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. 7**

FIFTY-NINTH SESSION

The Cove, ANGUILLA, 14-15 NOVEMBER 2019

# Operating Plan 2020-2023

**CMO Headquarters Unit**

(Submitted by the Coordinating Director)

## INTRODUCTION

1. Council will recall that, at its 59th session (Anguilla, November 2019), the CMO Headquarters presented to Council its “***Strategic Plan 2020-2023 - Strengthening capacity, adding value, and building resilience in the Meteorological and Hydrometeorological Services of the Caribbean***”. That Strategic Plan (CMC59, Doc 7) was approved by Member States in April 2020 after revision. In furtherance of the work proposed, the CMO Headquarters has prepared an Operational Plan for the period 2020-2023, provided in the ANNEX to this document.
2. The Caribbean Community (CARICOM) has developed its Strategic Plan 2020, and thereafter created its Operational Plan for the same period. The CMO Headquarters Operational Plan will be linked to the CARICOM plan. Council will recall that the CMO Headquarters has been contributing to the CARICOM strategic goal of “*Building Environmental Resilience*”.

## ACTION PROPOSED TO COUNCIL

1. **Council** is asked to:
2. **Discuss** the *Operational Plan 2020-2023***,** shown in the **ANNEX**;
3. **Approve** the Operational Plan

# Annex

CARIBBEAN METEOROLOGICAL ORGANIZATION



# CMO HEADQUARTERS

##### OPERATIONAL PLAN 2020-2023

**For**

**Strengthening Capacity, Adding Value, and Building Resilience in the Meteorological and Hydrometeorological Services of the Caribbean**

Prepared: November 2020

Approved:

**CMO**

**OPERATIONAL PLAN 2020-2023**

**A. Introduction**

**B. The Role of the World Meteorological Organization**

**C. The Caribbean Meteorological Organization and its Role**

**D. Elements of the CMO Headquarters Operational Plan 2020-2023**

**Annex. List of Acronyms and Abbreviations**

## A. Introduction

1. Weather, climate, and water are at the heart of the environmental issues affecting the planet and hydro-meteorological disasters are increasingly costly to economies worldwide. The integration of weather, water, climate, and related environmental Information into policy making and societal action are critical to building resilience and realizing sustainable development goals in the Caribbean.
2. Meteorological and Hydrometeorological Services (NMHSs) in the Caribbean and the 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. As the world deals with the ongoing Coronavirus 2019 (COVID-19) global pandemic, weather, climate, and water services provide warnings on hazardous weather that can exacerbate the spread of the virus or drought conditions and water management to ensure adequate sanitation or the relationship of outbreaks with seasonality.
3. Additionally, the provision of climate services supports the long-term policy and strategic planning by governments, the private sector, and civil organizations. Generally, the demands for the provision of national meteorological services are viewed and will continue to be viewed primarily in terms of the response to governments’ obligations to protect the safety of life, livelihood, and property of their citizens.
4. However, there are very specific and direct contributions of meteorological information, demands for which are increasing rapidly, to enhancing socio-economic benefits in such weather- and climate-sensitive sectors as:

* Air, land and sea transport;
* Agriculture;
* Water resources;
* Tourism;
* Planning and Development;
* Conventional and alternative sources of energy;
* Insurance and related areas;
* Disaster management;
* Health; and
* Environmental protection.

1. At the same time, the NMHSs must provide appropriate data and the scientific-basis for studies on the long-term potential impacts of both natural and human-induced climate changes 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. Meteorological Services cannot operate in isolation and cooperation between all countries at all levels is fundamental. The atmospheric and related processes and phenomena, with which an NMHS must deal in order to fulfil its mission at the national level, do not recognize political boundaries, and their detection and tracking and the provision of advice to national communities on their likely impacts require continuous trans-border cooperation. The provision of data, information, products and services by NMHSs to meet national requirements and international commitments is fundamentally dependent on the maintenance of a high level of international cooperation.
3. Since no country can be fully self-reliant in this respect, any national strategy for the provision of meteorological and related services should build upon, and itself contribute to the strengthening of the framework of regional and international cooperation. There are two primary international conventions that affect meteorological services worldwide, namely, those of the ***World Meteorological Organization*** (WMO) and the ***International Civil Aviation Organization*** (ICAO).
4. These two United Nations specialized agencies set the international standards for meteorological activity. Global programmes in meteorology and related sciences, to which all nations must subscribe, are coordinated internationally through the WMO, which in turn is a very close collaborator of the ICAO and similar organizations. For this reason, the NMHS must also participate actively in regional and international cooperation through the programmes and activities of the WMO. There is a very important mutually reinforcing relationship between the role, effectiveness and visibility of individual NMHSs, on the one hand, and the integrated operation of the entire WMO system, on the other. The strengthening of NMHSs contributes significantly to a more effective WMO and, in turn, an enhanced WMO can greatly assist the strengthening of NMHSs and the effectiveness of their services to their national communities.
5. This level of cooperation can be very difficult for small or relatively small countries to achieve. It is equally difficult for large international bodies to deal effectively with a large number of very small countries with differing needs, peculiarities and capabilities. For this reason, the ***Caribbean Meteorological Organization*** (CMO) is one of several regional organizations around the world that are considered critical to the overall global coordination of meteorological and hydrological activities of the WMO. This is particularly true because of the large number of Small Island Developing States (SIDS) in the Caribbean. Formal collaboration between CMO and WMO is governed by a set of “Working Arrangements”.

