INSTITUTE OF MARINE AFFAIRS

IMA NEWS

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Small Island Devleoping States - Ensuring our Future

The Institute of Marine Affairs (IMA) hosted its 14th Research symposium on Wednesday 17th September 2014 at the Magdalena Grand Beach & Golf Resort, Lowlands Tobago. This year's symposium theme was "Small Island Developing States – Ensuring our Future". The year 2014 has been designated the International Year of Small Island Developing States (SIDS) by the United Nations to celebrate the contributions that this group of countries and territories has made to the world.

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IMA 14TH Research Symposium, Tobago (con't.)

Five of IMA's researchers who presented at the 2014 Symposium:
(L-R) Rachael Shoy, Christopher Alexis, Wendy Nelson, Kahlil Hassanali, Jahson Alemu I

Our research symposium is a major information-sharing event which serves primarily to inform our many stakeholders of some of the key issues facing the marine environment.

The theme Small Island Developing States (SIDS) - Ensuring our Future, focuses on low-lying coastal countries that tend to share similar sustainable development challenges, including small but growing populations, limited resources, remoteness, susceptibility to natural disasters, vulnerability to external shocks, excessive dependence on international trade and fragile environments.

It is vital that SIDS adopt and implement plans and programmes to support the sustainable development and utilization of their marine and coastal resources, to meet essential human needs, to maintain biodiversity and to improve the quality of life for island people.

This symposium was comprised of three sessions. The first session addressed Climate Change Adaptation and Coastal Zone Management. Session two focused on Challenges facing Small Island Developing States, and session three suggested a way forward for SIDS. Topical issues such as the lionfish invasion, shrimp cultivation using a Marine Re-circulating Aquaculture system, Turtle Hatcheriey Management, Beach Water Quality and Coastal erosion were also covered.

Food-sources, biodiversity, housing and commercial infrastructural development, along with the environmental impact of industrial development, are all major areas of focus for Small Island Developing States such as Trinidad and Tobago.

Sixth form students from Speyside High School and Signal Hill Secondary School were in attendance.

L-R: Professor Indar Ramnarine, Chairman, IMA; Dr. Beverly Foster-Hinds, CIO, IMA; Dr. Donna-May Sakura-Lemessy, Director (ag) IMA; Raye Sandy, Chief Administrator THA

Professor Indar Ramnarine, Chairman of the Board of Governors IMA, in his address indicated "We have seen the effects of some of the threats faced by SIDS here in Trinidad and Tobago, notably in Tobago where the coral bleaching events of 1998, 2005 and 2010 resulted in the decline of many coral species found around the Island." Dr. Sakura-Lemessy Director (ag.), IMA emphasized that indiscriminate interference or modification of our sensitive coastal and marine ecosystems can have potentially negative effects on how they function. Feature Speaker for the symposium Mr. Raye Sandy, Chief Administrator, THA highlighted that "SIDS are renowned for their species diversity and endemism and as such marine and coastal biological resources are precious to islanders, economically and culturally."

Dr. Ellis Burris, Permanent Secretary, Ministry of Tobago Development, makes a point.

Dr. Lorna Inniss, CMU, Barbados

Dr. Dwight Gledhill, NOAA

Symposium participants included representatives from NGOs including Environment Tobago, ERIC, CYEN, Turtle Village Trust, All Tobago Fisherfolk, and students from Speyside High School and Signal Hill Secondary Comprehensive, the THA, Government Ministries, Tobago Hotel and Tourism Association, UWI, UTT, COSTATT and UNDP.

International presenters on the topic Climate Change Adaptation and Coastal Zone Management included:
Dr. Lorna Inniss – Acting Director of the Coastal Management Unit (CMU) in Barbados, Jonathan Mc Cue, Director of UK Consultancy, Sustainable Seas, Adam Hosking from Halcrow, Sara Valero Freitag, IDB, and Dr. Dwight Gledhill, Deputy Director of the NOAA Ocean Acidification Program.

