



*“This report was funded by a grant from the NOAA Adaptation Sciences program (Grant # NA23OAR4310114), with funding from the United States Department of State. The opinions, findings and conclusions stated herein are those of the author[s] and do not necessarily reflect those of the United States Department of State.”*



**National Framework for Climate Services Workshop  
(NFCS)**

**Final Report**

**March 20<sup>th</sup> to March 22<sup>nd</sup>, 2024**

**Background**

WMO, CIMH and other partners have been supporting Members in the development and implementation of National Frameworks for Climate Services (NFCS) as a coordination mechanism to facilitate the interaction of all the stakeholders in the climate services value chain with a view to enable co-design and co-development of actionable tailored climate services. NFCSs have been developed under the umbrella of the [Global Framework for Climate Services \(GFCS\)](#) that was established to harness both scientific and technological advances to enhance the development of tailored climate forecasts and predictions in support of climate risk management and adaptation planning to climate change decision-making. The NFCS provides a mechanism to enable NMHSs to play a central and leading role in the co-design, co-development and provision of climate services. The national frameworks help to overcome operational challenges, such as clarifying and coordinating the roles and responsibilities of all the national institutions and stakeholders involved in the climate services value chain.

Since 2012, the GFCS has been supporting the establishment of NFCSs. Based on the experiences and lessons learned from the initial support to countries, WMO [Step-by-Step Guidelines for Establishing National Frameworks for Climate Services](#) were published in 2016 based on a 5-step approach. Using these guidelines, various countries around the world have developed or are in the process of developing a NFCS.

More than 10 years have passed since the NFCS concept was proposed and over 8 years have passed since the guidelines were developed. Yet, the number of countries requiring support to develop an NFCS has continued to increase and the need to consider the key issues has emerged, like the more systematic integration of weather and hydrological services, the development of marine and health-related climate services, and the provision of services that address complex and cascading risks and impacts.

In the Caribbean multiple countries have already started the process of development of their NFCS, with some having received support through the Climate Risk and Early Warning Systems (CREWS) Initiative. At the same time WMO has been working with the UK Met Office to update the step-by-step guidelines for developing an NFCS and also undertake an assessment of the feasibility of regional frameworks for climate services (RFCS).

CIMH collaborates closely with NOAA to enhance regional resilience through the development of climate for adaptation and decision support. This CIMH-led workshop is supported by NOAA through a partnership with the U.S. Department of State and, in combination with other activities, will connect these initiatives, and help shape national scale climate services in the region.

#### **Workshop objectives**

- Share experiences on the development and implementation of NFCS in the Caribbean
- Gather lessons on development and implementation of the NFCS
- Share initial findings emerging from the WMO-UK Met Office review of the step-by-step guidelines on establishing an NFCS and the feasibility assessment of regional frameworks for climate services
- Provide a forum for the development of a regional peer to peer exchange/group for the development and implementation of NFCS.

**March 20<sup>th</sup> - Day 1**

## **SESSION 1: OPENING OF THE MEETING - Adrian Trotman (CIMH) - MC**

The event started off with a brief introduction by Mr. Adrian Trotman, Head of the Regional Climate Centre (RCC) at the Caribbean Institute for Meteorology and Hydrology (CIMH). He highlighted agencies such as The National Oceanic and Atmospheric Administration (NOAA), which provided most of the funding for this workshop, as well as the World Meteorological Organization (WMO) and The Caribbean Meteorological Organization (CMO), just to name a few, with which the CIMH partnered with to host this workshop. Mr. Trotman highlighted that the aim of the workshop is to enable participants to see the importance of responding to climate early warning information in a timely manner to minimise risks.

This was followed by brief introductory greetings from representatives of several key agencies, including Ms. Semelka Jackman from the Barbados Meteorological Services (BMS). Ms. Jackman pointed out that extreme events have placed weather in the spotlight, stressing on the importance for stakeholders to fully understand the importance of monitoring the weather, and stating that there is a great need for support for the Meteorological services.

Dr David Farrell, Principal of the Caribbean Institute for Meteorology and Hydrology welcomed all to the meeting including participants from agencies of the United Nations (UN), The Caribbean Community Climate Change Centre (CCCCC) and the Caribbean Disaster Emergency Management Agency (CDEMA), just to name a few. He then spoke about the importance of funding for these programs, especially when focusing on early warning. Despite the region's involvement in climate services for more than a decade, Dr. Farrell stressed his disappointment that the Caribbean is not further with regards to building resilience to these natural disasters, He also encouraged countries to develop their services to support their sectors, such as the finance sector, stating that it is clear that all are benefitting from the National Climate Outlook Forums (NCOF's).

Ms. Lillian Mitchel, representing the US Embassy gave her official introductory welcome then stated that Climate change is a reality, and the Caribbean is at the frontline when it comes to facing the impacts of climate related events. She stated that this U.S-Caribbean partnership aims to enhance resilience and helps to close the gap when it comes to supporting disaster risk reduction. Ms. Mitchel also encouraged all to engage the youth and advocate for Climate action.

Ms. Michel was followed by Ms. Lisa Vaughan, from the National Oceanic and Atmospheric Administration (NOAA). Ms. Vaughn extended thanks to all who made everything possible and brought them together for the meeting, as well as to her colleagues at the World Meteorological Organization (WMO), just to name a few. She then went on to mention the progress being made when it comes to managing risks and enhancing resilience, also stating that stakeholders require information across multiple timescales.

Dr Chris Hewitt, the Head of Climate Services of the World Meteorological Organization (WMO) joined virtually and gave his introductory welcome from Geneva. In summary, he stated that the Caribbean faces many risks from climate related hazards.

## **SESSION 2: CLIMATE SERVICES ACTIVITY IN THE CARIBBEAN - Shontelle Stoute (CIMH) - Chairperson**

### **Relevance of the Global Framework for Climate Services and Early warnings for all - by Dr. Chris Hewitt, (WMO) - Virtual**

In his presentation, Dr Hewitt defined a Climate service as the provision and use of climate information to assist in decision making on multiple timescales in the past, present and future-. The information allows decision makers to think about adaptation and plan large infrastructural projects that can reduce impacts.

Sectors prioritised for the use of such information include Agriculture and Food security, Water Resources Management, Health, Disaster Risk Reduction as well as the Energy sector. It was emphasized that user engagement is key because it helps to identify and align user needs and provider capabilities and improves climate literacy.

Some achievements under the Global Framework for Climate Services were mentioned such as the elevated awareness of climate services and the role they play in policy and development. It also helped the National Meteorological and Hydrological services be central to climate services within their respective countries, and aided in developing standards, quality management and training. He further reported that more countries are starting to get involved. He also pointed out that 2023 was the warmest year on record and Early Warnings for All (EW4All) initiative is a groundbreaking effort to ensure that everyone on earth is protected.

### **Workshop on Climate Services to Support adaptation and Resilience in the Caribbean - by Adrian Trotman (CIMH)**

Mr. Trotman provided a summary of the Workshop on Climate Services to Support Adaptation and Resilience in the Caribbean – a regional workshop led jointly by NOAA and CIMH, with support from the U.S. Department of State (DOS) and hosted at the same venue in April 2023. The workshop sought to explore areas of collaboration and partnership between NOAA and the Caribbean in climate services. Topics discussed at the workshop included:

- Resilience in the Caribbean: Challenges, Needs & Opportunities
- Exploring Capabilities and Near-Term Goals of key regional institutions engaged in building resilience through climate services
- Accessing Finance to Enhance Regional and National Resilience Efforts
- Current Status and the Future of Regional Early Warning Information Systems (EWIS)

- Early Warning Information Systems and Resilience-Building in Diverse Caribbean Communities
- Role of Ocean Observations for Coordinated Marine Governance
- Building Climate Literacy and the Next Generation of Practitioners
- Climate Services Financing and Sector Alignment Across the Region

Mr. Trotman also spoke about the importance of addressing any challenges faced in terms of needs and opportunities, the exploration of capabilities and near-term goals of key regional institutions engaged in building resilience through climate services as well as the current status.