## B. Role of the World Meteorological Organization

1. The World Meteorological Organization (WMO), a Specialized Agency of the United Nations with 193 Member States and Territories, is the UN system's authoritative voice on the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the weather and climate it produces, the resulting distribution of water, and related environmental issues. Since its establishment in 1950, WMO has been central in facilitating international collaboration and cooperation for: establishing interoperability, observations, data and knowledge exchange; setting standards; coordinating scientific and technical methods; and capacity development for the benefit of its Member States and their National Meteorological and Hydrological Services (NMHSs). WMO facilitates the gathering, processing and sharing of information, expertise and technology to create cost-effective solutions for the provision of weather, climate, water and related environmental services delivered by Members’ NMHSs.
2. Under the WMO framework, NMHSs deploy, operate and sustain essential infrastructure in a coordinated manner to deliver a wide range of services that support decision-making on current and emerging issues. Consequently, WMO and its Member States also support the work of the broader international community and their Conventions or Treaties such as the United Nations Framework Convention on Climate Change and the UN Convention to Combat Desertification, and the 2030 Agenda for Sustainable Development which has 17 Sustainable Development Goals (SDGs). This collaborative framework results in a much more efficient use of global resource.
3. Under its collaborative framework, WMO provides world leadership in expertise and international cooperation to enable the delivery and use of high-quality authoritative weather, climate, water and related environmental services by its Members States for the improvement of the well-being of societies of all nations. It does so through the coordination of standards and practices among its Members States and its core values of commitment and loyalty in international service; professionalism, objectivity, impartiality, excellence and team spirit; integrity and mutual respect, cultural sensitivity and non-discrimination.
4. WMO’s core mission is described in its Convention:
5. To facilitate worldwide cooperation in the establishment of networks of stations for the making of meteorological observations as well as hydrological and other geophysical observations related to meteorology, and to promote the establishment and maintenance of centres charged with the provision of meteorological, hydrological and related services;
6. To promote the establishment and maintenance of systems for the rapid exchange of meteorological, hydrological and related information;
7. To promote standardization of meteorological, hydrological and related observations and to ensure the uniform publication of observations and statistics;
8. To further the application of meteorology to aviation, shipping, water problems, agriculture and other human activities;
9. To promote activities in operational hydrology and to further close cooperation between meteorological and hydrological services;
10. To encourage research and training in meteorology, hydrology and, as appropriate, in related fields, and to assist in coordinating international aspects such as research and training;
11. To provide guidance to national regulations on provision of official meteorological information and advises, through the Common Alerting Protocol and Register of Alerting Authorities.
12. During the previous Strategic Period (2016-2019), the WMO Members States and their National Meteorological and Hydrological Services made remarkable progress on WMO priorities and in implementing both capacity development and service delivery strategies. For example:

* The WMO played a key role in the establishment and implementation of the Global Framework for Climate Services (GFCS), bringing operational climate services a step closer to their full potential;
* Significant advances among the NMHSs were made in implementing quality management systems and competency standards to improve the efficiency and safety of civil aviation;
* Global and regional plans were developed for implementing the WMO Integrated Global Observing System (WIGOS) and global and regional centres enhanced their capabilities to support the WMO Information System (WIS);
* The WMO has expanded techniques to monitor space weather and provide information on changes that may be detrimental to satellite communication systems and air transportation;
* The provision and use of severe weather and flood forecasts have been improved in some regions through the implementation of Severe Weather Forecasting Programmes (SWFP), Flash Flood Guidance Systems (FFGS), and Coastal Inundation Forecast Initiatives (CIFI) involving disaster management authorities, civil defence, and NMHSs.

1. For the current Strategic Period (2020-2023), the WMO conducted major governance reform aimed at fulfilling its vision for 2030, to “*see a world where all nations, especially the most vulnerable, are more resilient to the socioeconomic consequences of extreme weather, climate, water and other environmental events; and underpin their sustainable development through the best possible services, whether over land, at sea or in the air.”* That vision includes the following five long-term goals:

* Goal 1: Better serve societal needs: delivering, authoritative, accessible, user-oriented and fit-for-purpose information and services
* Goal 2: Enhance Earth system observations and predictions: Strengthening the technical foundation for the future
* Goal 3: Advance targeted research: Leveraging leadership in science to improve understanding of the Earth system for enhanced services
* Goal 4: Close the capacity gap on weather, climate, hydrological and related environmental services: Enhancing service delivery capacity of developing countries to ensure availability of essential information and services needed by governments, economic sectors and citizens
* Goal 5: Strategic realignment of WMO structure and programmes for effective policy- and decision-making and implementation

Details of the overarching priorities, long-term goals, activities, and anticipated outputs are described in the WMO Strategic and Operational Plans, available at <https://public.wmo.int/en/about-us/vision-and-mission>.

These initiatives support the delivery of effective services by NMHSs, for the safety of life and property and underpinning sustainable development.

## C. The Caribbean Meteorological Organization and its Role

1. The **Caribbean Meteorological Organization** (CMO) is a functionally autonomous agency within the CARICOM family. It originated out of the old British Caribbean Meteorological Service, which was established in **1951**. This Service later became the Caribbean Meteorological Service after the break-up of the Federation. But with the establishment of many National Meteorological Services after independence, the Caribbean Meteorological Service was subsequently transformed into the CMO in **1973**, so that the joint activities could continue.
2. The CMO comprises the following ***sixteen (16) Member States***:

Anguilla, Antigua and Barbuda, Barbados, Belize, British Virgin Islands, Cayman Islands, Dominica, Grenada, Guyana, Jamaica, Montserrat, St. Kitts and Nevis, Saint Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, Turks and Caicos Islands.