Local presenters were: Dr. Rahanna Juman, Kahlil Hassanali, Wendy Nelson, Christine Bullock, Christopher Alexis, Jahson Alemu I, Daniel Robinson, Adam Jehu, Rosemarie Kishore and Rachael Shoy - all of the IMA.

Coastal Erosion: A Challenge for Small Island Developing States

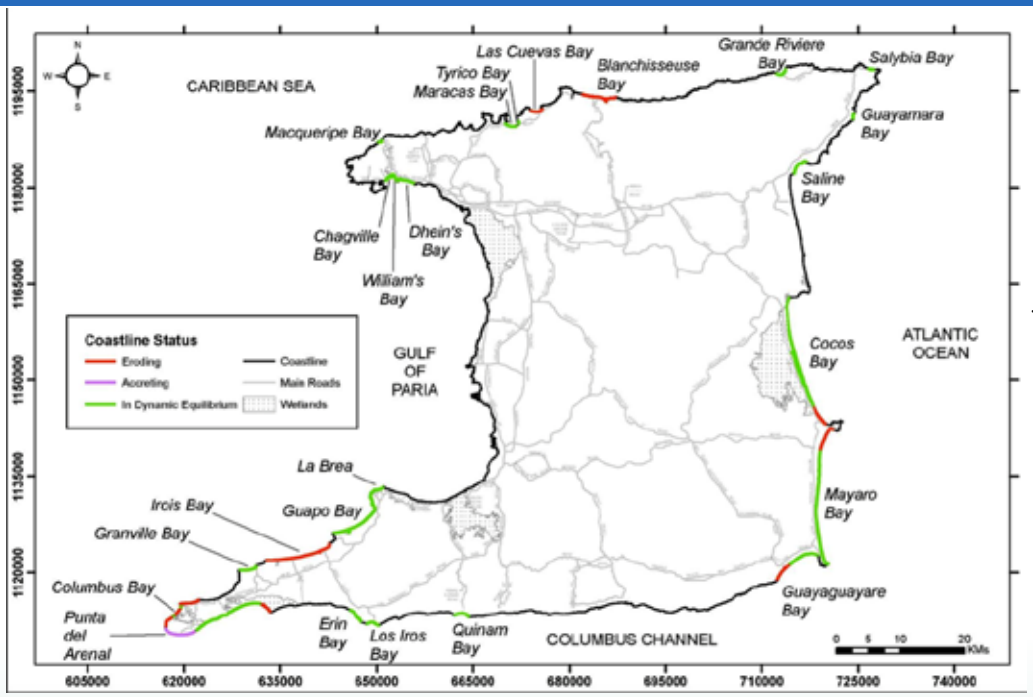

Fig. 1 - Coastline status of Trinidad

Coastal erosion is a major problem experienced in many areas of the world. It occurs when sediment is removed by the action of coastal processes (waves, currents, winds and tides). Erosion undermines coastal infrastructures including commercial jetties, road, bridges and building. It can remove coastal agricultural land and destroy recreational areas and habitats. Localized tectonic events and land subsidence may result in accelerated erosion rates especially during hurricane periods. This can be further exacerbated by sea level rise as the waves travel with increased energy and break further inland. The Intergovernmental Panel on Climate Change (IPCC) reported that sea levels may rise as much as 0.06 m/yr in the twenty-first century. Trinidad and Tobago like other Small Island Developing States (SIDS) have limited land space. Their coasts have been and are subjected to erosion whether natural or human induced.

Beaches are dynamic coastal features found at the interface between land and sea. They respond to storms and coastal processes differently depending on its geology. Where the coastal geology is resistant to wave attack, erosion may occur at a reduced rate and where it is more susceptible, it may erode at a faster rate. Areas consisting of loose, unconsolidated sediment will be more susceptible to erosion and re-alignment of the shoreline than those where the beach is backed by more resistant rocks.

