IMA NEWS

APRIL & AUGUST 2019 **VOLUME 9 - ISSUE 1**

Coral Bleaching Alert!

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INSTITUTE OF MARINE AFFAIRS

What is Coral Bleaching?

A bleached, dead brain coral with turf algae growing on parts of it. Photo Credit: Jonathan Gomez

The National Oceanic and Atmospheric Administration (NOAA) Coral Reef Watch released the latest coral bleaching outlook for the next four months (August to November) for the Caribbean region. As of 5th October 2019 Trinidad and Tobago's, coral bleaching stress gauge is currently at "**Alert level 1"**. This means that the waters around Tobago are above average sea surface temperature (SST) for this time of year. NOAA predicts that over the next 5-8 weeks, Tobago and the rest of the Lesser Antilles have a 60% chance of reaching **"Bleaching Alert 2"**, with widespread coral bleaching and coral mortality.

Corals are capable of building massive underwater structures because they form a special relationship with the symbiotic algae that live inside their tissue. The algae photosynthesizes using sunlight to produce enough energy to supply both themselves and their coral host. In return, the coral provides the algae with a safe haven, stores essential nutrients and removes the algae's waste.

Why is this important?

1. When corals become stressed, such as when water temperatures are too warm or too cold, the coral-algae relationship breaks down and the algae is expelled from the coral. This loss causes the coral to turn white and is therefore referred to as coral bleaching. The loss of the algae means that the corals lose their major source of food; and if unfavourable conditions persist, the coral will starve and eventually die.
2. Corals provide important ecosystem services for both marine life and human communities such as coastline protection and tourism.

In the last 40 years, coral reefs around the world have suffered from global and regional coral bleaching events, where large sections of reef turned white as summertime sea temperatures became too warm because of global warming. Coral reefs of Tobago have also suffered from multiple bleaching events in the past including 2005 and 2010, and these have significantly degraded reef health.

What to look for?

Caribbean corals are typically shades of brown and green, but once bleaching begins, the corals appear pale and eventually fade to bone white; at this point, the corals have lost most of their algal pigments. Bleached corals cannot survive for extended periods without their algal symbiont and in many cases they die. Once corals die, macroalgae and turf algae (different from the symbiotic algae) are the first things to grow over the coral skeletons and the reefs begin to take on a furry appearance. Even if corals do not die immediately, they become more vulnerable to infections and diseases. Coral diseases tend to spike after stress events. Look out

for corals with a black band or patches of white around the coral tissue and partial tissue loss and death.
A bleached, dead brain coral with turf algae growing on parts of it.

