THE CARIBBEAN ACADEMY OF SCIENCES

NEWSLETTER

SEPTEMBER 2024 - VOLUME 7 ISSUE 2

4TH INTERNATIONAL SMALL ISLAND DEVELOPING STATES (SIDS4) CONFERENCE

PLANT CONSERVATION & FOOD SECURITY

REVERSING & CURING TYPE 2 DIABETES

SARGASSUM-DERIVED ESSENTIAL OILS FOR BBNJ

TALENT MANAGEMENT LESSONS FROM ATHLETICS

MEMORIAM TRIBUTE: PROF. RAMSEY SAUNDERS



PHOTO: CARABOBO, VENEZUELA (HIURICH G)

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THE CARIBBEAN ACADEMY OF SCIENCES

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Prof. Mark Wuddivira

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Dr. Roshnie A. Doon

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PHOTO: NITIN SHARMA

LETTER FROM OUR **PRESIDENT**

Welcome from the President!

It is with great pleasure and honor that I extend a warm welcome to each of you to our latest newsletter issue. As we embark on this journey together, I am filled with a profound sense of optimism and excitement for the future of science in our region.

The Caribbean Academy of Sciences stands as a beacon of knowledge, innovation, and collaboration. Our collective dedication to advancing scientific research, education, and outreach underscores our commitment to addressing the critical challenges facing our communities.

In this issue, you will find a wealth of insightful articles, groundbreaking research, and inspiring stories from across the Caribbean scientific community. Our members continue to push the boundaries of knowledge and make meaningful contributions to society.

I would like to take this opportunity to express my heartfelt gratitude to each of you for your unwavering support and dedication to the mission of the Caribbean Academy of Sciences. Together, we have the power to drive positive change and shape a brighter future for generations to come.

I encourage you to explore the pages of this newsletter, engage with your fellow members, and share your own experiences and expertise. Together, we can harness the power of science to create a more prosperous, sustainable, equitable, and resilient Caribbean region.

Thank you for your commitment to excellence, and I look forward to our continued collaboration and success.

Warm regards,
Mark N. Wuddivira, Ph.D.
Professor of Agri-Environmental Soil Physics
President, Caribbean Academy of Sciences (CAS)
Regional (2023-2025)

"...the Caribbean Academy of Sciences (CAS) stands as a beacon of knowledge, innovation, and collaboration. Our collective dedication to advancing scientific research, education, and outreach underscores our commitment to addressing the critical challenges facing our communities..."

LETTER FROM OUR **EDITOR**

Effective representation and application of science are essential for the economic growth, diversification, and sustainable development of the Caribbean region. It is crucial to ensure the representation of diverse groups, including women and girls, to build a strong and inclusive scientific community in the Caribbean.

In the current edition of the Caribbean Academy of Sciences (CAS) newsletter, the CAS Regional Executive, in collaboration with member chapters spanning across the Caribbean, remains dedicated to promoting and advancing the representation and recognition of scientific endeavours within the Caribbean region. Their collective efforts aim to foster a supportive environment for scientific research, education, and innovation, contributing to the growth and development of the scientific community in the Caribbean.

This demonstrates our active engagement, as both the executive and chapter members have wholeheartedly participated in various prominent conferences. These include (1) the 4th International Conference on Small Island Developing States on Charting the Course Toward Resilient Prosperity held during the 27-30 May 2024 in Antigua and Barbuda, the Global Knowledge Dialogue for Latin America, (2) the International Science Council (ISC) Global Knowledge Dialogue for Latin America and the Caribbean held during 9-11 April 2024 in Santiago, Chile, (3) the Forecast Conference on Advancing Science & Technology Innovation for National and Regional Development held during the 14-16 August 2024 at the University of Technology, Jamaica, and (4) the International Mango Festival.

CAS active participation in a diverse array of events underscores our deep commitment to delving into and making meaningful contributions to a broad spectrum of topics and issues. Throughout these gatherings, CAS representatives delved into a wide range of issues specifically related to Small Island Developing States (SIDS) in the Caribbean region, such as the amplification of science, scientific collaboration, academic freedom, DEI (diversity, inclusion and equity), and resource mobilization.

"...effective representation and application of science are essential for the economic growth, diversification, and sustainable development of the Caribbean region ..."

Additionally, it is important to note that the advancement of graduate education in science within the Caribbean region greatly depends on the collaboration and support provided by academic professionals. The interaction between faculty members and graduate students in research settings not only enriches the learning experience but also equips students with the necessary skills and knowledge to take on complex research projects in the future. As such the CAS has launched its graduate student and guest seminar series to provide students and academic scholars globally with a platform to share their research findings and to receive valuable feedback from peers.

During the last few months, the CAS Regional executive has orchestrated a series of enlightening seminars that featured the exceptional insights of graduate students and esteemed academic scholars hailing from the Caribbean region, such as Guyana, Jamaica, and Puerto Rico. These engaging presentations encompassed diverse and fascinating topics, ranging from strategies to mitigate environmental degradation triggered by climate change by Prof. Jagessar to groundbreaking research on talent management by Ms. Hylton, as well as innovative approaches to reversing and treating type 2 diabetes by harnessing secondary metabolites from the Indian Bael plant by Mr. Allen. Furthermore, the seminars also delved into the use of Sargassum-derived essential oils as a catalyst for promoting the sustainable utilization and preservation of ocean resources in the Caribbean by Ms. Rhoden.

In the current issue, our engaging discussion of scientific advancements in the Caribbean region continues to captivate readers. This edition is enriched by a series of feature articles that delve deeper into the subjects presented during the CAS seminar series. Moreover, we are privileged to feature insightful contributions from Dr. Peter addressing plant conservation and food security in the Caribbean, as well as an in-depth study conducted by Mr. Remy and his colleagues on giant chemosynthetic bacteria.

Kind regards,
Dr. Roshnie A. Doon
Editor, Caribbean Academy of Sciences (CAS) Newsletter,
Secretary, Caribbean Academy of Sciences (CAS) Regional (2023-2025)

"... the advancement of graduate education in science within the Caribbean region greatly depends on the collaboration and support provided by academic professionals ..."

IN THIS **ISSUE**













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- SIDS4 CONFERENCE IN ANTIGUA & BARBUDA
- HIGHLIGHTS-CAS GUEST SEMINAR SERIES
- HIGHLIGHTS - CAS GRADUATE STUDENT SEMINAR SERIES

CAS-TRINIDAD & TOBAGO

- INTERNATIONAL MANGO FESTIVAL

CAS-GUYANA

- UN 9TH MULTI-STAKHOLDER FORUM ON STI FOR THE SDGS

FEATURED ARTICLES:

- PLANT CONSERVATION AND FOOD SECURITY
- THE EXTRACTION OF SECONDARY METABOLITES TO REVERSE AND CURE TYPE 2 DIABETES
- SARGASSUM-DERIVED ESSENTIAL OILS FOR BBNJ: ENHANCING CONSERVATION AND SUSTAINABLE USE OF OCEAN RESOURCES
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MEMORIAM TRIBUTE:

- PROF. RAMSEY SAUNDERS













THE CARIBBEAN ACADEMY OF SCIENCES (CAS) KEY ACTIVITIES AT THE 4TH INTERNATIONAL CONFERENCE ON SMALL ISLAND DEVELOPING STATES (SIDS) IN ANTIGUA & BARBUDA

PROF. MARK WUDDIVIRA
PRESIDENT, CAS REGIONAL (2023-2025)

HIGHLIGHTS OF KEY ACTIVITIES AT SIDS4 CONFERENCE

Prof. Wuddivira was the keynote speaker and a panelist on a side event titled "Amplifying Science in and from SIDS: Exploring the Role of Regional Scientific Cooperation," hosted by the International Science Council (ISC). This event explores how regional scientific collaboration enhances the empowerment, inclusivity, and resilience of SIDS in addressing challenges. It focused on addressing a fundamental question: How can regional scientific cooperation help address the unique challenges faced by SIDS? What are examples of initiatives that have successfully mobilized science across the region to tackle priority challenges?

As a Member of the ISC SIDS Liaison Committee, Prof. Wuddivira co-authored the declaration “From Shores to Horizons: Empowering Science for the Future of Large Ocean States”. This declaration https://council.science/current/press/sids4-declaration/ was published at the opening of the SIDS4 conference and became part of the Antigua and Barbuda Agenda for SIDS (ABAS). Endorsement of the declaration by colleagues, governments, scholars, scientists, researchers, engineers, policymakers, and organizations involved with or connected to SIDS was invited.

Prof. Wuddivira was a panelist on a side event titled “Enhancing Higher Education for Sustainable Development in Small Island Developing States” hosted by the Higher Education Sustainability Initiative (HESI) through UN DESA, UNITAR, and UNESCO-IESALC. This event focused on the significant influence that Higher education institutions wield in shaping the trajectory of SIDS by educating leaders, conducting research, and fostering innovation in sustainability.





Professor Mark Wuddivira was interviewed by Antigua and Barbuda Broadcasting Services (ABS) at the opening of the SIDS4 Conference on May 27, 2024.



Professor Mark Wuddivira was interviewed by the Global Centre for Climate Mobility during the SIDS4 Conference on May 28, 2024.





ISC pre-side event discussion and a group photo on May 28, 2024, with ISC SIDS Liaison Committee members (Prof. Mark Wuddivira, UWI T&T; Prof. Michelle Mycoo, UWI T&T; Dr. Vidushi Neergheen, Mauritius; Dr. Salome V. Taufa, Tonga; Mr. James Waddell, Science Officer, ISC Focal Point for SIDS4; Dr. Carolina Santacruz-Perez, Science Officer, Regional Focal Point for Latin America and the Caribbean; and other ISC Network persons.



UWI and the Caribbean Academy of Sciences members at the ISC SIDS4 side event.
From L-R: Prof. Mark Wuddivira; Mr. Christian Virgil (Ph.D. Student at the Faculty of Engineer, UWISTA); Dr. Lisa Benjamin (Lecturer at SVM, UWISTA); Dr. Andrea Veira (Lecturer in Teacher Education, UWIFIC); Dr. Andrew Hunte (Head of the School of Humanities and Education, UWIFIC).











ISC SIDS4 side event on May 29, 2024. Prof. Mark Wuddivira, keynote speaker, and panel discussion with Prof. Mark Wuddivira and Prof. Michelle Mycoo as part of the panellists. Also a group photo of panellist.



Side event titled “Enhancing Higher Education for Sustainable Development in Small Island Developing States” hosted by the Higher Education Sustainability Initiative (HESI) through UN DESA, UNITAR, and UNESCO-IESALC on May 30, 2024. Chaired by Mr. Nikhil Seth, UNITAR Executive Director and UN Assistant Secretary-General. Panellists: H.E. Mr. Jagdish Dharamchand Koonjul, Permanent Representative of Mauritius to the United Nations; Dr. Emily Wilkinson, Director, Resilient and Sustainable Islands; Professor Mark Wuddivira, Caribbean Academy of Science and Dean of the Faculty of Food and Agriculture at The University of the West Indies; Mr. Kalim Shah, University of Delaware; Ms. Naya Ifigenia Gomes Correia Sena, Peace Boat and University of Tokyo.









Photos with colleagues from the Pacific. with Dr. Salote Nasalo, University of the South Pacific (Fiji); with Prof. Peseta Su'a Dr. Desmond Mene Lee Hang, Deputy Vice-Chancellor at the National University of Samoa; and with Dr. Salote Austin, Oceania Programme Manager, Regional Focal Point for Asia and the Pacific.



Professor Mark Wuddivira was interviewed by Antigua and Barbuda Broadcasting Services (ABS) at the closing of the SIDS4 Conference on May 30, 2024.
Video: https://www.facebook.com/share/iNUpAPcNSZFtUyPG/?mibextid=xfxF2i





Photos with Nigerian delegation to SIDS4 conference. L-R: Mr. Balarabe Abbas Lawal, Minister of the Environment, Federal Republic of Nigeria; Dr. Salisu M. Dahiru, Director General, National Council on Climate Change, Federal Republic of Nigeria.

CONFERENCE ATTENDANCE

PROF. RAYMOND JAGESSAR
FOREIGN SECRETARY, CAS REGIONAL.

- Global Knowledge Dialogue for Latin America and the Caribbean (GKD-LAC) Organized by the International Science Council-9-11 April 2024, in Santiago de Chile.

- 4th International Conference on Small Island Developing States- Charting the Course Toward Resilient Prosperity, 27-30 May 2024 in Antigua and Barbuda.

- 1st inaugural Guest Seminar series of the Caribbean Academy of Sciences (CAS) on May 26th, 2024, on CAS-UN-SIDS partnership.

- Guest speaker on Academic Freedom for World Press Freedom Day.

- Member of the FORECAST Conference Planning Committee, University of Technology, Jamaica.

- Online Presentations at FORECAST conference at the University of Technology in Jamaica, August 14th – August 16th, 2024. Papers presented:
  - Jagessar, R, et.al. “Status of Surface Water at Three Selected Areas of Coastal Guyana (South America) and the Treatment of the Respective Water with a Suitable Adsorbent.”
  - Jagessar, R. et.al. “The Fermentation of Sugar Beet in Boiled and Unboiled State.”