The term resilience was also defined as the ability of a system, community or society exposed to hazards to resist, absorb, accommodate and adapt to transform and recover from the effects of a hazard in a timely and efficient manner. The importance of climate literacy was also mentioned in terms of understanding your influences on climate and climate's influences. This illustrates the need to value higher education institutions that support the building of human capacity for resilience solutions. He emphasized that early warning information has been proven to save lives, hence the development of regional educational policies and programs is necessary to enhance climate literacy.

Mr. Trotman posited that financing for Climate action is insufficient, hence National and Regional frameworks and proposals to access financing for climate services are needed. Mr. Trotman concluded by asking the question "Where from here?" in terms of looking at the next steps towards strengthening climate services in the Caribbean.

### **Climate Services in the Caribbean - Regional Level Expression of the Pillars and Priorities - By Dr. Roche Mahon and Dr. Cedric Van Meerbeeck, (CIMH)**

Dr. Mahon provided some background to and history of the Caribbean Institute for Meteorology and Hydrology (CIMH), its functions and its role in the Caribbean Meteorological Organization (CMO) as its technical arm, supporting its sixteen (16) Caribbean Member States. She pointed out that the Caribbean Institute for Meteorology and Hydrology (CIMH) has delivered uninterrupted service for over 55 years and is also the host for the World Meteorological Organization's (WMO) Regional Climate Centre (RCC) for the Caribbean, amongst those many functions. She stated that the Institute, through the RCC, provides climate monitoring and forecast products and information, which are made freely available every month. Various regional sector agencies representing water, agriculture and food security, health, energy, disaster risk management and tourism, partner with CIMH to oversee and support the delivery of climate services to their sector under the Consortium of Sectoral Early Warning Information Systems Across Climate Timescales (EWISACTs) Coordination partners. Within this partnership three sector climate bulletins are produced – for agriculture and food security, health and tourism. Dr. Mahon intimated that more focus needs to be placed on strengthening the associated frameworks and tailoring the information specifically for these sectors, stressing that more work still needs to be done, particularly at the national level.

Dr. Mahon introduced and described the WMO led Global Framework for Climate Services (GFCS) and its five pillars, outlining the work done or being done in the Caribbean under these five pillars - Observations and Monitoring, Research, Modelling and Prediction, Climate Service Information System, User Interface Platform and Capacity Development. Through her presentation, Dr. Mahon identified what are components of a Regional Framework for climate services:

- The EWISACTs Consortium that oversees, governs climate services at the regional level
- A Roadmap and Plan of Action (to 2030)
- CariCOF as a User Interface Platform (UIP)
- Sector-specific bulletins

Mention was made of the importance of the ClimSA programme for the period 2021 to 2026 stating that history shows that climate hazards result in economic losses. The hottest year on record was 2023, hence there is a great need for Climate information, as this information greatly assists when it comes to Climate risk management which in turn aids in enabling risk reduction.

Dr. Van Meerbeeck elaborated more on the five pillars, first focusing on Observations and Monitoring stating that the provision of instrumentation and tools to make observations, as well as proper management of the data is very important, as it allows for building a network of station data, hence enabling early warning systems to be tailored.

In terms of Research Modelling and Prediction, the data can be used to look at how climate relates to outcomes such as dengue outbreaks or warn of the onset of hazards like drought and heatwaves but is also important for verification of forecasts.

He mentioned that Climate Service Information Systems are the operational core of climate services. In terms of physical research, when it comes to drought early warning for example, the use of historical and current data is greatly required. There is also a need for awareness when it comes to educating the public about the usefulness of this information.

Participants were made aware of the Caribbean regional Climate Outlook Forums, the flagship meeting of the CIMH, held twice annually providing outlooks for the wet/hurricane and the dry season. CariCOF also provides an opportunity for climate information users, climate information providers and researchers to discuss issues related to climate information, allowing for improvements and gaps to be filled.

Also mentioned was the sectoral EWISACTS roadmap and plan of action 2020-2030 which is geared towards the improvement of the quality of climate information and services and the strengthening of capacity development.

She concluded by stating that one of the lessons learnt was that the development and delivery of climate services requires large incremental and continuous investments in robust monitoring and observations systems.

## **2024, A year of Climate Extremes, Seasons and Climate-Related Hazards in the Caribbean, by Dr. Cedric Van Meerbeeck (CIMH)**

In his presentation, Dr. Van Meerbeeck warned of climate related hazards all year. These include drought and excessive dryness, bush and forest fires, excessive heat, tropical cyclones, floods, coral reef bleaching, Sahara dust intrusion and sargassum beaching. He reminded that the period associated with many of these hazards runs from June 1<sup>st</sup> until the end of November.

Dr. Van Meerbeeck further reminded of the record-breaking heat of 2023, and warned that 2024 could be just as bad, if not worse. He further suggested that the Caribbean is likely to experience a region-wide early onset of intense heat, with much higher than usual night and daytime temperatures. He also mentioned the issues currently being experienced with the Saharan Dust which is not only a health hazard when it comes to respiratory and ocular diseases, but also on the effect it may have in subduing convective activity, thus reducing rainfall and resulting in fewer tropical cyclones.

In terms of the 2024 Atlantic Hurricane Season, Dr. Van Meerbeeck warned that the season is likely to be hyperactive, further stating that tropical cyclone activity could potentially start as early as April or May.

## **SESSION 3: NATIONAL FRAMEWORKS FOR CLIMATE SERVICES: GUIDANCE AND BENEFIT - Cedric Van Meerbeeck (CIMH) - Chairperson**

### **NFCS Guidelines and Review - by Nicola Golding, (UK Met/WMO ET- CID)**

Dr. Golding then defined a National Framework for Climate services, according to WMO, as a “National mechanism to bridge the gap between the climate information being developed by scientists and service providers on the one hand, and the practical needs of users on the other hand. Further, NFCSs should aim to coordinate institutions and enable them to work together across the value cycle to co-design, co-produce, communicate, deliver, and use climate services for decision-making in sensitive sectors.

She then outlined the five steps to establishing a National Framework for climate services:

- Step 1: Assessing the baseline on climate services, assess existing capacities and have a baseline
- Step 2: Organizing a national stakeholder consultation workshop on climate services - to identify the complementary functions of diverse stakeholders in the national value chain for climate services
- Step 3: Developing a national strategic plan and action plan for the NFCS
- Step 4: Endorsing the national strategic plan and action plan for the National Framework for Climate Services-convene a high-level meeting to endorse



- Step 5: Launching a National Framework for Climate Services – convene an event to launch

Dr Golding then asked some questions - “Are National Frameworks for Climate Services fit for purpose?”, “How does the NFCS interface with the National strategic plan and adaptation plan? “, “Are the guidance steps appropriate?”, Should the NFCS include weather and water services?”, What are the barriers to developing an effective NFCS? “, “How could the guidance better support the range of countries developing their NFCS?”, just to name a few.

Dr. Golding then turned our attention to the process for reviewing and updating the current NFCS guidelines, which includes a survey, interviews and developing case studies, all with the aim of acquiring feedback from participants to see how they responded to the guidance presented and identifying any barriers to NFCS establishment. Barriers such as resources, finance, legislation and politics as well as maintenance were identified. She reported that the team received 52 survey responses along with 13 completed interviews. Also addressed was the issue of common barriers as well as helping people to overcome these barriers. She stated that there is a need to provide a clear statement of the benefits of the NFCS to secure senior level buy in.

