SAINT LUCIA NATIONAL INVASIVE SPECIES STRATEGY







2012 - 2021

Ministry of Agriculture, Lands, Forestry and Fisheries

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NATIONAL INVASIVE SPECIES STRATEGY
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October 2011

Carried out under the Project
Mitigating the Threats of Invasive Alien Species in the Insular Caribbean
Project No. GFL / 2328 – 2713-4A86, GF-1030-09-03

INVASIVE ALIEN SPECIES (IAS)

... are species whose introduction and/or spread outside their natural past or present distribution threatens biological diversity ...

STOPTHESPREAD

of invasive alien species

FOREWORD

Invasive alien species (IAS) are species whose introduction and/or spread outside their natural habitats threaten biological diversity (CBD 2009). IAS are recognised as one of the leading threats to biodiversity, considered only second to habitat loss in terms of negative impact. They are imposing enormous costs on agriculture, forestry, fisheries, and other enterprises, on human and animal health as well as ecosystem services. Rapidly accelerating human trade, tourism, transport, and travel – the infamous "four Ts" - over the past century have dramatically enhanced the spread of IAS, allowing them to surmount natural geographic barriers.

*Saint Lucia as a Small Island Developing State is not exempted from the negative impacts of IAS as illustrated by the efforts to eradicate the Hibiscus Pink Mealy Bug, African Giant Snail, the non native Green Iguana, and Black Sigatoka (*Mycosphaerella fijiensis*). Saint Lucia also recognizes that IAS threats are encountered in the marine environment as we observe the rapid spread of the Pacific Lionfish throughout the Caribbean region. The destructive biological, social and economic impact of IAS has prompted many nations to develop and implement National Invasive Species Strategies (NISS), because in dealing with IAS the best defense is a good offense. Once an IAS becomes established, the cost of eradication is financially prohibitive and a strain on a small island fragile economy like Saint Lucia which is heavily dependent on the health of its natural resources. Therefore efforts at prohibiting entry in the first instance are a prudent and cost effective approach to IAS management.*

The Government of Saint Lucia, through its Ministry of Agriculture, Lands, Forestry & Fisheries is committed to monitoring and addressing the issues regarding IAS. This NISS is one of the products under the national component of the regional project "Mitigating the Threat of Invasive Alien Species in the Insular Caribbean" which included Saint Lucia. The project is financed by the Global Environmental Facility (GEF), implemented by the United Nations Environment Programme (UNEP) and executed by CAB International (CABI). The NISS is timely as it considers

Saint Lucia's current context in managing IAS issues and sets out recommendations concerning suitable institutional, policy and legislative needs to address this threat. It notes that IAS management merits a proactive response that places the emphasis on ***prevention*** *by: establishing the necessary political will; promoting public and media awareness of environmental impacts of invasive alien species; addressing the fragmented or outdated legislation that does not cover the full range of agricultural, environment, marine and public health concerns; establishing a strategic approach and proper coordination between key departments and agencies; building the necessary human, equipment and technical capacity to respond to IAS threats. Therefore we hope that this NISS will facilitate greater awareness and involvement by relevant agencies and institutions in Saint Lucia to address IAS issues.*

The Forestry Department, on behalf of the Government of Saint Lucia, wishes to thank the GEF and co-financiers for the financial support that made the development of this NISS possible. We are also grateful to CABI and UNEP for regional coordination and project management.

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PREFACE

Saint Lucia has rich levels of endemicity in its diverse fauna and flora which have been impacted on by IAS introductions. Faunal introductions range from the era of the Amerindians who brought dogs and agoutis, to the era of European colonization which saw unintentional introduction of the ship rat, the Norway rat and the house mouse. Some IAS introductions are plants that were introduced as species of horticultural interest or for potential agricultural economic activity. Invasive Alien Species have been formally recognized as a threat to the Saint Lucian biodiversity since at least 1998.

In June 2010, the Government of Saint Lucia embarked on the preparation of a National Invasive Species Strategy (NISS). The purpose of this NISS is to provide the appropriate policy, legal and institutional frameworks for all aspects of management of IS in Saint Lucia so as to (i) minimize the harmful effects of invasive species (IS) on the environment, economy and society through coordination of efforts at all levels of Saint Lucian society; and (ii) facilitate cooperation within the Caribbean region to prevent the movement of invasive species. The NISS will also inform coherent policies, legislation, regulation and management of invasive species in Saint Lucia. Additionally, it provides a communications strategy that will help raise public awareness so that all sectors of Saint Lucian society actively support efforts to minimise the risk and impact of invasives on Saint Lucia.

In Saint Lucia, several departments and agencies have responsibility for some aspect of IAS prevention and management and several different laws are relevant (e.g. plant and animal health and quarantine; wildlife management; fishing, environmental management etc.). The result, for a Small Island State is a complex situation where responsibilities, policies and laws are not very clear or may not even be compatible. This complex situation is further exacerbated by the fact that personnel in many frontline agencies and departments are not knowledgeable of IAS issues, far less the international obligations and national legislation that control IAS in Saint Lucia. Just as there are multiple agencies and persons who have responsibility for IAS management in Saint Lucia, there are an equally significant number of pathways for IAS to enter Saint Lucia.

The main pathways for alien harmful organisms affecting plants and animals are regulated and controlled by various units in the Ministry of Agriculture, Lands, Forestry & Fisheries (MALFF); and the Ministry of Health, Wellness, Family Affairs, National Mobilization and Gender Relations (MOH). These pathways are mainly plants (and plant parts), plant products (including wood), wooden packaging, soil, micro-organisms, viruses and animals, from insect pests to pets and wildlife. Such items are

subjected to inspection at the country's borders on entry, so that prohibited items and those deficient in documentation can be intercepted. Imported cargo at the airports is not monitored by the public, animal or plant health personnel. Only if quarantine products are identified by Customs personnel, are the public/ animal/plant health officers requested to conduct examinations.

With severe resource limitations, Saint Lucia cannot effectively address invasive alien species once they have been introduced or become established. Adopting vigorous prevention measures to keep invasive alien species from being introduced in the first place is plainly the best way. The relevant MALFF Units, farmers, divers, hikers, photographers, port workers, Extension officers, Customs officers, bird watchers, etc. should therefore be trained to assist with early detection. Education and awareness programmes targeted at these groups will be important. These programmes will have to demonstrate the value of native biodiversity and instil some sense of pride in protecting it.

A compendium of background papers has been prepared to inform this NISS (Annex 1). Two of the papers review the status of aquatic and terrestrial IAS. Yet another report reviews the different IAS Pathways in Saint Lucia. The compendium also includes a Critical Situation Analysis of IAS Status and Management. A report on Policy Gaps and Needs Analysis reviews the aforementioned reports and sets out to evaluate the extent to which IAS prevention, eradication and control are fully incorporated in national legislation and in biodiversity and other relevant policies, strategies and action plans, consistent with international law. In addition, an awareness survey on issues related to IAS was undertaken in early 2010. The objective of the survey was to identify areas where public awareness-raising and training are most needed, so that tailor-made programmes and curricula can be designed and implemented in order to raise awareness of the impact of IAS in Saint Lucia. The findings of this Survey and the Report on the evaluation of Communications, Education, Public Awareness Strategy and Actions were used in the preparation of the Communications, Education and Public Awareness Strategy that compliments this NISS.

Water hyacinth (*Eichhornia crassipes)*: one of 100 of the world's worst invasive species is found in Saint Lucia.

Credit: Roger Graveson

The formulation of the NISS also benefitted from broad-based consultations that were held in Castries, Vieux Fort and Soufriere in January 2011. The Summary of Conclusions and Recommendations from these Consultations have been cited in Annex I. The purpose of the consultations was to solicit information and guidance from members of the public, the private sector and persons in the community who are knowledgeable about pathways

and/or who would suffer from the impacts of invasive alien species. The workshops sought to

- ascertain the extent to which a cross section of the Saint Lucian public was knowledgeable about IAS;
- identify and discuss different approaches to managing IAS;
- identify strategic interventions for each of the policy responses; and
- identify specific activities for each identified strategic intervention and for each policy response.

The NISS was drafted by a team of consultants under the Guidance of the Project Director and Project Coordinator and with technical support of the IAS Working Group.

The goals of the NISS are four-fold and aim to minimize the harmful effects of invasive species on the environment, economy and society of Saint Lucia:

[1] to provide a national framework for invasive species prevention and management;
[2] to prevent introduction and establishment of further invasions;
[3] to reduce the impacts of invasive species already present in the country through a hierarchical approach comprising (i) Early Detection and Rapid Response (EDRR), (ii) Eradication, (iii) Mitigation and Containment, (iv) Restoration;
[4] to strengthen Saint Lucia's participation in regional and international efforts for invasive species prevention and management.

This strategy is expected to provide high level policy direction for:

- the preparation of IAS management action plans, e.g. for specific pathways, areas, ecosystems or taxa;
- legislative drafting and enactment on IAS issues; and
- enforcement of laws and regulations relevant to IAS management.

Orange-winged parrot (*Amazona amazonica*)

Box 1: A Tricky Situation!

Orange-winged parrots (*Amazona amazonica*) are invasive and have the potential of being destructive. These avid feeders are quick multiplying and can cause economic loss to farmers by feeding off their fruit trees and other crops. This would adversely affect the whole country. They also pose a threat to the Jacquot (*Amazona versicolor*) where they compete for nesting sites and possibly spread diseases to our national bird, which would threaten their population.

It is envisaged that once the administrative, legal and institutional gaps are closed, and the NISS, together with the integral Communications, Education and Public Awareness (CEPA) strategy, is being implemented, then Saint Lucia will be able to substantially enhance its management of IAS.

KEY TERMS, CONCEPTS & ACRONYMS

Most terms, concepts and acronyms used in this document are defined at first mention in the text. The following occur frequently and are defined here for ease of reference. Terminology for invasive species has not been standardised internationally, and some of the terms below are defined in the specific context of Saint Lucia.

alien species: A species, subspecies, or lower taxon occurring outside of its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could not occupy without direct or indirect introduction or care by humans) and includes any part, gametes or propagule of such species that might survive and subsequently reproduce.

biocontrol or biological control: Controlling an invasive species by introducing a natural enemy, such as an insect or fungus, that specifically attacks the target species and does not attack other native or economically important species.

biosecurity: Sometimes used to include all aspects of invasive species management, but in this document used in the more restricted sense of preventing the spread of invasive species across international, regional or internal borders, including between islands.

containment: Keeping an invasive species within a defined area.

control: Reducing the population and/or activity of an invasive species.

effective management: Achieving operational success (e.g. reducing a pest to defined levels) and desired outcomes (reduced impact and recovery of impacted values) of invasive species management.

eradication: The permanent removal of the entire population of a species within a specific time and area.

introduced species: Plants, animals and other organisms taken beyond their natural range by people, deliberately or unintentionally.

invasive alien species: Organisms whose introduction and/or spread impacts human health and well being, disrupts trade and threatens biological diversity.

invasive species: Usually *alien species* that become destructive to the environment or human interests; can also include some *native species* that proliferate and become destructive following environmental changes caused by human activities.

monitoring: Programmes to detect change, e.g. in the distribution of invasive species, the success of management projects etc.

native species: Plants, animals and other organisms that occur naturally on an island or in a specified area, having either evolved there or arrived there without human intervention.

naturalization: Process of establishment of an exotic species in its area of introduction. This establishment is associated to an area or place that, because of its characteristics (environmental similarity to the original distribution area or adequate conditions), allows the establishment of self sufficient free living populations. The process of naturalization of a species requires overcoming some biotic and abiotic barriers for the species to survive and reproduce regularly in the new environment.

negative impact: Adverse effects that invasive species can have on native flora and fauna, ecosystems, economy, society or health, according to their intrinsic biological characteristics, such as their life cycle and their feeding habits. Such effects are generated through competition, predation, herbivory, hybridization or disease transmission and they include vulnerability factors present in the areas into which they have been introduced. The impacts can be real or potential.

pathway: Process through which a species is moved from its native region into a new area, which it would not reach through natural dispersion; vectors are mechanisms via which such species are transported. These vectors are the means, activities or products by which an exotic species can be transported to a new environment, whether intentionally or accidentally**.**

surveillance: In this document, defined as *monitoring* to detect the arrival of new incursions of invasive species.

