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CARIBBEAN DEVELOPMENT BANK



**TECHNICAL ASSISTANCE
STRENGTHENING INSTITUTIONAL CAPACITY FOR A RESILIENT CARIBBEAN
COASTAL AND MARINE ENVIRONMENT – REGIONAL**

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CARIBBEAN DEVELOPMENT BANK

BOARD OF DIRECTORS – APPROVAL OF A PAPER

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**TECHNICAL ASSISTANCE – STRENGTHENING INSTITUTIONAL CAPACITY FOR A
RESILIENT CARIBBEAN COASTAL AND MARINE ENVIRONMENT – REGIONAL**

1. REQUEST

1.01 By correspondence dated March 1, 2024, the Caribbean Institute for Meteorology and Hydrology (CIMH) applied to the Caribbean Development Bank (CDB) for a technical assistance (TA) grant aimed at strengthening institutional capacities of CIMH and CDB's Borrowing Member Countries (BMCs) for coastal and marine resource and air quality monitoring, impact-based forecasting, early warning systems (EWS), and resilience building in the Caribbean (the Project).

1.02 The Project's estimated cost is one million, eight hundred and twenty-four thousand one hundred United States dollars (USD) (USD1,824,100). From this total, one million, five hundred and forty-two thousand, one hundred United States dollars (USD1,542,100) is provided from CDB's Special Funds Resources (SFR) allocated from the Caribbean Action for Resilience Enhancement (CARE) Programme, and two hundred and eighty-two thousand United States dollars (USD282,000) represents the counterpart contribution.

2. BACKGROUND

Overview of the Importance of/and Main Challenges in the Caribbean's Coastal and Marine Environment

2.01 The Caribbean's reliance on its coastal and marine ecosystems for food security is considerable, with fisheries serving as a significant and cost-effective protein source for many. Various activities linked to the coastal and marine environment, including fisheries, tourism, recreation, shipping, and mineral resource mining, contribute substantially to job creation and revenue generation within the Region. Despite their critical role, the health and viability of these ecosystems face significant threats from coastal pollution and climate change (CC) driven by sea-level rise, storm surges, elevated sea surface temperatures, and extreme weather events. Coastal communities, livelihoods and infrastructure are at high risk from these threats. In particular, low-income communities, marginalised groups such as women and children, persons with disabilities (PWD) indigenous and tribal people and fisherfolks often bear the brunt of these impacts.

2.02 Caribbean countries heavily depend on oil and gas imports to meet their growing energy demands. According to the Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE), Caribbean Community (CARICOM) countries import, on average, 87 percent of their oil, compared to a global average of 21 percent.¹ Recently, there has been a significant increase in offshore oil and gas production, with Guyana joining established producers Trinidad and Tobago, and Suriname. However, this increased industrial activity in the marine environment poses additional threats to Caribbean marine ecosystems.

¹ A roadmap for the Caribbean's energy transition – oil import situation for CARICOM 2021.

2.03 Growing concerns have emerged about the Caribbean's marine water quality due to CC and land use in watersheds feeding the river systems. The South American mainland significantly affects Caribbean Sea water quality, as northerly marine currents transport freshwater and sediment plumes from rivers like the Amazon and Orinoco to the Caribbean. These plumes alter marine environments around Caribbean islands, impacting biodiversity and fisheries. In addition, marine biodiversity has been changing over the past two decades with the increasing prevalence of sargassum seaweed across the Region. This has resulted in notable effects on fisheries, tourism, and coastal air quality.

2.04 Air quality in the Caribbean, particularly in densely populated coastal urban areas, is declining. Many Caribbean countries lack adequate spatio-temporal air quality data. Each year, Saharan dust travels to the Caribbean and poses significant respiratory health risks. Urban development, vehicle emissions, industrialisation, and the decay of large amounts of sargassum seaweed on Caribbean beaches, releasing harmful gases, worsen air pollution and affect health in nearby coastal communities. In addition, natural hazard events such as bushfires and intense volcanic activities have contributed to periodic air quality deterioration. The explosive eruption of the volcano La Soufriere in St. Vincent and the Grenadines (SVG) in April 2021, covering significant areas within SVG and other countries like Barbados with volcanic ash and gas, underscored the urgent need for enhanced air quality monitoring. Despite the significant health implications of deteriorating air quality, the connection is often inadequately documented due to limited monitoring to establish a direct correlation between air quality and health impacts.

