IMA NEWS

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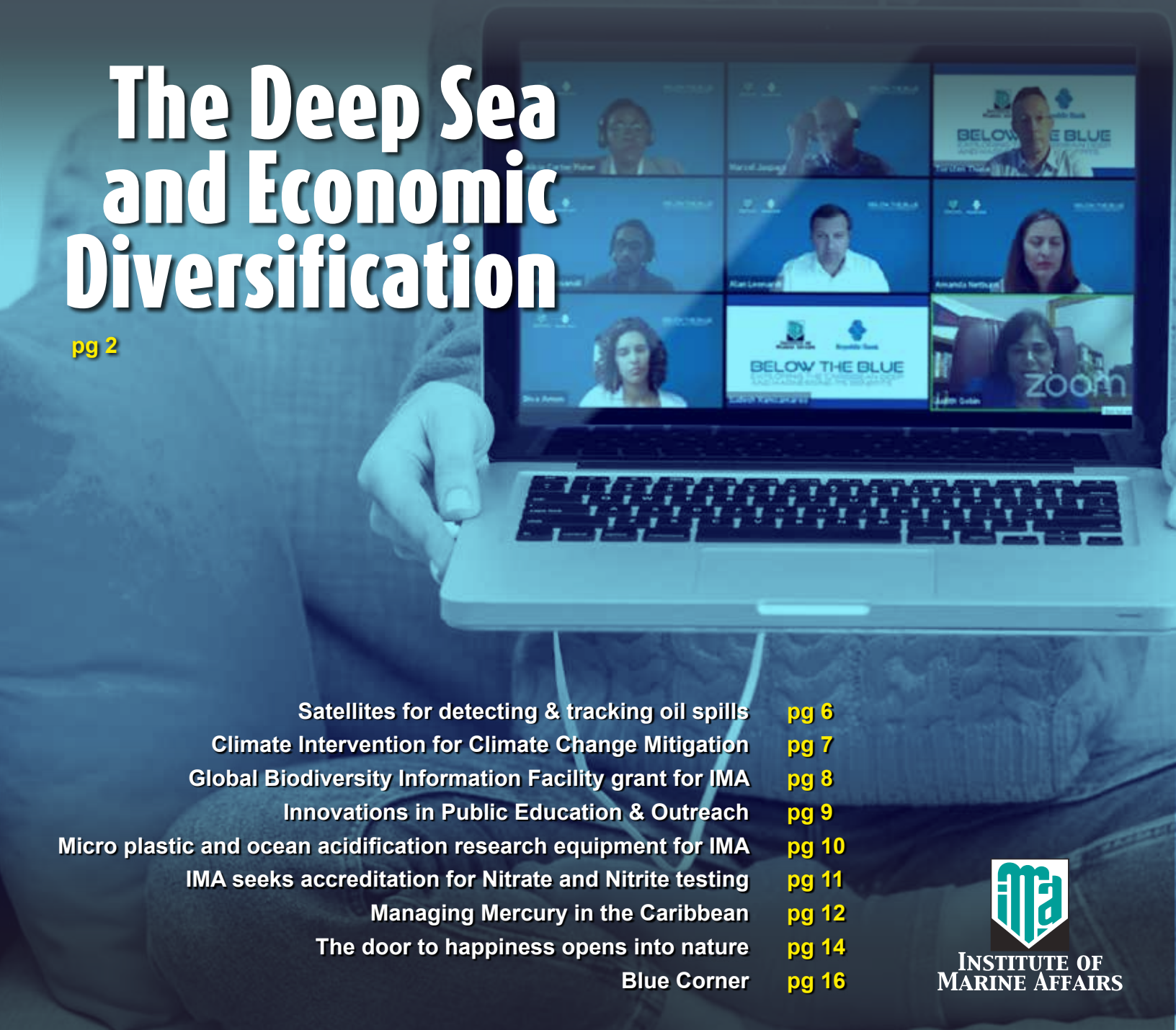

The Deep Sea and Economic Diversification

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INSTITUTE OF MARINE AFFAIRS

Below the Blue: Exploring the Caribbean Deep and Harnessing its Benefits

An old hydrocarbon province, Trinidad and Tobago has for decades been exploring opportunities to diversify its economy so that the domestic economy is not subject to the vagaries and volatility of the global energy arena. Tourism, manufacturing, and agriculture are some of the activities that supplement Trinidad and Tobago's income, but the petroleum sector however, still contributes the lion's share, 40 percent of the country's Gross Domestic Product.

In 2020 the Institute of Marine Affairs (IMA) began an excursion into the possibilities held within the waters around us to contribute to the diversification of our petroleum-based economy. Professor John Agard of The University of the West Indies, St. Augustine Campus, led the exploration into the possibilities of wind, geo-thermal energy, the use of sargassum to create organic-based plastics, carbon capture, sequestration and trading, algae and the myriad of applications in food, pharmaceutical and bio-technology to name a few, sea bed mining and more.

In 2021, the IMA continued its exploration into what possibilities lay in the Caribbean Deep, looking at how we can possibly harness and make use of those benefits. On World Oceans Day, which is observed by the international community on June 8th 2021, the IMA hosted its second virtual distinguished lecture and panel discussion on the topic "Below the Blue: Exploring the Caribbean Deep and Harnessing its Benefits." Professor Judith Gobin, a former researcher at the IMA and the distinguished lecturer, led our exploration into the possibilities of the deep. A panel of international experts also joined the discussion, lending their expertise and findings from years of research and collaboration to the discussion.

The IMA was pleased to have the expertise of Professor Marcel Jaspars of the University of Aberdeen United Kingdom who presented on the "*The Opportunities and Challenges for the Exploitation of Marine Genetic Resources by Small Island Developing States with Measures to Overcome those Challenges*." Mr. Torsten Theile presented on "*Engaging Science and Business to Explore the Deep: Innovative Finance for Ecosystem Conservation, Restoration and Sustainable Economic Development*." A German native, Mr. Theile has spent over 20 years in finance, structuring infrastructure debt facilities and technology equity investments and now focusses on ocean issues. He holds degrees in Law and Economics and in Conservation, as well as an Master in Public Administration from the Harvard Kennedy School.

Dr. Diva Amon, Deep-Sea Biologist and a former IMA researcher with over fifteen deep sea explorations to her credit spoke on "*The Regulations and Policy Considerations that must be Enacted in order to Protect*

Top L to R:
Alicia Carter-Fisher, CIO, IMA;
Prof. Marcel Jaspars, University of Aberdeen; Mr. Torsten Thiele, Founder, Global Ocean Trust

Middle L to R:
Mr. Kahlil Hassanali, PhD candidate, World Maritime University - Sasakawa Global Ocean Institute; Dr. Alan Leonardi, President and Chief Exec. Officer, Consortium for Ocean Leadership; Dr. Amanda Netburn, Oceanographer, NOAA

Bottom L to R:
Dr. Diva Amon, Deep-Sea Biologist, SpeSeas, Trinidad and Tobago;
Prof. Judith Gobin (feature speaker), The University of the West Indies, St. Augustine Campus, Trinidad

