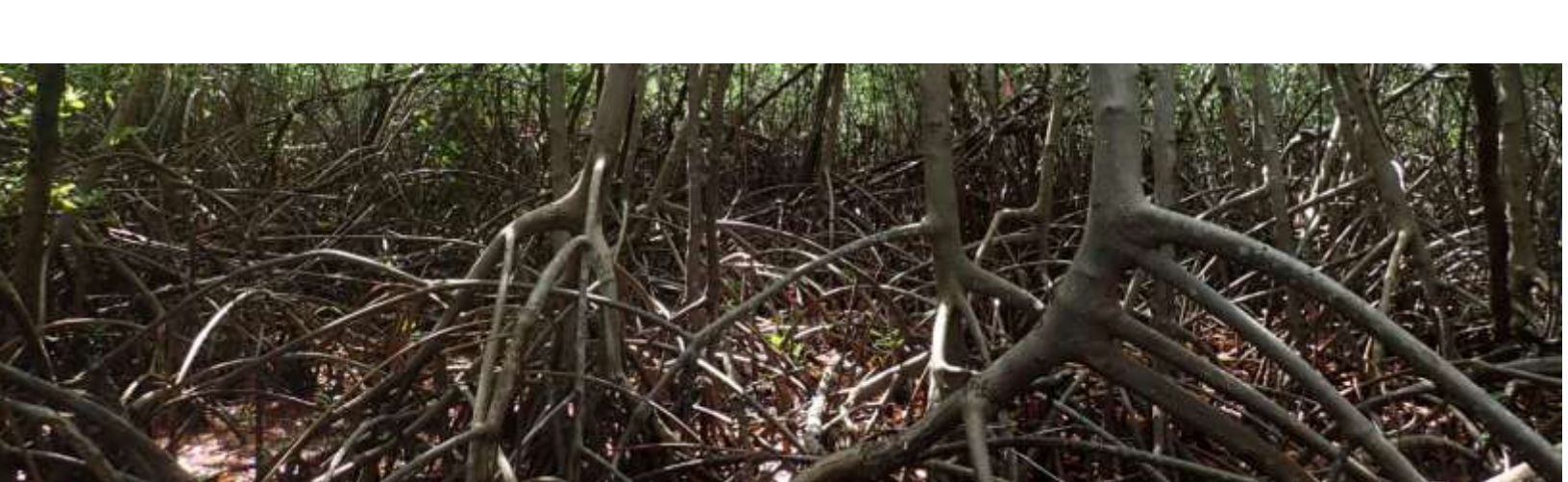




ANNUAL REPORT 2023-2024

James S. Moss Solomon Senior Chair in
Environmental Management

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Source: <https://www.wireconsultants.com/environmental-social-and-governance-esg-framework/>

Background:

The August 2023 to July 2024 period of the GraceKennedy Foundation- James S. Moss Solomon Senior (GKF-JSMSS) Environmental Chair saw Professor Mona Webber transitioning from her role as Director, Centre for Marine Sciences (CMS) to Head, Department of Life Sciences (DLS); the 'parent' department of the CMS. This meant, in addition to continuing her research, the JSMSS was also responsible for a department of 70 academic, ancillary and support staff and 218 students at both graduate and undergraduate levels. While these new responsibilities made this a very challenging year, they also provided new opportunities to give attention to environmental, social and governance (ESG) principles.

The last 12 months has been marked by strategic initiatives that have strengthened the foundation of the JSMSS portfolio for future growth. New activities and accomplishments primarily involved new publications, opportunities to speak both locally and at overseas fora as well as new projects in mangrove and seagrass areas of Jamaica. Recurring activities involved graduate student research projects involving design and deployment of fish aggregating devices towards development of alternatives to reef fishery, increasing the value of mangroves and seagrasses by accurately quantifying their 'blue carbon' stocks, assessing heavy metal contaminants in Kingston Harbour mangroves (sediment and oysters), and determining the effect of increased temperature and reduced pH (climate change effects) on Jamaican coral species.

As head of one of the largest Departments in the Faculty of Science and Technology (FST) that fits within the FST Strategic Framework and ultimately within the Campus and UWI Strategic Plan, the GKF-JSMSS chair has had increased opportunities to practice governance. We have had to give focus to the mission, vision and strategic objectives of the UWI 2022 - 2027 plan, the strategic objectives of the Mona Campus and FST so as to guide the DLS to recognize its position and realize its contribution via specific and unique areas. Over the year, the JSMSS Chair has had to use monitoring and evaluation systems to ensure goals are being achieved and progress is clearly indicated, or lack thereof, so there can be adjustment. Applying governance principles in Life Sciences has helped ensure that there is contribution to the overall mission of the UWI.

The headship of Life Sciences has also facilitated wider social involvement. In previous years social involvement of the GKF-JSMSS chair has included working with fishers and other community groups to achieve environmental sustainability. Previous achievements in this regard involved creating, training and evaluating mangrove wardens (KHEAM project) and employing and training fishers around the KH who became solid waste collectors (KFTL Refuge Cay clean-up project). Social intervention now also involves strategies that help create a caring, accountable, motivated and professional (CAMP) staff; which is also one of the UWI's strategic objectives. This has involved ensuring recognition for Technical and Service staff on their special day (that the JSMSS chair first developed in 2019 when as Deputy Dean of the FST), ensuring recognition of staff and their families during special times of the year e.g. Christmas season and at back-to-school 'season', and encouraging and participating in departmental fora and sporting activities. Other activities that cater to the needs of staff and students include the recognition of high achieving students by facilitating their induction into the DLS Honour Society, managing the Internship course for final year DLS students and mentoring young ladies from high school who are part of the University of the West Indies (UWI), Bethel Baptist Church (BBC) Youth Summer Employment Programme.

Overall the GKF-JSMSS chair has conducted environmental sustainability activities for **229 persons** including Interns (26), Graduate students (8), CMS/DBML staff (4), Honor students (14), national and international audiences at workshops and meetings (177). Furthermore through governance of Life Sciences and social interventions within and between departments another **248 persons** have benefitted; **totaling 477 persons** for the 2023/24 reporting period.

This report will be divided into the three main sections (listed below) as we seek this year to emphasize alignment to **social** outreach and effective **governance** along with our usual focus of **environmental** stewardship. The report sections are:

1. Research Activity and Achievements in New and Continuing Areas (ongoing graduate research and new project development)
2. Workshops, Seminars and Publications (sharing research with wide audiences)
3. Social Interventions- Student and Staff Development

1. Environmental Research Activity and Achievements

Several on-going MPhil and PhD projects were brought to significant milestones or transitioned to higher levels during the reporting period.

1.1 MPhil project by Mr. Jonathan Morris that explores the efficacy of moored fish aggregating devices (mFADs) deployed on the south coast of Jamaica has completed two years of data collection, through JSMSS funding to support field-work.

Data collection, that entailed a series of SCUBA and free dives (Figure 1) along with experimental fishing (Figure 2), has been completed. Data analysis is currently being done and preliminary results show that mFADs have successfully attracted fish, resulting in higher numbers around FADs than at the control sites (similar area without FADs). It was also found that the median fish abundance per sample day per site was higher for Black River mFADs than for the mFADs at Port Royal Cays (Figure 3 below).



Figure 1. Jonathan Morris collecting fish data from the mFAD. Picture Credit- Robyn Young.



Figure 2. Left- Experimental trolling; Right- Fish landed by J. Morris. Picture credits- M. Webber and D. Morris, respectively.