Most shorelines naturally align themselves parallel to the predominant wave direction, based on the movement of sediment within the system, although other factors are contributory. As the beach is eroded, sediment is transported either along or across the shoreline. Sediment transported along the shoreline may change the orientation of the bay. Sediment transported across the shoreline may either be deposited over the continental slope where it cannot return to the beach, or form sand bars that may or may not return with seasonal changes of waves.

Wave activity varies seasonally and is greater during the winter months from November to April due to intense mid-latitude storms in the North Atlantic Ocean which generate swell waves. These swell waves have higher energy and affect the north, east and west coasts of the Caribbean islands. During the summer (May–October) the beach undergoes accretion due to the lower wave energy and longer wave periods, but the higher wave energy and shorter wave period present in the winter period increase erosion of the beach. When these cycles of erosion and accretion occur without any long term deleterious effects on the beach, a state of dynamic equilibrium is said to exist. Dynamic Equilibrium or a state of relative stability is also achieved when the shoreline has adjusted (become parallel) to the prevailing pattern of the waves.

Beaches can be classified as being in a state of erosion, accretion or dynamic equilibrium. Erosion can occur either horizontally where the backshore retreats landward or vertically where the sand elevation decreases along the beach face. Accretion however, occurs where there is an increase in sediment on the beach face which extends the beach horizontally increasing its width. Beaches undergo erosion and accretion cycles during the rise and fall of the tides, changes in the moon phases between spring and neap cycles, and during the summer and winter seasons. Stable beaches have no net loss of sediment although their profiles change during the year.

In Trinidad, beaches provide considerable benefits through tourism. Nesting of leatherback turtles *(Dermochelys coriacea)* occur along the north, north-east and east coast beaches of Trinidad and contribute to the eco-tourism.

However, these beaches are impacted naturally or by activities such as trenching and pipe laying which are associated with the oil and gas industry, landing of telecommunication network cables and the construction of coastal protection structures. In some instances coastal protection structures are needed to stabilize the shoreline.

Most of the beaches and bays monitored in Trinidad and Tobago by the Institute of Marine Affairs are in dynamic equilibrium (Figure 1) (Alexis & Darsan, 2014). The north coast beaches are predominantly stable; however, sections of Las Cuevas and Blanchisseuse Bays are showing signs of erosion which have resulted in a lowering of sand elevations. This coastline is backed by resistant metamorphic rocks so recession of cliffs was not observed. At Macqueripe Bay, erosion of the backshore area led to the re-construction of a seawall to support this bay and protect it.