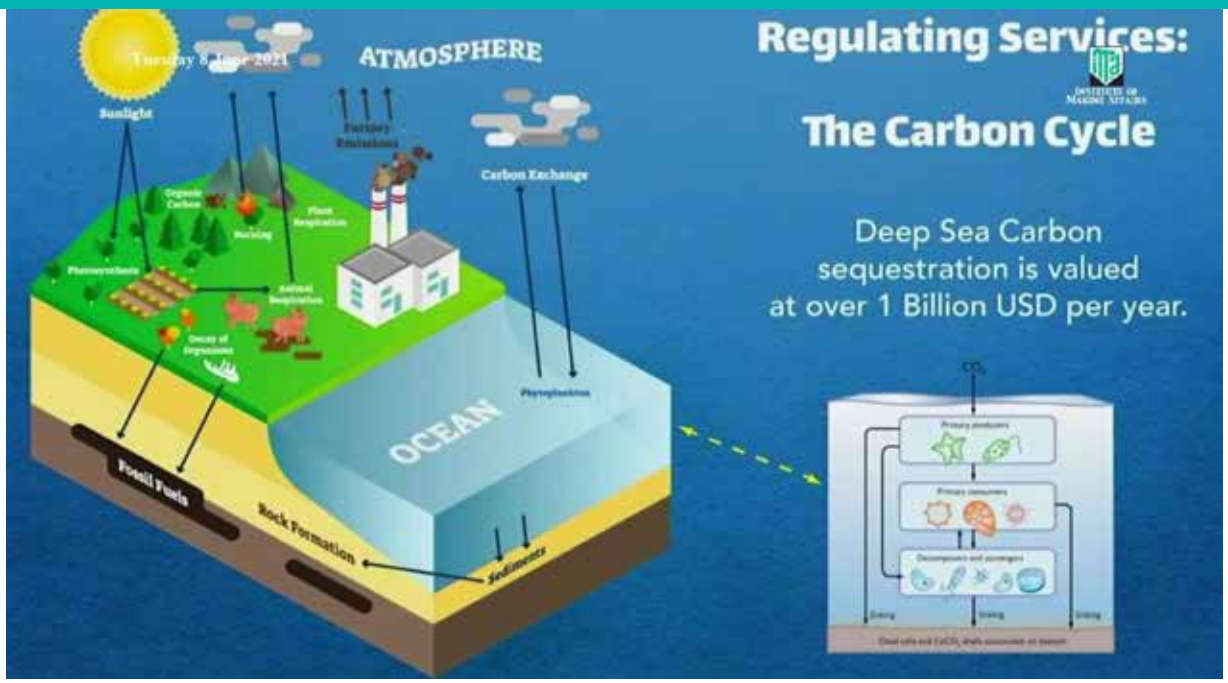
the Deep Sea Marine Environment and their Sensitive Ecosystems." Dr. Alan Leoanardi, Chief Executive Officer of the Consortium for Ocean Leadership and former Director of National Oceanic Atmospheric Administration (NOAA) - Office for Ocean Exploration and Research shared on the importance of *"Collaboration: The Key to Sustainably Advancing Ocean Science, Development, and Conservation."* Dr Amanda Netburn, representing the NOAA of the United States of America lent the organisation's expertise as it relates to *"Mobilising for Success: Government/ Private Sector Partnerships for Deep-Sea Exploration and Asset Monetisation."* Mr. Khalil Hassanali (PhD Candidate Sweden & IMA Researcher) presented on "*The Ongoing United Nations Negotiations for Treaties to Manage the Utilisation of Blue Assets (biodiversity) in Areas of the Oceans beyond National Jurisdictional Borders and CARICOM's Negotiation Position*."

Highlights of the Main Presentations

As the distinguished lecturer, Professor Gobin began her discourse establishing the intricate link between coastal communities in the Caribbean region and the ocean. Ocean spaces impact livelihoods, recreational activities, food security and weather conditions. Caribbean people rely on the ocean for sustainable development. Marine spaces host minerals, seafood, natural gas and marine biodiversity among other resources; yet for all of our dependence on the ocean, more than 80% of this realm, particularly, the ocean depths from 600 to 2,000 metres remain unexplored and the least studied environment on the planet.

Professor Gobin noted that a 72-hour deep-sea ocean research expedition in 2014 off the north coast of Trinidad and Tobago unearthed eight-seven (87) new speciess – polycheate worms, mussels, fish, crabs, sponges, octopus – which were added to the list of marine biodiversity of Trinidad and Tobago. Noting that the world has only scratched the surface at what lies at the bottom of the sea floor - deep sea biodiversity, mineral and metal deposits, hydrocarbons, and chemicals and enzymes; all of which can be used in the production of cosmetics, pharmaceuticals in the treatment of cancer and much more. Deep sea ecosystems are an important source of food, energy resources, marine genetic resources (MGR) and minerals and so must be conserved and protected as these resources can be utilized for human well-being. Marine Genetic Resources (MGR) as genetic materials or enzymes found in marine plants and animals in the deep sea.

Mapping the Caribbean's deep sea is quite expensive as advance technology and equipment are required to map the seafloor before the harnessing of its resources can be realized. A thorough understanding of deep sea ecosystems and their function is also required so that human activity in that marine space will not result in degradation. The deep sea, she noted, performs important ecological functions and provides ecosystem services which must not be lost in any effort to harvest



its resources. The deep sea is a major contributor towards carbon cycling which contributes to climate regulation.

The pictorial shows the regulatory function with regards to carbon sequestration in the deep sea. Carbon is cycled through a biological pump which is then sent to the sea floor where it is sequestered. This pump transports carbon from the atmosphere into the deep sea reducing the impact of anthropogenic carbon release.

Microbial oxidation of methane keeps another potent greenhouse gas out of the atmosphere while trapping carbon. Nutrient regeneration by the fauna that live at those depths creates the elements required for fueling surface productivity and contributing to fisheries. Microbial processes also detoxify a variety of compounds. These are all key processes which not only impact the overall health of our oceans but our planet. Professor Gobin advised that in the nation's quest to harness resources from the deep seas all efforts must be taken to ensure that the ecosystem services which are provided are not lost or inhibited in anyway. Conservation and sustainability of oceans as a resource is therefore key.

One of the recommendations Professor Gobin put forward was the promotion of a Deep Ocean Stewardship Initiative (DOSI) which is key in balancing the use of deep sea resources. The DOSI Group is a global organisation and multidisciplinary network that comprises in excess of two thousand (2,000) individuals from ninety-eight (98) countries. The Group is actively working to inform national, regional and global deep sea policy through independent science. Science is integrated with technology, policy, law and economics to advise on ecosystem based management, resource use in the deep ocean and strategies to maintain the integrity of these deep ocean ecosystems within national waters.

Professor Gobin closed by declaring that we are the custodians of the last frontier which is the deep ocean. Our resources on land are shrinking and becoming less productive. However, it is imperative that we turn the tide of the ocean and agree to continue improving on the acquisition of scientific knowledge to build up our human and financial capacity, to ensure that there is adequate transfer of marine technology through partnerships and alliances.

Making his contribution regarding marine genetic bioprospecting, Professor Jaspars of the Univeristy of Aberdeen, United Kingdom noted that oceans offer many invaluable opportunities and benefits, such as medicines, which can be used to manage human ailments. Over the last decade, genetic marine material extracts from the deep are being utilised more and more in pharmaceuticals industry. There are many opportunities he noted for Small Island Developing States for employment and income generation as these marine extracts potentially host a myriad of applications. One such example is the anti-cancer agent from the tunicate *Esteinascidia turbinata*, also known as the Caribbean seasquirt. Discovered twenty years (20) ago by a Spanish pharmaceutical company, the compound is extracted from the Caribbean seasquirt and is used as one of many compounds to produce the anti-cancer drug, Yondelis.