ANBAGLO	St. Lucia Dive Association
CISWG	Caribbean Invasive Species Working Group
CEPA	Communications, Education and Public Awareness
CPPC	Caribbean Plant Protection Commission
CSA	Critical Situation Analysis
CZMAC	Coastal Zone Management Committee
EDRR	Early Detection and rapid response
GEF	Global Environmental Facility
GIS	Geographic Information System
IAS	Invasive Alien Species
IASWG	Invasive Alien Species Working Group
IICA	The Inter-American Institute for Cooperation in Agriculture
IMO	International Maritime Organisation
IS	Invasive Species
ISE	Invasive Species Entity
LMO	Living Modified Organisms
MALFF	Ministry of Agriculture, Lands, Forestry and Fisheries
MEAs	Multilateral Environmental Agreements
MOE	Ministry of Education
MOH	Ministry of Health
MOT	Ministry of Tourism
NBSAP	National Biodiversity Strategy and Action Plan
NEC	National Environmental Commission
NEMO	National Emergency Management Organisation
NISS	National Invasive Species Strategy
OIE	World Organisation of Animal Health
SALCC	Sir Arthur Lewis Community College
SDED	Sustainable Development and Environment Division
SIDS	Small Island Developing States
SLASPA	Saint Lucia Air and Sea Ports Authority
SLSWMA	Saint Lucia Solid Waste Management Authority
SMMA	Soufriere Marine Management Area
UNEP	United Nations Environment Programme
WCR	Wider Caribbean Region
WHO	World Health Organisation
WTO	World Trade Organisation

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1.0 BACKGROUND

Invasive Alien Species (IAS) are organisms whose introduction and/or spread impacts human health and well- being, disrupts trade and threatens biological diversity[1]. Globally, IAS are recognised as the second most important threat[2] to biodiversity and also impose enormous costs on agriculture, forestry, fisheries, and other enterprises, on human and animal health as well as ecosystem services. In Saint Lucia's Fourth National Report to the CBD[3] (2009), IAS were rated as top threat to terrestrial biodiversity invertebrates, followed by habitat loss (Table 1).

For a species to become invasive, it must successfully out-compete native organisms, spread through its new environment, increase in population density and harm ecosystems in its introduced range.

Rapidly accelerating human trade, tourism, transport, and travel – the infamous "four Ts" - over the past century have dramatically enhanced the spread of invasive species, allowing them to surmount natural geographic barriers[4].

Not all non-indigenous species are harmful. In fact the majority of species used in agriculture, forestry and fisheries are alien species. Thus, the initial step in a national programme must be to distinguish the harmful from the harmless alien species and identify the impacts of the former on the various sectors.

[1] http://www.ciasnet.org/about-invasive-alien-species/addressing-ias/. Accessed on June 6 2011.

[2] Second to habitat loss.

[3] http://www.cbd.int/doc/world/lc/lc-nr-04-en.pdf. Accessed on June 6 2011.

[4] Krauss, Ulrike (2010) Critical Situation Analysis (CSA) of Invasive Alien Species (IAS) Status and Management, Saint Lucia, 2010 carried out under the project Mitigating the Threats of Invasive Alien Species in the Insular Caribbean Project No. GFL / 2328 – 2713-4A86, GF-1030-09-03. Forestry Department Ministry of Agriculture, Lands, Forestry and Fisheries (MALFF) Union, September 2010.

Table 1: SEVERITY OF THREAT POSED BY KEY ECOLOGICAL DRIVERS TO THE TERRESTRIAL BIODIVERSITY IN SAINT LUCIA[5]

	Invasive Alien Species	Habitat loss/ degradation	Pollution (agrochemicals)	Overexploitation/ deliberate killing
Trees	2	3	No data	2
Other Plants	2	3	No data	1
Invertebrates	3	2	2	1
Reptiles	3	3	1	1
Amphibians	2	0	1	0
Birds	3	3	1	1
Mammals	2	2	1	1
Average score	**2.4**	**2.3**	**1.2**	**1.0**

(0, not threat; 1, low threat; 2 substantial threat; 3, very high threat)

A species introduction is usually vectored by human activity, such as the above-mentioned "four Ts". If a species' new habitat is similar enough to its native range, it may survive and reproduce.

However, it must first subsist at low densities, when it may be difficult to find mates for species with sexual reproduction. For a species to become invasive, it must successfully out-compete native organisms,

spread through its new environment, increase in population density and harm ecosystems in its introduced range[6].

IAS occur in all taxonomic groups, including animals, plants, fungi and micro-organisms, and can affect all types of ecosystems. Common characteristics of IAS include rapid reproduction and growth, high dispersal ability, phenotypic plasticity (ability to adapt physiologically to new conditions), and ability to survive on various food types and in a wide range of environmental conditions. A good predictor of invasiveness is whether or not a species has successfully invaded elsewhere.

IAS pose a particular risk to Small Island Developing States (SIDS) by threatening the ecosystems, livelihoods, economies and public health of inhabitants. Islands are especially vulnerable to IAS because of the lack of natural competitors and predators that control populations in the aliens' native ecosystems. The geographic isolation of

[5] Adapted from Saint Lucia's Fourth National Report to the Convention on Biological Diversity (2009), http://www.cbd.int/doc/world/lc/lc-nr-04-en.pdf

[6] Krauss, (2010) *ibid*

islands limits immigration of new species, with two main consequences. Firstly, islands often have ecological niches that have not been filled because of the distance from colonizing populations. Secondly, the isolation allows established species to evolve with few strong competitors and predators. IAS thus have a dramatic effect on such isolated ecosystems and are a leading cause of species extinctions. Many islands, such as Saint Lucia, have a high proportion of endemic and specialized flora and fauna with relatively low breeding populations.

Box 2: The Asian Mongoose:
Small lizards that live on the ground, like the Saint Lucia pygmy gecko are especially vulnerable to rats and mongooses.

Asian Mongoose (*Herpestes javanicus)*
Credit G. Guida, Durrell

Saint Lucia pygmy gecko
(*Sphaerodactylus mirolepis*)

The Caribbean is recognized as one of the World's biodiversity hotspots with its exceptionally high levels of endemism in plants, mammals, reptiles, amphibians and freshwater fishes. Much of the region's invertebrate fauna is, however, yet to be described by science. Saint Lucia, likewise, has rich levels of endemicity in its diverse fauna and flora which have been impacted on by IAS introductions.

There were some noteworthy deliberate introductions which are implicated with significant biodiversity losses particularly among native birds, reptiles and amphibians (See Box 2). Examples include the cane toad (*Bufo marinus*) and the small Asian mongoose (*Herpestes javanicus*)[7].

[7] Andrew, Gaspard Michael & Lyndon John (2010) **National Invasive Species Strategy for Saint Lucia: Terrestrial Ecosystems Analysis.** Carried out in support of the Critical Situation Analysis (CSA) under the project *Mitigating the Threats of Invasive Alien Species in the Insular Caribbean Project* No. GFL / 2328 – 2713-4A86, GF-1030-09-03. pp 33

Problems of invasive alien species have not yet attracted the attention they deserve in Saint Lucia. There are no specific policies that explicitly speak of IAS. Nevertheless, most of the policies – especially those relevant to biodiversity management – provide the frameworks for the future inclusion of IAS management tools. In this instance reference is made to the Biodiversity Policy and 2nd National Biodiversity Strategy and Action Plan (NBSAP); the draft Revised Fisheries Management Plan; Hazard Mitigation Policy; National Forest Policy; and National Wildlife Policy.

Cane Toad (*Bufo marinus)*
Credit:deogr

Heliconia (*Heliconia wagneriana*)
Credit: *Roger Graveson*
Potentially invasive, as it might affect native *Heliconia* spp. and the birds that feed on them: apparently *H. wagneriana* nectar has lower sugar content.

Some IAS introductions are plants that were introduced as species of horticultural interest (e.g. *Heliconia wagneriana*) or for potential agricultural economic activity, e.g. lemon grass (*Cymbopogon citrates*) and leuceana (*Leuceana leucocephala*).

Some of the identified floral IAS pose a potential threat to native habitats; however they have had a more demonstrable impact on disturbed habitats. Invasive Alien Species can also be invertebrates. These have had far reaching impacts on public health, e.g. tiger mosquito (*Aedes aegypti*) with the spread of dengue fever or on

economic activity particularly in the agriculture sector, e.g. coconut mite (*Aceria guerreronis)* and giant African snail *(Achatina fulica*).

1.1 Introduction

*S*aint Lucia, like all islands, with its diverse but delicate ecosystems is at risk from invasive alien species. Invasives are a major threat to the vulnerable marine, freshwater and terrestrial biodiversity and to the people depending on this biodiversity for their livelihoods and well-being. Globalisation, through increased trade, transport, travel and tourism has inevitably also increased the intentional or accidental introduction of organisms into Saint Lucia. Furthermore, it is widely predicted that climate change will further increase the threat posed by invasive species[8]. To this end, with support from CABI Bioscience, the Global Environment Fund (GEF) and the United Nations Environmental Programme (UNEP) have embarked on a project entitled "Mitigating the Threats of Invasive Alien Species in the Insular Caribbean". Saint Lucia is one of the five participating countries. One of the five components of the project is the formulation of National Invasive Species Strategy (NISS).

Invasive Alien Species have been formally recognized as a threat to Saint Lucian biodiversity since at least 1998[9]. The Report on the Critical Situation Analysis (CSA) of Invasive Alien Species (IAS) Status and Management, Saint Lucia, lists a total of 124 IAS of which 102 are in terrestrial, six in marine and 16 in freshwater ecosystems[10].

Daltry[11] , as stated in the CSA, believes IAS (opossum, rats, dogs, cats and feral pigs and, most importantly, the

[8] Burgiel, Stas 2010. Background and Scoping Report. Helping Islands Adapt: A Workshop on Regional Action to Combat Invasive Species on Islands and Adapt to Climate Change. http://www.conference.co.nz/files/docs/info%20doc%206%20docdm-560573.pdf Accessed on August 31 2011.

[9] GOSL (1998). *Biodiversity Country Study Report of Saint Lucia.* UNEP/GEF Project No. GF/1200-96-64, MALFF, Castries

[10] Two species occur in two ecosystems at some part of their life cycle.

[11] Daltry, J. C. (2009b) *The Status and Management of Saint Lucia's Forest Reptiles and Amphibians*, SFA 2003/SLU/BIT-04/0711/EMF/LC, FCG Fauna & Flora, pp 80, http://www.bananatrustslu.com/index.php?link=doccentre&project=sfa2003 Accessed on June 3 2011.

mongoose) to be the greatest threats to Saint Lucia's native forest herpetofauna (Refer to Box 3 for an example). Alien invasive reptiles and amphibians also pose a great danger to native species through predation, competition and hybridization, e.g. the introduced green iguanas near Soufriere threatens the uniqueness of the native iguana through competition and hybridization.

1.2. Status of IAS Management in Saint Lucia

In Saint Lucia several departments and agencies have responsibility for some aspect of IAS prevention and management and several different laws are relevant (e.g. plant and animal health and quarantine; wildlife management; fishing, environmental management etc.).

Responsibility for alien invasive species management in Saint Lucia is shared among various sectors at various levels. There is no coordinating framework to link the various agencies with relevant powers or duties or to ensure consistent implementation. There are also institutional and administrative conflicts of interest. Such a conflict arises where the Ministry of Agriculture, Lands, Forestry and Fisheries (MALFF) is legally responsible both for regulating and promoting trade. The Ministry has a statutory duty to promote agricultural, forestry and fisheries development, and to enforce quarantine controls.

Practical difficulties arise when officials come under pressure from traders to release consignments from post-entry quarantine earlier than scientific caution might dictate.

Agencies involved in IAS management in Saint Lucia

MALFF
- Crop Protection Unit
- Plant Propagation
- Forestry
- Fisheries
- Veterinary Division
- Biodiversity Office

CZMU
MOH
MOT
NEMO
SLASPA
SMMA

Agencies that could potentially be involved in IAS management in Saint Lucia

MOE
SLSWMA
SDED
- Climate Change

Just as there are multiple agencies and persons who have responsibility for IAS management in Saint Lucia, there are an equally significant number of pathways for IAS to enter Saint Lucia.

Although there is room for further enhancing the policy and legislative frameworks, it must be acknowledged that there is a sufficient platform in Saint Lucia to build a substantial framework for the management of IAS. This platform provides a very strong foundation for the development of a national strategy for the control and management of invasives in the country.

African Tulip Tree (*Spathodea campanulata*)
Tree of disturbed moist areas and rivers, also a cultivated ornamental. It is on the "100 of the World's Worst Invasive Alien Species" list - A potentially serious invasive that must be kept out of the rainforest reserve. Monitoring is required.
Credit: Roger Graveson

Not all invasive species are aliens. Habitat disturbance can give the competitive edge to an indigenous organism that subsequently becomes invasive. Examples in Saint Lucian are the shiny cowbird, which is a nest parasite similar to a cuckoo, and the soap bush (*Clidemia hirta*, Kaka mèl), which tends to cover cleared areas close to the forest to the extent that it inhibits forest regrowth.

100 of the World's Worst Invasive Species

***Clidemia hirta* : kaka mél**
Credit: Roger Graveson

2.0 THE SAINT LUCIA NATIONAL INVASIVE SPECIES STRATEGY

In June 2010, the Government of Saint Lucia embarked on the preparation of a National Invasive Species Strategy (NISS). The aims of this Strategy are to (i) minimize the harmful effects of invasive species on the environment, economy and society through coordination of efforts at all levels of Saint Lucian society; and (ii) facilitate cooperation within the Caribbean region to prevent the movement of invasive species. The NISS will also inform coherent policies, legislation, regulation and management of invasive species in Saint Lucia. Additionally, it provides a CEPA that will help raise public awareness that should lead to all sectors of Saint Lucian society actively supporting efforts to minimise the risk and impact of invasives on Saint Lucia.