Prof. Raymond Jagessar

MEETINGS AND ENGAGEMENTS

PROF. MARK WUDDIVERA
PRESIDENT, CAS REGIONAL EXECUTIVE.

1. High-Level Political Forum (HLPF): UN High-Level Political Forum (HLPF) on Sustainable Development 2024.

Prof. Wuddivira attended the HLPF from July 8-17, 2024, at the UN Headquarters in New York. Tuesday, July 9th was Science Day at HLPF hosted by the ISC, he presented as part of the Lightning Talks on the "Consortium for Partnership: Mobilizing Scientific Resources for Food Security in SIDS".



On Wednesday, July 10, 2024, Prof. Wuddivira delivered a statement on behalf of the Scientific and Technological Community Major Group, coordinated by the ISC and the World Federation of Engineering Organizations in the session titled "Small Island Developing States: Implementing the Outcomes of the Fourth SIDS Conference," where the Prime Minister of Antigua and Barbuda, Gaston Browne, and Prime Minster of Samoa, Naomi Mata'afa, were featured speakers.

Excerpts from Prof. Wuddivira:

> "...The Antigua and Barbuda Agenda for SIDS (ABAS) aims to achieve resilient prosperity through actions across ten key areas including economic resilience, climate action and support, biodiversity, data, science and digitalization. These efforts must address the unique existential challenges of SIDS, not just global rhetoric..."
>
> "...SIDS face significant resource challenges due to climate change, natural disasters, food and water security issues, limited land, soil degradation, biodiversity loss, and funding constraints. Overcoming these challenges requires interdisciplinary research, a robust science-policy interface, and greater inclusion of diverse voices such as youth, Indigenous people, and women..."

"...Building human capital is crucial for the success of ABAS, but funding for this often lies outside of SIDS. Accessing these funds typically requires aligning research with the priorities of funding agencies, rather than SIDS' specific needs. Additionally, many funding opportunities have prohibitive co-financing requirements, making them inaccessible to most SIDS institutions..."

"...Strengthening research and teaching facilities is necessary to build human capital and expertise. Currently, SIDS institutions lack adequate facilities, making it difficult to recruit and retain top talent, leading to a significant brain drain. STEM salaries in SIDS are among the lowest globally, and graduate research is hindered by a lack of equipment and funding, resulting in low enrollment in experimental STEM programs. The best students often leave for better facilities abroad and do not return..."

"...The UN System should ensure that: Funding programs are tailored to SIDS' unique challenges, with minimal co-financing requirements; Grants should focus on upgrading research and teaching facilities, particularly in STEM fields; Support for international and regional research collaborations, and establishment of scholarships to encourage return migration; Strengthen the science policy interface and foster partnerships between SIDS institutions and global research entities; and encourage private sector involvement in funding and development projects, emphasizing corporate social responsibility and sustainable practices..."

2. Organization of Southern Cooperation (ConGres)

Prof. Wuddivira was a delegate representing the Latin America and Caribbean region at the Congress of the Greater South (ConGreS), LAC Consultation. Hosted by the Organization of South Cooperation (OSC) and the Union of Universities of Latin America and the Caribbean (UDULAC), August 8-9, 2024. Panama City.





The ConGreS was a momentous process in which delegates from across various regions, areas of expertise, and development sectors throughout the Global South came together, in a series of consultations to collectively define a Third Way of Development, articulate a common plan of action for its realization and contribute to a new and inclusive future for Humanity.





Prof. Mark Wuddivira and Ms. Petal Jetoo, former Secretary of CAS Regional., Mrs. Petal Jetoo.

References

1. International Institute for Sustainable Development (IISD). (2024). *Science Day at HLPF 2024. 9 July 2024 | UN Headquarters, New York City, United States of America.* New York, United States: IISD. https://enb.iisd.org/events/science-day-hlpf-2024
2. United Nations (UN). (2024). *Small Island Developing States: Implementing the outcomes of the fourth SIDS Conference, Wednesday 10 July, 15.00 – 16.45, Conference Room 4, UNHQ, New York.* New York, United States: UN. https://estatements.unmeetings.org/estatements/30.0010/20240710150000000/sXSp1tMpE14k/TPzTnMrhz_nyc_en.pdf
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SPOTLIGHT

CAS-GUEST SEMINAR SERIES

GUEST SEMINAR SERIES HIGHLIGHTS

DR. ROSHNIE A. DOON
SECRETARY, CAS REGIONAL (2023-2025)

1. United Nations-Caribbean Academy of Sciences-Caribbean SIDS Partnership, a new venture, in mitigating environment degradation resulting from climate change - Prof. Raymond Jagessar (Department of Chemistry, Faculty of Natural Sciences, Turkeyen Campus, Greater Georgetown, South America & Foreign Secretary of CAS).

The Caribbean Academy of Sciences (CAS) first inaugural Guest Seminar was held on May 26th, 2024, where the Foreign Secretary of CAS Prof. R. Jagessar spoke in detail about the development of Small Island Developing States (SIDS) as a means of mitigating against environmental degradation because of climate change events.

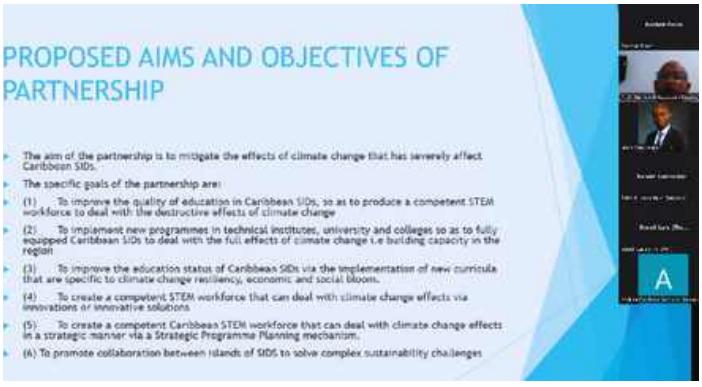
During his presentation, Jagessar (2024):

- Gave a detailed background on the composition of SIDS (membership, geographical location, land mass), their distinct vulnerability to climate change events, and the sustainable development challenges arising from the former.

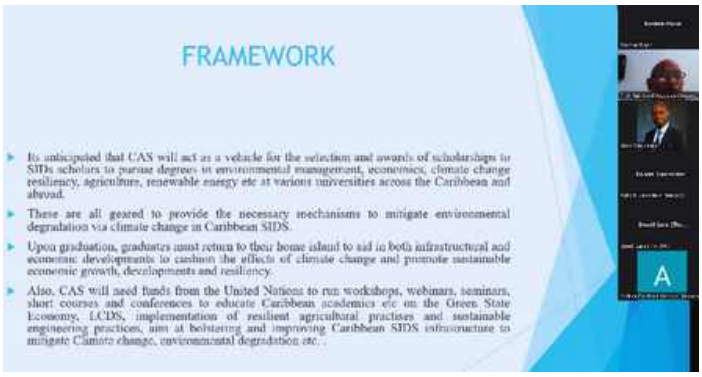


- Gave examples of countries such as Panama, Guyana, Suriname and Madagascar, that self-identify as carbon sinks.

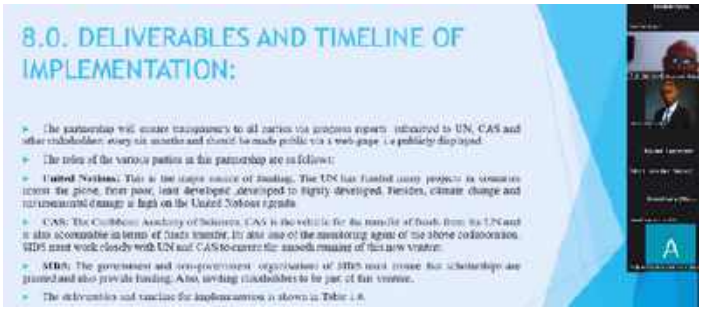
- Provided a discussion on the specific vulnerabilities that Caribbean SIDS (CSIDS) experience due to climate change events such as global warming, meteorological events, heavy rainfall, flooding, etc.



- Highlighted the role of the United Nations (UN) and 17 Sustainable Development Goals (SDGs) in achieving sustainable development.



- Highlighted the objectives of CAS, the various academic affiliations of CAS, and the different partnerships that can be formed, i.e., the UN-CAS-SIDS and the framework that governs the partnership. These partnerships can be focused on the social, economic and educational dimensions of sustainable development.



- The goals of the partnership included areas such as improving the quality of education across SIDS, producing a competent STEM workforce, and implementing programmes to increase the human resource capacity of the Caribbean that can address the destructive impact of climate change events in the Caribbean.

- Highlighted the significance of forming these partnerships, achieving measurable outcomes, and monitoring the partnership using different indicators such as the number of persons graduating from specific programmes, crop production and crop yield, and innovations made concerning the adaptation and mitigation of climate change events.



- Provided the deliverables and timeline of the UN-CAS-SIDS partnership that is expected to begin in September 2025 and end in October 2030.

2. Sprinting to Greatness: Talent Management Lessons from Athletics - Yolande Hylton (UWI, Mona, Jamaica, & Hylton Insights, Jamaica.

The second CAS Guest Seminar was held on 02nd August 2024, where Ms. Yolande Hylton (Director of Hylton Insights and UWI, Mona, Jamaica), spoke about the Talent Management Lessons that can be derived from Athletics.

During her presentation Hylton (2024):

- Explained what talent management is about.

- Gave a detailed review of how the Maximizing Velocity and Power (MVP) Track Club in Jamaica was formed and how they provided Jamaican athletes with an option of undertaking high school track and field training in Jamaica, rather than migrating to the US or other international institutions to access training resources through their Track Clubs/Track Colleges.

- Explained how the strategies implemented by MVP together with Jamaica's University of Technology, to retain their talented athletes in Jamaica had many successful performances of Asafa Powell and Brigitte Foster-Hylton by targeting second-tiered athletes and not necessarily star athletes.

- Highlighted that the strategy implemented by MVP can be applied to the employee Lifecycle in the areas of attraction, recruitment, onboarding, development, retention, and separation.

- Highlighted the key lessons that businesses can learn from MVP as:
  - Lesson (1): Have a recruitment strategy.
  - Lesson (2): Examine your selection process.
  - Lesson (3): Acquire the right team.
  - Lesson (4): Employee development.
  - Lesson (5): Build authentic relationships.
  - Lesson (6): Examine your work environment.
  - Lesson (7): Let your investment in talent management tell your story.

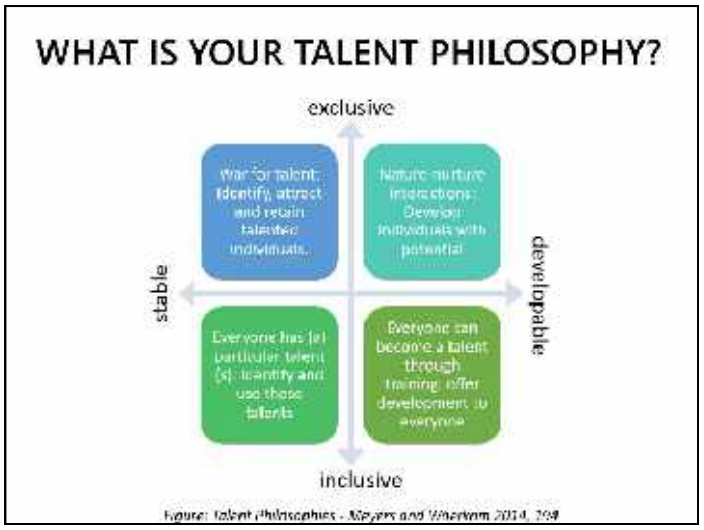


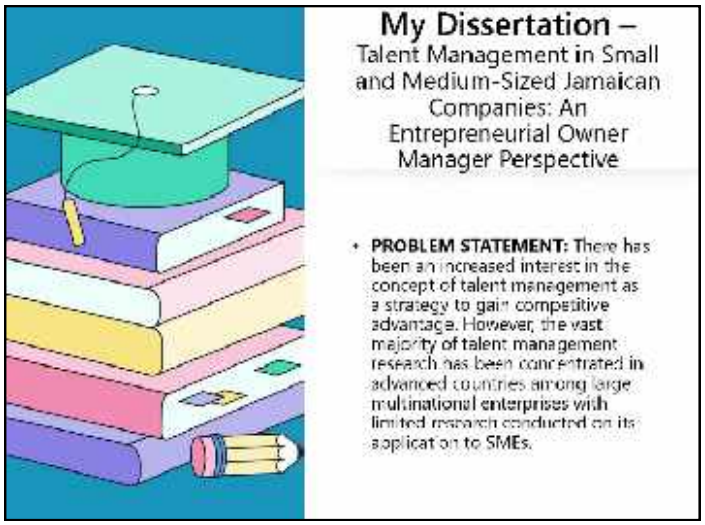






- Provided an overview of her thesis dissertation:
  - Topic: Talent Management in Small and Medium-Sized Jamaican Companies: An Entrepreneurial Owner Manager Perspective.
  - Purpose of the Study: To gain a deeper understanding of own SME managers define talent and talent management, their talent management practices, and how talent management decisions influence their business outcomes.
  - Research Question: How is talent management understood and practised by owners/managers of small businesses in Jamaica?
  - Significance of Study: Contributes to the conceptual/empirical literature on talent management in SMEs, proposes a conceptual framework that focuses on how the characteristics of managers of SMEs influence their talent management decisions and provides an understanding of talent management in SMEs in a Caribbean context.