1. The CMO undertakes the coordination of the joint scientific activities of the respective National Meteorological and Hydrometeorological Services, the establishment of joint technical facilities and systems, the provision of joint training and research facilities, and the promotion of a reliable severe weather warning system to safeguard the region. The CMO provides support and advice to governments in the development of their NMHSs and in dealing with issues of an international nature affecting weather, water and climate, and represents the regional meteorological community's interests in relation to international civil aviation matters. The CMO also works closely with regional agencies involved in disaster preparedness, response and relief.
2. There are four Organs of the CMO:
3. The ***Caribbean Meteorological Council*** (CMC) is the *Governing Body* of the Organization, comprising government Ministers responsible for meteorology or their representatives. The CMC meets annually to, among others, set policy, approve joint projects and budgets.
4. The ***CMO Headquarters,*** located in Port of Spain, Trinidad and Tobago, is headed by a Coordinating Director. Support and the provision of advice to governments, the coordination of joint activities, project formulation and implementation and the coordination of international activities are among the functions undertaken by the Headquarters.
5. The ***Caribbean Institute for Meteorology and Hydrology*** (CIMH), located in Barbados, is the CMO’s technical and training arm. The CIMH, originally the Caribbean Meteorological Institute, provides training for the region’s weather observers and technicians, weather forecasters, specialists in hydrology, agrometeorology and other related disciplines. The CIMH provides training to the Major in Meteorology in the Faculty of Pure & Applied Sciences Bachelor of Science degree, in cooperation with the University of the West Indies Cave Hill Campus, and collaborates with the UWI in a number of related post graduate programmes. The CIMH also serves as the CMO’s research and climate centre, as well as the regional instrument calibration and maintenance centre.

Through agreements between the CMO and the World Meteorological Organization (WMO), the CIMH has also been designated as a WMO *Regional Training Centre* (RTC), *a WMO Instrument Calibration Centre*, a WMO *Centre of Excellence* in Satellite Meteorology, and a WMO *Regional Climate Centre* (RCC) for the Caribbean.

1. The ***Caribbean Meteorological Foundation*** (CMF) was established to raise funds for the promotion, through the CIMH, of the study and research of meteorology and allied sciences.
2. Since its inception, the CMO has developed a series of initiatives and projects for the development and benefit of its Member States. CMO, either through the Headquarters or the CIMH, collaborates closely with institutions of CARICOM and has established a number of strategic partnerships with regional and international organizations and agencies (WMO, NOAA, ACS, CDEMA, among others), as well as funding agencies and countries (the European Commission, the World Bank, Finland, among others), to enable the National Meteorological and Hydrometeorological Services (NMHSs) of Member States to improve their involvement in and contribution to the sectors shown in section A above. Some of the partnerships focus on key areas such as early warning systems, meteorological telecommunications and observing networks, human resources development, and data management for climate change impact studies. Since the early 70’s, the CIMH has participated in the development and execution of collaborative programmes and projects on applications of meteorology and hydrology. For example, CIMH is undertaking applied research into weather and climate simulation, an aim of which is to provide an additional basis to (i) inform the decision-making process of CDEMA during weather-related emergencies, (ii) support disaster risk reduction and (iii) support the development of climate services and change adaptation strategies for the region.

1. This document provides details of the *CMO Headquarters* Operational Plan for the strengthening of Meteorological and hydrological services in the CMO Member States for the period 2020-2023. Operational or strategic plans and programmes of the CIMH are produced separately.

**D. CMO Headquarters Operational Plan 2020-2023**

1. The programmes and projects being undertaken or planned by the CMO Headquarters, as approved by the Caribbean Meteorological Council, have legal and planning framework aspects as well as observational and scientific data information components involving the use of new or modern technologies. Many projects of this nature, which involve CMO Member States, will be closely linked to the programmes and activities of the WMO and partner organizations. Significant changes at the regional and international levels are influencing various socio-economic sectors served by Meteorological and Hydrological Services of Member States of CMO, including food production, disaster risk reduction, water resource management, health, energy, and tourism, resulting in ***escalating or changing demands for services***:
2. As articulated in the **Strategic Plan 2020-2023** submitted by the CMO Headquarters, its involvement in regional strategic planning is necessary to ensure that the NMHSs of its Member States are better prepared for the following priorities and outcomes:

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| Strategic Priorities | Expected Outcomes |
| Enhance disaster preparedness and reducing losses of life and property from extreme hydrometeorological events and severe weather | Support for delivery of authoritative, accessible, user-oriented, and fit-for-purpose information and services to reduce the disaster risk of hydrometeorological extremes. |
| Support climate-smart decision making to build resilience and adaptation to climate risk | Climate services and information integrated into policy and decision-making framework for building socioeconomic resilience and reducing climate risk. |
| Support the strengthening and maintenance of observation networks and information services | Enhanced observations and integrated information services for impact-based forecasting and decision-support for both routine activities and high-impact events |
| Enhance the socioeconomic and national security value of weather, climate, hydrological, and related environmental services. | Enhanced service delivery capacity of Members to ensure availability of essential information and services needed by governments, economic sectors, and citizens |

These priorities match the WMO strategic priorities and long-term goals, specifically:

* *Long Term Goal 1: Better serve societal needs: delivering, authoritative, accessible, user-oriented and fit-for-purpose information and services*
* *Long Term Goal 4: Close the capacity gap on weather, climate, hydrological and related environmental services: Enhancing service delivery capacity of developing countries to ensure availability of essential information and services needed by governments, economic sectors and citizens*

Priorities are also aligned to the strategic priorities of donor organizations with whom the CMO Headquarters has initiated discussions, including the Caribbean Development Bank’s (*environmental sustainability*) and the World Bank Global Facility for Disaster Risk Reduction.

1. The Operational Plan is organized by outcomes and priorities defined in the Strategic Plan and includes programme activities and projects to achieve Expected Outcomes. The Operating Plan will be updated and adjusted as required.

