



Coastline newsletter

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Special Points of Interest

- Education and Outreach
- GIS Advancement
- Sportfishing
- Youth and the Environment
- Water Quality Monitoring
- Climate Change
- Community Engagement

ARTIFICIAL INTELLIGENCE (AI) FOR THE BELIZE NATIONAL MARINE HABITAT MAP

By: ARLENE YOUNG, DIRECTOR

In early 2020, Microsoft's "AI for Earth" and the Group on Earth Observations Biodiversity Network (GEOBON) Secretariat launched the program "Essential Biodiversity Variables (EBVs) on the Cloud"; the purpose of the new US\$1 million grant program is to provide financial support and Microsoft Azure credits to monitor Earth's biodiversity.

The program successfully attracted 60 proposals aiming to contribute to developing EBVs and derived biodiversity change indicators around the world. Of those 60 submissions, Coastal Zone Management Authority and Institute's proposal "AI for the Belize National Marine Habitat Map" was one of the five that has been selected for funding. The proposal was jointly developed with GRH Consulting which is comprised of Dr. Robert Griffin and Dr. Emil Cherrington who are no strangers to the mapping and GIS community in Belize.



For this project, the CZMAI/GRH team will use Microsoft Azure for machine learning-based mapping of the EBVs of ecosystem extent and fragmentation. The project's geographic focus will be Belize's coastal and marine ecosystems, with particular attention focused on coral reefs, seagrass pastures, and mangrove ecosystems. These ecosystems are recognized for their blue carbon focus and potential to contribute to Belize's climate change mitigation efforts. Via this proposed work, Belize's 1997 30m Landsat-based National Marine Habitat Map will be updated, using a combination of 3m PlanetScope and 10m Sentinel-2 imagery. As such, the data will provide updated estimates of the status of Belize's major coastal and marine ecosystems.



In addition to helping to inform Belize’s Nationally Determined Contribution (NDC) to the Paris Agreement, the data will also support the country’s implementation of Sustainable Development Goal 14 and will be integrated into the revision of the national Integrated Coastal Zone Management Plan. Capacity building will also be a key focus of the project through knowledge-transfer workshops which will help to sustain and extend the technical capacity of CZMAI in the field of cloud computing.

CZMAI is very excited that the one-year project was launched in October 2020 and subsequently convened a project workshop on December 2, 2020 with the following objectives:

1. To share project goal, objectives and proposed activities.
2. To share approaches, methodology and data needs.
3. To discuss opportunities for integration and collaboration.

Over 20 participants from the scientific and marine conservation community in Belize as well as international partners joined the workshop and shared insightful information on ongoing projects and opportunities for integration and collaboration. The next steps are to compile historic and recent data from partners and to initiate data collection for gap areas as well as to initiate the remote sensing data processing.



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Message from the Chief Executive Officer

Dear Partners, Colleagues, Friends:

I am pleased to share the final issue of our semi-annual Coastline Newsletter as we come close to the end of this fiscal year. Through this medium, CZMAI has the opportunity and distinct pleasure to communicate our accomplishments, challenges and opportunities for the foreseeable future. CZMAI continues to work diligently to strengthen the Authority and Institute so that the mandate for improved coastal area management in Belize can be effectively fulfilled. CZMAI is also grateful for your continued support, interest and commitment as we continue to deliver on our mission and purpose.

The year 2020 is behind us now but it has certainly been unusual to say the least given the ongoing COVID-19 pandemic. As a national community, we were not prepared for the impacts. Nonetheless, CZMAI like many of its partners and stakeholders, has used the opportunity to be innovative and proactive in its response to the pandemic in order to embrace new avenues for the delivery of its mandate for sustainable integrated coastal zone management.

Below are just a few highlights of the accomplishments for the period covering July-December 2020 that CZMAI was able to achieve:

- Welcoming the Ministers and Chief Executive Officers of the new Ministry of the Blue Economy and Civil Aviation, CZMAI's new parent ministry, as well as the new Ministry of Sustainable development, Climate Change and Disaster Risk Management
- Application of Artificial Intelligence for the updating process of the Belize National Marine Habitat Map that will provide current and accurate information on the spatial extent of natural assets in the coastal zone
- Securing Gold Standard Certification Status from the Belize Tourism Board for the safe re-opening of Goff's Caye Managed Area to local and foreign visitors
- Implementation of Annual Coastal Awareness Week 2020 using a virtual platform

There are several other exciting accomplishments for your information and reading pleasure in this issue of the Coastline Newsletter.

The continued partnership and support of key partners, such as yourselves, is critically important for the successful attainment of improved coastal and marine area management in Belize. I encourage you to stay in touch with us throughout the year for other updates via our semi-annual Coastline Newsletter and by connecting with us on our website, Instagram and social media!

Continue to stay safe!

Chantalle Samuels (Mrs.)
Chief Executive Officer



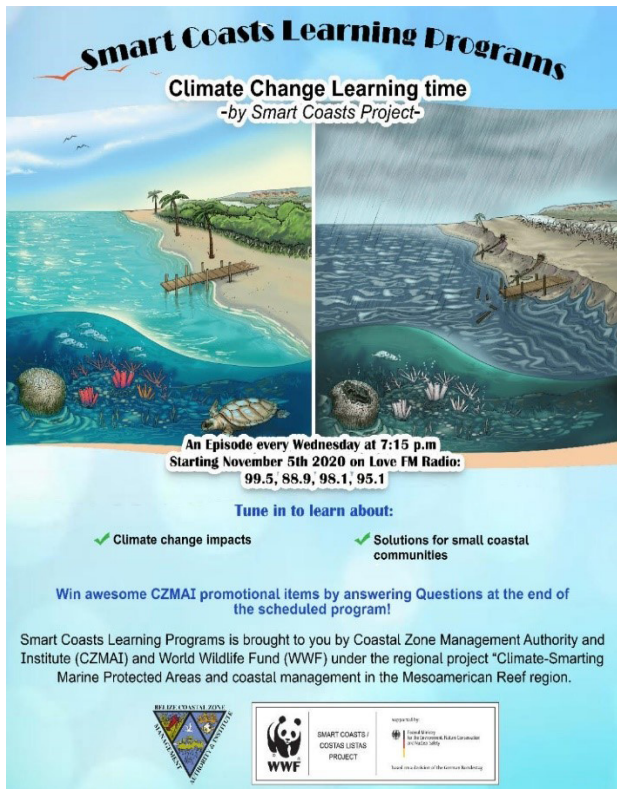
Goff's Caye Merchandise

LIMITED STOCK!



