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University of Guyana Graduate Programmes

Introduction

We are delighted to show to you the abstracts presented in our 3rd Symposium of Graduate Research at the Unviersity of Guyana. This year the theme emphasized Vulnerability, Resilience and Change towards Sustainability,anchored on the Perspectives of Multidisciplinary and Interdisciplinary.

Over several millennium change has been a phenomenon experienced in human society. However, this transformation has become more pronounced in recent decades as the types and intensity of change exponentially increases due to world population growth and demand for environmental resources. Change is viewed as a complex interplay of environmental, social, economic, and scientific and technological phenomena that have a profound impact on the lives and livelihood of humans on the global, regional, and local scales. Depending on the nature and scale of change, contrary trends often emerge, both to the detriment and benefit of society.

Environmental, social, economic, and scientific and technological change occur as a result of both natural and anthropogenic processes. Environmental change is seen as an alteration of bio-physical systems and sub-systems while social change features the processes of human interaction and relationships that alter cultural and social institutions respectively. Economic change refers to market adjustments for goods and services due to new opportunities or pressures from competing market forces. Scientific and technical change focusses on technological inventions, continued improvement, and commercialization.

Generally, human-induced changes are often designed to improve lives and livelihood in relation to such aspects as poverty, gender equality and equity, mortality and morbidity, biodiversity loss, reduction in socio-economic disparities and access to better quality education and medical care overall living conditions. However, change also has contrary consequences for society by becoming detrimental to sustainability. For instance, improved science and technology (medical care) contributes to longevity and high population growth rates which in turn leads to overexploitation of resources, occupation of marginal lands, land conflicts and vulnerability of communities.

Over time, multidisciplinary and interdisciplinary methodologies have been incorporated as pivotal strategies to not only build community resilience, but adaptation also has become a pivotal means to combat change. Change in its various forms is a cross-cutting concept across all disciplines and is perceived as the conceptual and contextual basis for the involvement of researchers across various disciplines in this proposed symposium. The focus on multidisciplinary and interdisciplinary research, therefore, is to allow for interaction between and within disciplines and identify the linkages with the concept of change in all its dimensions.

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Keynote Speakers

Biographical Profiles
& Abstracts

Dr Mahendra Persaud, A.A.

Plant Breeder/Chief Scientist at the Guyana Rice Development Board

Biographical Profile

Dr Mahendra Persaud completed his secondary education at Bush Lot Secondary School and achieved a Diploma in Agriculture at the Guyana School of Agriculture and a B.Sc. in Agriculture from the University of Guyana. He pursued his Master of Science and Doctorate in Plant Breeding and Genetics at the Indira Gandhi Agricultural University in India.

Dr Persaud is a Plant Breeder/Chief Scientist at the Guyana Rice Development Board. He is the National Focal Point for the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) and the Commission on Genetic Resources for Food and Agriculture (CGRFA).

Dr Mahendra Persaud is one of the leading figures in Guyana's and the region's food security because of his ground-breaking work in rice production and agriculture, which has placed science at the service of regional needs. He has developed several high-yielding, lodging and disease-resistant strains of rice that emerge excellently under flooded conditions, with superior grain qualities that are well-suited to the local, regional, and global markets. Dr Persaud's team has led the development of the first zinc-enriched rice in Guyana and the Caribbean. He is also leading the research and development of Aromatic Rice for Guyana and the Region.

In 2016, he received the fourth-highest Guyanese national award in the Order of Service – the Golden Arrow of Achievement (A.A.) - "for outstanding research as a scientist in the rice industry resulting in high-yielding varieties with consequential increased rice production". Only recently (June 2023), Dr Persaud received the prestigious Anthony N. Sabga Award, Caribbean Excellence for Science and Technology, for his contributions to the region.

Rice Breeding in Guyana: Priorities and Challenges

Mahendra Persaud[1], Danata Mc Gowan[1] *, Nandram Gobind[1],
Miranda Henry,[1] Baisham Persuaial Corredor[1], Violet Henry[1]

[1] *Guyana Rice Development Board, Rice Research Station, Burma,
Mahaicony, East Coast Demerara, Guyana, South America*

Rice is the most important food crop in Guyana. "Variety" is the crucial factor in determining the final quantity and quality of the product and the genetic makeup of the variety determines the limit of productivity. Increasing productivity of rice in Guyana through genetic manipulation is an important approach to improve the competitiveness of the rice industry in the face of the changing environment in which rice has to grow, the pest and diseases complex that prevails, and the serious threats from the major rice export countries of the world.

Significant progress has been made in developing improved rice varieties in Guyana. Beginning in 2009, several varieties of high yield potential (7-9 t/ha), Blast resistance, excellent milling and cooking qualities, and tolerance to lodging were released for commercial cultivation. In 2023, GRDB, through collaborative efforts with members of the CARICOM Bio-fortification network, released a zinc-enriched rice variety (GRDB IICA-17). Presently, there are ten high-yielding advanced breeding lines along with ten advanced aromatic breeding lines being evaluated within each of the five major rice growing regions in Guyana. Also, ninety lines selected from the pedigree nursery are being scrutinized in Observational Yield Trials at the Burma Rice Research Station. A single high-yielding candidate variety with exceptional agronomic characters is also being evaluated in the fields of thirty farmers across the country for possible varietal release in November 2024.

Most recently, Mutation Breeding has been considered since the breeding team is also confronted with the task of developing rice genotypes with extra early vigour, salinity, and drought and flood tolerance in an uncompromising way to mitigate present and future challenges of climate change. Transferring these genes into plants with other desirable characters will always be an uphill task.

Keywords: Variety, Genotype, Breeding

Dr. Vindhya Persaud

Minister of Human Services and Social Security

Biographical Profile

Dr. Persaud is the Minister of Human Services and Social Security, Member of Parliament and President of the Guyana Hindu Dharmic Sabha. She is a physician by profession.

Dr. Vindhya Persaud has been an outspoken and proactive advocate against many social ills, and she has spearheaded many initiatives to address social issues including child abuse which materialised in the construction of a children's home. Her work has been guided by the motto of "action thy duty, reward not thy concern". Over the years, she has worked integrally with communities to improve the welfare of women, youths, and the underprivileged. As the Minister, her work on Gender-based violence has given rise to many ground-breaking programmes but it is her brainchild, the WIIN Programmes, which continues to transform the lives of thousands of women through free technical vocational training, entrepreneurship, and employment, that speaks to her passion to achieve gender equality.

Dr. Persaud hosts popular radio and television programmes. She is the Director, Choreographer, creative mind and writer behind Naya Zamana, an award-winning theatrical production.

Dr. Persaud is the current Chair of the Parliamentary Committee on Social Services in this sitting of Parliament and a member of the Appointments Committee. She has received a few awards including the Medal of Service (Guyana's National Award) in 2011 for outstanding work in culture and the arts, the Pranav Ashram Award (Canada) for humanitarian work, social service and culture in 2016, and award from the East Indian heritage Diaspora, New York, as a pioneering Caribbean Woman for exemplary leadership, indomitable spirit and character, and admirable contribution to the Indo-Caribbean Community of the Diaspora.

Dr. Ulric Trotz, Ph.D., A.A.

Esteemed Scientist

Biographical Profile

A Scientist by training, Dr.Trotz obtained a B.Sc. Hons. Degree in Chemistry from the University of Edinburgh, and attained his Doctorate in Organic Chemistry at the University of Toronto, Canada. He has worked as Director, Science & Technology Division, Commonwealth Secretariat, 1993-1997; as Secretary, Commonwealth Science Council and Science Adviser to the Commonwealth Secretary General, 1991-1997; as Dean, Faculty of Natural Sciences, University of Guyana 1976-1979; and as Director, Institute of Applied Sciences and Technology in Guyana, 1980-1991.

Since 1997, Dr Trotz, in his capacity as Manager for the GEF-funded Caribbean Planning for Adaptation to Climate Change (CPACC), the Mainstreaming of Adaptation to Climate Change (MACC) projects and the CIDA-funded Adaptation to Climate Change (ACCC) project, has given direction to the region's efforts to build capacity for climate change adaptation. In 2005 Dr Trotz assumed the post of Deputy Director & Science Adviser to the newly established Caribbean Community Climate Change Centre, a post he held until his retirement in December 2020. He has been publicly recognized in his country of birth, Guyana, with the Golden Arrow of Achievement (AA) in National Honours in 1983 for long and distinguished service in Science and Research; and in Barbados, as an Honorary Distinguished Fellow of the University of the West Indies and by the Caribbean Community of Climate Scientists for his contribution in pioneering the region's approach to climate adaptation and resilience building.

Marshalling the Advances in Science and Technology to Meet the Development Challenges of Guyana in the 21st Century

U.O. Trotz, Ph.D., A.A.

Science and Technology Studies (STS) is an interdisciplinary field that examines the historical, cultural, and social contexts of science and technology. Science is the study of the natural world through observation, experimentation, and theory building. Science explores new knowledge using scientific methods like observation, hypothesis, experimentation, analysis, and conclusion. Technology is the application of scientific knowledge to solve problems and create useful devices. Technology is the practical use of scientific knowledge for many purposes. It can either be useful or harmful.

The twentieth century marked significant scientific achievements, for example, the discovery of the structure of DNA, space exploration milestones, and the development of quantum mechanics. We also witnessed the exponential growth in technology from the advent of electricity and the telephone to the transformative power of the internet and personal computing. Breakthroughs in fundamental science often lay the groundwork for technological innovations. For example, the development of semiconductors was rooted in solid state physics, leading to the creation of transistors and modern computers. Understanding the molecular bases of diseases has led to revolutionary treatments such as targeted cancer therapies and mRNA vaccines.

Today, Guyana and the global community faces many challenges in the quest for survival and for a better quality of life for all. This presentation will discuss the role that the University of Guyana, through its School of Graduate Studies, can play, in exploring opportunities to marshal the utilisation of Science and Technology to cope with the country's development challenges of the day. In particular, the presentation will focus on issues related to meeting the country's developmental challenges posed by climate change, a real and present danger to our environment, socio-economic wellbeing, livelihoods, and our lives; and to our aspirations to achieve our Sustainable Development Goals. It will also focus on examining ways in which Science and Technology can inform actions for the use of our natural resources base to generate a thriving "non-oil based" economy. It will highlight certain niche areas for research and development where UG will have a comparative advantage in carrying out such work locally. Some ideas will be shared on institutional arrangements to facilitate and bolster UG's potential to contribute to a national ethic of utilising science to provide the knowledge base that informs and directs Guyana's development programmes.

Professor Mohammad Ayaz Ahmad

Professor, Department of Mathematics, Physics & Statistics,
Faculty of Natural Sciences, University of Guyana

Biographical Profile

Prof. Mohammad Ayaz Ahmad have completed his Ph.D. in Exp. High Energy Physics from Aligarh Muslim University, Aligarh, India, in 2010. Since October 2022, he has been working full-time as a Professor at the Department of Mathematics, Physics & Statistics, Faculty of Natural Sciences, University of Guyana, Georgetown, Guyana, South America in the field of Interdisciplinary or Applied Sciences. In past decades, he worked at the University of Tabuk, Saudi Arabia, D.O.F. Physics (December 2010-July 2021), and also in India, Italy and Japan. He is also working pro bono as an honorary adjunct faculty at Maryam Abacha American University of Nigeria, Nigeria, South Africa - https://maaun.edu.ng/international-faculty/.