Dr. Golding provided an interim update to the current guidelines. Recommended are two additional steps:

- Step 0: Evaluate with key stakeholders the rationale for NFCS development and seek associated funding.  
Step 6: Maintain and develop the National Framework for Climate Services, with continuous monitoring and evaluation

## **Frameworks for Climate services at the National level in the Caribbean - by Jodi-Ann Petrie, CIMH**

Ms. Petrie defined a National Framework for Climate services as an institutional mechanism to coordinate, facilitate and strengthen collaboration among national institutions to improve the co-production, tailoring, delivery and use of science-based climate predictions and services.

Ms. Petrie pointed out that based on a survey conducted in 2017, NMHSs outperformed all other sources of climate information, for all categories of climate information among users of climate information. It was suggested that more exposure and training is needed to build the capacity of climate information users in making professional decisions.

Ms. Petrie made parallels between the five step NFCS guidelines and efforts in the Caribbean to support climate services developments at the national level:

- Step 1: Assessing the baseline on climate services, assess existing capacities and have a baseline - *User and provider baseline assessments conducted in the Caribbean between 2015 – 2017*

- Step 2: Organizing a national stakeholder consultation workshop on climate services - to identify the complementary functions of diverse stakeholders in the national value chain for climate services – *the Pilot Project for Climate Resilience (PPCR) supported the 1st National Stakeholder Consultation Workshops – 2018, 2nd National Consultation Workshops - 2020, 3rd National Consultation Workshops - 2021 in Grenada, Saint Lucia and St. Vincent and the Grenadines.*
- Step 3: Developing a national strategic plan and action plan for the NFCS - *3 National Roadmaps for Climate Services drafted, 10 National Strategic Plans for weather, water and climate services produced*
- Step 4: Endorsing the national strategic plan and action plan for the National Framework for Climate Services - *convene a high-level meeting to endorse - 10 NSPs Accepted by the NMHS Directors*
- Step 5: Launching a National Framework for Climate Services – *convene an event to launch - at least 1 NSP recently launched*

Like the EWISACTs Consortium which oversees climate services at the regional level, it was recommended that Caribbean countries establish national committees for climate services. Such committees need not be newly formed, but can be an existing committee with overlapping stakeholders, and with a similar agenda. The existing committee can then add overseeing climate services to its mandate. For example, the Flood and Drought Mitigation Committee in Saint Lucia can add the governance of national climate services to its responsibilities.

## **Group Activity**

### **Creating a Vision for the NFCS – Working Exercise; By Nicola Golding, (UK Met/WMO ET- CID)**

In this session participants were placed in groups representing various countries and asked the question “is your country resilient to Climate Change?”. By thinking through the question, the visioning session aims to familiarize participants with the NFCS aim and vision and to consider the benefits of the NFCS to a range of different stakeholders. The intended outcome of the exercise is for individuals or small same-country groups to start formulating the vision for their country’s NFCS and have confidence in completing this task. Some examples of the vision for NFCS were:

- Barbados – My country has developed through deeper cooperation with stakeholders, capacity enhancement of the meteorological services and early warning systems, and the mitigation of disruption to commercial travel and trade.
- Guyana – The Hydrometeorological Service reaches all stakeholders in all ten regions of Guyana before the onset of the rainy season

- Jamaica – a fully integrated NFCS which allows the continuous update of climate services to meet user needs
- Belize – NFCS that irons out current governance issues, and establishes the status of the meteorological service, and would bridge the gap between climate science and climate policy in the provision of climate services.



Figure 1 Dr. Golding, Chair of the WMO Expert Team on Climate Information for Decision Making, and lead facilitator for the workshop.

#### **SESSION 4: NATIONAL FRAMEWORKS FOR CLIMATE SERVICES: GUIDANCE AND BENEFIT - Adrian Trotman (CIMH) - Chairperson**

##### **To Understand where you are going you need to know where you are - by Jeffrey D. Michler, University of Arizona**

Dr. Michler suggested that if we want to identify the effect of a policy or an investment or some individual action on one or more outcomes of interest, baseline data is very important in identifying or understanding that effect. For example, improved tropical storm predictions to small businesses

does not necessarily mean that the share of businesses that are still in operation after a storm is an indication of the effectiveness/value of the investment in improved climate services, because we do not know how many businesses would have closed anyway without the service. Baseline data provides an additional way to try and establish causal inference. He further intimated that when we have multiple observations over time, we can control for time invariant unobservables and common shocks to obtain consistent and unbiased estimates of the treatment effect. Dr. Michler illustrated his points with some practical examples.



Figure 2 Dr. Michler capturing the attention of the participants during his presentation on the importance of baseline data

### **The Importance of Establishing Baselines-European Experience - by Nicola Golding, (UK Met/WMO ET- CID)**

In her presentation, Dr. Golding stated that it is important to identify who is involved in establishing the baseline, as well as why the baseline should be assessed. Baseline information can identify gaps and assess progress. Identifying a country's state of readiness to implement an NFCS was also mentioned taking note of what climate services are currently being provided. The process with which we interact with each other is also a very important output from assessing baseline data. The methods used to assess the baseline can be in the form of a questionnaire, which aids in the identification of gaps. Other approaches to assess the baseline are the project first approach as well as a consultation approach. An example was given from Ireland whereby they tried a project first approach to understand the national relevance and appetite for a coordinated approach to climate services. They chose this approach as it was low risk. Dr Golding concluded that the aim is to take

stock of climate service capability and identification of current gaps and potential solutions which could be supported by a framework.

### **Systematic Risks, Changing Storylines, and Climate Services - by Roger Pulwarty, NOAA**

Dr. Pulwarty spoke about known quantifiable threats as well as unknown uncharacterized low probabilistic events, noting that quantifiable threats have lower impactful systemic risks. He asked the question “What does this mean in a climate setting? And what do we do when we cannot predict the future?”

Dr. Pulwarty posited that the aim should be to assess impacts on small islands - impacts on island morphology, ecosystems, natural resources, livelihoods, settlements and infrastructure; then went on to ask, “How do we know that we are making a difference?”, stating that we use projections to enable us to see what is possible based on past events.

An example of Jamaica was given whereby he stated that it took them 10 years to recover from a hurricane. The year 2017 was a very destructive year for the Caribbean with 22 of 29 Caribbean island states impacted: 4 were affected by 1 storm, 13 by two storms, 5 by three storms – multiple impacts in some countries in one hurricane season. Puerto Rico was one of those Caribbean States impacted by more than one storm, with multiple systemic failures - Hurricanes Maria and Irma resulted in critical system failures, caused evacuations, closures, and reduced services, including water, cellular coverage, electricity, and disruption of medical services between September 20 and December 31, 2017. Puerto Rico experienced cascading risks well after the hurricane strike.

He pointed out that what happens globally also impacts us locally, for when situations arise, a dip in production of a certain crop can result in an increase in prices in the future. Dr Pulwarty stated that we are dependent on external markets, and we need to understand what that means in a climate context. He also reassured, that the fact that we are still here shows that we can survive in a risky environment, and we have a sense of how to build resilient communities all of which require climate information across timescales.

**March 21<sup>st</sup> - Day 2**

**SESSION 5: NATIONAL STAKEHOLDER CONSULTATION WORKSHOP ON CLIMATE SERVICE - Roche Mahon (CIMH) - Chairperson**

**You Need a Map to Find Your Way: The Value of Stakeholder Mapping - by Jeffrey D. Michler, University of Arizona**

Dr. Michler started by asking the question “What makes a good map?”, pinpointing the errors in map production, and suggesting that maps can be wrong or bad, containing too little or too much information. However, a good map is relevant to the context.

Dr. Michler defined a stakeholder map as a visual representation of an individual or group(s) with a vested interest in a project, product or idea. The goal of the map is to tell you where you are so you can figure out where you want to go. He added that the map helps you identify the key stakeholders, understand their influence, and develop a strategy for stakeholder management.