The National Invasive Species Strategy for Saint Lucia seeks to protect the island's aquatic and terrestrial ecosystems and their native biodiversity and domestic plants and animals from the risks of invasive species. The scope of this Strategy is broad and inclusive. It is applicable to all intentional (purposeful) introductions, both authorized and unauthorized (illegal), and all unintentional (accidental) introductions. This Strategy is applicable to a wide range of sectors, including agriculture, fisheries and aquaculture, wildlife, forests, transportation, industry, and animal and human health. It recognizes the roles and responsibilities of different public sector agencies in regulating and managing alien species, and the role and responsibilities of the private sector as well as general public as proponents and facilitators of intentional introductions of alien species.

The aim of the NISS is to minimize the harmful effects of invasive species on the environment, animal and human health, economy and society of Saint Lucia. This will be achieved through the coordination of efforts at all levels of Saint Lucian society, and cooperation with neighbouring countries and the Wider Caribbean Region (WCR).

The NISS will:

1. provide a framework for guiding all aspects of management of IS in Saint Lucia;

2. identify the appropriate mechanisms and modalities that will prevent the introduction and establishment, and reduce the impact of IS in Saint Lucia;
3. provide a platform for strengthening partnerships and participation in regional and international initiatives for IAS management; and
4. sensitise all sectors of Saint Lucian society to actively support efforts to minimize the risk and impact of IS on Saint Lucian biodiversity, economy, health and society.

2.1 Principles Guiding the NISS

The National Invasive Species Strategy is based on the recognition and acceptance of three principles:

1. Management of invasive species is an essential and integral part of the sustainable management of natural resources and the environment, and requires an integrated, multidisciplinary approach.
2. Prevention and early intervention are the most cost-effective techniques that can be utilized against invasive species.
3. Successful management of invasive species will require a coordinated national approach which involves all levels of government in establishing appropriate legislative, educational, and coordination frameworks in partnership with private business, landholders, and communities.

Box 3: The Shiny Cowbird
(Molothrus bonairensis), is a brood-parasite of the St Lucia Oriole (*Icterus laudabilis*), which is endemic to the island.
Credit: http://www.birdinginstlucia.org/Gallery/tendiwu.ht

The Strategy will recognise the following aspects of the problem and outline measures to address them:

1. shortage and inaccessibility of scientific information on invasive species and best practice management;
2. lack of awareness of the impacts of invasive species;
3. insufficient networking, coordination and collaboration at the national and regional levels;

4. inadequate legislation, regulations, cross-sectoral policies, and enforcement; and
5. shortage of trained personnel and inadequate facilities
6. insufficient funding.

Moses in the cradle (*Tradescantia spathacea*)
Credit: Roger Graveson

Wandering Jew (*Tadescantia zebrina*)
Credit: Roger Graveson

The Basket Plant (*Callisia fragrans*)
Credit: Roger Graveson

Box 4: The Vulnerable Piton Ecosystem

The distribution of these three plants in Saint Lucia suggests they have escaped from cultivation as ornamentals and are not indigenous. The wandering jew is invasive around the trail on Gros Piton, replacing native ground flora. Moses in the cradle and the *Callisia fragrans* are potentially serious invasives of the dry rocky slopes of the Pitons, threatening the native ground flora. These plants must not be cultivated in that area and should be removed from it. An awareness programme is required for the community of Fond Gens Libres

In addition, the NISS will be guided by the following:

1. Not all introduced species are invasive, and action should be prioritised to deal first with those currently causing, or with potential to cause, the most harm.
2. In order to be cost-effective, invasive species risk assessment, prioritisation and management must be based on science.
3. The "precautionary principle" should be applied to the management of introduced species. Where scientific knowledge is insufficient to assess accurately either the risk of a species becoming invasive, or its present or future impact, it should be assumed that impacts will occur and action should be taken to prevent the species spreading or becoming established.
4. The control of IS should be based on the vulnerability of the ecosystem (refer to Box 4)[12], location and time of year (refer to Box 5)[13]; and the control should be cost-effective.
5. A hierarchical approach to managing invasives will be adopted, in the following order of priority:

[12] The ornamentals that are invasives in the fragile ecosystems of the Pitons are not necessarily invasive in gardens elsewhere in the island

[13] Punctual control of mongooses, feral cats and dogs along the north east beaches of the island beaches is critical during nesting season of iguanas, marine turtles and ground-nesting birds.

Box 5: Protecting Saint Lucia's Turtle Nesting Sites – Punctual IAS Control

Grande Anse Estate, located in the northeast of Saint Lucia; it covers approximately 2000 acres and much of this area remains wild. The plant life ranges from cliff side cacti to the tropical scrub forests on the adjacent hillsides. Wildlife includes endemic reptiles such as the Saint Lucia Boa Constrictor, Fer-de-lance snake and the Saint Lucia Anole. It is also an important habitat for the endangered iguana. Grande Anse beach and associated mangroves was designated a marine reserve in 1986.

This beach is recognised as one of the largest known leatherback turtle nesting sites in the Eastern Caribbean. However, other species, including the hawksbill turtle and the green turtle, are known to nest there as well, but at lower frequencies.

Leatherback turtle nesting in Grande Anse Beach
Credit: IWCAM

The nesting sites, during the nesting season are targeted by opossum and other predatory introduced mammals – the mongoose, rats, feral cats. The opossum is specifically listed as protected under the Wildlife Protection Act 1980. Penalties for breaking the law are a maximum fine of $5,000 or in default of payment of fines a maximum of one year in prison. It has nevertheless been recommended that the Forestry Department undertake mammal – including opossum - removal from the turtle nesting sites during he nesting season so that the predation on turtle eggs and hatchlings is substantially decreased, benefiting the conservation of wildlife of global significance.

i. Prevention is more effective and cheaper than management of established invasives, so exclusion of invasives by border control is the first line of defence.
ii. Eradication is more effective and cheaper in the long run than permanent control of an IAS, so eradication should be considered where feasible.
iii. Species that cannot feasibly be eradicated should be considered candidates for biological control.
iv. Species that cannot feasibly be eradicated or controlled biologically, especially species whose value to people prevents the use of biocontrol, should be contained within delimited areas where feasible.
v. Location and time specific control of IAS populations by chemical and/or physical methods should be considered to protect existing native and/or endangered species.
vi. Permanent control of an established IAS population by chemical and/or physical methods should normally be considered the last resort approach, where eradication, biological control and containment are all deemed not feasible with current resources and tools.

The management of alien invasives in Saint Lucia will be guided by a set of processes adapted from the CBD's COP 6 Decision VI/23[14]. This is summarised as follows:

1. identifying national needs and priorities;
2. creating mechanisms to coordinate national programmes;
3. reviewing relevant policies, legislation and institutions to identify gaps, inconsistencies and conflicts, adjusting or developing policies, and legislation, and identifying appropriate institutional arrangements;
4. establishing cooperation between the various sectors, including the private sector, and ensure regular communication between focal points of respective relevant international instruments;
5. promoting awareness among policy makers at all levels of government, and in the private sector; quarantine, customs and other border officials; and the general public;
6. facilitating the involvement of all stakeholder groups in the preparation of national invasive species strategies and action plans, and in decisions related to the use of alien species that may be invasive;
7. collaborating with trading partners and neighbouring countries, to address threats of invasive alien species that cross international boundaries, migratory species, and to address matters of common interest.

[14] Available at http://www.cbd.int/decision/cop/?id=7197 Accessed on September 24 2010

2.2 Scope of the NISS

This document is intended to provide a strategic direction for the management of IAS in Saint Lucia, i.e. the scope is essentially national[15]. The document, however, is not designed to serve as a comprehensive, all-encompassing strategy. Instead, it is hoped that it will prepare the ground and create the capacity for its own regular and dynamic up-dating and up-grading. The NISS will cover a span of ten years: 2012 to 2021. The NISS will be complimented by a fully costed Action Plan, prepared under separate cover, that will be reviewed every three years. In addition, all national agencies involved in the management of invasive species will develop annual work plans and budgets that will be incorporated into the overall work plan and budget of the agency.

[15] Nevertheless, the position of Saint Lucia as a relatively small island state within the Wider Caribbean Region (WCR) and, in fact, an increasingly globalized world cannot be ignored.

For the purpose of this NISS, all species that are invasive – whether they are alien or native - will be considered for management

2.3 Goals, Purpose and Objectives of the NISS

This Strategy concentrates on species that are both invasive and alien. For purposes of the NISS an alien species is a non-native species introduced into Saint Lucia after colonization by Europeans (after *ca* 1500)[16]. On the other hand, as explained in Box 8, the mongoose qualifies as an 'alien', while the manicou, having been introduced prior to European colonization, would be considered 'native'. Nevertheless, both species have contributed to extinctions and continue to impact endangered wildlife through predation in Saint Lucia. Native species that turn invasive, e.g. as a result of habitat modification, are also covered. Non-invasive aliens are not the centre of attention, except where potential invasiveness is viewed as a risk. Living Modified Organisms (LMOs) may be a sub-set of IAS, but are not discussed in their own right here.

[16] Krauss, Ulrike (2010) *ibid*

The NISS recognizes the critical importance of regional collaboration to address the threat of invasive alien species, particularly as a means to enhance ecosystem resilience in the face of climate change.

While the main scope of the NISS is species that are both alien and invasive, it recognises that management decisions are often based on the damage done or potential damage expected if unmanaged.

Based on experiences in Saint Lucia, the NISS also recognises the cost-effectiveness of managing populations, rather than entire species. As presented in Box 6 below feral pigs, for instance, cause havoc to the biodiversity in Forest Reserves and have to be shot. These same pigs are also found in a farmer's pen, where prevention of escape is the option of choice.

The goals and objectives of the National Invasive Species Strategy are four-fold (Table 2) and build on the above-mentioned principles.

The purpose of the NISS is to provide the appropriate policy, legal and institutional frameworks for all aspects of management of IS in Saint Lucia.

Table 2: Goals And Objectives Of The NISS

Goals	Objectives
Goal 1: to provide a national framework for invasive species prevention and management;	♦ Harmonise and coordinate all IS management activities across sectors, agencies and stakeholders. ♦ A multi-sectoral and multi-agency platform is established to ensure effective inter-agency coordination. ♦ A database of current and planned IS activities, agencies, and key stakeholders is established and maintained.
Goal 2: to prevent introduction and establishment of further invasions;	♦ Appropriate existing sectoral legislation is strengthened to provide the necessary regulatory framework for preventing and managing IS. ♦ Adoption of a hierarchical management approach. ♦ Appropriately trained Quarantine and Veterinary Officers are in place and provided with necessary equipment. ♦ Regular cross-training is provided to all officers involved in border control and/or in all ports of entry. ♦ Detection and monitoring procedures are established in all ports of entry. ♦ Necessary protocols, plans and equipment are put in place to respond to new introductions.
Goal 3: to reduce the impacts of invasive species already present in the country	♦ Existing invasive species will be inventoried, assessed, and prioritised for appropriate management action, according to an hierarchical approach comprising: a) Early Detection and Rapid Response (EDRR) b) Eradication c) Mitigation and Containment d) Restoration;
Goal 4: to strengthen Saint Lucia's participation in regional and international efforts for invasive species prevention and management.	♦ Join and participate actively in regional organizations working to prevent and manage invasive species, as appropriate and feasible.

Box 6 Those Feral Pigs

Pigs (*Sus scrofa*), as a species, are not protected by Saint Lucian law: they are a highly valued source of food and kept in pens by farmers. Feral pigs are invasive and widespread in the Forest Reserve, threatening some rare birds and reptiles, and interfering with tree recruitment and livelihoods by destruction of home gardens. Feral pigs need to be controlled.

The objectives for each of the Goals identified in Table 2 are prioritized in terms of logical sequence of activities; urgency of need and those which are clearly within the responsibility of all the agencies that are presently involved in IS management and are members of the IAS Working Group (IASWG). These approaches are not mutually exclusive, but a hierarchy of decision-making. For example, after eradicating a predator from an off-shore island, the system reverts to prevention and possibly also restoration. Nevertheless, the success in the implementation of this NISS is contingent on the clearly articulated role of the IASWG and/or some other entity, such as an Invasive Species Entity (ISE) as the coordinating and facilitating body of this NISS.

Some of the actions span across all four goals and are considered to be essential for the success of the Strategy. These will be described and discussed in the following chapter. A Schema of the NISS is provided in Figure 1 below. The LogFrame supporting the NISS is provided in Annex 2.

This national strategy comprises two major components: the strategic interventions and the programmatic interventions. The strategic interventions will help to create the necessary enabling environment for the programmatic interventions to take place. The programmatic interventions are assembled along cascading management hierarchy and are supported by the enabling environment. The scope of each of these interventions is presented in Table 3 below.

Box 7: Off-Shore Islands for the Management of Critical Species

Off-shore Islands are so important to wildlife, because

- They are the last place on earth where certain critical species are found, i.e. the Saint Lucian racer (*Liophis ornatus*) and Saint Lucia whiptail lizard (*Cnemidophorus vanzoi*).
- They lack one of the most serious threats to wildlife: alien invasive predators, such as rats and the small Indian mongoose, that played a major role in the extirpation of the above-mentioned endemic reptiles on the main island. Thus they provide a safe habitat for migratory and ground-nesting sea birds.
- Nutrient input from sea birds, in turn, is crucial in maintaining globally threatened cacti.
- They are manageable in size. Thus, eradication of alien introduced predators is feasible, as is regular monitoring of IAS absence.