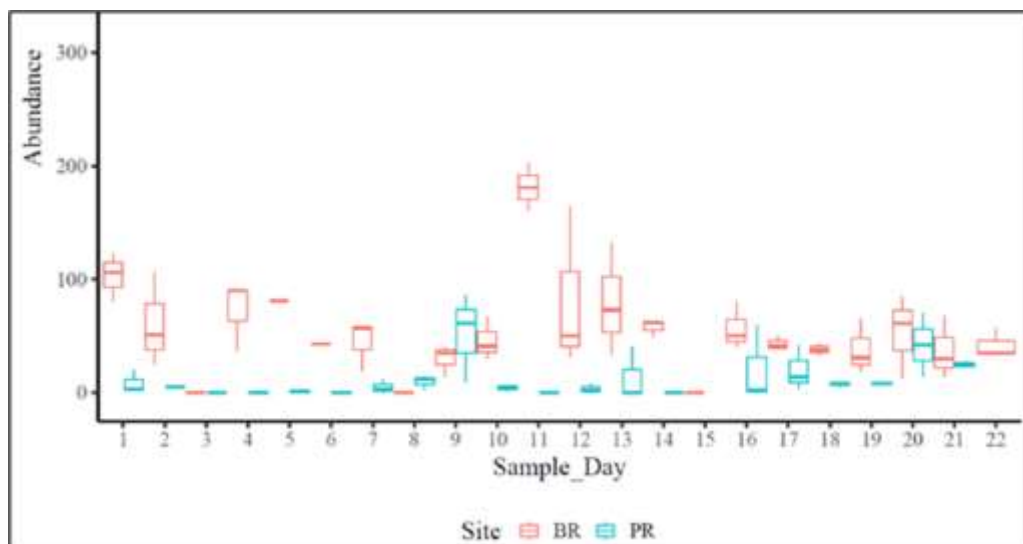


Figure 3. Median fish abundance per site (Black River in orange; Port Royal Cays in green), per sample day over the two years of sampling. J. Morris thesis results.

1.2 PhD project being conducted by Mr. Hugh Small investigating the effect of shading on seagrasses and how this can be mitigated has completed experimentation that involved deploying different degrees of shading to seagrass beds to measure the structural and physiological response. See composite Figure 4 below. Equipment and supplies for these experiments were procured using the GKF-JSMSS funds.



Figure 4. Seagrass shading experimental cage (left) over an area dominated by *Thalassia* (right). Picture credits- H. Small.

1.3. MPhil project on Mangrove Blue Carbon in the Kingston Harbour mangroves being conducted by Ms. Patrice Francis was successfully upgraded to a PhD, which gave greater focus on mangrove blue carbon but with comparison of undisturbed and restored mangroves across Jamaica. This research will indicate the rate of return of carbon stocks after restoration and will seek to employ drone and satellite imagery to sample above-ground forest parameters, development of new allometric equations to accurately indicate tree biomass and more accurate determination of ground and stored carbon using a specialized corer (Figure 5) as prescribed by the IPCC methods manual. This device was purchased using GKF-JSMSS funds.



Figure 5. Mangrove forest sampling for above and below-ground biomass with IPCC prescribed corer (red circle) and inserting the corer. Pictures by D. Webber.

1.4. The GKF-JSMSS funds has supported a PhD project being conducted by Mrs Marcia Creary Ford on the effects of climate change on selected coral species, with focus on pH and temperature changes. In 2023 to 2024 corals globally experienced the worst occurrence of bleaching ever recorded, this combined with other challenges like increased ocean pH and disease occurrence is causing precipitous losses and decline in live coral cover across the Caribbean.

Ocean acidification (OA) is the ongoing decline in the ocean pH, caused primarily by uptake of excess carbon dioxide. OA is of major concern for marine ecosystems because the changes taking place affect a wide range of species including coral reefs. When OA is combined with increased sea surface temperature, the results are expected to be disastrous for corals and their associated biodiversity especially when disease and algal overgrowth are added. E.g. Figure 6 below.

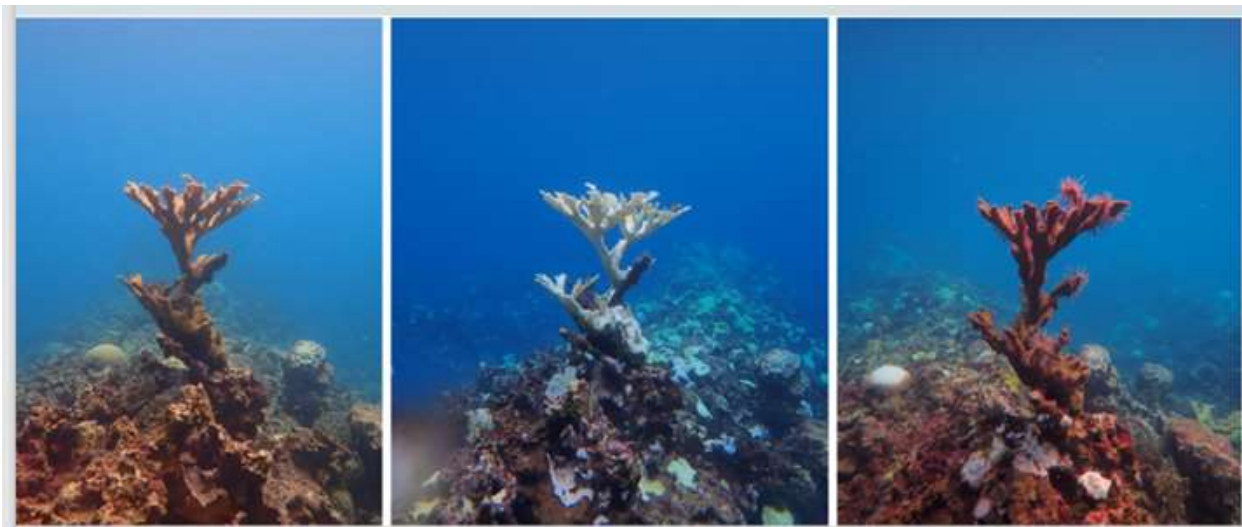


Figure 6. Stages of the coral decline after increased sea surface temperatures. In the last frame the coral is diseased and overgrown by algae. Pictures from Ocho Rios Marine park by Chilon McNally.

Experiments were therefore established (Figure 7) to document the growth and survival of coral, as well as the demise of coral fragments under different treatments of pH and temperature as were expected to occur at the turn of the century. Treatments were as shown in Table 1.

Table 1. OA and temperature experimental treatments.

Treatment	Temp. °C	pH
Control – ambient temperature and pH	28	8.1
Treatment 1– increased temperature and ambient pH	31	8.1
Treatment 2–ambient temperature and decreased pH	28	7.6
Treatment 3 – increased temperature and decreased pH	31	7.6

Weekly measurement of weight increase (calcification and tissue growth) under different pH and temperature regimes were conducted on selected coral species (*Undaria (Agaricia) agaricites*, *Porites porities* and *Porites asteroides*), which are deemed to have some degree of resilience as they are currently surviving under adverse conditions on the reefs.



Figure 7. Left- Experimental set-up for OA and Temperature experiments, Right- Marcia Creary Ford with her experiments. Picture credits- M. Webber.

1.5. MPhil project on microplastics in Kingston harbour (water column, sediments and oysters) that was reported on last year has transitioned to looking at heavy metal contamination in the systems and oysters with a view to demonstrate if bioaccumulation is occurring. This switch was due to the student running out of time and the lack of the device needed to assess nano-plastics which is the size range at which oysters would feed and bioaccumulate.

Nevertheless, another important milestone in microplastic research has been achieved using the GKF-JSMSS funds to procure the necessary spectral library (KIMW) for the FTIR microscope and processor (Figure 8). The KIMW library includes more than 1000 high-quality spectra with over 160 different polymers (types of plastics), as well as 150 spectra of additives. The quality of the spectra and the available meta-information for each spectrum are exactly what is needed to characterize and identify the microplastics collected from beaches and surface waters around Jamaica. This library was procured for 4211 euros (J\$704k) using GKF-JSMSS funds.

Furthermore, the launch of national and regional plastics projects, such as the NUTEC projects this year, coupled with the involvement of a PhD student poised to benefit from FTIR analysis, underscores the instrument's pivotal role within CMS initiatives. Looking ahead, the years 2024-2027 hold significant promise for the FTIR to contribute valuable data to our ongoing and future projects, reflecting our team's resilience and unwavering dedication to scientific progress.