Prof. Ahmad is a very versatile and independent researcher, an extremely curious and creative physicist who enjoys doing science very much. He is a very passionate and loves what he does, so his environment always gets contagious by his energy and passion for science. He is never what you usually expect. He always gives more and improves every day.

Prof. Ahmad has published more than 100 research articles in various refereed International Journals, like Journal of Physics G (IOP Journal), Nuclear Physics A (Journal of Science Direct/ Elsevier Journals), Journal of Physical Society Japan, Inter. Journal of Mod. Physics E (World Scientific), Romanian Reports in Physics, Ukrainian Journal of Physics (National Academy of Sciences of Ukraine), International Journal of Applied Physics and Mathematics (IJAPM), (Singapore), among others. He has over 2797 citations of his research work. Some of his work is available on the following web links: - h-index --- [28] and i10-index -- [88]

1. University of Guyana: https://fns.uog.edu.gy/staff/dr-mohammad-ayaz-ahmad
2. Publons: https://publons.com/researcher/1473522/mohammad-ayaz-ahmad/
3. Google Scholar Citations:
4. https://scholar.google.com/citations?hl=en&user=lmYgQe0AAAAJ
5. SCOPUS Author details: https://www.scopus.com/authid/detail.uri?authorId=57221604185
6. ORCID ID: https://orcid.org/0000-0002-5731-5439
7. INSPIRE-High Energy Physics:
8. https://inspirehep.net/literature?sort=mostrecent&size=25&page=1&q=M.A.Ahmad
9. IAEA: (INIS): https://inis.iaea.org/search/search.aspx?orig_q=M.+Ayaz+Ahmad&src=ics

Prof. Ahmad is involved in teaching and research for more than fifteen years. Besides undergraduate courses, he is teaching/has taught courses of Nuclear Physics, Particle Physics and Electrodynamics to postgraduate students. He has presented many research articles at various International Conferences/symposia and also delivered many talks at Erice (Sicily) Italy and got best scientific secretary Award 2009 and 2014 from the same place. For research purpose he visited/worked at various Institutes and universities and the details are given below: -

- World Federation of Scientists, & (EMFCSC), Sicily (Italy) (2009).
- KEK Laboratory (High Energy Accelerator Research Organization), Japan (2011).
- 1st Doha International Astronomy Conference: at Doha Qatar (Feb. 2013).
- World Federation of Scientists, & (EMFCSC), Sicily (Italy) (2014).
- EMFCSC, Sicily (Italy) 2015.

Advancements in Science and Technology are Contemporary Needs

Mohammad Ayaz Ahmad

Department of Mathematics, Physics and Statistics,
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The history of science and technology is the study of how people have realized the natural world or applied science and technology throughout history. This academic discipline also looks into the contexts and consequences of scientific methods on culture, economy, and politics. The purpose of this scientific presentation is to evaluate the role of science and technology in reconstructing human social history, specifically the impact of technological change on society as contemporary need. As such, secondary literatures are thoroughly researched to recount the discourse of the history of science and technology. The study concludes that science and technology have made an impact on the phenomenon of human social history and society in general. As a result, the industrial revolution, information communication technology and transportation technology, agricultural technology transformation, warfare technology progression, and changes in social values and social institutions are among the most significant changes. Revolutionary and evolutionary advancements in science and technology shaped the reconstruction of society's history from various periods in a continuous pattern. Our findings, based on nuclear and particles physics, were in good agreement and satisfactory with others. The invention of particle accelerators (Machine) is leading to treat cancer and contributing to the development of medical imaging techniques. Techniques such as PET scans and MRIs are among the better-known examples of particle physics innovations.

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Dr. Garvin Cummings
Chief Hydrometeorological Officer of Guyana

Biographical Profile

Garvin Rhandhir Cummings is a native of Wauna, Region 1, who currently serves as the Chief Hydrometeorological Officer of Guyana. Dr. Cummings has over 26 years of experience in hydrometeorology. His leadership extends beyond the national level, as he recently became the first Guyanese to be elected to the Executive Council of the World Meteorological Organization (WMO), a significant milestone for Guyana on the international stage. In this role, Dr. Cummings helps shape global policies on issues related to weather, climate and water, addressing the pressing challenges posed by climate change and variability.

Dr. Cummings has also contributed significantly to climate resilience efforts in Guyana. His work focuses on reducing the country's vulnerability to hydrometeorological hazards, particularly through disaster risk management and advanced climate services. He has served in various leadership roles, including Chairman of the Board of Directors of Guyana Water Inc. (GWI) and the Environmental Assessment Board of the Environmental Protection Agency.
Dr. Cummings has lectured at institutions like the University of Genoa and has co-authored numerous studies on flood risk management, remote sensing, and forecasting systems. His expertise and commitment to advancing climate science have earned him recognition at both national and international levels.

A New Menu: How Climate Change and Variability will Impact Food Security

Garvin Cummings

Hydro-Meteorological Office, Ministry of Agriculture,
Guyana, South America

Climate change is a pressing global issue that will have lasting impacts on agriculture globally, regionally, and right here at home in Guyana. Given Guyana's reliance on agriculture for economic stability and regional food security, understanding and acting on climate risks is crucial for the survival of this industry and by extension, national and regional food security. Guyana's non-oil economy is largely driven by its agricultural productivity along its narrow and highly fertile coastal plain. Climate change projections for Guyana indicate high risks associated with erratic rainfall patterns, intense drought events and heat stress, increasing sea levels and storm surges, reduced access to high quality irrigation water, the proliferation of pests and diseases, and alterations to growing seasons and crop yield. The risks to food security are further exacerbated because Guyana's best agricultural lands are situated in its vulnerable coastal zone which will face the onslaught of climate hazards. Equally important, but too often forgotten, is the element of climate variability. Climate variability occurs on a much shorter timescale, but yet having the potential to bring with it similarly devastating impacts for agriculture, and other forms of livelihoods as does climate change. In fact, climate change will amplify the impacts of climate variability delivering a double blow to the agriculture sector. The climate challenge will no doubt alter the environment for a thriving agriculture industry in Guyana. However, these challenges are not insurmountable, but requires a new menu of approaches that starts with understanding the risks, embracing sustainable farming practices, investing in resilient infrastructure, and engaging the entire community. In spite of environmental alterations driven by climate change, Guyana can work towards securing a path for a successful future in agriculture, ensuring food security for itself and its neighbours.

Dr. Gillian Smith

FAO Representative in Guyana

Biographical Profile

Dr. Gillian Smith, a national of Jamaica, holds a Bachelor's Degree in Zoology, a Master's Degree in Aquaculture and a Ph.D. in Marine Sciences from the University of the West Indies.

She started her career in 1993, as a Research Officer in the Fisheries Division of the Ministry of Agriculture in Jamaica, and was appointed Deputy Director of this Division in 1994, with responsibilities for fisheries research and extension development. From 1996 to 2008, she served in the Scientific Research Council of Jamaica as Senior Scientific Officer and Project Leader until 2005 and as Process Development Officer from 2005 to 2008.

In May 2008, Dr. Smith joined FAO as an Assistant FAO Representative (Programme) for Jamaica, The Bahamas and Belize. From 2017, she served as Officer-in-Charge of the FAO Representation in Jamaica, The Bahamas and Belize. She then became the FAO Representative in Guyana since December 2018 and currently is also the a.i Representative for Trinidad and Suriname.

Professor Emmanuel Cummings

Deputy Vice-Chancellor-Academic Engagement, University of Guyana

Biographical Profile

Professor Emanuel F. Cummings, A Fulbright Scholar, Full member of the British Physiological Society and Health Systems Global, and Deputy Vice-Chancellor-Academic Engagement, University of Guyana, is a Full Professor of Biochemistry and Molecular Medicine and a Visiting Professor at the American University of Barbados. He holds a Ph.D. and an M.Sc. in Nutritional Biochemistry from the University of Central Lancashire in the United Kingdom.

He is a former Dean of the Faculty of Health Sciences, the now College of Medical Sciences, where he conceptualized the formation and establishment of the University of Guyana's first College, The College of Medical Sciences. During his tenure as Dean, he introduced Undergraduate Degrees such as Dentistry, Optometry, Medical Rehabilitation, Medical Imaging, Nursing, among others. In addition, Professor Cummings was instrumental, through collaboration with the Georgetown Public Hospital, in introducing more than fifteen Postgraduate Programmes in Medicine. He is the Public Service Chair at CH&PA and a member of Davis Memorial along with the GPHC AND NAC Boards. Professor Cummings has more than 50 peer-reviewed publications in reputable journals in the area of Cancer and Diabetes with hundreds of citations. He has introduced a new concept of Diabetes Mellitus, "Starvation in the Midst of Plenty."

He has been a Member of several Site Visits Team on behalf of the Caribbean Accreditation Authority in Medicine (CAAMHP) and The Barbadian Accreditation Council, including the first-ever site visit that was carried out by CAAMHP and was instrumental in the accreditation of the University of Guyana School of Medicine. He was also instrumental in the negotiation of the World Bank Grant for the construction of the New Faculty of Health Sciences/College of Medical Sciences building as well as other research grants for the University of Guyana. Professor Cummings is Bilingual and very knowledgeable in Sports.

Graduate Students

Abstracts (arranged in order of sub-theme panels)

DAY 1 | PANEL 1:
Social and Economic Change

Factors Contributing to Maternal Mortality in Guyana: Applying Thaddeus and Maine's Three Delays Model for Targeted Interventions

Shekinah C. Stuart

Master of Sciences in Public Health Programme,
College of Medical Sciences,
School of Medicine, University of Guyana

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Purpose: The maternal mortality rate (MMR) in Guyana remains high compared to global averages, driven by healthcare inefficiencies and socioeconomic barriers. This study examined factors contributing to maternal mortality in Guyana, emphasizing regional and socio-demographic disparities, applying Thaddeus and Maine's Three Delays Model to understand healthcare access delay.

Methods: A retrospective quantitative research design analyzed 123 maternal mortality cases from January 1, 2017, to December 31, 2023. Data from the Ministry of Health's maternal mortality review reports were analyzed using descriptive statistics, and chi-square tests to determine associations between risk factors and type of maternal death and frequency of delays in accessing healthcare.

Results: The study revealed significant geographic disparities in maternal mortality in Guyana, with coastal regions having a lower maternal mortality rate (MMR) of 122.41 per 100,000 live births compared to 200.96 per 100,000 in hinterland regions. The age group (36-49) exhibited the highest MMR at 662.82 per 100,000 live births. Amerindian women had the highest MMR at 443.43, followed by Afro-Guyanese women at 327.46 per 100,000 live births. Obstetric hemorrhage emerged as the leading cause of maternal death (21.1%), with hypertensive disorders and respiratory diseases each contributing 13%. The most significant healthcare delay, "Delay 3" (delay in receiving adequate care at the facility), accounted for 57 cases, dominated by management and resource allocation delays (26.0%). Regional disparities significantly influence delays ($p = 0.046$), with hinterland regions experiencing more severe delays. While age and race were not significantly associated with delays, trends showed that mothers aged 20-35 were most affected.

Conclusion: The study emphasized the need to improve healthcare infrastructure, transportation, and prenatal care in Guyana to reduce maternal mortality. The government has already responded by building a specialized maternal hospital and enhancing regional healthcare.