Metapopulations as management tool[17]

- Small populations and habitats are particularly prone to extinction triggered by stochastic events, such as wildfire, flooding, hurricanes, tsunamis or disease ourbreaks.
- A metapopulation consists of several spatially separated populations of the same species, together with areas of suitable habitat.
- While individual small populations are at high risk, the metapopulation as a whole is more stable, because immigrants from the stronger population are likely to re-colonize habitat with suitable niches, opened by the decline of another population. Both, the resulting genetic exchange and the geographic diversification reduce the risk of extinction of the species. This approach has successfully been applied to the whiptail lizard: since the 1960s, this species was restricted to the two Maria Islands. Between 1993 and 2005, the Forestry Department, together with the Durrell Wildlife Conservation Trust cleared three additional islands of IAS predators and reintroduced the whiptails.
- On Rat Islands, two distinct lineages (one from each of the two Maria Islands) are now procreating to prevent inbreeding.

Habitats on Maria Major like this globally threatened cactus scrub thrive on nutrients transported in by sea birds

The Saint Lucia whiptail lizard – zando – rare and endangered

The management of metapopulations of critical species on off-shore islands cuts across the approaches "prevention", "early detection and rapid response (EDRR)", "control and mitigation", as well as "restoration". Off-shore islands play an important strategic role in risk diversification due to their manageable size. They first need to be freed from IAS. Subsequently, critical species can be re-introduced there to establish metapopulations. As part of on-going management, these sites need to be maintained IAS-free – prevention is routinely practiced. Sooner or later, however, a reintroduction is likely to occur, so EDRR will be crucial to prevent major damage. The IAS are eradicated on the off-shore islands and measures to restore the habitat to its previous state may be taken.

[17] Summarized from Morton, M.N. (2011) The Saint Lucia Whiptail Project. Unpublished report for the Forestry Department and the Durrell Wildlife Conservation Trust, Saint Lucia

Box 8: The Threat from Predators

A small Asian mongoose (*Herpestes javanicus*) exploring the nest of the endemic Saint Lucia iguana at Louvet Beach.

The mongoose was deliberately introduced into Saint Lucia in the early day of sugarcane plantations to control snakes. Good but ill-informed intentions resulted in an island-wide mongoose invasion and resulted in the extinction of indigenous wildlife. This destructive predator can no longer be eradicated, but can be efficiently controlled in small, sensitive areas of high conservation value or critical periods, such as nesting season of critical species.

The manicou or Southern opossum (*Didelphis marsupialis marsupialis*) looking for food near Louvet.

This omnivore seriously affects threatened wildlife through preadation. The manicous arrived in Saint Lucia during Amerindian migrations. It is currently protected by law, but experts are sure that focussed removal is unlikely to exert significant pressure on this fecund marsupial – and once more recommend control in sensitive areas of high conservation value and/or during vulnerable periods[18]

By the working definition used here, the mongoose qualifies as an 'alien', while the manicou, having been introduced prior to European colonization, would be considered 'native'. Both species have contributed to extinctions and continue to impact endangered wildlife through predation in Saint Lucia. From a conservation point of view, if populations are declared invasive - based on damage done - by an Invasive Species Entity, this particular population (in space and time) should qualify for control, independent of the species' definition as aliens or natives.

[18] Morton, M (2009b). *Management of Critical Species on St. Lucia*. National Forest Demarcation and Bio-Physical Resource Inventory Project, FCG International & Durrell Wildlife Conservation Trust, pp 103, http://www.bananatrustslu.com/index.php?link=doccentre&project=sfa2003

Table 3: SUMMARY OF THE STRATEGIC AND PROGRAMMATIC INTERVENTIONS IN THE NISS

STRATEGIC INTERVENTIONS IN THE NISS	
Enabling environment – policies, legislation and institutional frameworks	*Ensure that appropriate legislation, policies, protocols and procedures are in place and operating, to underpin the effective management of invasive species; actively engage the private sector and mobilise sufficient resources; and ensure appropriate institutional mechanisms for inter-sectoral and inter-agency coordination.*
Building capacity	*Develop the institutions, skills, infrastructure, technical support, information management, networks and exchanges required to manage invasive species effectively.*
Communications, Education and Public Awareness	*Raise awareness of the impacts of invasive species on biodiversity, economies, livelihoods and health, and generate support for action to manage and reduce them.*
Research	*Establish a baseline of information on the status and distribution of invasive species in Saint Lucia and a programme for detecting change, including range changes and emerging impacts; understand priority invasives, including research on species biology and quantifiable impacts, and the development of cost-effective control techniques.*
Resource mobilisation	*There may be some capacity for further funding under local budgets; however Saint Lucia cannot realistically fund the entire NISS. External support will need to be sought in the form of grants, technical assistance and equipment, such as through international and regional programmes, non-government organisations, and other donor agencies. Specific needs will be further clarified and proposals developed as the implementation of the action plan proceeds and we gain further knowledge of the invasive species problem facing Saint Lucia.*

PROGRAMMATIC INTERVENTIONS IN THE NISS	
Prevention	*Prevention as identified in the NISS will work by identifying pathways and establishing four barriers: 1) Pre-export control aims to prevent the export of known pests from places where they are established, to other islands; 2) Pre-border control regulates importation to an island or country; 3) At-border control will aim to prevent the arrival of species on-island*
Early detection and rapid response.	*Post-border rapid response (immediate eradication) aims to eliminate newly-arrived pests before they can spread far beyond the point of arrival.* *Rapid response is cheaper the sooner an arrival is detected, while numbers are small. Rapid response requires a surveillance programme, tested response plans in place, and resources ready for action.*
Eradication	*For management of invasive species that are established in Saint Lucia, a hierarchical approach to management will be adopted. Eradication (complete removal of the species from an island), if feasible, will be the preferred result, since management cost is minimal after eradication is achieved, although continued surveillance is required to ensure that re-invasion does not occur.*
Mitigation and containment	*(1) If assessment shows that eradication is not feasible with available resources, then biological control will be considered because, if successful, it also requires minimal further investment. (2) Species that cannot feasibly be eradicated or controlled biologically, especially species whose value to people prevents the use of biocontrol, will be contained within delimited areas or excluded from important areas, where feasible. (3) Permanent control of an established IAS by chemical or physical methods will require permanent investment; this will therefore be considered as a last resort option.*
Restoration	*Sometimes, control of an invasive species is followed by rapid and adequate recovery of the native ecosystem or of the economic or cultural value affected by the target species. But in some cases, populations of native species may fail to recuperate or other unforeseen adverse consequences may occur, such as invasion by other introduced species. In such cases additional intervention may be required to assist the recovery of native biodiversity or to ensure recovery of economic or other values. This may include specific restoration projects for individual native species, or management of additional invasive species*

FIGURE 1: SCHEMA OF THE NISS

VISION

Effective prevention, alert and response systems are in place to prevent, mitigate, control and eradicate IAS in Saint Lucia by 2021

GOALS

- Prevent Introduction and establishment of further invasions
- Reduce impacts of invasive species already present in the country
- Provide a National Framework for IS (NISS) Management
- Strengthen Saint Lucia's participation in regional and international efforts

INTERVENTIONS

STRATEGIC INTERVENTIONS

- ENABLING ENVIRONMENT
- BUILDING CAPACITY
- COMMUNICATIONS, EDUCATION AND PUBLIC AWARENESS
- RESEARCH
- RESOURCE MOBILISATION

STAKEHOLDERS

PROGRAMMATIC INTERVENTIONS

- PREVENTION
- EARLY DETECTION AND RAPID RESPONSE
- ERADICATION
- MITIGATION AND CONTAINMENT
- RESTORATION

MAIN OUTCOMES

1. Harmonised and coordinated IAS management activities across sectors, agencies and stakeholders
2. Appropriate existing sectoral legislation is strengthened to provide the necessary regulatory framework for preventing and managing IAS
3. Adoption of a hierarchical management approach
4. Cross trained border control officers are located in all ports of entry
5. Saint Lucia joins and participates actively in regional organizations working to prevent and manage invasive species, as appropriate and feasible

3.0 STRATEGIC ELEMENTS OF THE NISS

Implementation of the NISS will require activities to deliver outcomes under each of the main goals. These will build on past activities, ensure synergies with ongoing related activities, and will provide the basis for identifying gaps in the future. The following sections are based on the goals of the NISS and provide guidance for how Saint Lucia can seek to achieve the expected outcomes of the NISS by 2021. Additional activities will be introduced, as appropriate. All of these goals will require cooperation and support by the general public; SUSTAINED awareness-raising is therefore a crucial objective under all four goals.

Importantly, a number of the actions necessary to give effect to the NISS have to be undertaken within a regional framework primarily for purposes of cost effectiveness and to provide necessary backstopping to national activities. These include research, knowledge management; frame harmonised policies and legislation, public awareness and sensitisation, and capacity building and training, to mention a few. This strategy also encourages participation in regional and global initiatives for the prevention and management of IAS. For example, host range testing in a third party country is essential for the classical biocontrol approach.

The success of this strategy will depend on the availability of very significant funding. This is discussed further in Chapter 7. The grant provided by GEF, while sufficient to initiate the development of this strategy and to mobilise some of the initial interventions, will not be nearly sufficient to successfully meet the challenges presented by IS. Over the next few years, funding for research and capacity building will be very significant, as will be the demand for other resource requirements. This will be a primary challenge for the ISE working in collaboration with the IASWG.

Much of the content of this Strategy is based on the recommendations of the participants in Consultations that were held in January 2011; and on the recommendations that were articulated in the various background documents that were prepared for the NISS.

As previously mentioned, the NISS proposes 4 goals. For the achievement of each goal, positive objectives for action are outlined and measurable outcomes defined. Specific action programmes to be implemented under this Strategy will be detailed in action plans. Recommendations for initial government actions under the Strategy will be formulated for approval by the IAS Working Group and will be consistent with existing policies and programmes that impact on IS management in Saint Lucia.

Each goal is accompanied by its own suite of objectives. Each of the objectives has been converted into an output of one of the two outcomes, i.e. programmatic or strategic interventions. The priority actions for each of the objectives have been further grouped into short term (1 to 3 years), medium term (4 to 8 years) and long term (more than 8 years).

The Action Plan below provides INDICATIVE priority actions that need to be undertaken to give effect to each of the goals, the time frame, and the expected results. This list of actions is in no way exhaustive and will be reviewed regularly in order to ensure that it reflects changing circumstances. It is envisaged that lead agencies involved in the management of IAS in Saint Lucia will incorporate relevant actions from the NISS into their annual work plans and budgets. It is further envisaged that the IASWG will prepare annual reports on the status of implementation of the NISS, based on reports submitted from the lead agencies.

Where appropriate and necessary, technical assistance will be mobilised from regional and international organisations, especially in the areas of training and capacity development, and taxonomic support. Saint Lucia is a member of 19 of the 22 relevant organisations and their subsidiaries, the most pertinent being the Caribbean Environmental Programme of (CEP/UNEP), the Caribbean Invasive Species Working Group (CISWG), Caribbean Plant Protection Commission (CPPC), the Inter-American Institute for Cooperation in Agriculture (IICA), the International Maritime Organization (IMO), the Organisation of Eastern Caribbean States (OECS), the World Health Organization (WHO) and the World Trade Organization (WTO). Saint Lucia is not a member of the highly relevant CABI or World Organization for Animal Health (OIE). Saint Lucia is party to 16 of 21 relevant Multilateral

Environmental Agreements (MEAs), the most relevant being the Convention on Biological Diversity (CBD), the Cartagena Convention, the Protocol Concerning Specially Protected Areas and Wildlife (SPAW), the Ramsar Convention, the International Health Regulations, the International Plant Protection Convention (IPPC), the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), the Convention on the Control of Harmful Anti-fouling Systems on Ships, and the International Convention for the Control and Management of Ships' Ballast Water and Sediments (GloBallast)[19]. Details are discussed in Krauss (2010). It will therefore suffice to note here that the vast majority of the MEAS are non-binding agreements and are in the form of recommendations, guidelines, and programmes of action, declarations of principles etc., which are accepted by States as guidance for future action and are not mandatory.

There is a plethora of guidance and tools that are available and which the IASWG will evaluate for use. These include the I3N Tools for the Prevention of Biological Invasions[20]. This manual contains the information required for using the *Risk Analysis* and the *Vectors and Pathways Analysis* tools covering terrestrial vertebrates and vascular plants. A Climate Matching Module is also included. The Convention on Biological Diversity also provides key tools and guidance related to invasive alien species, as well as guidance documents that are specific to certain pathways.

