Mitigating the Threats of Invasive Alien Species in the Insular Caribbean

A framework for regional cooperation

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Invasive Alien Species – A Major Threat to Biodiversity in the Caribbean

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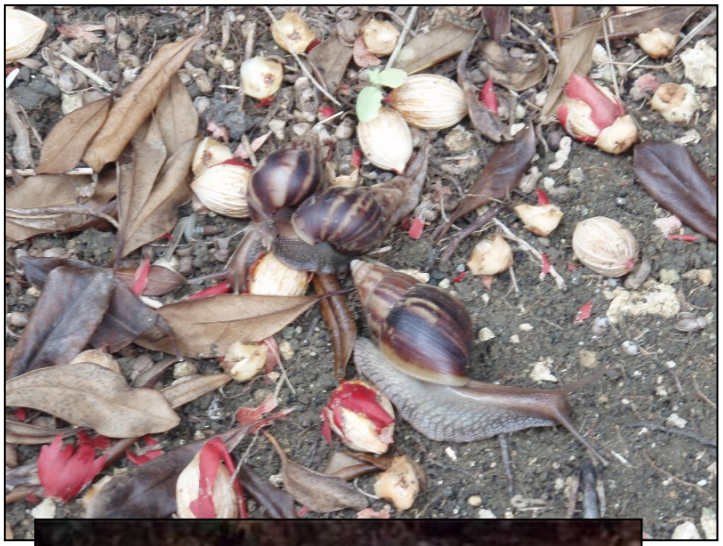
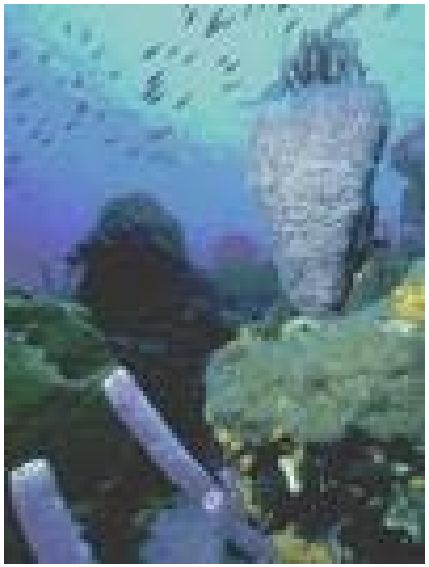


Importance of Caribbean Biodiversity

Caribbean ‘biodiversity hotspot’

- spans 4.31 million km^2 of ocean and just 0.26 million km^2 of land area
- encompasses most island groups in the Caribbean Sea and extends to southern tip of Florida
- contains habitats of international biodiversity and conservation value

Importance of Caribbean biodiversity cont'd



High level of endemicity

- 60 spp. of corals,
- 25% of the 1500 fish species

- Regional endemicity of other groups:
  - •60% of flora
  - •85% of herpetiles
  - •30% of mammals
  - •22% of birds

Importance of Caribbean Bio-diversity cont'd

http://www.biodiversityhotspots.org/xp/Hotspots/caribbean/

Hutias are threatened and endemic to Caribbean

http://www.kingsnake.com

Nariva swamp, Trinidad, a Ramsar site

http://www.ducks.org

- Caribbean 'biodiversity hotspot'
- High level of endemicity
- Ramsar and UNESCO World heritage sites
- Ecosystems provide services, food security and support vital industries, e.g. agriculture, fisheries, tourism
- Global connectivity, especially of marine ecosystems

Caribbean vulnerability to IAS

Complexity of the region:

- Geo-physical and ecological
- Political, social & economic
- Multiplicity of pathways
  - growing numbers of tourists
  - high volume of traded commodities
  - Increase in leisure, commercial, air and sea traffic
  - Deliberate introduction of ornamental plants, pets and aquaculture organisms
- Inadequate capacity and linkages between key stakeholders
- Influence by trading partners

Assessment of Caribbean Alien Species

Kairo et al. (2003) reported 552 alien species in insular Caribbean:

- 449 terrestrial (390 naturalized / invasive)
- 55 freshwater (10 naturalized / invasive)
- 18 marine (16 naturalized / invasive)
- Acknowledged: serious knowledge gaps in all areas, particularly aquatic (marine, freshwater) ecosystems:

Lopez & Krauss (2006) reported 118 marine species (based on a 2006 review of the Wider Caribbean), including:

- 39 fish
- 31 arthropods
- 15 molluscs
- 14 microalgae

IAS Priorities defined

In 2002 - 2003, CAB International (CABI), in collaboration with The Nature Conservancy (TNC) undertook a project 'Invasive Species Threats in the Caribbean Region'

The report (Kairo et al. 2003) identified the following priority areas:

- Development of national and regional policies and strategies
- Specific action plans to deal with present and potential problems in terrestrial, freshwater and marine ecosystems
- A framework for exchange of information, in particular networking with existing / ongoing or proposed projects / activities
- Access to information:
  - Strengthening existing national / regional mechanisms OR
  - Creation / development of a specific initiatives focussed on the Caribbean

IAS Priorities defined …. (cont'd)

- Capacity building (prevention / management of IAS, taxonomy)
- Regulatory and legislative frameworks: awareness-raising among policy and decision makers
- Global linkages (Global Invasive Species Programme (GISP), International Maritime Organization (IMO) etc

Development of a proposal for funding by the Global Environment Facility

Activities began in 2003, with consultations to develop partnerships and linkages

- Global:
  - Organizations involved in global projects dealing with Invasive Alien Species (IAS): GISP (of which CABI is a founding member), IMO, TNC and others
  - United Nations Environment Programme (UNEP): one of the executing agencies for Global Environment Facility (GEF) projects
- Regional agencies, including the Caribbean Invasive Species Working Group (CISWG - formed during the 2003 CFCS Meeting in Grenada)
- National organizations – Ministry of Agriculture / Environment and related agencies, in particular GEF Focal Points in the countries that expressed an interest in participating in the project

Participating countries

- The Bahamas
- (Cuba)
- Dominican Republic
- Jamaica
- St. Lucia
- Trinidad and Tobago

Other countries will be invited to participate: based on willingness to contribute to project objectives and outcomes

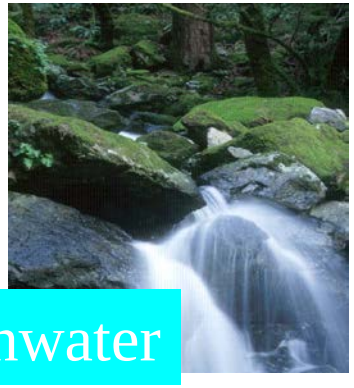
Project Goal and Objective

Goal: The project goal is to conserve globally important ecosystems, the species and genetic diversity within the insular Caribbean

Objective: The project objective is to mitigate the threat to local biodiversity and economy from IAS in the Insular Caribbean

Components of Full-size Project

1. Development of National IAS Strategies: Bahamas (revising); Dominican Republic; Jamaica, St. Lucia and Trinidad and Tobago.
2. Establishment of a Caribbean-wide Cooperation and Strategy.
3. Knowledge Generation, Management and Dissemination
4. Increase Capacity to Strengthen Prevention of new IAS Introductions in Terrestrial, Freshwater and Marine eco-Systems.
5. Increase Capacity to Detect, Respond, Control and Manage IAS Impacts in Terrestrial, Freshwater and Marine Systems



Main Stakeholders

Implementing Agency: UNEP. Task Manager, Kristin McLaughlin.

Lead Executing Agency: CABI CLA, Naitram (Bob) Ramnanan, Project Manager.

National Executing Agencies:

Bahamas: Department of Marine Resources: Lakeshia

Dominican Republic: Secretaria de Estado de Medio Ambiente y Recursos Naturales (SEMARENA): Carlos

Jamaica: National Environmental Management Agency (NEPA)

St. Lucia: Ministry of Agriculture Lands Forestry and Fisheries (MALFF): Nelsa

St. Lucia: Ministry of Agriculture, Forestry and Fisheries: Ulrike

Trinidad and Tobago: Ministry of Agriculture Lands and Marine Resources. (MALMR).: Velda

Participating Countries Pilot Projects

Bahamas:

1. **Management of the Lionfish *Pterois volitans***

Dominican Republic:

1. **Eradication of alien vertebrate predators and one alien invasive Plant Species from Alto Velo island, species targeted: brown and black rat; cat and neem plant**
2. **Eradication of an alien vertebrate predators and herbivores from Cabritos Island in Lake Enriquillo species targeted: cat; goat; and donkey**

Participating Countries Pilot Projects

Jamaica:

1. **Management and control Lionfish.**
2. **Selective eradication of vertebrate predators in the last remaining habitat of the Jamaican Iguana in the Portland Bight Protected Area. Species targeted: Dog; Goat; Cat; Mongoose; and Feral Pigs.**
3. **Control and management of two invasive freshwater animals and plants in the Lower Black River Morass (Ramsar Site) to prevent further habitat loss. Australian Red Crayfish; Sucker mouth catfish and Paper Bark Tree/Melaleuca.**

Participating Countries Pilot Projects

St. Lucia

1. Protection of Saint Lucia's unique biodiversity through eradication of invasive alien Iguanas.
2. To protect the Maria Island Nature Reserve for the threat of Invasive Alien Species (IAS)

Trinidad and Tobago

1. The maintenance of the native biodiversity of the ecologically sensitive area – Nariva Swamp by the production and transplanting of IAS – free palm seedlings. Species targeted: Red Palm Mite and Coconut Moth
2. Preventing the entry of frosty pod rot of Cocoa)
3. Management and Control of the marine invasive green mussel
4. Mitigating the spread and effects of the invasive green alga

Pathways and Collaboration for IAS in the Caribbean?

Dr. Heike Meissner led a team that evaluated the pathways for exotic plant pest movement into and within the Greater Caribbean. They presented their report to CISWIG in January 2009. The pathways identified were: 1. human movement; 2. airline passenger baggage; 3. international mail; 4. maritime traffic; 5. hitchhikers; 6. wood packaging material 7. forestry 8. propagative materials; and 9. natural spread.

The relative importance of each pathway was rated based on the available data, and recommendations for improved safeguarding were provided

Risks associated with the various identified pathways into the Caribbean for IAS?

The pest risk associated with human movement, hitchhikers, wood packaging materials, forestry, and propagation materials was rated as very high. The pest risk associated with airline passenger baggage, mail, and natural pest spread was rated as medium. None of the pathways assessed was rated as low-risk.

Even though the pathways are discussed separately, there is considerable overlap between them. This must be taken into account in the development of mitigation measures.

Relevance of GEF initiative to wider Caribbean

- Regional approach to tackle IAS issues
- Co-operation and linkages to facilitate information exchange
- Support ongoing/ future IAS initiatives in the region
- Strengthen position to develop national/collective IAS strategies
- Opportunity for countries to contribute to the region-wide IAS strategy to be developed.

Regional and Global Linkages

- UNDP and IMO: GloBallast
- UNDP/GEF: Seychelles IEM Program (Mainstreaming Prevention and Control Measures for IAS into Trade Transport and Travel across the Production Landscape)
- UNDP/GEF: Ecuador – Control of Invasive Species in the Galapagos Archipelago
- UNDP/GEF: Regional – Pacific Invasive Species Management
- UNEP/UNDP/GEF: Regional – Integrating Watershed and Coastal Area Management (IWCAM) in the Small Island Development States (SIDS) of the Caribbean
- UNEP/GEF: Regional Removing Barriers to Invasive Plant Management in Africa

Project Partners and Linkages

- Endorsement by CISWG and CARICOM Council for Trade and Economic Development (COTED) and building on their programme and activities, e.g.:
  - Caribbean Invasive Species Surveillance and Information Program (CISSIP)
  - Caribbean Regional Invasive Species Integrated Strategy (CRISIS)
  - USDA pathway analysis
  - Novel plant health d-groups
- Build on national / regional experiences and programmes, e.g.:
  - Caribbean Environment Programme (CEP) desk study on marine invasive species (Lopez & Krauss, 2006)
  - Apply / adapt regional and global expertise locally as needed and appropriate, such as NOAA and TNC freshwater invasives training and assessment
  - Strengthen existing databases, e.g. GISD, I3N, *etc.*

Mitigating the Threats of Invasive Alien Species in the Insular Caribbean: Regional Strategy

- Regional IAS Strategies for Marine, Terrestrial and Aquatic IAS that recognise the economic, ecological and political complexities in the region will be developed in collaboration with international, regional and national stakeholders.
- The Regional Strategy will build on individual and national strategies and expand the draft Caribbean Regional Invasive Species Intervention Strategy (CRISIS) document, which deals primarily with agricultural pests and diseases.
- Three separate Regional Consultations will be held in this regard by the end of 2010.

