IMA NEWS

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A solution to address pollution

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INSTITUTE OF MARINE AFFAIRS

To our readers

Toylan Arneaud, Director (Ag.)

Welcome to our final edition of the IMA Newsletter for 2017! Although we were faced with many challenges during the course of 2017, the Institute accomplished quite a lot and was able to raise its public profile.

The 1st State of the Marine Environment (SOME) Report for Trinidad and Tobago was launched in May 2017. This report provided a comprehensive and scientifically based assessment of the overall condition of Trinidad and Tobago's marine and coastal environment. We were privileged that our line Minister, the Honourable Camille Robinson-Regis, Minister of Planning and Development, attended the launch and applauded the IMA for this report. An action plan to address the issues highlighted in the SOME and an Inter-ministerial Committee to oversee the implementation of the plan was approved by Cabinet.

Ongoing research and monitoring of the coastal and marine environment (beaches, coral reef, seagrass beds and mangrove forests) continued at the IMA during 2017. The IMA was able to partner with the Marine Biological Laboratory (Woods Hole), from Boston, United States, to undertake isotopic analysis of nitrogen species to determine the source, transport and fate of nutrient pollutant in the Caroni River Basin. A baseline assessment of the benthic community to determine the presence of invasive alien species was conducted in the Port of Galeota and IMA began meeting with key stakeholders on the northwest peninsula of Trinidad towards developing a marine spatial plan for the area. The results of the research work were presented at two community research symposia held in Chatham in March and Mayaro in September.

The Board of Governors (BOG) was installed on 27th July, 2017 and has been working ardently with management to implement a structured approach in setting/planning the strategic direction of the Institute.

In October 2017, the IMA in conjunction with business affiliates Microsoft Caribbean Limited, Fijitsu/GlobeRanger, Digicel and fisherfolks deployed a Water Quality Buoy in Claxton Bay. The purpose of the proof of concept was to gather real time data 24/7 from underwater sensors positioned on the buoy. The data would be processed and analyzed to provide critical insight into levels of pollution that can better inform stakeholders about environmental incidents such as chemical spills, fish kills and harmful algal blooms.

Our public awareness, outreach and educational programs continued to broaden in scope as this year saw the first time that the Lionfish Tasting Event was streamed live from the Brian Lara Promenade where over 100 persons tasted and were made aware of the Lionfish. A 2-minute animation video on the invasive Lionfish was produced has been played in all theatre branches of Caribbean Cinemas and Movietowne theatres in November. Another significant highlight was the production of two short narrative videos pertaining to marine pollution entitled 'Nature Man' and the 'Bottle', which was a collaborative effort between Sustain T&T and IMA. These short narrative videos were shown at the launch of the 7th edition of the Green Screen.

IMA staff were quite successful as well. Alana Jute, Research Officer, Reference Collection was awarded an ISA/Ifremer international internship and spent 2 months in France being trained on taxonomic techniques using DNA-barcoding of specimens. Kahlil Hassanali, Research Officer, Marine Policy was awarded a

Hubert Humphrey Fellowship from the US State Department and Ms Rosemarie Kishore, Fisheries Biologist was able to take up her University of Florida Training Fellowship for Caribbean Fisheries Professionals.

The support departments worked diligently to help sustain the research activities, work within the Directorate and to maintain our compound. In 2017, we were able to upgrade our auditorium and we moved closer to having a field station in Tobago a reality.

We are saddened by the loss of Mr. Ruskin Cummings, Boat Captain, who passed away in June 2017. Mr. Gerard Mahabir and Mrs. Lori Lee Lum both proceeded on pre-retirement leave after having served the Institute dutifully for 34 years as Administrative Officer and 39 years as Community Education Officer, respectively.

Next year, 2018 marks the IMA's 40th anniversary. Despite ongoing budgetary constraints we are committed to work diligently with you to ensure that our mission is fulfilled, and, do look forward with anticipation for another productive year in 2018.

I wish you all a joyful and holy Christmas and a Happy New Year!