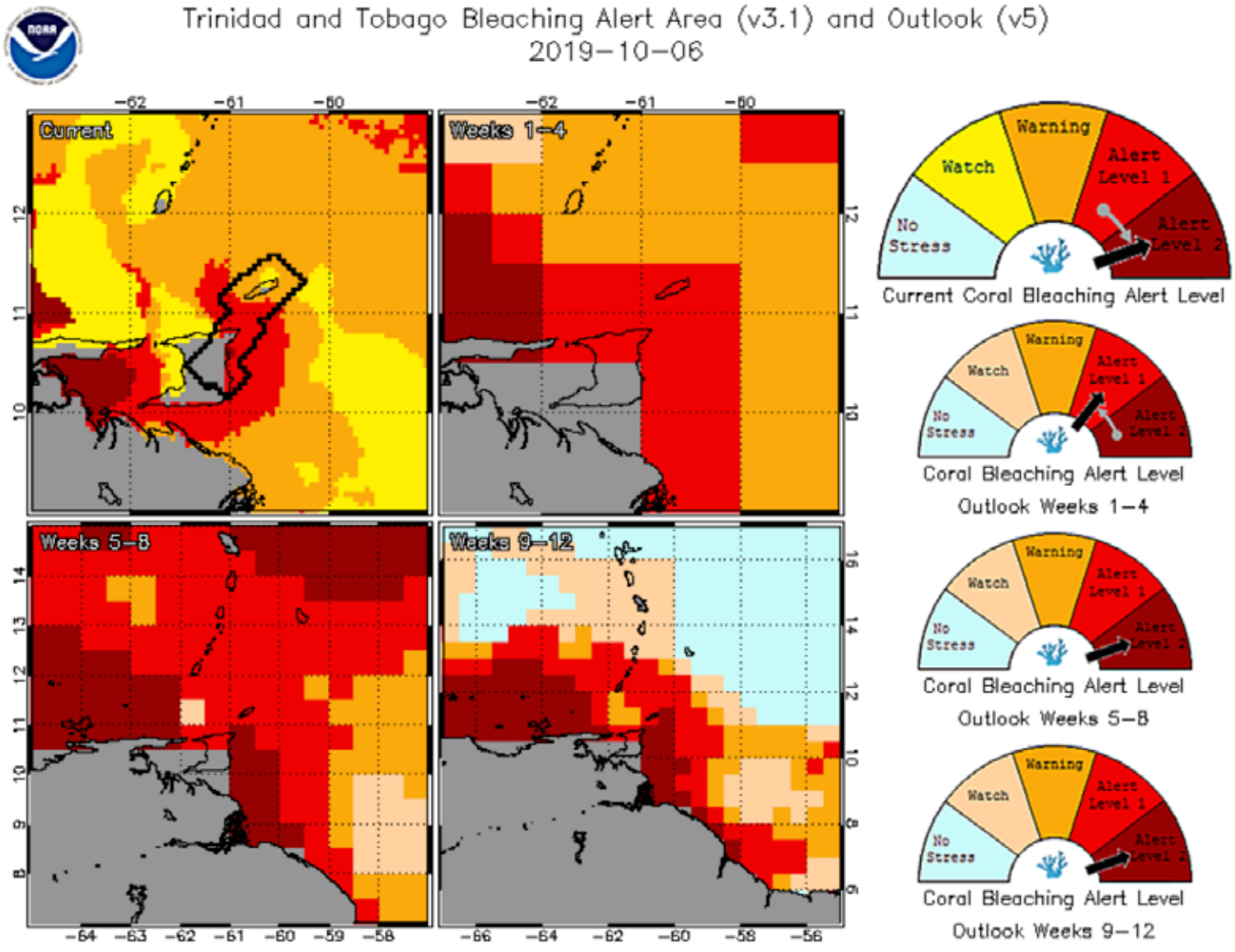
Report coral bleaching

Over the next three months, it is important for citizens who utilise the waters around Tobago to keep an eye out for changes to our reefs. Please report any observations of coral bleaching to local environmental authorities – The Institute of Marine Affairs, The Department of Marine Affairs and Fisheries, THA, and even NGOs in your area – Environmental Research Institute Charlotteville, Buccoo Reef Trust and Environment Tobago to let them know what you have observed. It will be great if pictures and notes such as the location, depth and extent of bleaching observed can be provided.

Assisting in Reef Recovery

Not all coral species are equally susceptible to bleaching but the extent of coral bleaching depends on the current state of reef health and the severity of the bleaching conditions (how long sea temperature remain too warm for corals). Following a bleaching event, the recovery of coral reefs depends on the species of the coral but also on the general health of reef. Therefore, curbing local stressors, such as non-sustainable fishing techniques, pollution and exposure to sedimentation, are highly recommended following a bleaching event to allow the reefs to have suitable condition for corals to recolonise and grow.

Trinidad and Tobago 5-km Bleaching Heat Stress Gauges (Version 3.1)
https://coralreefwatch.noaa.gov/vs/gauges/trinidad_tobago.php



Livelihoods and Learning

Mrs. Joanne Deoraj, Permanent Secretary delivers the feature address at the 6th Community Research Symposium, Carenage

How important is the Sea in sustaining livelihoods?