GET YOUR
Goff's Caye Merchandise
TODAY!

SMART COASTS LEARNING PROGRAMS
By: AZELEA GILLETT, COASTAL PLANNING TECHNICIAN



The Smart Coasts Learning Program was developed to substitute for the communication activities planned for the year 2020 for the Smart Coasts Project. Unfortunately, these activities were not feasible due to COVID-19 restrictions. The program was implemented through radio airings on LOVE FM which is the only national radio station in Belize. The program consisted of 10 airings (one airing per week) that dictated a story of a little boy named “Brayan”. Through his story, the audience learned about the vulnerability of coastal communities to climate change. The story also highlighted several climate change impacts and revealed how these impacts affected different members of Brayan’s community.

Every week an episode aired on Wednesdays for approximately 4-5 minutes. After the airings, a question and answer segment was featured to allow the public to interact and win prizes. The prizes were an incentive for listeners to tune in every week and allowed the information to be cemented in the minds of the public since they would have to listen closely to be able to answer the questions.

Every week members of the general public called to answer the questions which indicated that the public was being exposed and engaged. The recordings were also uploaded to the CZMAI website and Facebook posts were updated every week to allow the public to reference back to the website in the even they missed one of the airings. Through the Facebook posts we were able to increase reach.

Admittedly, the pandemic has prevented much human to human interaction over the past year. This was a challenging time for CZMAI since we were not able to engage the public and socialize our programs and activities in the manner we wished to however it has allowed us to become creative and adaptive. Thankfully the program was a success and the public was still engaged on the Smart Coasts Project.

Link to website: <https://www.coastalzonebelize.org/portfolio/climate-smarting-marine-protected-areas-and-coastal-management-in-the-mesoamerican-reef-region/>

Special thanks to:

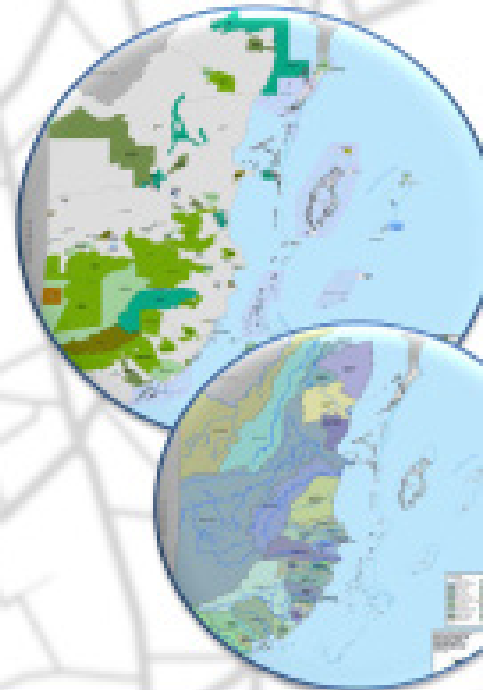
- Ms. Martha Montero- Love FM
- Ms. Nadia Bood- World Wildlife Fund
- Ms. Ariese Briceno- Marketing Assistant, CZMAI



Cartographic Map Production

&

Map Printing Service



**Cartographic Maps
Available**

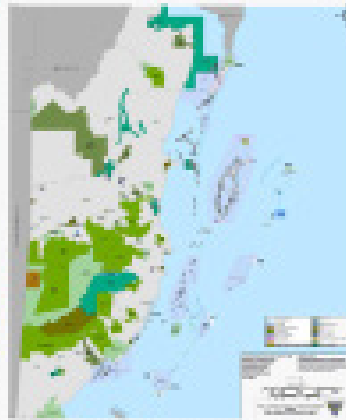
Map customisation based on
CLIENT SPECIFICATION

Framed/ Non- Framed
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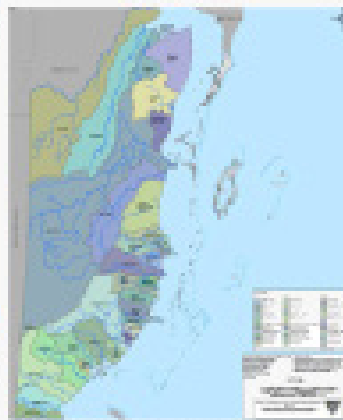
**NO DELIVERY AT THIS
TIME**



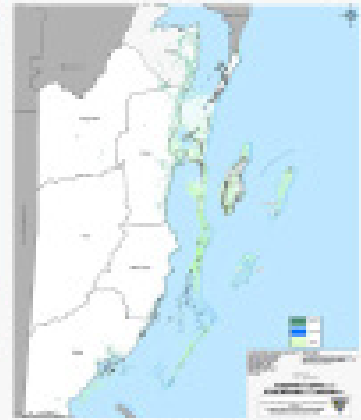
Baseline Map of Belize



Protected Areas of Belize



Watersheds of Belize



Marine Ecosystems of Belize

Printing Prices Only

Type	Size	Area	Per Sq Inch	Total Cost (BZE)
Plain Paper	42 x 36	1512	0.04	\$60.48
	24 x 36	864	0.04	\$34.56
	36 x 48	1728	0.04	\$69.12
	20 x 30	600	0.04	\$24.00
	11 x 17			\$2.50
Type	Size	Area	Per Sq Inch	Total Cost (BZE)
Glossy Paper	42 x 36	1512	0.05	\$75.60
	24 x 36	864	0.05	\$43.20
	36 x 48	1728	0.05	\$86.40
	20 x 30	600	0.05	\$30.00