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1. Jagessar, R. (2024). United Nations-Caribbean Academy of Sciences-Caribbean SIDS Partnership, a new venture, in mitigating environment degradation resulting from climate change. (Seminar Session) CAS 2024 Guest Seminar Series). Caribbean Academy of Sciences (CAS), St. Augustine, Trinidad and Tobago.
2. Hylton, Y. (2024). Sprinting to Greatness: Talent Management Lessons from Athletics. (Seminar Session) CAS 2024 Guest Seminar Series). Caribbean Academy of Sciences (CAS), St. Augustine, Trinidad and Tobago.

SPOTLIGHT

CAS-GRADUATE STUDENT SEMINAR SERIES

GRADUATE STUDENT SEMINAR SERIES HIGHLIGHTS

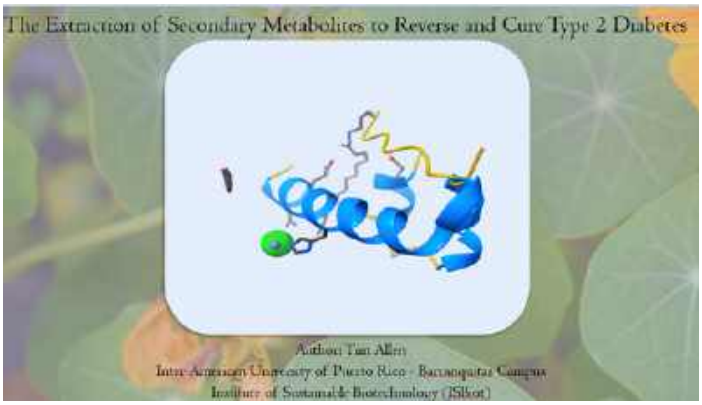
DR. ROSHNIE A. DOON
SECRETARY, CAS REGIONAL (2023-2025)

1. The Extraction of Secondary Metabolites to Reverse and Cure Type 2 Diabetes - Mr. Timothy Allen (Institute of Sustainable Biotechnology (ISBiot), Inter-American University of Puerto Rico - Barranquitas Campus, Puerto Rico).

The Caribbean Academy of Sciences (CAS) first inaugural Graduate Student Seminar was held on June 7th, 2024, where Mr. Allen, a PhD., student at Institute of Sustainable Biotechnology (ISBiot), Inter-American University of Puerto Rico - Barranquitas Campus, Puerto Rico, spoke about the Extraction of Secondary Metabolites to Reverse and Cure Type 2 Diabetes.



During Allen (2024) discussion, he sought to outline his study's research questions, which were to examine:



(1) What sort of antidiabetic properties does the plant Aegle marmelos (Indian bael) must alleviate nephrological damages to the kidney and lower blood sugar levels, effectively?

(2) Will the Indian bael properly grow through micropropagation methods in Puerto Rico's climate?

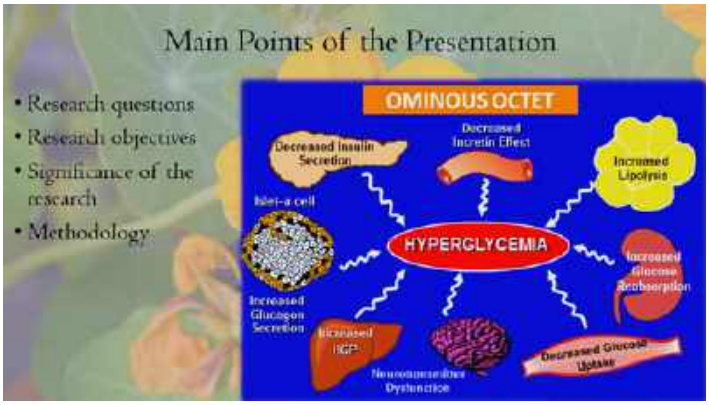
(3) Is the Indian bael more effective when combating damaged pancreatic cells or kidney cells from dialysis patients?

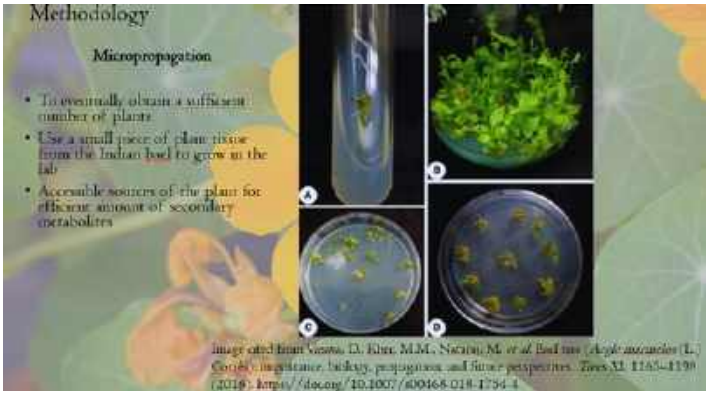
- For his study, Mr. Allen's primary objectives were to first grow the Indian Bael plant in Barranquitas, Puerto Rico. After the Soxhlet Extraction process, he would identify the type and profile the secondary metabolites that have antidiabetic properties using both Thin-layered Chromatography (TLC) and Mass Spectrometry.

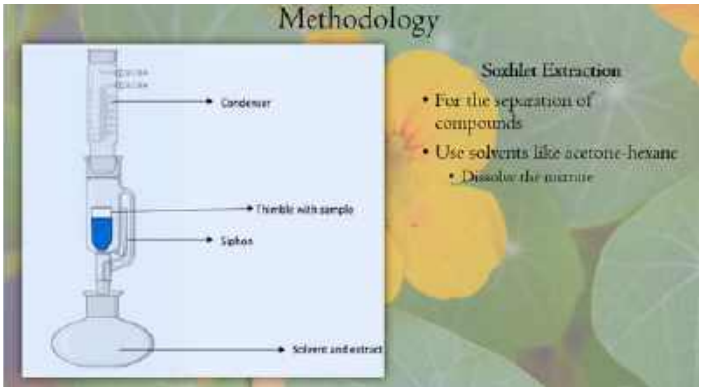
- Using the information gathered, he would then aim to understand how these properties can combat different cell types from the kidney, pancreas, and blood.

- He indicated that his research is quite significant in that it expands the literature on how insulin-resistant cells and nephron tissue react to antidiabetic compounds, which may assist in determining how to increase the functionality of kidneys in diabetic patients.

- Further to this, he explained that the outcome of his study is likely to contribute to the alleviation of Type 2 diabetes, as it not only identifies new medicines that can be used to treat the condition but also more accessible to patients.







2. Leveraging Sargassum-Derived Essential Oils for BBNJ: Enhancing Conservation and Sustainable Use of Ocean Resources-Leneka Rhoden (UWI, Mona, Jamaica).

On Friday 26th, July 2024, the Caribbean Academy of Sciences hosted its second Graduate Student Seminar where Ms. Leneka Rhoden spoke about Enhancing Conservation and Sustainable Use of Ocean Resources using Sargassum Derived Essential Oils for the Biodiversity Beyond National Jurisdiction (BBNJ) also referred to by some stakeholders as the High Seas Treaty or Global Ocean Treaty.

During her presentation Rhoden (2024):

- Provided a background on the BBNJ framework, and how the Sargassum blooms influence the ability of ecosystems and coastal economies to manage its occurrence within the framework.

- Explained that managing Sargassum blooms is crucial to preserving the marine ecosystems and can be used to encourage the sustainable development of coastal communities.

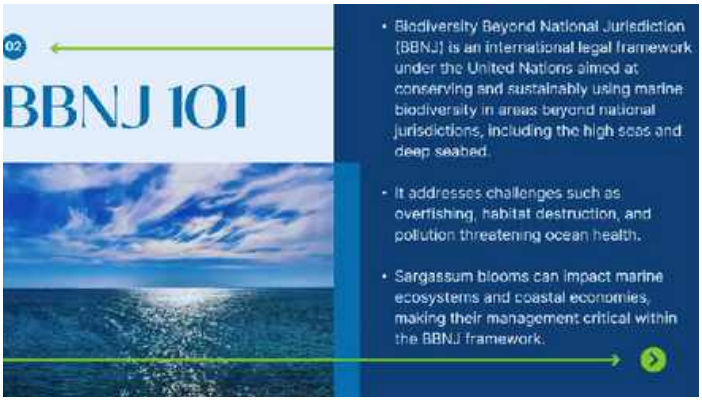
- Highlighted that the Sargassum blooms create several problems for coastal communities such as:
  - (1) reducing the income derived from tourist and fishing activities,
  - (2) nutrient runoff from agricultural activities and environmental pollutants also causing the spread of blooms which in turn negatively affects the health of persons, and again the marine ecosystem
  - (3) use of marine resources can lead to environmental degradation.

- Reviewed the literature on using Sargassum blooms as essential oils and explained her methodology to extract the oil from the bloom.

- Finds that several compounds in the Sargassum-Derived Essential Oils that have a high quality, such as Eugenol have antimicrobial and anti-inflammatory properties, and Limonene have insect-repellent and anti-inflammatory properties.

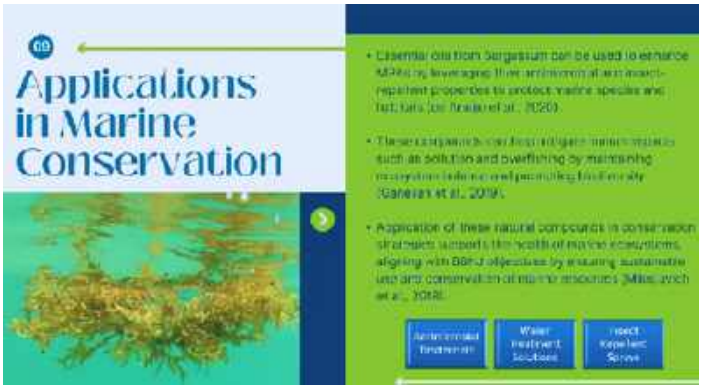








- Emphasized that the use of Sargassum-Derived Essential Oils can be applied in many different areas such as marine conservation in a variety of ways such as by protecting marine species and habitats, maintaining a balanced ecosystem, and encouraging diversity through antimicrobial treatments, water treatment solutions and Insect Repellents.



- Demonstrated how these activities were also in line with the BBNJ framework in terms of Marine Genetic Resources (MGRs), Area-Based Management Tools (ABMTs), Environmental Impact Assessments (EIAs), and Capacity Building and Transfer of Marine Technology (CBTMT).

- Recommended that sustainable practices should be used to harvest the Sargassum to reduce environmental implications and integrate the Sargassum-derived essential oils into MPAs and other conservation initiatives to enhance its effectiveness.



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SPOTLIGHT

CAS-TRINIDAD & TOBAGO (CAS-TT) CHAPTER

CAS-TT PARTICPATES IN THE INTERNATIONAL MANGO FESTIVAL

DR. ALBERTHA JOSEPH-ALEXANDER
(PRESIDENT, CAS-TT)

The Caribbean Academy of Sciences Trinidad and Tobago Chapter (CAS-TT) in collaboration with the Faculty of Food and Agriculture, UWI, had the opportunity to assist with the organising of this year's Mango Festival. This festival is the brainchild of the Network of Rural Women Producers Trinidad and Tobago (NRWPTT). The event was held on June 29th at the JFK Auditorium,UWI, St. Augustine Campus. This year's theme was: 'The Intersection of Mango and Technology:towards a Sustainable future.'





The chapter executive, our chapter members, friends, the department of Mechanical and Manufacturing Engineering and by extension the Faculty of Engineering, UWI, joined together to assist with the planning of the event. CAS-TT, besides being a member of the Mango festival planning committee, also took charge of the registration area for patrons. We also assisted in the drafting of the evaluation criteria for the various competitions.





The chapter also had an information table at the event which included four of the posters from last year's biennial conference being on display. Visitor's had the opportunity to answer questions related to the posters and receive a small token for their efforts. Our newly printed CAS-TT stickers and of course Mangoes, were available for distribution. A short snapshot of the day is included.



About the Authors:

Dr. Albertha Joseph-Alexander is the President of the Caribbean Academy of Sciences – Trinidad and Tobago (CAS-TT) Chapter.

CAS-GUYANA CHAPTER



UN 9TH MULTI-STAKHOLDER FORUM ON SCIENCE, TECHNOLOGY AND INNOVATION FOR THE SUSTAINABLE DEVELOPMENT GOALS
THU 09MAY 2024, 10:00AM - FRI 10 MAY 2024, 6:00PM,
UN HEADQUARTERS NEW YORK
STATEMENT OF THE INTERNATIONAL SCIENCE COUNCIL- STI FORUM 2024 - THEMATIC SESSION 4-FRIDAY 10 MAY 2024

MS. PETAL JETOO
(FORMER CAS REGIONAL SECRETARY)

This statement is delivered on behalf of the International Science Council (ISC), which federates over 250 national science academies and international unions in the fields of natural, social and human sciences.

