C A R I B B E A N

M E T E O R O L O G I C A L

O R G A N I Z A T I O N

**CARIBBEAN METEOROLOGICAL COUNCIL** **Doc. 11**



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# PROJECT UPDATES AND PROPOSALS

(Submitted by the Coordinating Director)

## Introduction

1. Weather, climate and water are at the heart of the environmental issues affecting the planet. National Meteorological and Hydrometeorological Services (NMHSs) in the Caribbean and across the globe must provide accurate information, analyses and timely forecasts of hazardous weather-related conditions that affect the sustainable development of their nations in the short term. At the same time, the NMHSs must provide the appropriate data and scientific-basis for studies on the potential impacts of seasonal climate variability as well as long-term natural and human-induced climate change on the environment. The contribution of meteorology and related sciences to these global studies is driven by the constant adaptation to and use of technological changes and opportunities.
2. In this regard, many of the projects being undertaken or planned have observational and scientific data information components involving the use of new or modern technologies. Additionally, most NMHSs are also in need of a legal mandate for their services and support in strategic planning to meet societal needs for weather, climate, water, and related environmental information. This is primarily an information document intended to keep the Council up-to-date on the status and/or progress of implementation on any projects of this nature, which involve CMO Member States and partner organizations, such as the *World Meteorological Organization* (WMO) and Universities. The document provides information on the following:

## (a) WMO Severe Weather Forecasting Programme (SWFP)

1. Council has recognized the need to improve the weather warning system, particularly for episodes of severe weather that may not be the result of a tropical cyclone and could occur at any time of year. Council will recall that, in November 2015, it endorsed a proposal by CMO and partners to implement a WMO *Severe Weather Forecast Demonstration Project*(SWFDP) in parts of the Caribbean, with an aim, among others, to foster greater collaboration among National Meteorological Services and Disaster Management Agencies. Since that time, significant strides have been made towards the implementation of what has now been renamed the ***Severe Weather Forecasting Programme*** (SWFP) - Eastern Caribbean. The WMO Secretariat, the CMO Headquarters supported by the CIMH, and the Meteorological Service of France, through its centre in Martinique, have been collaborating to develop the Project into an operational programme.
2. In this regard, the Regional WMO Management structure established what is now the *Regional Subprogramme Management Team* (RSMT) for the development and implementation of the SWFP. The Coordinating Director co-chairs the RSMT with an expert from Météo-France. Other CMO representatives on the RMST include Ms Kathy-Ann Caesar of the CIMH and Mr Dale Destin, Director (Ag) of Antigua and Barbuda Meteorological Service. It will be recalled that the WMO Severe Weather Forecasting Programme was being developed along the following lines:

(i) The SWFP would cover all the islands from Trinidad in the south to Puerto Rico in the North, to Dominican Republic and Haiti in the West;

(ii) The Météo-France Centre in Martinique will serve as the *Regional Forecast Support Facility* (RFSF) for the Project;

(iii) The CIMH will provide technical support for the SWFP.

1. SWFP implementation in the Eastern Caribbean has been made possible by seed funding from Canada through the WMO CREWS (Climate Risk and Early Warning Systems) Project. The SWFP has been developing in four phases: 1) Overall Planning; 2) Implementation plan development and execution; 3) Demonstration and 4) Operational (no longer a project). Phase 3 and 4 include capacity building through training of meteorologists, public weather service focal points, and the media.
2. The SWFP is now in its pre-operational Demonstration phase, initiated in 2019, with global and regional model forecast guidance being used to monitor potential severe weather by the Regional Facility for Severe Forecasts (RFSF–Martinique). Access to the Extranet, which became operational 24/7 in 2019, has been provided to all National Meteorological Services in the project domain.
3. Training was conducted in December 2019, as a part of a *Caribbean Weather Forecasting Initiative* to support the EUREC4A field study. More details are provided under Item (c) below.
4. In January 2020, the *Regional Subprogramme Management Team* met to examine progress made at the *Regional Forecast Support Facility* (Météo-France Martinique), including the development of the Web-based platform for data/products sharing, to produce severe weather guidance, and to ensure real-time coordination.
5. A report by the Caribbean Catastrophic Risk Insurance Facility (CCRIF) Intern, who had been hosted by the CMO HQ in 2019, was presented to the Regional Subprogramme Management Team. That report documented the severe weather warning needs of each state and territory and helped to define areas of responsibility for non-tropical cyclone severe weather warnings during the hurricane season, as well as recommended operating procedures between the Regional Specialized Meteorological Center (RSMC)–Miami/US Hurricane Center and the RFSF-Martinique.
6. The RSMT meeting originally scheduled as a side meeting of the 42nd Hurricane Committee was instead held as a virtual meeting on 19 June 2020. Guests were invited from the International Weather Ready Nations (WRN), Flash Flood Guidance System (FFGS), and Coastal Inundation and Forecast Initiative (CIFI) to encourage coordination among these related projects being implemented in the Caribbean.
7. Council will recognize that maximizing the benefits of the SWFP, requires a better understanding of the needs of each country for forecasting and warning of severe weather and to determine the gaps in capability and the necessary resources, services and training needed to improve that capability.
8. Council will recall that the WMO Expert Group on the SWFP identified the *Caribbean Meteorological Organization* (CMO), through its Headquarters and Technical Organ, the CIMH, as the regional entity to support the SWFP in the operational phase.