Honourable Camille Robinson-Regis, Minister of Planning and Development (c) receives a copy of the SOME 2016 Report from Ag. Director Ms. Toyland Arneaud (r) and Ag. Deputy Director of Research Dr. Rahanna Juman (L)

'The Honourable Camille Robinson-Regis, Minister of Planning and Development (centre) is flanked by IMA Board Members in July 2017. (L-R) Paul Gabbadon, Andrea Julien, Hayden Alexander (Chairman), Ricardo Alfredo, Nadine Jardine, Dave Elliott, Beverly Khan

Towards a HEALTHIER Southwest Peninsula
San Fernando to Icacos

A student of Presentation College, San Fernando expresses his views at the symposium held in Chatham in March 2017.

A screenshot from the Lionfish awareness animation

Water quality buoy pre-launch testing

Deployment of the Water Quality Monitoring Buoy in Claxton Bay

The Institute of Marine Affairs (IMA), in conjunction with Microsoft Caribbean, Fujitsu, GlobeRangers and Digicel deployed a Water Quality Monitoring Buoy in the Gulf of Paria (GoP) off Claxton Bay on October 25th 2017. In observing this event, a press conference was held at the Claxton Bay Fishing Facility and the feature address was delivered by the Honourable Camille Robinson-Regis, Minister of Planning and Development.

The Honourable Minister Robinson-Regis stated that for far too long we have talked about our problems, however, we need to start discussing a solution to address pollution. She commended the IMA for its initiative to work with private sector companies such as Microsoft Caribbean, Fujitsu, GlobeRangers and Digicel, and engage the fisherfolks to develop a Proof of Concept (PoC) that would enable the collection of real time water quality data in the GoP 24 -7.

The Honourable Camille Robinson – Regis Minister of Planning and Development aboard IMA vessel to view the deployment

Remarks were also delivered by Mr. Hayden Alexander, Chairman of the IMA Board of Governors, who briefly highlighted the need for private-public-partnerships to provide solutions to the many challenges facing our marine environment. Ms. Racquel Moses, Country Head of Microsoft Trinidad and Tobago, eagerly stated Microsoft's initiatives to invest in projects that use digital technology to benefit society, and the environment. Mr. Jean Paul Dookie, Vice-President of Government Business, Fujitsu, announced the company's willingness and cooperation to embrace more private-public partnerships that would benefit not only coastal communities, but Trinidad and Tobago as a whole.

L to R Stephen Juteram, Fujitsu; Rahanna Juman, Deputy Director Research, IMA; Frances Correia, formerly Microsoft Caribbean; Jean Paul Dookie; Fujitsu; Racquel Moses ,Microsoft Caribbean, The Honourable Camille Robinson – Regis Minister of Planning and Development; Adrian Bayrd, Fujitsu; Hayden Alexander, Chairman, IMA BoG, Toylan Arneaud, Director , IMA; Kishore Boodram, Presisdent Claxton Bay Fishing Association

Mr. Kishore Boodram, President of the Claxton Bay Fishing Association highlighted the problems that plague fisher folks, particularly pollution in the GoP, and welcomed this initiative to finding a solution. He stated that this was a new beginning for us to work together to address problems in our marine environment.

The purpose of this PoC is to gather real time data from underwater sensors positioned on a buoy in GoP. This data will be processed and analyzed to provide critical insight into levels of pollution, and will assist with early detection of environmental incidences such as chemical spills, fish kills and harmful algal blooms, and allow for a quicker response. This PoC is expected to last for six months and IMA staff will be monitoring the measurements throughout the period. Once completed and the concept is successful, the IMA intends to maintain the buoy in the Gulf of Paria, and possible duplicate the concept once funds are available. The data will be made available to the public.

After the press conference, the Minister, guests and media were invited to go out on an IMA vessel to view the deployment at sea.