Carenage, a tiny town located in the north western part of Trinidad, derived its name from the practice of careening. "Carénage" in French means sailing vessels for maintenance, which had been done in the area for many years. However, like similar fishing communities across the length and breadth of our nation, they are facing a number of challenges that take many forms – from coastal development limiting access to the shoreline, conflicts with other resource users, pollution from land-based runoff, oil spills, to overexploitation of resources.

According to Permanent Secretary of the Ministry of Planning and Development, **Ms. Joanne Deoraj**, these challenges adversely place our local coastal ecosystems such as mangroves, seagrasses and coral reefs at risk while rendering fish and other seafood unfit to eat, and impacting livelihoods.

Delivering the feature address at the Institute of Marine Affairs' (IMA) 6th Community Research Symposium, which took place on the 14th August 2019, the Permanent Secretary reiterated the Government's commitment to work alongside key stakeholders such as the Institute of Marine Affairs and other government and non-governmental agencies to protect and conserve our marine resources.

The IMA's Community 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. Themed, **"Sea and Me: Livelihoods and Learning"** the symposium brought together representatives from the Carenage Community, academia, private sector and key government stakeholders to learn about the state of the marine resources along the northwest peninsula of Trinidad from Glencoe to Chaguaramas. It aimed to clarify misinformation and share lessons and practical solutions for tackling complex coastal issues all while partaking of a delicious smoked tilapia chowder provided by the Caribbean Fisheries Training Development Institute.

The presentations focused on several aspects of the marine environment:

- **The impacts of loss of seagrass in William's Bay.**Turtle grass *(Thalassia testudinum),* which dominated seagrass beds in William's Bay have disappeared since 2016 and have not shown any signs of recovery. These beds supported a diverse benthic community that have since declined. Coastal development, including land reclamation, along with land-based runoff have led to increased sediment deposits, in turn smothering these grassbeds.

- **Bathing beach water quality along the Chaguaramas Peninsula** identified bathing areas that had bacterial loading above recommended bathing beach standards, thereby increasing risk to human health. This presentation also revealed that persons should avoid bathing in the peninsula during and immediately after heavy rain fall.
- **The importance of using oil fingerprinting techniques and radar systems to detect oil spills.** Since 2000, the IMA has acquired over 300 oil fingerprint samples which aid in identifying sources of oil spills. The IMA is collaborating with the Ministry of Energy and Energy Industries to install a radar system to help detect and monitor movement of oil spills. This together with the oil finger printing will greatly aid in linking mystery spills to suspect sources.
- **The suitability of fish population sizes to prevent overfishing.** Fisheries in Trinidad and Tobago and throughout the Caribbean have been under pressure from overfishing, habitat destruction and marine pollution for decades. Heavy fishing pressure leads to 'growth overfishing', a situation in which juvenile fish are removed from the population before they have a chance to spawn. This causes the fish to mature quicker and begin reproducing at a smaller size. Smaller fish produce fewer eggs than large fish, making it difficult for fish populations to replenish themselves under heavy fishing pressure.
- **The feasibility of a mariculture industry for Trinidad and Tobago; and solutions to coastal challenges on the North-West Peninsula through the Integrated Coastal Zone Management process.** The Caribbean Region, due to its large oceanic area and favourable climatic conditions, is often cited as having great potential for offshore aquaculture. While there are a few notable instances of mariculture development across the region, overall growth has not been significant. In light of this, the Institute of Marine Affairs (IMA) through funding under the Public Sector Investment Programme (PSIP) is implementing a multi-phased project to aid in the development of Trinidad and Tobago's mariculture industry.

Contributions being made by participants

Smoked Tilapia Chowder provided by CFTDI

Right:
Mr. Sheldon Ramoutar, Research Officer (Microbiology)

Welcome to the IMA

Cyril William Best

The IMA is pleased to announce Mr. Cyril William Best who assumed the position of Corporate Secretary/ Legal Counsel on 1st March 2019.

Mr. Best has been the Corporate Secretary at the Tunapuna/Piarco Regional Corporation for the past five years. Prior to relocating to the Republic of Trinidad and Tobago Mr. Best was an Assistant Chief Administrative Law Judge for the City of New York. He also worked as a Senior Attorney for the New York State, Workers' Compensation Board as well as a couple of general purpose Law Firms.