## (b) CREWS Caribbean: *Strengthening Hydro-Meteorological and Early Warning Services in the Caribbean*

1. Council will recall presentations from CMC58 and CMC59 about the Climate Risk and Early Warning System (CREWS) Caribbean Project, co-funded by the CREWS Initiative, and Environment and Climate Change Canada (ECCC). The project is being implemented by the WMO, the World Bank Global Facility for Disaster Reduction and Recovery (WB/GFDRR), the UN Office for Disaster Risk Reduction (UNDRR), and regional partners: Caribbean Disaster Emergency Management Agency (CDEMA), CIMH, and CMO Headquarters. The Coordinating Director represents National Meteorological and Hydrometeorological Services (NMHSs) on the Project Steering Committee. The aim of the CREWS-Caribbean project is to strengthen and streamline regional and national systems and capacity related to weather forecasting, hydrological services, multi-hazard, impact-based warnings and service delivery for enhanced decision-making in CARICOM countries.

1. The CREWS-Caribbean Project has three components:

* Component (1): Development of a regional strategy and roadmap for EWS; led by WB/GFDRR and implemented together with WMO, UNDRR and regional partners, in coordination with national disaster management and national meteorological services.
* Component (2): Institutional strengthening and streamlining of early warning and hydro-met services; led by WMO
* Component (3): Support for piloting high priority activities at the national level with regional involvement as well as at the regional level, informed by the regional strategy; led by WB/GFDRR,

1. The CMO Headquarters and the WMO signed an Implementing Agreement for the partial delivery of CREWS-Caribbean Project Component (2) with a project entitled, *Building Resilience to High-Impact Hydro-meteorological Events through Strengthening MHEWS in Small Island Developing States (SIDS) in the Caribbean*. This project will help create an enabling environment for National Meteorological and Hydrological Services (NMHS) of CMO Member States through the development of National Strategic Plans (NSPs) and Model Legislation to be used by NMHSs and their Governments to formally establish the legal mandate for their services.
2. The WMO Component of the CREWS Caribbean project is supporting the following activities being implemented by the CMO HQ, with funding of $263,000 USD. Both projects are expected to be completed by the second quarter of 2021.

* Meteorological Legislation

A project to draft a Legislative template for National Meteorological Services in CMO Member States has been implemented with support from the Organization of Eastern Caribbean States (OECS). After an open call and evaluation of submissions, a consultant was hired in August 2020 and the draft Legislative template is been developed. The same consultant will also be developing related Policy to accompany the legislation. The inception report and work plan are provided in ANNEX I.

* National Strategic Plans and Framework for Weather, Water, and Climate Services

The CMO HQ has initiated a project to develop Strategic Plans, Framework for Weather, Water, and Climate Services and complementary Action Plan for National Meteorological and Hydrological Services of eight CMO Member States that requested assistance with developing strategic plans. The consultant has been tasked with “*The development and endorsement of Strategic Plans (SPs) for the National Meteorological and Hydrological Services, a Framework for Weather, Water, and Climate Services (FWCS) and a complementary Action Plan for the countries: Anguilla, Antigua and Barbuda, Dominica, Grenada, Guyana, Jamaica, St. Kitts and Nevis, St Vincent and the Grenadines using the WMO National Strategic Plan Template and Guide*.” The implementation is being coordinated with the CIMH, which is developing Climate Services at the national level through their projects. Consultations with national focal points and national stakeholders began in September 2020. **Annex II** provides a summary of the progress to date.

1. Under Component (3) of the CREWS Caribbean Project, four pilot projects have been proposed:

* Pilot activity 1: Establishment of the Caribbean Operational Plan for Hydromet Hazards
* Pilot activity 2: Development of a Multi-sensor Precipitation Grid
* Pilot activity 3: Support the Transition to Impact-Based Forecasting
* Pilot activity 4: Development of a Regional Emergency Alert System

The pilot activities are to be implemented by various regional organizations including CIMH, CDEMA, the CMO Headquarters, Météo-France, Caribbean Telecommunication Union (CTU), among others.

1. The CMO Headquarters will be significantly involved in Pilot Activities 1 and 2. Pilot activity 1, the Caribbean Operational Plan for Hydromet Hazards aims to build upon the successful, cooperative Hurricane Operational Plan that is applied routinely and updated annually by the Hurricane Committee chaired by NHC Miami under the auspices of the WMO Tropical Cyclone Programme. The goal is to help develop a set of harmonized Operational Plans for each hydromet hazard.
2. The goal of Pilot Activity 2, is to rely on the Caribbean Radar Network to prepare a regional precipitation grid that would integrate radar and satellite derived rainfall estimates, calibrated with locally observed rain gauge data. The precipitation grid would be shared among participating countries and be used to drive forecasting systems such as the Flash Flood Guidance System (FFGS) and be useful to disaster management, water resources managers, agriculture, energy and other sectors that increasingly demand more accurate and timely access to rainfall information. Since there is benefit to the entire region, the hope is that a number of countries may be willing to participate in a sub-regional pilot that can incrementally extended as beneficial experiences are shown. The CMO Headquarters has initiated discussions with experts from the NOAA Multi-Radar Multi-sensor (MRMS) Program, who have created multi-radar, multi-sensor precipitation operational products using radar data from Puerto Rico, Florida, Mexico, Belize and Cayman Islands.