Mr. Torsten Thiele explored how deep sea research and product development can be financed. He advocated that new blended finance solutions are required to help reduce risk associated with blue investments and thereby attract a broader range of investors. This, he noted required an enabling framework supported by government. Engaging private sector partners, local communities, NGOs and civil society can address risks and deliver revenues to support resilience. Mr. Thiele also called for multi-interest collaboration whereby investors fund deep-sea science and monitoring where deep-sea ocean activities can pay for itself by delivering data for multiple users. Mr. Thiele advised that new finance mechanisms such as an Ocean Sustainability Bank can be considered to fund deep-sea explorative research. He further suggested that innovative funding can be considered where grants and commercial investment can be combined.

Dr. Amanda Netburn shared that NOAA is making ocean exploration more accessible in the United States of America (USA). Leading national efforts to explore oceans, NOAA continues to fill gaps in understanding oceans and conducting first time deep-sea research in deep waters thereby contributing to a repository of deep-sea data, information and awareness. She noted that this information would be crucial to accelerate the economy, health and security of the USA. However, she noted that deep-sea activities such as ocean mapping are best realized through coordination and collaboration which will eliminate duplication of equipment, resources and time; all of which are costly. The United States of American, Dr. Netburn noted, is poised to lead a new era in oceanic science and technology. Partnerships across academia, philanthropic organisations, private and government sectors, are essential to advance oceanic science and technology; and a collaborative and dynamic strategy for partnerships in ocean science and technology is needed to coordinate, focus and catalyse international effort.

Dr. Diva Amon called for a number of policy considerations with the aim of introducing environmental stewardship for marine life in the deep-sea ocean in Trinidad and Tobago, before any major foray into the deep. She said governments must formulate and implement a policy that would enable safe deep ocean scientific exploration. In order to know what lives in the deep, scientific data, information and analysis are required, which aligns with the UN Decade of Ocean Science for Sustainable Development 2021-2030 – 'the science we need for the ocean we want'. Further, before any evidence-based solutions can be drawn up, there needs to be an understanding of the needs of persons or communities who are dependent on the ocean and this should include economic, ecological and cultural values. Until we have an understanding of what exists in the deep-sea, together with robust policy to manage what exists there, Dr. Diva Amon advises the two top layers of the precautionary approach, which are to avoid and minimise interaction. This is necessary to preserve the sensitive ecosystems of the deep ocean.

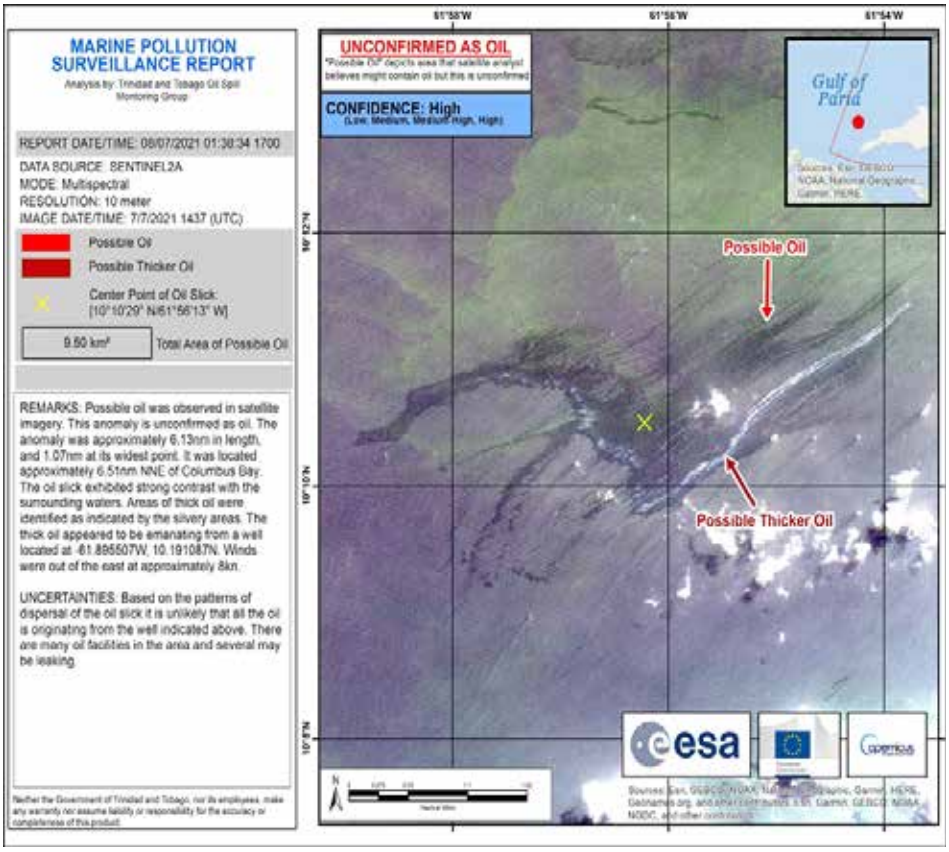
Mr. Khalil Hassanali explained that a new international agreement called the Biodiversity Beyond National Jurisdiction (BBNJ) is being negotiated to promote, protect and sustainably use biodiversity in international waters. He further explained that the BBNJ Agreement focuses on managing ocean areas where marine spatial planning tools can be used to ensure conservation of marine biodiversity; marine bioprospecting which will be used to equitably share benefits to be derived from ocean genetic resources; assessing impacts on ocean environments and building capacity for ocean management and use. According to Mr. Hassanali, the region must take a vested interest in the BBNJ Agreement as it facilitates increased knowledge of faunal species and discoveries of marine genetic resources (MGRs) in the deep sea.

Dr. Alan Leonardi, President and Chief Executive Officer for the Consortium for Ocean Leadership, championed the call for collaboration among actors and stakeholders in the public and private sectors, regionally and internationally. There is a need for convening meetings of stakeholders and actors in the ocean space around common issues and goals related to ocean health and sustainable use of its resources; communicating with one voice as to what is required to maintain a healthy ocean; and developing the next generation of scientists that will take preservation, conservation and responsible use forward. He shared the Consortium's initiatives in these areas.

The talks have been made possible by the Republic Bank Limited Power to Make a Difference Programme. A Summary Report will be made available to the Ministry of Planning and Development and the CARICOM Secretariat. Three hundred persons from across the globe participated in the virtual discourse. A recording of the Distinguished Lecture and Panel Discussion can be viewed at:

https://www.youtube.com/watch?v=W0eHPZOQ2XY

Detecting and tracking oil spills with the help of Satellites

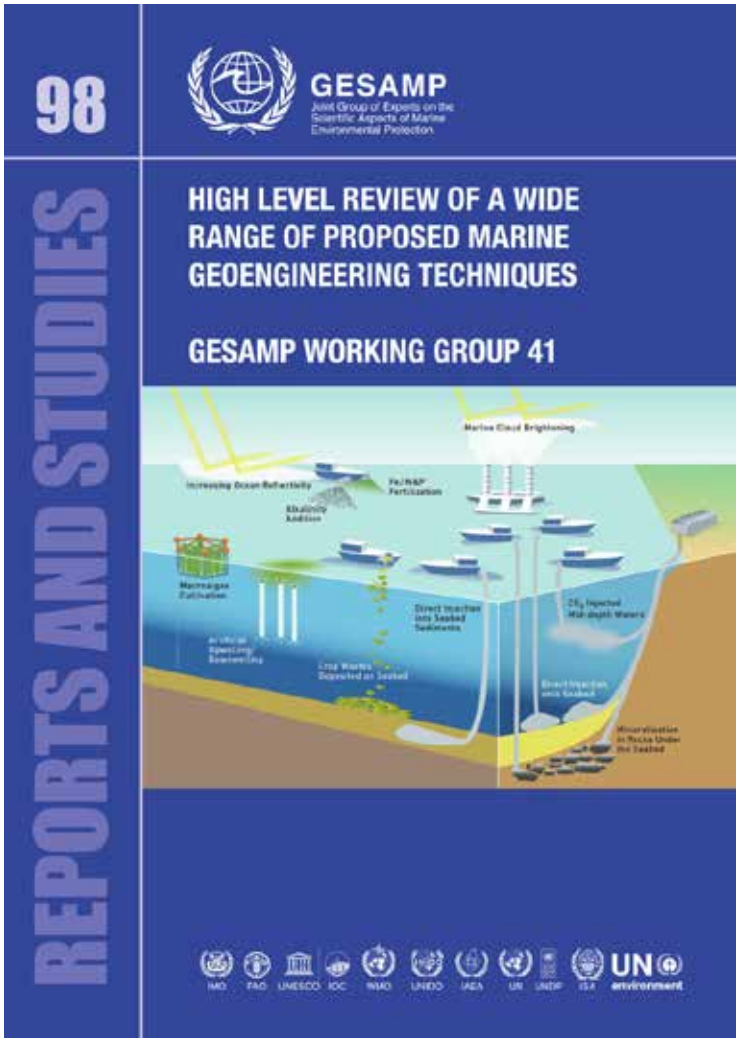


The Wider Caribbean Region (WCR) has experienced a number of large oil spills that have impacted multiple jurisdictions. Major spills originating in Trinidad in 2014 impacted Venezuela and in 2017 an oil spill from Trinidad impacted Aruba, Bonaire and Curacao the ABC Islands. More recently in 2019, thousands of kilometres of the coast of Brazil was impacted with oil from an unknown source. The illegal discharge of oil-contaminated waste by ships in the region also commonly occurs. Despite these risks in the region, the Caribbean Sea lacks an operational oil spill monitoring system. Often, spills are identified only after oil reaches environmentally sensitive coastal areas. The time lag between the oil spill occurrence and notification to the government authorities and enforcement agencies is critical. Without effective monitoring of the oil spill incident, this prolonged time lag results in missed opportunities to identify oil spill sources and responsible parties, and less effective mitigation leading to more severe environmental damage.

In May 2018, the Intergovernmental Oceanographic Commission (IOC) of UNESCO hosted a workshop on 'Sargassum and Oil Spills Monitoring Pilot Project for the Caribbean Sea & Adjacent Regions' in Mexico City. At this meeting, the participants of many Caribbean countries expressed a strong interest in setting up a regional Caribbean wide oil spill monitoring system. To this end, the IOC for the Caribbean and Adjacent Regions (IOCaribe) arranged for the United States National Oceanic and Atmospheric Administration (NOAA) Satellite Analysis Branch (SAB), which currently conducts satellite oil spill monitoring of the US waters, to train analysts in Trinidad and Tobago on oil spill monitoring. Analysts with a GIS background from the Institute of Marine Affairs (IMA), Ministry of Energy and Energy Industries (MEEI) and the Environmental Management Authority (EMA) were trained on using a variety of optical and synthetic aperture radar (SAR) satellite platforms to identify oil on the surface of the sea. These satellite platforms included: United States Geological Survey (USGS) Landsat 7 and 8; European Space Agency (ESA) Sentinel 1 and 2; NOAA Suomi; and NAA Aqua and Terra. NOAA SAB very generously provided all their standard operating protocols, templates, scripts, and devoted a large amount of time spread over 2 months to train all analysts and get the programme started. Operational monitoring by the IMA commenced on July 1st 2021 and has been continuously proceeding. The MEEI analysts will be joining the operational monitoring from August 1st. 2021

The image above illustrates an example of a Marine Pollution Surveillance Report (MPSR) issued for a possible oil spill identified in Trinidad and Tobago waters from Sentinel 2 (optical) imagery. The dark areas are anomalies which were identified as possible oil, while the brighter sheen is possibly thicker oil. These anomalies cannot be confirmed as oil from the satellite data, they can only be confirmed by ground truthing or direct observation. As part of the National Oil spill Contingency Plan, the MEEI is collaborating with a number of agencies, including the IMA, to establish a ground truthing process for the detected anomalies.

GESAMP Working Group 41- Climate Intervention for Climate Change Mitigation



Dr Rahanna Juman, Director (Agt.) was invited to be a member of the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) Working Group 41 on Climate Intervention for Climate Change Mitigation. GESAMP is a group of independent scientific experts that provides authoritative, independent, interdisciplinary scientific advice to the UN System and governments to support the protection and sustainable use of the marine environment.

The objectives of GESAMP WG 41 are:

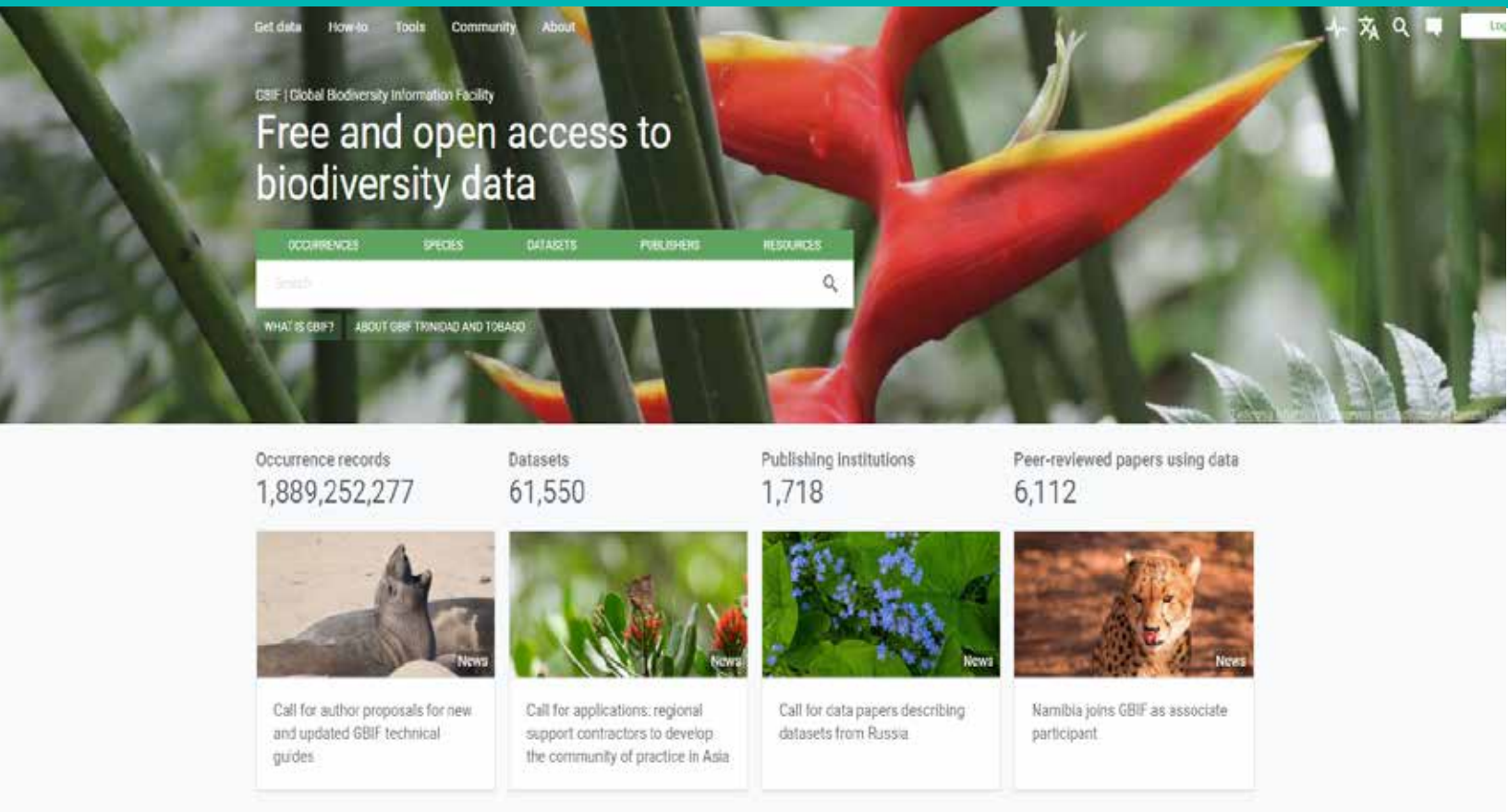
1. To allow for a better understanding of the potential environmental and wider societal impacts of different marine geoengineering approaches: and
2. To provide advice to the London Protocol Parties to assist them in identifying those marine geoengineering techniques that might be sensible to consider for listing in the new annex 4 of the Protocol. The London Convention and Protocol promotes the effective control of all sources of marine pollution. Contracting Parties shall take effective measures to prevent pollution of the marine environment caused by dumping at sea.