As we convene to address the need to foster robust STI ecosystems in SIDS, we must recognize both the challenges posed by the unique attributes of island nations, and the fact that SIDS stand resilient, spearheading endeavors towards sustainable development amidst existential risks.

Science, including natural and social sciences, plays a pivotal role in surmounting current and emerging challenges. We therefore stress the urgent need for concerted efforts in several key areas:

- First, **the obstacles to accessing and employing STI in SIDS must be addressed**. These include limited financial and infrastructural resources, limited access to expertise and technology, small and geographically dispersed populations, brain drain, as well as technology transfer challenges.

- Second, we emphasize the imperative of **capacity-building initiatives tailored to the unique contexts of SIDS**. Initiatives such as scholarships, mentorship programs, and career development opportunities are instrumental in retaining local expertise and fostering innovation hubs within SIDS. For instance, our esteemed partners the University of the West Indies, the University of the South Pacific, and initiatives like the Intra-Caribbean Mobility Programme offer models for nurturing STEM talent and fostering collaboration among SIDS.

- Third, we advocate for the **integration of Indigenous Knowledge and Local Knowledge (IKLK) with modern science**. Recognizing the value of traditional wisdom in addressing environmental and societal challenges, we underscore the importance of collaborative frameworks that bridge Indigenous practices with scientific methodologies. Initiatives such as the Caribbean Local and Traditional Knowledge Network and emerging indigenous research methodologies in the Pacific Islands exemplify the nexus between IKLK and modern science, driving sustainable development in SIDS.

- Fourth, SIDS encounter several challenges in accessing and employing STI to accelerate economic growth and ensure sustainable development. **Economic diversification is crucial**, necessitating **reduced reliance on traditional industries** and the exploration of new economic sectors. Supporting startup ecosystems and small businesses, along with fostering collaboration between stakeholders, is essential. Leveraging SIDS' unique assets, such as geographical features and cultural heritage, also presents opportunities for innovation and talent retention.

- Finally, we call for **enhanced partnerships and international cooperation to bolster STI ecosystems in SIDS**. It is imperative that the international community commits to prioritizing science and technology as key drivers of innovation and inclusive growth in SIDS. We urge for increased support for scientific research, capacity-building initiatives, and technology transfer, while also enhancing the visibility of SIDS scientists on the global stage. Partnerships via organizations like the ISC and with UN agencies such as UNESCO and others foster international cooperation. Platforms already exist, such as the Caribbean Academy of Sciences and the future Pacific Islands Academy of Sciences, which serve as conduits for regional collaboration and knowledge exchange, facilitating SIDS' representation in global scientific discourse.



FEATURE ARTICLES

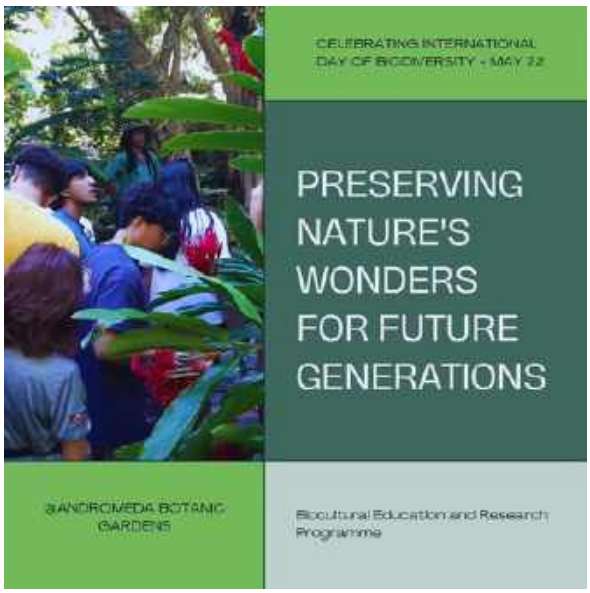
CITIZEN SCIENCE FOR PLANT CONSERVATION AND FOOD SECURITY

DR. SONIA PETER,
EXECUTIVE DIRECTOR BIOCULTURAL EDUCATION AND RESEARCH PROGRAMME

The Biocultural Education and Research Programme was established in 2017 as a non-profit organization with the mandate of promoting the conservation of plant biodiversity for food security and health. An educational platform was launched with the philosophical undergirding of Transformation through Biocultural Education by engaging the target public via citizen science.

The challenges facing Small Island Developing States, in this era of climate change, require engagement outside of the board rooms and summit panels. Response mechanisms must be inclusive and citizens who will be in the fields of impact must be armed with knowledge to make informed decisions. As stated by De Sherbinin et al. (2021), "Citizen science is an important vehicle for democratizing science and promoting the goal of universal and equitable access to scientific data and information."

Further to this, the International Science Council, in its groundwork, reinforces that the United Nations Universal Declaration of Human Rights makes explicit the right to benefit from advances in science and technology, and to access scientific information, whether as a practicing scientist or a lay citizen. The council further stresses that researchers have a responsibility not only to disseminate scientific knowledge within their academic community but also to ensure that it is made accessible to the public (ISC, n.d).



These principles have been embraced by B.E.R.P in the development of tools designed to engage the public in issues of plant conservation, food security, traditional knowledge, and Medicinal and Aromatic Plants (MAPS). Platforms of communication include symposia, workshops, online courses, books, and charts.

The biennial symposium, Plants and Planting for the Future, brings scientists and other professionals together to share their work programs in areas including restoration ecology, agriculture, drug discovery, and biocultural collections. This has been a welcomed strategy by a public eager to tap into a knowledge base that is not only inaccessible but often delivered in a manner that can be considered exclusive. Botanical knowledge, traditional knowledge, and art have been combined to deliver a tool for plant biodiversity and MAPS conservation in the book entitled Yabis Guada.

This coloring book engages the user in the traditional value of selected Caribbean MAPS, their botanical features, and binomial classification. The book is named to honor the indigenous peoples of Barbados (Ichirouganaim) and was produced and published for both youth and adults. The book has been distributed across the public school system. This approach has been expanded to reach students at a primary cognitive level with the development of an educational tool for connection with local/Caribbean food plants, flowers, and MAPS in the form of an alphabet chart and flash cards.





The Caribbean is one of the listed biodiversity hotspots on a global scale. Endemism is high and estimated at approximately 72%. This level of biodiversity reflects an important reserve of molecular endemicity as the biosynthetic pathways will be regulated by unique enzymatic systems. It is, therefore, paramount that conservation be seen as a priority for the region, especially with the pending impacts of climate change. Botanical reserves are important for the conservation of plant biodiversity and B.E.R.P has engaged in the establishment of MAPS reserves.



An Ethnobotanical Garden has been developed in collaboration with Andromeda Botanic Garden with a focus on species that have been documented as being part of the landscape in the 1600s – 1800s by naturalists from the period, including Hans Sloane who donated his herbarium collection to the Natural History Museum in the UK.

A modern collection is in development at the recently opened EBG that features plant families including Euphorbiaceae, Lamiaceae, Boraginaceae, Liliaceae, and Caesalpiniaceae. Prominent species include Caesalpinia pulcherrima, Croton flavens, Ricinus communis, Cassia alata, and Ocimum campechianum. Phytochemical research is also being conducted on selected species for molecular diversity and potential applications.

Agriculture and food security are inextricably linked, and the Caribbean has a vulnerability, due to climate variability and change, exacerbated by the dependence on imported food supplies. Vision 20 by 2025 is a target set by the Caricom Community to reduce the Caribbean food import bill by 25% by the year 2025 via the promotion of agriculture of priority crops. At the level of citizens, their involvement should be encouraged within a 'Feed Ourselves' program. B.E.R.P approaches this conceptualization at the youth level, promoting food gardens in schools with the provision of planting materials, tools and literature.

To date, the research and education programming has seen significant success with the execution of three symposia, contact across fifteen schools, publication of two books, one documentary and a series of workshops and online classes. This programming will be offered to other Caribbean islands. The fourth edition of the Plants and Planting for the Future symposium takes place in April 2025 under the theme 'Conservation of Plant Biodiversity for Food, Medicine and Resilience'.

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About the Author:

Dr. Sonia Peter established the Biocultural Education and Research Programme in 2017 after leaving the post of Department Head in Chemistry and Environmental Science at the Division of Natural Sciences at the Barbados Community College. Her research focus is natural products with flavonoids in Caribbean Lamiaceae as a focal point. Papers can be found in related scientific journals including Phytochemistry, Natural Products, Tetrahedron, Economic Botany, Nature, and Environmental Science and Health, as well as conference proceedings.

She is the recent recipient of a certificate of recognition for her current work in biocultural education from the American Association for the Advancement of Science, Caribbean Chapter, and winner of the Phytoinnovation Award from Export Barbados (Barbados Industrial and Development Corporation) for the development of a traditional treatment for Type 2 Diabetes. Dr. Peter is the author of the book Seed Under the Leaf (new edition pending) and producer of the documentary Healing Roots (YouTube).

THE EXTRACTION OF SECONDARY METABOLITES TO REVERSE AND CURE TYPE 2 DIABETES

MR. TIMOTHY ALLEN
INSTITUTE OF SUSTAINABLE BIOTECHNOLOGY (ISBIOT),
INTER-AMERICAN UNIVERSITY OF PUERTO RICO - BARRANQUITAS CAMPUS, PUERTO RICO.

I'm a graduate student studying to earn a doctorate in International Biotechnology. This program focuses on plant biotechnology and is at the Inter-American University of Puerto Rico - Barranquitas Campus. The research mostly takes place in the Institute of Sustainable Biotechnology where the main laboratories are located. My dissertation focuses on type 2 diabetes (T2D) and how its resistance to insulin causes several medical issues in patients, which is catalyzed by hyperglycemia. The overall goal is to pinpoint a species of interest from either the Hypoxidaceae or Rutaceae family. One of the florae, I'm seeking to study is Aegle marmelos commonly known as Indian bael, which contains antidiabetic properties for reducing blood sugar.



Aegle Marmelos (Indian Bael)

The three research questions that come to mind are first, what sort of antidiabetic properties does the plant Aegle marmelos (Indian bael) must alleviate nephrological damages to the kidney and lower blood sugar levels, effectively?

Second, will the Indian bael properly grow through micropropagation methods in Puerto Rico's climate?

Lastly, is the Indian bael more effective when combating damaged pancreatic cells or kidney cells from dialysis patients?

Furthermore, the objectives tied to these three research questions are to successfully grow Indian bael in Barranquitas, Puerto Rico. Once this is done then we follow up by identifying each type of secondary metabolite from the Indian bael and profile any secondary metabolites with anti-diabetic properties. Finally, is to understand how the antidiabetic medicinal compounds combat different cell types ranging from the kidney, pancreas, and blood.

The methodology begins with micropropagation of the Indian bael to obtain enough plants to utilize and extract enough secondary metabolites. Also, the Soxhlet extraction to separate compounds will be done using solvents like acetone-hexane. After this methodological step, thin-layered chromatography (TLC) to further identify all the secondary metabolites.

The metabolic disorder, T2D affects many people around the world as numbers increase each year. There needs to be accessible sources of medicine derived from plant-based materials like roots, leaves, stems, fruits, petals, etc. The secondary metabolites will be potentially tested on insulin-resistant cells, kidney tissue, and blood samples from dialysis patients to see if there's an increase in kidney activity.

Discovery of new sources for medicine may lead to alleviating T2D, which will offer the development of attainable pharmaceutical drugs to assist with type 2 diabetes worldwide.

About the Author:

Mr. Timothy Allen's academic journey has been marked by a strong dedication to the field of biotechnology and a commitment to making meaningful contributions to scientific research. His background in Biology and Applied Biology (Translational Life Science Technology) which he pursued at the Community College of Baltimore and the University of Maryland, has provided him with a solid foundation in the life sciences, which he has further developed through his work in bacterial and cancer research.

His interest in ethnobotany reflects his desire to explore the intersection of traditional knowledge and modern scientific advancements, seeking innovative solutions to complex biological challenges. With his current pursuit of a PhD in International Biotechnology at the Inter-American University of Puerto Rico, Mr Allen is poised to continue pushing the boundaries of scientific discovery and making a positive impact on global health and environmental sustainability.

SARGASSUM-DERIVED ESSENTIAL OILS FOR BBNJ: ENHANCING CONSERVATION AND SUSTAINABLE USE OF OCEAN RESOURCES

LENEKA RHODEN
THE UNIVERSITY OF THE WEST INDIES (UWI), MONA, JAMAICA.

The presentation, titled 'Sargassum-Derived Essential Oils for BBNJ: Enhancing Conservation and Sustainable Use of Ocean Resources,' focuses on the integration of Sargassum-derived essential oils into the international Biodiversity Beyond National Jurisdiction (BBNJ) framework, a legal framework under the United Nations aimed at conserving and sustainably using marine biodiversity in areas beyond national jurisdiction.

BBNJ is an international legal framework under the United Nations to conserve and sustainably use marine biodiversity in areas beyond national jurisdictions, including the high seas and the deep seabed. It came into effect in 2023 and already, over 90 countries have signed and 8 ratified – this includes our very own Belize and Cuba. We need 60 ratifications by June 2025 for the treaty to come into force.