[19] Krauss, Ulrike (2010) ibid

[20] www.institutohorus.org.br

Table 4: INDICATIVE PRIORITY ACTIONS BY TYPE OF INTERVENTION AND TIME FRAME

Goal 1 *STRATEGIC INTERVENTION*	**Provide a national framework for invasive species prevention and management**	
Responsible agency	Priority Actions	Expected Results
Short Term (1 to 3 years)		
ISE, IASWG, with subcontracted Consultants, as required	Establish a legally mandated Invasive Species Entity (ISE) that oversees the IASWG as the coordinating and implementing body for IAS management in Saint Lucia. Review and enlarge membership to include MEA Focal Points, civil society representation, private sector representation and representation from community based organisations.	An authority is in place to provide policy directions to the management of IS in Saint Lucia. A formal inter-agency and inter-sectoral mechanism is in place to facilitate, coordinate and monitor IAS management in Saint Lucia.
	Undertake audit of roles and responsibilities of all agencies involved in the management of IAS in Saint Lucia.	Database and inventory of roles and responsibilities and policy instruments of agencies and the overlaps and gaps in IAS management in Saint Lucia.
	Assign clear responsibilities to governmental bodies and agencies for the prevention, detection, rapid response, and long-term management of invasive species.	Agencies are assigned clear responsibilities so that there is no overlap in functions.
	Identify and legally mandate the ISE to act as lead agency on Saint Lucia's IAS management.	A Focal Point is established and acts as Secretariat to the ISE.

Goal 1 *STRATEGIC INTERVENTION*	**Provide a national framework for invasive species prevention and management**	
Responsible agency	Priority Actions	Expected Results
Short Term (1 to 3 years)		
ISE, IASWG, with subcontracted Consultants, as required	Modify, adapt and develop the pertinent legal instruments. Incorporate economic principles into national legislation for addressing invasive species including appropriate taxes, the user-pays principle, and public investment when invasive species management yields public benefits.	Legal framework appropriate to regulate the introduction and management of invasive species in Saint Lucia is in place. The use of economic instruments for IAS management is legislated and mandatory in Saint Lucia.
	Facilitate the preparation of sectoral/agency Action Plans based on the NISS.	Guidance Notes for the preparation of sectoral/agency Action Plans are developed. All agencies involved in IAS management in Saint Lucia have Action Plans which are incorporated into their annual work plans and budgets.
	Undertake review of modalities and mechanisms available at the national, regional and international levels for financing the NISS.	A well articulated Financing Plan for the NISS is in place by the end of year 2.
	Develop mechanisms to factor invasive species management into national and regional decision-making processes on trade and transport, economic development and land use planning.	Invasive species issues are mainstreamed into appropriate national programmes, plans and interventions.
	Endorse NISS CEPA and mobilise resources for its implementation, and undertake implementation.	All levels of society are sensitised and aware of relevant aspects of IAS and IAS management in Saint Lucia
		All sectors of society will cooperate and support the prevention and management of IAS in Saint Lucia
	Establish a national electronic hub for sharing	Updated, reliable and accessible information available

Goal 1 *STRATEGIC INTERVENTION*	**Provide a national framework for invasive species prevention and management**	
Responsible agency	Priority Actions	Expected Results
Short Term (1 to 3 years)		
	information on NISS in Saint Lucia and with the region.	to all users.
	Establish protocols and guidelines for information sharing through the electronic hub.	
IASWG	Develop awareness-raising programmes and materials for key regional, national, sectoral and community target groups, including curriculum development for the formal education sector.	All levels of Saint Lucian society including decision-makers, economic and other interest groups (e.g. agriculture, forestry, horticulture, fisheries, aquaculture, community groups, cultural groups, construction, tourism, shipping, public health, military, pet trade, quarantine) and the general public, are convinced of the importance of invasive species risks and impacts, and of the benefits of invasive species management for biodiversity, the economy and human health, and actively support invasive species management.
ISE and relevant Ministries, Industry sectors and interest groups involved in IAS related activities	Develop Voluntary Codes of Conduct for different industry sectors and interest groups involved in IAS related activities. Provide educational programmes for their employees and clients.	Particular industry sectors voluntarily adopt practices that limit the importation and spread of invasive species now and in the future.
ISE, Attorney General's Chambers	Gazette Rat, Praslin and Dennery Islands as Nature Reserves.	Conducive framework for management of metapopulations on off-shore islands is in place.
ISE	Explore the possibility of creating permanent alien predator-free enclaves on the main island of Saint Lucia to which whiptail lizards could be re-introduced.	Realistic account of benefit versus cost to metapopulation management covering a larger area is readily available.

Goal 2 ***PROGRAMMATIC INTERVENTION***	**Prevent introduction and establishment of further invasions** ***PREVENTION***	
Responsible agency	Priority Actions	Expected Results
On-Going Efforts		
IASWG with partners	Continue preventative measures to keep off-shore islands predator-free. Continue training by the MALFF's Crop Protection Unit and Veterinary Division to Officers who undertake inspections at ports of entry. Continue monitoring and updating MOH's National Influenza plan Continue early detection and rapid response on the iguana project.	Long-term survival of threatened species of global importance is ensured.
Short Term (1 to 3 years)		
Individual Member agencies of the IASWG, Ministry of Education, SALCC	Develop awareness-raising programmes and materials for key, national, sectoral and community target groups, including curriculum development for the formal education sector.	All levels of society, including decision-makers, economic and other interest groups (agriculture, forestry, horticulture, community groups, cultural groups, fisheries, aquaculture, tourism, shipping, public health, quarantine) and the general public, are convinced of the importance of invasive species risks and impacts, and of the benefits of invasive species management for biodiversity, the economy and human health, and actively support invasive species management. Sufficient resources are available to enable all national and regional invasive species priorities to be addressed.

Goal 2 ***PROGRAMMATIC INTERVENTION***	**Prevent introduction and establishment of further invasions** ***PREVENTION***	
Responsible agency	Priority Actions	Expected Results
IASWG led by MALFF	Secure support for invasive species issues among local communities.	Long-term local commitment and sustainability is ensured by promoting full participation of local communities in Saint Lucia in all aspects of invasive species management, including collection of information, awareness raising, identifying priorities, and preventing the introduction and spread of invasive species.
ISE	Identify responsibilities of different government entities regarding detection, risk management and early warning, and correct existing gaps.	Coordinated and efficient rapid response actions are in place.
IASWG, MALFF, Ministry of Health, Customs, SLASPA	Establish harmonized protocols for the prevention of invasive species, taking into consideration mandates of the different sectors.	IAS prevention is effective and efficient and all sectors involved in IAS management follow standardised and harmonised procedures and protocols.
ISE, IASWG, MALFF, Customs, Regional Agencies	Standardise prevention mechanisms and protocols. Establish Protocols to prevent entry of IAS into Saint Lucia. Identify responsibilities of different government entities regarding detection, risk management and early warning to identify and correct existing gaps. Train quarantine staff and provide adequate equipment.	The introduction of new species with the potential to become invasive is prevented and monitored. Infrastructure and surveillance capacities for introduction and dispersal pathways of invasive species are coordinated and appropriate management procedures are in place.
IASWG; MALFF, Customs, Ministry of Health, Regional	Conduct cross-training for Quarantine, Customs, Environmental, and Health Officers and Inspectors, and protected area managers in the prevention of new	Officers and Inspectors are trained and more vigilant of new introductions. Impact of staff-turnover or transfer is reduced.

Goal 2	Prevent introduction and establishment of further invasions
PROGRAMMATIC INTERVENTION	***PREVENTION***
Responsible agency	Priority Actions	Expected Results
Agencies; International Conservation Agencies	introductions.	
IASWG, Private Sector	Conduct cross-training for private companies involved in imports in the prevention and detection of new introductions.	The private sector is sensitised and vigilant of new introductions.
IASWG led by SLASPA, SMMA, Marinas, Customs, ANBAGLO	Formulate clear procedures for inspection of all incoming vessels and cargo.	Procedures are in place for preventing the introduction of aquatic species.
IASWG, MALFF Customs, SLASPA	Implement risk analysis tools in activities related to the import, use, commerce or movement of exotic, invasive or trans-located native species.	Decision making is based on scientific information and the precautionary principle.
IASWG	Develop response plans for rapid response to new introductions of high-risk species.	Response Plans are in place and utilised when necessary.
IASWG, MALFF	Development of specific mechanisms and protocols for the management of established invasive species that cannot be eradicated.	The risk of spread and mitigation of damages caused by established species is reduced.
IASWG and MALFF Communications, GIS	Implement specific elements of NISS CEPA.	Various publics are sensitised and aware of impact of IAS on the health and economy of Saint Lucia.
IASWG led by NGO members and other	Promote and follow up on mechanisms of community and civil society participation in surveillance activities.	Monitoring and early detection actions at the level of the community are strengthened.

Goal 2	**Prevent introduction and establishment of further invasions**	
PROGRAMMATIC INTERVENTION	***PREVENTION***	
Responsible agency	Priority Actions	Expected Results
Community Based Organisations		
Medium Term (4 to 8 years)		
IASWG, Customs, MALFF	Implement mechanisms for rapid information access for surveillance personnel.	Statistical indicators are improved and approved; information is readily available to surveillance personnel.
MALFF, Customs, SLASPA	Strengthen surveillance actions (in customs, markets, aquariums, greenhouses, garden centres, among others).	Key control points for the introduction and spread identified; monitoring and surveillance activities are established; decrease of commercialization of unlicensed species.

Goal 3	**Reduce the *impacts* of invasive species already present in the country**	
PROGRAMMATIC INTERVENTION	***EARLY DETECTION AND RAPID RESPONSE (EDRR)*** ***ERADICATION*** ***MITIGATION AND CONTAINMENT*** ***RESTORATION***	
Responsible Agency	Priority Actions	Expected Results
On-Going Efforts		
IASWG with partners	Continued maintenance and monitoring of sentinel station on off-shore islands. Rapid eradication of any incipient invasion detected on off-shore islands. Eradicate predators from Dennery Islands and remove small livestock in order to include Dennery islands in the programme.	Long-term survival of threatened species of global importance is ensured.

Goal 3 ***PROGRAMMATIC INTERVENTION***	**Reduce the *impacts* of invasive species already present in the country** ***EARLY DETECTION AND RAPID RESPONSE (EDRR)*** ***ERADICATION*** ***MITIGATION AND CONTAINMENT*** ***RESTORATION***	
Responsible Agency	Priority Actions	Expected Results
	Continue iguana eradication programme in Soufriere. Continue implementation of National Influenza Plan.	Survival of Saint Lucia iguana is ensured. Prevention of influenza epidemics in animal and humans is maintained.
Short term (1 to 4 years)		
IASWG and member agencies	Implement specific elements of NISS CEPA.	Various publics are sensitised and aware of impact of IAS on the health and economy of Saint Lucia.
ISE MALFF	Development of specific mechanisms and protocols for the management of established invasive species that cannot be eradicated	There is a reduction in the risk of spread and a mitigation of damages caused by established species.
Medium to Long Terms (4 to 8 years)		
MALFF; Regional Agencies; International Conservation Organisations	Develop contingency plans for containment actions for new infestations.	A rapid response system for invasive species in Saint Lucia is readily available for use when necessary.
ISE	Development of guidelines for the containment, control, eradication and mitigation of damages of invasive species of greatest concern.	Specific action guidelines are developed and stakeholders responsible for the effective management of invasive species, particularly those identified as the most harmful, are aware of their specific roles.

Goal 3 ***PROGRAMMATIC INTERVENTION***	**Reduce the *impacts* of invasive species already present in the country** ***EARLY DETECTION AND RAPID RESPONSE (EDRR)*** ***ERADICATION*** ***MITIGATION AND CONTAINMENT*** ***RESTORATION***	
Responsible Agency	Priority Actions	Expected Results
	Generate containment, control and eradication plans which consider ecological restoration measures of damaged areas.	Ecosystems are restored and risk reduction of re-establishment of eradicated species and establishment of new invasive species is reduced.
Saint Lucia Fire Service, Forestry Department	Effective Fire Control through: (i) learning from best practices and lessons learned on fire and IS management, (ii) establishment of methods and tools for the management of wildfires and invasive species, (iii) Factoring Weed Risk Assessment in fire hazard assessments, and (iv) Development of fuel and hazard maps to locate IS/fire hotspots.	Practical guidelines for fire managers to effectively integrate invasive plant management activities into their fire management programs. Minimize or eliminate the introduction of invasive plant propagules into fire management areas. Minimize the amount of resources available to any such plants that might find their way into the burned area.

Goal 4 ***STRATEGIC INTERVENTION***	**Strengthen Saint Lucia's participation in regional and international efforts for invasive species prevention and management**	
Responsible Agency	Priority Actions	Expected Results
Short term (1 to 3 years)		
ISE	Join and participate actively in regional organizations working to prevent and manage invasive species, as appropriate and feasible.	Saint Lucia joins and participates in the appropriate regional and international organisations., including the World Organization for Animal Health (OIE).
ISE	Endorse and comply with relevant international bodies, agreements, and conventions working to prevent and manage invasive species, as appropriate and feasible.	Relevant international agreements are reviewed and complied with.

3.1 Risks and Assumptions

The successful implementation of the NISS is based on a suite of assumptions that are detailed in the Log frame. In summary, the successful implementation of the NISS hinges on the following:

- establishment of a legally mandated Invasive Species Entity to coordinate and monitor the implementation of the NISS;
- all the member agencies implement the appropriate sections of the NISS;
- appropriate legislation is in place to give the NISS the necessary legislative and regulatory backing;
- appropriately trained officers are in place and are served by adequately resourced facilities to undertake the necessary risk analyses;
- funding is available to undertake the short and medium term activities in the first place;
- all stakeholders are sufficiently informed of their roles and responsibilities in IAS management and perform these roles and duties with due diligence; and
- third party countries are available to undertake host range testing for classical biocontrol.