Dr. Michler stated that the objective is to develop an efficient and effective plan that:

- Identifies partners (stakeholders, actors)
- Understands the influence of these various parties / partners
- Creates a plan of involvement, management, and collaboration
- Observes and plans for potential areas of conflict and misunderstanding
- Sets expectations

Dr. Michler identified several types of stakeholders based on:

- Influence (whether direct, indirect or potential)
- Interest (how involved is the stakeholder)
- Internal (directly related with a vested interest) vs. External (not directly related)

He then recommended six steps to stakeholder mapping:

1. Frame the question
2. Identify the stakeholder involved
3. Look at the links
4. Identify motivations and interests
5. Discuss influences and power
6. Collect observations and make a plan of engagement

The data from a stakeholder map can be both quantitative and qualitative. It can reveal where you need to dedicate time and resources, provide a perspective on where one can mobilize support and identify opinion leaders.

He concluded that a good map shows us something useful and new.

## **Stakeholder Engagement- Mechanisms from the Caribbean: The NCOF process- A Belize perspective; by Shanea Young (National Meteorological Service of Belize)**

Ms. Young outlined that the NCOF serves as a key national platform for promoting regular dialogue and inter-agency coordination in responding to natural hazards, climate variability, extremes, and change in particular sectors and contexts. She emphasized that climate services provided through the NCOF serve as the basis for multi-hazard early warning systems. NCOFs spur the development and enhancement of user-specific products and serve as a mechanism for soliciting feedback from users on the early warning information and services provided by meteorological services.

Ms. Young informed that the NCOF in Belize has grown over the years, and that so far 11 NCOFs were held to date. Funding was provided for two forums per year (start of wet and dry season) by Environment and Climate Change Canada up until 2017, but from 2018 – present, funding was provided by the Government of Belize.

Ms. Young went on to showcase a number of climate products presented and discussed at the Belize NCOF. These include the annual rainfall climatology of Belize (1981-2010 vs 1991-2020), monthly rainfall summary, monthly rainfall and temperature forecasts, drought (6 and 12 month) and forecast verification. The information also includes likely sector specific impacts for the upcoming season.

Ms. Young concluded by identifying lessons learnt with some recommendation:

- There is increasing knowledge and interest in accessing Climate Information and Products.
- A people-centred approach is necessary for communicating weather and climate information.
- Need tailored climate services to other climate sensitive sectors such as fisheries, health, and the environment.
- Users of Belize's climate services require more sub-seasonal information, access to climate data, user-friendly application for weather and seasonal forecasts, outreach, farmer visits, education, training, and capacity building.
- Users need assistance in understanding and utilizing climate information in planning processes and decision making.

## **Stakeholder Engagement-Mechanisms from the Caribbean: Guyana: by Ms. Haymawattie Danny (Guyana Hydrometeorological Service)**

Ms. Danny identified 2 activities – the Participatory Integrated Climate Services for Agriculture (PICSA) and the NCOF - in Guyana to engage stakeholders from all agencies representing climate sensitive sectors such as agriculture, water, health, energy, and fire. Such meetings are used to provide weather and climate information to stakeholders and to obtain feedback.

At the PICSA meeting she stated that farmers were trained using location specific climate information, and that WhatsApp groups were created for each farmers region for the dissemination of the climate information. Several positive outcomes from PICSA implementation were listed. These include:

- The ability of agriculture extension officers to better communicate agrometeorological information, and with confidence, to farmers,
- PICSA being a vehicle to easily engage farmers, bridging the gap between the science and traditional knowledge in preparing for weather and climate,
- Farmers utilizing the approaches that incorporates the seasonal forecast into their planning,
- Farmers having more control of their farm productivity through understanding how they can plan with the weather and climate in mind.
- Farmers utilising the expertise of staff from the Agrometeorological Department of the Hydrometeorological Service who can advise on best agronomic practices.

Ms. Danny informed that Guyana held its first NCOF in 2016 and since then NCOFs have been conducted biannually (ahead of the two rainy seasons). She further posited that the forums contributed to the continuous improvement of climate services in Guyana. Thanks to the NCOF process, the Hydrometeorological Service now collaborated with the Ministry of Health on issues related to malaria.

### **Shaping Climate Services at the Community Level-Examples from Caribbean Indigenous Communities - by Dr Andrew Simmons (Consultant)**

Dr. Simmons engaged participants in an exercise imagining that they were in a disaster. A game called Lifeboat. Participants moved around the room forming various small groups. In these groups there was an exchange of information as they discussed key points raised in the meeting so far.





Figure 3 Dr. Simmons taking participants through the exercise

Aims of the consultancy:

- To develop and pilot a participatory approach to climate services development and delivery at the grassroots level, particularly targeting vulnerable rural communities, including indigenous populations.
- Assess climate early warning information delivered to vulnerable indigenous communities in St. Vincent and the Grenadines (SVG), Dominica, and Guyana.

Dr. Simmons and his team partnered with CIMH, the national meteorological services of the three countries and indigenous communities in the three countries – the Garifuna in SVG, the Kalinago in Dominica, and the Moco Moco Amerindian community of Region 9 in Guyana. He provided background information on each of the communities for participants to understand the contexts.

Dr. Simmons then outlined the methodology to acquiring the necessary data and information, including:

- Participatory Climate Risk Mapping approach that would determine and map where in their communities 5 or 6 climate stressors are most impacting the community
- Questionnaires: administered to collect perceptions of the community's physical infrastructure, impact of climatic stressors, the extent of the impacts of these climate stressors on their livelihoods
- Focus Group Discussions: to seek their participants' perspectives on climate stressors and Early Warning Information Systems (EWIS)

- Interviews: with heads of Meteorological Services in the three countries to provide insights on the services and products provided by their offices, the weaknesses of the services to the communities and the strategies for enhancing the qualities of the products and the services.

Lessons learnt include:

- Climatic conditions are monitored and forecasted at regional and national levels by CIMH and National Meteorological Services.
- Participants and stakeholders confirmed the benefits of using Participatory Climate Risk Methodology for implementing the consultative workshop on Climate Early Warning Information.
- The cultural and traditional practices are transferred through generations of indigenous people, even Climate early warning information. Cultural practices can discriminate against women and youth:
- Women and youth work the land and tend their livestock, yet men decide where products will be sold and how the monies accruing from the sales will be used (not as evident in SVG).
- Climate early warning information services are not yet fully integrated into the work of socioeconomic sectors.

Dr. Simmons concluded his presentation with recommendations going forward surrounding:

- Extension services to promote and develop climate early warning information services and products in the community
- Strategies for enhancing work: Communication and community development, for example a social scientist and staff that can help Meteorological Services communicate effectively to stakeholders
- Raising awareness of the broader climate change issues

## **Working / Breakout Groups session**

### **Working through NFCS templates, by Nicola Golding, (UK Met/WMO ET-CID)**

In this session participants were placed into 5 groups and attempted stakeholder mapping using templates provided. First the group would think through their suite of stakeholders that would likely be impacted by a NFCS – from Ministries, government agencies, all the way to the community level. Map the stakeholders against:

- Timescale of information they would need – e.g. weather, seasonal, climate change timescale
- Spatial interest – national, local, regional and even global (e.g. donors)

Then use the matrix provided to identify stakeholders with the highest and lowest influence, power or interest. Afterwards, determine how to interact with these different stakeholders – for example would you invite them to a consultation, or just keep them informed by sending them the climate bulletins.