Keywords: Maternal Mortality, Guyana, Thaddeus and Maine's Three Delays Model, Healthcare Access, Regional Disparities

Assessing Regulatory Support for Entrepreneurial Development: Progress and Gaps

Mark Wong

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Purpose: The purpose of this paper is to undertake a historical trend analysis of the regulatory environment for entrepreneurial development by interrogating Guyana's performance under the World Bank Doing Business Index. In addition, the research will assess progress and gaps in key areas in order to stimulate and aid achievement of the country's diversification goals.

Methods: The research will follow a quantitative design based on descriptive analysis of all areas of the World Bank Doing Business Index, which includes the following variables: (1) Starting a business; (2) Dealing with construction permits; (3) Getting electricity; (4) Registering property; (5) Getting credit; (6) Protecting minority investors; (7) Paying taxes; (8) Trading across borders; (9) Enforcing contracts; (10) Resolving insolvency. The data will cover the period 2004 to 2022.

Results: Preliminary analysis indicates that Guyana has made progress generally on the doing business index. However, when the sub-variables of the index are examined there is need for targeted interventions in areas such as enforcing contracts, paying taxes, and trading across borders for more significant impact on entrepreneurial development in Guyana. This is particularly as it relates to stimulating investment interests in the economy in order to support diversification away from the oil and gas sector.

Key Words: Doing business, entrepreneurship, investment, diversification, Guyana

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BOOK OF ABSTRACTS

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Enhancing Efficiency: Assessing the Impact of the Single Window Electronic System at the Ministry of Housing

Nicketa McClean

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Purpose: This research paper sets out to examine the rationale, impact, and challenges of the Single Window Electronic System (SWES) within the intricate operational landscape of the Ministry of Housing Guyana, guided by the New Public Management theory of governance. In particular, the paper sought to answer the following questions: (1) What is the rationale for the SWES in the context of the government's efforts to digitize operations at the Ministry of Housing? (2) What is the impact of the SWES on land distribution efforts at the Ministry of Housing? and (3) What are the challenges involved in the implementation of the SWES at the Ministry of Housing?

Methods: The research followed a mixed method approach where qualitative and quantitative techniques were used to both collect and analyse the data. The qualitative approach entailed a systematic review of the literature. The quantitative element was based on a survey using purposive sampling, that was conducted with staff across all departments within the Central Housing and Planning Authority.

Results: The paper found that the implementation of the SWES has led to notable improvements in administrative efficiency, transparency, and service delivery in land distribution. However, overcoming technological and human resource challenges is crucial to fully harness the system's potential and sustain its benefits in the long term. It is therefore recommended that the government first address human resource challenges by focusing on comprehensive staff training and establishing a dedicated support team. Strengthening technological infrastructure through regular updates and adequate data storage is also crucial for system reliability and efficiency.

Conclusion: Regular monitoring through key performance indicators and audits is advised to support continuous improvement. Additionally, the government should develop a strategic plan for expanding the system to meet growing user demands and extend its applications beyond land distribution.

Key Words: e-governance, single window, technology, Guyana, urban development, central housing

PANEL 2:

Scientific and Technological Change

An Assessment of The Properties of Electrodeposited Co-Mn Oxide for Use in Third Generation Concentrated Solar Power

Medeba Uzzi

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Purpose: The consumption of fossil fuels accounts for over 75 per cent of global greenhouse gas emissions and approximately 90 per cent of all carbon dioxide emissions. Greenhouse gases are the main contributors to climate change through global warming. Renewable energy sources such as Concentrated Solar Power (CSP) reduce reliance on fossil fuels, but initial production costs are prohibitive. CSP can become more affordable through electrodeposition and optimization of its thermal cycle efficiency, a process that requires a thermal receiver to operate at temperatures above 750 0C. The objective of this research is to assess the microstructure and thermal properties of electrodeposited cobalt-manganese oxide (Co-Mn oxide) on stainless steel substrates for potential use as a thermal receiver in third generation CSP (Gen3 CSP).

Methods: The Co-Mn oxide was galvanostatically electrodeposited on 310SS coupons using a Gamry Potentiostat via a procedure adopted from Wei et al., 2009. The morphology and composition of the coatings were analyzed using SEM/EDS and XRD and the adhesion was assessed by Scratch tests.

Results: The electrodeposited coating adhered well to the substrate based on a scratch test determination. SEM/EDS revealed the presence of cobalt and manganese oxide in the coating, which were confirmed by XRD. Surface morphology consisted of particles of approximately 5 microns in diameter that were similar in size to those of cobalt oxide electrodeposited on stainless steel in another study. The coating exhibited superior thermal efficiencies compared to those of conventional thermal receivers like Pyromark 2500.

Conclusion: Cobalt-manganese oxide can be electrodeposited with appreciable adhesion on stainless steel substrates through simple electrochemical reactions and solution chemistry. The composition and microstructure of the coating suggest good thermal efficiency for Gen3 CSP thermal receiver

Key Words: thermal efficiency, Gen3 CSP, thermal receiver, electrochemistry, stainless steel 310

Machine Learning- Driven Optimization of Temperature for Enhanced Hydrogen Production Through Catalytic Pyrolysis of Biomass

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Purpose: This study focuses on enhancing hydrogen production through catalytic pyrolysis by optimizing temperature utilizing the power of machine learning (ML) models. The main aim is to establish the ideal temperature ranges for enhanced hydrogen yield, improved catalyst life, and reduction in unwanted byproducts for the process. Hydrogen is conventionally produced through various methods, but most of these processes are not carbon-free. Catalytic pyrolysis is a thermochemical process that offers a carbon-neutral solution to hydrogen production from biomass.

Methods: Supervised machine learning algorithms such as Random Forest (RF) regressor, Gaussian process (GP) regressor, Support vector machines (SVM), and Artificial neural networks (ANN) are used to analyze comprehensive datasets from experimental studies comprising biomass and catalyst composition, temperature, and hydrogen production outcomes. Through feature importance, temperature is identified as one of the most influential parameters affecting hydrogen yield, thus corroborating current literature. These insights are utilized to guide temperature range selection for improving hydrogen yield, thereby addressing the limitations of traditional trial-and-error experimental methods.

Results: Initial findings indicated that machine learning models accurately predict the optimal temperature with an $R2>0.87$ and an $MAE<15\%$. The findings show the correlation between temperature and feedstock composition, conversion rates, catalyst deactivation, and product distribution. Interpretation of the models revealed the importance and influence of temperature on other process parameters and hydrogen yield.

Conclusion: Machine learning provides a more nuanced understanding of the best temperature ranges and their interaction with other variables. The result is the potential for accelerated development and scaling of the process, which contributes to the advancement of clean and cost-effective hydrogen production technologies. The findings of this research have broad implications for the field of renewable energy, offering a data-driven and systematic approach to enhanced hydrogen production that can be extended to other chemical processes.

Key Words: Hydrogen, yield, thermochemical, neural networks, renewable energy

Performance Understanding in Kinaesthetic Learning: A Dominican Undergraduate Case Study of Virtual Reality Integration in Computer Literacy

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Purpose: To explore how three undergraduate computer literacy classes at a Dominican tertiary institute would demonstrate performance understanding of virtual reality (VR) integration within a specific course area of their current academic pursuit via a 10-minute TED-Talk-style presentation.

Methods: Design-based research (DBR) methodology (Johnson et al., 2017) was employed to evaluate how the undergraduate students demonstrated an understanding of the target goal for the task; determine how they applied the VR lecture beyond what they were taught; and design a series of tasks, namely, introductory performances, guided inquiry performances and culminating performances, aimed at potentially improving how learners utilise multiple intelligences and technologies in a collaborative learning environment. This case study comprised three groups of two face-to-face classes, and one online class. The qualitative research was grounded in the teaching for understanding with technology framework by Franz et al., (2014), focusing on performance understanding and new technologies. The recruitment of participants adhered to the principles of non-probabilistic sampling, employing convenience sampling (Andrade, 2021). Acknowledging the limitations of convenience sampling in generalisability, stratified random sampling was employed to improve representativeness within the recruitment process. The research garnered fifteen participants. The research sought to answer:
o What does undergraduate students' understanding of VR integration in a chosen course area look like when using a kinaesthetic learning style?
o How can educators effectively assess a student's understanding of VR
integration in a kinaesthetic learning activity for deep understanding?
o How can educators use kinaesthetic learning activities to promote a deeper understanding of VR integration among undergraduate students?
Results:
o Students demonstrated understanding of VR integration in the following course areas: Tourism, Biology and Paralegal Studies. Technology: Canva, Google Slides and Microsoft PowerPoint.
o Utilise standards-based rubrics with key features such as Development and Demonstration of Understanding Goals, Students stretch their minds beyond what was taught, Sequence of Activities; and Dimensions: Knowledge, Methods, Purposes, Forms.
o Integrate critically thinking activities that require students to analyse the current situation regarding technology use in the classroom, include collaborative role-play scenarios, combine VR integration activities with traditional teaching methods and offer continuous feedback via verbal comments, written notes, videos or digital annotations.

Conclusion:
The research meaningfully contributed to the existing body of research on virtual reality immersive learning experiences (VRILE)-based science of learning and instruction. This was achieved via the design-based research (DBR) methodology that aided the interventionist approach.

Key words: Performance Understanding, Kinaesthetic Learning, Virtual Reality Integration

DAY 2

PANEL 3:
Scientific and Technological Change

A Dive into Thermoelectric Ocean Thermal Energy Conversion (TE-OTEC): Potential of Implementation in Jamaica

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Purpose: To determine the potential and the feasibility of Ocean Thermal Energy Conversion (OTEC) as a viable and sustainable source of energy for a small island setting as in Jamaica. A systematic comparison with the main actual renewable energy adopted in the island (solar and wind) as it relates to cost, energy output and efficiency was performed. Finally, we discussed the new concepts of introducing compact thermoelectric heat exchanger, as a promising alternative to the actual Rankine cycle.

Methods: We performed a detailed analysis of the available technical, economical and geophysical references for the potential of OTEC, with a special emphasis on its potential to Jamaica. A comparative study was done with existing renewable options already adopted for the energy mix in the island (such as solar and wind) to assess its feasibility on practical grounds. The paper also shows preliminary results of simulations of realistic thermoelectric generators (TEG), which could be integrated to greatly simplify its design as they are the only devices which can directly convert heat to electricity.

Results: Our analysis shows that, indeed OTEC coupled with thermoelectric technology, present a real potential for the northern and western parishes in Jamaica, where the ideal depth of 1000 m and distance from the shores below 2.5km could be economically highly viable. This could be even more attractive if OTEC could be integrated into much larger integrative development projects capable of providing answers to many global issues such as access to clean water, irrigation, advancements in aquaculture, Energy and HVAC supports for the tourism sector and many more.

Conclusion: The present study shows that OTEC combined with thermoelectric technology is indeed a very attractive and sustainable option to mitigate the energy needs for a small island such as Jamaica. Products from OTEC commercialization perfectly meet many of Jamaica's SDG and naturally those of the entire Caribbean region.

Key Words: Ocean Thermal Energy Conversion, Thermoelectric Ocean Thermal Energy Conversion, Thermoelectric Generator, Sustainable Development Goals

PANEL 4:

Environmental and Agricultural Change

Variable Shifts in Bird and Bat Assemblages as a Result of Reduced-Impact
Logging Revealed After 10 Years

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Purpose: Selective logging is the most widespread driver of land-use change in biodiverse and carbon rich tropical forests. Recent research on short-term impacts has shown that Reduced-Impact Logging (RIL) results in few or no changes to biological assemblages. We addressed the longer-term research gap by quantifying changes in biodiversity assemblages as a result of RIL over approximately 10 years.