## Strategic and Operational Planning at the Regional Level

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| **Programme** | **Partners (if any)/Contact Organizations** | **Status** | **Remarks** |
| CMO’s participation in a **WMO Regional Management Group** to align RA IV working structures with the WMO Strategic Plan (2020-2023) goals to support National Meteorological and Hydrological Services in North America, Central America and the Caribbean  CMO’s participation in the (i) development of a Regional Operating Plan; (ii) organization of the 18th RA IV Session and (ii) high-level dialogue between RA III and RA IV. | Canada, Costa Rica, Jamaica, USA, and WMO  Canada, Costa Rica, Jamaica, USA, and WMO | Commenced in 2019 at Regional Management Group meeting and continued through 2020  Commenced in June 2020 | Activities have begun on Regional Operating plan (2020-2023) |

## Expected Outcomes and Key Performance Indicators for NMHSs in CMO Member States

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| Strategic Priority 1: Enhance disaster preparedness and reducing losses of life and property from extreme hydrometeorological events and severe weather | | | | |
| Ultimate Outcome 1 Support for delivery of authoritative, accessible, user-oriented, and fit-for-purpose information and services to reduce the disaster risk of hydrometeorological extremes. | | | | |
| Intermediate Outcome 1 Enhanced capability of Members to develop, deliver, and utilize accurate and reliable weather, climate, water and related environmental impact-based forecasting services to mitigate against extreme hydrometeorological events. | | | | |
| Performance Indicators | | Baseline 2019 | Target 2021 | Target 2023 |
| 1.1.1 Number of Members participating in a Common Alerting Protocol (CAP) for warnings and alerts  1.1.2 Number of Members with a MHEWS integrated in a national Disaster Risk Reduction management system | |  |  |  |
| 1.2.1 Number of forecasters trained in the SWFP concept  1.2.2 Number of Members participating in the SWFP  1.2.3 At least one verification measure implemented for severe weather forecasts  1.2.4 Users feedback on the usefulness of severe weather forecasts | |  |  |  |
| 1.3.1 Number of Members providing national flood and drought monitoring and prediction services  1.3.2 Number of Members making use of RCCs and/or RCOFs  1.3.3 User/stakeholder assessment of the relevance, usefulness and timeliness of outlooks/alerts for extreme climate events | |  |  |  |
| 1.4.1 Number of Members using (a) web applications and (b) social media in warning delivery  1.4.3 Number of Members using online platforms for integrating weather, water, and climate hazards with socio-economic data  1.4.4 Number of Members with agreements between NMHSs and private sector/academia actors on (a) EWS service delivery and (b) maintenance of networks for EWSs | |  |  |  |
| 1.5.1 Number of Members with backup communication and power systems  1.5.2 A revised regional EWS with backup assignments for forecast and warnings | |  |  |  |
| Key Focus Areas in 2020-2023 | | | | |
| * Support implementation of impact-based forecast and warning products and services * Strengthen national capacity in multi-hazard early warnings through enabling legislation that clarifies the roles and responsibility of NMHSs * Support Members’ delivery of authoritative national weather, water, and climate information products and services, through enabling legislation authorizing those functions. * Support the development of national strategic plans, national frameworks for weather, water, and climate services, and action plans * Support the upgrading of meteorological services in the Turks and Caicos Islands   + Support the enhancement of weather services via uptake of modern technology in service delivery and quality management principles.   + Provide guidance on the adoption of international standards, quality control mechanisms and recommended practices.   + Provide guidance to NMHSs for the implementation of redundant communications systems that should be used in WMO RA IV (North and Central America and the Caribbean)     - Assist in the mobilization of resources involving development agencies and national governments for disaster risk reduction | | | | |
| Activities | | | | |
| **Programme** | **Partners (if any)/Contact Organization** | | **Status** | **Remarks** |
| **Drafting of Legislation for National Meteorological Services**  CMO Headquarters is leading a project to draft a Template Meteorological Bill for adapting by CMO Member States without a legal mandate for their Meteorological Services. A Policy Document and draft memoranda will be developed to accompany the Legislation. As part of the agreement with the WMO, two Meteorological Bills are to be submitted for enactment by 2021.  **National Strategic Plans with National Framework for Weather, Water, and Climate Services and Complementary Action Plan**  CMO Headquarters is leading a project to develop National Strategic Plans in eight CMO Member States that requested assistance with Strategic Planning. The project began in April 2020 and will end in March 2021.  **Severe Weather Forecast Programme-Eastern Caribbean**  CMO HQ and Météo-France Martinique, co-chair the Regional Sub-programme Management Team (RSMT), guiding the implementation of the SWFP-EC by which NMHSs access new numerical weather products, radar products, and lightning monitoring;  Improving service delivery of seamless and accurate warnings of hazardous weather that may not be the results of a tropical cyclone and could occur at any time of year, in collaboration with relevant national organizations;  Training of forecasters in severe weather forecast concepts and cascading-scale of global to regional to local scale and in collaborative forecasting using online platform  **EUREC4A-UK-CMO Caribbean Weather Forecasting Initiative**  CMO Headquarters collaborated with the University of Leeds to propose a Caribbean Weather Forecasting Initiative, including two workshops and a Forecast Testbed as part of EUREC4A field campaign. The first workshop and testbed were organized in collaboration with CIMH. The first workshop was held prior to the field campaign to train forecasters on providing briefing to support research operations.  **Regional Hurricane Warning System**  Coordination of CMO Member States’ involvement in the Atlantic-Caribbean Hurricane Warning System, including back-up arrangements among States.  Coordination of annual training activities with the US National Hurricane Center.  **Development of a new Meteorological Service in the Turks and Caicos Islands**  CMO Headquarters assistance for a complete multi-stage development of a new National Meteorological Service from a small ad-hoc meteorological operation in support of Civil Aviation. New internal structure will include observational systems and network, telecommunications, data collection, dissemination and storage; instrument maintenance; multi-level training programmes.  **Ongoing upgrades of Communication Systems and Infrastructure**  Guidance/Assistance to Member States on the correct communications systems to be procured and the necessary data protocols, formats and information pathways to share the information generated regionally and internationally. | WMO, CREWS-Caribbean, Relevant Government Ministries, NMHSs of CMO Member States and their stakeholders, Organization of Eastern Caribbean States (OECS)  WMO, CREWS-Caribbean, Relevant Government Ministries, NMHSs of CMO Member States and their stakeholders, Organization of Eastern Caribbean States (OECS), CIMH  Météo-France, NOAA, Environment and Climate Change Canada, WMO, CIMH  University of Leeds, WMO, CREWS, UK Met Office, CIMH  NOAA/NHC, CDEMA, and WMO  TCI Airport Authority; TCI Department of Disaster Management and Emergencies; NMHS of Bahamas, CIMH  NMHSs, NOAA, WMO, World Bank | | Project started in April 2020. Legal consultant, hired in August 2020, has been conducting consultations with Member States. Assessment report and draft Template Legislation to be submitted by December 2020.  Consultant, hired in September 2020, has been conducting surveys of NMHSs and stakeholders. Draft Plans are due in January 2021.  Ongoing. All NMHSs in the programme have access to the forecast products via the Extranet of the 24/7 operational *Regional Forecast Support Facility in Martinique.*  Workshop and Forecast testbed during EUREC4A field study supported SWFP goals. CMO HQ and University of Leeds have funding for a 2nd workshop, postponed from 2020 to 2021.  Ongoing  Draft roadmap plans were developed, including a new leadership position. Thus, a Director of Meteorology is scheduled to start in May 2021, having finished operational training at CIMH and received approval for on-the-job training with the Bahamas Dept of Meteorology  Ongoing. A Pilot project of CREWS Caribbean is aimed at enhancing alerting communication system | CMO HQ - WMO Implementing Agreement is scheduled to end by Q2 of 2021.  CMO HQ - WMO Implementing Agreement is scheduled to end by Q2 of 2021.  Other SWFP Training activities postponed from 2020 to 2021  Back-up arrangements in CMO States reaffirmed at Annual Hurricane Committee  Major multi-year activity for TCI and CMO.  Driven by continuous advances in systems technology. |
| **Risks**  Limited economic resources to support the activities, especially in light of the ongoing pandemic and the resulting shrinking of economies worldwide  The continuing risk of hurricanes and other hazards that can have major impacts the socio-economic development of Member States and would limit the available funding that supports the programmes | **Mitigation Measures**  Support the setting of priorities for a basic level of services that are the most critical to support and conduct interim analysis of Member State capacity to implement the programmes and activities.  Encourage NMHSs to seek partnerships among sectors for whom weather, water, and climate data are vital. It is hoped that the legislation being developed will provide mechanism for those engagements. | | | |