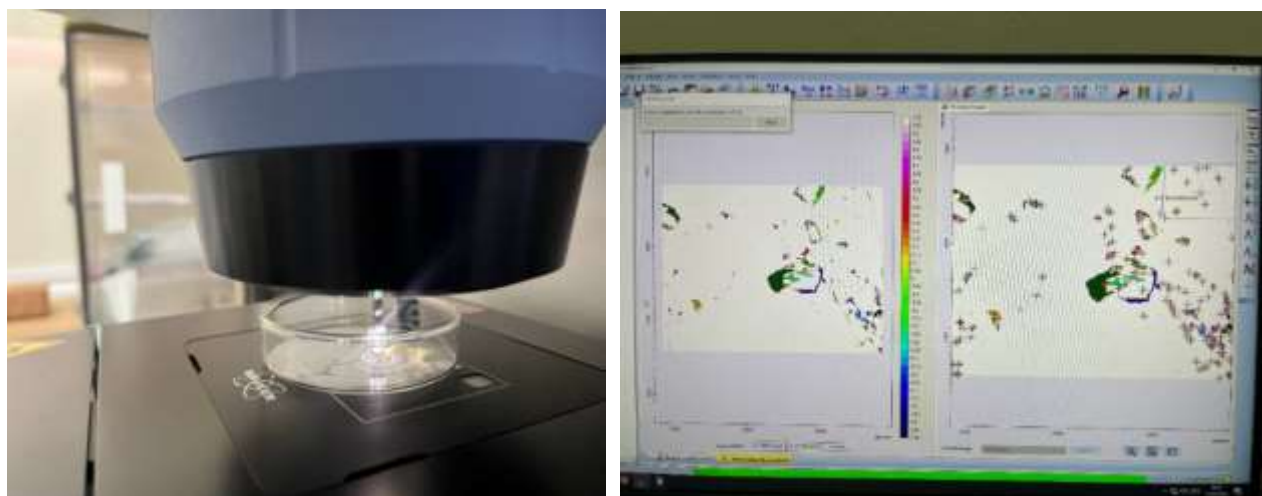


Figure 8. Bruker Lumos II FTIR-ATR being used to identify possible microplastics of different polymer types (**left**) and spectral measurement of the particles sampled. Each color indicates a unique type of polymer (**right**). Photo credits: J. Williams

Other graduate students in Life Sciences benefiting from the GKF-JSMSS funds include a forensic entomology researcher who is using flesh-eating flies to indicate time and place of death. Molecular analysis of different species was made possible using blood and tissue DNA kits procured using GKF-JSMSS funds.

The GKF-JSMSS Chair has also been involved in numerous non-graduate student projects that involved **partnership with other universities** (Florida Atlantic University- FAU- Harbor Branch Oceanographic Institute- HBOI, Florida International University (FIU) Seagrass lab and PEW Charitable Trust and the Nature Conservancy- TNC). These partnerships led to the establishment of a Mobile Queen Conch Laboratory (located at the DBML) with expertise and funding from Dr Megan Davis (FAU-HBOI), Involvement of Jamaica in the Caribbean-wide carbon assessment for seagrasses (CariCAS) project led by FIU's, James Fourqurean (CariCAS project PI), and the UWI-PEW-TNC blue carbon project which seeks to assess Jamaica's coastal carbon stocks for inclusion in the NDCs. There were also on-going sargassum projects aimed at public education and use of citizen science to obtain data on sargassum beaching and beach erosion (CoastSnap) with the University of Southampton (Dr Vicky Dominguez Almela).

1.6 CARICAS - Caribbean Carbon Accounting in Seagrass

Seagrass meadows are declining globally and their associated carbon stocks are large enough to be considered in global budgets, making them prime candidates for inclusion in Blue Carbon strategies. Unlike most other ecosystems incorporated into climate change mitigation strategies, seagrasses are included for their existing soil carbon stocks rather than living biomass or current production rates. Sediment carbon stocks associated with seagrass ecosystems vary greatly among sites and are influenced by local seagrass-related features, but also the local geomorphological and hydrological setting.

Seagrass Blue Carbon determination project focused on mapping seagrass because information on carbon density of Caribbean seagrass meadows is surprisingly sparse. This project aimed to:

- 1) build a collaborative network of Caribbean seagrass scientists interested in Blue Carbon and
- 2) outfit local experts from the new network to collect the data from needed to construct inventories of seagrass Blue Carbon to a depth of 1m from as many seagrass sites across the Caribbean (Figure 6) as possible to understand the range, variation, and environmental correlates of seagrass carbon stocks.



Figure 6. CARICAS sites across the Caribbean (from the CariCAS manual, 2023).

These seagrass blue carbon data will be combined with data from an ongoing seagrass mapping effort to generate estimates of the amount of carbon stored in seagrasses across the wider Caribbean and Florida, allowing countries to include conservation of seagrass blue carbon in the Nationally Determined Contributions (NDCs). A regional publication will be generated from the research that will include all countries and all scientists contributing to the research.

The GKF-JSMSS chair and the PRML team therefore conducted seagrass sampling using a 1.5 m perforated corer provided by the CariCAS project. Sites sampled were located in the Palisadoes and Port Royal Protected area and included Kingston Harbour, Drunkenman's Cay and Lime Cay. Figure 8 shows sampling of seagrass beds near the Port Royal Mangroves. This effort will also help to increase the value of seagrasses as important contributors to carbon sequestration and storage, which may help to stem their decline.



Figure 8. Deploying the CARICAS seagrass corer in the beds associated with Kingston Harbour mangroves (Left and Centre). Removing seagrass sediment sub-cores from the specially designed perforated seagrass corer (right).

1.7. UWI-PEW-TNC Project- Advancing understanding of the carbon sequestration role of Jamaica's seagrass and mangroves: Potential for inclusion in Nationally Determined Contribution (NDC).

As signatories to the UN Paris Agreement, Jamaica can include the protection of coastal vegetated systems as part of their commitment to reduce emissions, known as a Nationally Determined Contribution (NDC). However, it is critical for us to quantify our carbon stocks as accurately as possible. These carbon stock assessments begin with the accurate determination of the areal extent of mangrove and seagrass ecosystems.

This project aims to support the enabling conditions for inclusion of mangrove and seagrass ecosystems into Jamaica's NDCs. It is similar to the previous regional seagrass carbon project but focuses on Jamaica's blue carbon stocks (both mangroves and seagrasses). It also hopes to improve knowledge about the country's coastal ecosystems through the following outputs:

1. Develop baseline carbon stock estimate for mangrove and seagrass ecosystems in Jamaica using globally accepted (IPCC) standards
2. Build and utilize local capacity in mangrove and seagrass carbon assessment by training local stakeholders
3. Develop a refined national seagrass map by providing field verification data to TNC

Jamaica to inform the process

The methods employed were based on those developed by the IPCC and were very labor-intensive. Collection and processing of mangrove sediment cores from 1 m below the surface (Figure 9a) was a critical component of this project along with accurate measurement of mangrove tree biomass (Figure 9b).



Figure 9 (a & b) sampling mangrove blue carbon using sediment cores and determination of tree size for biomass determination. Photo credits - M. Webber

1.8 Queen Conch Spawning project and Mobile Queen Conch Lab:

The queen conch is deeply rooted in the way of life for communities across the Caribbean region and is a significant source of earning in the Jamaican fishery. As grazers, they play a key ecological role in nutrient cycling and carbon sequestration in seagrass habitats. Intense fishing pressure and habitat loss have resulted in declining queen conch populations. In 1992, queen conch became a CITES II managed fishery, however, this along with local regulations has not been enough to slow the decline of the species.

The previous NEPA and JCP funded conch project was critical in identifying and documenting the breeding behaviour of Queen conch within Discovery Bay and two other sanctuaries on the north coast. In addition, the previous project allowed for the determination of the temperature associated with spawning and the exact period in which spawning occurred in captivity and the wild to guide the revision/placement of the closed season. Persons have also been trained to work with conch (in situ), inclusive of distinguishing sexes, identifying mating as well as identifying egg masses. See figure 10 below.



Figure 10. Queen conch egg mass and mating conch in enclosures near the DBML. Photo credit- Shanna-Lee Thomas.