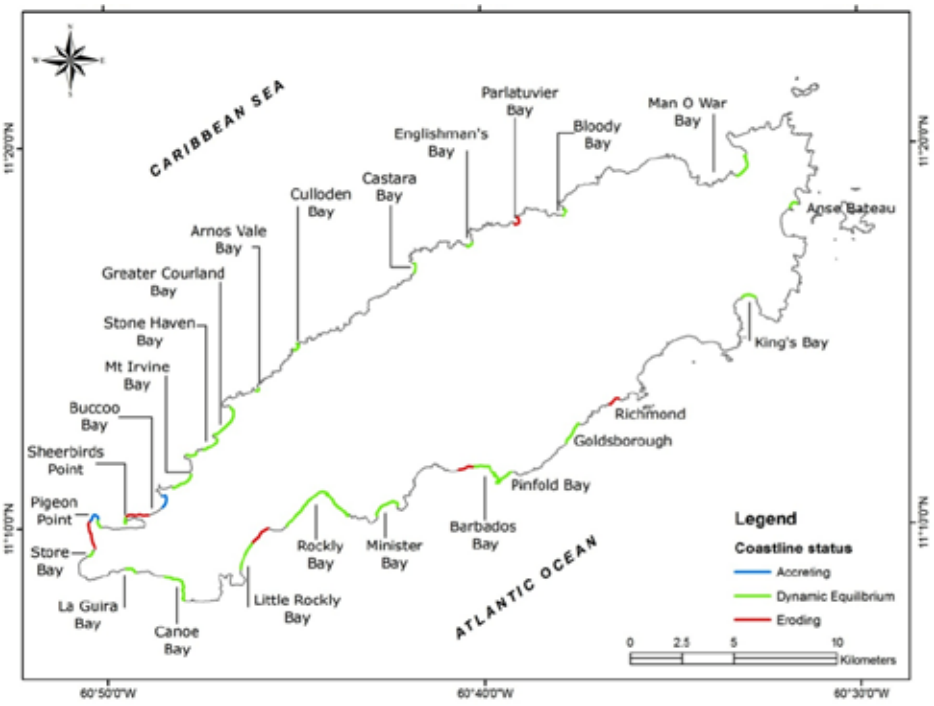

Fig. 2 - Coastline status of Tobago

East coast beaches are predominantly in dynamic equilibrium with the exception of South Cocos Bay, Manzanilla. Although this bay is backed by extensive coconut palms and other low shrubs, this section of coastline experienced the most erosion of all bays monitored suggesting that the presence of vegetation was insufficient to combat the erosive force of the waves. Other sections of this coastline were also experiencing erosion, but were stabilized using hard engineering structures.

The south coast of Trinidad is more sheltered than the north and east coast but the geology of the backshore makes is very susceptible to erosion. Unconsolidated sands and clays succumb to weathering, undercutting at the base from wave action and results in erosion. Laying of pipelines and trenching in the near shore zone have resulted in increased rates of erosion and relocation of one village at Guayaguayare Bay. Punta del Arenal is the only beach that experiences accretion. This accretion however was not a seaward extension of the berm but a vertical increase in the beach elevation.

The west coast beaches were predominantly in dynamic equilibrium with the exception of North Chatham, Irois Bay and the western section of Guapo Beach. Erosion in North Chatham is ongoing and has doubled during the period 2004–2008. The monitored site at west Guapo Beach was in dynamic equilibrium between 2004 and 2006 but construction activities led to erosion in 2007. The beach in this region was subsequently stabilized by the construction of an offshore breakwater.

In Tobago, most of the beaches and bays are in a state of dynamic equilibrium where the seasonal changes of erosion and accretion revolve around a state of stability (Figure 2). Tobago is oriented in a northeast, southwest direction. The coastline is generally rocky and rugged. The northeastern part of the island is steeper and more irregular, resulting in a highly indented coastline. The southwestern region in contrast consists of a limestone platform and is less rugged. Tobago's Leeward coast is rugged and fringed by coral reefs. The beaches here are generally of biogenic origin and some of them are leatherback turtle nesting sites.

The beaches on the leeward coast are less prone to erosion due to the more resilient metamorphic rocks that form these bays. However, changes in sand elevations due to coastal processes do occur. All beaches monitored on the leeward coast were in a state of dynamic equilibrium with the exception of the western region of Pigeon Point, the eastern region of Sheerbird's Point, the southern section of Buccoo Bay.

Coastal Erosion (con't.)

All windward coast beaches are in a state of dynamic equilibrium except for Richmond Bay, Goldsborough Bay and the western region of Barbados Bay. Erosion along this part of the coastline threatened to breach the roadway and has prompted the use of coastal protection measures such as revetments and groins.

The main factors driving erosion are the aspect or configuration of the bay, geology of the backshore, waves, currents, winds, tides and sediment supply. Other natural forces that exacerbate erosion include storm surges, weathering and surface run off. Coastal development, construction and offshore activities such as offshore dredging or construction in the near shore zone also result in severe environmental impacts on the coastline which interfere with the natural coastal processes. Any disturbance to this natural equilibrium can affect wave energy and longshore drift which results in erosion.