Figure 4 Working through the Stakeholder Mapping exercise

## **SESSION 6: NATIONAL STRATEGIC PLAN AND ACTION PLAN FOR THE NFCS - Lisa Vaughan (NOAA) - Chairperson**

### **Developing a National Strategic Plan and Action Plan for the NFCS - by Jean- Baptiste Migraine, (WMO)**

In his presentation, Mr. Migraine started by emphasizing the need for supporting NMHSs along the full climate services value chain/ value cycle. He raised the importance of providing the appropriate training for meteorological services involving observations and monitoring, modelling predictions, development and delivery of weather, climate and hydrological services. He stated that there are very few examples of Met services with a coherent plan. It was mentioned that the NFCS is under review by the U.K Met Office. He spoke about the various documents provided, along with the NFCS, saying that they can be used together. It was pointed out that each agency has its planning cycle,

and they also started a committee of practice to have exchanges among National Met Services. He noted that the first meeting held in French speaking countries took place in 2022, with an upcoming meeting in May 2024, to be held in Spanish speaking countries. He stated that they are looking to expand the community of Practice, as there are only five (5) members at present.

### **Integrating of Climate Weather and Water in National frameworks - by Haley Anderson (CMO HQU)**

Mr. Anderson stated that the Caribbean Meteorological Organization (CMO) headquarters are mandated to coordinate agreements and provide advice to member states, pointing out that the challenges remain the same with regards to a lack of manpower and financing. He spoke about creating an enabling environment in terms of developing strategic plans for 10 member states. He highlighted however that there are huge gaps in the frameworks with only 4 Meteorological services with legislation stating that met services need to update their strategic plans. It was mentioned that the most recent plans were done in Turks and Caicos as well as for the Cayman Islands stressing on the importance of this as it integrates weather, climate, water and ocean services. Future interventions were mentioned in terms of strengthening Hydro Meteorological and Multi hazard early warning services in the Caribbean Phase 2 (CREWS). Mr. Anderson concluded by making recommended actions for NMHSs by suggesting that there is a need to adapt the model legislation and policy, and review existing strategic plans.

### **Breakout Groups/ Strategic Plans: Theory of Change; by Nicola Golding, (UK Met/WMO ET- CID)**

Dr Golding indicated that the Theory of Change is a way of expressing a project plan or a strategic plan in terms of the input and what you expect out of it. She further explained that the Theory of Change conveys the intended benefit of a new programme or activity to its funders or stakeholders and provide a valuable framework to guide activity planning and drive monitoring, evaluation and learning processes. It also identifies the problem or challenge; the activities or interventions needed to address the problem, the outcomes expected and the impacts these outcomes would have. So based on the problem, participants would determine - if we do this, we will have this, leading to this, with this impact.

Participants were again placed in working groups and asked to respond to three points -

1. Identify 3 or 4 key impacts that you would hope an NFCS for your country would achieve.
2. Taking each one in turn, identify the interventions, outputs and outcomes that will lead to these impacts.
3. Fill out the flow chart provided and take a photo so you can refer to it later.

Below is an example from one of the groups.

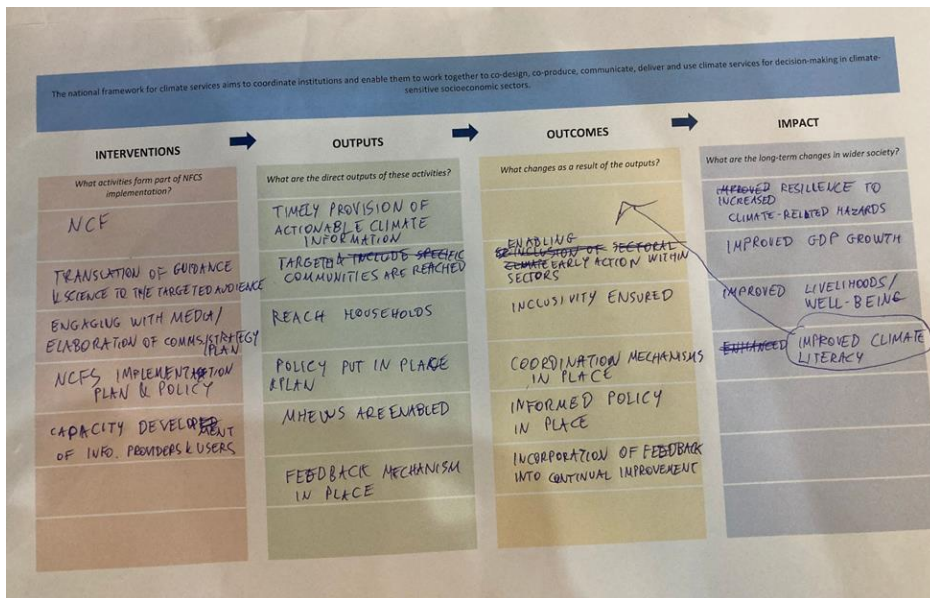


Figure 5 Theory of Change submission from one of the working groups

## SESSION 7: ESTABLISHING OTHER INFORMATION SERVICES IN THE CARIBBEAN - Theodore Allen (CIMH) - Chairperson

### Hydrological Services in the Caribbean - Regional Hydrological Centre - by Shawn Boyce (CIMH)

In his presentation, Mr. Boyce provided some background on the WMO Global Data Processing and Forecasting Systems (GDPFS), stating that it is an international mechanism that coordinates member capacities to prepare and make meteorological analyses and forecast products available to all members. Participants learnt that the WMO 2nd Hydrological Assembly (HA-2) adopted a

plan for the establishment of hydrological centres in the GDPFS with global, regional and national coverage as elements of a network of global, regional and national centres.

Mr. Boyce reported that Hydrological Centres with Regional Coverage (HC/R) are recommended to provide specific products to Hydrological Centres with National Coverage (HC/N) - NMS & NMHS. The recommended functions of HC/R related to the generation of hydrological prediction products and services include:

- Flash floods
- Hydrological outlooks
- Drought

He further informed that Hydrological Activities of the GDPFS involves:

- Hydrological monitoring and assessment
- Short-term hydrological forecasts
- Medium to long-term hydrological forecasts and outlooks
- Satellite-based products
- Products supporting hydrological forecasting

In terms of hydrological monitoring and assessments Mr. Boyce pointed out that there has been an ongoing collection of water samples from 1<sup>st</sup> November 2022 for the Global Network of Isotopes in Precipitation (GNIP). He also informed of the various climate monitoring products, some using the Standardized Precipitation Index (SPI) and the Standardized Precipitation and Evapotranspiration Index (SPEI). Other monitoring and assessment information includes flood hazard maps, groundwater exploration.

Short term hydrological forecasts would include precipitation and impact prediction, and inundation and streamflow predictions.

## **Establishing Marine services in the Caribbean - by David Farrell, Principal (CIMH)**

Dr. Farrell first made participants aware of the Caribbean Regional Marine Forecast Support Centre based at CIMH, with its aim to create a regional marine forecast support centre at CIMH that takes advantage of the existing infrastructure, competencies, resources, products and services as well as international partnerships and collaborations already present at CIMH, to develop a suite of products and services that improve (i) the operations of marine based sectors in the region, (ii) improve marine ecosystems and fisheries, and (iii) ocean governance, planning and policies. He identified significant marine challenges in SIDS such as elevated sea surface temperatures that fuel tropical storms and contributes to coral bleaching, sea level rise that will promote storm surge and

large swells and enhance salinization of coastal aquifers, and marine algal blooms and sargassum seaweed that at times inundate the marine ecosystem.

Dr. Farrell posited that a Caribbean a multi-hazard early warning system be developed that considers hydro-meteorological, climate, geological and marine hazards in one integrated framework. For this to be achieved there must be access to and development of new technologies and knowhow, development and nurturing of new skills and thinking, public, private and academic partnerships for innovation, entrepreneurship and finance and access to data.