Mr Best is a well qualified and outstanding Attorney who brings a wealth of experience. He holds a Bachelors of Business Administration with a major in Management from Pace University in New York where he was on the Dean's List. He's a Fellow, Life Management Institute with distinctions and also holds a Juris doctorate from New England Law, Boston Massachusetts. In addition Mr. Best attended Hugh Wooding Law School where he obtained his Legal Education Certificate.

He has been admitted to the Bar in New York and New Jersey as well as the Law Association of Trinidad and Tobago. Mr. Best is a member of the American Bar Association and the FLMI Society of Greater New York. It is this love of helping people that led him to gravitate to the study of law.

The Board is confident that Mr. Best is the best candidate to assist the Board and the IMA in realizing the objects under the IMA Act Chapter 37:01.

Participants of the tree planting exercise

Forest fires spark planting of over 500 seedlings at Chaguaramas

Over 500 seedlings were replanted in Chaguaramas on Corpus Christi, Thursday 20th June, to help restore forested areas that were destroyed by recent bush fires. Historically, Corpus Christi is used as an indicator for the beginning of the planting season.

The initiative was led by the Institute of Marine Affairs, the Chaguaramas Development Authority and the Ministry of Planning and Development.

The main objective of this exercise, was to counter some of the effects of forest fires during the 2019 dry season which destroyed many of the trees in the Chaguaramas area.

The planting exercise attracted members from the public, and various NGOs who all volunteered.

The 500 seedlings included 200 cedar, 250 mahogany and 50 Marite Polar trees from the Forestry Division.

The Ministry says there would be more such replanting exercises planned for other affected areas across Trinidad and Tobago in the near future.

Forests and biodiversity are key to all life forms. The richer the diversity, the greater the opportunity for medical discoveries, economic development and adaptive responses to new challenges such as climate change.

Scope for Jobs within the Marine sector

On Wednesday 3rd July 2019, the IMA hosted a Career fair entitled 'The Sea and Me: Livelihood and Learning' at the Carenage Fishing Centre. Many children and young adults from the Carenage community visited to learn about the marine environment, and the career opportunities that exist in the marine sector. Exhibitors at the fair included Caribbean Fisheries Training and Development Institute (CFTDI), Trinidad & Tobago Pilots' Association, Trinidad & Tobago Hospitality and Tourism Institute (TTHTI), Trinidad & Tobago Coast Guard, the University Of Trinidad & Tobago (UTT) and a private sector company-Capital Signal. The visitors were exposed to different types of equipment used to collect data in the ocean, variety of marine specimens, and the various qualification/skills needed to work in this sector. Exhibitors expressed that human actions on land often have the potential to impact marine areas (example: slash and burn on hillsides). Those marine areas are intricately linked to sustaining livelihoods and by extension creating jobs and opportunities for future generations.

Careful oversight as a member of the Carenage community learns how to fillet fish

(L-R) Staff Members Glendon Glasgow, Krystal Ganaselal, Tracey Medina and Ramona O' Brien posing with gleeful visitors

Heart Reef, part of Australia's Great Barrier Reef in the Whitsundays, Queensland. Photo by Jumbo Aerial Photography. Copyright Commonwealth of Australia (GBRMPA).
Source:facebook.com/AustraliaInTheCaribbean

Scientists fight to save coral reefs

To raise awareness of the value of coral reefs and the threats they face, the Australian High Commission hosted a screening of the IMAX 3D documentary 'Great Barrier Reef' in Port of Spain on Wednesday 15 May. The film follows the journeys of 'citizen scientists' who are working to save coral reefs, including Australia's iconic Great Barrier Reef – the largest single structure of living organisms in the world.

Guests included prominent environmental scientist Professor John Agard, Institute of Marine Affairs Director Dr Ahmad Khan, diplomats, representatives of environmental groups and teachers and students from the University of the West Indies UWI St. Augustine and UTT - The University of Trinidad and Tobago.