Christopher Alexis,
Research Officer,
Institute of Marine Affairs

Welcome to the IMA

Peter Briggs
Project Manager

Tyann Henry
Marine Technician II, F&ARP

Amelia Williams
Clerk Typist II

Kamau Downes
Lab Technician II F&ARP

IMA EVENTS & ACTIVITIES

Weather Station installed at the IMA

The IMA signed an MOU with the Trinidad and Tobago Meteorological Services for a weather station to be placed on the IMA's compound. Installation of the weather station was completed in July 2014. The measurements taken include temperature, barometric pressure, humidity, wind speed, wind direction, and precipitation amounts.

Wind measurements are taken with as few obstructions as possible, while temperature and humidity measurements are kept free from direct solar radiation, or insolation. Automated measurements are taken at least once an hour.

The weather station measures temperature, barometric pressure, humidity, wind speed, wind direction, and precipitation amounts

NIHERST Camps visits

NIHERST Explorer Camp students

The IMA welcomed a group of children from the Niherst Explorer Camp 2014 as they visited the Marine Education Centre on July 15 2014. The 30 students were accompanied by four camp counsellors.

A presentation on Coral reefs was given by Glendon Glasgow Information officer. At the end of the presentation the campers left with knowledge of different types of corals and how to keep the oceans clean.

IMA EVENTS & ACTIVITIES (con't)

IMA Hosts workshop on Climate Change Adaptation and ICZM

The Institute of Marine Affairs (IMA) hosted a two day workshop on September 22nd and 23rd 2014 on Climate Change Adaptation and Integrated Coastal Zone Management (ICZM) Policy Development. The workshop was facilitated by Mr. Jonathan Mc Cue and Dr Martin Le Tissier, Coastal Zone Specialists from the United Kingdom. Mr, Mc Cue was contracted by the IMA to design and implement a coastal ecosystem-based climate change adaptation response plan and to provide guidelines for incorporating an ecosystem based approach to adaptation into a national ICZM policy. This consultancy is part of an Inter-American Development Bank (IDB) Technical Cooperation entitled 'Piloting the integrated of climate change adaptation and coastal zone management in Southwest Tobago' being executed by the IMA.

Mr. Jonathan Mc Cue

A cross-section of participants

Successful implementation of this project is expected to contribute to the development of tools for decision-making that integrates Climate Change Adaptation into Coastal Zone Management. The workshop aimed to build capacity among stakeholders in the public sector on ecosystem-based approaches to resource management, and highlighted options and best practices for adapting to climate change impacts. Participants included representatives from the Ministries of Environment and Water Resources, Tourism, Planning and Sustainable Development, Works and Infrastructure, Land and Marine Resources and from Town and Country Planning Division, Water Resources Agency, UN-ECLAC, CANARI and staff from the IMA.

IMA at Felicity Fishing Tournament

The IMA, through its Information Centre was present at the Felicity Fishing Tournament prize giving ceremony on September 7th 2014. The prize giving ceremony was the aftermath of the fishing tournament that was held on August 31 2014. The tournament was held to encourage support and participation from local fishing communities including women and youths; to create a safe fishing experience for competitors and spectators; and to provide positive social and economic benefits to the community. The IMA's booth focused on lionfish handling and awareness. The live lionfish on display attracted many curious onlookers.

Glendon Glasgow speaks to participants about the lionfish.

Commissioning of the Marine Re-circulating Aquaculture System and the launch of the Jumpstart Aquaculture Programme

Due to technological advancements in tilapia farming and the culturing of *Litopenaeus vannamei* (white legged shrimp) in clearwater recirculating aquaculture systems (RAS), there has been renewed interest in shrimp and tilapia production in Trinidad and Tobago.