In its 1st Phase, GESAMP WG 41 carried out a high level review of a wide range of proposed marine geoengineering techniques. This was the first study to comprehensively examine the many proposed ways in the marine environment to remove carbon dioxide from the atmosphere or boost the reflection of incoming solar radiation to space (termed "albedo modification") - or, in some cases, both. (http://www.gesamp.org/publications/high-level-review-of-a-wide-range-of-proposed-marine-geoengineering-techniques)

The current phase will focus on:

1. Developing a framework to integrate inputs from natural and social science disciplines into a holistic assessment of ocean interventions for climate change mitigation;
2. Stimulating information gathering to fill the knowledge gaps, enabling robust scientific assessment and improved modelling simulations, at the scale of ocean basins and multiple decades, to look at spatial and temporal extrapolation of climate intervention approaches; and
3. Encouraging a stronger dialogue between modellers and scientists (conducting lab and field studies) to improve model accuracy and hence reduce uncertainties in projections.

GESAMP WG 41 will provide thorough scientific and social assessments of potential ocean interventions for climate change mitigation so that their potential contribution to net zero and climate recovery can be reliably evaluated.



IMA awarded grant from Global Biodiversity Information Facility

The Institute of Marine Affairs (IMA) has won funding to develop the **IMA Marine Biodiversity Hub (MBH)** from the 2021 Biodiversity Information for Development (BID) programme and the Global Biodiversity Information Facility (GBIF). As the government-based marine research institute, our mandate is to observe, report and advise on the health of marine ecosystems in Trinidad and Tobago. IMA has functioned within its capacity to provide information to all stakeholders, in the absence of a standardised and centralized database. However, there was an urgent need to improve the efficiency of our data management and distribution, to this end, IMA seeks to develop a centralised Marine Biodiversity Hub (MBH) for the purpose of effective dissemination of data on the state of marine ecosystems in Trinidad and Tobago to research partners, civil society, decision makers and the international community.

In addition to the development of the MBH, the IMA seeks to build its capacity for data sharing, more integrative research collaborations and creating sustainable partnerships for the purpose of research, management and conservation. This two-year project will focus on the designing and developing the digital infrastructure for storing, visualising, and sharing our marine data. It will also provide the opportunity to digitise historical records to populate the database and link to publications in the IMA library. All biodiversity information will be made available on GBIF in addition to a direct link to the National Trinidad and Tobago Biodiversity Information System (TTBIS), an online interface for data access by other sectors and the public. We hope that the MBH will improve existing data exchange and encourage more collaborations across research fields and development of data informed policies and legislation for better decision making on the marine environment.

https://myviewboard.com/blog/education/distance-learning-virtual-classrooms-where-learning-never-stops/

Global Pandemic Forces Innovation in Public Education & Outreach

The Global Pandemic has placed a damper on traditional public outreach activities at the IMA because of public health restrictions as a result of Covid-19. Before 2020, the pre-pandemic era, key messages on the importance of the marine environment would have been packaged, and delivered via face to face meetings with members of the public and students in their communities, utilising interactive and hands on approaches to learning. However, in light of the pandemic and its attendant public health restrictions (social distancing and limits on the congregation of individuals), IMA's information officers have been looking at innovative ways to engage our stakeholders.

One particular activity that has been impacted by the Covid-19 restrictions is our SEA & ME programme. This programme which has been in existence for well over a decade is targeted at students in the eleven to thirteen age group in the post-Secondary Examination Assessment (SEA) classes. It utilised the face to face engagement of the students through a myriad of sensory activities to improve learning. The SEA & ME students were introduced to the wonders of the marine environment and our islands' interconnectedness with the ocean. The programme is very hands on and practical. Activities include marine sing along, environmental jeopardy, art and craft, multimedia presentations and a field trip.

However, the COVID – 19 restrictions have forced Information Officers to rethink how outreach and engagement of this group, and students in general, can meaningfully take place until the easing of restrictions.

Information Officers at the IMA's Information Centre have been at the middle of the thrust to find new ways to engage our student population. Virtual engagement platforms and social media have provided answers. The Library at the Information Centre has also adapted receiving queries and providing information to both internal and external clients online. And with the prolonged work from home arrangements, the Library is working to finalise the digitization of its holdings. About sixty-five of the Library's holdings have already been digitized.

Similar to our library staff, the information officers have facilitated outreach to a group of scouts on various topics such as Marine Pollution, Marine Biodiversity, Mangrove Ecosystem and Coral Reefs using virtual platforms, which offered a high level of engagement. This was achieved by use of vivid photography, animated slides which incorporated interesting scientific facts. A Question and Answer session ensured that students understood what was shared. Platforms such as Microsoft Teams, Zoom, and Google Classroom were put to use and students were directed to credible marine science websites to further their learning.

Our Information Officers also presented at a number of virtual school career fairs arranged by the educational districts of the Ministry of Education. Although the COVID – 19 restrictions limited face to face activity, students still appreciated and looked forward to IMA presentations. .