Methods: Using a Before-After-Control-Impact (BACI) approach, we assessed three timeframes of RIL recovery within the Iwokrama rainforest to understand how bird and bat communities respond to RIL. We measured species richness and utilized Bayesian analyses for community change in response to logging intensity, timeframe, feeding guild, and stratification.

Results: Time since logging explained >50% of the assemblage change in birds and >80% in bats. Ten years later, richness had slightly declined in some groups whilst others showed complete recovery. A subtle, long-term relaxation effect may be occurring in some groups, whilst other groups have either recovered or haven't changed after logging. Assemblage change was predicted by vertical stratification of forest use.

Conclusion: Concessions with extensions on regeneration times are likely to benefit from ecosystem services provided by biodiversity, whilst also making a valuable contribution to the global conservation estate.

Key Words: Reduced-impact logging, forestry, extinction debt, Guyana, tropical rainforest

Coastal Carbon Storage in Degraded, Natural, and Restored Mangrove Ecosystems of Guyana

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Purpose: Mangroves are among the most carbon-rich forests in the tropics due to their capacity to sequester and store carbon within their ecosystems. However, the combination of natural and human-induced phenomena causes changes in these ecosystems which can affect the flow of carbon within them. This study was conducted to compare the carbon storage capacity of natural, degraded, and restored mangrove ecosystems found along Guyana's coastline.

Methods: Along the coastline of regions 4, 5, and 6 in Guyana, nine mangrove locations were selected – three natural, three degraded, and three restored areas. In the wet and dry seasons, we examined and compared the carbon content stored in aboveground biomass, standing litter, and soil in the three ecosystem types. During a one-year period, the point-centred quartered method was used for tree sampling, while the randomised blocked design was used for standing litter and soil sampling.

Results: Our study revealed that the natural ecosystems exhibited higher carbon pool levels (29.58 – 35.14 Mg/ha), followed by the degraded ecosystems (30.49 – 32.27 Mg/ha), and then the restored ecosystems (22.81 – 27.63 Mg/ha). Significant differences were only documented in carbon found in aboveground biomass between ecosystem states, particularly within the natural ecosystems. While seasonal fluctuations exist between the carbon pools, linear mixed effect models revealed that seasonality may influence the soil and standing litter carbon concentrations to some extent. Positive correlations in the restored ecosystems suggest that the larger carbon stocks in aboveground biomass may be associated with soil and standing litter carbon, unlike the negative correlations seen in the natural and degraded ecosystems

Conclusion: Our study provides some evidence that the overall carbon storage capacity of mangroves is influenced by the current state of their ecosystem. Ecosystems characterised by minimum disturbances may possess a greater carbon storage capacity in comparison to ecosystems that are currently experiencing or have recovered from disturbances.

Key Words: carbon, Mangroves, aboveground biomass, Soil, standing litter, Guyana

Multi-Index Analysis of Agroecological Zones of Guyana using Google Earth Engine

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Purpose: This study uses the capabilities of Google Earth Engine (GEE) to analyse and assess the coastal agroecological zones of the Mahaica Mahaicony Abary (MMA) using a variety of spectral indices from multi-temporal satellite imagery. Coastal agriculture is highly vulnerable to climatic stresses, making monitoring crucial for farmers and policymakers to address challenges effectively.

Methods: This study integrates a comprehensive suite of spectral indices, including the Normalized Difference Water Index (NDWI), Chlorophyll Vegetation Index (CVI), Normalized Difference Salinity Index (NDSI), Enhanced Vegetation Index (EVI), Normalized Difference Vegetation Index (NDVI), and Modified Soil Adjusted Vegetation Index (MSAVI). These indices provide critical information about soil properties, salinity levels, chlorophyll concentration, moisture, and urban encroachment. Remote sensing data from Sentinel-2 and Landsat 8 TOA imagery (2015-2023) are processed to assess and analyse temporal and spatial variations among these indices.

Results: Agricultural productivity and sustainability are evaluated through the correlation between these indices and ground-truth agronomic data. This robust framework, comprising enhanced spectral indices, enables precision monitoring and management of coastal agroecological zones.

Conclusion: Agricultural productivity and sustainability are evaluated through the correlation between these indices and ground-truth agronomic data. This robust framework, comprising enhanced spectral indices, enables precision monitoring and management of coastal agroecological zones.

Key Words: Climate-Smart Agriculture, Coastal Agroecological Zones, Google Earth Engine (GEE), Remote Sensing, Spectral Indices

Building Urban Resilience to Floods in Urban Communities of The Coastal City of Georgetown, Guyana

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Purpose: The fundamental structure of this research is based on the perception that flood events cannot be disparaged. Cities must reinvent themselves to confront future problems as a result of climate change's unpredictability and an increase in extreme weather conditions such as prolonged and intense precipitation. As such, this research deems the main aim as to develop an urban resilience conceptual framework in the effort to guide decision-makers and urban planners to mitigate flood impacts in the coastal city of Georgetown, Guyana. That aim was further envisioned through the design of the urban regenerative plan for urban communities in Georgetown, which integrates urban planning and design strategies to prevent and mitigate future flooding while moving away from traditional floods control infrastructure.

Methods: Consequently, five main objectives were used to accomplish these aims. The first objective was achieved through the case study analysis of Portland, Malmo, Rotterdam, Boston and Yanweizhou flood resilience strategies. Subsequently, the development and validation of the conceptual framework for urban resilience for measuring the coastal city of Georgetown, Guyana's resilience to floods was a product of the second and third objectives. The conceptual framework's content validity was assessed in the judgement stage, using equations of CVI and CVR that involved a panel of 10 experts ranging from local to international level. The framework was judged based on a set of 25 items sub-divided into five dimensions, namely; economic, environmental, social, infrastructural, institutional. Following that, the design of the urban regenerative master plan was aimed at testing the principles defined in the theoretical phase of research by connecting theory with practice.

Results: The experts judged all 25 items as having excellent content validity (CVR >0.62 and ICVI > 0.78). The framework's overall SCVI was 0.95 (SCVI/Ave) and 0.52 (SCVI/UA). As a result, the urban communities of North Turkeyen, North Pattensen and North Liliendaal, with a total area of 0.66 km2, was identified as an excellent environmental setting for this sort of demonstration, since it necessitated flood-resilient improvements at different morphological levels.
Conclusion: This research highlighted the complexities of managing flood risk and acknowledged that it should not be viewed as a constraint, but rather as an opportunity for innovative designs and creation of stimulating, inspirational landscapes and spaces.

 Key Words: Urban resilience, Content validity, Urban regenerative design, Stormwater management, Flood-resilient interventions

PANEL 5:

Environmental and Agricultural Change

A Retrospective and Histopathological Study on the Incidence of Bovine Tuberculosis in Guyana

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Purpose: Renewed interest in zoonotic diseases have been sparked by the increase in bovine tuberculosis (bTB). It had a long history of negative economic impact in several countries. It is an illness that causes fatalities in both humans and animals.

Method: A retrospective and histopathological study on the incidence of bovine tuberculosis was conducted at the Georgetown Municipal Abattoir in Guyana. Retrospective data were collected on 67,170 animals slaughtered between 2008 and 2018. Thirty-five samples were examined histologically using hematoxylin and eosin stains.

Results: Analysis indicated that 2,287 incidences of tuberculous lesions were observed. This reflects a 3.3% incidence rate of tuberculosis lesions among the studied animals. The lung was the organ that was most negatively impacted. The highest number of instances (345) was seen in 2009, but the cause of the high number of instances was unclear. The number of infected females was significantly higher than males (P 0.0002). Samples from the lymph nodes, liver and lungs were examined and thirty of the cases depicted histological lesions that were compatible with tuberculosis. Gross lesions observed include caseous necrosis or caseation, multinucleated giant cells, fibrous connective tissues, mineralization and inflammation.

Conclusion: These studies confirmed that there is a high incidence of bovine TB in Guyana. Further, evidence from both research facets indicate that the majority of the diseased animals came from Region 6. It also indicated that farmers were experiencing significant financial losses as a result of the rejection of complete carcasses and edible organs.

Key Words: Bovine, Tuberculosis, Caseous necrosis, Tissues, Hematoxylin

An Evaluation of Various Feedstocks in the Production of Biochar for Utilization in Potting Media

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Purpose: This research sought to examine the scope in Guyana to develop a local potting media. Guyana's agricultural sector generates a large amount of waste biomass, that garners no substantial marketable use. Based on the nature and availability of biomass, opportunities can be harnessed to derive a commercial product such as a biochar based potting media for use in nursery settings.

Methods: Biochar was made from sugar- cane bagasse, rice hulls, coconut coir and water hyacinth (Eichhornia crassipes) biomass through slow, low to moderate temperature pyrolysis using a charring kiln. Biochar based potting media were formulated and mixed with a sandy loam soil and then used to grow tomato and sweet pepper in a seedling trial for six weeks in a CRD. An imported commercial soil medium - Promix and locally produced NAREI's S-SowMix were also utilized in this research for comparison. Parameters of interest included the effects of the various potting media on seedling growth and performance such as seedling height, root length, seedling fresh weight and root and shoot dry weights and pH of each media. A one-way ANOVA was performed to compare the effects of all potting media; furthermore, post-hoc examination of statistical significance between treatments was compared by LSD All Pairwise Comparison Test at $P<0.05$ significance level.

Results: Potting media containing bagasse biochar produced superior results along all parameters of interests; tallest seedlings - measuring 5.9cm, also produced root lengths that were among the longest measuring 12.25cm and the heaviest seedlings recorded at 200mg (dry weight) and above. Promix and media containing bagasse biochar possessed an optimum pH range of 6.0 – 7.5 where most agricultural crops thrive.

Conclusion: Feedstock present in Guyana can be pyrolyzed to produce good quality biochar, thus encouraging research and development of various biochar potting media formulations.

Key Words: Biomass, Biochar, Potting media, Bagasse biochar

Predicting Malaria Incidence in Tropical Countries Using Climate Variability Trends and ARIMA Modelling

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Purpose: This study aimed to investigate whether climate variability has directly contributed to the resurgence of malaria and to predict its spread using auto-regressive integrated moving average (ARIMA) modelling over nine years (2024-2033).

Method: A time series graph of malaria cases, average annual temperature, and annual rainfall was generated for 15 tropical countries where malaria is endemic. The study's sole source of secondary data was obtained from the World Bank Open Data sources for confirmed malaria cases, the annual mean temperature and the mean precipitation. The data was collected from 2000 to 2021 and analysed in an Excel sheet. The data was uploaded to Gretl's statistical software to perform the ARIMA models.

Results: The results obtained from this study showed that the relationship between the number of confirmed malaria cases and climate variability was undetermined based on the empirical evidence obtained from the ARIMA models. The similarity in trends of malaria cases, temperature, and precipitation was inconsistent across the 15 tropical countries selected. This could be due to the lack of an empirical link between the variables or substandard data quality in less developed or developing tropical countries.

Conclusion: Further research and improved policies are recommended for further verification. This can involve including other countries and expanding the data set to validate these conclusions. In addition, new policies are needed to improve the collection of temperature, precipitation, and malaria case records for tropical developing countries to predict future disease incidence changes and substantially improve national control and prevention programs. It is, therefore, essential to construct prediction models for malaria trends according to the available passive and economic monitoring systems to report cases, especially in resource-constrained regions where it is necessary.