From far left: Dr. Sakura-Lemessy, Director (Ag.) IMA; Dr. Foster-Hinds, CIO, IMA; Minister Ramdial, Minister of State in the Ministry of the Environment and Water Resources; Professor Indar Ramnarine, Chairman of the Board of Governors, IMA; and Dr. Jobity, PRO, Fisheries and Aquaculture Research Programme, IMA.

The commissioning of the Marine RAS and the launch of the Jumpstart Programme, were jointly held on July 16, 2014 at the IMA. Throughout the duration of the study, a complete portfolio including the economics, ecological and environmental impacts and other relevant data for investment by potential shrimp farmers is being compiled.

Minister Ramdial releases Pacific White Shrimp into one of the production tanks of the Marine Re-circulating Aquaculture System

Production of Tilapia for the Jumpstart Aquaculture Programme

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INSTITUTE OF MARINE AFFAIRS

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INTERNATIONAL COASTAL CLEANUP

2014

at Chagville Beach, Chaguaramas
September 20, 2014

Lionfish Derby, Charlotteville

On the 27th and 28th of September, the IMA in collaboration with the THA through the Department of Marine Resources and Fisheries (DMRF), held Trinidad and Tobago's first Lionfish Derby.

The Derby took place in Charlotteville, Tobago, with the tournament spanning from Castara to Charlotteville. The derby's goals were to remove lionfish from our waters and to increase education and awareness about the lionfish and the threat it poses to our marine ecosystems. The Derby also presented participants and spectators, an opportunity to sample dishes prepared using lionfish caught during the two day event.

The Derby was broken up into SCUBA teams, Non-SCUBA and Under-18 categories, with 1st, 2nd and 3rd place prizes awarded for the largest, the smallest lionfish, the most amount of lionfish caught and the greatest total weight of lionfish collected by a single team. In total, 293 lionfish were removed by participants over the course of the Derby.

The largest lionfish caught had a length of 38.3 cm and was caught by Rajesh Mohan, while the smallest had a length of 12.4 cm which was caught by SCUBA team; R&Sea Divers. SCUBA team Tobago Dive Experience (T.D.E.) caught the most lionfish (82) lionfish with a total weight of 53 lbs.

Largest Lionfish - 37.8cm

Smallest Lionfish - 12.4cm

Most Lionfish - 82 lionfish; Greatest Total Weight - 53lbs

Largest Lionfish - 38.3cm

Smallest Lionfish - 15cm

Most Lionfish - 9 lionfish

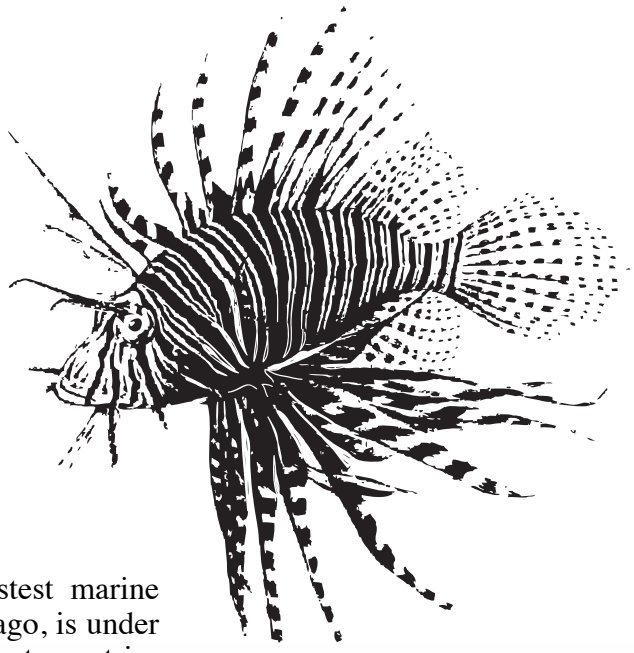
Largest Lionfish -15.3cm; Most Lionfish - 10 lionfish