Bahamas Pilot: A Local and regional research, training and Management Approach to the Lionfish

- Lion Fish *Pterois volitans* venomous spines makes them almost immune to predators
- Native to the Indo-Pacific is highly invasive in the Western Atlantic
- Abundant along the US continental shelf, rapidly spreading into the waters of the Caribbean
- Outcompetes native reef predators – threat to fisheries
- Venomous spines a serious threat to human life

The project will:

- Evaluate Removal Techniques
- Provide training in safe handling
- Conduct Lionfish ecological studies to improve management
- Evaluate and implement policies to manage Lionfish
- Enhance public awareness

D.R. Pilots: 1. Eradication of alien vertebrate predators and one alien invasive Plant Species from Alto Velo island.

Alto Velo

- Part of Jaragua national park – an important bird reserve
- Home to one of the most endangered reptile (Iguana) speices in the world, Noble's Anole (*Anolis altavelensis)*

IAS Threats: Rats and cats prey on native seabird and Noble's Anole

D.R. Pilots: 2. Eradication of an alien vertebrate predators and herbivores from Isla Cabritos in Lago Enriquillo

Cabritos Island

- the biggest island in Lake Enrequilo, a Ramsar site.
- Home to critically endangered iguana species (*Cyclura ricordi & Cyclura cornuta)* and the American crocodile (*Crocodylus acutus)*

IAS Threats; Cats, dogs and mongooses prey on young igunas. Donkeys, cattle and goats overgraze and reduce the availability of food.

Over the next four years:

The project will:

- Establish a National IAS Steering Committee
- Develop a Draft National IAS Strategy for the Dominican Republic
- Conduct baseline surveys for flora and fauna in the two pilot sites
- Devise eradication strategies for IAS identified above

Jamaican Pilots: 1. Management and control of the marine invasive species, *Pterois volitans* (Lionfish) to prevent the impending population explosion in the Caribbean Sea.

- Jamaica identified Lionfish as a priority IAS due to its destruction of fisheries resources and decline in its marine ecosystem.
- This project will focus on sensitising stakeholders on the impact of marine Invasive species and focus on gathering baseline data on the lionfish invasion and it's the ecological impacts. The project will conduct ecological studies and anti venom research.

Jamaican Pilots: 2. Monitoring and selective eradication of vertebrate predators in the last remaining habitat of the Jamaican Iguana (*Cyclura collie)* in the Portland Bight Protected Area.

- The endemic Jamaican Iguana, (*Cyclura collie*) previously though to be extinct, is listed as a Critically Endangered in the IUCN Red List.
- Illegal tree cutting for charcoal production resulting in habitat loss and predation by wild introduced animals are largely responsible for the iguana's demise.
- Since 1991 the Jamaica Iguana Recovery Group (JIRG) operated a head start-release programme, diverted charcoal burners and controlled predators in an attempt to protect known nesting areas.
- This project will build on this and increase the number and range of iguanas in Hellshire hills. Provide a safe habitat for introduced iguanas by removal of goats and eradication of cats, dogs and mongooses in the two nearby Goat Islands. As populations increase in the safe areas it will provide iguanas to accelerate restoration efforts in the Hellshire Hills.

Jamaican Pilots: 3. Control and management of two invasive freshwater animals and plants in the Lower Black River Morass (Ramsar Site) to prevent further habitat loss.

- The Black River morass, a Ramsar site, is the largest freshwater wetland ecosystem in Jamaica and the Caribbean.
- The Australian red claw crayfish *Cherax quadricarinatus*, Suckermouth catfish *Pterygoplichthys paradalis*, Paper Bark tree *Melaleuca quinquenervia* and a member of the ginger family *Alpinia allughas* are IAS found in the Black River.
- The project aims to determine the value of the ecosystem and hence determine the impact of the species on the ecosystem.
- Restoration efforts will focus on removal of target species and replanting with native species. Public awareness and development of an adaptive management Plan are also envisaged.