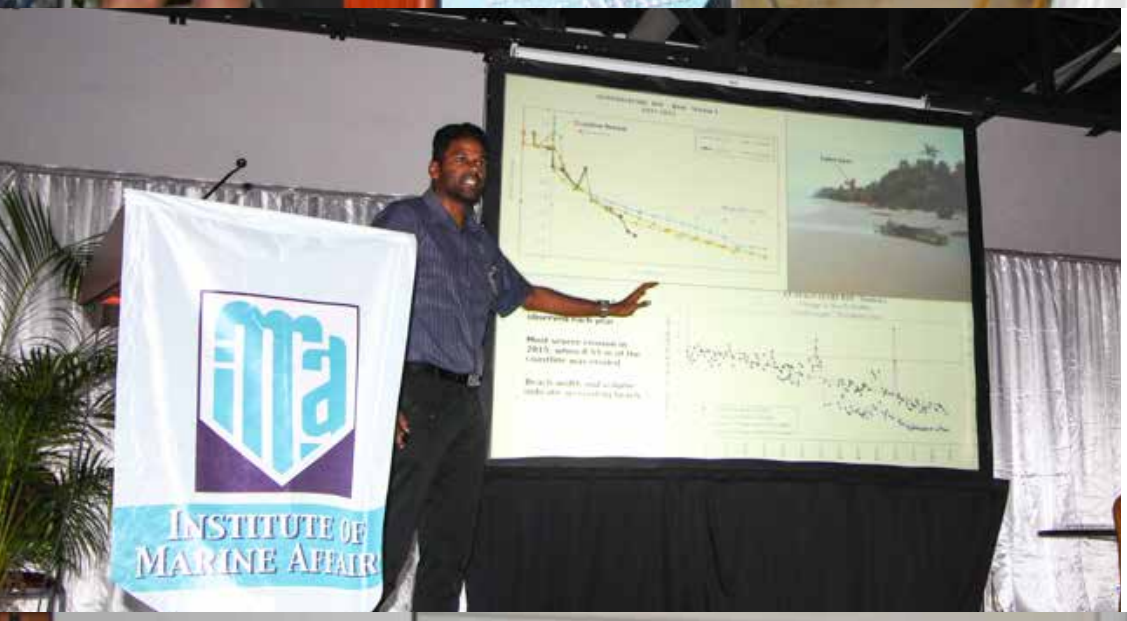
Cover photo: Water Quality Buoy active at Claxton Bay Gulf of Paria

IMA's 3rd Community Research Symposium, Mayaro

'Promoting stakeholders' participation on marine resource management,' was the theme for the IMA third Community Research Symposium, which was held on September 20th 2017 at the BPTT Mayaro Resource Centre, in Mayaro. Attendees included the Chairman and members of the Mayaro- Rio Claro Regional Corporation, students form the Mayaro Secondary School, representatives from fisherfolk organisations and community groups, non-governmental organisations and government agencies. Opening remarks were provided by Mrs. Toyland Arneaud, Director (Ag), Mr. Paul Gabbadon, Governor of the IMA Board of Governors and Mr. Glen Ram, Chairman of the Mayaro Rio Claro Regional Corporation. The feature address was delivered by Ms. Camille Guischard on behalf of the Minister of Planning and Development. The goal of the symposium was to provide pertinent scientific information in the state of the coastal environment in the southeast peninsula, clarify misinformation and share lessons and practical solutions for addressing complex coastal issues.

Presentations were delivered by IMA researchers on coastal erosion, bathing beach water quality and marine invasive species. External presenters included a representative form Coastal Dynamics Limited, who presented on the topic of rip currents; a representative of the Fisheries Division, who presented the management plan for the demersal fisheries in Trinidad and Tobago; a representative of the Food and Agricultural Organization (FAO), who discussed the importance of community engagement in protected areas management; and a representative of the Life Sciences Department of UWI, who presented on the use of seaweed extracts in plant cultivation. A panel discussion followed the presentations and panellists representing the Regional Corporation, National Energy Corporation, Coastal Protection Unit, MOWT and the Guayaguayare/ Ortoire and Mayaro Fishing Association identified some of the actions being undertaken to address environmental and socio-economic problems such as coastal development, coastal erosion, pollution, disaster risk reduction, user conflicts and sustainable livelihoods. The symposium provided a platform for multi-stakeholder dialogue, and highlighted the need for cooperation on the way forward. The IMA will continue its initiative to provide pertinent information to coastal community. The next community symposium is being planned for March 2018 in Central Trinidad.