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| Strategic Priority 2: Support climate-smart decision making to build resilience and adaptation to climate risk. | | | | |
| Ultimate Outcome 2 Climate services and information integrated into policy and decision-making framework for building socioeconomic resilience and reducing climate risk. | | | | |
| Intermediate Outcome 2 Enhanced capability of Members to develop, access and utilize accurate, reliable climate, water and related environmental services to best support the policy-making and actions that mitigate against climate risks and build socioeconomic resilience. | | | | |
| Performance Indicators | | Baseline 2019 | 2021 | 2023 |
| 2.1.1 Number of Members with basic system for delivering climate services | |  |  |  |
| 2.2.1 Number of Members making use of RCCs and/or RCOFs  2.2.2 Number of Members organizing NCOFs  2.2.3 Number of users accessing climate services through web platforms or other methods of service delivery  2.2.4 User/stakeholder assessment of the relevance, usefulness and timeliness of climate information | |  |  |  |
| 2.3.1 Number of Members contributing to the climate impacts database of the WMO RCC at CIMH | |  |  |  |
| Key Focus Areas in 2020-2023 | | | | |
| * Support Members’ in delivery of authoritative national climate information products and services in the priority areas of the CIMH-led Early Warning Information Systems Across Climate Time Scales (EWISACTS) to adapt and respond to climate variability and change through draft legislation that authorizes their provision of climate services. * Support the development of national strategic plans, national frameworks for weather, water, and climate services, and action plans * Encourage participation of NMHSs in a climate service information system enabling all Members to access, and add value to, the best available regional climate information products and methodologies. | | | | |
| Activities | | | | |
| **Programme** | **Partners (if any)/Contact Organization** | | **Status** | **Remarks** |
| **Drafting of Legislation for National Meteorological Services**  CMO Headquarters is leading a project to draft a Template Meteorological Bill for adapting by CMO Member States without a legal mandate for their Meteorological Services. A Policy Document and draft memoranda will be developed to accompany the Legislation. As part of the CMO agreement with the WMO, two Meteorological Bills are to be submitted for enactment by 2021.  **National Strategic Plans with National Framework for Weather, Water, and Climate Services and Complementary Action Plan**  CMO Headquarters is leading a project to develop National Strategic Plans in eight CMO Member States that requested assistance with Strategic Planning. The project began in April 2020 and will end in March 2021. | WMO, CREWS-Caribbean, Relevant Government Ministries, NMHSs of CMO Member States and their stakeholders, Organization of Eastern Caribbean States (OECS)  WMO, CREWS-Caribbean, Relevant Government Ministries, NMHSs of CMO Member States and their stakeholders, Organization of Eastern Caribbean States (OECS), CIMH | | Project started in April 2020. Legal consultant, hired in August 2020, conducting consultations with Member States. Assessment report and draft Template Legislation due by December 2020.  Consultant, hired in September 2020, has been conducting surveys of NMHSs and stakeholders. Draft Plans are due in January 2021. | CMO HQ - WMO Implementing Agreement is scheduled to end by Q2 of 2021.  CMO HQ - WMO Implementing Agreement is scheduled to end by Q2 of 2021. |
| **Risks**  Limited human resources and workforce competency to deliver climate services, particularly for the smaller Meteorological Services  The continuing risk of hurricanes and other hazards that can have major impacts the socio-economic development of Member States and would limit the available funding that supports the programmes | **Mitigation Measures**  Support the setting of priorities for a basic level of services that are the most critical to support and conduct interim analysis of Member State capacity to implement the programmes and activities.  Encourage NMHS to work with CIMH to develop the scientific and technical skills of their staff  Encourage NMHSs to seek partnerships for climate service delivery among sectors for whom climate and water data are vital | | | |