## (c) EUREC4A-UK-CMO Caribbean Weather Forecasting Initiative

1. Through a proposal of the University of Leeds and CMO Headquarters, a *Caribbean Weather Forecasting Initiative* supported *EUREC4A-ATOMIC*, an international field study led by France and Germany; with the CIMH as a lead institution (see CIMH Principal’s report to CMC59). The field campaign was held 20 January to 20 February 2020 and based out of Barbados. The Forecasting Initiative is supported by a grant from the Natural Environment Research Council (NERC), United Kingdom, and the WMO Climate Risk and Early Warning Systems (CREWS) Caribbean Project.
2. Council will note the benefits of the Initiative to the National Meteorological Services of CMO Member States**,** whichgained enhanced capability in understanding dry season weather and localized storms, through training workshops and a forecast “test-bed". A pre-EUREC4A, knowledge exchange workshop was organized by the CMO Headquarters, University of Leeds, and CIMH. The workshop brought together researchers and 16 forecasters from 14 Caribbean States and Territories. During the forecast testbed, which ran from 20 January to 14 February, forecasters from CMO Member States worked in dispersed teams, collaborating via online communication systems to deliver weather forecasts to support research operations (<https://public.wmo.int/en/media/news-from-members/caribbean-forecasters-contribute-major-international-atmospheric-and-oceanic>). A follow-up workshop to consolidate knowledge from the forecast testbed was postponed from July 2020 to July 2021 due to the pandemic.
3. Council is advised that the project is partially funded through an agreement between WMO and CMO Headquarters Unit, as it supported the Severe Weather Forecasting Programme in the Eastern Caribbean by developing collaboration practice among regional forecasters and helping forecasters to understand the strengths and limitations of high-resolution weather prediction models.

## (d) Caribbean Symposium 2020: Operational Hydro-meteorology Leadership Summit

1. Council will recall that, in response to challenges articulated by Directors of NMHSs, the CMO Headquarters Unit co-organized a symposium focused on operational hydro-meteorology in the Caribbean in November 2019. Directors desired guidance in dealing with various issues, including growing demands for new weather and climate services and the data requirements that underpin those services. With sponsorship from Varysian Ltd, a UK Hydromet. networking company, the CMO Headquarters created a forum for Met Directors to learn and to share best practices in:
2. data collection, management, sharing, and integration for decision-making (helping to inform the 2020 WMO Data Conference);
3. how NMHSs can invest, improve, and work collaboratively, with public sector, private sector, and academic partners, on hydro-meteorological infrastructure and services.
4. Council is asked to note subsequent action by the CMO Headquarters on the issues from the symposium. Specifically, the CMO Headquarters encouraged Member States to participate in the workshops preceding the WMO Data Conference, Subsequently, the Coordinating Director will be sharing information from the symposium in an oral presentation, entitled, “A Caribbean Perspective on Data and Partnerships for National Hydro-Meteorological Services and Key Stakeholders at the WMO Data Conference on 17 November 2020.
5. Council will also recall that the Met Directors found the 2019 symposium very valuable and desired to have follow-up symposia. Therefore, the CMO Headquarters is currently organizing, with Varysian Ltd, a Virtual Caribbean Symposium 2020 scheduled for 15-17 December 2020. The 2020 symposium will include a special focus on operational hydrology, which will help to inform the integration of operational hydrological services into the WMO and development of hydrological services in CMO Member States.

## (e) Lightning Detection System and Lightning Safety Awareness

1. Council will recall that, in the past, the CMO Headquarters indicated its interest in establishing a ground-based *Lightning Detection System* in the region in partnership with the Meteorological Service of France [Météo-France]. The CMO Headquarters has studied this system in detail and was of the opinion that such a system was very necessary in the Caribbean. At the 59th Session (Anguilla, 2019), Council approve the initiation of a project to develop a CMO Lightning Detection Network.
2. Over the years, the CMO Headquarters has received proposals from a number of lightning-detection suppliers. The CMO Headquarters proposed that the Council consider a capital project approach, in which international funding could be sought, in the same way as was done for the CMO Radar Project, through an internationally-tendered process, in which the equipment purchased and installed under such a project would be owned and operated by the CMO for the benefit of all CMO Member States and the region in general.
3. The 57th session of the Council (2017) discussed the matter and endorsed the concept of a *CMO Lightning Detection Network* (CLDN). However, it was felt that more information was required as to the cost of, and a sustainability model for the system. It was also suggested that before a final decision could be made on CLDN, the *Geostationary Lightning Mapper* (GLM), which had just become available on the new GOES satellites, should be evaluated during 2018 and 2019 prior to deciding on the CLDN. Studies conducted over North America that compared the GLM with the Vaisala's National Lightning Detection Network and Earth Networks Total Lightning Network, provided guidance for how to proceed. For operational forecasting, it is best to have lightning observations from both the GLM and a ground-based network of sensors. The GLM provides high quality observations over data sparse regions (e.g., the ocean) and while ground-based networks are excellent at locating cloud-to-ground flash strikes. Some Member States, such as Belize and Jamaica, have begun exploring setting up sensors, which can become part of a regional network.
4. The importance of lightning safety awareness has also come to the forefront, particularly in Jamaica, where a number of lightning deaths have occurred in 2020 and members of the National Football team were injured by lightning during an international match in 2019. With the support of wel-known lightning safety experts at NOAA and elsewhere, the CMO Headquarters has started discussions with the Meteorological Service of Jamaica about developing a lightning safety awareness forum.

**ACTION PROPOSED TO COUNCIL**

1. The Council is invited to:

**Note** the progress made by the WMO *Severe Weather Forecasting Programme* (SWFP) in the Eastern Caribbean and to **strongly support** the regional participation in its implementation.

**Note** developments regarding the CREWS-Caribbean project to strengthen the National Meteorological and Hydrometeorological Services of CMO Member States through the development of model legislation and policy as well as the development of National Strategic Plans with National Frameworks for Weather, Water, and Climate and Action Plans for beneficiary Member States and to **strongly support** these critical activities.