Key Words: Climate variability, Temperature, Precipitation, Malaria, Tropical Country

Dry Season Heavy Metal Abundance in The Interstitial Water of Undisturbed Black Mangrove Stands in Guyana

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Purpose: Black mangroves are the dominant species found in Guyana's fringe mangrove forests which are under threat from numerous anthropogenic activities. Heavy metal pollution has been found to be negatively affecting mangrove forests worldwide. Hence, the purpose of this study was to investigate the dry season abundance of selected heavy metals in the interstitial water of undisturbed Avicennia germinans stands in Guyana.

Methods: The study site is located at 6°49'24.52"N, 58° 5'30.48"W and is dominated by black mangroves. Samples were collected at equal intervals along a transect oriented from south to north with an approximate length of 709 m. Sample analysis was done using atomic absorption spectroscopy by the University of Guyana Chemical Laboratory Analytical Services. The data was then analysed using a one-way analysis of variance (ANOVA) and a simple regression model.

Results: The results indicated that there was a trend identified in the data along the transect and a significant relationship between Fe and Zn concentration and distance along the transect. The mean Fe concentrations were found to exceed both USEPA and WHO guidelines while the Zn concentration exceeded the USEPA guidelines but not the WHO guidelines since none was mentioned by the organization.

Conclusion: The key findings are there is a relationship between the heavy metals and distance, there is no physical indications of heavy metal toxicity at the study site although they were above USEPA and WHO recommended limits, and finally, the Fe concentration in the study site can go as high as 41mg/L and Zn can reach as high as 0.18mg/L in the dry season. Cd, Cu, Pb and Ni were below the detectable limit indicating that their concentrations were very low, or they might have been absent at the study site.

Key Words: Avicennia germinans, Iron, Mangrove regeneration, Pollution, Sediment, Zinc

The Study of Bio-Efficacy Properties of Sargassum Extract on The Growth of Rice (*Oryza sativa*)

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Purpose: Rice is a primary food source for an estimated 3.5 billion people globally. It serves as a stable food for more than half of the world's population for its nutritional and caloric value. As such, rice cultivation has traditionally relied on inorganic fertilizers to increase crop growth and production over the years, however, this has negatively impacted the environment by reducing soil fertility. Overuse of inorganic fertilizers also polluted waterways and destroyed the land's natural biome. One promising approach involves using natural bio-stimulants such as Sargassum extracts, which have been shown to improve plant growth and resilience. Therefore, this study aims to investigate the bio-efficacy of Sargassum extract on the growth of rice, providing insights into its potential application in rice cultivation as a bio-stimulant.

Methods: This research will follow an experimental design and a quantitative approach. There will be field and greenhouse trials conducted on rice plants grown in plots and buckets respectively. There will be five treatments (T1- 0.3 % SE + inorganic fertilizer, T2- 0.5% SE + inorganic fertilizer, T3- 1 % SE + inorganic fertilizer, T4- Inorganic fertilizer only T5- Sargassum extract only and T6- Control). Treatments will be arranged in a randomized complete block design. The Sargassum extract will be provided by the University of the West Indies St. Augustine's campus. Greenhouse and field evaluation of the effect of Sargassum products on the plant growth parameters and yields of crops.
Parameters to be investigated include:
Greenhouse inoculation of plants treated with Sargassum plants for studying the effects on disease severities.
Field evaluation of crop plants treated with Sargassum products for disease severities.
Study of the mechanisms of disease and stress resistance Assessment of defense enzyme activities Assessment of leaf chlorophyll contents Phenotypical assessment of tolerance of plants to salinity stress qPCR-based assessment of stress marker and tolerance genes.
Metagenomic analysis of soil rhizosphere, phyllosphere, and endosphere of plants to evaluate the microbial diversities and population dynamics.
Analysis of nutritional composition and qualities of crop plants treated with Sargassum products.

Conclusion: It can be concluded that sargassum extract has been shown through literature that it has the capacity to enhance rice growth and yield acting as a biostimulant. It offers an alternative solution to the use of inorganic fertilizer that is more environmentally safe.

Keywords: Sargassum, Biostimulant, Oryza sativa, seaweed

Identification and Molecular Characterization of Salinity Tolerance Among Some Rice (*Oryza Sativa L.*) Genotypes in Guyana

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Purpose: Salinity stress severely threatens rice cultivation, especially in regions like Guyana where coastal and inland salinization is prevalent. More than 30% of the total acreage under rice cultivation is subjected to salinization; therefore, addressing salinity tolerance in rice is crucial for ensuring food security, improving agricultural productivity, and enhancing the livelihoods of farmers in these affected areas.

Methods: This research will follow a quantitative approach with a randomized complete block design. The rice genotype of 90 species will be determined through molecular markers at the University of West Indies (St. Augustine's campus) after which identification of salt-tolerant and susceptible rice genotypes will be done based on specific traits. The biochemical characterization and determination of the growth, yield and yield attributes of the salt tolerance genotypes will be done. Several methodological steps include screen house, laboratory, and field experiments with advanced biotechnological tools. The screen house and field experiments will be conducted at the Guyana Rice Development Board Rice Research Station in Burma while the laboratory experiment will be conducted in the laboratory of the University of the West Indies, Trinidad. Data will be collected using established guidelines and will be analyzed using appropriate statistical tool and formulas.

Conclusion: This study will identify and characterize salinity tolerance in several rice (Oryza sativa L.) genotypes cultivated in Guyana. By evaluating morphological, physiological, and biochemical traits under controlled salinity conditions, certain genotypes are expected to exhibit superior tolerance, marked by sustained growth rates and higher chlorophyll content. These genotypes are anticipated to demonstrate a robust capacity to withstand saline stress, offering promising candidates for future breeding programs aimed at improving rice resilience in saline-prone areas of Guyana.

Key Words: Oryza sativa L., rice genotype, salinity

PANEL 6:
GENERAL SESSION

Interdisciplinary and Multidisciplinary Perspectives

Early Discontinuation of Subdermal Contraceptive Implant and The Associated Reasons for Discontinuation: A Scoping Review

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Purpose: This scoping review aims to examine the prevalence and identify the contributing factors associated with the early discontinuation of subdermal contraceptive implants.

Methods: The review used the Arksey and O'Malley (2005) framework for scoping reviews, ensuring a rigorous and transparent approach to study selection and data extraction. The Liverpool John Moores University Electronic Library which gives access to multiple public health databases was used to identify relevant published, peer-reviewed articles on early discontinuation (defined as removal within 12 months) of subdermal contraceptive implants. A modified PICO framework was used to define the inclusion and exclusion criteria for the study selection process.

Results: The review revealed significant variability in early discontinuation rates of subdermal contraceptive implants ranging from 38% in Pennsylvania, USA to 8.4% in the Democratic Republic of Congo. There was also variability within countries such as Ethiopia where the discontinuation rates were between 37.3% and 10.8%. The most frequently reported reasons for discontinuation included side effects such as irregular bleeding patterns, headaches, and mood changes and skin changes. Menstrual irregularities were the most common reported side effect with as much as 97.3% of women reported experiencing that side effect. Inadequate counselling, services dissatisfaction, desire for pregnancy, partner and community disapproval, misconceptions and socioeconomic variables also emerged as contributing factors.

Conclusion: Addressing the high rates of early discontinuation of subdermal contraceptive implants requires a multifaceted approach. Healthcare providers should prioritize comprehensive counselling, address concerns about side effects, and offer management strategies. Improving access to healthcare services, particularly in underserved areas, and ensuring culturally sensitive care are essential to supporting women's contraceptive autonomy and successful use of this long-acting reversible contraceptive methods.

Key Words: Early discontinuation, sub-dermal contraceptive implant, early removal, reasons, factors.

Factors Associated with Pacifier Use Among Infants Under Six Months Old at Linden, Guyana: A Cross-Sectional Study

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Purpose: The study sought to determine the prevalence of and identify factors related to pacifier use among infants under 6 months old at Linden, Guyana. Due to the high frequency of pacifier use and varying recommendations based on the benefits and risks of its use, understanding the extent of this practice and influencing factors may help guide and support public health recommendations and interventions.

Methods: A cross-sectional survey employing a validated questionnaire was used to collect data on maternal demographic, reproductive, pre and perinatal factors, as well as infant characteristics, from a representative sample (n=202) of consenting mothers with singleton babies less than 6 months, attending Child Health and Immunization Clinics at Linden, Guyana. A convenience sampling technique was utilized. Analysis was carried out using SPSS version 23.0. The chi-square test assessed for significance of relationships, considering a p-value of <0.05 to be statistically significant.

Results: Pacifier use was reported in 67.8% of infants. In the bivariate analysis, significant differences regarding pacifier use were observed based on the mother's relationship status (p = 0.023), parity (p = 0.036), monthly income (p = 0.021) and breastfeeding initiation ability during the first hour after birth (p = 0.042). Multivariable binomial logistic regression revealed that infants of mothers whose monthly income was $70,000 GYD and above were more likely to use pacifiers before 6 months old (AOR = 2.80, p = 0.007, CI = 1.33 − 5.87).

Conclusion: The prevalence of pacifiers use among infants under 6 months old at Linden, Guyana was relatively high. The study identified higher maternal income ($70,000 GYD and above) as a significant determinant of pacifier use in this specific population.

Keywords: pacifier use, infants, associated factors, breastfeeding

Exploring Graduates' Perception of Employability Skills for Sustainable Development Goal 4 in Guyana

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Purpose: The purpose of this exploratory single case study was to explore how employed graduates from the University of Guyana view their employability skills.

Methods: A qualitative research design was adopted in the study and an exploratory single case study research design was used. Twelve graduates were interviewed using semi-structured interviews and data was analyzed through content analysis with the help of NVivo software. The target population was employed graduates of the University of Guyana who had moved to the workplace in the last four years.

Results: The study revealed two key findings: first, graduates felt that there was a discrepancy between the skills that were being imparted at the university including technical fields such as the oil and gas and those needed in the employment sector; second, there was an indication that certain employability skills that included communications and flexibility among others were inadequately taught at the university.

Conclusion: To sum up, this work shows that existing between the educational offering of the University of Guyana and the market demands there is a lack of correspondence about the technical and soft employability skills expected in the labour market. This paper finds that graduates feel the need for better re-alignment of academic curricula with the industry to improve preparedness for the labour market. The areas highlighted above must be closed through curriculum development and industry linkages to enhance graduate employment and the overall economic development of the nation.

Key Words: human capital theory, employability skills, technical skills, soft skills, job alignment, real-world application

An Evaluation of the Archaeological Shell Midden Record along Guyana's Northwestern Coast

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Purpose: The shell midden sites of Guyana's northwestern coast are a very visible record of prehistoric occupation and land use during the Holocene period. Drawing from regional and local climate and environmental data, this paper reviews zooarchaeological, bioarchaeological, and environmental data as an aid to understanding prehistoric land use, shell midden function, and the complex relationship between the Archaic populations and their landscape. The paper analyzes available and previously published materials which covers the spectrum of faunal exploitation and incorporates recent isotopic analysis of human and faunal remains from seven Early to Mid-Holocene Guyanese shell middens as a proxy to infer land use and foraging behavior.To improve our understanding of the role a changing environment played in food security and resource use by employing a multi proxy approach using archaeological record for the purpose of environmental reconstruction to determine human demography and influence on land use along Guyana's Coastal Littoral.

