

AN INTRODUCTION TO GROUNDWATER MANAGEMENT FOR CARIBBEAN SIDS



caribbean.waternet@sta.uwi.edu



1868.662.2002 ext. 82318 | 82078



Business Development Unit
Faculty of Food and Agriculture
The University of the West Indies
St. Augustine Campus

Caribbean WaterNet/Cap-Net UNDP hosted the virtual ***Introduction to Groundwater Management for the Caribbean Training Workshop*** as the inaugural programme of the Caribbean Water and Wastewater Association (CWWA) Research and Education Foundation (ReEF) from the 25th – 27th April 2022 (8:30am to 12noon daily). The training was a collaborative effort with partners from CWWA, the University of the West Indies, Faculty of Food and Agriculture (FFA), and the Centre for Resource Management and Environmental Studies (CERMES), and delivered to over 120 participants.

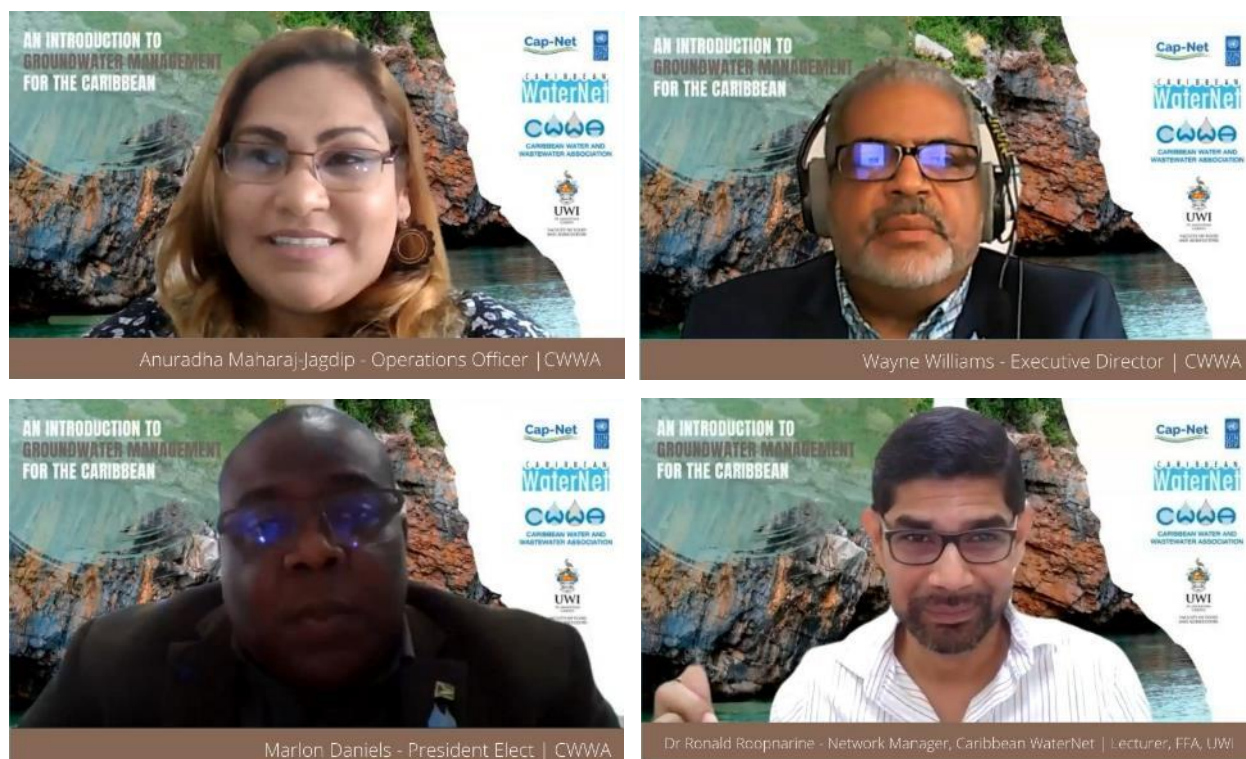
Groundwater accounts for on average 70 to 90% of the water supply in some Caribbean islands making it essential to the national water supply. Economically, groundwater assessments are expensive and complex, its use is decentralized making management and monitoring difficult and expensive, and its contamination in most cases are near irreversible. Physically, it is less vulnerable to the impacts of severe dry seasons and drought conditions while usually being cheaper to treat compared to surface and desalinated water. Climatic changes, land use changes especially in recharge zones, pollution and over-exploitation are all factors that negatively impact aquifer systems. Water security in groundwater dependent islands such as the Bahamas and Barbados is constantly under threat from the non-linear response of aquifers to recharge and pumping. Tourism, agriculture and manufacturing, three of the major economic drivers in the Caribbean are relatively water intensive and sometimes make groundwater allocation and regulation challenging. Across the Caribbean, various mechanisms have been employed to develop and manage aquifer systems and wellfields. In many instances more stringent methods of data collection, assessment and management is required to protect groundwater sources for use now and by future generations. Therefore, there is a need to build capacity, techniques and skills among Caribbean water utilities and other stakeholders for successful groundwater monitoring, assessment, management and governance.

This training provided insights into the field of groundwater hydrology with a dual focus on the technical and social aspects of groundwater management. Participants gained knowledge and understanding of aquifer system properties, key groundwater parameters and influencers, factors affecting groundwater quality and quantity, guidelines for efficient resource acquisition and conjunctive use, as well as good governance practices. Through an interactive online training participants engaged in practical exercises and were presented with Caribbean case studies.

Caribbean WaterNet hosted interactive sessions across a 3-day training course including lectures, case studies, varying methodologies, and activities. This training covered ten (10) modules as follows:

- Module 1: Introduction Water Resources Management in Caribbean SIDS
- Module 2: IWRM and Groundwater Management Framework
- Module 3: Aquifer System Characteristics for Groundwater Management
- Module 4: Integrated Groundwater Management in Practice
- Module 5: Groundwater Legislation and Regulation
- Module 6: Groundwater Allocation and Licensing
- Module 7: Economic and Financial Instruments in Groundwater Management
- Module 8: Stakeholder Participation in Groundwater Management
- Module 9: Groundwater Quality and Management
- Module 10: Groundwater Management and the Impact of Wastewater

The training commenced with an opening ceremony including remarks from all participating partners. Caribbean WaterNet Network Manager, Dr Ronald Roopnarine opened with a brief welcome and thanked all speakers, facilitators and participants for attending. Operations Officer of CWWA, Mrs Anuradha Maharaj-Jagdeep brought opening remarks about the training workshop and invited the Executive Director of CWWA, Mr Wayne Williams to address the participants. Mr Williams noted that this training was a watershed moment, being the first programme offered by ReEF since its launch on World Water Day 2022. He then gave a detailed introduction of the feature speaker, Mr Marlon Daniels, President Elect and Ag. President of CWWA.