The associated risks are, *inter alia*:

- the Cabinet does not approve the establishment of the ISE and there is no formal mechanism to coordinate and facilitate the implementation of the NISS.
- funding is not readily available from either national, regional or international sources to implement the short and medium terms actions identified in the NISS.

- the NISS is not enshrined in legislation thereby making it difficult to implement appropriate and cross sectoral actions which are necessary for effective management of IS;
- the knowledge base – including knowledge of the actual pathways by which IAS are carried from place to place and identification of pathways by taxonomic groups and ecosystems - is lacking; and
- there are major gaps in institutional coordination which in turn will impact on the timely implementation of the NISS and associated sectoral and agency work plans.

Activities have been identified in the NISS – refer to Table 4 - to mitigate these risks.

4.0 SUPPORTING ELEMENTS OF THE NISS

The Indicative Actions identified in Table 4 and all other actions that will be implemented to give effect to this NISS will be supported by a number of management principles and tools, some of which are described in this chapter.

4.1 Lag-Phase

Invasive species dynamics are often characterized by a long lag Phase. In plants, this phase typically spans several decades, with some trees having lag phases of 100 years or more before their populations enter the exponential growth phase[22]. While this provides an ample window of opportunity for EDRR of

Box 9: Saving the Saint Lucian Iguana

Saint Lucian iguana nesting season as an example of site- and time-specific management[21]

- Mongooses are among the most detrimental invasive alien predators throughout the Caribbean. They predate both the eggs and hatchlings, as these emerge from the nests of Saint Lucia's native iguana. Mongooses have been established for too long to allow for cost-effective eradication or islands-wide, constant population control.
- During trapping trials focusing on the nesting season of the Saint Lucia iguana at the Louvet Estate from March to May, a total of 81 mongooses were caught and removed. Although some immigration of mongooses into the trapping site seemed to occur during the latter stages, 79% of captured mongooses were trapped during the first five weeks. This relatively large percentage was removed with just five weeks trapping effort and concomitant investment: the entire circuit, encompassing 48 trapping stations, was approximately 3 km.
- Mongoose removal focussed on site (a perimeter around the communal iguana nesting area) and a time of year (the early nesting season) appears to offer an opportunity to reduce predation by a well-established introduced predator on vulnerable life stages (eggs, hatchlings) of the threatened Saint Lucian iguana, at minimum cost.

[21] Summaries from Morton, M.N. (2005) Mongoose trapping at Louvet Estate iguana nesting site 2005. Unpublished report to Saint Lucia Forestry Department and Durrell Wildlife Conservation Trust,

[22] Aikio, S., Duncan, R.P. & Hulme, P.E. (2010) Lag-phases in alien plant invasions: separating the facts from the artefacts. *Oikos.* 119:370-378.

plants introduced without a permit based on risk assessment (i.e. by accident, illegally or before regulations were in place), decision-makers must not be lured into complacency by the lack of apparent invasiveness. Instead, as soon as the alien plant is detected, a risk assessment into its potential invasiveness will be conducted swiftly. Where sufficient information is not available, again, the precautionary principle will apply, and the species will be removed before it causes damage or passes the stage when eradication is no longer possible.

4.2 Control Focused on Specific Time or Site

It is usually impossible to eradicate fully established IAS. Continuous partial control is costly and rarely justified. The NISS therefore recommends punctual control, focusing on a specific site and/or season that is particularly vulnerable and/or valuable to conserve (Boxes 5 and 7). Such an approach will minimise control costs while maximizing potential beneficial impact.

4.3 Lists

Once a risk assessment has been carried out, the results should be documented in a transparent manner in a publicly accessible database. Potential importers and exporters can then see whether a species may be imported ("white list") with the appropriate permits or not ("black list") without duplication of efforts. Many species, however, will either "require further study" or not be listed at all. In the latter case, the missing risk assessment can simply be carried out and documented when required. In the former case, the precautionary principle should apply until information gaps can be closed sufficiently to obtain a meaningful result. Exiting risk assessment may also be up-dated when additional input data becomes available.

Adult female Saint Lucian Iguana
Credit: Matthew Morton, Durrell

Black lists and white lists will reduce duplication of effort whenever stakeholders apply for import permits via planned and legal procedures. The NISS recognises that the usefulness of lists in targeting accidental and illegal (including through lack of knowledge) introductions will be restricted to raising public awareness[23]. Several reasons contribute to this limitation:

- By their very nature, lists are notoriously incomplete and out of date
- It is impossible to prioritize potential threats comprehensively, because of the myriads of potentially invasive species living outside the national territory and waters
- Too little is known locally about absent species, while they are the focus of prevention

Therefore, preventative measures will be given priority to targeting high-risk pathways over species listings. Systematic interception, regulation, and monitoring at critical intervention points will potentially prevent the accidental or illegal introduction of most macroscopic life forms.

[23] The "100 of the World's Worst Invasive Alien Species" list by the World Conservation Union (IUCN, http://www.issg.org/database/welcome/) was prepared to raise awareness of IAS, using 100 species as case studies. The list has often been misinterpreted to represent a ranking. Nevertheless, these species are considered of major importance because of their impact.

4.4 Amnesty

One aspect of NISS implementation will be drafting IAS legislation. Laws, however, cannot be applied retrospectively. Therefore, it is expected that numerous plant and animal species will already be in the possession or on the land of individuals who acquired them prior to enactment. In order to reduce the risk of invasion originating from such existing stocks, these will be recorded (identified and quantified). A decision will then be taken whether to grant a licence, together with provision of the necessary technical support and subsequent monitoring, or whether prohibited plants or animals need to be removed, through re-homing or destruction.

The public will we encouraged to report the ownership of members of recently banned or restricted species, independent of whether they had been obtained through legal, informal or illegal channels, in special, well-advertised Amnesty Weeks. Once the

Amnesty period has expired, keeping of such (unlicensed) species will be prohibited and sanctionable.

4.5 Commercialisation

The ISE will decide for which declared invasive species commercial use of the species is permitted and will define which form this may take. The ISE will be guided by the factors outlined in Table 5. According to this guideline, the lionfish would be an example of a species that lends itself to commercialization, whereas commercialization of the giant African snail would be rejected.

Table 5: GUIDING FACTORS REGARDING THE DECISION WHETHER OR NOT AN INVASIVE SPECIES MAY BE USED COMMERCIALLY

	Commercialization of Invasive Species Advisable	
	In Favour	**Against**
Species absent from Saint Lucia		✓✓
Species eradication likely to be feasible		✓
Species can be cultivated/bred economically in Saint Lucia		✓
Species exclusively harvested from wild	✓	
Harvesting is likely to reduce population size and/or spatial range of species	✓	
Harvesting is likely to encourage beneficiaries to make habitat modification that allow species to multiply better		✓
Species prone to parasites or pathogens which are invasive or possess wide host range		✓
Commercialization likely to attract followers outside the national territory		✓
Species easily smuggled		✓

✓ relevant criterion, ✓✓ highly relevant criterion

4.6 Tools

The NISS recognises that specific tools and methods will have to be used to undertake vector and pathway risk analysis to aid decision-making in the management of IAS in Saint Lucia. Decisions will have to be made on the probability of establishment and invasion; potential impact; and difficulty of control and eradication. To this end the ISE, in collaboration with the IASWG, will review the suite of tools and methods that are already available on the shelf in order to ascertain those that are most suited to Saint Lucia's situation.

4.7 Biocontrol

Classical Biocontrol is the introduction of a natural enemy from the area of origin of a pest to a new area where the pest has become established and, in the absence of natural enemies, often invasive. If a natural enemy can also be introduced successfully, it can provide biological control and thereby restore the natural balance. However, great care needs to be taken that the alien biocontrol agent does not affect non-target species. Thus, for classical biocontrol, it is essential to carry out extensive ecological and host-range tests in a safe quarantine facility, ideally in a third-party country with a different (e.g. temperate) climate. Thus, international collaboration is essential because it can provide the critical mass for cost-effectiveness. This was seen during the highly successful biocontrol of the Pink Hibiscus Mealy bug throughout the Caribbean (Box 10).

4.8 Climate Change and Climate Variability

Regional climate models for the Caribbean predict increasing air and sea surface temperatures. The models also point to decreasing overall precipitation, but a higher proportion of precipitation in more intense showers. Recent scientific studies project an average increase in hurricane intensity and a peak in the ratio of higher-category hurricanes by around 2025. Sea-level rise is also expected to be a major issue of concern. In addition to changes

To predict the impact of climate change on IAS is far from easy, because of …

- ***the biology of the species,***
- ***the susceptibility to invasion of the host ecosystem,***
- ***the vulnerability of native species to climate change, and***
- ***the dynamism of changes in the interactions within ecosystems***

in temperature, rainfall and other meteorological parameters, there is growing concern about increasing climate variability.

The NISS recognises that climate change can facilitate IAS in Saint Lucia as:

- New species that may become invasive may be entering the region due to climate change;
- Species hierarchies in ecosystems will change, leading to new dominants that may have invasive tendencies;
- Frequency and intensity of wildfires will increase thereby benefitting pioneer plant species;
- Climate induced stress in an ecosystem will facilitate invasive behaviour; and
- High altitude endemics may be replaced through encroachment by mid-elevation species, as temperatures increase.

As such the NISS recognises IAS as part of climate change, although the synergy between IAS and climate change is both

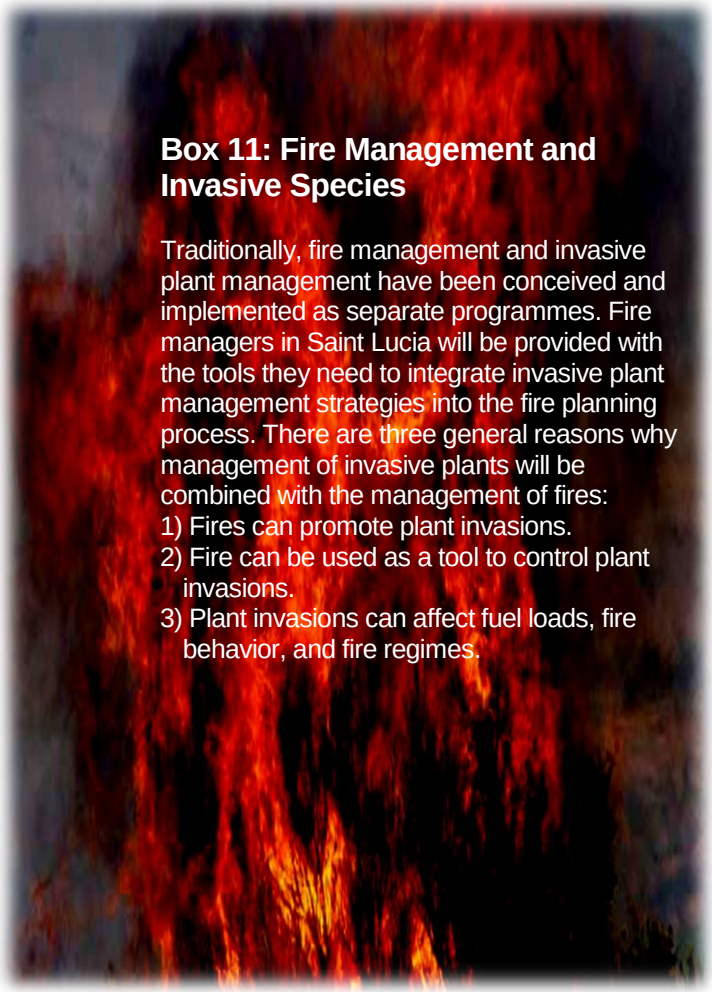
Box 10: Biological Control of the Pink Hibiscus Mealybug

The Pink Hibiscus Mealybug (PHMB, *Maconoellicoccus hirsutus*) was accidentally introduced to the Caribbean on ornamental plants. It was first reported in Grenada in 1994. By 1996 it had spread through the entire Caribbean. A regional, concerted effort was made to identify natural enemies of the PHMB in its home region: Asia. Extensive testing on candidate organisms was done in the UK, as a third-part country with good quarantine facilities and probably minimal environmental risk should the PHMB or natural enemy accidentally escape. After careful evaluation, a parasitoid wasp (*Anagyrus kamali*) was introduced to the Caribbean from China and a coccinellid (*Cryptolaemus montrouzieri*) from India, both through quarantine in the UK.

The highly successful project adhered to and reinforced the application of the ISPM 3 guidelines. One of the reasons for the tremendous success of this programme was the excellent collaboration between various regional (CARDI, CariNet, IICA, USDA-APHIS) and international (CABI, FAO) institutions with 15 Caribbean countries as well as several Dutch, French, UK and US territories.