The queen conch mobile laboratory project was established through a partnership between the GKF-JSMSS Chair and Dr Megan Davis a world renowned expert in queen conch production. The project started with a joint webinar (Figure 11) held in the Goreau lab at the DBML, which progressed to the signing of an MoU between UWI, FAU-HBOI and Jamaica Conch Project (Sven Lapiner). This new conch project is potentially more effective at enhancing stocks because it involves ‘head-starting’ which has been shown to effectively restore declining populations of several endangered species.

Conch egg masses are collected from the wild, hatched into larvae and taken through their juvenile phases until they are large enough to be released for restocking the wild populations. The ‘head-starting’ increases their chances of survival by supporting the species through critical and vulnerable life stages. Where poaching of adult conch was the single greatest factor impacting the success of the previous project, the hatchery project would have no such a challenge as the focus would be supporting the recruitment of the juvenile.



Figure 11. Joint queen conch webinar (M. Webber & M. Davis) and signing of MoU by D. Webber, M. Davis and S. Lapiner. Picture credits- D. Webber and P. Housen, respectively.

The Queen Conch Lab is a research and education program within the Aquaculture Innovation and Global Food Security Department of the FAU Harbor Branch Oceanographic Institute. The Lab's mission is to grow conch for the longevity of the species, ecosystem and people who depend on the fishery and has successfully developed mobile conch hatcheries and related conch projects in the Bahamas and Puerto Rico in association with community-based organizations/fishing associations. In Jamaica the partners are The UWI's Discovery Bay Marine Laboratory and the Jamaica Conch Project (Sven Lapiner). The partners signed an MoU at the start of the project and continue to work together to achieve the project expected outputs.

Project Expected Achievements

- 1. Establishment of an ex-situ Conch spawning lab to produce/rear conch larvae and hatchlings to serve not only as a facility for boosting the conch population but also for educational/demonstration/teaching and training purposes.*
- 2. The rearing of 1000-1500 juvenile conch from egg mass through their larval stages. With the aim to ultimately release these juveniles, we expect an increased abundance of the Queen conch population within Discovery Bay and adjacent waters.*
- 3. Ensuring technology transfer and training of Jamaicans (Scientists, Fishers, NFA and JFSN) in queen conch spawning, larval development and juvenile survival and growth.*

4. Facilitate teaching/education on the importance of conch + conch life cycle+ conservation to secondary and tertiary level students through ‘tours’ of the hatchery or by incorporating the conch hatchery into the DBML tour package.

5. Facilitate continuation or replication of the project at other MPAs by partnering with, and otherwise exploring ways of involving other MPAs during the DBML phase

Many of these expected achievements have already begun to be seen with the queen conch mobile laboratory at the DBML being incorporated into the outreach and community education activities at the lab (Figure 12).



Figure 12. Queen conch mobile lab team (left) and mobile lab display for DBML open day (right).



Figure 13. The Queen Conch Mobile Lab newly established at the DBML



Figure 14. Inside the queen conch lab and conch larvae (top right) being produced from eggs (bottom right).

1.9 Coast-Snap Citizen Science Sargassum Project

The CoastSnap project established through partnerships with the University of Southampton and UNAM-Mexico, seeks to collect long term photographic data for selected bays and harbors using citizens and permanently mounted cameras. Cameras and phone mounts were established at the Port Royal Marine Laboratory (Figure 15) and Fort Clarence beach (Figure 16).



Figure 15. Composite of the CoastSnap camera and phone mount at the PRML being used by students of the Port Royal Primary school and JSMSS Chair with partners from Southampton and UNAM. Photo credits- D. Webber.



Figure 16. CoastSnap system at the Fort Clarence Beach. Photo credits- D. Webber

2. Workshops, Talks and Media Interviews

2.1 **Elizabeth Alberts of Mongabay** visited Jamaica to report on the Kingston Harbour mangrove restoration projects. Mongabay (mongabay.com) is an American conservation news web portal that reports on environmental issues. It was founded in 1999 by economist Rhett Ayers Butler in order to increase "interest in and appreciation of wildlands and wildlife, while examining the impact of emerging local and global trends in technology, economics, and finance on conservation and development". In recent years, to complement its US-based team, Mongabay has opened bureaus in Indonesia, Latin America, and India. Mongabay's reports are available in nine languages.

Link to Article- <https://news.mongabay.com/2023/11/jamaica-battles-relentless-plastic-pollution-in-quest-to-restore-mangroves/>



Figure 17. GKF-JSMSS Chair with Elizabeth Albert from Mongabay and Caroline Mahfood of Executive Director of GKF. Photo credits D. Webber.

2.2 Blue Carbon Workshop

The GKF-JSMSS chair and the CMS partnered with TNC Jamaica and PEW Charitable trust to host a workshop held April 17-18 with participants from government agencies responsible for climate policy, forestry, fisheries, and coastal management, along with academia, coastal marine experts from non-governmental organizations, and private sector environmental consultants. The goal of the workshop was to gather feedback from local partners of the proposed mangrove and seagrass mapping research and discuss how the data could be used to inform policy. In addition, the workshop attendees worked with the joint TNC and UWI project research team to help identify sampling locations and validate the mapping work.



Figure 18. Participants gather during an April 17-18 workshop, hosted by The Nature Conservancy and the University of The West Indies, in Kingston, Jamaica, to help improve mapping of the country's seagrass and mangrove ecosystems and the carbon stocks those habitats hold. Photo credit- PEW.

2.3 Life Sciences Bat Workshop

The DLS, through the efforts of PhD Student Mr. Damion Whyte, hosted a bat workshop with PhD students from the University of Toronto, February 16 - 17. 38 persons were in attendance including DLS students, NEPA, UDC, CCAM and other private companies. Activities included lectures and in-field training in trapping of bats (overnight on the Mona Campus). GKF-JSMSS Funds assisted with the meals for the participants.



Figure 19. Bat workshop attendees (left) and attendees in the field (right)
Photo Credits: Damion Whyte

2.4 Cornell University Plastics and Mangroves Webinar

The GKF-JSMSS Chair was invited to give a panel-presentation style webinar for international participants in an online course (taught by Prof Bethany Jorgensen of Cornell University) called- Plastics: Impacts and Action. The on-line course is offered through Cornell's Civic Ecology Lab, where they teach 9 online courses for public international audiences and generally have about 600-700 participants per course. The webinar took place Wednesday 10 April and had a maximum of 91 participants in attendance. Normally about 100 students participate in the webinars as they are being presented, and others watch the recorded version at their convenience. Participants come from about 60 countries; in addition to China and the US, the most well represented countries include Iran, Nigeria, India, and the Philippines. Most participants work or volunteer in the environmental or education sectors, or are college students.

The JSMSS Chair's talk covered the scope of the plastics threat in the Caribbean, how we specifically address plastics and plastic pollution and the effects of plastics on mangroves. Figure 20 gives cover slide of the PPT used for the talk with Prof Bethany Jorgensen in the top right.



Figure 20. PPT used for the Cornell webinar with Prof Bethany Jorgensen in the top right.

2.5 Great Mangrove clean-up talk and interview

On April 22, the GKF-JSMSS chair was invited to participate in the launch of the great mangrove clean-up. The GKF-JSMSS chair spoke on the effects of plastics on the mangroves and the need to remove these materials once deposited but the even greater need to prevent plastic pollution, due to the threat of microplastics. Figure 21.



Figure 21. JSMSS Chair speaking at the Great Mangrove Clean-Up Launch and poster of the activity. Photo credit- D. Webber

2.6 Norfolk University Mangrove and Plastics talk

On June 11, 2024 the GKF-JSMSS gave a talk on mangroves in Jamaica, their issues and the plastic problem. The group was visiting the DBML as part of a course on SIDS and ecosystem services and visited the Mona Campus for the talk and tour of the FTIR microscope as well as ICENS to see the use of nuclear energy as an analytic tool and for environmental monitoring. Figure 22 shows the students and professors with the GKF-JSMSS chair.



Figure 22. Norfolk University students and professors with the GKF-JSMSS chair.