Mr Daniels commended the partnering organizations for their role in delivering the training and remarked on the evolution and progressive development of the CWWA. He reiterated the organizations commitment to being a regional leader in the water sector, boosting capacity building and financial and human capital.

He ended by underscoring ReEF's role in filling sectoral training gaps alongside partners throughout the region and declared the workshop officially open.

Ms Candice Santana, Vice President of CWWA, closed the opening ceremony by giving participants some insight into ReEF. This foundation stemmed from a 2017 multi-stakeholder regional assessment which determined that there was a considerable lack of capacity building



Candice Santana, Vice President | CWWA

and training throughout the region. Stemming from additional meetings in 2019, there was a directive to form a CWWA Academy, however progress on this initiative was hindered by the COVID 19 pandemic. The ReEF was finally launched in March 2022 and with this training programme as the first of many, it will continue to serve as a foundation for increased education, training and capacity building.

A graphic showing the event schedule for Day 1 of Caribbean WaterNet 2022. The background features a stylized brown mountain range over a blue body of water. At the top left are logos for Cap-Net, UNDP, Caribbean WaterNet, CWWA (Caribbean Water and Wastewater Association), and UWI. On the right, it says 'Day 1' in a script font, with the date '25.04.22' below it. The moderator is listed as 'Moderator: Ronald Roopnarine'. The schedule is as follows:

8:30 - 9:00	Opening Ceremony Feature Speaker: Mr Marlon Daniels - CWWA
9:00 - 9:30	MODULE 1: Introduction to WRM in Caribbean SIDS - Ronald Roopnarine
9:30 - 10:10	MODULE 2: IWRM and GwM Management Framework - Marilyn Crichlow
10:10 - 10:40	MODULE 3: Aquifer System Characteristics for GwM - Anuradha Maharaj-Jagdeep
10:40 - 11:20	MODULE 4: Integrated GwM in Practice - Kambiri Cox
11:20 - 11:50	Breakout Room Session
11:50 - 12:00	Feedback from Group Activity Summary of Day 1



Mrs Marilyn Crichlow then covered key facts about water, identifying water resources, and external factors which impact its use and management. This presentation focused on IWRM and the structure of Groundwater Management Frameworks.



Module 3 was presented by Mrs Anuradha Maharaj-Jagdip and led participants through a detailed explanation of the properties of groundwater aquifers and the different hydrogeological environments in relation to groundwater development. It also touched on groundwater occurrence and its interaction with surface water.



Kambiri Cox - Hydrologist


Presenting on Groundwater Management in practice, Ms Kambiri Cox shared a wealth of information on available resources, case studies and regional examples specifically covering multi-million dollar projects in Jamaica and Tobago. Participants

were able to see practical and current examples including the use of nature-based solutions and alternative water resources.


Participants then engaged in extensive group discussions on each module and their respective challenges bringing Day 1 to a close.

Water Management Principles


The Dublin principles have been the basis for much of the subsequent water sector reform.




Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.



Water development and management should be based on a participatory approach, involving users, planners and policymakers at all levels.



Women play a central part in the provision, management and safeguarding of water.

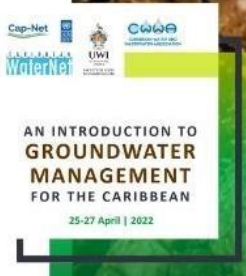


Water has an economic value in all its competing uses and should be recognised as an economic good.

Module 2

Introduction to Integrated Water Resources Management (IWRM) and Groundwater Management Framework

Presented by
Marilyn Crichtlow
25 April 2022





AN INTRODUCTION TO GROUNDWATER MANAGEMENT FOR THE CARIBBEAN
25-27 April | 2022


CASE STUDY 1 - JAMAICA


Flood control measure as river overflows banks frequently during rainy season BUT


- Environmental concerns in Rio Cobre hydrologic basin**
 - 2019 NEPA report linked pollution to river to effluent from aluminum mining storage ponds overflow into Rio Cobre after heavy rainfall
 - Baseline mining to the north allegedly responsible for fish kills in Rio Cobre; mining in watershed that captures water for the underlying aquifer
 - Saline intrusion in aquifer due to overabstraction (IDR/Coxson, 2023)
- Need to balance user needs**
 - E.g. WAP modelling - environmental flow, uses by riparian communities
















Day 2

26.04.22

Moderator: Anuradha Maharaj-Jagdeep

8:30 - 9:00 **Recap of Day 1 | Feedback from Breakout Rooms**

9:00 - 9:40 **MODULE 5: Groundwater Legislation and Regulation - Geoffrey Marshall**

9:40 - 10:20 **MODULE 6: Groundwater Allocation and Licensing - Geoffrey Marshall**

10:20 - 11:00 **MODULE 7: Economic and Financial Instruments in GwM - Geoffrey Marshall**

11:00 - 11:50 **Group Activity**

11:50 - 12:00 **Feedback from Group Activity | Summary of Day 1**

Which country are you from?



In one word, what stood out to you most from yesterday's session?