*** Personalized map creation based on map content is available***

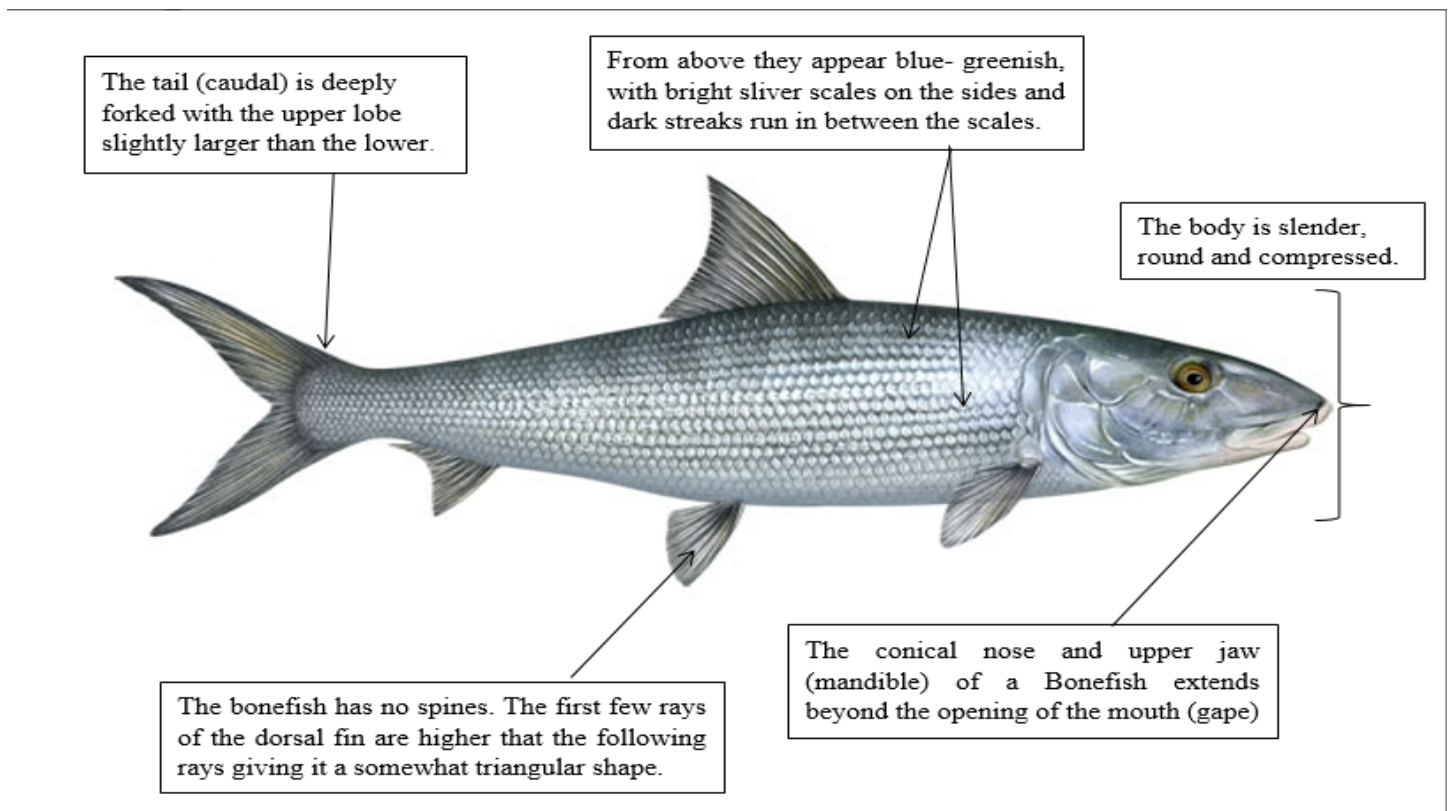


BONEFISH IN BELIZE

By: VICTOR SHO, SPORT FISHING COORDINATOR

Belize is quite famous for its marine diversity and the many offerings it presents to both locals and visitors in terms of recreational activities. One of the many famous offerings is the great fishing experience that can be had in Belize, an experience that is world renowned. Belize's sport fishing industry is built upon both our marine habitats and fish species. Today we will focus on one of fish species that make up the grand slam, the bonefish. The bonefish, commonly known as maccabee in Belize, can live up to 19 years and grow up to 31 inches (Crabtree et al, 1996). Bonefish travel up to 100 miles (round trip) for spawning, but their regular home range is estimated at 1km. Similar to the other sport fishing fish species information of on the bonefish is sparse, however recent research by the Bonefish and Tarpon trust in Belize has shed some light on the bonefish situation in Belize.

Physical Description of the Bonefish



Early mapping efforts by EcoWorks & Green Reef Environmental Institute in 2010 and Stienberg in 2015 coupled with anecdotal information by stakeholders have helped to identify the relative locations of the bone fish populations in Belize. Whilst bonefish can be found along the entire coast, individual pockets exist due to their habitats needs (Murchie et al, 2015). Bonefish transition between various habitat types throughout their life cycle. The combination of these habitat types are typically referred to as the habitat mosaic, the bonefish population heavily relied on the connectiveness of the habitat mosaic in order for the population to be healthy. After spawning, bonefish larvae depend on natural ocean currents to carry them to mangrove roots which offered shelter from heavy wave action, predators and provided access to nutrients. In their juvenile stage, bonefish then migrate from the mangrove roots to seagrass beds which offered bigger prey and shelter from predators. During adulthood the bonefish migrate to open sandy/muddy flats, they form large schools of up to 300 individuals that run up and down the coast. Adult bonefish have an estimated home range of 1km, however during spawning they are known to travel up to 100 miles (round trip) to form large spawning aggregations (DanylChuk et al, 2011).