Dr Farrell emphasized the need to improve marine ocean observation and prediction systems (meteorological, oceanography and quality/chemistry) to improve management, decision-making and governance by:

- Significantly increasing the number of in-situ observation and monitoring platforms required;
- Capacity building activities, including marine forecaster competency and research and development capacity, in national and regional institutions;
- Cooperation, coordination and coherence of strategies and activities among partners;
- Enhancing prediction and forecasting platforms across weather and climate time scales.

### **March 22<sup>nd</sup> - Day 3**

#### **Remarks celebrating World Water Day and World Meteorological Day - by Arlene Laing (CMO HQU) – Virtual presentation.**

In her remarks celebrating World Water Day and World Meteorological Day, Dr Laing reminded that the Caribbean Meteorological Organization (CMO) remains committed to improving early warning systems and reducing climate impacts, supporting climate adaptation and embarking on partnerships to enhance observations. Referring to the NFCS workshop, she pointed out the importance of implementing what is learnt at the workshop at the national level and mainstreaming the use of climate information.

#### **SESSION 8: SUPPORT FOR THE ENDORSEMENT AND LAUNCH OF NFCS - Sherri Frederick (CIMH/ClimSA) - Chairperson**

##### **Involving Decision Makers in the Process - by Cheryl Jeffers (CC, St Kitts/ Nevis)- Virtual presentation.**

Ms. Jeffers emphasised the importance of climate services in anticipation of, and adaptation to, climate change, supporting risk management and decision making, and enhancing climate resilience. She further emphasised that accurate and timely climate information is important to good decision making.

Ms. Jeffers identified several key documents in St Kitts and Nevis that helps to create the enabling environment for decision making related to climate. These include:

- National Conservation and Environment Protection Act (NCEPA)
- Climate Change Policy 2017
- National Climate Change Adaptation Strategy and Action Plan (2018)

An important aspect of the enabling environment is the mandate of the Ministry of Sustainable Development, Environment, Climate Action & Constituency Empowerment in collaborating with the climate change community (ICPP, UNFCCC), the international donor community (GCF, GEF) and key regional agencies (e.g. CCCCC, OECS, CDB) in the quest for climate resilience. She informed that the Ministry is supporting the meteorological service in St. Kitts and Nevis by leveraging finance for improvement of data services, procurement of automatic weather stations and involving them at all stakeholder consultations that feed into preparation of national climate change related reports and programmes.

Ms. Jeffers identified gaps and challenges, suggesting that:

- the sources of funding at times restricts the type of equipment that can be sourced
- there is a need to have a homogenous set of equipment and data that adheres to WMO standards
- access to financial and technical resources as St. Kitts and Nevis is ranked as a high-income country

In closing, Ms. Jeffers stated that the ministry realizes that climate services represent a critical part in the decision-making process.

## **Communication of Climate Services to Users - By Lyn-Marie Deane (CIMH)**

In her presentation, Ms. Deane posited that the purpose of communicating climate information is to serve the public and help stakeholders to understand the value of climate information which supports the decision-making process. Identification of climate-related needs is also very important as it enables one to be able to respond to those needs.

Ms. Deane further suggested that considerations be given to:



- What to communicate in the many instruments such as bulletins and newsletter; e.g. how products are used, new products and services, impacts of climate related hazards, workshop and training activities,
- Timing and Scheduling – routine schedules, messages surrounding specific events like World Meteorological Day, or surrounding extreme climate events.
- Scheduled Communications - Develop a strategic communication plan around a regular schedule of products and services, workshop and training activities,
- Audience Specific Content – what is shared depends on the users’ values and their attitudes, concerns and knowledge of climate.
- From Communication to Engagement – build relationship between climate users and providers
- Message design and dissemination – this would consider terms and language used, institutional or cultural norms, and include how the stakeholders would be impacted

Ms. Deane informed of the Intra-ACP Climate Services and Related Applications (ClimSA) Programme funded by the European Union, reporting on the development of its Communication, Visibility and Knowledge Management Strategy and expected outcomes.

### **Co-evaluating Climate Services: Examples from Agriculture - by Sebastian Grey (WMO) - Virtual Presentation**

Mr. Grey began by stating that one should take note of what type of climate-related information the farmer requires to support such decisions as when to plant, harvest, or irrigate, or move livestock, or if to invest in more efficient irrigation systems. He stated that one should look at how climate information assists farmers, focusing on qualitative as well as quantitative information.

Mr. Grey also emphasized the importance of feedback from farmers by means of a survey to ascertain whether changes were made by the farmers based on the climate information provided, and if those changes benefited the farmer through, for example, increases in yields. He stressed that early warning information can aid in preparations for hazardous events which results in economic losses. He also gave examples from Malawi, Tanzania and India where weather and climate services were evaluated, illustrating the many socio-economic benefits of these services. In emphasizing the socio-economic benefits of climate-related services, Mr. Grey reported that every \$1 invested in early warning systems could yield \$10 in net economic benefits.

### **SESSION 9: CHARTING THE WAY FORWARD - Adrian Trotman (CIMH) - Chairperson**

## **PANEL DISCUSSION – Moderated by Dr. David Farrell, Principal, CIMH**

In his preamble to the Panel Discussion on financing climate services and NFCSSs, Dr. Farrell posed the question “Are people happy with the progress made in climate services?” Feedback suggests that funding of climate services at the national level is not where we would want it to be. An important question now is “How do we fund climate services and its frameworks and how do we use the frameworks to channel funds”.

## **Panelists Mr. Mansfield Blackwood (USAID), Mr. Gabriele Coccia (CCRIF SPC) - Virtual, Dr. Mark Bynoe (CCCCC)**

Mr. Mansfield Blackwood (USAID) in his message stated that we need to drive the process to the private sector. He informed that USAID and other US agencies have been supporting the CIMH and its work for over 10 years and he is proud to see the positive changes which have taken place due to the funding provided through USAID. He commented on and applauded the point made by the communication officer at the CIMH regarding communication and being able to understand the scientific language, and that climate specialists need to be able to translate the technical terms in a way that they can be understood by all. Mr. Blackwood emphasised the importance of making sure that there is an increase in the uptake of information in the marketplace. In terms of the funding, particularly the Governments, he hopes that they will accelerate their support to climate services. He also mentioned that there is involvement from the private sector and the international donor committee, however it will be left for governments to mainstream the costs of the programs and incorporate in their policies, including Environmental Impact Assessments. He stressed the need to make sure that the message is clear across all sectors so that they can understand the importance of Climate services. Mr. Blackwood elaborated on the support for climate related projects at CIMH in the past, including the most recent SDCR project.

ME. Mark Bynoe (CCCCC) stated that the focus of his organization is climate change, which is a long-term issue, and the Centre sees the importance of supporting the Regional Climate Centre (RCC) at CIMH in its climate variability and seasonal climate work. He further indicated that CCCCC seek funds for climate work, and focused on multilateral and bilateral funding - what was done in the past as well as what is yet to be done. He mentioned that there is joint work with CIMH and others putting together a USD50 million proposal for GCF funding and indicated that countries are hesitant to sign off on regional project proposals, with benefits of synergies across the countries of the region – the preference of the countries is for national projects, but those beneficial synergies are lost. He also informed that in order to garner funds from the GCF, it is necessary to put forward the climate rationale for the finance. Here is where CIMH and its climate services come in. It was also suggested that insurance companies and banks assist in minimising climate related risks – being another source of finance. Another issue is the high rate of turnover of staff. The region’s institutions are constantly training new staff to perform the necessary tasks.