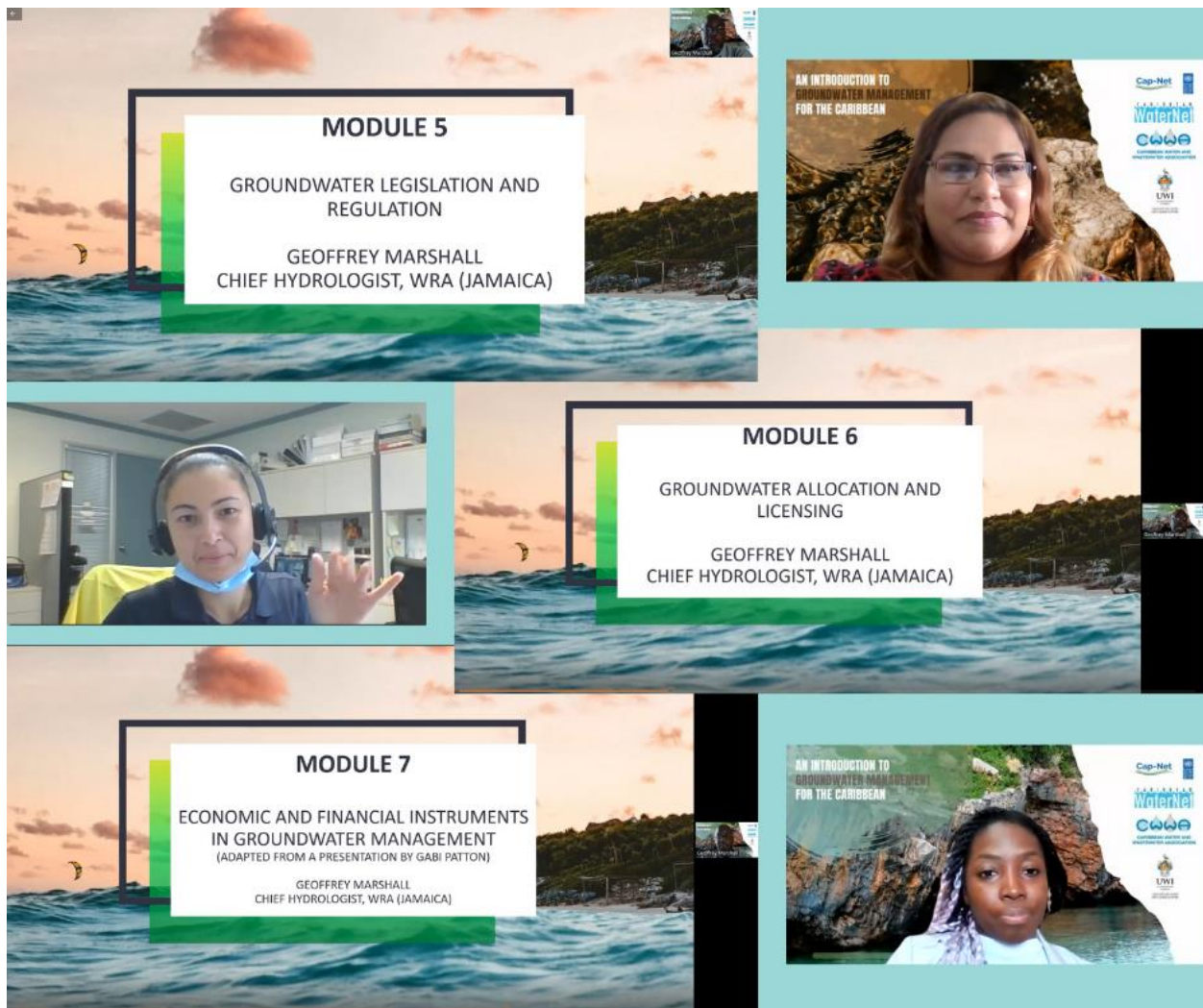


91

Day 2 began with a quick poll on the country demographics of our participants and their feedback from Day 1.

Mr Geoffrey Marshall accomplished a noteworthy feat of keeping over 120 participants engaged and interactive across 3 Modules. He began with the components on groundwater legislation and regulation and discussed the potential arrangements to facilitate it. Module 6 touched on the issue of water

“ownership” and why allocation of water resources is important. He gave examples of allocation systems and illustrated the information and assumptions behind the allocation and licensing processes. Finally, Module 8 highlighted the difference between economic and financial instruments and how they can be applied for better Groundwater Management. This addressed issues such as cost recovery, behaviour change, equity and the poor and environmental protection.



The Day 3 poll was utilised as a means of collecting feedback on other training areas which participants would be interested in. Data collected will be used by Caribbean WaterNet and partner organizations to plan and implement more regional training programmes to fill these gaps.

What other training areas would you be interested in? Mentimeter

Hydrological Modelling	groundwater modelling	Water quality monitoring
Database management	aquifer characteristics	Lead and copper rule, coliform rule
Best practices in IWRM	Using GIS to map reservoirs	Desalination operations
aquifer modelling	Wastewater reuse	Quarrying and groundwater
Waste water management and reuse	Wastewater reuse	Isotope Hydrology
water quality	Water quality	Ground water mapping
Aquifer performance tests	Ground water mapping	Groundwater Mapping, Groundwater Safety, Wastewater reuse, Quarrying and Groundwater
Groundwater monitoring network design and selection	Waste water management	Alternate sanitization and treatment of surface or ground water to make it potable
data management	Any short courses that you have in the future	
DRR/DRM in Ground and service water resources	pump testing and analysis	wastewater management
Groundwater metering	Advanced and novel wastewater treatments Anaerobic digestion Solids management in anaerobic digestion	Alternative methods for attaining water and TnT's plan for improving water capture
IWRM, rainwater harvesting, water quality monitoring and analysis, waste water treatment and reuse, water resource and asset management	Identifying recharge areas of aquifers	Ground and surface water modeling using GIS
water quality	Tariff design	Ground water safety
Hydroinformatics	Groundwater mapping, Hydraulic modelling, best practices in water management	Rainwater Management
Biotechnology and Sustainable Water Management	Groundwater modelling/software	Surface water monitoring and testing



After a recap on Day 2 Ms Angela Franklin delved into a presentation on stakeholder participation in groundwater management asking the pertinent question “who is a stakeholder?”. She discussed the importance of stakeholder participation as it relates to understanding of issues, essential management activities, mobilizing users’ self-regulatory capacity, counteracting corruption and facilitating the coordination of decisions relating to groundwater management.





Dr Gaius Eudoxie - Soil Scientist | Deputy Dean Outreach, FFA, UWI

Module 9 was facilitated by Dr Gaius Eudoxie, who presented on the importance of protecting the quality of groundwater resources. He also underscored the importance of risk assessment and vulnerability mapping in managing quality with a case study from the Bahamas. This module ended by examining the specific case of urban wastewater in relation to groundwater quality.