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According to a recent study by Dr. Perez (2019) the bonefish pockets within the norther of Belize around the San Pedro area migrate and intermingle with bonefish groups within the south of Mexico. This has revealed that Belize's bonefish stocks are shared with Mexico which have implications on the management of this fish stock. This means that similar to pelagic fish species, it will take trans-boundary management to properly management and protect the bonefish species. Anecdotal information has indicated that the bonefish population is currently on a decline, this decline is attributed to a number of reasons such as illegal poaching of the protected species, destructive fishing techniques such as gill nets, unplanned coastal development and dredging activities. Both stakeholders and researchers have identified that utilizing the grand slam as umbrella species maybe an appropriate management strategy to help protect both the environment and the industry.

CZMAI continues to work with both research organization and stakeholders to fill existing data gaps on the bonefish fish species and identify realistic and practical management strategies that can be put in place to allow for continued sustainable growth of the industry.

References:

Crabtree R.E., Harnden C.W., Snodgrass D., Stevens C. (1996). Age, growth and mortality of bonefish, *Albula vulpes*, from the waters of Florida Keys. Florida Marine Research Institute, Department of Environmental Protection, 100 Eight Avenue SE.

Danylchuk A.J., Cooke S.J., Goldberg T.L., Suski C.D., Murchie K.J., Danylchuk S.E., Shultz A.D., Haak C.R., Brooks E.J., Oronti A., Koppelman J.B., Philipp D.P. (2011). Aggregations and offshore movements as indicators of spawning activity of bonefish (*Albula vulpes*) in the Bahamas. *Marine Biology* (2011) 158:1981-1999. DOI 10.1007/s00227-011-1707-6

Ecoworks & Green Reef Environmental Institute (2010). Sport Fish Distribution and Conservation in Belize.

Murchie K.J., Shultz A.D., Stein J.A., Cooke S.J., Lewis J., Franklin J., Vincent G., Brooks E.J., Claussen J.E. and Philipp D.P. (2015) Defining adult bonefish (*Albula vulpes*) movement Corridors around Grand Bahama in the Bahamian Archipelago. *Environmental Biology Fish* (2014) 98:2203-2212, DOI 10.1007/s10641-015-0422-4

Perez A.U. (2019). Connectivity mediated by seasonal bonefish (*Albula vulpes*) migration between the Caribbean Sea and a tropical estuary of Belize and Mexico. *Environmental Biology of Fishes* (2019) 102:197-207. DOI 10.1007/s10641-018-0834-z

Stienberg M. (2015). A nationwide assessment of threats to bonefish, tarpon and permit stocks and habitat in Belize. *Environmental Biology Fish* (2015) 98:2277-2285 DOI 10.1007/s10641-015-0429-x



Goff's Caye

Palapa Area



Changing & Restroom



Public Grill



Pier



FOR MORE INFO CONTACT US AT TEL: 223-5739/0719 || Email: info@coastalzonebelize.org || WEBSITE: www.coastalzonebelize.org

THIS IS GOFF'S CAYE, EXPERIENCE IT!

BY: ARIESE BRICENO, MARKETING ASSISTANT

Goff's Caye may not be the grandest island in the Caribbean Sea but where it may lack in size it certainly makes up with its rustic and quaint charm. Its crystal-clear blue waters, white sandy beach, and easily accessible reefs remain a true haven for sunbathers and snorkelers. The year 2020 has seen the downfall of many businesses and communities, and the devastation continued with the back-to-back hits from Tropical storms, depressions, and the ongoing COVID-19 pandemic. But through it all our beautiful Goff's Caye still stands. As our country re-opens and attempts to come to terms with the new NORMAL, so must tourism sites such as Goff's Caye. One of the many obstacles but certainly the most important one faced while re-opening the island was that we now had to qualify as a Gold Standard Certified site by the Belize Tourism Board. It was no easy task, but our dedicated staff buckled down and got the relevant Covid-19 safety trainings. CZMAI's management ensured that Goff's Caye staff were equipped with all the necessary safety gear and certainly made all the health and safety improvements needed so that the Goff's Caye experience could continue. After long months of repairing damages sustained from storms and the installation of social distancing signs and sanitizing stations we can now say Goff's Caye is more than ready for visitors both local and foreign and even prouder to say we are GOLD STANDARD CERTIFIED!



BELIZE COASTAL ZONE
CAYE MANAGER
TOURISM ASSISTANT

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Island Capacity: 2 groups of 10 per day or 20 (persons- not inclusive of island staff and tour operators)

One Week Notice in advance is required!