Mr. Gabriele Coccia is a risk modeler with the development insurance company CCRIF SPC, which was formed in 2007 and offers parametric insurance to governments in the Caribbean and Central America for hazardous events such as tropical cyclones, floods and earthquakes. He stated that the insurance payments, which can provide funds to governments immediately after an event, are based on models, hence the quality of data is crucial. It was highlighted that there is a need for historical data to understand the threats, real time data to trigger the policy, and the use of short-term forecasts to understand the potential impact of a pending event, which can speed up the process of liquidity. CCRIF also uses seasonal forecasts for preparations and discussions with re-insurers, and climate projections so that CCRIF is sustainable and can provide services into the future. CCRIF has signed MOUs with 5 Caribbean institutions, with CIMH being the first entity to sign with CCRIF. CCRIF does not currently use rain gauges in their models, and this is something they would like to pursue. He concluded by re-iterating CCRIF's openness to collaborate with national and regional agencies to build regional resilience through their parametric programmes.



Figure 6 Dr. Bynoe (CCCCC) and Mr. Blackwood (USAID) left photo from left to right, and Mr. Coccia (CRIFF SPC)(Virtual) - panelists on financing climate services and NFCS

## Discussion

The presentations were followed by a short discussion. Moderator Dr. Farrell posed a question to national institutions as to how their observation and data networks are being sustained. He also queried about coordination between donors. Meteorological services raised lack of funding and tools, and interest shown from governments when it comes to financing to aid in the development of the national meteorological services, including climate services. There is a need for human resources in the meteorological services. Dr. Bynoe informed that the GCF Readiness Fund can build capacity, but the governments need to fund and sustain the human resource. One participant indicated that their service needs to employ staff at the graduate level. Governments must seek to maintain and sustain the observation networks as well, noting for example in Jamaica, there are numerous requests for data from many sectors, but maintaining and sustaining the networks seem not to be prioritized. There is a further concern that the political directorate has not yet bought into the idea of climate services – because, maybe, it is not an election issue. Dr. Bynoe responded to indicate that Climate Change is now a standard agenda item at the Heads of Governments meetings of CARICOM, but

in some ways still does not resonate with Heads as it should. One suggestion by Dr. Simmons for success is not to rely solely on government, but to involve communities in the process. Mr. Blackwood informed of the USAID programme RESET in the eastern and southern Caribbean valued at USD 2 million – aimed at increasing public sector capacity for climate and improving private sector investment.

**Specific Question to CCRIF;**

How soon will the local data be used to determine the payouts, as there is a hurricane season beginning in two months or so? The response was not for the upcoming season as maintenance and equipment are required – the observation networks need enhancement.

**Regional Support Group for NFCS Implementation and Knowledge of Success Sharing - by Nicola Golding, (UK Met/WMO ET- CID)**

In this session brief recaps of two of the working groups on the Theory of Change were provided.

**Group 1: Barbados Group**

for the intervention was improved modeling and forecasting by the Barbados Meteorological Services, and improved relationships with technical staff in the Ministry of Agriculture, including Extension Officers. The Outcome being the development of a communications mechanism to enhance information sharing with extension officers and farmers. The impacts would be district level climate information to agriculturists on daily and seasonal timescales.

**Group 2: OECS Sub-group (Grenada, St. Vincent and the Grenadines, Saint Lucia)**

This group's discussion can be followed in Figure 5

Dr. Golding commented on the very informative feedback given by the two groups stating that this is one way we can translate what we are trying to do to the government, which in turn can enable us to get more funding.

More linked with the intended topic for discussion, Dr. Golding concluded that we need to think of ways we can support each other in developing NFCS. It was suggested that establishing a Community of Practice introduced during the WMO presentation by Mr. Migraine may be one way to go. Can there be a Community of Practice within the Caribbean?

**Recap of Progress made During the workshop and next steps - by Adrian Trotman (CIMH)**

Mr. Trotman in his brief review of the workshop, shared several take-aways and conclusions from the workshop:

1. For quality climate products and services to be delivered by our NMHS, they need to be adequately resourced – not only with observation networks, but with networks of people. There must be adequate human resources.
2. Climate capacity in the sectors' human resource must be built. Greater focus on enhancing climate literacy in the sectors is essential. This breeds people in the sector who can converse with the professionals from weather and climate. An example of how this can happen was provided - a three-month course for agriculturists, particularly agricultural extension officers was held at CIMH in 2014 to enhance that sector's literacy.
3. Greater focus on communications. How this can be done was elaborated by Ms. Deane in her presentation.
4. NMHSs are needed to support the establishment of the basis or rationale for climate financing. The GCF, for example, is asking countries to show the rationale for receiving climate finance. This focuses more on the development issues created or exacerbated by climate change.
5. Monitoring and Evaluation is an important addition to the steps to developing a NFCS, to gauge how well we are doing, and if our efforts are fruitful or moving in the right direction.

In closing, Mr. Trotman thanked the US Department of State and NOAA for their continued support for the work of CIMH and NMHSs in the Caribbean. He also thanked the EU for their support through the ClimSA project, as well as the WMO through their support under the ClimSA project. Finally, he thanks the presenters, facilitators and all present for their participation. In particular, thanks to Dr. Golding for facilitating the breakout sessions and making it clearer as to the thought, information, and effort that need to go into establishing NFCSs.

## PARTICIPANTS

<b>Organisation</b>	<b>Last Name</b>	<b>First Name</b>	<b>Email contact</b>
Antigua Met	Humphreys	Charissa	<a href="mailto:charissa.humphreys@gmail.com">charissa.humphreys@gmail.com</a>
Bahamas Met	Greene	Geoffrey	<a href="mailto:GEOFFREYGREENE@BAHAMAS.GOV.BS">GEOFFREYGREENE@BAHAMAS.GOV.BS</a>
Barbados Met	Brathwaite	Cherise	<a href="mailto:cherise.brathwaite@barbados.gov.bb">cherise.brathwaite@barbados.gov.bb</a>
Barbados Met	Nurse	Danielle	<a href="mailto:danielle.nurse@barbados.gov.bb">danielle.nurse@barbados.gov.bb</a>
Belize Met	Young	Shanea	<a href="mailto:syoung@nms.gov.bz">syoung@nms.gov.bz</a>
Cuba INSMET	Guevara	Vladimir	<a href="mailto:vladimir.guevara@insmet.cu">vladimir.guevara@insmet.cu</a>
Dominica Met	Carrette-Joseph	Annie	<a href="mailto:ac_joseph@outlook.com">ac_joseph@outlook.com</a>
Dominican Rep Met	Viloria	Cecilia	<a href="mailto:Cecilia.Viloria&lt;ceciart.cv@gmail.com&gt;">Cecilia Viloria &lt;ceciart.cv@gmail.com&gt;</a>
Grenada Met	Tamar	Gerard	<a href="mailto:gtamar@gaa.gd">gtamar@gaa.gd</a>
Guyana			
Hydromet	Danny Spence-	Haymawattie	<a href="mailto:haymadanny@yahoo.com">haymadanny@yahoo.com</a>
Jamaica Met	Hemmings	Jacqueline	<a href="mailto:Jacqueline.Spence@megjc.gov.jm">Jacqueline.Spence@megjc.gov.jm</a>
St. Kitts Met	Benjamin	Vincere	<a href="mailto:vincere.benjamin@scaspa.com">vincere.benjamin@scaspa.com</a>
St. Lucia Met	Descartes	Venantius	<a href="mailto:vdescartes@gosl.gov.lc">vdescartes@gosl.gov.lc</a>
St. Vincent Met	Neverson-Jack	Desiree	<a href="mailto:desneverson@gmail.com">desneverson@gmail.com</a>
Suriname Met	Samuel	Dwight	<a href="mailto:dwrightsamuel82@gmail.com">dwrightsamuel82@gmail.com</a>
UK Met	Golding	Nicola	<a href="mailto:nicola.golding@metoffice.gov.uk">nicola.golding@metoffice.gov.uk</a>
NOAA	Bekele	Endalkachew	<a href="mailto:endalkachew.bekele@noaa.gov">endalkachew.bekele@noaa.gov</a>
NOAA	Vaughan	Lisa	<a href="mailto:lisa.vaughan@noaa.gov">lisa.vaughan@noaa.gov</a>
US Embassy	Michel	Lillian	<a href="mailto:MichelRL@state.gov">MichelRL@state.gov</a>
US Embassy	Snowbarger	Troy	<a href="mailto:SnowbargerTB@state.gov">SnowbargerTB@state.gov</a>
UK MET	Hewitt	Chris	<a href="mailto:chewitt@wmo.int">chewitt@wmo.int</a>
USAID	Blackwood	Mansfield	<a href="mailto:mablackwood@usaid.gov">mablackwood@usaid.gov</a>
AACARI	Browne	Claude	<a href="mailto:jugobrowne@gmail.com">jugobrowne@gmail.com</a>
CARDI	Flemming	Kistian	<a href="mailto:KFlemming@cardi.org">KFlemming@cardi.org</a>
CARPHA	Cox	Horace	<a href="mailto:coxhorac@carpha.org">coxhorac@carpha.org</a>
CCCC	Bynoe	Mark	<a href="mailto:mbynoe@caribbeanclimate.bz">mbynoe@caribbeanclimate.bz</a>
CCREEE	Evelyn	Ayanna	<a href="mailto:ayanna@ccreee.org">ayanna@ccreee.org</a>
CDEMA	Greenidge	Nicole	<a href="mailto:nicole.greenidge@cdema.org">nicole.greenidge@cdema.org</a>
CHTA	Duffy Mayers	Loreto	<a href="mailto:loreto.duffy-mayers@un.org">loreto.duffy-mayers@un.org</a>
CMO	Anderson	Haley	<a href="mailto:handerson@cmo.org.tt">handerson@cmo.org.tt</a>
CTO	Charles	Amanda	<a href="mailto:acharles@caribtourism.com">acharles@caribtourism.com</a>
CWWA	Alfred	Louise	<a href="mailto:louisealfred@gmail.com">louisealfred@gmail.com</a>
WRA	Marshall	Geoffey	<a href="mailto:gmarshall@wra.gov.jm">gmarshall@wra.gov.jm</a>
GDA HEALTH	Cronneit	Denny	<a href="mailto:jcronneit@gmail.com">jcronneit@gmail.com</a>
SURI AGRI	Samoender	Iwan	<a href="mailto:isamoender@hotmail.com">isamoender@hotmail.com</a>