The Australian Government is committed to working closely with the countries of the Caribbean to share knowledge, research and expertise to help protect and preserve the world's coral reefs for future generations, including through the International Coral Reef Initiative. For further information about ICRI, please visit: https://www.icriforum.org/.

Environmental scientist Professor John Agard, with Institute of Marine Affairs' Director, Dr Ahmad Khan

Invited guests peruse educational content provided at the event

UTT and IMA to Cooperate on Marine Science & Environmental Research and Training

Professor Sarim Al-Zubaidy, and the Acting Director of the IMA, Dr. Rahanna Juman (center), and Corporate Secretary of each of the organisations (right) Hayden Alexander Chairman of the Board of Goveners IMA (left)

The University of Trinidad and Tobago (UTT) signed a Memorandum of Understanding (MoU) with the Institute of Marine Affairs (IMA), aimed at facilitating joint development and coordination of studies of interests to both organisations – UTT and the IMA.

The signing of the MoU between UTT and the IMA by UTT's President, Professor Sarim Al-Zubaidy, and the Acting Director of the IMA, Dr. Rahanna Juman took place at UTT O'Meara Campus on Thursday April 18th 2019 and was witnessed by the Corporate Secretary of each of the organisations. Professor Al-Zubaidy indicated that The University of Trinidad and Tobago is pleased to enter into this agreement with the Institute of Marine Affairs, and UTT looks forward to working with the IMA for the sustainable development and management of Trinidad and Tobago's coastal and marine environment. This MoU creates a mechanism for the two organisations to collaborate in areas such as Research and Monitoring, Training, Environmental Sciences and Management, Public Education, Environmental Technology and Engineering.

Speaking following the signing, Mr. Hayden Alexander, Chairman of the Board of Governors, IMA, said that both UTT and the IMA stand to benefit tremendously, as this venture allows for shared expertise and resources, which are expected to lead to greater human capacity and ground-breaking future research in Marine Sciences.
The MoU is renewable and, in the first instance, will govern the five-year period of cooperation, inclusive of the delivery of courses, exchange of scientific and technical information, and provision of advisory services.

The University of Trinidad and Tobago and the Institute of Marine Affairs view this MoU as paving the way for both organisations to strengthen their scientific and technical cooperation, with the focus to improve the quality of life of the people of Trinidad and Tobago.

'Creatures of the Deep' and Hollywood

Attish Kanhai, Research Officer,
Institute of Marine Affairs

'Kraken Grimm' illustration by TheRogueSPiDER.
www.deviantart.com

For some ill-advised reason I subjected myself to this year's Godzilla: King of Monsters. Among the bad acting, poorly developed characters and illogical science one scene stood out to me in particular. If you haven't seen the movie, which I really do not recommend, I will explain. When Mothra (so named because it is a giant Moth I assume) hatched into its larval stage I couldn't help but notice the legs looked like an actual earth creature I am all too familiar with. Mothra's legs and carapace resembled that of an Isopod I regularly encounter in the sediments of Trinidad belonging to the Genus Cirolana. To the untrained eye the similarities may seem contrived at best but it got me wondering, "How many deep sea creatures have been used as inspiration for movie monsters over the years?"

Hollywood has long been fascinated with the potential terrors that lurk in the deep. Who can forget the iconic Jaws, The Abyss, The Kracken, Aquaman, 20,000 leagues under the sea and of course the epic Megalodon. Almost countless movies warn of potential treachery lurking beneath the deep blue. While it does remain true that we know more about outer space than we do about the deepest oceans on our planet each day more discoveries are being made about creatures residing in the deep. Anyway that's not exactly the point of this article. The Classic movie Alien draws its inspiration from a marine parasite known as Phronima. Phronima are found throughout the world's oceans simply because they benefit from a rather curious case of locomotion. They have been able to escape the confines of the sea floor by invading a barrel-shaped zooplankton known as Salps. Phronima will use their fearsome front claws and carve their way through the insides of salps (chest busting scene anyone?) leaving only their barrel-shaped outer structure which enables them to traverse the majority of the world's oceans. Think of it like taking a ride in a hot air balloon and simply allowing it to blow you wherever it chooses.