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COASTAL PLANNING AND MONITORING UNIT UPDATE

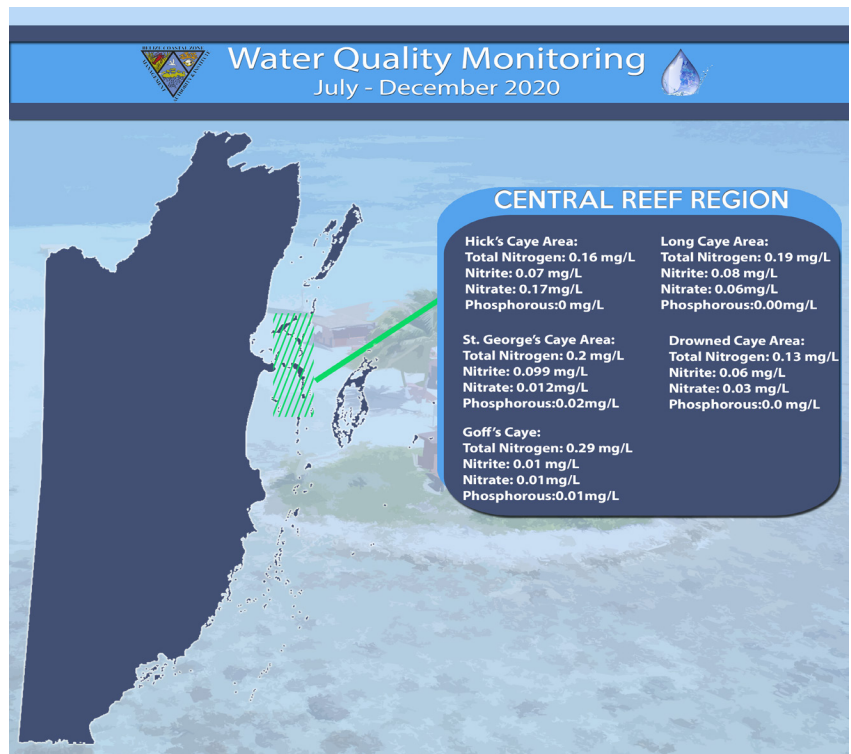
By: SAMIR ROSADO, COASTAL PLANNER

Water Quality Monitoring

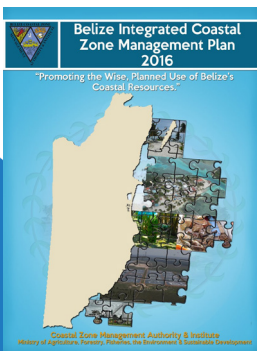
The activities of the Water Quality Monitoring Unit was severely affected by the COVID-19 pandemic during the period of July to December. This was due to both a significant reduction in financial resources necessary to conduct monitoring activities as well as the health restrictions put in place. As a result, monitoring during this period was opportunistic and restricted only to reef areas.. This was done in order to reduce potential exposure of the unit staff to COVID-19. Therefore there was no Central Coast samples collected during this time period.

One of the major focus of the Unit during the time period of July to December was the BECOL Compliance Monitoring Programme and the maintenance of the Ocean Acidification Kit. Despite all the limitations the WQM unit was still able to fulfill its obligations related to these projects. As such the unit conducted its regular two week sample trips related to BECOL compliance monitoring in June, August, October, and December. Additionally, all deliverables were submitted as required.

Despite setbacks, below is a summary of the data collected by the CZMAI staff from within the Central Coastal Region during this time period.



Coastal Planning Unit




The start of 2020 signalled the beginning of the Revision period for the Belize ICZM Plan 2016. This is because with the CZMAI parent act, The Coastal Zone Management Act 1998, calls for the revision of the Plan every four years. Therefore the CZMAI Coastal Planning Unit has been focusing efforts on the revision process. In line with this, the unit had began to reassemble Coastal Advisory Committees (CAC) in each of the nine planning regions throughout Belize. When the effort started, the unit was able to host in person meetings with the various stakeholders. However, as a result of restrictions related to the COVID-19 pandemic, the unit was forced to look to virtual platforms in order to host meetings and collect the information necessary to update the plan. This took the form of Zoom meetings with CACs hosted by the CZMAI.

The unit was successful in carrying out one meeting with all nine CACs. However, as time passed the unit noticed that attendance had dwindled, which could be explained by the urgent need for all stakeholders to figure out a way to address their financial needs in light of the pandemic, which has crippled the Belizean economy. Nevertheless, the unit had to remain innovative in its approach and looked to other virtual platforms to get the information. Additionally the Unit decided to alter its approach to the revision process which would see the unit doing most of the heavy lifting with regard to the editing and revision of the Plan and fewer more targeted meetings would be held with CACs.



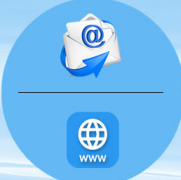
This approach would allow the unit to complete a first draft within the timeframe envisioned and would reduce the burden of an excessive amount of meetings during this difficult time. One of the substitutes for in person meetings being utilized to receive spatial information from stakeholders is the MURAL platform. MURAL is an online collaborative platform that will allow the unit to receive spatial information from stakeholders. As a result the unit will be able to feed the information collected into the process of revising the zoning schemes within the Plan. Using the approach mentioned, the Unit will continue to make stride towards the completion of the revision process by the end of 2021.



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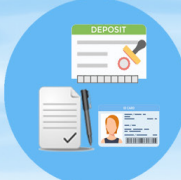
Step 1



Application

Send an email or call to request a Sport Fishing License application form and Bank details for payment or visit our website to purchase from our online portal @coastalzonebelize.org


Step 2



Submission

Submit completed application form along with Belize passport/ Proof of permanent residency / ID card and a deposit slip as proof of payment.

Step 3



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CZMAI'S ADVANCEMENTS IN GIS

By: DELWIN GUEVARA, GIS TECHNICIAN

Over the years, there have been many advancements in the realm of Geographic Information Systems (GIS) and spatial information. With this fast-paced increase in technology and the availability of data, the Coastal and Marine Data Center at Coastal Zone Management Authority and Institutes (CZMAI) has not been left behind. In the past when the organization was established in 1992, floppy disks and CD's were the norm. Then, CZMAI was the second government agency to utilize GIS in Belize. At that time, there was very little data management practices in place, and datasets were digitized from maps by hand using a digitizing table (See Figure 1).

CZMAI now has an array of contemporary tools and techniques used by the Data Center, such as using the current GIS software, to using apps, tablets, mobile devices, to online GIS analysis and everything in between. The new growing field of Drone Mapping technology has been used by CZMAI to gather high quality drone imagery from coastal communities and cayes to gather baseline information to determine development extent and land use practices within the coastal zone.