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| Strategic Priority 3: Support the strengthening and maintenance of observation networks and information services | | | | |
| Ultimate Outcome 3 Enhanced observations and integrated information services for impact-based forecasting and decision-support for both routine activities and high-impact events. | | | | |
| Intermediate Outcome 3 An integrated observational network optimized to ensure effective national coverage and accessibility for risk monitoring and numerical weather prediction. High quality fit-for-purpose measurements feeding a continuous data exchange underpinned by best practices in data management and data processing mechanisms. | | | | |
| Performance Indicators | | Baseline 2019 | 2021 | 2023 |
| 3.1.1 Percentage of the regional Earth system covered by observations (especially hydrosphere)  3.1.2 Number of Members complying with WMO observation standards  3.1.3 Number of Members implementing national observing system WIGOS | |  |  |  |
| 3.2.1 Number of Members with national network monitoring and data management systems established  3.2.2 Number of Members implementing data exchange policies, as per WMO Resolutions | |  |  |  |
| * + 1. Approved Terms of Reference for the radar operations working group     2. Initial meeting/workshop held     3. Online platform initiated for collaboration, troubleshooting, and information exchange | |  |  |  |
| 3.4.1 Number of Members using online platforms, such as DEWETRA, for integrating observations, model forecasts, with hydrological and socio-economic data for decision support and collaboration.  3.4.2 Number of Members with agreements between NMHSs and private sector/academia actors on(a) service delivery and (b) maintenance of networks | |  |  |  |
| Key Focus Areas in 2020-2023 | | | | |
| * + - * + To encourage and support international exchange of data, along with strengthened monitoring of compliance within WMO RA IV         + Provide advice on the development of data management systems and practices through WMO Information System (WIS) to help ensure that all observational data and key products are properly archived.         + Help facilitate international exchange of data, along with strengthened monitoring of compliance.         + Assist in the development of data management systems and practices through WMO Information System (WIS) to help ensure that all observational data and key products are properly archived         + Creating and operationalizing of the CMO Operational Radar Working Group         + Supporting the use of information technology for impact-based forecast and warnings.         + Supporting the use of guidance material to facilitate integration of externally-sourced observations into the impact-based forecast process.         + Provide leadership in promoting the principles on which global meteorology is built, emphasizing authoritative voice, common standards, data and product sharing among NMHSs of Member States. | | | | |
| Activities | | | | |
| **Programme** | **Partners (if any)/Contact Organization** | | **Status** | **Remarks** |
| **WMO Integrated Global Observation System (WIGOS) – Initial Operational Phase**   1. **WIGOS Station Identifiers**   This service will involve the provision of advice and guidance to help Members integrate the new WIGOS Station Identifiers (WSI) into their monitoring systems. CMO Headquarters will help support NMHSs who are responsible for the establishment of WSI schemas, observational data product integration, and end user awareness and transition   1. **WIGOS National Implementation Plans**   CMO Headquarters is providing guidance and templates for Member States to use in developing their National Implementation Plans.   1. **WMO Integrated Global Observation System (WIGOS) – Regional WIGOS Centre**   Regional WIGOS Centres ensure the quality of surface observation (accuracy, availability, and timeliness). A Regional WIGOS Centre has been approved by WMO RA IV Management Group as a virtual centre to be hosted by NOAA, Environment and Climate Change Canada, the CMO Headquarters, and Trinidad and Tobago Meteorological Service. The CMO Headquarters and TTMS will be responsible for the WIGOS Data Quality Monitoring for the English-speaking Caribbean.   1. **Global Basic Observation Network (GBON)**   CMO Headquarters will help support NMHSs to be compliant with the requirements to contribute essential observations and data exchange for the public good of all nations - improved weather forecasts and climate services.  **Ongoing Installation of Remote Sensing Equipment and the Sharing of Data**  CMO Headquarters providing guidance/assistance to Member States on the procurement of remote sensing systems (terrestrial and space-based), data protocols and formats.  Also providing guidance to Member States on the Integration of national observing platforms into the global observing systems. | CIMH, WMO, NMHSs of CMO Member States and other national entities with surface observing stations  WMO, NMHSs of CMO Member States and other national entities with surface observing stations  WMO, NOAA, Environment Canada, TTMS  CIMH, CCCCC, NOAA, WMO, NMHSs of CMO Member States and other national entities with surface observing stations  WMO, NOAA, National Governments, NMHSs and Stakeholders | | WIGOS Pre-operational phase was from 2016-2019. Initial Operational Phase is expected to be from 2020-2023  Same as above  Collaboration of CMO HQ and TTMS endorsed by Council in 2018. Concept Note was approved by WMO RA IV Management Group in January 2020. Currently developing Implementation Plan.  GBON regulations and guidelines to be approved by WMO Extraordinary Congress in 2021. Many GBON requirements can be met by existing network of CMO Member States. Members with large uninhabited or sparsely populated areas can request exemption or assistance to meet requirements  Ongoing | Requirements and guidelines provided by the WMO Infrastructure Commission.  Only a small percentage of CMO Member States have been implementing WIGOS  Some technical tools developed by WMO and Centres in other regions. Extra resources needed for Caribbean part of RWC  Systematic  Observations Financing Facility (SOFF) aims to support countries to meet GBON requirements  Project driven, with funds from national and international sources. |
| **Risks**  Limited technical and human resources and workforce competency to fully implement WIGOS, particularly for the smaller Meteorological Services.  Under WIGOS, NMHSs are to be integrators of weather, climate, water, and environmental data, who identify surface observations at the national level and make outreach to other data holders. Data policy at the national level may not support this activity and NMHSs will need the support of their governing bodies. | **Mitigation Measures**  Delegating more of the CMO Science and Technology Officer’s time to assist Member States with WIGOS implementation.  CMO to advise Caribbean Meteorological Council and other Government entities on the importance of the services of NMHS and WIGOS. | | | |