From Jaws to Deep Blue Sea and Megalodon sharks reign supreme in striking terror into the hearts of not only movie goers but everyday beach bathers and dare I say man on the street as well. Sharks are the perfect movie villains. Rows and rows of fearsome teeth, mysterious habitat and a taste for human flesh all add up to cement sharks as the kings of movie terror lore. Statistically you have approximately a 1 in 4,000,000 chance of dying from a shark attack while at the beach. You are far more likely to die of drowning or sun exposure but this still does little to allay the fears of Galeophobes or Selachophobes.

We would all agree that Captain Jack Sparrow of Pirates of the Caribbean fame isn't scared of much. However, in Pirates of the Caribbean: Dead Man's Chest the fearsome sea monster known as the Kraken managed to devour Captain Sparrow and his beloved Black Pearl (spoiler alert). The Kraken has been quite the movie star for more than a century, first appearing in Georges Méliès' 1906 film Under the Seas. It also appeared in Clash of the Titans original film of 1981 as well as the remake in 2010. Other films include Jack the Giant Killer (1962), Atlantis: Milo's Return (2003), Kraken: Tentacles of the Deep (2006), and Hotel Transylvania 3: Summer Vacation (2018) to name a few. The legend of the Kraken originated in Scandinavian folklore and resembles that of a giant cephalopod (Squids, octopus, basically anything that makes Calamari). Unlike most other fictional creatures, however, The Kraken was given a scientific name by none other than Carolus Linnaeus back in 1735, even appearing in the first version of his Systema Naturae. Back then it was known as Microcosmus for a short period (Linnaeus excluded it from later versions of Systema Naturae).

Another under sea enthusiast who also does some directing in his spare time, James Cameron, took a slightly different approach in his 1989 epic, The Abyss. Instead of blood thirsty deep sea creatures craving man flesh, The Abyss tells the story of an entire alien civilisation camping out in the Cayman Trough, the stretch of ocean between the Cayman Islands and Jamaica. The alien civilisation turned out to not be hostile, unlike other aliens mentioned previously in this piece, and even went so far to rescue a Navy SEAL running out of oxygen as he tries to navigate the deep Trench.

I was tempted to include something about the 2018 DC superhero movie Aquaman but I am fairly certain no one knows anything about that movie other than the fact it stars Jason Momoa who is famous for being in a TV show about dragons or something?

Countless other movies make various nods to underwater creatures in some form or fashion from Finding Nemo to Ice Age. Hollywood's fascination with the deep is not likely to end any time soon. The ocean contains many treasures and creatures that will forever be the basis of many Hollywood feature film. With much of the depths still to be explored and many fearsome sea monsters still to be discovered, long will the ocean capture the imagination of many a movie maker and movie-goer.

[The Phronima is a] tiny, shrimplike creature no more than 2.5 centimeters (1 inch) long, but it's as ferocious as a shark. Its giant eyes spot prey. Huge claws grab the prey, and a tiny mouth rips it to shreds. The prey never sees what's coming, because Phronima's transparent body blends into the surrounding water.
Reference: https://ocean.si.edu/
Photo: David Shale

Microplastics pollution - a pervasive problem on our planet

There are two issues of major significance to the Arctic Ocean – Plastic Pollution and Climate change. With our climate changing, sea ice acts as a transport medium for microplastics, which are a growing environmental hazard. Microplastics are small plastic pieces less than five millimeters long, which can be harmful to oceans and aquatic life. They come from a variety of sources, including larger plastic debris that under sunlight, changes in temperature, mechanical abrasion and wave action, degrades into smaller and smaller pieces. A predominance of fibers and polyesters were found in Arctic sea ice based on recent scientific research conducted by local scientist Dr La Daana Kanhai.