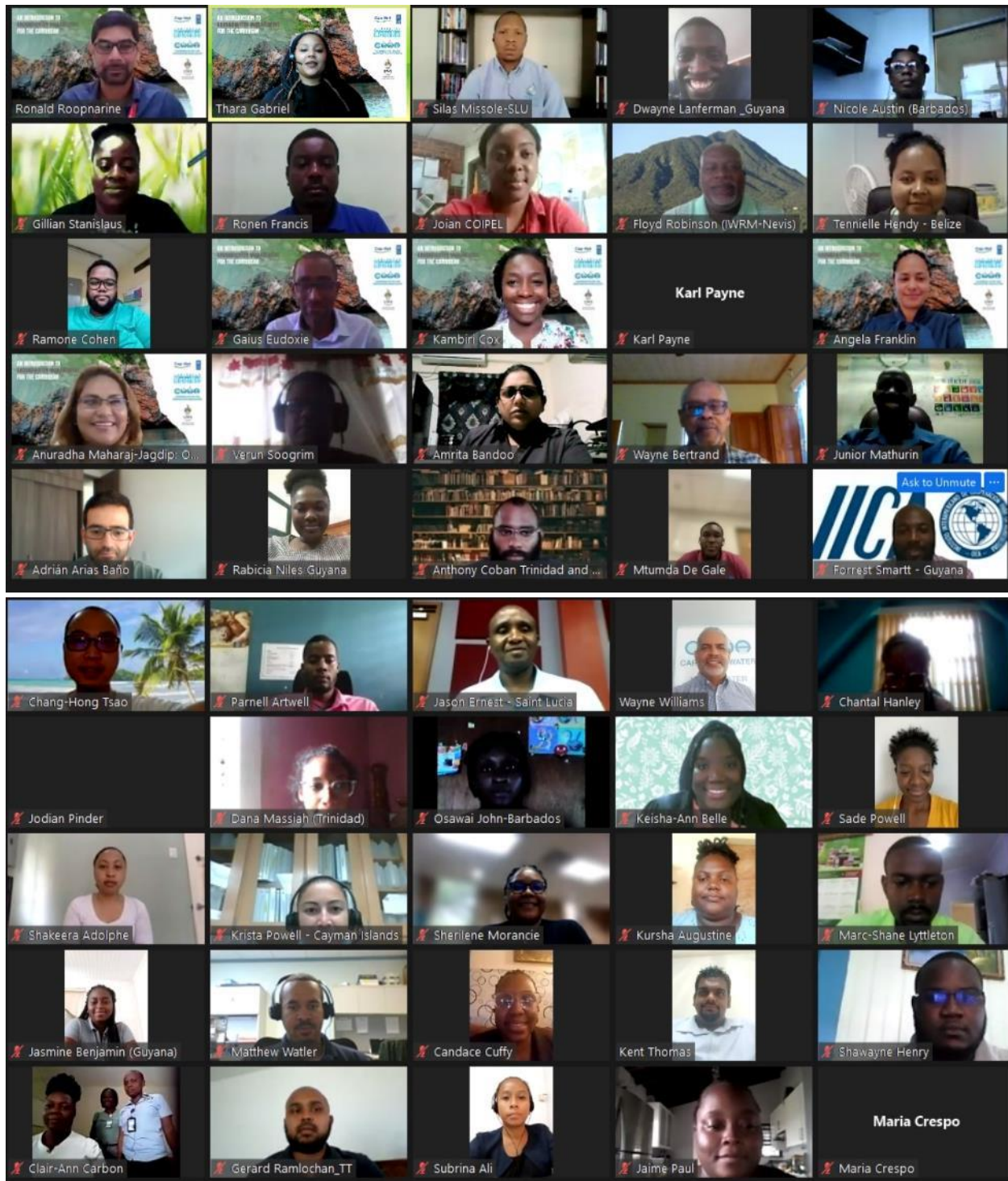
Dr Karl Payne led the final module on cross-cutting issues between Groundwater Management and wastewater. He described how varied local contexts present unique challenges and opportunities throughout the region. Dr Payne also outlined the complex trade-offs that are often necessary when navigating the various Groundwater Management options.



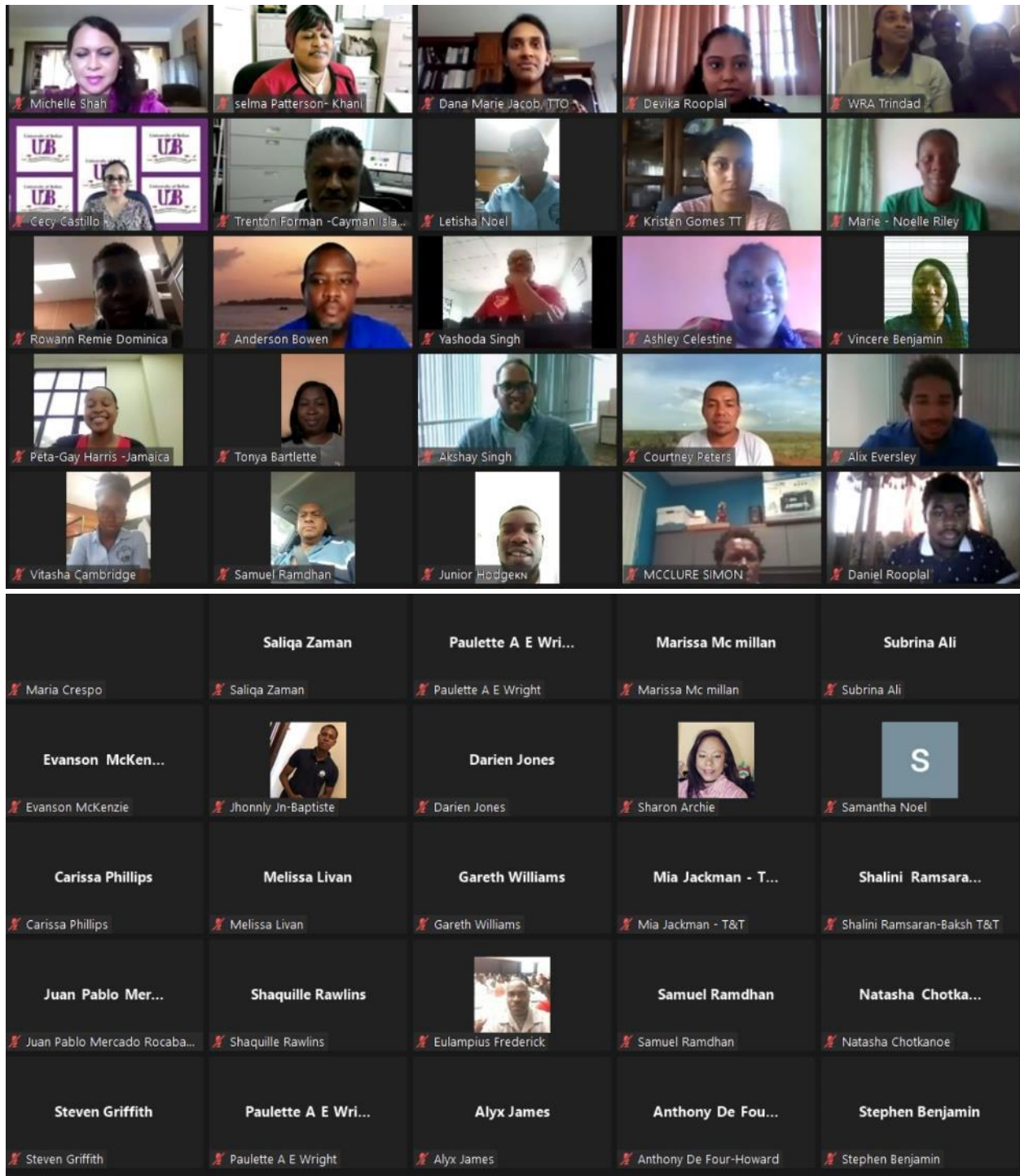
Dr Karl Payne - Water Resources Programme Coordinator, CERMES

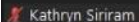



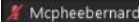
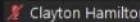
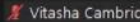

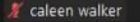
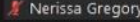
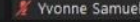
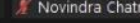
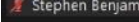

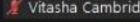


Day 3 concluded with comprehensive group discussions and the and the completion of an exit survey. Representatives from all partner organizations brought closing remarks and expressed their thanks to all facilitators and participants for their contributions and dedicated engagement over the 3-day training period which ended with a virtual photo of the entire cohort.