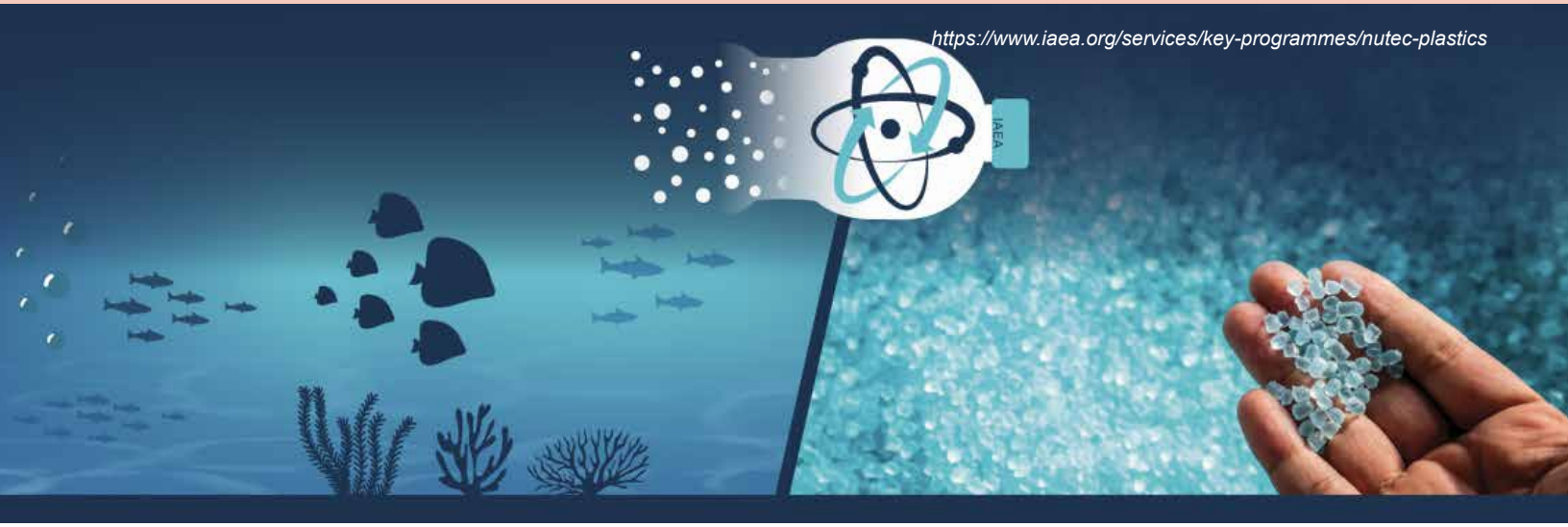
It is hoped that this approach can be transferred to the Sea & Me outreach, with some modifications for the academic year 2021/2022. Perhaps virtual tours and virtual interschool marine Jeopardy competitions can become our new reality.

Going forward there are several benefits to be had from this adaptive approach to outreach; such as:

- Adhering to all the public health restrictions for the Covid-19 pandemic while enabling learning in a safe environment;
- The convenience of engaging students and their families working from home; and
- The engagement of a greater number of participants from across a wide geographical area. As we revamp our SEA & ME programme, get on board and join us for an adventure in ocean literacy.

Should you like additional information about the program, you may contact our Information Officers using their electronic addresses:

Glendon Glasgow gglasgow@ima.gov.tt; and
Krystal Ganeslal kchandler@ima.gov.tt



IMA to receive € 37,000 in laboratory equipment to conduct research on micro plastic and ocean acidification

The Government of Trinidad and Tobago has a Technical Cooperation (TC) with the International Atomic Energy Agency (IAEA) on Using Nuclear Techniques for Climate Change Adaptation and Mitigation. The IAEA supports member states in using nuclear and isotopic techniques to develop a science-based understanding of changes in the ocean and supporting climate change monitoring and adaptation activities.

Scientists have already observed changes in seawater chemistry as the ocean takes up about one-fourth of man-made carbon dioxide emitted to the atmosphere each year. While this leaves less carbon dioxide in the atmosphere and substantially aids our thrust in mitigation of the impact of greenhouse gases on climate change; ocean acidification, which is sometimes referred to as the "other CO2 problem", has emerged as a key global issue in the last decade because of its potential to affect marine organisms and biogeochemical cycles. Nuclear and isotopic techniques are powerful tools that can be used to study the carbon cycle and ocean acidification. They have widely contributed to the understanding of past and current ocean conditions including predicting the impact of climate change. The Institute of Marine Affairs, the national counterpart for this TC, will receive in 2021 over €35,000 in laboratory equipment that will help boost its capacity to conduct research on ocean acidification and microplastics. IMA researcher, Mr. Hamish Asmath has also participated in a virtual regional training course on Isotope Hydrology facilitated under this TC.

Accreditation, and what it means to the Institute

After a two-year long journey towards the development of the ISO/IEC 17025 management system, the Institute of Marine Affairs (IMA) Environmental Quality Program Laboratory (EQPL), is in the final stages of the accreditation process for the Nitrate/Nitrate test scope. Many may wonder, what is ISO/IEC 17025 and what does this mean for the IMA?

What is ISO/IEC/17025

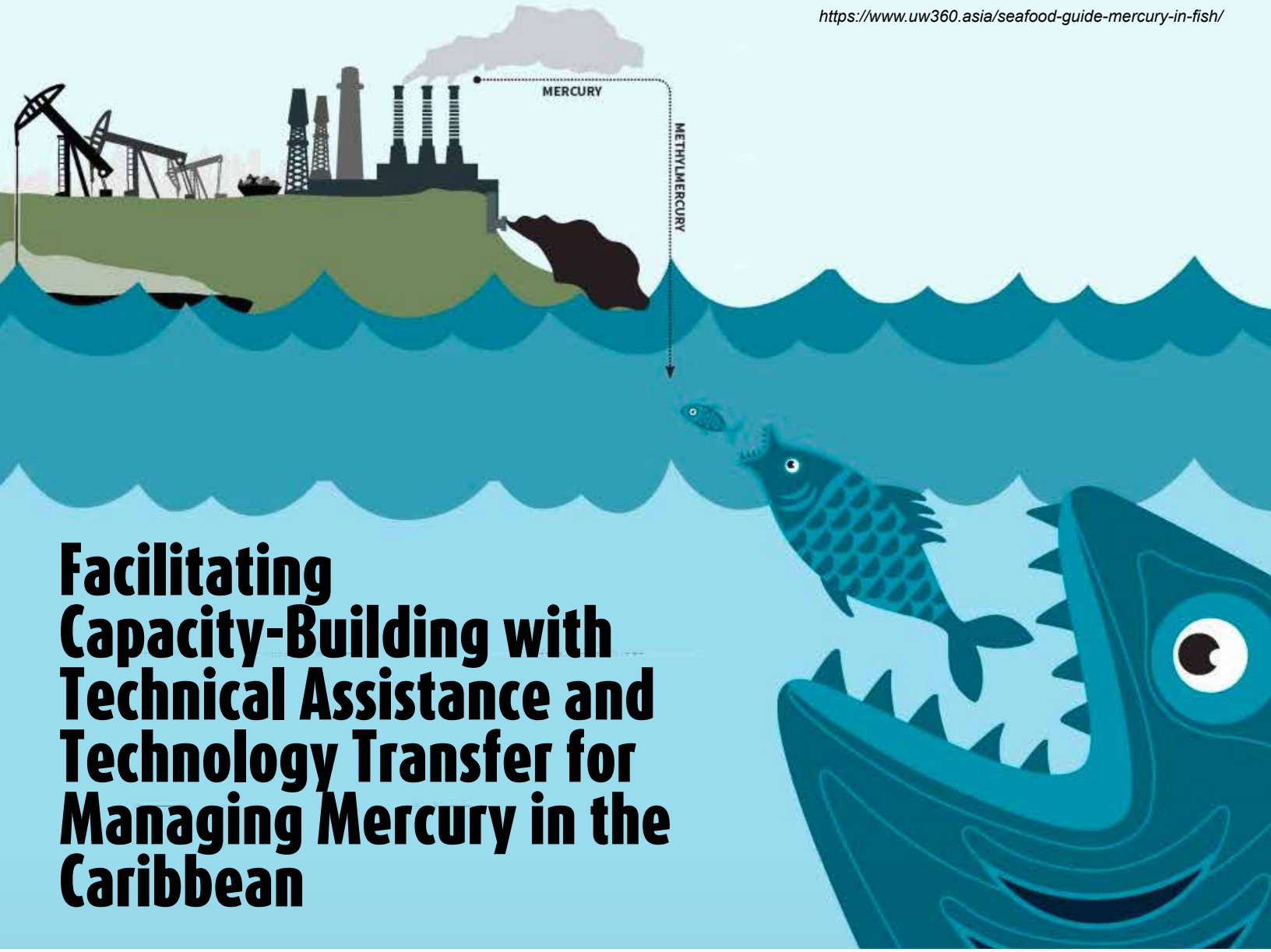
ISO/IEC 17025 is the primary international standard for both testing and calibration laboratories. The standard specifies the general laboratory requirements for the competence to carry our testing, calibration and sampling. The standard provided laboratory (EQPL) the framework for the establishment of a management system, which standardized the operations of the laboratory, addressed personnel competency and resulting in defined quality standards.