Within the last 10 years, marine pollution, specifically, plastics in the world's ocean have become a global concern owing to plastic's pervasive and persistent nature, and the potential threat they pose to marine organisms. Plastics, the most prevalent type of marine debris found in our oceans, consist of all shapes and sizes. Marine species ingesting microplastics can experience a myriad of problems from blockages, starvation due to the accumulation of toxic chemicals found in plastics.

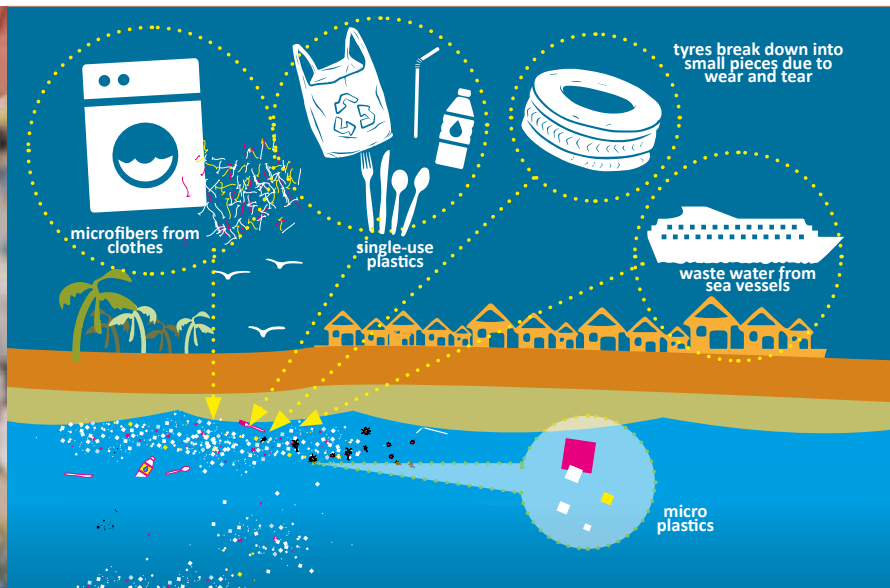
From Dr. Kanhai's Arctic Ocean 2016 expedition, the team of scientists were able to confirm that sea ice in the Arctic Ocean acts as a sink for microplastics, therefore when it melts, it releases microplastics that were once locked up in the ice. The concentrations of plastics were found to be higher than those found in contaminated surface waters. These particles were found in surface water, sub-surface, throughout water column and sediments. Plastic polymers and added chemicals that make them more durable and flexible, are found in a multitude of items, clothing to electronics to paints. One of the biggest categories is single use plastics, which include plastic drinking bottles and plastic grocery bags and plastic cutlery.

The Institute of Marine Affairs (IMA) hosted a Research Seminar entitled 'Microplastics in the Arctic Central Basin – Insights from the Arctic 2016 Ocean Expedition' by Dr. La Daana Kanhai, Marine Scientist and Instructor, Department of Life Sciences, University of the West Indies at its Chaguaramas Auditorium on 14th March 2019. A recording of Dr. Kanhai's presentation can be found on the IMA's Facebook Page at **http://bit.ly/ima-microplastics-kanhai-seminar2019**

Dr. Kanhai stated that in Trinidad and Tobago, there have been environmental initiatives, including Governments' EMA's iCare Programme to encourage recycling of products and recently it was announced in the Budget Statement that importation of styrofoam in the food industry would be banned from January 1, 2020. Dr. Kanhai called on us as a society to challenge the plastic status quo, and to change our culture in the workplace and personal attitudes and behaviour towards the use of plastics. Reducing and even refusing the use of single use plastics is critical to the health of our oceans.

Left:
Small pieces of plastic, known as micro plastics, are routinely mistaken for food by seabirds and marine life. Source: Florida Sea Grant, CC BY-NC-ND 2.0

Right:
Sources of micro plastics



IMA Events, Activitie & Outreach

"All hands on deck!" UTT students at sea.

UTT students (L to R): Israel Eugene, Krizia-Lee Chang, Stephon Cadogan, and Aaliea Ramjohn.