Methods: This research utilized both Quantitative and Qualitative approaches relying on archival shell midden data, published records, in addition to recent site excavation and observations. We utilized Stable Isotope analysis of human and faunal remains including sediments from shell middens in addition to quantifiable faunal record and material culture to establish the nature of the environment and determine the extent of past land use strategies and foraging behavior.

Results: Oxygen $\delta18O$ isotope and Carbon $\delta13C$ compositions of Early to Mid-Holocene shell middens have provided for a new understanding of Holocene climatic conditions of Guyana. The data demonstrates that marked shifts in the diet coincides with open canopy during warmer intervals and changes in vegetation structure which were influenced by shoreline movement also influenced the distribution and abundance of biodiversity couples with human colonization of the coast and a foraging strategy consistent with seasonal mobility, suggesting a land use pattern influenced by the environmental factors. The emergence of mangrove swamps 6,000 and 4,000 B.P. based on pollen data, supports a condition of fluctuating environments as indicated by the $\delta18O$ isotopic record. A noted decline in the number of mounds possibly signals decreasing productivity of the area and the gradual adaptation to horticultural dependency. These emerging physical environments are believed to have produced ecosystems supporting and increasing the use of non-molluscan fauna - especially fish.

Conclusion: We conclude in part that shellfish collection, as well as an increasing use of vertebrate resources, may vary significantly by virtue of localized coastal landscapes as seen in coastal Puerto Rico (Pestle et al. 2001).

Keywords: Shell middens, archeological study, paleo-environmental records

Project-Based Learning to Enhance Medical Students' Engagement and Skill Development in Mental Health Outreach Programs Post-COVID-19

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Purpose: This mixed-method exploratory sequential quantitative-qualitative quasi-experimental study investigated the effectiveness of Project-Based Learning (PBL) in enhancing medical students' engagement and skill development in mental health outreach programs at the University of Guyana post-COVID-19. The study aimed to address the insufficient engagement and skill development observed due to the lack of collaborative activities during the pandemic.

Methods: The study employed a quasi-experimental design with three groups of 61 medical students engaging in PBL as part of their coursework. Data collection involved semi-structured interviews and pre- and post-intervention assessments. The students' competencies were evaluated using a modified 40-point rubric adapted from the Master of Public Health program at the University of Montana. A logic model guided the outreach program implementation.

Results: Quantitative data analysis revealed strong reliability, with the Intraclass Correlation Coefficient (ICC) increasing from 0.647 to 0.801 for single measures and 0.924 for average measures post-intervention. Normality tests indicated significant deviations, necessitating non-parametric tests. The Kruskal-Wallis test showed significant differences in intervention effects across three weeks for all groups (Group 1: $H = 44.00$, $p < .001$; Groups 2 and 3: $H = 77.00$, $p < .001$). Qualitative data revealed concerns about curriculum adequacy, while post-intervention themes highlighted the effectiveness of collaborative learning and enhanced communication skills.

Conclusion: The study suggests that incorporating PBL into medical education curriculum can effectively improve students' engagement and competencies in mental health outreach programs. The findings highlight the importance of culturally sensitive approaches and emphasize the need to further explore curriculum development strategies to enhance the effectiveness of outreach programs and the overall learning experience of medical students.

Key Words:
Project-Based Learning, Mental Health Outreach, Medical Students, COVID-19, Curriculum Development

An Exploration of Faculty's Perspectives of Staff Morale at a Guyanese Tertiary Institution

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Purpose: The purpose of this descriptive phenomenological qualitative study was to explore lecturers' perceptions of staff morale at a Guyanese Tertiary Institution

Methods: The data were analyzed using Clarke and Braun's (2006) six steps to thematic analysis.

Results: The themes discovered were motivators -recognition, advancement, and responsibility. The sub-themes were high satisfaction, hope, and verbal acknowledgements from leaders and students, and the low satisfiers were unfair advancement opportunities, the need for more recognition, unfair recognition, and excessive workload. The themes under hygiene are - policy/administration, salary, supervision, interpersonal relationships, and working conditions, with the sub-theme being high dissatisfaction with poor communication, staff unaware of documented policies, significant decrease in staff meetings, fear of victimization, low job security, low salary, inadequate allowances, lack of transparency, maltreatment, poor leadership quality, inadequate communication, departmental focus and more conducive physical working conditions, and low dissatisfaction being collaboration and communication, trust and support, improve practice and improve working condition.

Key Words: Staff morale, Herzberg two - factory theory, job satisfaction, motivation, Hygiene

A Correlational Analysis of Educational Productivity and Grade 9 Social Studies Students' Academic Performance, Guyana

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Purpose: The purpose of this quantitative study was to correlate the components of the Educational Productivity Theory with Grade 9 Social Studies students' grades in two schools in Georgetown.

Methods: Remler and Ryzin (2011) detailed surveys as a primary data collection method from a relatively large group of individuals or entities. It is often referred to as a questionnaire and involves multiple choice, Likert scales, or open-ended questions. These questionnaires can be classified as online or physical, self-administered or researcher-administered, or given individually or in a group setting. For the study in question, the questionnaire was in-person and group self-administered. Group self-administered questionnaires are especially common in the educational setting where the units of the study are students or teachers.

Results: Descriptive and inferential statistics were presented from a 22-item student questionnaire. It sought to correlate the components of the Educational Productivity Theory with Grade 9 Social Studies students' grades in two secondary schools in Georgetown. The results gleaned from 80 students show a correlation between the Theory and Academic Performance components. Similarly, there is a relationship between the Theory and Academic Performance components. Therefore, the null hypotheses were rejected in both scenarios for Schools A and B. Key correlations were found for all four components: motivation, quality of instruction, classroom climate, and home environment. Regarding statistically significant relationships, only motivation and home environment recorded high significance.

Conclusion: Based on the aforementioned findings, the following conclusions were drawn from this correlational study. Regarding Grade Nine students in two secondary schools in Georgetown, correlations indicate that all four components tested in the Educational Productivity Theory (motivation, quality of instruction, classroom climate, home environment) correlated positively with students' academic performance in Social Studies in Schools A and B. This meant that as one unit of these components increased, there was a corresponding increase in academic performance.

Key Words: Educational Productivity, Academic Performance, Classroom Climate, Quality of Instruction, Motivation, Home Environment

An Exploration of Teacher Burnout at a Secondary School in New Amsterdam

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Purpose: Teacher burnout is a growing concern that affects performance, well-being, and retention, particularly in challenging school environments. This study aims to investigate the contributing factors of teacher burnout at a secondary school in New Amsterdam. The research seeks to answer the question: What are the primary causes of burnout among teachers in this setting? Guided by Maslach's Burnout Inventory (MBI), the study explores burnout through the lens of emotional exhaustion, depersonalization, and reduced personal accomplishment.

Methods: This study is a non-experimental research design due to its descriptive and exploratory nature. A qualitative research design was employed, utilizing semi-structured interviews to gather in-depth insights from participants. The sample comprised nine teachers, selected using convenience sampling technique. Thematic analysis was used to analyze the data, identifying key patterns and sub-themes.

Results: Emotional exhaustion stemmed from overwhelming workloads, insufficient administrative support, and physical and mental strain. Depersonalization manifested through negative attitudes towards students, emotional detachment, and frustration with student behavior. Additionally, teachers reported a diminished sense of personal accomplishment, fueled by a lack of recognition, disillusionment with the profession, and feelings of going through the motions.

Conclusion: The findings provide a deeper understanding of how systemic issues, inadequate resources, and job pressures impact teacher well-being, offering insights into the urgent need for structural changes and enhanced support systems to mitigate teacher burnout and improve retention.

Key Words: Burnout, Emotional exhaustion, Depersonalization, Reduced personal Accomplishment, Physical and mental strain

Psychological Distress Substance Use and Risky Sexual Behaviour Among Adolescents in Regions 4 and 6 of The Cooperative Republic of Guyana

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Purpose: The present research will be conducted with the objective of documenting the intersection among psychological distress, substance use and risky sexual behaviours among adolescents (10-17 years) in Guyana's youth community centres in Regions 4 and 6. Contextual associations with social media use and youth delinquency/truancy will be explored. Exploring the didactic cyclic relationship among psychological distress, substance use and sexual risk behaviours has never been conducted in Guyana. Therefore, the population used will be unique and will contribute to the body of knowledge in this field.

Methods: There will be a convenience sample of adolescents 10-17 years from community centres and/health clinics located in Region 4 (Georgetown) and Region 6 (New Amsterdam and Corriverton). A total of 100 males and 100 females in both Region 4 and Region 6 (total N=400) will be targeted. For mental health measures, depression will be assessed using the Patient Health Questionnaire (PHQ-9) while anxiety will be assessed using the Generalized Anxiety Disorder-7 scale. Sexual behaviour will be assessed using items from the CDC Youth Risk Behaviour Surveillance Survey. Analyses will be carried out in R Studio and/or SAS.

Results: The overall prevalence of mental health, risky sexual behaviours, and substance use will be examined by Region. The measures of delinquent activity and social media use, along with sample sociodemographic characteristics, will then be examined and displayed. The mediating effects of substance use on the association between mental health and sexual risk behaviours will be examined and displayed via logistic regression, controlling for socio-demographics and other covariates identified in bivariate analyses.

Conclusion: These findings can be used to ensure evidence-based interventions by the Ministry of Health and/or Ministry of Education to address school delinquency, substance use and risky sexual behaviour among adolescents in Guyana.

Key Words: Psychological distress, adolescents, substance use, risky sexual behaviour, social media use

PANEL 7:
5 Minutes Competition

The Emergency Preparedness and Response Level of the Entry Ports in Guyana
Against Infectious Disease Outbreaks

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Purpose: The study aimed to assess the preparedness and response level of Guyana's entry ports to infectious disease outbreak threats, specifically the screening measures used at the Lethem Ground Crossing and the Cheddi Jagan International Airport to prevent infectious disease outbreaks. This would be done through these objectives:
To evaluate the systems for controlling and screening of arriving passengers and cargo at the CJIA and LGC.
To assess the preparedness and response level employed at the port of entry. To outline a strategy to assess screening procedures at the port of entry.

Methods: The researcher adopted a descriptive (mixed method) research design for the study since she was interested in understanding the methods used for controlling and screening of arriving passengers and goods at the port of entry. The research design was used to gain insight of the current systems to ensure effective monitoring. Additionally, the researcher used a quota sampling technique to select participants for the study. The quota sampling is a technique characterized by selecting a sample group with some defined characteristics to participate in the study (Nikolopoulou, 2022).

Results: The sole application of entry screening methods seems ineffective in identifying infectious disease cases at the borders, with limited chances for sensitizing travelers. As a result, measuring the efficiency of screening techniques proves challenging. Analysis of the findings indicates low case detection rates during screening procedures at the various entry and exit points. As a result, screening methods should apply procedurally, considering the illness and pandemic patterns observed in relation to the available resources.

Conclusion: The application of effective screening measures will reduce the prevalence of infectious diseases. Screening procedures necessitate careful planning, resource allocation, and application of the protocol designs.