**Note** the planned pilot activities under the CREWS Caribbean project including harmonized operational plans for multiple hydromet hazards, modelled after the Hurricane Operational Plan and a high-resolution timely regional precipitation grid to aid decisions by hydro-met sensitive sectors.

**Note** the success of a collaborative forecasting project that advanced forecaster skill and allowed forecasters from across the region to have a knowledge exchange with researchers and contribute to an international field study.

**Note** the upcoming operational hydro-meteorology symposium for Directors of National Meteorological Services and other key stakeholders, which follows on the successful 2019 symposium.

**Note** the recent developments in connection with enhancing lightning safety awareness and an operational ground-based lightning detection system.

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CMO Headquarters

October 2020

**ANNEX I**

**INCEPTION REPORT & WORK PLAN**

**CARIBBEAN METEOROLOGICAL ORGANIZATION**

**Financed by the Caribbean Meteorological Organization by Agreement with the World Meteorological Organization (WMO)**

**CONSULTANCY SERVICES FOR**

**DRAFTING OF LEGISLATION AND POLICY FOR THE NATIONAL HYDRO-METEOROLOGICAL SERVICES OF THE ENGLISH-SPEAKING MEMBERS OF THE CARIBBEAN COMMUNITY (CARICOM)**

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# 1. INTRODUCTION

While notable strides have been made in National Meteorological Services (NMS) and Hydro-meteorological Services within the CARICOM Region, a fundamental shortcoming is the absence of adequate legislation governing their establishment and operations, and particularly having regard for the technologically advanced era in which we operate.

Resulting from the current modus operandi, there are several loopholes and areas of concern as it relates to NMS and Hydro-meteorological Services. Specific reference can be made in respect of their involvement in national disaster services and advisory climatic services. In addition, there are currently no frameworks that facilitate, guide, govern and regulate collaborative arrangements with national, regional or international partners, including NMSs in other Caribbean countries. Other shortcomings speak to issues that affect the financial viability of NMS and its overall institutional operations as legal entities empowered to make informed decisions.

Giving regard to the afore-mentioned, this Consultancy is being pursued to strengthen the legal framework governing the operations of National Meteorological and Hydro-meteorological Services.

# 2. PROJECT OVERVIEW: OBJECTIVES AND ACTIVITIES

The Terms of Reference illustrate that this Consultancy focuses on strengthening the national hydro-meteorological services across the CARICOM Region. It specifically seeks to develop policy and legislation for the national Hydro-Meteorological Services of Anglophone CARCIOM Countries. The primary objectives of the Consultancy are therefore to strengthen and streamline regional and national systems and capacity related to weather forecasting, climate services, hydrological services, multi-hazard impact-based warnings and service delivery for enhanced decision-making. In addition, it further endeavours to strengthen the policy framework governing Meteorological and Hydro-meteorological Services in the CARICOM Region, in an effort to better align the regional regime with international standards and best practices and the prescriptions of the WMO Convention. This is to be achieved through the development of regional policy.

In pursuit of achieving the objectives of this Consultancy, the Consultant will conduct a series of national assessments and consultations with key stakeholders across CARICOM Member States. These consultations will be convened virtually unless otherwise requested and agreed on with the Caribbean Meteorological Organization (CMO). Key stakeholders to be consulted include the CMO Headquarters Unit, the Caribbean Institute for Meteorology and Hydrology (CIMH), the Organization of Eastern Caribbean States (OECS) Commission, the Caribbean Disaster Emergency Management Agency (CDEMA), the Caribbean Community Climate Change Centre (5Cs). Other key regional and national institutions will be consulted. These consultations will, among other things, facilitate the garnering of information to inform the drafting of legislation and determining:

1. the institutional “personality”, nature, capacities, responsibilities of, and services offered by, respective NMS;
2. institutional landscape, including the presence of other institutions with similar or overlapping mandates;
3. the status of legislation to support the operation of NMS;
4. the stakeholder, partner and client landscape as pertains to respective NMSs;
5. government regulations that pertain to the NMS.

Stakeholder consultations will be undertaken with national representatives from:

* National Meteorological Services of CMO Member Countries (Weather Forecast and Warning Offices[[1]](#footnote-1) and Aeronautical Meteorological Offices[[2]](#footnote-2))
* Ministries with responsibility for Climate Change
* Ministries with responsibility for the Environment and Land Management
* Ministries with responsibility for Aviation
* Ministries with responsibility for Water Supply, Usage and Management

In an effort to inform the development of the regional policy framework, the Consultant will undertake a review and analysis of national policies, guidelines, statements and strategies governing and interplaying with meteorological and hydro-meteorological services. In addition, stakeholder consultations will be conducted with representatives from relevant stakeholder groupings and institutional organisations to inform the assessment being undertaken. Based on information gathered both in respect of the national policy framework appraisal and stakeholder consultations, the findings will be benchmarked against international best practices to identify and confirm gaps and shortcomings. This assessment will yield recommendations for improvement and alignment with international standards and best practices, thus informing the development of the regional policy.

Specific to the legislative component of the Consultancy, the Consultant will review current national legislation and regional agreements that impact and interplay with the operations of National Meteorological and Hydro-meteorological Services. The consultant will also identify international best practices for the operations akin to the National Meteorological and Hydro-meteorological Services. Common issues and themes as well as country-specific issues will also be identified and legislative gaps and regulatory needs will be examined. A review of national and international laws with agreed on comparator countries (two comparator countries) will be undertaken to identify compatible legislation models that can be applied and/or adapted to the CARICOM context.