As CZMAI continues to explore new techniques to monitor Belize's coastal resources, it is now undertaking a project which will utilize new methods such as Artificial Intelligence (AI), Machine learning and cloud computing. The project which is funded by Microsoft's AI for Earth program and the Group on Earth Observations Biodiversity Observation Network (GEO BON) Secretariat will utilize these machine learning techniques along with GIS for the mapping of the ecosystem extent, and fragmentation of Belize's coastal and marine ecosystems. AI and Machine learning is rapidly growing and its intersection with GIS has created several opportunities for research and monitoring. These methods have been key components of spatial analysis to solve problems in classification, clustering and mapping. CZMAI will continue to use these emerging technologies for efficiency in conducting monitoring and research of Belize's coastal resources.

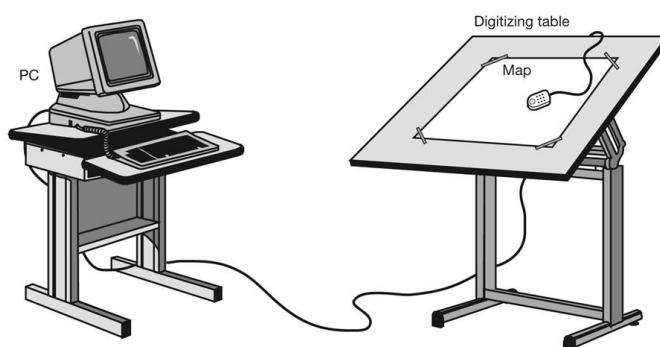


Figure 1: Digitizing table.

sources:

ESRI News Room

<https://www.esri.com/about/newsroom/page/2/?s=AI>

Deep Learning + GIS=Opportunity

<https://www.esri.com/about/newsroom/arcuser/deep-learning/>

HOW AI and Location Intelligence Can Drive Business Growth

<https://www.esri.com/about/newsroom/podcast/ai-and-location-will-drive-tomorrows-digital-transformations/>

Where Deep Learning Meets GIS

<https://www.esri.com/about/newsroom/arcwatch/where-deep-learning-meets-gis/>

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Coastal Zone Management Authority and Institute



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Amenities:

- * PA systems
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CZMAI's OCEAN ACIDIFICATION KIT (UPDATE)

BY: GILBERT ANDREWS,

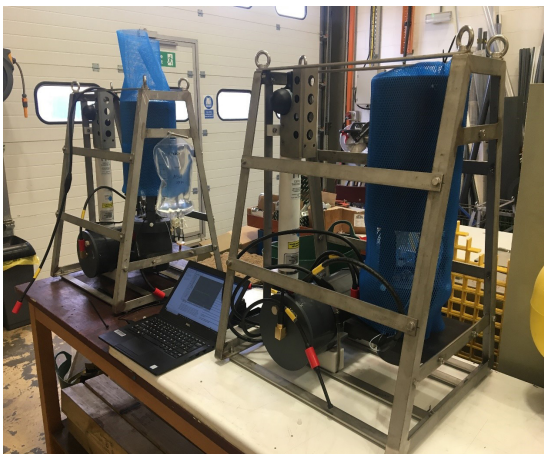
In late 2019, CZMAI's Water Quality Unit received an ocean acidification kit through collaboration with the National Oceanography Centre. After its installation, CZMAI became responsible for maintaining the device. Also, CZMAI is to conduct visits to collect data from the device. In December 2020, the Water Quality Unit retrieved the kit from the ocean to conduct the data collection. The kit is comprised of a stainless steel frame that houses a spectrophotometric pH sensor, a SEA-BIRD Electronics 37 SMP ODO conductivity (and salinity), temperature and dissolved oxygen sensor, a battery pack and a communications hub, an Iridium satellite telemetry unit with a 25 m length cable.

One of the main device on the kit, SBE 37-SMP-ODO MicroCAT C-T-ODO (P) Recorder that store Conductivity, Temperature, Optical Dissolved Oxygen (pressure optional) Recorder with RS-232 Interface & integral Pump had malfunctioned so that particular device had been remove from the ocean acidification kit and currently has been shipped to the United Kingdom for further diagnosis.

The MicroCAT has three basic sampling modes for obtaining data:

- Polled Sampling – On command, the MicroCAT runs the pump, takes one sample, and transmits data.
- Autonomous Sampling – At pre-programmed intervals, the MicroCAT wakes up, runs the pump, samples, stores data in memory, and goes to sleep. Data is transmitted real-time if TxRealTime=Y.
- Serial Line Synchronization – In response to a pulse on the serial line, the MicroCAT wakes up, runs the pump, samples, stores data in memory, and goes to sleep. Data is transmitted real-time if TxRealTime=Y.

The ocean acidification kit is benefitting Belize greatly as it monitors the increasing acidity of our ocean. This increase in acidity is caused by the increase in atmospheric CO₂ primarily from human fossil fuel combustion. Consequently this reduces ocean pH and causes shifts in seawater carbonate chemistry. Ocean acidification threatens many marine organisms that form shells and skeletons from calcium carbonate. After monitoring the seasonal results from the ocean acidification kit CZMAI will be in a better position to advise policy makers. CZMAI's has a mandate to ensure that natural resources are used in a sustainable manner for future generation.



To date, CZMAi has successfully downloaded 5 major datasets from the OA Kit. It was expected that the battery pack that came with the OA kit had the ability to power the device for two month intervals. However, to date the maximum battery life was only one month. This would mean that CZMAI would need to conduct twice as many trips to recover and download the data. However, as a result of very limited resources, the unit has only capable of retrieving the device a maximum of once per quarter. Therefore each data set only covers one month per quarter.

Outside of the near regularized service periods established, CZMAI has had to retrieve the device in times of extreme weather events. This is to avoid a total loss of the device in the event of a storm surge or any other type of catastrophic failures that may occur due to extreme weather. However, it seems that regular conditions to date have taken a toll on the device itself.

...Cont'd on Page 15

As is expected with any piece of equipment that is left at on the sea bed for any extended period of time, biofouling had become a major issue. Organisms did not miss the opportunity to call the OA kit home and as a result in many instances the entire kit was overrun by algae, casings, and even small crabs which made mainenance difficult and eventually affected the accuracy of the data.