An Introduction to Groundwater Management for the Caribbean Caribbean WaterNet 2022



An Introduction to Groundwater Management for the Caribbean Caribbean WaterNet 2022



Kathryn Siriram 	 Vishala Maharaj	 Ravi Baboolal TT	Ian Mason 	 Melissa Mills
Mcpheebarnard 	Clayton Hamilton 	Nerissa Gregory 	Vitasha Cambri... 	Damani Bruno 
Deendar Kissoon 	 Miguel Montoute	Hermine Rodney 	caleen walker 	Junior mathurin... 
Marilyn Crichlow 	 Ervin Henry	Kenau Ryan M... 	Nerissa Gregory 	Yvonne Samuels... 
Tahir Rochford 	Jason Benn Guy... 	Romaine Gordon 	 Leann Dogan-Mason	Novindra Chatr... 
Stephen Benjamin 	Vjay Seecharan 	Yvonne Samuels... 	Kathryn Siriram 	 Vishala Maharaj
 Ravi Baboolal TT	Ian Mason 	 Melissa Mills	Mcpheebarnard 	Clayton Hamilton 
Nerissa Gregory 	Vitasha Cambri... 	Damani Bruno 	Deendar Kissoon 	 Miguel Montoute
Hermine Rodney 	caleen walker 	Junior mathurin... 	Marilyn Crichlow 	 Ervin Henry
Kenau Ryan M... 	Nerissa Gregory 	Yvonne Samuels... 	Tahir Rochford 	Jason Benn Guy... 

RR:tg

Participant Listing

Adrián Arias Baño	Ingeniero Ambiental
Adrian Cashman	Consultant
Akshay Singh	Geologist
Alix Eversley	
Alyx James	Mineral Resource Officer
Amira Sandy	Hydrological Tech II
Amrita Bando	
Anderson Bowen	Water Quality Officer
Anthony Coban	Student
Anthony De Four-Howard	Information System Analyst
Ashley Celestine	Environmental Health Officer
Ayla Isaacs	Project Manager
Bernard Mcphee	Inspector
Caleen Walker	Instructor
Candace Cuffy	Customer Service Officer II
Carissa Phillips	Hydrological Technician
Cecy Castillo	Lecturer
Chang-Hong Tsao	Terrestrial Research and Monitoring Officer
Chantal Hanley	Assistant Water Engineer
Chavala Campbell	Hydrological Tech II
Clair-Ann Carbon	Environmental Health Officer
Clayton Hamilton	Maintenance Supervisor
Courtney Peters	Ranger
Damani Bruno	
Dana Marie Jacob	Hydrological Technician II
Dana Massiah	Mineral Resource Officer
Daniel Rooplal	Unemployed
Darien Jones	Forest Officer
Deanna Rose	Environmental Science Graduate
Deendar Kissoon	Environmental Officer
Devika Rooplal	Engineer
Dwayne Lanferman	Agrometeorologist
Ervin Henry	Lab Technician
Eulampius Frederick	Policy and Programme Officer

Evanson McKenzie	Chief Surveyor
Floyd Robinson	
Forrest Smartt	Climate Change Specialist
Frank Grogan	Specialist Hydrologist
Gareth Williams	Jr Geologist
Gillian Stanislaus	Environmental Programme Officer II
Hermine Rodney	Lecturer / Instructor
Ian Mason	Plant Operator
Jaime Paul	Hydrogeologist
Janelle Vincent	WASA
Jasmine Benjamin	Engineer Technician
Jason Benn	Lecturer
Jason Ernest	Director
Jhonny Jn-Baptiste	Coordinator
Jiselle Webster	Manager, Regional Administration
Jodian Pinder	Student
Joian Coipel	Hydro-Meteorological Technician Intern
Juan Pablo Mercado Rocabado	Site Engineer
Julia Ribeiro	Consultant
Junior Hodge	Water Department
Junior Mathurin	Field Scientist
Kaneisha Toussaint	Project Green Heart
Kathryn Siriram	Geoscientist
Keisha-Ann Belle	Administrative and Logistics Officer
Kemeisha Smith	Educator
Kenaid Ryan	Manager Water & Waste Water Division
Kendell Francois	Hydrological Tech III
Kenlee Hadai	Standards Officer
Kent Thomas	Site Engineer
Khemraj Lalchan	WASA
Krista Powell	Laboratory Technician II
Kristen Gomes	Water Field Technician/Research Officer
Kursha Augustine	Environmental Health Officer
La Reine Williams	Mineral Resource Officer- Geologist
Leann Dogan-Mason	Lab Technician
Letisha Noel	Environmental Officer

Lorenzo Kasmani	Operational Forecaster
Marc-Shane Lyttleton	
Maria Crespo	Compliance Manager
Marie - Noelle Riley	Unemployed
Marissa Mc millan	Watershed Planner
Matthew Watler	Sample Collector
Maya Manickchand	Senior Manager, Internal Audit and Compliance
Melissa John	Unemployed
Melissa Livan	Environmental Officer
Melissa Mills	Technician
Mia Jackman	Assistant Geologist
Michelle Shah	Chief Agricultural Engineer
Miguel Montoute	Water Resources Specialist
Mtumda De Gale	Technical Assistant
Natasha Chotkanoe	Non-Revenue Water Officer
Nerissa Gregory	Environmental Specialist
Nicole Austin	Water Quality Technologist
Novindra Chatreman	Environmental Officer II
Osawai John	Research Fellow
Parnell Artwell	Facility Maintenance Technician
Paulette A E Wright	Acting Senior Instructor
Peta-Gay Harris	Postgraduate
Rabicia Niles	Environmental Officer
Ramone Cohen	Laboratory Technician
Ravi Baboolal	Instructor
Romaine Gordon	Instructor
Ronen Francis	PhD Candidate in Soil Science
Rowann Remie	Student
Sade Leonce	WASA
Saliqa Zaman	Environmental Officer
Samantha Noel	Water and Sewerage Authority of T&T
Samuel Ramdhan	Unemployed
Selma Patterson-Khani	
Shakeera Adolphe	Cashier (Geology Graduate)
Shalini Ramsaran-Baksh	Instructor
Shaquille Rawlins	GIS Technician