# 3. PROJECT APPROACH AND METHODOLOGY

**3.1 Project Implementation Phases**

As noted in the preceding chapter, this Consultancy focuses on two broad yet interrelated components; the development of Policy and Legislation for the National Hydro-meteorological services of the Anglophone CARICOM Countries. In implementing this Consultancy, some tasks will be jointly undertaken, notably the stakeholder consultations and the literature review to some extent.

**Figure 1** below notes that this Consultancy will be implemented in six (6) Consultancy Implementation Phases, noting both the policy and legislative elements of the Project.

**Figure 1: Project Implementation Phases**

* 1. **Project Activities**

*(i) Inception Phase*

During this Phase, the Consultant undertook a preliminary review of key legislative, policy and overarching guiding documents internationally that influence, impact and affect the provision of meteorological and hydro-meteorological services. This Inception Report represents the principal output of this Phase. A review of reference documents provided by the CMO will also be undertaken to identify the difficulties on the current business models in the NMS in an effort to inform the policy and legal regimes to be strengthened.

This Inception Report details the findings of the Inception Phase.

*(ii) Stakeholder Consultations and Assessment Implementation Phase*

During this Phase, the Consultant will conduct a series of national assessments and consultations with key stakeholders across CARICOM Member States. These consultations will be convened virtually. Key stakeholders to be consulted include the CMO Headquarters Unit, CIMH, OECS, CDEMA, the Caribbean Community Climate Change Centre. Other key regional and national institutions will be consulted. These consultations will, among other things, facilitate the garnering of information to inform:

* An enhanced understanding of the policy and legislative regimes of English-speaking CARICOM Member Countries in respect of meteorological and hydro-meteorological services
* The development of the Policy framework for CARICOM Member Countries; Member States and Associate Member States
* The drafting of legislation and determining:
* the institutional “personality”, nature, capacities, responsibilities of, and services offered by, respective NMS;
* institutional landscape, including the presence of other institutions with similar or overlapping mandates;
* the status of legislation to support the operation of NMS;
* the stakeholder, partner and client landscape as pertains to respective NMSs;
* government regulations that pertain to the NMS.

A **consolidated Stakeholder Consultation Report** will be developed under this Phase.

*(iii)* *Legislative and Policy Review and Gap Assessment Phase*

During this Phase, the Consultant will review current national policies, legislation and regional agreements that impact and interplay with the operations of National Meteorological and Hydro-meteorological Services. The consultant will also identify international best practices for the provision of National Meteorological and Hydro-meteorological Services. Key comparator countries will include Kenya, Malawi, Australia and Japan.

Specific to the policy component of the consultancy, the Consultant will:

* Identify national policies, guidelines, statements and strategies governing and interplaying with meteorological and hydrometeorological services
* Assess the content, prescriptions and governing principles of key policy and other documents, where they exist, to identify implications of legislative and institutional regimes to be developed and/or strengthen
* Undertake an appraisal of Policy and related documents against international best practices to identify and confirm gaps and weaknesses. Discuss and prioritize areas and issues for reform to address shortcomings and deficiencies identified.

Common issues and themes as well as country specific issues will also be identified and legislative gaps and regulatory needs will be examined. A review of national and international laws with agreed on comparator countries (two comparator countries) will be undertaken to identify compatible legislation models that can be applied and/or adapted to the CARICOM context.

A **Policy Regime Assessment and Appraisal Report** will be developed based on the findings of the Policy review and assessment conducted. This Report will also feature the outline proposed for the Policy to be developed. The outline will identify issues related to among other things:

* Financial mechanisms to sustain the NMHS operations.
* Institutional arrangements for the monitoring of weather and climate
* management and the sharing of meteorological data and information;
* Harmonization of risk management and climate change adaptation national plans
* infusion and leveraging of ICT
* sustainability regarding climate change and meteorological sector;
* capacity building
* stakeholder awareness
* Role of the private sector
* cross-cutting issues

In addition, a **Legislative Review and Gap Assessment Report** will be developed detailing the findings of activities undertaken in this phase. This Report will represent the principal output of this Phase and will contain among other things recommendations to address the gaps identified. In addition, the Report will also include an adaptation guide to be used by each Member State to address country-specific issues. In addition, the Consultant will also develop a **Template for the Meteorological Bill that may be adopted/adapted by all beneficiary Member States**. The Template will include among other things:

* Legal status/personality
* Authority/Powers
* Functions and core professional competencies
* Scope or responsibility
* Data sharing policy
* Relationship with other national entities
* Obligations and responsibilities as these pertain to regional and international organisations (CMO, WMO, ICAO, etc.)
* Regional cooperation (e.g., with NMS in other Member States)
* Immunity/Liability

*(iv) Policy Formulation and Legislative Drafting Phase*

Under this Phase, the Consultant will formulate the **Meteorological and Hydrometeorological Services Regional Policy Document** to guide the drafting of the legislation. In formulating the Policy, consideration will be given to international best practices and the WMO convention.

Under this Phase, the Consultant will also draft legislation and relevant drafting instructions and country specific guidelines to facilitate the operations of the National Meteorological and Hydro-meteorological Services. Legislation to be drafted will take into consideration the regional economic thrust of CARICOM and commitments/provisions under the Revised Treaty of Chaguaramas that may interplay. **Draft meteorological legislation** will represent the principal output under this Phase.

(v) *Validation Phase*

Under this Phase, the Consultant will convene a regional validation meeting and where relevant additional consultations in an effort to present the draft policy and legislation and obtain feedback in an effort to revise and improve content, relevance and application. The draft legislation will be presented at this validation meeting and will inform the revision and finalization of the legislation.

