dolphin Watching Association
Jane Tipson

Talvan Water Catchment Group
Morrison Lucien
Claudina Robert
Innocent Roserie

Vieux Fort Heritage and Conservation Group
Sylvester Clauzel
Myrtle Isaac

Private sector

ACME Consultancy
Agnes Francis

Cable and Wireless Telecommunications Ltd.
Roderick Cherry

Cox and Company
Gilda De Veer-Spencer

Minvielle and Chastanet
Ian Herman

Petroleum Dealers Association
Clinton Charlery

Rodney Bay Marina
Ian Cowan

Sandals St. Lucia
Anthony Leonce

Shoppers Paradise Pet Store
Fitzroy Pollard

St. Lucia Banana Corporation
Frank Polius

St. Lucia Distillers Ltd.

Allan Lang
Marie-Celine Lawrence

Tropical Quality Fruits Company
Cuthbert Joseph
Andre Lansiquot

Windward Islands Banana Development Corporation
Luvette Thomas-Louisy

Regional and international organisations

Caribbean Agriculture Research and Development Institute
Lennox Daisely

Caribbean Environmental Health Institute
Herold Gopaul

Caribbean Natural Resources Institute
Mathias Burt
Yves Renard
Allan Smith

CARICOM Secretariat
David Brown

Inter-American Institute for Cooperation in Agriculture
L. Barbara Graham

Organisation of Eastern Caribbean States/ Natural Resources Management Unit
Keith Nichols

RARE Centre
Paul Butler
Alleyne Regis

University of the West Indies
Dunstan Campbell