Smallest Lionfish - 13.3cm

		Largest Lionfish	Smallest Lionfish	Most Lionfish
SCUBA TEAM	1st	Lion Killers	R& Sea Divers	Tobago Dive Experience
	2nd	Tobago Dive Experience	Xtra Divers	R& Sea Divers
	3rd	Ocean Experience	Silent Assassins	Coscorub
NON-SCUBA	1st	Rajesh Mohan	Phillip Almandoz	Kester Jerry
	2nd	Kester Jerry	Leeroy Burris	Phillip Almandoz
	3rd	Christopher Dillon	Kester Jerry	Rajesh Mohan
UNDER 18	1st	Curtis Da Silva	Luke Dubarry	Curtis Da Silva
	2nd	Luke Dubarry	Curtis Da Silva	Luke Dubarry

Lionfish, Train the Trainer workshops in Trinidad and Tobago

Dr. Dayne Buddo shares valuable insights at the 'Training the Trainer' workshop held at the Botanical Gardens Conference Room, Tobago



The Lionfish invasion has been described as one of the fastest marine invasions in history. The Caribbean, including Trinidad and Tobago, is under severe threat from this species, and it is increasingly important that countries which have been invaded, and those yet to be invaded, build their technical capacity to respond.

As part of the ongoing fight against Lionfish, a "Training course for trainers on the Management and Control of the Invasive Lionfish" was delivered to a wide range of stakeholders in Trinidad and Tobago by Dr. Dayne Buddo of University of the West Indies (Mona) in collaboration with the Institute of Marine Affairs and Department of Fisheries. The workshops were held in Tobago from September 29 to October 1 and in Trinidad from October 2 to 3, 2014.

These training modules allowed for greater capacity building and increased awareness, given the cross-cutting issues emanating from the Lionfish invasions such as the rapid increase in lionfish populations and the negative impacts on biodiversity and associated livelihoods.

The training course was designed especially for persons who will be participating in active lionfish research, public education/outreach, lionfish surveys and removals and persons administering first aid and advanced medical treatment of a venomous lionfish sting.

At the end of the course, key personnel in Trinidad and Tobago would be able to:

1. **Understand the regional impacts of marine invasive alien species.**

2. **Conduct public education and outreach activities on marine invasive alien species using the lionfish as an example.**

3. **Perform first-aid as it pertains to lionfish stings**

Workshop participants in Trinidad, dissecting and examining the stomach contents of the lionfish that were caught at the 2014 Lionfish Derby

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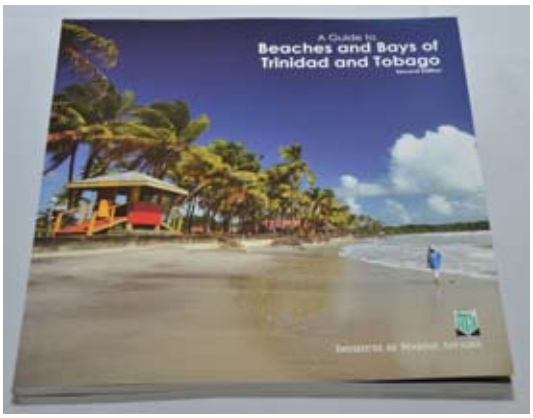

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THE BLUE CORNER

We have the power to save the earth!

Sea Cucumber

- Sea cucumbers are echinoderms—like starfish and sea urchins.
- There are over 1,250 known species, and many of these animals are indeed shaped like soft-bodied cucumbers.
- Their size can range from 2cm to 2m and they are all ocean dwellers and live on or near the ocean floor—sometimes partially buried beneath it.
- When threatened, some sea cucumbers discharge sticky threads to ensnare their enemies. Others can mutilate their own bodies as a defense mechanism. They violently contract their muscles and discard some of their internal organs out of their anus. The missing body parts are quickly regenerated.

References: http://animals.nationalgeographic.com/

Sea Cucumber *Holothuria sp.*

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