Mr. Glen Ram, Chairman of the Mayaro-Rio Claro Regional Corporation



Top:
L-R: Dr. Rahanna Juman, Dept. Director - Research (Ag.), IMA,moderator; Glen Ram; Renelle Bernard-Brown, Coastal Protection Unit, MOWT; Marcia Inkim, National Energy Corporation of Trinidad & Tobago; Francis Arjoon, President Guayaguayare, Ortoire and Mayaro Fisherfolk Association

Middle:
Christopher Alexis, Research Officer, IMA shares data on Beach Dynamics - An Indicator of Shoreline Stability on the Southeast Coast of Trinidad

Bottom:
A member of the audience makes a contribution

Caribbean Coastal Resilience Forum

Dr. Rahanna Juman, Deputy Director (Ag.)

Dr. Rahanna Juman, Deputy Director (Ag.) was invited to participate in a Caribbean Coastal Resilience Forum (CCRF) and presented on 'Trinidad and Tobago's ICZM Experience, Challenges and Lessons Learnt'. The conference was hosted by the Inter-American Development Bank in Bahamas on September 26-27th 2017. The goal of Caribbean Coastal Resilience Forum (CCRF) was to bring together key stakeholders who will drive policy that will improve climate resilient coastal zone management in the Caribbean region by utilizing innovation, best practices and partnerships that leverage natural capital. Climate-resilient coastal management is an ecosystem-based approach that incorporates integrated coastal zone management (ICZM), climate adaptation and mitigation, disaster risk management and science-based coastal infrastructure.

So how important is Coastal Resilince?

There is growing awareness among public and private sector leaders in the Caribbean concerning the impacts to the coast (erosion), environmental quality decline and socioeconomic impacts caused by climate change (such as sea level rise and increased frequency and intensity of hurricanes). The demand for innovation from island states that are highly dependent on coastal ecosystems holds promise for more effective approaches for improving coastal resilience.

Increasingly, people are turning to nature as the first line of defence for coastal protection and as an engine for economic growth. Compared to hard infrastructure designed for a single purpose, natural systems provide a variety of benefits while being more adaptive to change. The practice of integrated coastal zone management in the Caribbean has been fragmented and many initiatives are first generation, varying from island to island. Emerging evidence of best practice shows that the approach requires investments in policy, science and human capacity; consideration of the full range of pressures and interactions driving coastal health; robust public-sector management for conflicting uses, overlapping jurisdictions, enforcement and monitoring; participatory approaches and integration of climate change science and public-private (PPP) partnerships.

Sustainable Ocean Initiative

Dr. Farahnaz Solomon attended the Sustainable Ocean Initiative (SOI) training in Seocheon, South Korea from 24th – 29th September 2017. The Sustainable Ocean Initiative addresses capacity building needs across the major ocean sectors, with a clear focus on improving coordination and cooperation between the fisheries and biodiversity sectors and across the science and policy realms. It takes a multi-scale approach, providing tools and resources to support ground-level implementation, in line with national and regional priorities in order to meet global level commitments, and to improve exchange across these multiple scales. (Global, regional, national and local).

There were participants from 16 countries (Antigua and Barbuda, Belize, Bosnia, Comoros, Dominica, Guin-ea, India, Madagascar, Mayanmar, Peru, Samoa, Seychelles, Sri Lanka, Sudan, Suriname and Trinidad and Tobago). Over the 5 days presentations were delivered by experts in the field of Integrated Coastal Zone Management (ICZM), Stakeholder Involvement and Marine Spatial Planning. Participants were asked to identify challenges faced by their country in achieving the Aichi Biodiversity Targets relevant to the coastal and marine environment. The long-term expectation is that participants will continue to work on these proposals with their relevant institutions, which would eventually implement the training proposal.