The BBNJ framework covers approximately 50% of the Earth's surface and plays a critical role in preserving global biodiversity. It is important to manage Sargassum blooms, which have become prevalent in the Atlantic Ocean and Caribbean Sea. These blooms create massive floating mats that can disrupt marine ecosystems and affect coastal economies, making their management crucial within the BBNJ framework.

Factors such as nutrient runoff from agriculture, increased sea temperatures due to climate change, and changes in ocean currents contribute to the proliferation of Sargassum blooms. These blooms can disrupt marine life by blocking sunlight, depleting oxygen levels in the water, and smothering coral reefs.

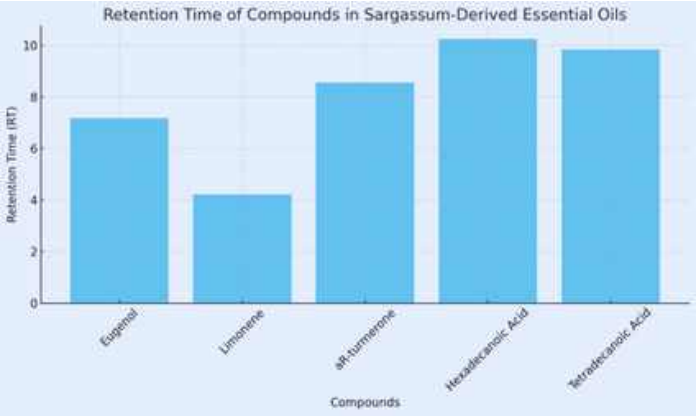
Essential oils are volatile aromatic compounds extracted from plants, known for their bioactive properties. These oils are used in various industries, including pharmaceuticals, cosmetics, and agriculture. The research explores the potential of utilizing Sargassum for essential oils as a sustainable solution to manage excessive biomass produced by blooms, which not only addresses environmental issues but also creates economic opportunities. The research on Sargassum-derived essential oils aligns with BBNJ's objectives by promoting the sustainable use of marine resources through innovative and eco-friendly practices.

The methodology involves collecting Sargassum off the coast, drying it, and using steam distillation and solvent extraction (Hexane and Dichloromethane) to isolate essential oils. Gas Chromatography-Mass Spectrometry (GC-MS) analysis is used to identify and quantify the chemical constituents, providing detailed information on the composition of the essential oils. Key findings from the analysis reveal the presence of compounds such as Eugenol and Limonene, which have significant bioactive properties, including antimicrobial, anti-inflammatory, and insect-repellent effects.

Eugenol and other compounds can be used in antimicrobial treatments to protect marine species from pathogens, while Limonene-based sprays can serve as insect repellents in coastal and marine habitats. It is integral to include these natural compounds into conservation strategies as they can enhance the health and resilience of marine ecosystems, aligning with BBNJ's objectives of sustainable use and conservation of marine resources.

The integration with the BBNJ framework is discussed in four key areas: Marine Genetic Resources (MGRs), Area-Based Management Tools (ABMTs), Environmental Impact Assessments (EIAs), and Capacity Building and Transfer of Marine Technology (CBTMT). The research supports the sustainable use of marine genetic resources, enhances Marine Protected Areas (MPAs) through the application of natural compounds, aligns with the goals of EIAs by promoting eco-friendly practices, and contributes to capacity building by fostering knowledge transfer in sustainable marine resource management.

Key recommendations include implementing sustainable harvesting practices for Sargassum, integrating Sargassum-derived essential oils into MPAs and other conservation initiatives, and promoting blue economy initiatives. These recommendations aim to ensure minimal environmental impact, enhance conservation strategies, and create new economic opportunities, thereby supporting the BBNJ framework's goals of sustainable use and conservation of marine resources.



This graph illustrates the retention time (RT) and quality score of compounds detected in Sargassum-derived essential oils.
Retention time indicates the time taken for a compound to pass through the chromatography column, while the quality score reflects how well the detected compound matches the reference spectrum. Compounds like Eugenol and Limonene, which have high quality scores, are key for their bioactive properties, making them valuable for marine conservation.



This bar chart displays the area percentages of various compounds identified in the essential oils extracted from Sargassum.
A higher area percentage signifies a greater abundance of that compound in the sample. The chart shows that Eugenol, with a significant area percentage, is one of the most abundant and important compounds in the essential oils, which has antimicrobial and anti-inflammatory properties.

About the Author:

Born and raised in Jamaica, Leneka holds a degree in Marine Biology and International Relations and an MPhil Candidate at the University of the West Indies, Mona. She has dedicated her efforts to integrating science, policy, and law to advise on ecosystem-based management for safeguarding marine ecosystems within and beyond national jurisdictions. She has worked with the Commonwealth Blue Charter to champion ocean conservation and has led dialogues with local NGOs on marine protected areas. Leneka has worked with Governments across the Caribbean and Africa to promulgate policy frameworks and guidelines on sustainable development and energy. Her work supports countries in achieving their climate goals by addressing data and institutional gaps in their existing Nationally Determined Contributions (NDCs). Leneka is an Advisory Board Member of the Deep-Ocean Stewardship Initiative (DOSI) and serves as the Caribbean Regional Campaign Lead for the Biodiversity Beyond National Jurisdiction (BBNJ) Treaty.

SPRINTING TO GREATNESS:
TALENT MANAGEMENT LESSONS FROM ATHLETICS

YOLANDE HYLTON
THE UNIVERSITY OF THE WEST INDIES (UWI), MONA, JAMAICA,
& HYLTON INSIGHTS, JAMAICA

Introduction

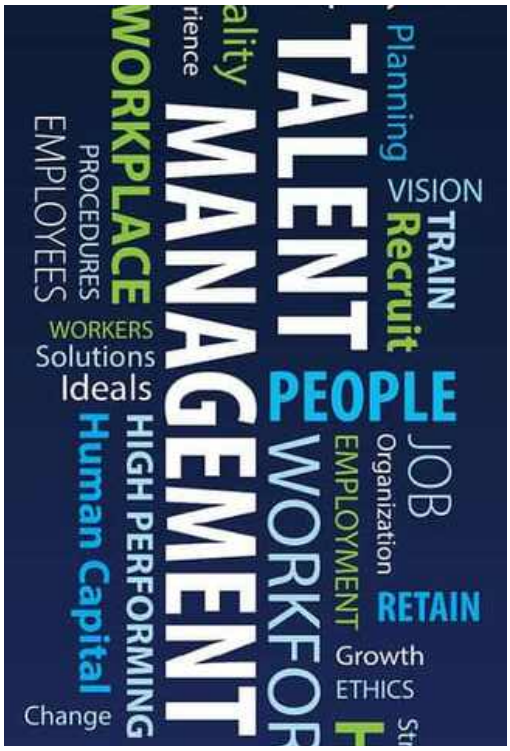
Jamaica is renowned for creating global superstars in athletics despite resource challenges. Initially, these athletes would leave Jamaica to acquire training and development in more advanced nations. However, in the late 90s, armed with an idea, the Maximising Velocity and Power Track and Field Club (MVP) was formed to offer athletes an opportunity for local development. A few people thought that the founders of MVP were crazy. Why would an athlete choose to stay in Jamaica for their development? With time, MVP proved that the crazy idea was viable as their athletes' broke records and won medals on the global stage. This piqued my interest in talent management. Could businesses learn talent management lessons from sports and win the war for talent? This article explores how businesses, particularly SMEs, can apply talent management lessons from the world of athletics to win the war for talent.

What is Talent Management?

Talent Management is "aimed at the systematic attraction, identification, development, engagement/retention and deployment of high potential and high performing employees, to fill in key positions which have significant influence on organization's sustainable competitive advantage," (Gallardo-Gallardo & Thunnissen, 2016). If we break down the elements of this definition it suggests that the organization is firstly aware of the key positions it needs to fill. Additionally, a talent management plan should also exist which defines talent and considers how the company will attract, develop, engage and retain people starting with the development of a talent pipeline.

The Jamaican Athlete Talent Pipeline

In Jamaica there are annual athletic championships at the primary, preparatory and high school levels. However, it is at the high school level at 'Champs' that identification of talent, specifically students that have the potential to grow in the sports begin.



Although, Jamaica has always had a talent pool, about 25 years ago, the 'most talented' athletes didn't choose to stay in Jamaica for their training and development. International scouts come to identify and attract high-calibre athletes who can be developed at international institutions. However, the founders of MVP thought, what if we were able to provide a Jamaican option for post- high school track and field training?

This required a strategy to combat the war for talent.

The MVP Strategy: Identifying Hidden Gems

MVP acknowledged that it would be challenging to attract the obvious superstars from 'Champs'. The founders had to get innovative (MVP, n.d). The MVP Track Club's strategic approach included:

1. Developing their strategic intent. The MVP Track Club had a vision and a distinctive mission.
2. Identifying, targeting and developing non-superstar athletes i.e. not the athlete scouts would recruit.
3. Researching what it would take to train international athletes.
4. Establishing relationships with international entities involved in the world of athletics.
5. Investing in professional development as all founders had to become certified as IAAF officials or IAAF coaches
6. Partnering with the University of Technology (Utech) which provided education, accommodation and training facilities for athletes
7. Committing significant personal financial resources to this vision

MVP executed their strategy and recruited Brigette Foster-Hylton as its first athlete. Within a year she qualifies for the final in 100m hurdles. In 2001 an athlete who won no races at Champs, and didn't even make a Champs was the second person to join MVP. This was Asafa Powell who by 2005 was breaking world records. This was significant for MVP who since then has identified and developed global superstars such as Shelly-Ann Fraser-Pryce, Elaine Thompson-Herah, Tajay Gayle and recently Kishane Thompson. This list is by no
means exhaustive. Can businesses, especially small and medium-sized enterprises (SMEs) win the war for talent against global competition with a strategic talent management approach? There are clearly lessons that SMEs can learn from MVP.



Lessons SMEs can Learn from the MVP Story

1. SMEs can focus on identifying potential rather than established talent, allowing them to develop employees who align with their unique culture and needs.
2. With limited resources, its crucial for SMEs to refine their hiring processes to identify candidates with the right attitude and potential, not just qualifications.
3. SMEs can create a competitive advantage by ensuring every team member, from support staff to leadership, is high-quality and aligned with the company's mission.
4. By investing in training and development, SMEs can build loyalty and skills potentially reducing turnover and increasing productivity.
5. In smaller organizations, strong relationships between leadership and employees can foster a culture of trust and high performance.

Conclusion

The success of Jamaica's MVP track club demonstrates that with the right talent management strategy, even smaller organizations can compete on a global stage. By focusing on identifying potential, developing talent, building the right team, and creating an environment for success, businesses of all sizes can sprint ahead in the race for talent.

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About the Author

Ms. Yolande Hylton is the Managing Director of Hylton Insights, a Management and HR Consultancy Firm based in Kingston, Jamaica with a mandate to bring the world of theory and practice together to bolster "I think" and couple it with research that will provide more sustained and impactful solutions to improve the efficiency and effectiveness of individuals and companies. She has over 14 years of experience in the Financial Industry, 8 of which was spent managing Retail and Small Business performance analytics. In particular, she led and oversaw the Metrics and Measurement – Analytics team for the English Caribbean Region (Barbados, Bahamas, Cayman, Jamaica, Trinidad, Turks and Caicos Islands) at Scotiabank. Additionally, Yolande has over 10 years experience as an Adjunct Lecturer at the University of the West Indies (UWI), Mona Campus teaching foundation HRD and Business courses to students at the graduate and undergraduate levels. A few courses she has taught include Human Resource Management, Organizational Behaviour, Organizational Development, Organizational Theory, Team Building, and Operations Management. Yolande earned a bachelor's degree in management studies (First Class Honours) and a master's degree in human resource development (Distinction) from the University of the West Indies (UWI). She is currently pursuing a Doctor of Business Administration (DBA) at the Mona School of Business and Management where she is researching talent management and the role it plays in firms.

ARE CARIBBEAN MANGROVES THE NEW MICROBIOLOGY ELDORADO TO STUDY GIANT CHEMOSYNTHETIC BACTERIA?

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Abstract

Mangroves are unique intertidal ecosystems characteristic of tropical and subtropical regions with a generally accepted role of coastline's protection and stabilization. The chemical characteristics of Caribbean mangrove's sediments allow the development of a wide range of bacteria, particularly thioautotrophic bacteria. This study aims to show the strong presence of sulfur-oxidizing chemosynthetic organisms in the seaside mangroves of Guadeloupe, in order to demonstrate the richness of these bacterial families through the marine mangroves of the Caribbean. The task here will be to analyze two main sulfur-oxidizing bacterial genera covering the marine sediment of mangrove and perform EDX analysis to confirm the metabolic pathway linked to the sulfur cycle of such bacteria. Observations and EDX analyses showed spherical cells containing both cytoplasmic elemental sulfur and calcium inclusions, suggesting that they could belong to the Chromatiacea family. The results presented here also described Gammaproteobacteria belonging to the Beggiatoacea family (Isobeggiatoa and Maribeggiatoa genera), and Cyanobacteria. The mangrove ecosystem is very present in the Caribbean, it is a true model ecosystem for the study of sulfur-oxidizing bacteria, in particular because of its accessibility and the richness of the diversity of species found within these marine mangroves.