Besides the threats from organisms, the environment itself posed significant problems for the kit during this last year of deployment. Firstly, the satellite unit cable was severed due to extreme chaffing as a result of the choppy conditions in the area. This satellite unit is attached to the main device but is tethered above the surface of the water by a buoy or float. However, the constant motion caused the cable to break and thus the unit was no longer able to access the real time data via the online portal. The CZMAI has since been in contact with the team at the UK National Oceanography Center and to date the CTD has been sent to the manufacturer for servicing and repairs and the OA Kit has been cleaned and serviced. Once the CTD is returned the unit will redeploy and continue to collect this very valuable dataset.



CZMAI IS AT THE CORE OF FORGING A SUSTAINABLE BLUE ECONOMY FOR BELIZE

By: CHANTALLE SAMUELS, CHIEF EXECUTIVE OFFICER

The term “blue economy” first emerged as part of the United Nations Conference on Sustainable Development in Rio (Rio+20) in 2012, and the concept was pioneered by Small Island Developing States (SIDS), whose economies and cultures are highly dependent on ocean resources. It is an approach to sustainable economic development that depends on healthy marine ecosystems and environmental sustainability in order to bolster robust maritime economies and improved livelihoods. In light of the adverse impacts of climate change on the marine ecosystems and economies of vulnerable countries like Belize, the Blue Economy is important for survival and resilience-building. A sustainable approach to the Blue Economy model for development offers the promise of food security, livelihood diversification opportunities, poverty reduction; sustainable economic growth and development. Given the role of marine and coastal ecosystems as a climate regulator, protection under a Blue Economy regime could yield important co-benefits such as disaster risk reduction, and climate change mitigation and adaptation.

The Blue Economy model is not new to Belize, and the country has already been implementing key components of such a model. Additionally, Belize has some of the required legal, policy and institutional frameworks in place that serve as important building blocks to forge the way forward for the Blue Economy mandate. Given that CZMAI’s mandate is focused on the sustainable use and management of coastal resources using evidence-based information to inform relevant public policies, it is one of the key institutions at the core of forging and informing the future pathway of Belize’s Blue Economy.

Integrated coastal zone management is an important pillar of the Blue Economy model. In 2016, the Government of Belize approved the country’s first national integrated coastal zone management plan, inclusive of an explicit ecosystem-based marine spatial plan (MSP). The ICZM Plan, developed and implemented by CZMAI and key agencies and partners, serves as the overall framework to guide decisions and lead actions on the sustainable use and development of resources within the coastal zone in the short and long term. The Belize Fisheries Department is also another key institution at the core of the new and innovative Blue Economy Model for Belize. Both CZMAI and the Fisheries Department are currently under the Blue Economy portfolio of the new Ministry of the Blue Economy and Civil Aviation that was formally constituted in November 2020. Furthermore, CZMAI and the Fisheries Department, along with a multi-sectoral advisory body known as “The Blue Economy Cluster” will provide high-level guidance and direction to the Ministry during the initial stages of establishing a framework for implementing a sustainable Blue Economy for Belize.



It is to be noted that even though CZMAI is assigned to the Blue Economy portfolio of the new Ministry, its mandate is also aligned to the broader sustainable development mandate. As such, CZMAI will work closely as well with the Ministry of Sustainable Development, Climate Change and Disaster Risk Reduction.

CZMAI meets with the Ministry of the Blue Economy and Civil Aviation on November 26, 2020

Image (L-R): Minister Hon. Andre Perez; Chief Executive Officer Ms. Kennedy Carrillo (in black blazer), Ms. Manuela Lue (CZMAI's Finance and Operations Manager), Mrs. Arlene Young (CZMAI's Director), Mrs. Chantalle Samuels, CZMAI's Chief Executive Officer



CZMAI meets with Minister Hon. Orlando Habet of the Ministry of Sustainable Development, Climate Change and Disaster Risk Management on November 18, 2020



VIRTUAL COASTAL AWARENESS WEEK 2020

By: SAMIR ROSADO, COASTAL PLANNER,



The Coastal Zone Management Authority and Institute (CZMAI), in its mission to support the allocation, sustainable use and planned development of Belize's coastal resources through increased knowledge and the building of alliances will be hosted its 6th Annual Coastal Awareness Week (CAW 2020) under the theme **“Back to Nature: Investing in Natural Capital for the Recovery of Livelihoods and Environmental Health.”** The week of events took place from Monday, October 26th to Friday, October 30th, 2020. In light of the global COVID-19 pandemic, CZMAI hosted all of this year's events virtually in order to be compliant with the current social distancing requirements and to keep all our valued stakeholders safe. Since events were confined to a virtual platform, the staff at the CZMAI was forced to be innovative in order to host activities that

would be fun and engaging for the general public while at the same time accomplish the mission of spreading awareness on how we, as Belizeans, can protect and sustain our marine resources. The staff understood that it would be very hard to replace our mainstay set of activities which included the Primary School Trivia Competition and The Run for the Coast, however we strongly believe that this year's events were good placeholders.

SCHEDULE OF EVENTS			
MONDAY 26	Virtual Opening / Media Rounds CZMAI Facebook Page 7:00 a.m. - 9:00 a.m.	Coastal Awareness Virtual Trivia Competition CZMAI Facebook Page 9:00 a.m. ~ 4:00 p.m.	TUESDAY 27
WEDNESDAY 28	Primary School Poster Competition Announcement of Winner @ 10 a.m. (FB Page)	Secondary School Essay Competition Announcement of Winner @ 10 a.m. (FB Page)	THURSDAY 29
		Closing/ Virtual Fun Night Live on CZMAI Facebook 7:00 p.m. ~ 9:00 p.m.	FRIDAY 30

Virtual Opening/Media Rounds

To kick off this year's week of events the CZMAI had virtual opening/media rounds to promote the week of events. CZMAI staff were featured on two morning television shows including Channel 5's Open Your Eyes and Love FM's The Morning Show. These media rounds allowed the CZMAI staff to promote the week of events while also establishing the link between the events being hosted and the importance of recognizing the need for sustainable use and management of our coastal resources. We believe that following these interviews listeners had a clear sense of what the CZMAI was trying to accomplish during the week and as well what activities would take place.