Marine Spatial Plan for Trinidad

The IMA hosted its 1st Stakeholder Meeting in August for the Development of an Integrated Coastal Zone Plan and Marine Spatial Plan (MSP) for the Northwest Peninsula of Trinidad. This is a pilot project and the first attempt to develop a Marine Spatial Plan in Trinidad. Our Coastal and marine environments are characterized by beautiful landscapes and rich ecosystems of great importance, offering rich biodiversity. They also attract human activities such as tourism and industrial uses. However, the co-existence of human activities and natural resources often creates conflicts of use in the coastal zone.

The development of a coastal and marine spatial planning system presents an opportunity for the implementation of an overall strategy of conservation, sustainability and management to maximise future economic profit.

In addition Marine Spatial Planning is a public process that brings together multiple users of the ocean – including shipping, energy, industry, government, conservation and recreation – to make informed and coordinated decisions about how to use marine areas and resources sustainably. Stakeholders attending the meeting included representatives from the Diego Martin Regional Corporation, Commissioner of Stake Land Office, TCPD, Water Resources Agency, Coastal Protection Unit, CARIDOC and the Trinidad and Tobago's Pilot Association.

MSP meeting

Major Aspects of Coastal Environmental Management

The term 'Sustainable development" is often used to suggest "moving forward while leaving reousrces for future generations" but are we aware of the 17 goals to change our world?

On September 25th 2015, countries adopted a set of goals to end poverty, protect the planet and ensure prosperity for all as part of a new sustainable development agenda. Each goal has specific targets to be achieved over the next 15 years. For the goals to be reached, everyone needs to do their part - governments, the private sector, civil society and people like you. Mrs. Wendy Nelson, Research Officer, Chemistry (IMA) attended a workshop themed "Major Aspects of Coastal Environmental Management" which was held in Kingston, Jamaica from 17th to 20th October 2017.

The objective of the workshop was to assist CARICOM countries in achieving one of the United Nations Sustainable Development Goal number 14, "Conserve and Sustainably Use the Oceans, Seas and Marine Resources". Nine CARICOM countries were represented at the workshop including Antigua and Barbuda, Barbados, Belize, Guyana, Jamaica, St. Lucia, St. Kitts and Nevis, Suriname, and Trinidad and Tobago.

Discussions were held on various topics including dumping of waste at sea, emergency response plans, marine environmental monitoring and marine debris. Participants visited the Los Palisadoes Beach in order to facilitate hands-on experience with the methodology for sampling of marine debris. Quantities and types of macrolitter and microlitter present in quadrants (of a known size) along transects were determined. Countries represented at the workshop are expected to select suitable locations and determine the quantity and type of macrolitter present at these locations using the methodology provided. This will assist in filling the existing data gaps for the Wider Caribbean Region.

Left:
Wendy Nelson Research Officer Chemistry

Right:
Workshop participants sorting macrolitter

Coastal and Environment Summit 2017

Dr. Rahanna Juman was invited by EqUip Global Pte Ltd, an international training organisation, to present at the Coastal and Environment Summit 2017 and Workshops held in Singapore from November 7-10th 2017. Dr. Juman presented on Trinidad and Tobago's Integrated Coastal Zone Management (ICZM) Experience: The problems, approached, challenges faced, and lessons learnt. The conference was attended by over 20 participants from 12 countries that shared experience on coastal zone management and interventions to adapt to a changing climate.

Issues discussed include marine hydrodynamics and morphologic impacts and its implication on coastal engineering, overcoming imbalance between marine preservation and coastal resource exploitation, soft –engineering structure to arrest coastal erosion and disaster risk reduction measures against flood, storm systems and erosion. Dr Juman also moderated a panel discussion on Coastal and Environmental Challenges to Major Stakeholders and facilitated a workshop entitled 'Evaluation and Improving Effectiveness of ICZM'. The exchange of experiences and best practices was quite valuable and can assist with the implementation of ICZM and address disaster risk reduction in Trinidad and Tobago.

The IMA & Green Screen

The IMA partnered with Sustainable Living Trinidad and Tobago (Sustain T&T) to produce two short films, "Nature Man" and "The Bottle, which were featured at the 7th Edition Green Screen festival. These short films focused on land based sources of pollution and how decisions we make can affect tourism and quality of life for our future generations. Through the use of creative methods such as film and special events, Sustain T&T encourages dialogue and information exchange about sustainable living in Trinidad and Tobago. Sustain T&T has used the Green Screen platform to launch educational animated short films as well as short-format documentary content about climate change in Trinidad and Tobago.