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| Strategic Priority 4: Enhance the socioeconomic and national security value of weather, climate, hydrological, and related environmental services | | | | |
| Ultimate Outcome 4 Enhanced service delivery capacity of Members to ensure availability of essential information and services needed by governments, economic sectors, and citizens | | | | |
| Intermediate Outcome 4 Improved access to regional and global monitoring and prediction systems and utilization of weather, climate and water information and services that brings tangible benefits to Members | | | | |
| Performance Indicators | | Baseline 2019 | 2021 | 2023 |
| 4.1.1 Number of NMHSs with strategic plans and national frameworks for weather, climate, and water services  4.1.2 Number of NMHSs with legal basis for their operation  4.1.3 Number of NMHSs with enhanced human and technical capacity to provide a range of services. | |  |  |  |
| 4.2.1 Number of NMHS staff trained at WMO training centres and/or through fellowships  4.2.2 Number of NMHSs whose staff have adequate (to be defined) level of core competencies to meet national and international mandate 2.2.4 User/stakeholder assessment of the relevance, usefulness and timeliness of climate information | |  |  |  |
| 4.3.1 Number of NMHSs receiving international capacity development assistance  4.3.2 Number of Members benefiting from catalysed development projects  4.3.3 Number of Members with legal basis for public-private partnerships | |  |  |  |
| Key Focus Areas in 2020-2023 | | | | |
| * + - Facilitate development of draft legislation to aid Member States with respect to technical, institutional, and human resources, enabling them to provide neededweather, climate, water and related environmental services     - Facilitate the development of national strategic plans and operational plans for NMHSs to boost their service capabilities and, hence, their socio-economic value * Liaise between Member States and WMO to support the assessment of the economic benefits of NMHSs.   + - Support Members to understand and acquire the qualification and competencies required for effective service delivery, focused on WMO standards and recommendations.     - Coordinating with WMO on new integrated weather service delivery, such as their marine service delivery training initiative, to which the CMO Headquarters has been contributing. * Facilitate the establishment of principles and guidance for successful partnerships with public sector, private sector, or academia to improve and expand services and develop markets for services. Expand on dialogue started during the Caribbean Symposium 2019: Operational Hydro-meteorology Leadership Summit. * Support improvement in the communication skills of NMHSs and uptake of modern technology in service delivery. * Help NMHSs to become more visible by amplifying their news | | | | |
| Activities | | | | |
| **Programme/Activities** | **Partners (if any)/Contact Organization** | | **Status** | **Remarks** |
| **Drafting of Legislation for National Meteorological Services**  CMO Headquarters is leading a project to draft a Template Meteorological Bill for adapting by CMO Member States without a legal mandate for their Meteorological Services. A Policy Document and draft memoranda will be developed to accompany the Legislation. As part of the CMO agreement with the WMO, two Meteorological Bills are to be submitted for enactment by 2021.  **National Strategic Plans with National Framework for Weather, Water, and Climate Services and Complementary Action Plan**  CMO Headquarters is leading a project to develop National Strategic Plans in eight CMO Member States that requested assistance with Strategic Planning. The project began in April 2020 and will end in March 2021.  **Support Members in enhancing the communication skills of NMHSs**  The CMO Headquarters developed a proposal to enhance the communication of warnings and other information from NMHSs and to aid media and disaster managers to better understand hydrometeorological hazards. Discussions were initiated with the Caribbean Broadcast Union (CBU) and the American Chamber of Commerce to develop a workshop in 2020, that expanded regionally, a national plan by Grenada’s Manager of Meteorology. The proposal was tabled due to the pandemic. In the interim, the CBU developed an online self-paced course in media communication that was opened to meteorologists in a number of CMO Member States.  **Partnerships to advance Caribbean Hydro-Meteorology**  The CMO Headquarters has been working with private sector in hydro-meteorology to promote dialogue in Caribbean Symposia on Operational Hydrometeorology and to identify successful partnerships that demonstrate the value of weather, climate, and water services to society.  **Recruitment of experts to advance Caribbean Hydro-Meteorology**  The CMO Headquarters has been working with CIMH and Member States to identify persons to serve on national and international bodies to help raise the profile of Caribbean Hydro-meteorology services. For example, the CMO is now represented in the Presidency of WMO RA IV, on the WMO Executive Council, the Chair of Expert Teams in WMO Aviation Services, among others | WMO, CREWS-Caribbean, Relevant Government Ministries, NMHSs of CMO Member States and their stakeholders, Organization of Eastern Caribbean States (OECS)  WMO, CREWS-Caribbean, Relevant Government Ministries, NMHSs of CMO Member States and their stakeholders, Organization of Eastern Caribbean States (OECS), CIMH  CBU, NOAA, UN Disaster Risk Reduction (UNDRR)  Varysian Ltd, WMO, NMHSs of CMO Member States, CIMH, Stakeholders in the Public, Private, and Academic Sectors, and Civil Society  CMO Member States, CIMH, WMO | | Project started in April 2020. Legal consultant, hired in August 2020, conducting consultations with Member States. Assessment report and draft Template Legislation due by December 2020.  Consultant, hired in September 2020, has been conducting surveys of NMHSs and stakeholders. Draft Plans are due in January 2021.  The proposal has been submitted to the American Chamber of Commerce in Trinidad and Tobago  The first symposium was held in November 2019. The second is being planned as a virtual symposium in December 2020.  Ongoing | CMO HQ - WMO Implementing Agreement is scheduled to end by Q2 of 2021.  CMO HQ - WMO Implementing Agreement is scheduled to end by Q2 of 2021. |
| **Risks**  Limited pool of persons from whom to choose, so some persons are asked to serve in multiple capacities, which is detrimental to their ability to be effective. | **Mitigation Measures**  Recruit new mid-career persons and take advantage of training in management and leadership for early-career persons to develop management expertise. | | | |