Introduction

Mangroves are unique intertidal ecosystems characteristic of tropical and subtropical regions, covering 70% of their coastlines. They protect and stabilize the coastline and are sources of nutrients for coastal waters (Sievers et al., 2023). They are characterized by sediments with high redox potential values, dynamic salinity levels, and a large reservoir of organic matter with high nutrient recycling rates. These characteristics make mangroves "hot spots" for microbial diversity. These microbial communities play a crucial role in cycling carbon, nitrogen, phosphorus, sulfur, and thus control the chemical environment of mangrove sediments (Alongi et al., 1993; Crémière et al., 2017; Gontharet et al., 2017). Mangroves are particularly effective at storing atmospheric carbon, making them blue carbon ecosystem (Lovelock et al., 2020).

Mangroves throughout the Caribbean are subject to little tidal range, with very low tidal coefficients. Thus, sediments are continuously submerged, accumulating large quantities of organic matter coming either from the canopy of Rhizophora mangle or from marine fauna. This organic matter is degraded in the anoxic layers of the sediment by sulfate-reducing bacteria, producing high concentrations of sulfides (H2S, HS-) that can reach up to 2.4 mM (Jean et al., 2015). These sulfides diffuse passively across the marine sediment surface, serving as an energy source for chemosynthetic sulfur-oxidizing bacterial communities.

Chemosynthesis is a metabolic pathway for the synthesis of organic compounds from the reduction of inorganic carbon (CO2) using energy derived not from light, as in photosynthesis, but from reduced inorganic or organic compounds, such as hydrogen, sulfides or methane (Yang et al., 2011). Marine mangroves contain large quantities of reduced chemical compounds such as hydrogen sulfide, making them an ideal ecosystem for chemosynthesis (Laurent et al., 2009; Crémière et al., 2017). Chemosynthetic bacteria live at the oxic-anoxic interface of anoxic sediment and oxygenated seawater in order to benefit from sulfide production from the lower sediment layers before they are naturally oxidized by the oxygen present in seawater (Jean et al., 2015; Grimonprez et al., 2018).

Chemosynthetic bacteria found in this environment can live as free-living organisms moving through the water column or attached to hard substrates on the sediment (as plant materials or oyster shells) or as symbionts with various invertebrates (Grimonprez et al., 2018). They can form complex assemblages of macroscopic multicellular filaments called microbial mats (Delfino et al., 2012). In seaside mangroves, bacterial mats are made up of filamentous sulfur-oxidizing bacteria (Beggiatoaceae), Cyanobacteria, purple sulfur bacteria, and Campylobacterota (Guidi-Rontani et al., 2014; Jean et al., 2015; Gros et al., 2018; Sylvestre et al., 2022; Halary et al., 2024). These mats also contain benthic invertebrates such as crustaceans, gastropods nematodes, as well as ciliate and flagellate protists (Grimonprez et al., 2018).

Fixed chemosynthetic bacteria, for their part, are found mainly on woodfalls from Rhizophora mangle plant materials (Laurent et al., 2009). A number of these chemosynthetic bacteria concern Large Sulfur Bacteria (LSB) which are remarkably large compared to “normal” most bacterial cells (Ionescu et al., 2023). Bacteria of the family Beggiatoaceae form centimeter long filaments with a diameter from 60 to 120 µm (Jean et al., 2015) while those of the Campylobacterota (genus Thiovulum) are single cells with a diameter that can reach up to 50 µm (Sylvestre et al., 2022).

Large sulfur-oxidizing bacteria from mangroves have not been isolated in culture and remain poorly studied. Yet, they have a number of interesting features, including extreme forms of gigantism and large polyploid genomes with a high potential of discovery for new molecules of interest (Ionescu et al., 2017; Volland et al., 2022). Bacteria are known to be major carbon fixers and bacterial mats can extend over very large surfaces, sometimes kilometer-long, therefore accounting for a large biomass (Ding et al., 2007; Valentine et al., 2016). Mats of sulfur-bacteria from the deep sea have been shown to have a major ecological impact in benthic nitrogen, sulfur, and iron cycling (Valentine et al., 2016; Yousavich et al., 2024). It is therefore necessary to gain a better understanding of their occurrence and biodiversity in Caribbean mangroves.

This study aims at showing the strong presence of sulfur-oxidizing chemosynthetic organisms in the seaside mangroves of Guadeloupe and Jamaica. We analyzed two bacterial genus from the mats and performed Energy Dispersive X-ray analyses to interrogate the presence of intracellular sulfur granules and confirm the chemosynthetic sulfur-oxidizing nature of these species.

Material and Methods

I) Sample collection

Samples of bacterial mats were manually collected from a depth of approximately 1 m, using a 50ml-syringe, from the periphyton of marine mangrove under Rhizophora mangle canopy from the Manche à Eau lagoon in Guadeloupe (Latitude 16°16'39"N and Longitude 61°33'24"W) and from Salt River, Clarendon in Jamaica. Cells from the genera Achromatium, Isobeggiatoa and Maribeggiatoa were purified in the laboratory before analysis.

II) Purification of Achromatium and Beggiatoa cells

Spherical bacterial cells were recovered by filtering successively the bacterial mat twice through a nylon screen of 90 µm followed by a 26 µm. The filtrate was then pipetted clean of impurities, leaving only a purified fraction of Achromatium-like cells. Isobeggiatoa and Maribeggiatoa filaments were sorted under a binocular magnifying microscope from the collected mat sample within 1 hour after collection.

III) Preparation of cells for EDX analysis

Purified cells were fixed for 15 minutes in a 2.5% glutaraldehyde solution in 0.2 µm filtered seawater before dehydration in graded concentrations of acetone baths (30%, 50%, 95%, 100%, 10 minutes each), critical point dried in CO 2, and sputter-coated with gold before observation with a Quanta 250 FEI SEM at an accelerating voltage of 20kV. For EDX analyses, samples were observed at 15 kV under an environmental pressure of 7 Torr at 8°C to detect elemental compounds of individuals. Just before observation, samples were quickly rinsed in deionized water to remove salts. EDX spectra were obtained using an M-max 50-mm2 Oxford detector.

Results and Discussion

The white bacterial mats covering the sediment of marine mangrove (Fig. 1A) were composed of several macroscopic bacterial species. Based on morphology, different cell types were observed, including white, translucent, green and pink multicellular filaments (Fig. 1C) as well as large white oval single cells (Fig. 1B).

After purification, large oval cells, ca. 30 µm long, were observed (Fig. 1B). These cells contain large cytoplasmic inclusions and EDX analysis revealed the presence of elemental sulfur and calcium (Fig. 1D). Bacteria from the Achromatium genus (Chromatiaceae) are characterized by large cell sizes, oval shapes and both cytoplasmic sulfur granules, as previously described (Head et al., 1996; Schorn et al., 2020), and CaCO 3 inclusions (Ionescu et al., 2017). While Achromatium spp. have never been reported from the mangrove environment, our morphological observations and elemental analysis suggest that the large single-cells isolated from marine mangrove mats belong to the Achromatium genus. These results have to be confirmed by further molecular analyses.

In addition, we purified and characterized macroscopic white filamentous bacteria. Two morphotypes were observed with diameters of 120µm and 60 µm respectively, both multicellular and consisting of an assembly of discoid cells (Fig. 1C). EDX spectral analysis (Fig. 1E) confirms the presence of elemental sulfur within these cells. Two species of Beggiatoacae have been described from the mangrove of Guadeloupe: Maribeggiatoa and Isobeggiatoa (Jean et al., 2015). Indeed, the literature describes these genera as filaments made up of an assembly of sulfur-oxidizing discoid cells (Jean et al., 2015). The presence of elemental sulfur within the cells according to EDX spectra obtained from various cells strongly suggest the sulfur-oxidizing chemosynthetic nature of these species (Volland et al., 2018).

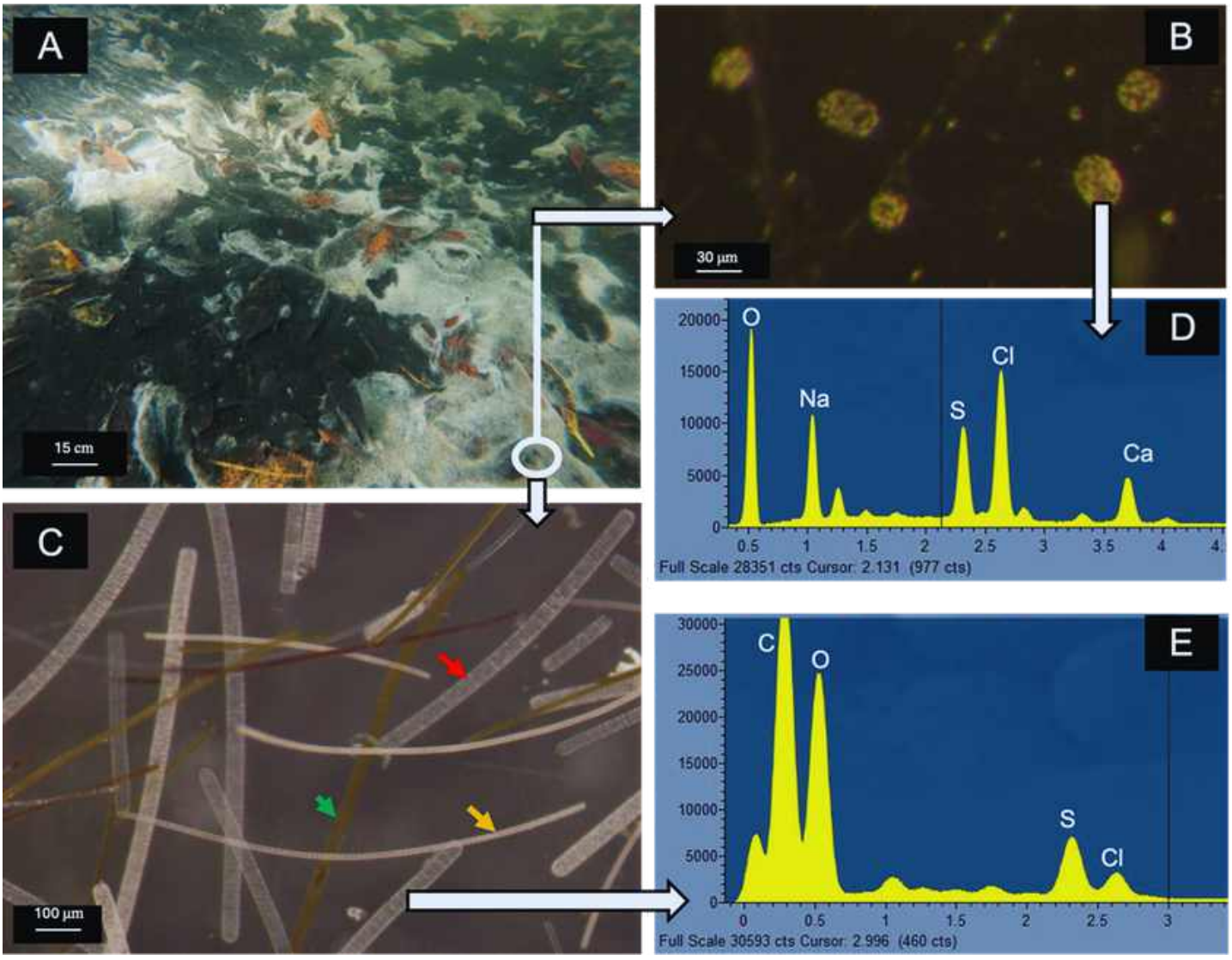


Figure 1. A: In situ observation of the bacterial mat (~1 m depth) mostly made of Large Sulfur Bacteria (LSB) from the Beggiatoaceae family. B: Light micrograph of individual cells of putative Achromatium cells. C: Higher magnification of filamentous bacteria identified as Isobeggiatoa (yellow arrow), Maribeggiatoa (red arrow), and cyanobacteria (green arrow). D-E: EDX spectra obtained from an Achromatium-like cell showing peaks of calcium and elemental sulfur (D), while Maribeggiatoa filament was characterized by a peak of sulfur with no detectable calcium.

Our results show the importance of studying mangrove bacterial communities as they play an important role in nutrient recycling and truly control the chemical environment of mangrove sediments (Alongi et al., 1993; Crémière et al., 2017; Gontharet et al., 2017). The mangrove ecosystem is very present, with 15,000 hectares of listed mangroves in the Caribbean (Imbert et al., 2018), it is a true model ecosystem for the study of sulfur-oxidizing bacteria, in particular because of its accessibility and the richness of the diversity of species found within these marine mangroves. Moreover, many of these species present a very large size (either as multicellular filamentous bacteria or as giant single cells) compared to conventional bacteria, particularly in the Guadeloupe mangrove where the world's largest bacterium, Candidatus Thiomargarita magnifica, has been described recently (Volland et al., 2022). Thus, Caribbean marine mangroves represent an exceptional potential for discovery in Microbiology. Today, we need to step up our research efforts in this unique ecosystem.