2.7 Media Appearances, Interviews and Publications (sharing scientific findings to a range of audiences.

The GKF-JSMSS chair gave several interviews via the media inclusive of a TVJ Interview on Kingston Harbour Pollution, conducted on July 23, which aired Wednesday July 24 and Thursday July 35th on the TVJ nightly news. The interview sought to get information on the effect of raw, untreated sewage on the Kingston Harbour communities. The GKF-JSMSS chair also conducted a 15 minute interview on Sargassum seaweed on the NCU Radio station on May 1, 2024 and an interview with Hon. Pearnel Charles (Snr.) and Hon. Rev. Ronald Thwaites on the 'Public Eye' radio talk-show, also about Sargassum seaweed and its uses. See composite figure 23 below.



Figure 23. GKF-JSMSS chair in TVJ news interview and as advertised for ‘Public Eye’ interview.

The GKF-JSMSS chair also co-authored two new sargassum publications along with other members of the CMS, yielding a total of seven sargassum-related journal articles over the past three years. The two new articles are listed below.

Machado, Carla Botelho, Robert Marsh , Jessica K. Hargreaves, Hazel A. Oxenford, Gina-Marie Maddix, Dale F. Webber, **Mona Webber**, and Thierry Tonon. 2024 "Reply to Gobert et al.: The need for more research to understand changes in new pelagic sargassum ecosystem during its advection" Proceedings of the National Academy of Sciences (PNAS), 121 (34) e2412718121, <https://doi.org/10.1073/pnas.2412718121> IF- 9.4

Machado, Carla Botelho, Robert Marsh , Jessica K. Hargreaves, Hazel A. Oxenford, Gina-Marie Maddix, Dale F. Webber, **Mona Webber**, and Thierry Tonon. 2024. Changes in holopelagic Sargassum spp. biomass composition across an unusual year. Proceedings of the National Academy of Sciences (PNAS) Environmental Science. Volume 121, No. 23. <https://doi.org/10.1073/pnas.2312173121>

3. Social Interventions; Staff and Student Development

The GKF-JSMSS funding facilitated members of staff from both the Port Royal and Discovery Bay Marine Laboratories to attend international conferences in Colombia, Martinique and the Bahamas, aiding with capacity building and possible applicability here in Jamaica.

3.1 The 4th Biospheres International Conference

The 4th Biospheres International Conference was organized by the AREBio Association of Martinique and was held on December 8th and 9th, 2023 at the Bellevue High School, Martinique. The focus of the conference was to promote science and research carried out in Martinique and to also provide a platform for knowledge exchange with local and international researchers. The conference was aimed at both the scientific community and the general public. The University of the West Indies was invited to speak on research carried out by its marine centres. Chauntelle Parkins, Scientific Officer at the Port Royal Marine Laboratory was selected to represent the UWI and presented *“Research and Science Communication as pillars for marine conservation and rehabilitation”*.

During her time in Martinique, Mrs. Parkins was also able to meet with environmental organizations in varying capacities, including AREBio, Parc Naturel Marin de Martinique (PNMM), Protection, Observation and Study of the Marine Environment (POEMM) and Solda Lanmè (Caribbean Sea Soldier). These engagements fostered positive knowledge exchange and potential collaborations with the UWI especially in mangrove habitat assessments and science communication. JSMSS funds supported Mrs. Parkins’ per diem during her stay.



Interviews of presenters, including Chauntelle Parkins, published in the France Antilles/Martinique paper on December 14, 2023 (left) and visit to marine sanctuary in South Martinique to learn about restoration activities and status of reefs in the area (above).

3.2 The GCRMN-Caribbean Steering Committee Meeting and 76th GCFI Conference

The GCRMN-Caribbean Network is co-chaired by the Regional Activity Center for the Specially Protected Areas and Wildlife Protocol (SPAW-RAC) and the UN Environment - Caribbean Environment Programme (UN Environment - CEP). Chauntelle Parkins, Scientific Officer at the Port Royal Marine Laboratory was appointed as a member of the Steering Committee in August 2023, and JSMSS funds supported Mrs. Parkins during her trip. The GCRMN-Caribbean Steering Committee Meeting was held at the Atlantis Paradise Island Hotel, The Bahamas on November 5, 2023. The focus of the meeting was to discuss ways to strengthen the region's network of reef practitioners and to propose ideas on how to improve activities for the protection and development of the region's reefs. This included how to get the GCRMN-Caribbean more visible, how to get more reef practitioners involved in providing reef data to the regional databases and reports, capacity building and training, and producing the next report on status of the region's reefs.

3.3 The 76th GCFI Conference was held at the Atlantis Paradise Island, The Bahamas from November 6 to 10, 2023. The theme of this year's conference was "Linking science and society towards a vision for sustainable fisheries". The conference had sessions titled "Research and stakeholder collaboration to inform and execute conservation and

restoration”, “Climate Change”, “Communication and Science”, “Sargassum”, “Marine Litter” and “Reef Fisheries”.



Chauntelle Parkins sharing ideas on ways to prepare the next Caribbean report, including funding agencies and contacting data collectors (left) and discussing parameters used in habitat assessments in an effort to standardize data collected regionally (above).

3.4 The 6th Mangrove, Macrobenthos and Management Conference (MMM6) - Colombia 2023

The sixth Mangrove Macrobenthos and Management conference (MMM6): “Mangrove Ecosystems for Human Well-being in a Changing Planet” brought together stakeholders from different sectors of society from many countries across the five continents in a single forum to present and discuss research advances and proposals for the conservation and management of mangrove forests, as well as to advocate for mangroves as Nature-based Solutions to climate change. MMM6 is the first conference of the series to be held in Latin America and the Caribbean, a neotropical region where mangroves have evolved among some of the most diverse tropical forests in the world. In particular, mangroves in Colombia are found in both the Caribbean and the Tropical Eastern Pacific Marine Ecoregions.

The conference was attended by Dr. Camilo Trench, Academic Coordinator of the UWI Discovery Bay Marine Laboratory through the assistance of the JSMSS funds.



Dr Camilo Trench at the MMM6 conference with AMLC colleagues

The conference offered six themes of presentations with over 90 oral presentations and over 150 poster presentations from 450 abstracts received, on research topics regarding mangrove forests.

The themes included:

1. Protecting and restoring mangrove biodiversity
2. Understanding and solving marine pollution in mangrove wetlands
3. Achieving sustainable socio-economic development and equity
4. Unlocking climate change and implementing mangrove-based solutions to climate change
5. Expanding the Global observing systems and implementing inclusive technological innovations and education to increase awareness.
6. Changing human relationships with mangrove wetlands.

The conference afforded Dr Trench opportunities for knowledge sharing and networking.

“Without environmental sustainability, social cohesion, and good governance, economic stability cannot be achieved.”

3.5 Launch of the FST Endowment Fund

The GKF-JSMSS chair contributed funds to assist with the launch of the UWI Mona's Faculty of Science and Technology Endowment Fund, a transformative initiative aimed at fostering innovation, research, and academic excellence within the realm of science and technology. The launch took the form of a 'Morning Mixer' held on December 21, 2023.

Key Objectives of the Endowment Fund:

1. **Research Excellence:** The fund will support ground breaking research initiatives, providing faculty and students with the resources needed to tackle pressing challenges and contribute to the advancement of scientific knowledge.
2. **Student Scholarships and Opportunities:** The fund will establish scholarships, fellowships, and experiential learning opportunities to empower students pursuing degrees in science and technology, encouraging the next generation of innovators.
3. **Infrastructure and Technological Advancements:** Investments from the endowment will contribute to state-of-the-art facilities, cutting-edge technology, and modernized laboratories, creating an environment conducive to innovative research.



Figure 24. Attendees at the 'Morning Mixer' included Prof Michael Taylor (Dean of the FST), Ms. Elecia Edwards Myers, Mr Ainsley Henry and Keynote speaker and Professor of Aerospace Engineering and Engineering Mechanics, University of Texas at Austin John-Paul Clarke

3.6 Student Honour Society

On Friday, February 9, 2024 14 students were inducted into the **DLS Honor Society**. The Students received the Honor Society pin, a certificate and a UWI-Bookshop gift certificate. This was the 8th batch of DLS honor students to be inducted. JSMSS funds assisted with the induction and incentives for the students.