## Additional Projects and Proposals to Enhance Capabilities of Weather, Climate, and Water services in Member States

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| Strategic Priority 1: Enhance disaster preparedness and reducing losses of life and property from extreme hydrometeorological events and severe weather Strategic Priority 2: Support climate-smart decision making to build resilience and adaptation to climate risk  Strategic Priority 3: Support the strengthening and maintenance of observation networks and information services  Strategic Priority 4: Enhance the socioeconomic and national security value of weather, climate, hydrological, and related environmental services |
| Ultimate Outcome 1 Support for delivery of authoritative, accessible, user-oriented, and fit-for-purpose information and services to reduce the disaster risk of hydrometeorological extremes  Ultimate Outcome 2 Climate services and information integrated into policy and decision-making framework for building socioeconomic resilience and reducing climate risk  Ultimate Outcomes 3 Enhanced observations and integrated information services for impact-based forecasting and decision-support for both routine activities and high-impact events  Ultimate Outcome 4. Enhanced service delivery capacity of Members to ensure availability of essential information and services needed by governments, economic sectors, and citizens |

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| **Programme** | **Partners (if any)/Contact Organization** | **Status** | **Remarks** |
| 1. **Maintenance and Upgrade of CMO Radars**   CMO has been drafting a proposal to upgrade the current CMO radars to dual-polarization, which is now the operational standard for weather radars. The CMO Headquarters is working with development partners, such as the Caribbean Development Bank, to access appropriate funding sources. A pivotal role in the maintenance of the radar network is the CMO Operational Radar Working Group, led by the CMO Science and Technology Officer and comprised of regional technicians sharing knowledge and troubleshooting issues with expert input as necessary.   * 1. ***Review/Feasibility study of Radar Network***:   A feasibility study of the current radars will be conducted by a radar expert hired by the World Bank, who will be supported by the CMO Headquarters. Study results will guide the proposal to upgrade the radars.   * 1. ***Multi-Radar Multi-sensor Precipitation Grid***   CMO Headquarters initiated discussions with NOAA in 2018 on the expansion of their Multi-radar Multi-sensor (MRMS) Caribbean to aid in monitoring hazardous weather and in contributing to climate resilience building by creating a dataset of rainfall variability and climate change to guide adaptation and mitigation. Discussions also included support for radar training in collaboration with CIMH (CMC58, Final Report).  Recent discussions were continued with the World Bank CREWS to take advantage of the expertise of the MRMS team to support the CREWS Caribbean Pilot Project to develop a regional precipitation grid to serve various weather, climate, and water sensitive sectors.   1. **Lightning Detection System and Lightning Safety Awareness**   Development of a regional system – enhancement of warning system; augment satellite and radar systems.  Organizing a workshop on lightning safety awareness, with participation of experts in lightning safety, health, education, and mitigation efforts. | World Bank CREWS-Caribbean, Radar host countries, Development partners, CIMH,  Regional NMHSs  Radar host countries, NMHSs, and CIMH. Collaboration with national hydrological and agricultural agencies with rain gauges, WMO Flash Flood Guidance Systems, World Bank  NOAA, World Bank CREWS Caribbean, WMO Flash Flood Guidance Systems, CIMH  NMHSs with interest in lightning safety and their stakeholders, including Civil Aviation, Agriculture, Outdoor recreation sector, Youth and Sport Organizations, Other Private Sector | Proposal under development, in consultation with the Caribbean Development Bank  Visit of consultant, scheduled to coincide with first meeting of the Operational Radar Working Group in May 2020 was delayed due to pandemic  Technical proposals to be developed. The precipitation grid is one of the pilot project planned for CREWS Caribbean  Proposals to be developed | External funding support for this activity will be sought.  National and external funding to be sought |

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**List of Acronyms and Abbreviations**

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| ACS | Association of Caribbean States |
| CARICOM | Caribbean Community |
| CDEMA | Caribbean Disaster Emergency Management Agency |
| CIMH | Caribbean Institute for Meteorology and Hydrology (of CMO) |
| CMC | Caribbean Meteorological Council (of CMO) |
| CMF | Caribbean Meteorological Foundation (of CMO) |
| CMO | Caribbean Meteorological Organization |
| ECMWF | European Centre for Medium-Range Weather Forecasts |
| GFCS | Global Framework for Climate Services |
| ICAO | International Civil Aviation Organization |
| ISO | International Organization for Standardization |
| Météo-France | National Meteorological Service of France |
| NHC | National Hurricane Center (USA) |
| NMHS | National Meteorological and Hydrological Services |
| NOAA | The National Oceanic and Atmospheric Administration (USA) |
| QMS | Quality Management System |
| RCC | Regional Climate Centre |
| RTC | Regional Training Centre |
| SIDS | Small Island Developing States |
| UWI | University of the West Indies |
| WIGOS | WMO Integrated Global Observing System |
| WIS | WMO Information System |
| WMO | World Meteorological Organization |

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