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After beginning his academic journey in the Caribbean, Jean-Marie Volland moved to the Indian Ocean and received his B.S. in Biological Science with a focus on organismal biology from the University of Reunion Island. He then pursued a Master's program in environmental science and coastal ecosystems at La Rochelle, France, before returning to Guadeloupe in the Caribbean to complete a Master's degree and a PhD in Physiology and Biology of Organisms, Populations, and Interactions. His doctoral research shed light on the symbiotic relationships between sea snails and Sporozoan endobionts, highlighting their potential benefits, particularly in the context of conserving species like the Queen Conch. During his first postdoctoral fellowship at the University of Vienna, Jean-Marie delved deep into the study of chemosynthetic microbial symbiosis, similar to those found in deep-sea ecosystems. This was followed by a second postdoctoral project in the Caribbean, focusing on chemosynthetic symbiosis between nematodes and bacteria, thereby broadening his expertise in marine microbiology. His career then took a significant turn in California, where he joined as a project scientist at the Laboratory for Research in Complex Systems, also affiliated with the DOE Joint Genome Institute. Here, his pioneering research on giant chemosynthetic bacteria laid the groundwork for his current role as an Assistant Professor at the University of California Santa Barbara, where he aims to continue unraveling the mysteries of microbial life.

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Olivier Gros was born in Pointe-à-Pitre Guadeloupe in 1970. After obtaining a Master's degree in microbial ecology in 1994 in Lyon (France), he went back to Guadeloupe for a Ph.D obtained in April 1997. This Ph.D focused on bacterial symbioses in Mollusc bivalves of the family Lucinidae colonizing seagrass bed and mangrove in the Caribbean. This was followed by a short post-doctoral fellowship in the laboratory of Prof H. Felbeck at the Scripps Institution of Oceanography in San Diego, California (USA). He then got a position at the Université des Antilles et de la Guyane in 1998 in Guadeloupe as an assistant professor. He has been a full professor at the University des Antilles since 2009. His studies focus mainly on the microbiology of Caribbean coastal marine ecosystems (mangroves and sea grass beds), studying both free-living bacteria (cyanobacteria and sulfur-oxidizing bacteria) and those involved in symbiotic relationships with various marine invertebrates (bivalves, nematodes, protists, etc.). Olivier Gros supervises and has supervised 20 Ph.D students and is the author and/or co-author of more than one hundred scientific articles and more than 200 posters and oral communications presented at international conferences. He is the head of the team "Biologie de la mangrove" from the UMR ISYEB located in Guadeloupe and is the director of the C3MAG (Centre Commun de Caractérisation des Matériaux des Antilles et de la Guyane).

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UNITED NATIONS-CARIBBEAN ACADEMY OF SCIENCES- CARIBBEAN SIDS PARTNERSHIP, A NEW VENTURE, IN MITIGATING ENVIRONMENT DEGRADATION RESULTING FROM CLIMATE CHANGE.

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Abstract

The Caribbean SIDS (CSIDS) like all other SIDS is vulnerable to environmental damages, resulting from climate change. The latter, resulting from global warming can destroy the infrastructure of CSIDS, induce flooding, loss in food security, loss in marine and terrestrial diversity, ecosystem destruction, soil erosion etc. Thus, there is an urgent need to prevent environmental damage, resulting from climate change effects in CSIDS. Various partnerships can be sought of which the United Nations-Caribbean Academy of Sciences-Caribbean SIDS partnership is proposed in this presentation. This partnership is expected to address the environmental dimension which affects the economic and social dimensions. All three dimensions are interconnected and thus a holistic effort is necessary to mitigate environmental damage and protect CSIDS. This presentation will focus primarily on the education dimension. Education is fundamental for the fulfilment of all UN 17 sustainable development goals. It's one of the major pillars of sustainable development. This partnership is expected to be transparent and be monitored with various consultations during its tenure. It's anticipated that the United Nations will provide the necessary funding, and CAS will act as a vehicle for the transfer of funding to CSIDS. In addition, CAS can function as one of the monitoring and consulting agents.

Keywords: Caribbean SIDS, environmental damage, CSIDS infrastructure, food insecurity, United Nations, CAS.

1. Introduction

Caribbean Small Island States (CSIDS), like other SIDS, are the most vulnerable to climate change effects, resulting from global warming [1-5]. Climate change is said to have resulted in more forceful hurricanes in CSIDS yearly, a rise in the Caribbean Sea and a loss in biodiversity, both marine and terrestrial. This usually destroys the island infrastructure, heavy rainfall, flooding, soil and shoreline erosion etc. These conditions are exacerbated by CSIDS below sea-level status. Caribbean SIDS are the most vulnerable to climate change effects such as rise in sea levels, flooding, sea line erosion, infrastructure destruction via forceful hurricanes, and decline in crop production and productivity. Thus, there is an urgent need to curb climate change and mitigate its destructive effects on Caribbean Small Island States, CSIDS. This can be done via three dimensions. These are economic, environmental and social. Whatever the dimension is, it will entail significant funding. The best solution is to form a collaboration unit with a donor monitoring agency. Thus, there is a need to establish a United Nation-Caribbean Academy (CAS)-SIDS Partnership, abbreviated as UN-CAS-SIDS. The United Nations is notorious for providing funding to numerous projects worldwide [6-7].

The Caribbean Academy of Sciences, CAS is a non-profit organization. It was inaugurated at an international seminar on "Science, Development and Society" at the Central Bank Auditorium in Port of Spain, Trinidad on 16th and 17th May 1988. The idea of establishing a Caribbean Academy of Sciences (CAS) was informally proposed at the 21st General Assembly Meeting of the International Council of Scientific Unions [ICSU] in Bern, Switzerland, September 1986 [8].

The objectives of the CAS have been:

(1) To provide a forum for the interchange of ideas amongst scientists on important issues related to the application of Science and Technology.

(2) To serve as a source of advice to regional governments and regional governmental and non-governmental organizations in scientific and technological matters.

(3) To facilitate cooperation amongst scientists and promote the execution and coordination of scientific research in all its aspects.

(4) To liaise with relevant research organizations and assist in facilitating their mutual interaction.

(5) To recognize and reward outstanding performance and achievement within the region in the fields of Science and Technology.

(6) To undertake, and collaborate in, the collation and publication of results of scientific research.

(7) To raise the level of scientific consciousness in the region and increase the public understanding and appreciation of the importance and potential of Science and Technology in human progress.

(8) To establish and maintain high standards of ethics in all scientific endeavours.

CAS, to maintain its objectives strives to publish all scientific proceedings of the Biennial General Meetings and Newsletters which are distributed throughout the academy membership and elsewhere. In 2007 it launched an online e-journal for publication of conference proceedings and seminars.

CAS is also a member of the Inter-Academy Panel (IAP) which addresses international scientific issues. CAS is also a member of TWAS, The World Academy of Sciences. Regionally, CAS has close ties with The University of the West Indies (UWI) and Universities des Antilles et de la Guyane. Regionally, CAS has five chapters: CAS-Trinidad and Tobago, CAS-Jamaica, CAS-Guyana, CAS-Barbados and CAS-Guyana. Each Chapter is self-autonomous.

2. Framework

This partnership entails a collaboration between the United Nations, the Caribbean Academy of Sciences, CAS and Caribbean SIDS. Its core mission is to mitigate environmental damage via climate change effects through various mechanisms such as better-quality education in environmental management, renewable energy transfer etc. Mitigating the effects of climate change and environmental degradation necessitates the implementation of all dimensions of the education fields: engineering, science, mathematics, physics, chemistry, biology and even the social dimension etc. Educating the workforce of SIDS can be done via workshops, seminars, and pursuing university and college degrees in engineering, science, technology, renewables and medicine. A holistic effort is necessary.

The partnership will also work towards mitigation of climate change in SIDS Caribbean via advocating for a Green State Economy, ensuring that countries in the Caribbean follow the various protocols such as Kyoto, Paris and COP 28. It's envisioned that such a partnership will ultimately lead to the achievement of 90% of UN 2030 sustainable goals. This partnership will promote both economic and environmentally sustainable development and will collectively protect the vulnerable Caribbean SIDS against the effects of environmental damage resulting from climate change. It must be noted that climate change is the source of global warming, which has resulted in the rise of oceans, seas, and lakes, loss in marine and land biodiversity, soil erosion, destruction of the infrastructure, hurricanes, and loss of lives. Thus, CAS having a partnership with the United Nations, will enable Caribbean SIDS to be resilient to environmental damage and economic decline. Thus, leading to sustainable development.

It's anticipated that CAS will act as a vehicle for the selection and awards of scholarships to small island scholars to pursue degrees in environmental management, economics, climate change, agriculture, renewable energy etc. These are all geared to provide the necessary mechanisms to mitigate environmental degradation via climate change in Caribbean SIDS. Upon graduation, graduates must return to their home island to prepare and aid in both infrastructural and economic developments to cushion the effects of climate change and promote sustainable economic growth and resiliency.

CAS will also need money from the United Nations to run workshops, webinars and conferences to educate Caribbean academics on the Green State Economy, LCDS, implementation of resilient agricultural and sustainable engineering state-of-the-art practices, aimed at bolstering and improving Caribbean SIDS infrastructure to mitigate climate change, environmental degradation etc. It is anticipated that CAS will give reports on the issuing of grants and feedback/evaluation reports on the performance of Caribbean SIDS scholars, workshops and conferences conducted and feedback from workshop and conference participants on the economic promoting, sustainable economic management and environmental workshop.

The United Nations will be the source of funding and will monitor progress via the submission of a month's progress report. However, the United Nations, CAS and government agencies in Caribbean SIDS must work together strategically to ensure the successful realization of this partnership. It will be a tripartite agreement. All recipients of UN grants must register as members of CAS.

3. Significance of Partnership

This partnership can be considered for SIDS Partnerships Awards because it provides the vehicle to prepare citizens of the Caribbean SIDS to counteract environmental degradation via climate change effects (UN goal 13) such as force full hurricanes that have destroyed Caribbean SIDS yearly via destruction of infrastructure, loss of lives, loss of biodiversity, rise in oceans and seas, flooding, erosion, loss of agriculture output, resulting in food insecurity and a rise in Caribbean SIDS import bill and an overall decrease in economic status etc. This partnership will result in sustainable developments in all sectors and the fulfilment of all UN 17 sustainable development goals. The partnership should work via the SIDS Partnership Framework under the SAMOA pathway [9-10].

The SAMOA (Small Island Developing States Accelerated Modalities of Action) pathway will stimulate the launch of new, genuine and durable partnerships such as the UN-CAS-SIDS for the sustainable development of SIDS. Thus, there is a need to curb environmental damage to Caribbean SIDS via the mitigation of the effects of climate change via educating the workforce of the island so that they are better prepared to deal with climate change effects in an innovative way. This partnership will ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. These will all provide the impetus to develop an educative, innovative workforce that is well-prepared and can make crucial decisions on their own. The SAMOA pathway also allows for group consultation of SIDS [9,10].

This partnership is SIDS-specific because it deals with the destructive realities that Caribbean SIDS are facing and promotes sustainable development which is not easy to achieve in SIDS that suffer from climate change effects. Climate change effects have caused havoc in Caribbean SIDS via the destruction of prime infrastructure via the generation of forceful hurricanes whose intensity has increased every year. Climate change effects have also resulted in flooding which has destroyed crops and affected productivity yields. Thus, a decline in production and productivity in the agriculture sector.

Hence, there is a need to address the effects of climate change disasters in Caribbean SIDS. The SAMOA pathway has several objectives, and these are:
(1) Give full support to the coordinated follow-up of the Programme of Action for the Sustainable Development of SIDS.
(2) Undertake advocacy work in favour of SIDS in partnership with the relevant parts of the United Nations as well as with the civil society, media, academia and foundations.
(3) It assists in mobilizing international support and resources for the implementation of the Programme of Action
(4) Provide support to group consultations on SIDS.
(5) It ensures the mainstreaming of the SAMOA pathway and SIDS-related issues in the work of the UN system and enhances the coherence of SIDS issues in UN processes. Thus, the five above objectives of the SAMOA pathway are geared towards the establishment of a Programme of action that will utilize grants from the United Nations and disperse them to Caribbean SIDS via CAS in the attainment of Sustainable Development that will cushion the effects of climate change.

Thus, via the SIDS Partnership Framework via the SAMOA pathway, the following will be achieved:
The provision of inclusive and equitable quality education and the promotion of lifelong learning opportunities for all, to build an intelligent sustainable workforce for SIDS (UN SD Goal 4). Education in health sciences will ensure the fulfilment of UN SD Goal 3. Sustainable management of water and sanitation for all, to operate in a healthy environment will result in the attainment of UN SD Goal 6. Education in renewable energy and its implementation will see the realization of UN SD Goal 7. Education to Caribbean SIDS citizens in engineering degrees and other degrees mentioned above will allow Caribbean SIDS residents to have the knowledge to build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation to deal with climate change effects (UN SD Goal 9). It will also result in the realization of UN SD Goal 11. The overarching mission to combat climate change and its impacts is governed by UN SD Goal 13. The use of renewables such as hydro power sees the realization of UN SD Goal 14. Another dimension of the UN-CAS-SIDS partnership is to prevent environmental degradation via sustainably managing forests, and halt and reverse land degradation and biodiversity loss. This is covered by UN SD Goal 15. The fulfilment of all the above UN SIDS will result in the revitalization of the Global Partnership for Sustainable Development.