Figure 25. Department of Life Sciences Honor Society inductees attending the induction luncheon **Photo Credit** - Mona Webber

3.7 The GKF-JSMSS chair participated in several outreach and in-reach group activities

involving members of staff and students that facilitated social interaction and intervention.

These included the 12th Annual CB-UWI 5-K run involvement as part of the DLS team (Figure 26).



Figure 26. The DLS team of participants in the 12th annual CB-UWI 5-K

The GKF-JSMSS chair supported the organizing and execution of a special DLS Christmas luncheon for all staff and their children in the department on December 18, 2023. The luncheon was a great opportunity to show appreciation to staff and have them enjoy a catered lunch without having to themselves cater or serve. It was a very memorable occasion. Composite figure (# 27) below shows members of the DLS at the Christmas function.



Figure 27. DLS Christmas luncheon

The GKF-JSMSS chair participated in several in-reach and out-reach/open day activities including open days at the marine labs (Figure 28) and breast cancer awareness activities on the Campus (Figure 29). Team building functions like sip n' paint (Figure 30) and departmental sports day (Figure 31) were organized by the Life Sciences team and supported by JSMSS funds, provided opportunities for relaxation and social interaction.



Figure 28. DBML Open day, June 2024



Figure 29. Pink Day for Breast Cancer Awareness



Figure 30. Sip and Paint in the DLS as part of staff social interaction



Figure 31. DLS Sports day at Noranda Bauxite Sports complex in St Ann

3.8 Student development - DLS and other student interns

Twenty-six student interns accessed the 2023/24 Internship course coordinated by Professor Webber. These were employed at a range of agencies (**Alligator Head Foundation; St Lucia National Trust, Belize Wildlife Conservation Society (WCS); Discovery Bay Marine Laboratory- DBML; Environmental Foundation of Jamaica- EFJ; Forestry Department; Plant Quarantine- Produce Inspection Division; NEPA- National Environment and Planning Agency; Scientific Research Council- SRC; E-Biome**). JSMSS funds assisted with stipends for students working at the CMS.

The GKF-JSMSS chair also hosted and mentored students for three weeks as part of the University of the West Indies (UWI), Bethel Baptist Church (BBC) Youth Summer Employment Programme. The students (Composite Figure 32 below) were exposed to cataloging scientific literature, laboratory processing of carbon samples and museum displays. They were presented with gifts during the closing ceremony.



Figure 32. Student interns from the UWI-Bethel Baptist youth summer programme.

Photo credits- M. Webber

3.9 Board/Committee Appointments and Awards

The GKF-JSMSS chair was reappointed to the NRCA Board for a third term and also returned as the Chair of the Biodiversity Committee.

Professor Webber was honored by the Faculty for being an inspiration (Figure 33) on staff appreciation day in the faculty of Science and Technology. She was also honored by the Ardenne Alumni Association as one of 100 high achieving Ardenne alums which involved a write-up in the Ardenne Alumni Focus as they sought to highlight persons on the road to Ardenne's 100 year celebrations in 2027 (Figure 34).



Figure 33. Faculty award presented to persons voted to be inspirational.

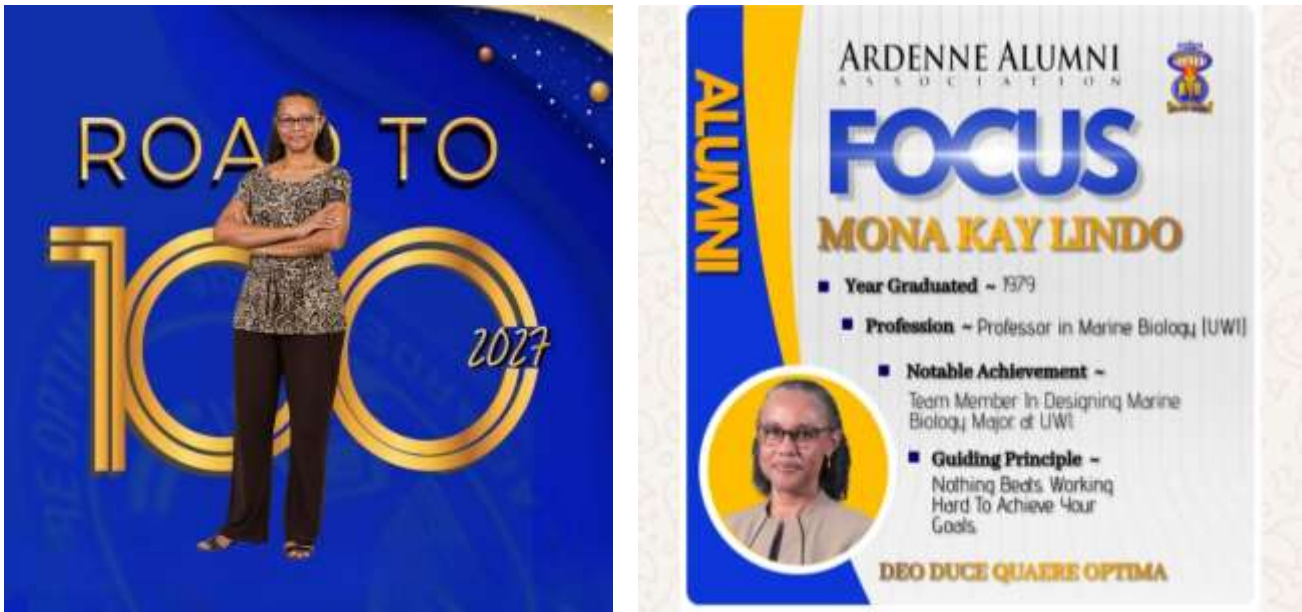


Figure 34. Ardenne Alumni 'Focus' magazine dedicated a page to the JSMMS Chair.

4. Looking Forward

As we work towards greater achievement of ESG principles, the GKF-JSMSS chair and team will seek improved alignment by looking at ESGs in the context of the Sustainable Development Goals (Figure 35). The GKF-JSMSS activities already achieve some of these goals as we already conduct activities that positively affect or enhance; SDG-14 (Life below water), SDG-13 (Climate Action), SDG-4 (Quality Education) and SDG-17 (Partnerships). However in the new reporting year (2024/25) the GKF-JSMSS chair and teams will seek to have greater representation of ESG values as well as engage projects and actions that help us achieve the SDGs. Many of these areas also achieve the UWI strategic goals and Jamaica's Vision 2030 and so there are several intersecting frameworks that can help us conduct focused and targeted activities towards greater achievement of environmental health and economic stability.



Figure 35. SDGs and their alignment with ESGs. Source- *Sustainability* 2021, 13(15), 8503; <https://doi.org/10.3390/su13158503>

5. Financial Report:

The 2023/24 financial report from the Bursary (Table below) is up to July 18, 2024 which is when spending ended for the 2023/25 AY.