The main output under this Phase is the **Validation Meeting Report.**

*(vi) Project Close Off Phase*

Under this Phase the consultant will finalise the Policy and draft legislation based on input received in the validation phase and will further prepare a Cabinet Briefing Note and a Parliamentary Submission Brief to facilitate submission to Cabinet and Parliament and subsequent promulgation. The consultant will submit the Meteorological bills to relevant national entities for enactment in two CMO Member States.

The main outputs under this Phase are:

* **Finalised Legislation; Two Meteorological Bills**
* **Finalised Meteorological and Hydrometeorological Services Regional Policy Document**
* **Cabinet Briefing Note; Cabinet Memorandum**
* **Parliamentary Submission Note; Parliament Memorandum**

The main findings of Phase I are summarized below:

***3.3 Findings from Phase I***

Based on a preliminary review of the national and regional framework, it has been identified that the Consultant will be required to review:

1. Current national legislation in respect of hydro-meteorological and meteorological services;
2. Regional agreements and Policies, notably:
   1. Growth and Development Policies and Strategies
   2. Climate Change Policies
   3. Agricultural/Environment/Water Policies
   4. Land Resource Management Policies/Forestry Policies
3. National and international law

As noted in the Terms of Reference, only two Member Countries have relevant legislation: Cayman Islands and Guyana. A summary of these provisions is presented below.

1. **THE NATIONAL WEATHER SERVICE LAW, 2010 – CAYMAN ISLANDS**

The Act establishes the Cayman Islands National Weather Service which shall be recognised as the authority for all weather, climate, seismic and other meteorological matters in the Islands. The Minister of Agriculture shall exercise general direction and control over the Service.

The functions of the Service are to: (a) establish and maintain a national network of meteorological and seismic stations as necessary; (b) forecast weather conditions and the state of the atmosphere; (c) provide information and advice on meteorological and climate matters; (d) provide information and advice to the Governor in Cabinet of severe weather conditions likely to affect the safety of human life or property in the Islands; (e) issue tsunami warnings; (f) provide meteorological services in order to ensure the safety and efficiency of aviation and marine services; (g) provide meteorological data and advice for weather sensitive national development projects and other important weather sensitive economic activities; (h) collect, collate, compile, record, archive and make available meteorological reports and information; (i) arrange means of communication for the transmission and reception of meteorological reports and information in the Islands or outside the Islands; (j) operate at the international standards required for observations used for general, aviation, maritime and other forecasts; (k) participate in the work of the appropriate regional and international organizations, in particular, the Caribbean Meteorological Organisation, the World Meteorological Organisation and the International Civil Aviation Organisation; (l) promote the advancement of meteorological science by means of meteorological research and investigation or otherwise; (m) conduct or make arrangements for the training of persons in meteorology; and (n) advise the Governor in Cabinet on all matters relating to meteorology, climate, hydrology and seismic activity

The staffing of the Service comprises a Director General and such other officers as necessary for proper functioning.

It is an offence for person to interfere with or obstruct the Director General or a meteorological officer in the exercise of any function under the Law.

1. **GUYANA WATER AND SEWERAGE ACT 2002**

Hydrometeorological Department

Part III establishes the Hydrometeorological Department within the Ministry of Agriculture. The functions of the Department are to: a) establish, manage and operate national systems, to monitor the availability, quality and use of surface water and ground water; b) establish, manage and operate national systems to monitor atmospheric conditions, climate change and water resources; c) establish and maintain forecasting competence including competence in numerical models for weather, climate and water resources to satisfy policy directives, sustainable development, warnings and operational needs in aviation, marine, agriculture, defence, waste management, mining, tourism, construction and public recreation; d) collect, process, archive and make available, data on weather, climate and climate change, hydrology and oceanography; e) establish, manage and operate licensing systems for the construction of boreholes, abstraction of ground water, construction of works affecting flow in watercourses and diversion or abstraction of source water; establish a register of each licence issued by the Department, cancellation, amendment or relinquishing of a licence; g) assess and record the impact of water use on the quantity and quality of surface and ground water; h) provide technical and strategic advice to the Minister and the Council on all matters relating to climate and resource availability; i) provide other agencies with information on the composition of the atmosphere, quantity and quality of surface and ground water, sea surface temperature, waves, swells, ocean currents and other factors; j) conduct research and systematic monitoring of activities in the furtherance of Guyana’s commitments under international related conventions; k) ensure that existing sources of ground and surface water are conserved or used sustainably; l) promote public awareness of the atmospheric and water resources; m) identify, promote, procure and implement research and development work; n) such functions that may be necessary to implement the national water policy.

The Act mandates the Department to establish the National Monitoring Systems, to provide for the collection of data necessary to assess the quantity and quality of water in the water resources, seasonal or temporal variations, the use and rehabilitation of water resources and atmospheric conditions which may influence water resources. The Department shall also establish mechanisms to co-ordinate the monitoring of water resources. The provisions specify that the Department may enter into a memorandum of understanding with any agency or competent person to establish mechanisms and procedures to monitor water resources.

A national hydrometeorological database shall be established which will include information systems for hydrology, water resource quality, groundwater, oceanography, climate and weather, surface water and standards for the collection of hydrometeorological data. The objectives of this database are to gather, process, store and provide data and information for the protection, sustainable use and management of water resources and to gather store and provide information on climate, climate change and weather. This will also support objective evaluation of availability and quality of water resources and to provide information to water users, developers and the public.

A further function of the Department is to advise and make information available to the Minister and relevant agencies of any matter connected with climate, climate change, weather, oceanography or hydrology.