4. Strategies

The implementation methodology involves administering grants given by the United Nations to CAS to vulnerable SIDS in the Caribbean. No agreement has been established between the United Nations and CAS yet. It will depend on the outcome of a proposal by CAS Executive and CAS Council to the United Nations. The money/grant will be used to finance workshops, and conferences to fast-track the education of Caribbean SIDS inhabitants/Scholars on Green State Economy, LCDS, Climate Change and mitigation of Climate Change in the Caribbean, implementation of resilient smart agriculture practices, with the view to developing resilient agriculture practices. Grants will also be issued to universities to aid in the development of programmes, diplomas and degrees on Green State Economy and Sustainable development. Workshops and conferences will also focus on rendering knowledge to the public on the establishment of solar and wind farms (renewables). Also, knowledge of the establishment of bio-ethanol plants. Bioethanol can be blended with gasoline to produce gas-alcohol in varying blends. This is a cleaner burning fuel than gasoline and thus will decrease the CO2 emissions of current vehicles. SIDS must embark on renewables because they are the most vulnerable to the effects of climate change and eroding sea defences.

5. Achieving concrete output

This partnership will see small grants utilised to promote workshops on sustainable development with particular emphasis on capacity building to educate the populace on climate change, its effects and how to mitigate it. Also, the development and implementation of resilient smart agriculture practices. Populace must be educated on the development of resilient infrastructure, good drainage, and the use of renewable energy such as solar, and wind to reduce the CO2 content in the Caribbean atmosphere and reinstation the CO2 cycle. The Caribbean is blessed with diverse and luxuriant forests that can offer a good sink for CO2 capture and thus educating our populace on forest management/policies i.e. environmental management is crucial.

The University of the West Indies (UWI) offers degrees in these and other areas so the Caribbean SIDS populace will be much more educated to deal with climate change, environmental degradation, and deforestation in an educative and innovative way. Workshops can also be conducted to fast-track knowledge sharing on the Low Carbon Development State Strategy, LCDS and the pursuant of a Green State Economy. Caribbean SIDS are vulnerable to high rise in the ocean, flooding and eroding coastline. Thus, via the implementation of the Green State Economy and the establishment of mechanisms to combat climate change, the Caribbean States will survive, and the economy will project upward.

The partnership is expected to have the following output and outcomes:

(1) An increase in the number of qualified graduates from the University of West Indies and other colleges on climate change resiliency. This includes degrees in engineering, science, technology, health sciences, renewable energy etc.

(2) An improvement of Caribbean SIDS infrastructure to cushion the effects of climate change. This includes more robust houses, roads, bridges, and sluices, increase in the height and strength of Caribbean SIDS Sea walls.

(3) The planting of more mangroves to buttress the effect of ocean and sea waves.

(4) Reduction in deforestation.

(5) Protection of biodiversity.

(6) Extensive use of renewables.

(7) Increase in the number of roads, concrete bridges etc.

(8) Enunciation of more environmental policies and practices.

(9) The conduct of seminars, webinars, conferences etc.

6. Monitoring the Partnership

The United Nations (UN)-CAS-Caribbean SIDS partnership is measurable and monitorable. It must be measurable and monitorable so that it can be successful. There must be transparency. The partnership aims to mitigate the effects of climate change that would severely affect Caribbean SIDs.

The specific goals of the partnership are:

(1) To improve the quality of education in Caribbean SIDS, to produce a workforce to deal with the destructive effects of climate change.

(2) To implement new programmes in universities and colleges to fully equip Caribbean SIDS to deal with the full effects of climate change i.e. building capacity in the region.

(3) To improve the education status of Caribbean SIDS via the implementation of new curricula that are specific to climate change resiliency and economic decline.

(4) The implementation of crop-resistant and resilient varieties that can counteract the effects of climate change.
(5) The increase in the number of innovations in science that are specific to the mitigation of climate change effects.
The progress of Caribbean SIDS should be monitored and evaluated by the UN, CAS and other Stakeholders. It's the UN that will be channelling money into this tripartite agreement and thus it's anticipated that they see progress and success and that the process be as transparent as possible. The UN has funded many projects in countries across the globe, from poor, least-developed, developed, to highly developed6-7. Besides, climate change and environmental damage are high on the United Nations agenda. To aid in the monitoring of the partnership, progress reports must be submitted every six months to the United Nations and CAS.

7. Conclusion

The United Nations-CAS-Caribbean SIDS Partnership is a proposed new venture. It's achievable but needs funding from the United Nations and other Stakeholders. It is urgent to aid in mitigating environmental degradation, resulting from climate change effects such as destruction of Caribbean-SIDS infrastructure, flooding, soil and shoreline erosion, rise in the Caribbean Sea, loss of both marine and terrestrial biodiversity, generation of food insecurity etc. CAS is expected to act as a vehicle for the disbursement of funds, monitoring the partnership and providing consultations should this venture be successful. It's anticipated that this partnership will be a successful one. However, it must be monitored and be transparent. The environmental dimension will affect the economic and social dimensions.

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About the Authors

Prof. Raymond Jagessar obtained his BSc (Distinction) in Chemistry/Biology from the University of Guyana (1992) and his PhD from the UK (1995). He was an Assistant Lecturer at the University of Guyana, from 1991-1992.

He held three Post Doctoral Research Fellowships (PDF) at the University of South Carolina, Columbia (USA), Wichita State University, Kansas (USA) and the University of the West Indies during the period, 1996-1999. He is also accredited with a distinction in DiPEd (higher education) at the University of Guyana in 2022. He has several international awards, amongst them Chartered Chemist, CChem, Fellow of the Royal Society of Chemistry, FRSC, UK, member of the American Chemical Society, Research Grants etc. He is also a Fellow of the Caribbean Academy of Sciences. His research interests are broad, covering the spectrum of Pure and Applied Chemistry, Chemical Biology and Pharmaceutical Chemistry. He has published over one hundred (100) research articles, five book chapters, one book, three e-books and presented at over 100 conferences locally, regionally and internationally. He has given keynote presentations at several conferences and is a member of several editorial boards and a reviewer of several journals. He is currently a Professor of Chemistry at the University of Guyana (South America), former President of the Caribbean Academy of Sciences (2020-2023) and currently, Foreign Secretary of the Caribbean Academy of Sciences.

CAS
MEMORIAM TRIBUTE



IN REMEMBERANCE OF PROF. RAMSEY SAUNDERS

DR. ROSHNIE A. DOON
SECRETARY, CAS REGIONAL.

On behalf of the Caribbean Academy of Sciences (CAS), we wish to continue to convey our heartfelt support and condolences to the family of one of our dearest members, the late Professor Ramsey Saunders.

We commemorate the esteemed physicist and trailblazing educator, Professor Saunders, whose remarkable contributions to science and education have forged an enduring legacy.

Professor Saunders was the founding president of the CAS from 1988 to 1996. During his time, he played a crucial role in shaping the organization and promoting a culture of scientific inquiry and collaboration in the region. He remained an active member and Fellow of CAS until his passing.

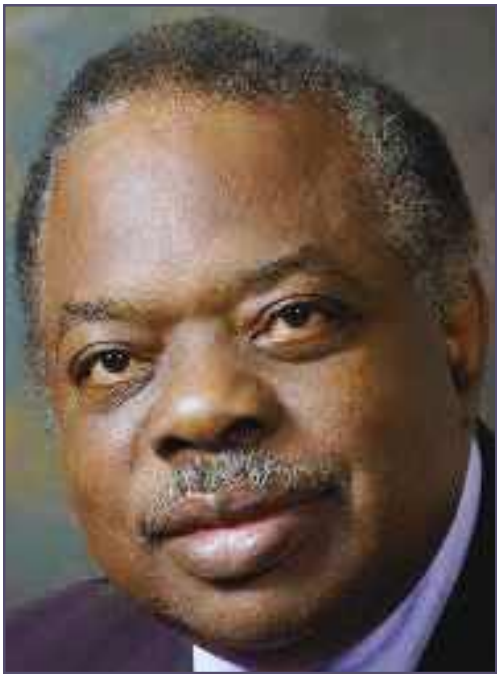
Additionally, he served as the Chairman of the Board of Governors of the Institute of Marine Affairs in Trinidad and Tobago and was a member of the Nobel Committee for Physics, making significant contributions to the global scientific community.

Professor Saunders made significant contributions that were acknowledged with numerous accolades, including the title of Fellow of CAS and the Pinnacle Award for Sustained Achievement in Pure and Applied Physics from the National Coalition on Caribbean Affairs (NCOCA) in Washington DC in 2005.

His inspiring advice to students, "The sky is the limit for any individual once he or she can identify an area of interest," continues to motivate aspiring scientists.

His untimely passing leaves a profound void in the scientific community. Nevertheless, his impactful legacy will undoubtedly endure, serving as a source of inspiration and wisdom for generations to come.

May his soul rest in peace.



Prof. Ramsey Saunders



Prof. Ramsey Saunders
at the CAS 23rd Biennial Conference 2023



Prof. Ramsey Saunders
speaks on the 'ring around the sun' occurrence at the UWI Postgraduate Open day in 2012

When I'm Gone
by Mosiah Lyman Hancock

When I come to the end of my journey
And I travel my last weary mile
Just forget if you can, that I ever frowned
And remember only the smile

Forget unkind words I have spoken
Remember some good I have done
Forget that I ever had heartache
And remember I've had loads of fun

Forget that I've stumbled and blundered
And sometimes fell by the way
Remember I have fought some hard battles
And won, ere the close of the day

Then forget to grieve for my going
I would not have you sad for a day
But in summer just gather some flowers
And remember the place where I lay

And come in the shade of evening
When the sun paints the sky in the west
Stand for a few moments beside me
And remember only my best



SPOTLIGHT

CAS-REGIONAL ANNUAL INITIATIVES



SHOWCASE YOUR EXPERTISE

This is your opportunity to share your insights, knowledge, and experience with the Caribbean Academy of Sciences (CAS) Community.

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The CAS was inaugurated in May 1988. It is the primary Academy for Sciences in the Caribbean. It is an independent, non-governmental body registered in the Republic of Trinidad & Tobago.

Its primary objective is to provide a forum for interchange among scientists on important issues related to the application of science and technology to development.

The CAS serves as a source of advice to regional, governmental and non-governmental organizations in scientific and technology matters.

Target Audience

All Academicians, Scientists, Researchers, Specialists, Practitioners, and Industry Leaders worldwide are invited and encouraged to submit webinar proposals for the various webinars that the CAS offers throughout the year.

We are accepting proposals on a rolling basis until the end of 2024. Interested presenters are asked to please submit a 300-word abstract of the paper being presented and author biography. Further information will be provided upon acceptance.

Please feel free to forward to colleagues who you feel would be interested in taking part.

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Mark.Wuddivira@sta.uwi.edu

Dr. Roshnie Doon:
casexecutive2023@gmail.com

The Caribbean Academy of Sciences (CAS)



Call for Graduate Student Webinar Speakers

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All Academicians, Scientists, Researchers, Specialists, Practitioners, and Industry Leaders worldwide are invited and encouraged to submit workshop proposals for the various online workshops that the CAS is hosting throughout the year.
We are accepting workshop proposals on a rolling basis until the end of 2024. Interested participants are asked to please submit their proposal and author biography. Further information will be provided upon acceptance.

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THE CARIBBEAN ACADEMY OF SCIENCES (CAS)

Call For Newsletter Articles

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THE CAS NEWSLETTER

The Caribbean Academy of Sciences (CAS) Newsletter is one which is driven by its members from the Trinidad and Tobago, Guyana, Jamaica, Guadeloupe, Antigua and Barbuda, and Barbados Chapters. We rely on your expertise in the various areas and sub-categories of Science, Technology, Engineering, and Mathematics (STEM), to share the most updated and relevant information from around the world with the STEM community in the Caribbean.

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Articles submitted to The CAS Newsletter should be original contributions and should not be under consideration for any other publication at the same time.

AUTHOR GUIDELINES

- Articles must be 1.5 spaced, should be between 500 and 2500 words, and submitted as an MS Word file.
- An autobiographical note of 250 words of all authors and co-authors, as well as their full names, affiliations, and email addresses, must be included.
- The title and headings used within the article must be short and clearly defined.
- Figures should be submitted in its electronic form (jpg file with a dpi of 330) and be clearly labelled.
- References to other publications must be clearly cited using the APA reference style.
- Articles may be copyedited for clarity and style.

SUBMISSION PROCEDURE

To be considered, your article should be submitted to the Editor: Dr. Roshnie A. Doon, Secretary, Caribbean Academy of Sciences (CAS) Regional Executive, and the President of CAS Prof. Mark Wuddivira.

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Dr. Roshnie Doon: casexecutive2023@gmail.com

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As an Ordinary Member / Associate / Life Member of the Caribbean Academy of Sciences (CAS)

Proposer	**Seconder**
Name _____ (BLOCK LETTERS)	_____ (BLOCK LETTERS)
Signature _____	_____

I accept this nomination _____
(Signature)

Address:_____

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Please attach your curriculum vitae.

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