Screenshots from the short films, "The Bottle" (2017) and "Nature Man" (2017), produced by Sustain T&T, presented by the Institute of Marine Affairs at GREEN SCREEN - The Environmental Film Festival in Trinidad & Tobago (All rights reserved).

Was 'Sebastian the Crab' an Invasive organism?

Attish Kanhai
Research Officer Benthic Ecology

Jamaican Red Crab (Gecarcinus ruricola)

Watching animated movies as children is one of life's greatest pleasures. In order to fully enjoy the adventures of our animated friends requires a certain suspension of disbelief. As an adult looking back on our beloved childhood characters through the lens of more knowledgeable eyes, certain questions arises. As a marine scientist, one movie in particular fascinates me in ways anew, Disney's *The Little Mermaid*. However, it is not the mermaid that fascinates me but one of her companions, 'Sebastian'.

'Sebastian' the crab, full name, Horatio Felonius Ignacius Crustaceous Sebastian, is notable in this movie mostly because of his Jamaican accent. By all accounts, 'Sebastian' is a Jamaican Red crab, *Gecarcinus ruricola*. The interesting thing about Jamaican red crabs are they are a terrestrial species, and they are found exclusively in the Caribbean. Theories suggests that this particular story takes place off the coast of Denmark. How then did a Jamaican terrestrial crab species end up off the coast of Denmark? The best expert opinion I can give is that 'Sebastian' was an invasive organism. He certainly displays the characteristics of an invasive species throughout the movie. Allow me to build my case.

Disclaimer: the rest of this article assumes that the terrestrial crab *G. ruricola* can in fact survive in the ocean for extended periods of time. I also assume no responsibility for changing your views on a beloved childhood character.

Marine invasive organisms usually have to survive after overcoming some sort of geographical barrier, which usually means being transplanted from their native region to some other region where they are not normally found. I theorise that 'Sebastian' was taken up from his native Caribbean Island, most likely by some sort of shipping vessel, and transported to either the Baltic or the North Sea, both of which border Denmark.

Not only was 'Sebastian' able to survive the journey but he was also able to survive outside of his native environment as is evident in the movie. 'Sebastian' seems comfortable in his new surroundings and is able to interact with other species without any real problems. Another characteristic of successful marine invaders is their ability fill a feeding niche in their new environment. Throughout the movie, no other crabs are seen which suggests that there is indeed a feeding niche which 'Sebastian' could fill relatively easily without much competition for resources from other native organisms. 'Sebastian' also displays a certain level of hostility towards his fellow sea dwellers throughout the movie. This can be chalked up to his age, however I do think this has something to do with the fact that as an invasive organism, he is also somewhat aggressive to the other native organisms who are also scared of him as they are not accustomed to encountering species of his kind. Invasive organisms can display this level of aggression when they enter new environments. The fear of the other sea dwellers also brings into focus another point. 'Sebastian' is also one of King Triton's most trusted confidantes. This then implies that he is an older organism. This also means he has no natural predators in his new environment or else a crab of his size would have not survived long enough to gain King Triton's trust. This allows 'Sebastian' to grow unchecked by any natural predators until he eventually ends up in Prince Eric's kitchen. The fear he instils in the other sea creatures would also play into the fact that they would be less inclined to eat him.

Another characteristic of invasive organisms is their ability to tolerate a wide range of environmental conditions. 'Sebastian' is seen moving effortlessly from under the sea, to the shoreline of Denmark's coasts and even into a pond, which appears to be freshwater, where he encourages Prince Eric to "kiss the girl". This ability to tolerate a wide range of conditions would certainly help 'Sebastian''s ability to survive in a new environment. 'Sebastian''s diet also raises a few questions. 'Sebastian' attempts to distract King Triton with 101 recipes for plankton at a certain point in the movie. This would suggest that 'Sebastian' does in fact have a wide and varied diet which is known in biological terms as being a generalist. Invasive organisms are usually generalists due to their ability to live off a wide range of food types.