Key Words: Infectious disease, Port health, Travel, Pandemic, Ground Crossing, Airport, Ports of Entry, Preparedness, Exercise, Outbreak threats

Spatio-Temporal Flood Mapping for Disaster Risk Management and Planning in Lethem, Guyana

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Purpose: Floods are among the most frequent and impactful natural disasters. Flood risk management seeks to predict and prevent flood disasters through proactive planning and mitigation for long-term decision making. Lethem is the main urban hub for the Upper Takutu Essequibo Region of Guyana. It is extremely vulnerable to flooding due to its natural topography and its geographical proximity to the Takutu River. Owing to institutional challenges, the region has been unable to obtain current flood extent and frequency data. Therefore, the advancements in remote sensing technologies have been fundamental to enhance risk identification and can provide near-real-time inundation maps for visualisation and decision-making. The purpose of this study is to evaluate the use of satellite data through the platform Google Earth Engine as tools for mitigating flood risk in Guyana.

Methods: This paper employed the use of the European Space Agency (ESA) Sentinel 1 C Band Synthetic Aperture Radar (SAR) Ground Range Detection (GRD) datasets to map flood extents, using the threshold method, and flood frequency between 2018-2023. In addition, ESA's Sentinel 2 MultiSpectral Instrument (MSI) datasets were used for land-use/land-cover (LULC) classification and to determine the levels of flood exposure for 2018 and 2023. Image preprocessing and analysis was done using an open platform Google Earth Engine (GEE).

Results: Results showed that filtered pixel backscatter values-23 dB threshold represented flooded pixels. Moreover, the merged flooded pixels for the study period showed the frequency/number of times the pixels were flooded. Furthermore, the overall accuracies for LULC classification for 2018 and 2023 was 82% and 92%, respectively. These analyses served as essential components for the GEE application, which provided precise and near real-time information on inundation extent and exposure in Lethem.

Conclusion: The methodology employed in this case study can be applied to other areas in Guyana and the Caribbean region at large.

Key Words: flood mapping, Disaster Risk Management, Guyana, Google Earth Engine, Sentinel 1&2

Seasonality of Terrestrial Insect Communities at Sophia Point Rainforest Research Centre, Essequibo Guyana

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Purpose: The objective of this research is to determine the insect diversity of a pristine mixed forest habitat in Guyana, investigate seasonal changes in diversity and calculate the ratio of functional roles between the wet and dry seasons. The account of the diversity can be of significant value to conservationists and land managers. The diversity of insects found and the changes between seasons are valuable data since insects are understudied in the tropics. The information from this study also gives insight into the health of the various microhabitats and ecosystems given that insects are bioindicators giving insights into ecosystem functioning.

Methods: Insects were collected in three habitat types (Swamp, Forested, Hilly). Insects were collected using hand nets and handpicking along 100M X 10M line transects. These line transects were replicated three times in each habitat type. Insects collected were placed in vials and taken to the University of Guyana Centre for the Study of Biological Diversity for identification. Comparative analysis was conducted using RStudio 4.3.1. for both the Wet and Dry Seasons.

Results: In the Wet season a total of nine different orders, consisting of 39 families and 97 morph species were identified within those families. In the Dry season 10 orders consisting of 43 families, comprised of 104 different species of insects were collected. The Dry Season had a higher diversity and abundance than the Wet season. There were shifts in the ratios of the functional roles of these insects between the wet and dry seasons depending on the habitat. The ecosystems were determined to be healthy by using insect bioindicators which didn't discover any insect that indicated devastation.

Conclusion: The mixed forest surveyed was determined to be healthy and did not show a statistically significant shift in insect diversity and functional ecology between seasons.

Key Words: Insect Diversity, Seasonality, Functional Ecology

Use of Biochar Produced from Agricultural Residues to Treat Wastewater
Released by Guysuco in Blairmont, Berbice, Guyana

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Purpose: The present research objective was to investigate and assess biochar's potential use as a sustainable and effective method for treating wastewater produced by the Guyana Sugar Corporation (GuySuCo) in Blairmont. The biochar produced can benefit GuySuCo, as it offers a cost-effective solution for treating the wastewater released, particularly given the abundance of agricultural residues.

Methods: Four treatments were employed [T1 (Control), T2 (Wastewater + Coconut Husk), T3 (Wastewater + Rice Husk), and T4 (Wastewater + Sugarcane Bagasse)]. Water samples were collected at the point of inlet and outlet after twenty-one weeks of production. Agricultural residue biochar was produced in a locally constructed Top-lit Updraft kiln using a process known as slow pyrolysis. An ANOVA single-factor test was performed at a 95% confidence level to assess the statistically significant differences among agricultural residues used as adsorbents for wastewater treatment.

Results: Results indicated that the biochar produced from coconut husk and sugarcane bagasse were classified as class one due to their high fixed carbon content, and rice husk as class two. Iron was the sole metal detected. The inlet concentration of iron was 4.26 mg/L, with recorded removal rates of 44%, 40%, and 31% for T2, T3, and T4. The outlet concentration was 4.72 mg/L, with removal rates of 31%, 9%, and 34% for T2, T3, and T4. The initial Escherichia coli count in the inlet was 12 cfu/mL, with removal efficiencies of 83%, 92%, and 58% at T2, T3, and T4. The outlet had a count of 11 cfu/mL, with removal efficiencies of 64%, 36%, and 73% respectively. The total coliform count in the inlet and outlet exceeded 200 cfu/mL.

Conclusion: Statistically significant differences were found in the physicochemical and microbiological parameters among the three types of biochar.

Keywords: Agricultural residues, Biochar, Effluent, Pyrolysis, Sugarcane Industry

An Assessment of Selected Heavy Metals in Soils and Food Crops Grown
on The Mined-Out Bauxite Soils of Guyana

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Purpose: Heavy metal levels affect soil quality and food safety standards and can bioaccumulate in the tissues of animals that consume contaminated foods. Current research was conducted to determine if heavy metal content in mined-out bauxite soil and food crops grown in them exceeded acceptable levels.

Methods: Twenty-seven soil samples and twenty-four food plant samples (including Brassica rapa cv. chinensis, pak chow; Spinacia oleracea, spinach; Cocos nucifera L coconut fluid, Manihot esculenta cassava tuber, Apium graveolens celery and Lycopersicon esculentum) were collected from four (three mined-out and one unmined) districts. Concentrations of heavy metals (Al, Cd, Cr, Cu, Mn, Pb and Zn) were analyzed in the soil and food samples using Induced Coupled Plasma Mass Spectroscopy. In addition, chemical parameters like soil pH and organic matter content were determined by Activation Laboratory Inc., an ISO 9001:2015: IEC/17025-accredited facility. With the data obtained the geo-chemical index and bioaccumulation factor were calculated and compared with the FAO/WHO Codex Standards using one-way ANOVA and Pearson correlation using the Statistical Package for the Social Sciences software.

Results: Results indicated that the mean heavy metal concentration (mg kg-1) in the soil samples did not exceed the permissible limits set by the FAO/WHO. Soil pH and OM were not affected by mining, however in post-mined district, soil pH and OM showed a positive significant correlation ($r= 0.885*$) suggesting a link with time. Leafy vegetables (celery, pak choy, spinach), tomato, and cassava root tuber are effective bio-accumulators of heavy metals, exceeding the Joint FAO/WHO Codex Standards while coconut fluid excludes metals below the toxic permissible limits.

Conclusion: The study indicates that some food crops grown in Guyana's bauxite soils may have higher than normal permissible levels of heavy metals. However, further studies must be conducted to validate these results.

Key Words: Heavy metals concentration, bioaccumulation factor, mined-out bauxite soils, Codex standards

Equitable Utilization of Sargassum-Derived Bioactive Compounds: Advancing Marine
Biodiversity and Resource Justice Beyond National Jurisdiction

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Purpose: Marine biodiversity is under significant threat from human activities such as overfishing, pollution, and climate change. Biodiversity Beyond National Jurisdiction (BBNJ) refers to the marine areas that lie beyond the exclusive economic zones (EEZs) of individual countries, typically beyond 200 nautical miles from shore. Despite their vastness, BBNJ areas are not adequately protected by current international regulations, making them vulnerable to overexploitation and degradation. This research investigates the equitable utilization of bioactive compounds derived from Sargassum, focusing on their potential to advance marine biodiversity conservation and resource justice beyond national jurisdiction (BBNJ).

Method: Samples of Sargassum were collected from coastal areas, cleaned, and air-dried before being processed. The dried samples were subjected to hydrodistillation to obtain hydrosol extracts. These extracts were then separated into two portions for extraction with Hexane and Dichloromethane (DCM). The extracted samples were analyzed using Gas Chromatography-Mass Spectrometry (GC-MS).

Results: The results revealed that Eugenol is a dominant compound in Sargassum extracts, especially in hexane extracts with 98.77% area coverage. Other significant compounds identified include Acetaldehyde, Benzene derivatives, and various phenolic compounds. The variability in chemical composition between the two solvents highlighted the importance of solvent selection in the extraction process. The findings suggest that utilizing Sargassum-derived compounds can significantly contribute to resource justice by supporting the sustainable use of marine biodiversity. These compounds have potential industrial and pharmaceutical applications, providing socio-economic benefits for coastal communities and promoting global resource equity. Case studies of successful Sargassum-based initiatives are examined, demonstrating their economic and conservation benefits and analyzing their impact on local communities and ecosystems.

Conclusion: The research offers strategies for ensuring equitable benefit-sharing from marine resources and provides guidelines for the sustainable harvesting, processing, and commercialization of Sargassum.

Keywords: Sargassum, Biodiversity Beyond National Jurisdiction, Environmental Justice, Marine Resources, Bioactive Compounds

An Investigation into the Causes of Lessees' Non-Compliance with all of the Conditions of State Land Leases:
A Yarowkabra Residential Layout Case Study

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Purpose: The research determined and examine the factors contributing to the failure of lessees to fully comply with all leasehold conditions.

Methods: The researchers in this study used a survey approach. This method was deemed superior because it allowed the researcher to adequately explain, investigate, document, evaluate, and interpret the study's findings.

Population

The study population comprises lessees of residential lots within the research area, land administration managers, and the senior land administrator for the Region Four office.

For this study, the accessible population includes all lessees who have been granted residential leases in the Yarowkabra area, as well as relevant land administration personnel. Documentation from the Guyana Lands and Surveys Commission (GLSC) and local administrative records have provided the exact number of lessees and land administration managers, forming the sample frame for the study.

Sample

The sample size of 496 respondents, of a possible total of 1951 lessees for the study area was determined using Raosoft software, calculated with a confidence level of 99% and a margin of error of 5%. This ensures that the survey results are accurate within a 5% margin of error, 99 times out of 100. To justify this sample size, the population size was considered, and a balance was struck between precision and practicality.

Instrumentation

The research instruments used in this study were carefully designed to capture comprehensive data aligned with the research objectives. The questionnaire, divided into Sections A and B, effectively gathered demographic information from respondents in Section A, including details on gender, ethnicity, age, marital status, family structure, household size, and employment status. Section B of the questionnaire focused on measuring the constructs related to lease compliance and its determinants, such as financial capability, land accessibility, development challenges, and infrastructure availability.

Results: From the analysis, it was realized the Yarowkabra residential area is suitable for a quiet rural family living; however, the lack of finances by the lessees, lack of adequate physical infrastructure and the inadequate monitoring and enforcement by GLSC contribute to the non-compliance of leaseholders to leasehold covenants.

Conclusion: It was found that the major guiding policies for public land administration in Guyana include the State Lands Act, Lands Department Act, and the Guyana Lands and Surveys Commission Acts. However, the enforcement of these laws is not as stringent as needed and are hindered by too many bureaucracies. This study also revealed that non-payment of rent negatively impacts GLSC's revenue and increases monitoring costs.