The Department shall establish an early warning system and make information available to the public in an appropriate manner. The Department may also authorise persons in writing to perform the above-mentioned functions. A certificate of appointment will be given to such persons describing their functions and authority.

1. **WMO GUIDELINES ON THE ROLE, OPERATION AND MANAGEMENT OF NATIONAL METEOROLOGICAL AND HYDROLOGICAL SERVICES**

The document, Guidelines on the Role, Operation and Management of National Meteorological and Hydrological Services, World Meteorological Organization, 2017, (“Guidelines Document”) provides an invaluable Roadmap to the issues to be considered and addressed.

It notes the key importance of the national legislation which establishes a National Meteorological and Hydrological Services (NMHS) in terms of such legislation helping to define the mission and mandate of the NMHS, providing clarity in the scope of its responsibilities; providing legal authority for specified responsibilities; as well as recognizing the importance of the NMHS to society and facilitating the allocation of adequate resources.

National legislation demonstrates how a government will meet their obligations under various international agreements, including the WMO Convention. National legislation will also articulate the relationship between the national meteorological and hydrological service and (a) the government (b) other government agencies. Formal legislation also play a role in highlighting the national visibility of a national meteorological and hydrological service and the socioeconomic benefit. Formal legislation also define international relationships, including with the World Meteorological Organization.

The Guidelines Document also notes that over half the NMHSs operated by WMO Members are legislated and further notes that:

“The advantages of such a legal instrument are:

* The duties and areas of responsibility of the NMHS are defined for the benefit of both the NMHS and the governments;
* The NMHS is clearly designated as the national authority for the provision of information in support of disaster risk management (DRM) on weather-related hazards (in some cases, also for water- and climate-related hazards), to avoid public confusion;
* Legal protection is provided for the field equipment and officers in the performance of their duties;
* Direct access to essential international communications is assured;
* Coordination of various weather, climate, water and related environmental activities in the country is provided;
* A basis for determining the level of funding needed to fulfil the agreed role is clarified, including provisions for retaining revenues earned by the NMHS to improve its operations.”

The Guideline Document provides the following as a checklist of aspects that could be included in a national legal instrument:

“Legal form of the NMHS (government department, agency):

* Point of accountability in the government
* Which ministry?
* Which minister?

Purpose:

* General benefits
* Contribution to safety and security of society
* Contribution to economic progress

Duties:

* Observations
* Forecasts
* Warnings (the official, authoritative source)
* Collation of information
* Supply of information
* Training provision
* Research and development
* Advice (consultancy)
* International cooperation”

Other matters such as Authority, Funding, Governance, Management and Regulations are also noted.

The Guidelines Report identifies that Australia has developed a national Australia Meteorology Act.[[3]](#footnote-3) A summary of the Act is presented below.

**(iv) AUSTRALIA METEOROLOGY ACT**

This Act establishes a Commonwealth Bureau of Meteorology and a Director of Meteorology.

The functions of the Bureau are:

* the taking and recording of meteorological observations and other observations required for the purposes of meteorology
* the forecasting of weather and of the state of the atmosphere
* the issue of warnings of gales, storms and other weather conditions likely to endanger life or property, including weather conditions likely to give rise to floods or bush fires
* the supply and publication of meteorological information, reports and bulletins
* the promotion of the use of meteorological information
* the promotion of the advancement of meteorological science, by means of meteorological research and investigation or otherwise
* advice on meteorological matters
* co‑operation with the authority administering the meteorological service of any other country (including a Territory specified under subsection 4(2)) in relation to any of the matters specified in the preceding paragraphs of this subsection
* such other functions as are conferred on the Bureau by any other Act.

The Act states that the Bureau shall perform its functions under the Act in the public interest generally and in particular:

* for the purposes of the Defence Force;
* for the purposes of navigation and shipping and of civil aviation; and
* for the purpose of assisting persons and authorities engaged in primary production, industry, trade and commerce.

The Act sets out the powers of the Director as it pertains to enabling the Bureau to perform its functions

Specific to the Policy framework, a review of the Kenya Meteorological Policy and the Malawi Meteorological Policy has been undertaken. Summaries of these policies are presented below.

**(v) MALAWI METEOROLOGICAL POLICY**

The Malawi Meteorological Policy[[4]](#footnote-4) was developed with a view to:

* improving planning, programming, and implementation of weather and climate activities in Malawi;
* enabling generation of reliable, responsive, high quality, timely and up-to-date weather and climate services;
* ensuring timely dissemination of accurate and reliable sector relevant information for early preparedness;
* providing a framework for monitoring, evaluation, and reporting on interventions for the meteorological sector and
* providing a platform for stakeholder engagement in the meteorological sector.

It is intended to contribute towards enhanced meteorological services to support the socioeconomic development of Malawi and has as its principal objectives:

* To provide readily accessible and accurate weather and climate information for efficient planning, management and operation of relevant sectors;
* To guide and improve coordination of collection, management and dissemination of
* meteorological data and information among stakeholders;
* To ensure timely dissemination of meteorological information for early preparedness; and
* To improve capacity of the climate change and meteorological sector for effective and
* efficient delivery of meteorological services in the country

This meteorological policy identifies key policy areas to be targeted, noting the problems/challenges in respect of each and identifying a strategic approach to address them. The Policy priority areas noted in the Malawi Meteorological Policy are noted to be:

1. Monitoring and prediction of weather and climate
2. Management of meteorological data and information;
3. Meteorological engineering, communication and Information Technology (IT) development;
4. Meteorological research services
5. Capacity building and awareness;
6. Financing the climate change and meteorological sector; and
7. Cross-cutting issues.