There are, however, some holes in my theory. One major characteristic of invasive organisms is that they reproduce and spread rapidly in a new environment. Unfortunately for 'Sebastian' it appears that there are no other female Jamaican red crabs that made the journey with him. As such, no information is available about his ability to reproduce in the seas of Denmark and at what rate. Until 'Sebastian' acquires a mate, we cannot know for sure if he is in fact an invasive organism.

While a lot of this may seem humorous, invasive organisms are no laughing matter. In 2015, the Chinese mitten crab was found in the Karrebæk Fjord in southern Zealand, Denmark. These furry crabs are fearsome invaders as they damage fishing gear, destroy river banks and clog up drainage systems. Proliferation of these creatures cost the Danish government millions of kroners in damage.

Obviously a children's movie is not meant to be taken literally or as scientific fact and I am in no way suggesting that Jamaican red crabs are invading the Danish marine ecosystem. Sebastein, however, does serve as an excellent example of what invasive organisms look like in a marine environment, apart from the elaborate multispecies musical numbers. Invasives represent a very real biological and economic problem to many areas already affected by their presence and they should not be taken lightly regardless of their exotic accents or ability to put on even the greatest underwater shows.

IMA Events & Activities

Beach Profiling with Bishop Anstey High School

On 11th October 2017 the Geology Department assisted students from Bishop Anstey High School on a field trip at Las Cuevas to discuss coastal conservation and climate change. The IMA, through its Geology department conducts beach profiling, which is a surveying technique used to measure changes in the contour of the monitored beach. During the discussion the students considered how climate change affects them and the coastal environment.

Approximately seventy percent of Trinidad & Tobago's population lives near the coast. Sea level rise poses the following challenges to the country's development and wellbeing: flooding, saltwater intrusion and coastal erosion.

Scientists have determined that global sea level has been steadily rising since 1900 at a rate of at least 0.04 to 0.1 inches per year.

Sea level can rise by two different mechanisms with respect to climate change. First, as the oceans warm due to an increasing global temperature, seawater expands—taking up more space in the ocean basin and causing a rise in water level. The second mechanism is the melting of ice over land, which then adds water to the ocean.

Research Officer Christopher Alexis with Students of Bishop Anstey High School

Aquaculture for La Horquetta Government Primary

Students of La Horquetta Government Primary School learning about Tilapia production

"How many of you enjoy eating fish?"

This was asked to stimulate the young minds into thinking about from where the fish they eat come. On 2nd October 2017, 80 students from the La Horquetta Government Primary visited the IMA for a tour of the Aquaculture Facility. These students learned that fish stock in our oceans has been on the decline and as a result an alternative source of fish is needed. Tilapia, a freshwater species, has become the third most important fish in aquaculture after carp and salmon; worldwide production exceeded 1,500,000 metric tons in 2002 and increases annually. Tilapia has high protein content, is large in size, and grows rapidly (6 to 7 months from fingerling to harvest size).

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THE BLUE CORNER

Sting rays *Dasyatidae (whiptail stingrays)*

Stingrays are commonly found in the shallow coastal waters of temperate and tropical seas. They spend the majority of their time inactive, partially buried in sand, often moving only with the sway of the tide.

The stingray's coloration commonly reflects the seafloor's shading, camouflaging it from predatory sharks and larger rays.

Recently stingrays have been spotted at the Manzanilla Beach, the Lifeguard Services Division of the Ministry of National Security has issued an advisory to sea bathers and visitors, stating that there has been an increase in the presence of stingrays along the coastline of the beach and bathers should be careful.

Stingrays are well known for their spine, or barb, which can be ominously fashioned with serrated edges and a sharp point. The underside may produce venom, which can be fatal to humans, and can remain deadly even after the stingray's death.

While Stingrays are interesting creatures we urge persons to be vigilant while wadding in shallow waters.

Reference:
https://www.nationalgeographic.com/animals/fish/group/stingrays

The stingray's tail, which is an extension of its spine, is used solely for defensive purposes

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