Sharon Archie	Manager, Water Resources
Shawayne Henry	Student
Sherilene Morancie	Student
Silas Missole	OSH Officer
Simon McClure	Antigua Public Utilities Authority
Stephen Benjamin	NAWASA
Steven Griffith	Asst. Mge. I.T. Services
Subrina Ali	Senior Hydrological Technician (Groundwater Dept)
Tahir Rochford	Environmental Investigator Assistant
Tennielle Hendy	Principal Hydrologist
Theophilus Franklyn	Environmental Health Officer
Tonya Bartlette	Manager
Trenton Forman	Inspector/Trainer
Verun Soogrim	Former QC Supervisor
Vincere Benjamin	Meteorological Services
Vishala Maharaj	ROSE Environmental Ltd
Vitasha Cambridge	Environmental Officer
Vjay Seecharan	Water Well Engineer
Wayne Bertrand	Retired
Wendy Harrison-Smith	R&D Manager
Yashoda Singh	Director
Yasmin James	Water Resources Technologist
Yvonne Samuels-Ramsay	Registrar

AN INTRODUCTION TO GROUNDWATER MANAGEMENT FOR CARIBBEAN SIDS



TRAINING AGENDA

25.04.22 - 27.04.22

- 8:30 - 9:00 **Opening Ceremony | Feature Speaker: Mr Marlon Daniels - CWWA**
- 9:00 - 9:30 **MODULE 1:** Introduction to WRM in Caribbean SIDS - **Ronald Roopnarine**
- 9:30 - 10:10 **MODULE 2:** IWRM and GwM Management Framework - **Marilyn Crichlow**
- 10:10 - 10:40 **MODULE 3:** Aquifer System Characteristics for GwM - **Anuradha Maharaj-Jagdip**
- 10:40 - 11:20 **MODULE 4:** Integrated GwM in Practice - **Kambiri Cox**
- 11:20 - 11:50 **Breakout Room Session**
- 11:50 - 12:00 **Feedback from Group Activity | Summary of Day 1**

Day **1**

25.04.22

Moderator: Ronald Roopnarine

- 8:30 - 9:00 **Recap of Day 1 | Feedback from Breakout Rooms**
- 9:00 - 9:40 **MODULE 5:** Groundwater Legislation and Regulation - **Geoffrey Marshall**
- 9:40 - 10:20 **MODULE 6:** Groundwater Allocation and Licensing - **Geoffrey Marshall**
- 10:20 - 11:00 **MODULE 7:** Economic and Financial Instruments in GwM - **Geoffrey Marshall**
- 11:00 - 11:50 **Group Activity**
- 11:50 - 12:00 **Feedback from Group Activity | Summary of Day 1**

Day **2**

26.04.22

Moderator: Anuradha Maharaj-Jagdip

- 8:30 - 9:00 **Recap of Day 2 | Feedback from Group Activity**
- 9:00 - 9:40 **MODULE 8:** Stakeholder Participation in GwM - **Angela Franklin**
- 9:40 - 10:20 **MODULE 9:** Groundwater Quality and Management - **Gaius Eudoxie**
- 10:20 - 11:00 **MODULE 10:** GwM and the Impact of Wastewater - **Karl Payne**
- 11:00 - 11:40 **Breakout Room Session**
- 11:40 - 11:55 **Feedback from Group Activity - Kambiri Cox**
- 11:55 - 12:00 **Conclusion and Workshop Evaluation**

Day **3**

27.04.22

Moderator: Kambiri Cox

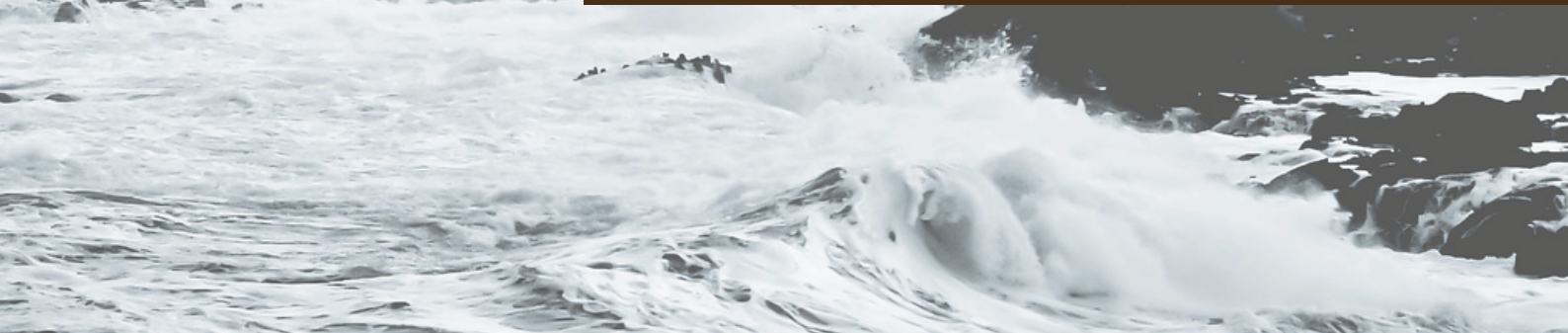
Facilitator Profiles



Mrs Anuradha Maharaj-Jagdip

Mrs. Anuradha Maharaj-Jagdip is a dedicated advocate for Caribbean water resources understanding, research, education and protection. Academically, she holds a BSc. in Geology & MPhil in Hydrogeology from the University of the West Indies (UWI), Jamaica and an MSc. in Water Engineering, Specialized in Hydrology and Water Resources from the UNESCO-IHE, The Netherlands. She has also been the recipient of several academic awards including: a UWI Departmental Award (2009), a UWI Postgraduate Scholarship (2011), a Partnership for Canada-Caribbean Community Climate Change Adaptation (ParCA) Scholarship for MPhil studies in 2013 and a Small Island Developing States (SIDS) Fellowship (UNESCO-IHE 2016).

Career related, she was initiated into Caribbean hydrology via an internship at the Caribbean Institute for Meteorology and Hydrology (CIMH) in 2010. Thereafter she served as a Project Manager of the Natural Hazards Division at the Mona Geoinformatics Institute (MGI), Jamaica. As Research Assistant at the Centre for Resources Management and Environmental Studies (CERMES), Barbados she led the Hydrological modelling work package of the 'Sustainable Water Management under Climate Change in Small Island States of the Caribbean' (Water-aCCSIS) project. Her current designation is Operations Officer of the Caribbean Water and Wastewater Association (CWWA), and Caribbean Hydrogeological Consultant. Her main research interests are hydrological modelling (surface, groundwater and ecosystem), integrated water resources management (IWRM) and conducting water availability assessments to ensure equitability from resource to meet demand-supply.