**(vi) KENYA METEOROLOGICAL POLICY (DRAFT)**

The overall goal of the national meteorological policy is to guide the provision of efficient and effective weather and climate services for the safety of life, protection of property and safeguarding the natural environment. Key objectives of the Policy are noted to include:

(a) have in place a legal and institutional framework for the management, understanding and exploitation of meteorological services;

(b) provide meteorological and related services in support of relevant national, regional and international needs

(c) facilitate the integration of weather and climate information in the decision-making processes of climate sensitive sectors

(d)promote domestication, coordination and utilization of benefits from international conventions on meteorology;

(e) strengthen education and training in meteorology and related sciences;

(f) promote research and development in the field of meteorology and related sciences;

(g) promote and enhance cooperation, partnerships and collaboration locally and internationally for the enhancement of utilization of meteorological services.

Similar to the Malawi Meteorological Policy framework, the Kenya Policy also establishes key priority policy area and refers to these as Policy themes.

While the development of the regional policy under this Consultancy may benefit from looking at these frameworks, an important element in the CARICOM and OECS contexts that must be considered is regional cooperation, given the regional integration thrust of the CARICOM region and further, the Economic Union within which the OECS Member States, operate.

# 4. CONCLUSION AND THE WAY FORWARD

The Consultant will continue to implement the various tasks associated with the completion of this assignment. There are no foreseen issues and the Consultant will continue building on the relationship established with the contracting authority.

|  |  |
| --- | --- |
| 5. IMPLEMENTATION WORK PLAN | |
| Activity | **Implementation Status** |
| Phase 1: Submit Inception Report | Completed |
| Phase 2: Stakeholder Consultations and Assessment Implementation Phase |  |
| Conduct a series of national assessments and consultations with key stakeholders across CARICOM Member States to facilitate the gathering of information for the drafting of legislation | Outstanding |
| Submit Consolidated Stakeholder Consultation Report | Outstanding |
| Phase 3: Legislative and Policy Review and Gap Assessment Phase |  |
| Review current national legislation and regional agreements that impact and interplay with the operations of National Meteorological and Hydro-meteorological Services | Outstanding |
| Undertake an assessment of international best practices |  |
| Policy Regime Assessment and Appraisal Report | Outstanding |
| Legislative Review and Gap Assessment Report |  |
| Convene stakeholder consultations to inform the development of the formulation of the policy relevant Bills and amendment of laws | Outstanding |
| Draft Meteorological and Hydro-meteorological Services Regional Policy Document | Outstanding |
| Draft Legislation and relevant drafting instructions and country specific guidelines to facilitate the operations of the National Meteorological and Hydro-meteorological Services | Outstanding |
| Phase 4: Draft meteorological legislation | Outstanding |
| Phase 5: Validation Phase |  |
| Convene a regional validation meeting in an effort to present the draft legislation and obtain feedback | Outstanding |
| Submit Validation Meeting Report | Outstanding |
| Phase 6: Project Close Off Phase |  |
| Finalized Meteorological and Hydro-meteorological Services Regional Policy Document |  |
| Finalized Legislation: Two Meteorological Bills | Outstanding |
| Cabinet Briefing Note: Cabinet Memorandum | Outstanding |
| Parliamentary Submission Note: Parliament Memorandum | Outstanding |

# ANNEX II

# Table: Progress Matrix

**Strategic Plans for National Hydro-Meteorological Services, Framework for Weather, Water, and Climate Services with Complementary Action Plan for Eight English-Speaking Members of the Caribbean Community (CARICOM)**

| Table CH – column heading | Anguilla | Antigua and Barbuda | Dominica | Grenada | Guyana | Jamaica | St Kitts & Nevis | St Vincent and the Grenadines |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| National Focal point | Jeffrey Jennings | Dale Destin | Marshall Alexander | Cécile Mitchell | Haymawattie Danny | Jacqueline Spence-Hemmings | Elmo Burke | Billy Jeffers |
| Baseline Survey- Total 31 responded to the online questionnaires) | 2 | 1 | 1 | 19 (All stakeholders participated) | 5 (Major Stakeholders participated) | 1 | 1 | 1 |
| One to one interview (NMHS) | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Stakeholder’s interview |  |  | Yes | Yes | Yes |  |  |  |
| Literature review | Completed | Completed | Completed | Completed | Completed | Completed | Completed | Completed |
| SWOT Assessment | Drafted for consultation and validation | Drafted for consultation and validation | Drafted for consultation and validation | Drafted for consultation and validation | Drafted for consultation and validation | Drafted for consultation and validation | Drafted for consultation and validation | Drafted for consultation and validation |
| Policy assessment | Drafted for consultation and validation | Drafted for consultation and validation | Drafted for consultation and validation | Drafted for consultation and validation | Drafted for consultation and validation | Drafted for consultation and validation | Drafted for consultation and validation | Drafted for consultation and validation |

1. Antigua and Barbuda, Barbados, Belize, Cayman Islands, Grenada, Guyana, Jamaica, St Lucia and Trinidad and Tobago all have Weather Forecast and Warning Office [↑](#footnote-ref-1)
2. Anguilla, British Virgin Islands, Dominica, Montserrat, St Kitts and Nevis, St Vincent and the Grenadines and Turks and Caicos Islands. [↑](#footnote-ref-2)
3. <https://www.legislation.gov.au/Details/C2007C00548> [↑](#footnote-ref-3)
4. <http://www.metmalawi.gov.mw/docs/MetPolicy.pdf> [↑](#footnote-ref-4)