Formatted: Font: Bold

<u>Organisation</u>	<u>Last Name</u>	<u>First Name</u>	<u>Email contact</u>
SLU TOURISM	John	Adiva	<a href="mailto:adiva.john@govt.lc">adiva.john@govt.lc</a>
SKI TOURISM	Jeffers	Cheryl	<a href="mailto:Cheryl.Jeffers@gov.kn">Cheryl.Jeffers@gov.kn</a>
SVG ENERGY	Joseph	Malika	<a href="mailto:malikajoseph@gov.vc">malikajoseph@gov.vc</a>
BZE ENERGY	Hanson	Geon	<a href="mailto:g.hanson@energy.gov.bz">g.hanson@energy.gov.bz</a>
Arizona	Michler	Jeffrey	<a href="mailto:jdmichler@arizona.edu">jdmichler@arizona.edu</a>
Consultant	Simmons	Andrew	<a href="mailto:kingshill.reserve@gmail.com">kingshill.reserve@gmail.com</a>
BDOS WATER	Ifill	Alex	<a href="mailto:Alex.Ifill@bwa.gov.bb">Alex.Ifill@bwa.gov.bb</a>
BDOS WATER	Greaves	Jatobi	<a href="mailto:Jatobi.greaves@bwa.gov.bb">Jatobi.greaves@bwa.gov.bb</a>
HEALTH	Daniel	Steve	<a href="mailto:Steve.Daniel@health.gov.bb">Steve.Daniel@health.gov.bb</a>
AGRI	Wilson	Michelle	<a href="mailto:mwilson@agriculture.gov.bb">mwilson@agriculture.gov.bb</a>
AGRI	Drakes	Timothy	<a href="mailto:tdrakes@agriculture.gov.bb">tdrakes@agriculture.gov.bb</a>
AGRI	Marshall	Glenn	<a href="mailto:GMarshall@agriculture.gov.bb">GMarshall@agriculture.gov.bb</a>
TOURISM	Bradshaw	Kwame	<a href="mailto:kwame.bradshaw@barbados.gov.bb">kwame.bradshaw@barbados.gov.bb</a>
DISASTER	Johnson	Joy-Anne	<a href="mailto:Joy-Anne.Johnson@barbados.gov.bb">Joy-Anne.Johnson@barbados.gov.bb</a>
EU	Andre	Virginie	<a href="mailto:Virginie.ANDRE@eeas.europa.eu">Virginie.ANDRE@eeas.europa.eu</a>
CCRIF	Coccia	Gabriele	<a href="mailto:gcoccia@ccrif.org">gcoccia@ccrif.org</a>
CIMH	Trotman	Adrian	<a href="mailto:atrotman@cimh.edu.bb">atrotman@cimh.edu.bb</a>
CIMH	vanMeerbeeck	Cedric	<a href="mailto:cmeerbeeck@cimh.edu.bb">cmeerbeeck@cimh.edu.bb</a>
CIMH	Allen	Teddy	<a href="mailto:tallen@cimh.edu.bb">tallen@cimh.edu.bb</a>
CIMH	Stoute	Shontelle	<a href="mailto:sstoute@cimh.edu.bb">sstoute@cimh.edu.bb</a>
CIMH	Kirton-Reed	Lisa	<a href="mailto:lkreed@cimh.edu.bb">lkreed@cimh.edu.bb</a>
CIMH	Applewhaite	Andrea	<a href="mailto:aapplewhaite@cimh.edu.bb">aapplewhaite@cimh.edu.bb</a>
CIMH	Mahon	Roche	<a href="mailto:rmahon@cimh.edu.bb">rmahon@cimh.edu.bb</a>
CIMH	Deane	Lyn-Marie	<a href="mailto:Ideane@cimh.edu.bb">Ideane@cimh.edu.bb</a>
CIMH	Boyce	Shawn	<a href="mailto:sboyce@cimh.edu.bb">sboyce@cimh.edu.bb</a>
CIMH	Petrie	Jodi-Ann	<a href="mailto:jpetrie@cimh.edu.bb">jpetrie@cimh.edu.bb</a>
CIMH	Frederick	Sherri	<a href="mailto:sfrederick@cimh.edu.bb">sfrederick@cimh.edu.bb</a>
CIMH	Farrell	David	<a href="mailto:dfarrell@cimh.edu.bb">dfarrell@cimh.edu.bb</a>
CIMH	Lowe	Daison	<a href="mailto:Dlowe@cimh.edu.bb">Dlowe@cimh.edu.bb</a>
Bdos Met	Jackman	Semelka	<a href="mailto:Semelka.Jackman@barbados.gov.bb">Semelka.Jackman@barbados.gov.bb</a>
UNDRR	Torres	Jair	<a href="mailto:jair.torres@un.org">jair.torres@un.org</a>
UNDRR	Blenman	Carol-Anne	<a href="mailto:carolanneblenman@gmail.com">carolanneblenman@gmail.com</a>
WMO	Grey	Sebastian	<a href="mailto:SGrey@wmo.int">SGrey@wmo.int</a>
WMO	Migraine	Jean-Baptiste	<a href="mailto:jbmigraine@wmo.int">jbmigraine@wmo.int</a>
NOAA	Pulwarty	Roger	<a href="mailto:roger.pulwarty@noaa.gov">roger.pulwarty@noaa.gov</a>