What ISO 17025 means to the IMA

Achieving accreditation for the EQPL would represent a ground-breaking achievement for the Institute. The IMA would be able to boast of being the first Marine and Environmental research organisation in the region that has a laboratory with an accredited test scope. Such an achievement has the potential to capture funded, research partnerships with local, regional and international organisations. The accreditation will serve a strong guarantee to those organisations that the EQPL is committed to quality and the production of valid results. Additionally, accreditation would confirm the technical competency of the staff, as well as the commitment of the organisation to work in an ethical and impartial manner. The Institute would also have a very well-structured management system whereby our risks and opportunities are continuously assessed in a bid to achieve key objectives, thus ensuring continuous improvement in the laboratory operations.

The way forward

While the EQPL is presently awaiting assessment for the proposed test scope, management has already committed to extend the accreditation scope to include other tests.



https://www.uw360.asia/seafood-guide-mercury-in-fish/

Facilitating Capacity-Building with Technical Assistance and Technology Transfer for Managing Mercury in the Caribbean

Trinidad and Tobago is participating in a regional project entitled, "Facilitating Capacity-Building with Technical Assistance and Technology Transfer for Managing Mercury in the Caribbean". Ms. Wendy Nelson and Mr. Salinas James of the IMA represented the country at the Inception Workshop held online on 27 July 2021.

The regional project was developed by the Department of Analytical Services (DAS) located in Antigua and Barbuda. The DAS is the country's Focal Point for the Minamata Convention on Mercury, an international treaty designed to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. The Minamata Convention sets up a Specific International Programme (SIP) to support capacity building and technical assistance, which is expected to improve the capacity of developing-country Parties, and Parties with economies in transition, to implement their obligations under the Convention. This project is one of ten projects selected for the second (2019) round of applications. Ten countries are participating in the project: Antigua and Barbuda, Guyana, St. Kitts and Nevis, St. Lucia, Barbados, Belize, Dominica, Grenada, St. Vincent and the Grenadines, and Trinidad and Tobago. The first four countries are already Parties to the Minamata Convention.

The main objective of the project is to establish the Caribbean Regional Mercury Monitoring Network (CRMMN). The project is expected to help participating countries that have ratified, or want to ratify, the Minamata Convention on Mercury, to meet its obligations and effectively implement its provisions. The project will facilitate the collection of mercury data for the Caribbean region, currently a gap in the global dataset, and will contribute to the global assessment on mercury. The establishment of a regional laboratory will assist in the assessment of mercury in the Caribbean environment and the foods on which people depend,

as well as in meeting the regulatory needs in the European Union for seafood and cosmetics. Workshops conducted during the project are expected to consolidate expertise within the region and provide a forum for communication, networking and collaboration of laboratory directors/managers, field personnel involved in sample collection, and policymakers for Ministries related to environmental monitoring, international trade, commerce and human health.

The DAS in Antigua and Barbuda will serve as the Central Laboratory for the project. This laboratory will coordinate sample collection, handle shipping logistics, disseminate data and information, procure standards and certified reference materials, coordinate inter-laboratory comparison and engage laboratories on comparable test methods. Standardised biotic sampling for mercury monitoring will be established. Laboratory capacity in Antigua and Barbuda and technical capacity in St. Kitts and Nevis will be emphasized during the project. The US Biodiversity Research Institute (BRI) mercury laboratory will provide technical expertise for the project. A State of the Region document has been prepared by the BRI, and is available on their website via the following link: https://briwildlife.org/wp-content/uploads/2021/07/FINAL-Antigua-Biomonitoring-Caribbean-Region-07-22-21-1.pdf.

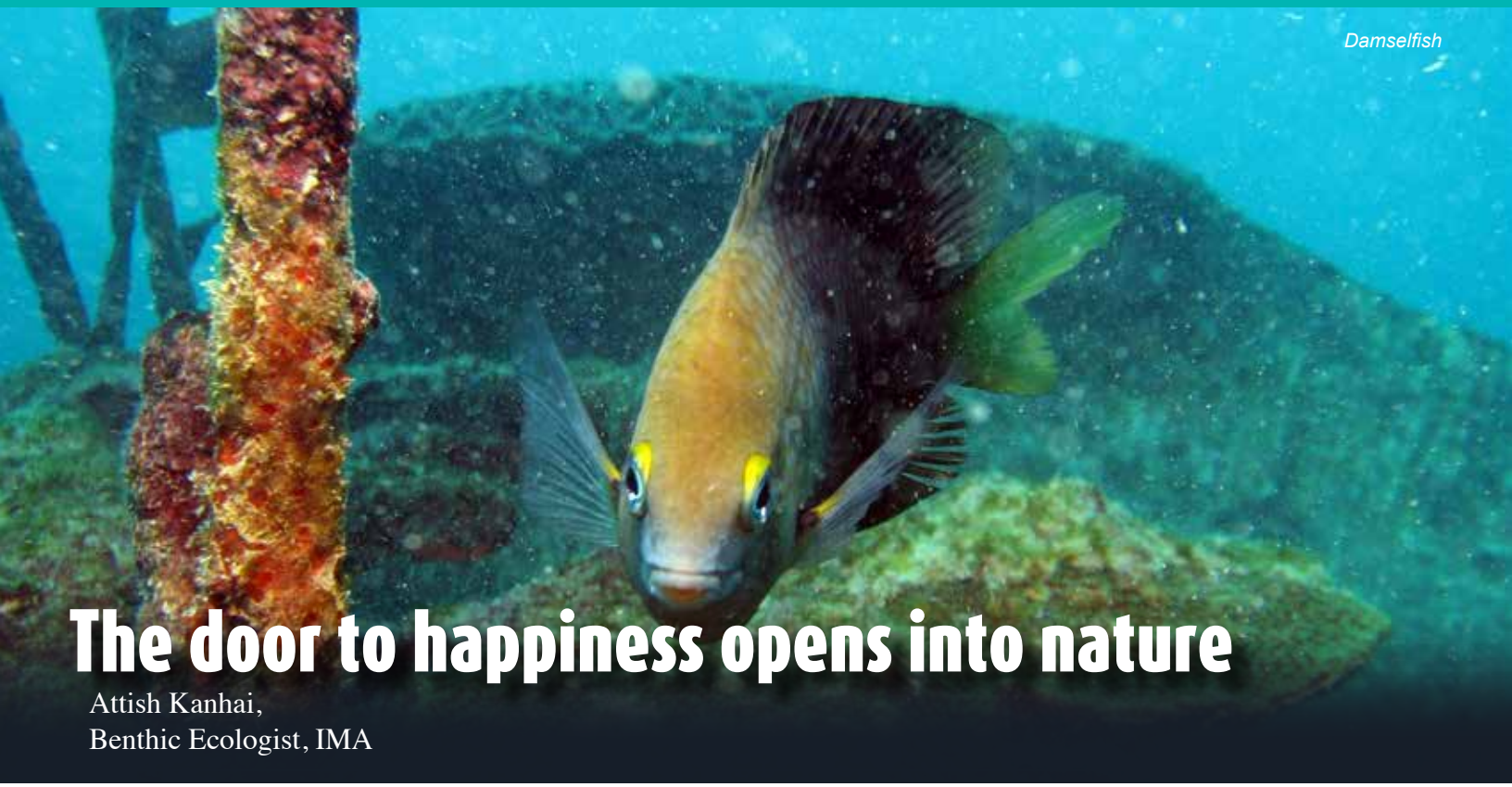
New timelines for project activities are currently being established, as there have been delays due to COVID-19. The project is, however, scheduled to be completed within two years. Project outputs are as follows:

- Output 1- Develop an integrated network of laboratories for the Caribbean Region.
- Output 2- Develop a regional mercury monitoring program that meets national interests and obligations to the Convention.
- Output 3- Develop outreach materials and communicate findings to the public and at COP 4.
- Output 4- Monitoring, evaluation and audit.