Source: Kairo, M.T.K. , Pollard, G.V., Peterkin, D.D. and Lopez, V.F. (2000) Biological control of the hibiscus mealybug, *Maconellicoccus hirsutus* Green (Hemiptera: Pseudococcidae) in the Caribbean. Integrated Pest Management Reviews 5, 241-254

Deformed leaves and buds on a hibiscus plant show the obvious signs of PHMB infestation
Credit: ldaf.louisiana.gov



Box 11: Fire Management and Invasive Species

Traditionally, fire management and invasive plant management have been conceived and implemented as separate programmes. Fire managers in Saint Lucia will be provided with the tools they need to integrate invasive plant management strategies into the fire planning process. There are three general reasons why management of invasive plants will be combined with the management of fires:

1) Fires can promote plant invasions.
2) Fire can be used as a tool to control plant invasions.
3) Plant invasions can affect fuel loads, fire behavior, and fire regimes.

complex and poorly understood. While Saint Lucia does not have the research capabilities to fully understand the synergies between climate change and IAS within the context of the special peculiarities of a small island, the NISS acknowledges that to develop effective management strategies for IAS influenced by climate change, it is necessary to adopt a holistic, interdisciplinary approach comparing various control methods. Table 4, Goal 1, includes actions for a management strategy for fire prone IAS (e.g. inflammable grass). It is also appropriate to mention here that Saint Lucia is a member of the Florida and the Caribbean Fire and Invasive Species Learning Network This Network is hosted by The Nature Conservancy and builds a peer-to-peer network of practitioners for information-sharing and capacity-building; assesses the state of knowledge about interactions between fire and invasive plants; identifies and prioritizes management and information needs; identifies barriers to prevention and restoration; and develops integrated fire and invasive species management plans.[24]

[24] Burgiel, Stas 2010. *ibid*

4.9 Proposed Institutional Arrangements

One of the first actions that will be undertaken as soon as the NISS is approved by the Cabinet of Ministers is to conduct an audit and arrangement should be in place within 18 months of the commencement of the implementation of the NISS.

It is envisaged that the institutional arrangements would include the establishment of an Invasive Species Entity (ISE) which will have a mandate to deal with IAS in Saint Lucia. It is proposed that the Entity's special purpose be to foster coordinated approaches that support local initiatives for the prevention and control of invasive species, by providing policy level direction and planning that includes legislation, funding, and programme direction for all agencies responsible for invasive species issues. It is proposed that the members include senior personnel from the Ministries of Agriculture, Lands, Forestry and Fisheries; Physical Development and the Environment; Finance, Economic Affairs and National Development; Tourism; Health and Wellness; and the National Emergency Management Organisation, as well as representatives from non-governmental organisations and the private sector.

gap analysis of all the agencies that are involved in the management of IAS in Saint Lucia. This review should be completed within six months and the enhanced institutional

It is also envisaged that the IASWG will continue to provide the coordination and facilitation until such time as the ISE is designed, approved by Cabinet and implemented, most likely within an existing structure.

4.10 Roles and Responsibilities

Communities & Civil Society:

- organise local, cooperative efforts to mitigate the impact of invasive species;
- practice sustainable and responsible maintenance of land and households;
- support and organise educational efforts regarding invasive species; and
- stay updated on current invasive species concerns in Saint Lucia.

The Private Sector:

- be aware of current invasive species issues and the laws that apply;
- share information on invasive species issues with clients and staff;
- work with clients in identifying existing and new species of IAS and sensitise them to the economic, social and health impacts of IAS invasions;
- participate in corporate social responsibility through the development and implementation of voluntary codes of conduct and policies that will reduce the impact of invasive species; and
- represent members' interests on invasive species issues.

The Government of Saint Lucia:

- facilitate the development of an economic, social and cultural framework that encourages invasive species management as an integral part of sustainable environmental management;
- provide and enforce an appropriate legislative framework, including quarantine and environmental legislation, necessary to prevent the introduction or to reduce the impact of invasive species and prevent them from spreading; and
- provide leadership, coordination and resources for research, assessment and eradication of invasive species of national significance.

The ISE

- provide policy guidance on all matters pertaining to IS management in Saint Lucia;
- decide which species or sub-populations of species should be managed, and how;
- decide which species may be commercialized and how;
- be responsible for licensing all those species that are not already covered under the existing legislation;
- evaluate and introduce cost recovery mechanisms to finance IAS management in Saint Lucia;
- decide on membership in and collaboration with regional organisations; and
- monitor and evaluate the implementation of the NISS.

The IASWG:

- provide overall leadership in implementing the NISS.

- take a leading role in public education and community awareness regarding invasive species, working with State agencies, the private sector and communities, i.e. implementing the CEPA.
- provide scientific and technical information, advice and guidance on the management of IS in Saint Lucia.
- identify and consider relevant, specific, and concrete tools, voluntary codes of practice, methodologies, guidance, best-practice examples and instruments, including possible regulatory mechanisms for addressing the risks associated with the introduction of alien species.
- respond to all reasonable requests for help with invasive species from community groups and the private sector.
- develop, with all stakeholders, a balanced programme of incentives, standards and penalties to ensure effective action to address invasive species problems.
- form partnerships with international agencies and other nations in order to benefit from their experiences and technical expertise, and to share our experiences with overseas invasive species managers.
- be aware of the invasive species concerns of other jurisdictions in the WCR.
- encourage the development and integration of effective invasive species management strategies at local, and national levels.

4.11 Time Frame

- the Saint Lucia National Invasive Species Strategy will take effect upon adoption of the NISS by the Cabinet of Ministers of Saint Lucia.
- the ISE will become a formalized entity with a legal mandate within two years of the start of implementation of the NISS.
- the IASWG shall submit an annual progress report to the ISE which, in turn, will submit a consolidated report to the MALFF.
- the IASWG will review and update the Action Plan of the NISS at three-year intervals after adoption, or anytime upon recommendation by the ISE or the MALFF.

5.0 COMMUNICATIONS, EDUCATION AND PUBLIC AWARENESS FOR THE NISS

Communication, Education and Public Awareness (CEPA) are important instruments for the management of invasive species. The CEPA provides the link from science and ecology to people's social and economic reality. It deals with the processes that motivate and mobilize individual and collective action. It comprises a range of social instruments including information exchange, dialogue, education, and marketing. The CEPA instruments, however, work best when part of a broader instrument mix - e.g. combined with legal, financial and other instruments - that is used to develop, implement and manage the NISS. The CEPA will provide tools to:

- facilitate and support all stakeholders in decision-making;
- foster policy change by making policy makers aware of the issues of IAS;
- make information understandable and meaningful; and
- foster acceptance of new policies, legislation and regulations.

5.1 Proposed Actions for NISS Stakeholders

CEPA as one of the key elements of the NISS will effectively engage and manage multi-stakeholder dialogue to plan and implement IAS management interventions. With appropriate handling these processes will develop a sense of ownership of the IS problem and the solutions so that action is sustained. CEPA will be used with the other instruments that have been put in place through the NISS.

The IASWG and its member agencies will implement the CEPA and coordinate the implementation of the NISS. A sample of the messages and channels for the different stakeholders is provided on the next page. Support will also be sought from the private sector for financing elements of the CEPA and from communities for implementation.

Table 6: CEPA Actions for each Stakeholder

Stakeholders	Information	Messages and Channels
General Public (*including tourists visiting Saint Lucia)*	❖ What are IAS ❖ What impacts do IAS create – environmental, health, economic, positive and negative ❖ IAS Pathways – arrival, spread ❖ IAS Management Hierarchy – prevention, early detection and rapid response, control, mitigation ❖ Management Options	Brochure on Invasive Species in Saint Lucia: ❖ what are invasive alien species; ❖ how do they arrive in Saint Lucia; ❖ examples of invasives found in Saint Lucia; ❖ impact on the economy and society of these invasives ❖ what to do when you see an invasive ❖ who to contact Information Brochures on Entry Restrictions of Certain Plants and Animals, and need for obtaining import permits on all plants and animals, to be placed at all points of entry Public Service Announcements (Bilingual) ❖ Radio Shorts ❖ TV spots ❖ Documentary on Invasives in the Caribbean (25 mins.) ❖ Posters ❖ Various Pathways – Schools ❖ Libraries ❖ General public ❖ SLASPA – ports of entry ❖ Marinas ❖ Pet Shops ❖ Various public places ❖ Selected Invasives – picture poster + special information ❖ Schools ❖ Libraries ❖ General public ❖ SLASPA – ports of entry ❖ Marinas ❖ Pet Shops ❖ Plant and Garden Shops ❖ Various public places ❖ Government Offices ❖ Existing IAS high risk species and threats posed by them ❖ Recent IAS Outbreaks and Impacts

		❖ Importance of Off Shore Islands in IAS Management WebPages ❖ General information – Pathways ❖ Specific invasives ❖ What to do ❖ Who to contact Talk Shows – coordinated with GIS and the MALFF Communications Unit Special Events – inclusive of cultural productions, carnival costumes, music, dance, theatre, community events Seminars for Media personnel - General information as above so that personnel are sufficiently sensitised to write/host their own articles/shows on IS
School Children	❖ What are IAS ❖ What impacts do IAS create – environmental, health, economic, positive and negative ❖ IAS Pathways – arrival, spread ❖ IAS Management Hierarchy – prevention, early detection and rapid response, control, mitigation	Creation of an IS mascot for primary schools <u>Primary</u> Teacher Packs ❖ Informational briefs on prioritised IAS ❖ Cartoon booklets and colouring books using the IS Mascot ❖ Role Play and drama ❖ Songs ❖ Field Trips to observe invasives ❖ Infusion into curriculum – social science, general science <u>Secondary and Tertiary</u> Teacher Packs containing ❖ Informational briefs on prioritised IS ❖ Posters ❖ Brochures ❖ Briefing Sheets on each of the selected invasives ❖ Work Activity Sheets ❖ Infusion into curriculum – social science, general science Field trips to observe invasives Information/ field work for SBAs (to be provided by Department of Forestry) – social science, geography Plays and poems in literature curriculum

		WebPages on existing Ministry of Education and School websites – electronic information packs Science Fairs – promoted by the Ministry of Education for primary, secondary and tertiary schools on IAS detection, eradication and control
Focussed Stakeholders	Marinas, Seaports	Signage – ❖ Things that yachtees should NOT do while in the Marina, e.g. not walk their animals in the marina unless they have been inspected - REGIONAL ❖ How do you treat Ballast Water? – REGIONAL Posters - Marine invasives ❖ Marine Pathways – REGIONAL ❖ Informational Brochures on regulations on the importation of exotic animals and plants WebPages – to be uploaded on existing marine sites, e.g. SLASPA, Marinas, SMMA, Marine Industries of Saint Lucia, etc. Training: ❖ Marine Invasives ❖ Pathways Management
	Sea- and Airports Private sector	Electronic Bill Boards at the airports to carry messages on the regulation of imports of potential IS Information sheets for Pet Shops to distribute to clients on how to manage unwanted aquatic and terrestrial species and the horticultural sector on desirable and undesirable ornamentals ❖ Posters in public places ❖ Bi-lingual Radio Shots for farmers, fisher folk and rural communities ❖ Bi-lingual TV documentaries on Existing IAS high risk species and threats posed by them ❖ Posters and brochures on halting entry and spread of IAS places in Health Centres and other places of medical care ❖ Preparation of Emergency Plan for IAS Epidemic or other forms of outbreak ❖ Training REGIONAL Farmers and landowners on early detection and response protocols Community Health workers on how to prevent spread of IAS Plant and Animal Inspection Officers, and Forestry Officers from the MALFF,

	Customs and Ports Police to regulate imports of potential terrestrial IS Fisheries Officers, SLASPA, Ports Police to regulate potential imports of potential marine IAS Hotel, tour and dive operators on monitoring and use of off-shore islands
Media	❖ Training REGIONAL ❖ Field Trips
Policy Makers	Training REGIONAL ❖ to enhance their understanding of IAS issues; ❖ to increase their knowledge of international conventions and protocols that impact on IAS management in Saint Lucia ❖ to increase their knowledge of the range of regulations and early detection and response protocols

Cane toad (*Bufo marinus*)
Photo: Craig Morley, Global Invasive Species Database (GISD)

Sweet potato whitefly (*Bemisia tabaci*)
Photo: S. Gassouma, GISD

Ship rat (*Rattus rattus*)
Photo: David Mudge, GISD

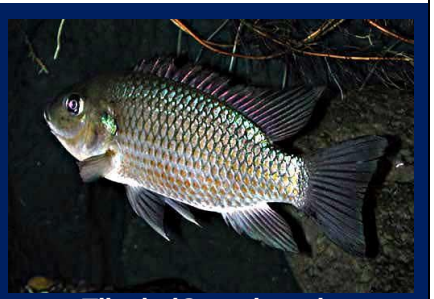
Water hyacinth (*Eichhornia crassipes*); Photo: Roger Graveson, www.saintlucianplants.com

BOX 12: 100 OF THE WORLD'S WORST INVASIVE SPECIES - AT LEAST 12 ARE ALIENS REPORTED PRESENT IN SAINT LUCIA

Feral cat (*Felis catus*)
Source: Wikipedia

African tulip tree (*Spathodea campanulata*); Photo: Roger Graveson, www.saintlucianplants.com

Feral goat (*Capra hircus*)
Photo: M. Morton, DWCT



Tilapia (*Oreochromis mossambicus*); Source: Atlas of Living Australia

Indian mongoose (*Herpestes javanicus*)
Photo: Alessio Marrucci, GISD

Catclaw mimosa (*Mimosa pigra*)
Photo: Roger Graveson, www.saintlucianplants.com

Feral pig (*Sus scrofa*)
Photo: Andrew Bengsen, University of Queensland, Australia

Roseleaf bramble (*Rubus rosifolius*); Photo: Roger Graveson, www.saintlucianplants.com

6.0 MONITORING AND EVALUATING THE NISS

Implementation of this National Invasive Species Strategy will include regular monitoring and evaluation of progress. The IAS Working Group will be responsible for coordination and implementation of this NISS. Participating institutions will be responsible for monitoring and implementation of their respective tasks.