Dr. Ahmad Khan, Director looks on as Shane Ramsammy, Lab Technician, prepares to test a water sample.

The Institute of Marine Affairs (IMA) has successfully hosted final-year Marine Science students from the University of Trinidad and Tobago (UTT) in IMA's May - August 2019 Internship Programme. For fifteen weeks, while awaiting graduation, the interns benefitted from the opportunity to gain hands-on experience under the supervision of experts in the field, in conducting marine environmental research, as well as to develop proper work ethics in an effort to gain an appreciation for all aspects of the marine environment.

Wednesday 21st August 2019 was another exciting day for the Interns here at the Institute as they geared up with the staff and ventured out to Hart's Cut, Chaguaramas. The crew was in good spirits as they set out to complete their mission of conducting sediment and water quality testing at four different stations.

Leading the operations was Director of the IMA, Dr. Ahmad Khan, who guided the Researchers to ensure everything went smooth sailing. Under the supervision of the Director and two Lab Technicians, Shane Ramsammy and Amir Dubrie, the Interns received hands-on experience with the different sampling and analytical procedures and equipment used. They were also exposed to the importance of such research as it provides a window into the health of our marine environment that can favourably impact both aquatic and human life.

As the crew anchored at each station, water quality was analyzed through sample collection and tested for levels of ammonium, nitrates, and phosphates. This is important as excess levels of ammonium are toxic and can prove to be fatal for fish, as well as, excess levels of nitrates and phosphates stimulate growth of phytoplankton that deplete oxygen levels and make survival of aquatic life difficult.

Physical parameters such as dissolved oxygen concentration, pH temperature, salinity and turbidity were also measured to assess the water quality. All of which affect the survival of aquatic life.

Sediment samples were collected to be taken to the IMA lab and tested for heavy metals which can sbioaccumulate in aquatic organisms and pose a risk to human health during consumption.

Once the mission was completed, the crew headed back to the IMA where further testing is to be completed.

Sea & Me expands

The IMA introduced a project called the Sea & Me to the Cunapo St Francis Roman Catholic Primary School. The Sea & Me Project has been successfully carried out in schools in the Carenage area for the past 15 years and it is one of our milestone achievements. This project targeted 175 post-SEA students 75 students more than the previous year and covered topics such as the importance of mangroves, coral reefs, marine mammals and citizen's role in keeping healthy oceans. The 2019 Sea & Me Project ran over a four week period and is part of forging a link with the Sangre Grande community, as creating awareness of the costal environment and its impact on everyday lives remains an important part of our mandate.

Top:
Students of Cunapo St Francis Roman Catholic Primary School with Glendon Glasgow, Information Officer, IMA

Bottom:
Point Cumana Roman Catholic Government Primary School with Krystal Ganaselal, Information Officer, IMA

INSTITUTE OF
MARINE AFFAIRS

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(Chap. 37:01 of the Revised Laws of the Republic of Trinidad and Tobago, as amended by Act No. 13 of 1990).

Institute of Marine Affairs
Hilltop Lane, Chaguaramas
Trinidad & Tobago, W.I.

Phone: 634-4291
www.ima.gov.tt
imadirector@ima.gov.tt

IMAgovTT

THE BLUE CORNER

Thinking Deep: ROVs

ROV" stands for remotely operated vehicle. ROVs are unoccupied, highly manoeuvrable underwater robots that can be used to explore ocean depths .These underwater robots are controlled by a person typically on a surface vessel, using a joystick in a similar way that you would play a video game. A group of cables, or tether, connects the ROV to the ship, sending electrical signals back and forth between the operator and the vehicle. Work-class ROVs are built with a large flotation pack on top of an aluminium chassis to provide the necessary buoyancy to perform a variety of tasks. They have proven extremely valuable in ocean exploration and are also used for educational programs at aquaria and to link to scientific expeditions live via the Internet. ROVs comes in all shapes and sizes

Image courtesy of Art Howard, Global Foundation for Ocean Exploration, Windows to the Deep 2019.