Coastal Awareness Week Virtual Trivia Competition:

Our first event of the week was the Coastal Awareness Week Virtual Trivia Competition. Everyday, CZMAI staff posted a trivia question pertaining to some aspect of the coastal zone and coastal resources on the CZMAI facebook page. The first person to answer the question correctly won a prize which varied from a CZMAI gift package to a grand prize of tablet with keyboard courtesy of Fultec Systems.

Primary School Poster Competition

In celebrating CAW 2020, CZMAI hosted a Posted Competition of primary school student in Standards 4,5 & 6. Students were asked to create a poster with their interpretation of this year's theme. All submissions were to be hand painted or drawn, however students were to submit digital image of the poster along with a short paragraph explaining their poster and how it showcases the theme. Posters were then judged by a panel and scored based on originality, creativity, clarity and interpretation. CZMAI received 17 submission, however there could only be three winners. The winners of the competition and their posters were:



**Coastal Awareness Week 2020
Poster Competition**

Congratulations Winner

STD 6- Zanely Chun- 1st Place
from St. Benedict Primary School, Toledo District

STD 4- Karona Gibson- 2nd Place
from St. Benedict Primary School, Toledo District

STD 6- Kenon Gill- 3rd Place
from St. Benedict Primary School, Toledo District

Each winner receives:

First Place **Second Place** **Third Place**

We thank all students for participating in our Coastal Awareness Week 2020 secondary school Essay competition



1st Place



2nd Place



3rd Place

Secondary School Essay Competition

CZMAI hosted a Secondary School Essay Competition which was open to all High School level students in Belize. For this competition, students were asked to write a 400 word essay reflecting on the theme and what it means to them. Essays were judged by panel and scored based on word count, interpretation of the theme, organization, originality and Grammar, Usage Mechanics. In total CZMAI received 42 entries and from those entries the follow were the winners of this year's competition and their prizes:



**Coastal Awareness Week 2020
Essay Competition**

Congratulations Winner

1st Place- Florencio Moa
from Escuela Secundaria Técnica México, Corozal District (First Form)

2nd Place- Roselyn Peck
from Saint Catherine Academy, Belize City (Third Form)

3rd Place- Hector Rene Sabido Jr.
from Corozal Community College, Belize City (First Form)

Each winner receives:

First Place **Second Place** **Third Place**

We thank all students for participating in our Coastal Awareness Week 2020 secondary school Essay competition

Closing/Virtual Fun Night



To close off this very unique version of CAW, CZMAI decided to end the week with a bang by hosting its first Virtual Fun Night. This event was coupled with a video competition that took place throughout the week, in which CZMAI asked NGO partners to submit videos showcasing how their work and how it was being done in light of the global pandemic. The videos were then showcased as a part of the Virtual Fun Night. The Fun Night itself featured live music by DJ Sambo and DJ Smurf and was hosted by DJ Khris. There were live raffles and through the programme CZMAI took a trip down memory lane with a collage of photographs for past CAWs. Additionally, CZMAI took the opportunity to celebrate the winners of the various competitions that occurred this year and of course showcased all the posters and videos received. The Fun Night was shown live on Facebook, Sector 9 app, and on the TCN Station. As previously mentioned,

videos submissions from the Video Competition were shown during the Fun Night. However, there was only one winner selected. After judging, the following was the winner of this year's video competition:



Sponsors:

The Management and Staff of the CZMAI would like to thank all the sponsors of this year's CAW. It is not lost upon us of the financial hardships being experienced globally as a result of the COVID-19 pandemic. Therefore we were extremely grateful for all of your kind donations that contributed to the success of CAW. Therefore we would like to thank:

- Integrated Ridge to Reef Management of the Mesoamerican Reef Ecoregion Project (MAR2R)
- Fultec Systems
- Angelus Press Ltd.
- Sector 9 Studios
- DJ Khris (Studio 196)



Integrated Ridge to Reef Management of the Mesoamerican Reef Ecoregion Project (MAR2R)





VISION

TO BE A GLOBAL CENTRE OF EXCELLENCE IN SUSTAINABLE COASTAL ZONE MANAGEMENT

MISSION STATEMENT

TO LEAD THE SUSTAINABLE USE AND PLANNED DEVELOPMENT OF BELIZE'S COASTAL ZONE.

OUR TEAM

Chantalle Samuels
Arlene Young

Chief Executive Officer
Director

FINANCE, ADMINISTRATIVE, & OPERATIONS STAFF

Manuela Lue
Whitney Requena
Kachiri Flores
Anna Mae Gentle
Jason Ferguson
Ian Banks
[VACANT]
[VACANT]

Finance & Operations Manager
Accounts Clerk
Administrative Clerk
Office Cleaner
Goff's Caye Ranger/Boat Captain
Goff's Caye Assistant
Driver
Goff's Caye Sales Representative

MARKETING

[VACANT]
Ariese Briceno

Marketing Officer
Sales & Marketing Assistant

SPORTFISHING

Victor Sho

Sportfishing Coordinator

GIS DATA MANAGEMENT

Andria Rosado
Delwin Guevara

Data Manager
GIS Technician

COASTAL PLANNING & MONITORING

Samir Rosado
[VACANT]
Gilbert Andrews
Kent Garbutt

Coastal Planner
Coastal Planning Technician
Water Quality and Coastal Monitoring Technician
Water Quality and Coastal Monitoring Boat Captain/ Assistant



Coastal Zone Management
Authority & Institute



Ministry of Blue Economy
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