To be able to effectively monitor the NISS, the ISE will:

- take the lead in developing a Monitoring and Evaluation Plan that will include a reporting structure and format, performance and impact indicators, compliance indicators and monitoring tools;
- assist sectoral institutions to develop baseline performance indictors with milestones for tracking implementation progress over an initial 5-year period and at regular intervals thereafter, and
- assist sectoral institutions to develop their own monitoring plans and seek to integrate these into the over-all invasive species-monitoring plan.

The Key Monitoring Tools shall include:

- annual reports from relevant stakeholders;
- consolidated Annual reports from the ISE;
- annual meetings convened by the ISE to specifically discuss progress on implementing the invasive species plan;
- periodic National Reports to the Convention on Biological Diversity.

7.0 FINANCING OPTIONS FOR THE NISS

For the NISS to be sustainable, adequate funds have to be allocated to the implementation of annual work plans emanating from the NISS. As soon as the NISS is endorsed by the Cabinet of Ministers, the ISE should embark on developing a financing strategy that will include "polluter pays" principles and other mechanisms for ensuring that persons who illegally import and/or release invasive species into the wild are sufficiently penalized for their act. The ISE should also review and recommend appropriate economic instruments that will provide incentives/disincentives to deter the importation of alien species.

Financing mechanisms are usually complimented by economic instruments such as charges on imports and subsidies for control, and command and control instruments such as bans on imports of alien species and quarantine requirements. Economic instruments create incentives to reduce alien spreading activities, such as import charges, or adopt cleaning activities such as subsidies for ballast cleaning. These interventions are likely to have both a revenue impact and an incentive effect.

With respect to IAS, the cost of correcting environmental damage is many times higher than preventing damage and maintaining adequate levels of environmental quality in the first place. Moreover, in some instances restorative costs are effectively infinite where damages are irreversible. The application of economic instruments is an important cost-saving tool in this regard. The "user pays" principle needs to be applied to requests for permits to introduce a new species. The user, or "responsible party", is the entity which seeks to conduct the activity that may result in an IAS introduction, and who will benefit from it. Therefore any costs associated with the process, and the burden of proof for demonstrating compliance with regulations, should fall upon the user. Permits for intentional introductions should involve a fee structure that not only covers administration costs of management, including risk analysis, but which also addresses the issue of liability, should the species in question become invasive. There is also a need to introduce financial penalties

for non-compliance with regulatory requirements in the case of both intentional and unintentional introductions. Furthermore, the risks associated with operating various known pathways (such as cargo handling or international flights) should be assessed, costed and paid for by the users of the pathways. For example, airport departure taxes are a way of making those who travel pay for the procedures of screening for propagules at customs checks.

The use of earmarked revenues creates an important focal point for decentralising decision-making authority and provides greater incentives to local resource users to manage resources sustainably. It will also allow for the creation of a "Compensation Fund" to address potentially devastating impacts on farmers, forest owners, or other businesses who, through no fault of their own, may be forced to destroy crops to deal with an invasive pest.

Earmarked revenues can also fund capacity-building: institutional strengthening is viewed as a co-requisite to the successful implementation of any policy intervention and should go hand-in-hand with the implementation. Unfortunately, previous experiences in Saint Lucia indicate the administration's disquiet with earmarking revenues solely for environmental interventions. The general tendency is for all revenues to be channeled into the Consolidated Fund.

In light of the preference for all revenues collected to be channeled through the Consolidated Fund, it may also be useful for agencies implementing elements of the NISS to ensure that they either create a separate budget line item for IAS in their agency budgets or ensure that IAS activities are included in the appropriate budget sub-line items.

It will also be imperative for the ISE to have a budget of its own. This allocation will depend on where the IAS is to be located and the type of legal mandate that it will be provided.

ANNEX 1

LIST OF BACKGROUND DOCUMMENTS SUPPORTING THE NISS

Andrew, Gaspard Michael & Lyndon John	2010	**National Invasive Species Strategy for Saint Lucia: Terrestrial Ecosystems Analysis.** Carried out in support of the Critical Situation Analysis (CSA) under the project *Mitigating the Threats of Invasive Alien Species in the Insular Caribbean Project* No. GFL / 2328 – 2713-4A86, GF-1030-09-03, pp 33.
Chase, Vasantha	2010	**National Invasive Species Strategy for Saint Lucia: Policy Gaps and Needs Analysis.** Carried out in support of the Critical Situation Analysis (CSA) under the project *Mitigating the Threats of Invasive Alien Species in the Insular Caribbean Project* No. GFL / 2328 – 2713-4A86, GF-1030-09-03, pp 54.
Chase, Vasantha	2010	**National Invasive Species Strategy for Saint Lucia: Communications, Public awareness and Education Strategy.** Carried out in support of the Critical Situation Analysis (CSA) under the project *Mitigating the Threats of Invasive Alien Species in the Insular Caribbean Project* No. GFL / 2328 – 2713-4A86, GF-1030-09-03, pp 33.
Chase, Vasantha, Marie-Louise Felix and Ulrike Krauss	2011	**Summary of Conclusion and Recommendations from National Consultations.** Carried out in support of the National Invasive Species Strategy (NISS) under the project *Mitigating the Threats of Invasive Alien Species in the Insular Caribbean Project* No. GFL / 2328 – 2713-4A86, GF-1030-09-03, pp 62.
Felix, Marie-Louise	2010	**Policy, Gaps and Needs Analysis for Invasive Species Management for Saint Lucia: Aquatic Ecosystems** Carried out in support of the Critical Situation Analysis (CSA) under the project *Mitigating the Threats of Invasive Alien Species in the Insular Caribbean Project* No. GFL / 2328 – 2713-4A86, GF-1030-09-03, pp 62.

Felix, Marie-Louise 2010 **National Invasive Species Strategy for Saint Lucia: Communications, Education, Public Awareness Strategy and Actions**. Carried out in support of the Critical Situation Analysis (CSA) under the project *Mitigating the Threats of Invasive Alien Species in the Insular Caribbean Project* No. GFL / 2328 – 2713-4A86, GF-1030-09-03, pp 48.

Krauss, Ulrike 2010 **Critical Situation Analysis (CSA) of Invasive Alien Species (IAS) Status and Management, Saint Lucia, 2010.** Carried out under the project *Mitigating the Threats of Invasive Alien Species in the Insular Caribbean* Project No. GFL / 2328 – 2713-4A86, GF-1030-09-03, pp 102.

Krauss, Ulrike 2010 **Invasive Alien Species (IAS) Awareness Baseline Survey, Saint Lucia, 2010.** Carried out in support of the Critical Situation Analysis (CSA) under the project *Mitigating the Threats of Invasive Alien Species in the Insular Caribbean Project* No. GFL / 2328 – 2713-4A86, GF-1030-09-03, pp 56 .

Mathurin, Guy 2010 **National Invasive Species Strategy for Saint Lucia: Pathways**. Carried out in support of the Critical Situation Analysis (CSA) under the project *Mitigating the Threats of Invasive Alien Species in the Insular Caribbean Project* No. GFL / 2328 – 2713-4A86, GF-1030-09-03, pp 39.

ANNEX 2

LOG FRAME FOR THE NISS

	INTERVENTION LOGIC	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
IMPACT/ GOAL	To implement a national framework for invasive species prevention and management	1. Invasive species are controlled or eradicated in at least six key biodiversity areas, where they threaten native species with extinction, by the end of the life of the NISS	• NISS Annual Reports • Sectoral Reports • Technical Reports • NISS documents and reports • Policy Briefs • Press releases	• Establishment of a legally mandated Invasive Species Entity to coordinate and monitor the implementation of the NISS; • Agencies of the IASWG implement the appropriate sections of the NISS; • Appropriate legislation is in place to give the NISS the necessary legislative and regulatory mandate; • Appropriately trained officers are in place and are served by adequately resourced laboratory facilities to undertake the necessary risk analysis; • Funding is available to undertake the short and medium term activities in the first place; • All stakeholders are sufficiently informed of their roles and responsibilities in IAS management and perform these roles and duties with due diligence; and • Third party countries are available to undertake host range testing for classical biocontrol **The Government of Saint Lucia:** • facilitates the development of an economic, social and cultural framework that encourages invasive species management as an integral part of sustainable land management; and • provides and enforces an appropriate legislative framework, including quarantine and environmental legislation, necessary to prevent the introduction or reduce the impact of invasive species and prevent them from spreading
OUTCOME/ PURPOSE	To provide the appropriate policy, legal and institutional frameworks for all aspects of IS management in Saint Lucia	1. The IS Legislation and regulatory framework is approved by Parliament and fully implemented by end of Year 3 2. A legally mandated ISE is established and operational by end of second quarter of year 2 3. Clear responsibilities are assigned to governmental bodies and agencies for the prevention, detection, rapid response, and long-term management of invasive species by the end of Year 1 of the NISS being approved by Cabinet.	• Legislation is gazetted and regulatory framework is fully operational • A fully operational ISE • Consultant's report and recommendations on audit of agencies involved in IAS management in Saint Lucia	

	INTERVENTION LOGIC	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
OUTPUTS	1. Harmonised and coordinated IAS management activities across sectors, agencies and stakeholders 2. Strengthened sectoral legislation regulatory framework for preventing and managing IAS 3. Adoption of a hierarchical management approach 4. Regular cross-training provided to all officers involved in border control and/or in all ports of entry 5. Saint Lucia joins and participates actively in regional organizations working to prevent and manage invasive species, as appropriate and feasible	1. Sectoral Plans based on the NISS are endorsed for all the major sectors by the middle of Year 2 2. The NISS CEPA is endorsed by second quarter of Year 1 and resources mobilised for 50% of its implementation by the end of year 2 3. At least 15 officers are trained in border control during the first 3 years of the NISS	• Sectoral Plans • Technical Reports • Training certificates and reports • Programme progress reports • Fact Sheets • NISS Website • Pest and Disease Survey Reports, including regional/global databases • Sectoral Annual Reports • Annual ISE Reports • Feedback from stakeholders • Emergency response plans • National Pest and Disease management plans	**The ISE** • provides policy guidance on all matters pertaining to IS management in Saint Lucia; • is responsible for licensing all those species that are not already covered under the existing legislation; • evaluates and introduces cost recovery mechanisms to finance IAS management in Saint Lucia; • decides on membership in and collaboration with regional organisations; and • Monitors and evaluates the implementation of the NISS. **The IASWG:** • provides overall leadership in implementing the NISS; • provides scientific and technical information, advice and guidance on the management of IS in Saint Lucia; • identifies and considers relevant, specific, and concrete tools, voluntary codes of practice, methodologies, guidance, best-practice examples; • develops with all stakeholders a balanced program of incentives, standards and penalties to ensure effective action to address invasive species problems; • forms partnerships with international agencies and other nations in order to benefit from their experiences and technical expertise; • is aware of the invasive species concerns of other jurisdictions in the WCR; and • encourages the development and integration of effective invasive species management approaches at local and national levels.
ACTIVITIES/ PROCESS	**Strategic Interventions** • Enabling Environment – policies, legislation and institutional frameworks • Building capacity • Communication, Education and Public Awareness • Research • Resource Mobilisation **Programmatic Interventions** • Prevention • Early detection • Eradication • Mitigation and Containment • Restoration	1. Financing is available for at least 75% of the short to medium term activities identified in the NISS by the end of Year 2. 2. At least 80% of the CEPA is completed by the end of the NISS. 3. Voluntary Codes of Conduct for 3 different industry sectors and interest groups involved in IAS related activities are developed. 4. Rat, Praslin and Dennery Islands are gazetted as Nature Reserves by the end of Year 3. 5. At least 2 training courses are provided to the private sector every year for the first 3 years	• Quarterly NISS programmatic and financial reports • Sectoral Plans and Reports • Technical reports • Media and awareness products • Scientific research reports • Quantum of funds raised from resource mobilisation efforts • Donor reports • Project proposals • Gazetted Reports	

	INTERVENTION LOGIC	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
		of the NISS 6. Clear procedures for inspection of all incoming vessels and cargo are developed by the end of Year 3 and all port personnel are provided training by the end of year 4.		
INPUTS	Financial Inputs are required for the following line items: **Recurrent Costs** Salaries and emoluments of staff of the ISE x 5years Office Equipment x 5 years Office Supplies x 5 years Travel and DSA Preparation of Reports	**Capital Costs** Institutional Strengthening Consultancies Technical programmes CEPA implementation Training and Capacity Development Research		