During the next few weeks, target matrices, and where applicable target species, will be finalised in collaboration with participating countries. Matrices to be considered include (1) Air, using passive air sampler technology developed by Environment and Climate Change Canada (2) Fish- marine species (e.g. mahi mahi, yellowfin tuna, red snapper, kingfish, carite); coastal/ reef species (e.g. barracuda, grouper, bonefish, tarpon, permit, croaker), freshwater species (e.g. wolffish, catfish, snook) (3) Birds- blood, feathers or eggs of seabirds and land birds (4) Marine Mammals e.g. pilot whale (5) Human hair (human biomonitoring often requires ethical clearance) (6) Human cosmetics e.g. skin lightening creams.

Samples will be collected, and prepared for storage and transport, by participating countries. Sample analysis will be performed at the DAS and BRI using Direct Mercury Analyzers, as well as at laboratories in participating countries using existing techniques, in order to ensure that results reported for the region are comparable. Analysis will be performed using Cold Vapour Atomic Absorption Spectrometry at the IMA. Data will be analysed and results will be shared in accordance with data sharing policy guidelines previously approved by participating countries.

Atomic Absorption Spectrometer for the analysis of samples at the IMA



Damselfish

The door to happiness opens into nature

Attish Kanhai,
Benthic Ecologist, IMA

Danish philosopher Søren Kierkegaard once commented, "*The door to happiness opens outward.*" Given Kirkegaard's reputation for being somewhat broody, it is doubtful whether he was talking about the literal outdoors. He did not seem like the outdoorsy type. However, to grossly miscontextualise Kirkegaard and to take this quote literally, I agree. The door to happiness does indeed open outward because outward is where we find nature, outward is where we find biodiversity.

The diversity of creatures on this floating rock through space truly warrants celebration and reverence. It is tempting to think as we look around and see birds fly, the odd pets about our gardens and animals here and there, trees, shrubs and the like, that this is the sum total of biodiversity. But two thirds of life on earth cannot be seen with the naked eye. One single bacterium can fit on the tip of a needle one million times. Even these minute creatures add their voices to the choir of life albeit ever so quietly. Each living thing on this Earth, from the smallest of microbes in the soil, to the largest deep-sea whales that rival the size of passing ships, blends seamlessly into the tapestry of life. As more and more of nature's sopranos, altos, baritones or tenors grow silent, the song of nature becomes less Mozart and more Falco. Our challenge then, is for Amadeus to keep on rocking (Unless you're a fan of 80s music you will not catch that reference, I digress).

Biodiversity, in a practical sense plays an extremely important role in our health and well-being. Nearly 75%[1] of all new medicines and drugs are derived from nature. Without plants and animals, the medical field would look radically different. Our ability to treat diseases would be greatly compromised, and medical discoveries would be limited were we not able to draw on the wealth provided to us from our biodiverse nature library. To date only a small fraction of plants, animals and microbial organisms have been studied for their medicinal properties. Who knows what cures lie dormant in nature waiting for its chance to influence the world? The greatest tragedy would be if these plants and animals would become extinct before we get a chance to know them.

Research has shown that biodiverse environments can help us to mentally recharge[2]. For example, people living in neighbourhoods with more birds[3] report being less stressed. The more biodiverse an environment the more relaxed people feel. The less connected we are to nature, the more our mental and physical health suffer. However, our connection to nature is becoming less commonplace, as green spaces give way to grey concrete jungles. It is no wonder people living in intensely urbanised areas report decreased mental health[4]. Biodiversity conservation is not an option it is a necessity.

No one needs me to keep itemising all the ways biodiversity is being destroyed and the extremely poor job *Homo sapiens* (humans) have done as stewards of our other earthly gifts. On the flipside, if we have the power to destroy, we also have the power to preserve. The impetus for biodiversity conservation can fall in only one place and that is squarely on the shoulders of those who have, up until this point, shirked our responsibilities.

As we commemorate World Biodiversity Day we are charged to be part of the solution, a solution to the problem we have created. A shift in thinking is required. We are part of nature, we come from nature and everything we do affects nature. We are part of the organism, the numerous parts of Earth's symphony that harmonises in a way no other planet in this galaxy can boast.

The Yale office of sustainability highlights six ways in which we can assist biodiversity in our local environments[5]:

1. Support local farms – in Trinidad there are an abundance of farmers' markets that sell locally produced goods. Supporting farmers' markets has the added benefit of keeping money in the local economy
2. Save the bees, the pollinators – bees are under constant attack from a variety of sources. Planting nectar producing flowers or, if you are so inclined, building a bee box for local bees to call home can be very helpful ways in saving the bee community. Most importantly don't kill the bees!
3. Plant local flowers, fruits and vegetables – yes an apple a day keeps the doctor away but here in Trinidad we are fortunate to have a wide variety of local fruits and vegetables. Local nurseries can provide a variety of information on local plant species, where they are sourced and how best to care for locally grown plants.
4. Take shorter showers! Biodiversity depends on the abundance of local fresh water. Taking five-minute showers and turning the water off while washing your hands, doing the dishes, or brushing your teeth are all easy ways to conserve water.
5. Respect local habitats. Plants growing in the parks and nature preserves near your homes often play an important role in preserving the local ecosystem. When you are outdoors, protect local biodiversity by sticking to the walking path or hiking trail. Help your children and pets to do the same!
6. Know the source! It is important to support companies that sustainably source their products and do not engage in environmentally destructive practices.

Kirkegaard's entire quote reads: "*Alas, fortune's [happiness] door doesn't open inward so that one can push it open by rushing at it; but it opens outward, and therefore one can do nothing about it.*" I am less inclined to agree with this full statement. We can still do something about it. Preserving biodiversity means preserving happiness. Simple steps and mindfulness for our fellow Earth dwellers does more than we perceive. Perhaps if Kirkegaard had spent more actual time outdoors he would have experienced more happiness instead of having to write about it.

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THE BLUE CORNER

Why is the Ocean salty?

Salt in the sea, or ocean salinity, is mainly caused by rain washing mineral ions from the land into water.

Carbon dioxide in the air dissolves into rainwater, making it slightly acidic. When rain falls, it weathers rocks, releasing mineral salts that separate into ions. These ions are carried with runoff water and ultimately reach the ocean.

Sodium and chloride, the main constituents of the type of salt used in cooking, make up over 90% of all the ions found in seawater. Around 3.5% of the weight of seawater comes from dissolved salts.

https://www.nhm.ac.uk/discover/quick-questions/why-is-the-sea-salty.html
https://www.surfertoday.com/environment/why-is-the-ocean-salty

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

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

IMAgovTT

Prepared by
Glendon Glasgow, Information Officer

Design/Layout:
Karl Doyle