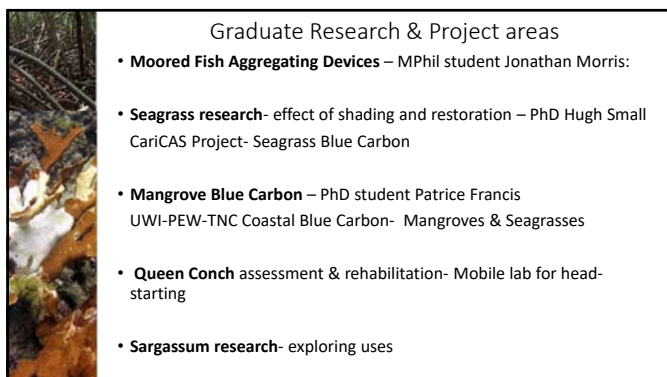
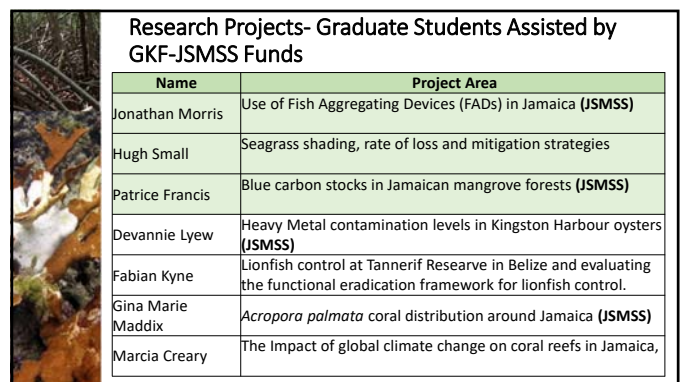
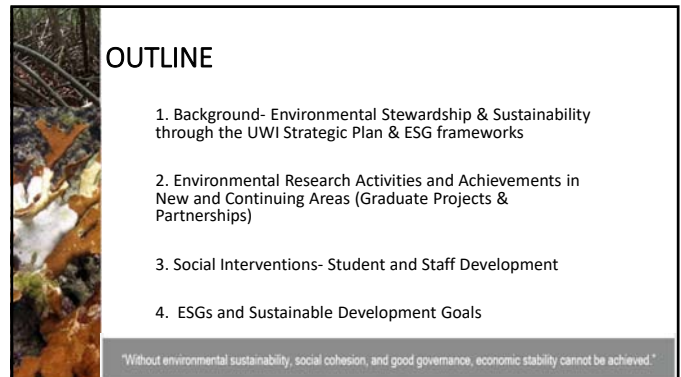
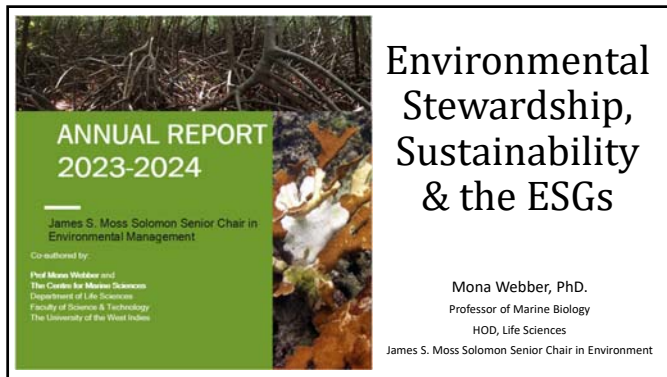
Commitments at the end of July could be captured by the report as goods have not yet been received. These are as follows:

QTY	ITEM	SITE	JA\$ COSTS	TOTAL
2	36000 BTU AC	BIOLOGY LAB- PRML BDC	\$456,000.00	
4	INTERNET SWITCHES	MARINE LABS; SEMINAR ROOMS	\$1,630,000.00	\$2,086,000.00

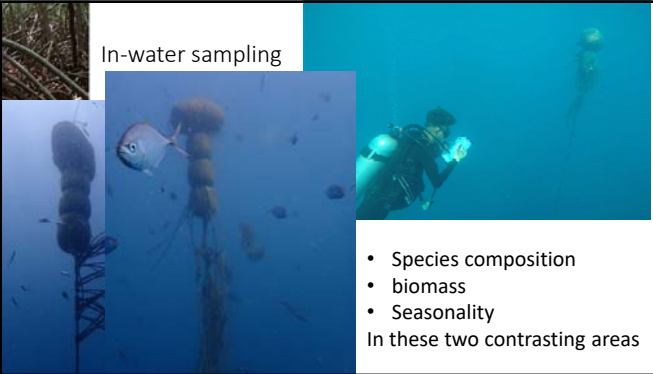
THE UNIVERSITY OF THE WEST INDIES					
GRACE KENNEDY FOUNDATION					
JAMES MOSS-SOLOMON CHAIR IN ENVIRONMENTAL DEVELOPMENT					
STATEMENT OF EXPENDITURE FOR THE PERIOD					
AUGUST 1, 2023 - JULY 18, 2024					
PARTICULARS	BUDGET YEARS 5-12 JS	PREVIOUS EXPENDITURE 01/08/2016 - 31/07/2023 JS	CURRENT EXPENDITURE 01/08/2023 - 18/07/2024 JS	TOTAL EXPENDITURE 01/08/2016 - 18/07/2024 JS	BUDGET BALANCE JS
Equipment & Maintenance	16,850,500.00	15,164,378.80	582,970.48	15,747,349.28	1,103,150.72
General Office Expenses	2,662,000.00	1,743,815.88	218,587.28	1,962,403.16	699,596.84
Local & International Travel	12,537,500.00	10,863,885.83	1,303,590.82	12,167,476.65	370,023.35
Research & Publication	5,750,000.00	5,461,617.18	777,686.49	6,239,303.67	(489,303.67)
Salaries & Stipends	2,600,000.00	2,197,311.27	0.00	2,197,311.27	402,688.73
Administrative Expenses	3,600,000.00	3,068,991.04	256,860.60	3,325,851.64	274,148.36
TOTAL	44,000,000.00	38,500,000.00	3,139,695.67	41,639,695.67	2,360,304.33

Bursary, Mona
July 18, 2024

August 26, 2024.

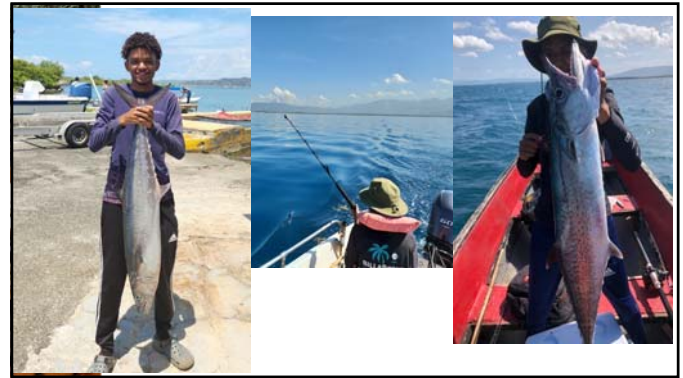


In-water sampling



- Species composition
- biomass
- Seasonality

In these two contrasting areas



Environmental Research Activities and Achievements - Graduate Projects
Hugh Small, PhD in progress. Effect of shading on seagrasses.
 CariCAS- seagrass blue carbon.



- Assessed seagrass response to shading at overwater bungalows (Sandals funded)
- Erosion- loss of sand
- Nursery function and biodiversity threatened; Blue Carbon loss.
- Experiments conducted @ DBML (GKF-JSMSS funds)
- Determine critical light levels and how seagrasses respond.

CariCAS The Caribbean Carbon Accounting in Seagrass Network
 Interim Project Report



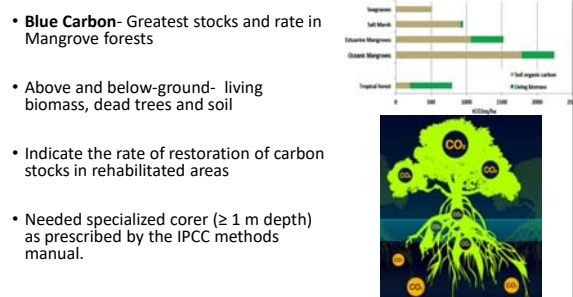
The Nature Conservancy

CARICAL PARTNER'S PRACTICAL FIELD AND LABORATORY GUIDE

CariCAS Project Value

- **Carbon density** information for Caribbean seagrass was sparse even with evidence of widespread seagrass loss across the region
- Caribbean seagrass blue carbon stocks are at risk - add to global warming.
- **Findings:** Caribbean Seagrass Carbon values are sig. higher than global average
- Greater Caribbean is a **global hotspot** for seagrass Organic Carbon stocks.

Mangrove Blue Carbon- PhD project by Patrice Francis
"Blue Carbon stocks in Jamaica's mangrove forests."



- **Blue Carbon**- Greatest stocks and rate in Mangrove forests
- Above and below-ground- living biomass, dead trees and soil
- Indicate the rate of restoration of carbon stocks in rehabilitated areas
- Needed specialized corer (≥ 1 m depth) as prescribed by the IPCC methods manual.



UWI-PEW-TNC Project + PhD work- Advancing understanding of the carbon removal role of Jamaica's seagrass and mangroves. Potential for inclusion in Nationally Determined Contributions (NDCs).