St. Lucian Pilots: Protection of Saint Lucia's Unique Biodiversity through eradication of Invasive Alien Iguanas

- The St. Lucian iguana with its unique genetic signatures is the largest native land animal on the island but its low population makes these iguanas critically endangered.
- An alien species of iguana, used for display at a local hotel, escaped and established a local breeding population in and around Soufriere. If interbreeding takes place the genetic uniqueness of the native species could be lost.
- The project aims to determine the spread of the alien iguana and evaluate methods for eradication. It also aims to sensitize persons on IAS issues, particularly in reducing entry of new IAS.

St. Lucian Pilots: Protecting Saint Lucia's Biodiversity from Invasive Alien Species (Maria Island Nature Reserve)

The Maria Islands, part of Pointe Sable National Park is home to the most threatened, endangered and restricted endemic reptile species. Of the eight species on the island, five are endemic:

1. The St. Lucia Racer snake (*Liophis ornatus*)
2. the Maria island ground lizard (*Cnemidophorus vanzoi*).
3. St. Lucia pigmy gecko (*Sphaerodactylus micropleis)*
4. Tree lizard (*Anolis luciae)*
5. Fer-de-lance snake (Bothrops caribbaeus).

Biological invasion by IAS have the potential to disrupt this fragile ecosystem.

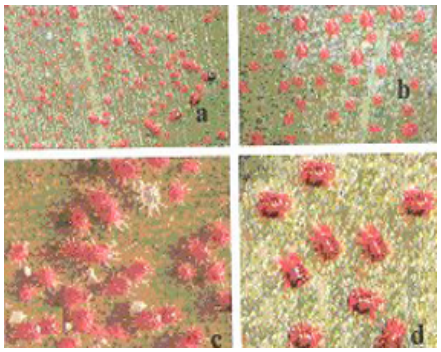
The project aims to prevent the entry of IAS by creating general awareness among the general public and in particular ports of entry. Focus will be placed on improving capacity in monitoring, early detection and rapid response.

Trinidadian Pilots: 1. The Maintenance of the Biodiversity of the Nariva Swamp by the production and transplanting of IAS free palm seedlings

- A Ramsar site rich in biodiversity
- Protected from the Atlantic ocean by a thin sliver of sand held together by coconut trees that are threatened by two recent IAS introductions: Red Palm Mite (*Raoiella indica*) and Coconut Moth (*Batrachedra nuciferae*)

The Project will:

- Monitor and eradicate these IAS from the Nariva swamp
- Replant palms to ensure protection of this Ramsar site



Trinidadian Pilots: 2. Preventing the entry of *Moniliophthora rorei* (causal agent of frosty pod rot of Cocoa) into Trinidad and Tobago.

- Trinidad and Tobago is home of fine flavoured Trinitario cocoa and the International Cocoa Genebank (ICGB), Trinidad.

- *Moniliophthora roreri*, a fungus that causes Frosty Pod Rot of cocoa, is a threat to cocoa production and the ICGB

- The Project will: Develop and begin implementing a strategy to prevent FPR introduction.

Trinidadian Pilots: (3&4)Management and Control of the Marine Invasive *Perna viridis (green musssel)* Green Algae (*Caulerpa taxifolia*)

Green Mussel: (*Perna virdis)*

Possible spread from the Indo-Pacific into the Caribbean, Florida and Gulf of Mexico via ship ballast water

Attaches to hard substrates and interferes with water systems by clogging pipes and outcompetes other fouling species such as those on mangrove prop roots

This project aims to gather ecological and economic information as well as identifying an effective control mechanism

Green Algae *(Caulerpa taxifolia)*

A tropical marine macroalga native to the Caribbean, Indian Ocean and South Pacific, widely used as a decorative plant in the aquarium trade.

An enhanced cold tolerant “aquarium strain” that was introduced into the Mediterranean Sea and is now on the west coast of the USA threatens native flora, decreases species abundance and biodiversity in the wild.

The project aims to determine if *C. taxiflora* which is suspected to present in the west cost of Trinidad is the native or aquarium strain. In such a case, eradication would be a priority.