Facilitator Profiles



Ms Angela Franklin

Angela Franklin hails from the home of the majestic Kaieteur Falls in Guyana. Angela currently serves on the Board of Directors of CWWA as Public Relations Officer. She has been a member of the CWWA since 2017 and was a member of the Local Organising Committee for the 2017 Conference held in Guyana. She has also served as Chair of the Guyana National Section since 2019.

Her passion for the environment was ignited in her secondary education years which drove her to pursue a BSc in Environmental Studies at the University of Guyana. Subsequent to completing BSc she spent the next few years living in Guyana's lush tropical forest as Monitoring Coordinator of the Iwokrama International Centre for Rainforest Conservation and Development. Forever a lover of water, her BSc would open her eyes to ways in which she could contribute towards the protection of water resources and directed her to pursue a MSc in Hydrogeology and Surface Water Management at the University of Newcastle, UK.

Upon completion of this she would merge her environment and water perspectives in her role as Senior Environmental Officer responsible for water at the Environmental Protection Agency, Guyana. Here she provided developmental projects with mitigation measures to ensure they did not have a significant negative impact on the environment and neighbouring waterways.

She would later take a more specialised role, which she currently holds, as Hydrologist at the Guyana Water Incorporated ensuring the safe and sustainable use of water resources for supply to the population.

Angela is proud to serve as Public Relations Officer as it will give her an added opportunity to share knowledge and to contribute towards the growth of the water and waste sectors for the development of the Caribbean Region.

Facilitator Profiles



Dr Gaius Eudoxie

Dr. Gaius Eudoxie is an advocate for soil and Senior Lecturer of Soil Science at the University of West Indies (St. Augustine Campus) with responsibility for teaching and research in soil physical and fertility management. Additionally, he serves as Deputy Dean, Outreach and Internationalization, Faculty of Food and Agriculture.

He has over 20 years teaching and research experience in soil management with a significant part of that focus dedicated to soil health management and crop nutrition. He is a member of several national and regional committees and has coordinated and facilitated capacity building in sustainable soil and land management and integrated water resources management throughout the Caribbean.

Dr. Eudoxie is a vice-president of the Latin America and the Caribbean Regional Soil Partnership, FAO (ASLAC) and Vice Chair of the Intergovernmental Working Group on Drought, UNCCD. He has taken the responsibility of showcasing soils as more than “dirt” through media articles and commentaries. While Dr. Eudoxie recognises the importance of research he acknowledges the role of policy and governance in the sustainability framework. He is dedicated at improving the weak policy and institutional arrangements currently governing soil resource use and management.

Dr. Eudoxie is not all work oriented, but also enjoys many of the services provided by soils, including sporting activity (football enthusiast), agriculture and nature exploration.

What will we do without soil?



Facilitator Profiles



Dr Ronald Roopnarine



Dr. Ronald Roopnarine is a career researcher and academic with a thorough background in Disaster Risk Resilience and Sustainable Land and Water Resources Management. Presently, Dr. Roopnarine is a Lecturer in the Faculty of Food and Agriculture, University of the West Indies, St. Augustine Campus (FFA, UWI) responsible for teaching and development of courses related to Agri-environmental Disaster Risk and Climate Resilience. He is also the Network Manager of Caribbean WaterNet, (Caribbean arm of CapNet UNDP) and an international consultant for various developmental agencies. Thus far he has amassed significant experience in Integrated Water Resources Management and Climate Change Adaptations, with specific focus on Caribbean Small Island Developing States.

In the last 4 years, he convened a series of regional capacity building activities aligned to Disaster Risk Management/ Climate Resilience. These activities were done in collaboration with numerous Regional Organizations, Government Ministries and NGOs. Based on his regional expertise and experience, he was recruited to numerous National and International Steering Committees focused on various aspects of Sustainable Development and Climate Change Resilience. He was also responsible for coordinating and developing two training manuals on Water Use Efficiency for Caribbean SIDS which were highly praised by various Regional and International agencies.

Commendably, Dr. Roopnarine has also continued to enhance his professional and academic proficiency. He has completed numerous professional development and training courses in the last couple years from reputed international agencies (World Bank, Humanitarian Leadership Academy, UNDP, Global Soil Partnership, UNFAO and IW LEARN). He is actively engaged in regional and international networking resulting in strategic financing mechanisms for a myriad of regional activities. Dr. Roopnarine's progressive thinking, was the genesis for the development of a New Major in Disaster Risk Resilience in Agriculture and the Environment. The Major received outstanding reviews and is expected to be offered by the FFA, UWI from September 2022.

Facilitator Profiles



Mrs Marilyn Crichlow

Marilyn Crichlow is a Hydrologist and Water Resources Specialist with over thirty (30) years' experience in the Water Sector of which twenty-two (22) years are at Senior and Executive Management levels. Focused on managing water resources for sustainability and transforming management of the water sector in the Caribbean through an Integrated Water Resources Management (IWRM) approach. Mrs Crichlow has operated at the highest Policy, Operational and Regulatory levels, in various capacities and achieved several milestones in water resources management throughout the region.

A former director of the Water Resources Agency (WRA) in Trinidad and Tobago and the first woman to hold such a position in the region, she has helped Caribbean countries to better manage their water resources using an integrated approach that considers user needs, environmental needs and stakeholder participation. She has consulted on water resources management issues for the Caribbean Council for Science and Technology (CCST), Global Water Partnership-Caribbean (GWP-C), the Organization of American States (OAS), CATHALAC, CAPNET and the United Nations Economic Commission for Latin America and the Caribbean (UN-ECLAC). Through her work with these agencies, she developed a model Integrated Water Resources Management (IWRM) Plan for the Caribbean; led IWRM training workshops; and prepared country water profiles and capacity assessments. Countries assisted include Antigua and Barbuda, Dominica, Grenada, St Kitts and Nevis, and St. Lucia.

Mrs Crichlow played a lead role in the preparation of Trinidad and Tobago's water resources management strategy and the country's IWRM initiatives. She shared her expertise with students as a lecturer in programmes at The University of the West Indies (UWI), St Augustine, and the College of Science, Technology and Applied Arts of Trinidad and Tobago (COSTAATT), in areas such as watershed management and hydrology.

Facilitator Profiles



Ms Kambiri Cox

Kambiri Cox (MSc) is a climate resilience consultant and water resource engineer experienced in resource assessment and management, grounded in hydrogeochemical, climatic and geospatial data analysis. Her work in the water sector transverses 9 years in 7 countries, with a focus on water security for emerging economies in Small Island Developing States (SIDS) and strengthening resilience for water and wastewater utilities globally.