Key Words: GLSC- Guyana Lands and Surveys Commission, Leaseholders, leasehold covenants, Lessees

Promoting Sustainable Development in a Frontier Community: A Case Study of Eteringbang, Cuyuni River, Region 7, Guyana

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Purpose: The research investigated the socio-economic, and administrative issues that impact the sustainability of the border community of Eteringbang in Region 7.

Methods: A mixed-method approach was used to obtain primary and secondary data for this study. These included descriptive, observational, and field surveys research techniques to measure/ascertain the community's challenges and determine strategies to help mitigate the current issues. An unofficial count of the population of Eteringbang as of May 2022 was established as approximately 400 persons. According to the Bureau of Statistics (2012), the last official population count was listed as 95. Using a confidence level of 90%, a margin of error of 10%, and a population size of 400, a sample size of 81 was established.

Results: The main findings of the research show that the community of Eteringbang has physical infrastructure and services which are insufficient to meet the needs of the community.

Conclusion: The community of Eteringbang has several economic and administrative issues such as the high cost of living and proximity of settlement to Venezuela, which continues to undermine the sustainable development of the community.

Key Words: Frontier Community, Governance, Informal settlements, Sustainable Development

The Potential Impacts of Oil and Gas Production on the Marine Environment in Guyana (Case Study of Shell Beach Protected Area)

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Purpose: Commercial hydrocarbon production in Guyana is new, and the plans to increase Guyana's economic growth are ambitious and transformative. The Shell Beach Protected Area is a treasure trove of Guyana's biodiversity and therefore, from a conservation and environmental management perspective, it has become increasingly important to understand the potential impacts of oil and gas exploration and production on the marine environment within the navigational channel of the Shell Beach Protected Area. As such, this research focuses on a review of Guyana's legislative framework and its oil spill preparedness with suggestions for improvement in critical areas such as capacity building for key institutions, biodiversity monitoring and disaster risk management through proactive inspection and corrective enforcement.

Methods: In this study, the qualitative methodology was used to generate detailed and relevant data that aided in a better understanding of the research topic. A thorough desk review of the literature was done; this included academic, government, and industry publications and reports on oil spills and their environmental and societal impacts, with a focus on economic implications. The literature is mainly comprised of event case studies from various geographic places and subject fields.

Results: Guyana's institutional capability is under immense pressure to alter and expand to fulfil the massive demands of the oil and gas sector. In order to ensure that capacity building and other human resources are developed, the government has to constantly research and develop new oil spill response and mitigation techniques, as well as modern methods to foster faster and more efficient coordination among response agencies. Additionally, due to the increase in discoveries in the Stabroek Block, there is an added risk of an oil spill or related marine pollution. The artisanal finfish industry off the coast of Shell Beach in Guyana's fisheries often generates value; however, it would suffer adverse effects in the case of an oil spill.

Conclusion: Creating effective ways to safeguard coastal and marine ecosystems and potential control threats necessitates an interdisciplinary approach. Therefore, ecological knowledge must be combined with information about human activities that may be examined by social and economic sciences and governed by environmental laws and policies. Accidents happen even with the most robust safety systems in place, and Guyana must be prepared for any eventuality as it continues to expand its oil production. Such an overview is the first and most critical step in contribution to the more significant process of mitigating the danger of an oil spill disaster.

Key Words: oil spill, Shell Beach Protected Area, impacts, capacity

COVID – 19 Vaccination Barrier Analysis

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Purpose: The present research was conducted to analyze and compare the barriers to COVID-19 vaccine acceptance in Regions 4 and 10 within the framework of a modified Health Belief Model. At the implementation of the research project, 78.1% of the adult population had received the first dose of any the COVID-19 vaccines and 54.2% had received the second dose. At least 70% of the population should have been fully vaccinated (at least two doses) to achieve population immunity.

Methods: Cluster-stratified, probability sampling was used to select the sample population. One-on-one interviews were conducted using a standardized questionnaire among communities in Regions 4 and 10 that were randomly selected. This paper-based questionnaire was then transcribed to Microsoft Excel using codes for the quantitative data and separating the qualitative data into themes. Data analysis was performed using SPSS and/STATA and t test analyses were used to summarize the descriptive data into a table. Pearson's Chi-Squared test in STATA version 13 was used to compare the barriers associated with COVID-19 vaccine uptake between Regions 4 and 10. The level of significance employed for all tests was 0.05. Population sample was 335.

Results: The results indicated that a significant percentage of persons did not trust the information coming from government officials and/politicians with respect to the COVID-19 vaccine for both Regions. In addition, there was no significant difference between the two Regions regarding the barriers identified and analyzed as it relates to COVID-19 vaccine uptake. There were noteworthy recurrent themes of the population's perceptions of COVID-19 vaccines and, by extension, of vaccines for the general adult population.

Conclusion: These findings can inform social behaviour change interventions in Guyana to address barriers to a successful vaccine uptake for other diseases with a public health threat or of public health emergency of international concern.

Key Words: COVID-19, vaccination, acceptance, analysis, barriers

Celebrity Endorsements during COVID-19: Impact on Health Messaging, Perceptions, and Compliance with Guidelines and Vaccination

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Purpose: This study explores Celebrity Endorsements during COVID-19: Impact on Health Messaging, Perceptions, and Compliance with Guidelines and Vaccination, with specific emphasis on the role of celebrity endorsements in influencing public health behaviour during the COVID-19 pandemic. The study investigates how endorsements by celebrities affect public perceptions of health messaging, adherence to COVID-19 guidelines, and vaccination uptake, particularly within the context of Guyana.

Methods: Employing a mixed-method approach, the research combines quantitative surveys and qualitative content analysis to provide a comprehensive understanding of the phenomenon. The quantitative component surveys a representative sample of Guyanese residents and a very small sample of Guyanese living in the diaspora, examining their exposure to and perception of celebrity endorsements related to COVID-19 health guidelines and vaccination. The qualitative analysis focuses on health messages endorsed by local celebrities, assessing the themes and strategies used to promote adherence to public health guidelines.

Results: Key findings reveal that while celebrity endorsements can positively influence public health behaviours, their effectiveness is not uniform across all demographics. Healthcare professionals, perceived as more credible and trustworthy, have a greater impact on public compliance with health guidelines than non-healthcare celebrities. The study also highlights that celebrity endorsements' frequency and perceived authenticity are crucial factors in determining their effectiveness. Notably, the research underscores the importance of aligning celebrity endorsements with clear, consistent public health messages to maximize their impact.

Conclusion: This research contributes to a deeper understanding of the role of celebrity influence in public health communication, particularly during crises like the COVID-19 pandemic. The findings offer valuable guidance for public health officials and policymakers, emphasizing the crucial need for strategic and ethical use of celebrity endorsements to promote adherence to health guidelines and improve vaccination rates. The study underscores the importance of aligning endorsements with credible health messaging to build public trust and achieve better health outcomes.

Key Words: Celebrity Endorsements, COVID-19, Health Messaging, Public Perceptions, Compliance, and Vaccination.

PANEL 7:
3 Minutes Competition

The Effects of Hemodialysis Versus Peritoneal Dialysis on the Quality of Life of Adult End-Stage Renal Disease Patients in Guyana

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Purpose: The research seeks to investigate the effects of Hemodialysis (HD) versus Peritoneal Dialysis (PD) treatment on the Quality of Life (QOL) of adult End-Stage Renal Disease (ESRD) patients at the Guyana Public Hospital Corporation (GPHC). Globally, renal failure has increased drastically over the past years that the situation has become of great public health concern worldwide. Moreover, in Guyana, ESRD patients use two main renal replacement therapies to treat kidney failure (HD and PD), which give patients hope and maintains the QOL of ESRD patients.

Methods: A cross-sectional quantitative study was conducted among 55 adult ESRD patients (42 HD and 13 PD). The Kidney Disease Quality of Life health survey and a demographic questionnaire were used to collect data. Stata version 13 and SPSS version 25 Statistical Software's were used to analyze the data and Dorothea Orem's Self Care Deficit Theory was used to guide the study.

Results: PD patients reported better overall health-related QOL outcomes than HD patients at the GPHC as it relates to the eight domains of QOL. Also, 100% of the ESRD patients adhered to their dialysis treatment even though 10% of the HD patients and 8% of the PD patients had no family support. The cost of dialysis treatment was a major concern for ESRD patients as a result of hospitalization and unemployment. Significant associations were found for all of the eight domains of QOL when the Pearson Chi-square test statistics was done leading to the null hypothesis (Ho) being rejected in this research.

Conclusion: The ESRD patients at the GPHC were affected in all of the eight domains of QOL, but patients taking PD treatment reported better overall QOL outcomes than patients taking HD treatment. Also, adherence to dialysis treatment is an important factor in sustaining the QOL of dialysis patients.

Keywords: Hemodialysis, Peritoneal dialysis, Quality of life, Adult ESRD patients

Social-Ecological Impacts of Oil Development on Mangrove Ecosystems in Essequibo Coastal Regions: Evaluation of Guyana's Oil Sector Governance Framework

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Purpose: Guyana has a size of 21,496,900 hectares and 22,632 hectares of mangrove vegetation. It is an oil-producing country, with approximately 90% of its population in coastal regions. Mangrove benefits include sequestering carbon, mitigating climate change, and providing coastal defence. Esso Exploration and Production Guyana Limited, a consortium of ExxonMobil, Hess Guyana Exploration Limited, and China's National Offshore Oil Corporation, announced its first oil production in Guyana's offshore deep water in December 2019. The consortium completed the Liza 1 Development of Stabroek Block in record time, raising governance concerns on safety, environmental, and economic dimensions due to the potential impact of an oil spill, a low-probability, high-impact event. An oil spill raised concerns about financial guarantees, which could extend beyond Guyana's borders and affect ten Caribbean islands reliant on beach-based tourism.

Methods: This research investigates Guyana's oil and gas sector governance and the potential impacts on mangrove ecosystems and coastal community's well-being in Region 1 and Region 2. A systematic literature review was conducted on the relationship between oil development impacts of oil spills on mangrove ecosystems and coastal community's well-being in Nigeria, Indonesia, and Brazil and the risks associated with developing Guyana's oil and gas sector. A comparative analysis was also conducted on the Social-Ecological System Framework (SESF) and Interactive Governance Framework (IGF) to assess Guyana's oil and gas sector governance. Semi-structured interviews were conducted with Toshaos/Leaders regarding environmental risks, mangrove ecosystems, the coastal community's well-being and the mitigation strategies to manage these risks. A questionnaire survey was administered on the regulatory framework of the oil and gas sector's governance. The data analysis strategies included thematic analysis using the Nvivo and SPSS software. The quantitative information from the survey was summarised with descriptive analysis and triangulated with qualitative data. The results suggest potential oil spills could lead to mangrove ecosystem degradation and adversely impact the community's well-being in Essequibo coastal Region 1 (Barima-Waini) and Region 2 (Pomeroon-Supenaan).

Results: Mitigation strategies for managing environmental risks include a legal framework and education on mangrove protection.

Conclusion: Considering the ecological and social concerns, the research proposes a comprehensive governance framework for Guyana's oil and gas sector.

Keywords: Interactive Governance Framework, Mangrove Ecosystems, Oil Spills, Regulatory Framework, Social-Ecological Systems

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