Producing blue carbon data:

- PEW- US\$ 232,408.
- Protocols and methods – IPCC standards
- Mangrove areas of different physiography
- Different species; stage of regeneration
- ID priority areas 'ring-fenced'
- Accurate picture of carbon storage

- Support fieldwork being conducted by the TNC
- Determination of the areal extent of mangroves (confirmatory) and seagrasses – large gaps

Queen Conch Spawning project and Mobile Queen Conch Lab

- Queen Conch- significant Jamaican (export) fish
- Grazers- play a key ecological role in seagrass beds, making them productive and healthy.
- Managed fishery – closed season (August to February)
- Overfished, declining populations across USA ;
- Jamaica banned fishing for one year

Our Research:

- Conch abundance in the Discovery Bay SFCA, spawning activity and **spawning season** (August to February). Has warming led to changes in timing/duration.
- Queen Conch mobile laboratory- **head-starting**

Conch Crisis - Depleted Stock Forces Ministry To Order One-Year Fishing Ban

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Published: January 26, 2016 | 12:20 AM | Commented: 2016 | 12:20 AM

Queen Conch Research:

- Queen conch numbers- low reproductive activity
- Conch pens- increased density
- Spawning started as early as April
- Spawning occurred in conch pens – poaching
- Workshop held for other sanctuaries
- **HBOI- Mobile lab-** Controlled environment; Queen Conch eggs allowed to hatch
- Algal cultures produced to feed the larvae; Juvenile conch fed – returned to the sea

Achievements:

- 1st time in Jamaica:
 - Queen conch eggs hatched in the lab- larvae
 - Juveniles (small shell)
- Current stock ~50 (using beakers); work out the feeding; water quality- turbidity
- Lab able to produce 1000 - 1500 juveniles from a third of the egg mass
- Natural survival- 1 adult from ~500,000 eggs.

Conch Project Partners/Funders- DBML team (US\$138,000; 70,000- Lab construction; shipping).

- National Environment & Planning Agency (NEPA)
- National Fisheries Authority (NFA)
- Jamaica Conservation Partners (JCP)
- **Harbour Branch Oceanographic Institution (HBOI) Dr. Megan Davis**
- **Jamaica Conch Restoration Project- Sven Lapiner**
- US Embassy Federal Assistance Grants
- GKF- JSMSS funds

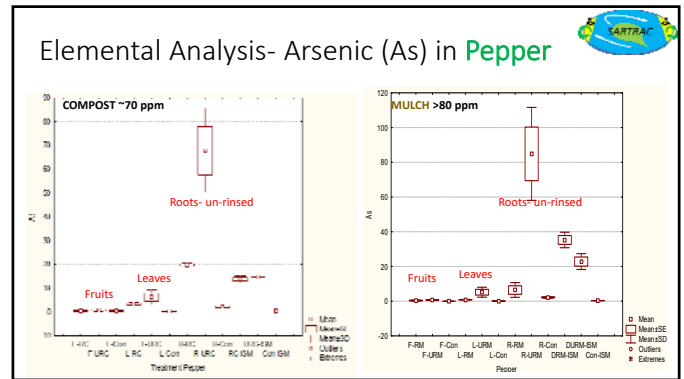
Sargassum Seaweed Research

Effect of sargassum compost & mulch on growth of corn (*Zea mays*), scotch bonnet pepper (*Capsicum chinense*) and tomato (*Solanum sp.*).



2022/23

Danielle Haye
Mona Webber
Dale Webber
Thierry Tonon
Bhaskar Chinthapalli



Bio-methane Potential (BMP) of Co-Digested Sargassum & Pig Slurry



Deborah Broomfield (SRC)
Thierry Tonon (U of York)
Gina-Marie Maddix (CMS)
Mona Webber (UWI)

Outcomes

- ✓ Gas from all treatments 0, 40, 50, 60 100% Sargassum were ignited and burned with a bright yellow/gold flame
- ✓ Gas from the control (100% Sargassum) did not ignite
- ✓ Gas produced by the Sargassum alone did not contain sufficient amounts of methane
- ✓ 60% Sargassum produced the most burnable gas at **3.049 L/ Kg 50% 2.515 L/Kg**

Mona Webber | Sargassum seaweed: what to do and what not to do with it

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Published Sunday, April 9, 2023 | 12:50 AM



Communicating research with wide audiences
Publications, Workshops, On-line and Print media

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Communicating research with wide audiences
Publications, Workshops, On-line and Print media



Tackling sargassum seaweed problem

Publications, Workshops, On-line and Print media

- Norfolk University Students
- Cornell University-
- Plastics and Mangrove Webinar

Public media- Radio and TV

PLASTICS AND MICROPLASTICS IN JAMAICA AND THE CARIBBEAN
FINDING SOLUTIONS THROUGH PARTNERSHIPS

Maria Webster, PhD
Professor of Marine Biology, Head, Department of Life Sciences
James S. Mims Solomon Senior Chair in Environmental Management (UWI Mona)

Communicating the research with wide audiences

Mongabay- American conservation news web portal that reports on environmental issues. **Kingston harbour Mangroves and solid waste**
Link to Article- <https://news.mongabay.com/2023/11/jamaica-battles-relentless-plastic-pollution-in-quest-to-restore-mangroves/>

Staff development – supporting opportunities for growth = Sustainability (JSMSS)

2nd MANGLAES AMERICA

GCFI NASSAU THE BAHAMAS

6th Mangrove Macrobenthos and Management meeting

ISBWTA

MNMMS

The Department of Life Sciences Honorary Society Induction 2024

- Honour Society- recognizing high achievers- Luncheon (JSMSS)

ENVIRONMENTAL SOCIAL GOVERNANCE

- Environment:**
 - New research and Researchers for sustainability
- Social**
 - Staff and student welfare
 - Recognition and motivation
- Governance**
 - CITES S/Authority
 - NRCA board
 - HOD Life Sciences

Source: <https://www.wireconsultants.com/environmental-social-and-governance-esg-framework/>

"Without environmental sustainability, social cohesion, and good governance, economic stability cannot be achieved."



Future work of the JSMSS Chair on ESGs and SDGs

- GKF-JSMSS chair and team seek improved alignment - ESGs in the context of the Sustainable Development Goals
- The GKF-JSMSS activities already aligned- positively affect or enhance:
 - SDG-4 (Quality Education),
 - SDG-13 (Climate Action),
 - SDG-14 (Life below water) and
 - SDG-17 (Partnerships).
- Intersecting frameworks -focused activities towards greater achievement of environmental health and economic stability.



ESGs and the Sustainable Development Goals

ENVIRONMENT			SOCIAL			GOVERNANCE		
6. Clean water and sanitation	7. Affordable and clean energy	9. Industry, innovation and infrastructure	1. No poverty	2. Zero hunger	3. Good health and well-being	5. Gender equality	8. Decent work and economic growth	9. Industry, innovation and infrastructure
11. Sustainable cities and communities	12. Responsible consumption and production	13. Climate action	4. Quality education	5. Gender equality	6. Clean water and sanitation	11. Sustainable cities and communities	12. Responsible consumption and production	13. Climate action
14. Life below water	15. Life on land		8. Decent work and economic growth	9. Industry, innovation and infrastructure	10. Reduced inequalities	16. Peace, justice and strong institutions	17. Partnerships for the goals	

"Without environmental sustainability, social cohesion, and good governance, economic stability cannot be achieved."



ANNUAL REPORT 2023-2024

James S. Moss Solomon Senior Chair in Environmental Management

Covered by:
Prof Dale Webber and
The Centre for Marine Sciences
Department of Life Sciences
Faculty of Science & Technology
The University of the West Indies

THANK YOU!

CMS Team: Prof Dale Webber, Patrice Francis, Robyn Young, Jhenelle Williams, Pam Blackwood

DBML Team: Dr Camilo Trench, Shanna-Lee Thomas, Khianna Lee, Ricardo Hickling, Interns

PRML Team: Hugh Small, Chauntelle Parkins, Paul Kisson, Mark Gold, Michael, Everton Morris.

DLS Team: Claudia Lewis, Sophia Davis, Donald Simpson, Kevin Peart, Elaine Denton, Technologists, Academic staff, Service Staff, Students