Kambiri consults on a range of projects in water security, sustainable (waste)water management and climate resilience strategy. Most recently, she managed the Membership Engagement department at the International Water Association (IWA) in The Hague, Netherlands, and London, United Kingdom. At IWA, she led a small, robust team in launching the IWA Climate Smart Utilities programme and overseeing project management for the Water and Wastewater Companies for Climate Mitigation (WaCClim), a joint project between IWA and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

Prior to her work in Europe, Kambiri acquired extensive hydrogeological field work and project administration experience as Senior Hydrological Technician at the Water and Sewerage Authority of Trinidad and Tobago on the landmark multi-million dollar Tobago Hydrogeological Reassessment Study / Well Drilling and Development Programme.

Kambiri recently returned to the Caribbean to work more directly on advancing climate resilience in Caribbean SIDS. From May 2022, she will be a full-time consultant at the Inter- American Development Bank (IDB), supporting the organisation's innovation arm (IDB Lab) in identifying and scaling innovative sustainable waste management solutions for the Caribbean region.

Facilitator Profiles

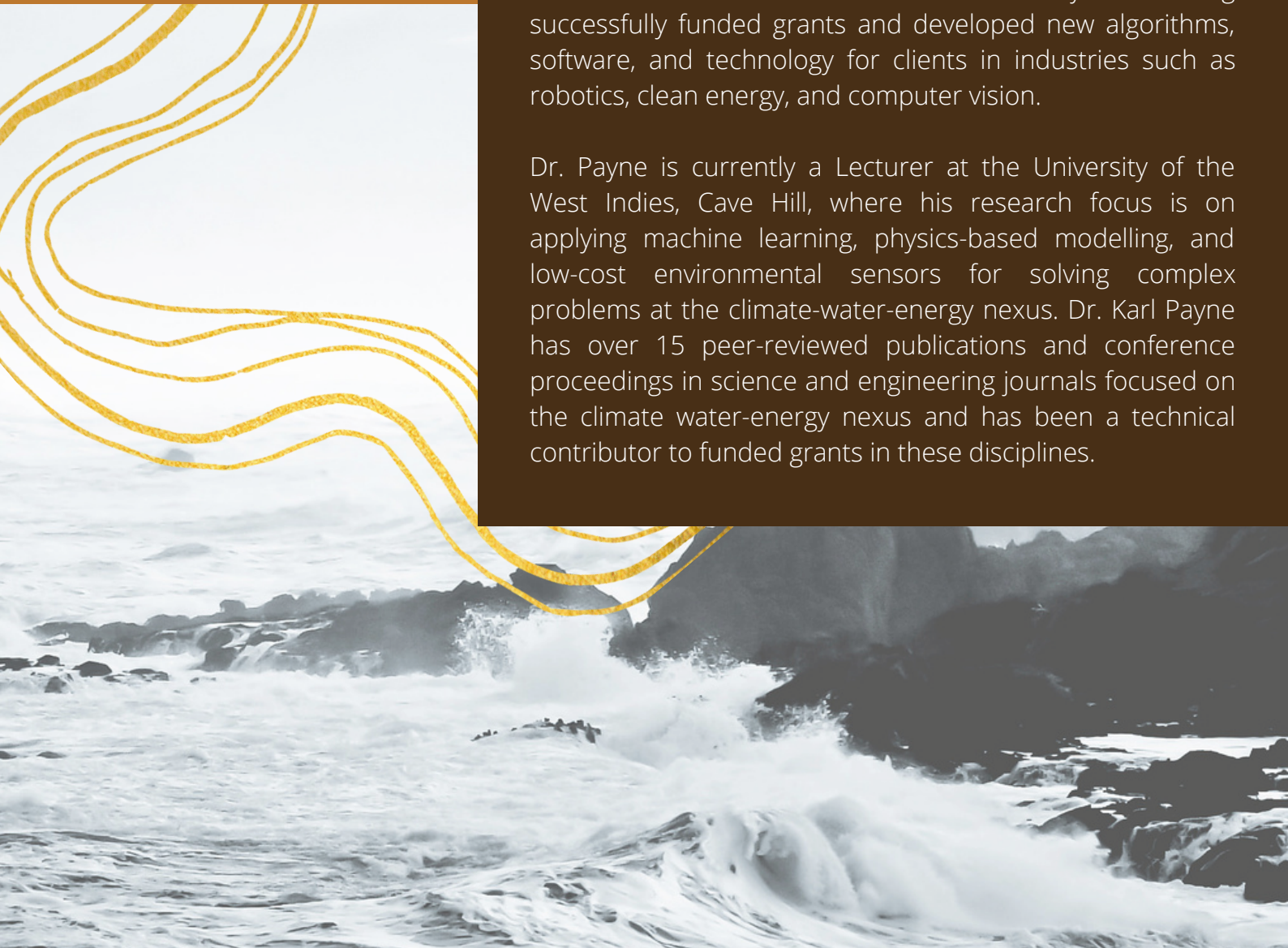


Dr Karl Payne

Dr. Karl Payne completed his Doctorate in Water Resources Engineering at the University of South Florida, Tampa, USA in 2018. He holds Master's degrees in Physics and Water Resources Engineering from the University of Toronto and has over ten years' experience in water and wastewater management.

Dr. Payne has developed a physics-based island scale model for Barbados, which improves the understanding of the impact of climate change on the island's available groundwater resources. Dr. Payne has experience consulting on projects and conducting research in groundwater quality mapping, monitoring, and applied geophysics for water resource assessment in the Caribbean, the USA, and Canada. He also has tech industry experience, where he worked for close to three years writing successfully funded grants and developed new algorithms, software, and technology for clients in industries such as robotics, clean energy, and computer vision.

Dr. Payne is currently a Lecturer at the University of the West Indies, Cave Hill, where his research focus is on applying machine learning, physics-based modelling, and low-cost environmental sensors for solving complex problems at the climate-water-energy nexus. Dr. Karl Payne has over 15 peer-reviewed publications and conference proceedings in science and engineering journals focused on the climate water-energy nexus and has been a technical contributor to funded grants in these disciplines.



Facilitator Profiles



Mr Geoffrey Marshall

Geoffrey Marshall has been interested in water resources for as long as he can remember. He started his water career as a Hydrology Technician right out of 6th form in 1997 for a year at the Water Resources Authority of Jamaica. He then completed a B.S. in Geology and B.A. in Computer Science at Washington and Lee University in Lexington, VA from 1998 - 2002, and then completed his M.S. in Hydrology at the New Mexico Institute of Mining and Technology in Socorro, New Mexico from 2002-2005.

He returned to the WRA in 2006 as a Hydrogeologist, and currently serves as the Chief Hydrologist and head of the Planning and Investigations Unit. He recently led the charge to complete an update of the National Water Resources Development Master Plan of Jamaica, and is also currently involved in isotope hydrology, dye tracing and saline intrusion monitoring research activities.