2.05 Effectively addressing the complex challenges of coastal and marine resources management requires a comprehensive approach to protect and enhance the resilience and sustainability of the Caribbean's marine environment. This involves, *inter alia*, enhancing marine governance, expanding marine observation networks, strengthening impact-based forecasting, improving air quality monitoring and modelling, building adequate capacities for tailored marine products and services, promoting responsible ocean resource use, and supporting community-based initiatives.

Regional Initiatives Addressing the Key Challenges

2.06 To enhance marine governance and address challenges in human and technological capabilities, along with limited access to data across different spatio-temporal scales, CIMH Board of Governors and the Caribbean Meteorological Council² have endorsed the creation of a Regional Marine Forecast Support Centre (RMFSC). The RMFSC has been established and operates at CIMH to support the development of capacity within National Meteorological and Hydrological Services (NMHS) and other national institutions within the Caribbean Meteorological Organization (CMO) Member States to: (a) develop, deliver and interpret marine meteorological forecasts and associated impacts within their respective jurisdictions; (b) continuously deliver marine forecasts, monitoring and early warning supporting products and services for the wider Caribbean Sea and adjacent oceans at spatial and temporal scales that meet the needs of stakeholders in key sectors, including disaster risk management, fisheries, coastal zone management, marine transport, security/search and rescue, and tourism; and (c) improve the understanding of deep ocean circulation processes and their role in influencing the Region's climate systems and related food supply systems.

2.07 The CDB-funded project "Expanded Weather and Climate Forecasting and Innovative Product and Service Development and Delivery in the Caribbean" executed by CIMH from 2017 - 2022, supported the assessment and feasibility study for the RMFSC. Under this project, CIMH and the University of the West

² The Caribbean Meteorological Council (CMC) is the governing body of the CMO, a specialised agency of CARICOM that coordinates the scientific and technical activities in weather, climate and water-related sciences in 16 Caribbean countries. CMC meets once per year to define policy for CMO.

Indies (UWI), Climate Studies Group, Mona also collaborated to initiate the development of high-resolution ensemble climate predictions for the Caribbean at the 20-km domain. However, they did not complete downscaling to the 10-km domain, which would provide finer details for evidence-based planning and decision making.

2.08 The World Meteorological Organization (WMO), through the Climate Risk and EWS Caribbean Trust Fund, also supported the development of RMFSC. This included a technical visit to the Center for Ocean-Atmospheric Prediction Studies (COAPS), an institution within the Florida State University College of Arts and Sciences known for its advanced research and high-quality data services. CIMH staff's visit to COAPS facilitated the advancement of an operational ocean circulation forecasting model currently used by CIMH for marine predictions, encompassing currents, tides, water quality, and pollutants. Additionally, CIMH is establishing a Memorandum of Understanding with COAPS to bolster collaboration in marine modelling, product development, and service delivery.

2.09 The Moisture and Aerosol Gradients/Physics of Inversion Evolution programme, a collaboration among scientists at the Naval Postgraduate School, CIMH, the National Ocean and Atmospheric Administration, the National Aeronautics and Space Administration, and many universities, seeks to understand energy and atmospheric exchanges through clouds between the warm subtropical ocean and the atmosphere, and their impact on weather and climate. The first phase of the experiment ended in August 2023 with a spotter buoy deployment near Ragged Point, Barbados. The spotter buoy was re-deployed in the eastern part of Barbados in February 2024 with support from the CIMH. Additional buoys operate near the northern Leeward Islands and southeastern Bahamas, but coverage is limited in the Caribbean Sea and east of the Atlantic Island chain. Expansion is planned for Turks and Caicos Islands and Trinidad and Tobago using similar technology.

2.10 Over the last decade, CIMH has been involved in programmes that support air quality monitoring and prediction across the Region, with an emphasis on aligning them with health and energy impacts. In 2017, WMO designated CIMH as the Pan American Node in its Sand and Dust Storm Warning and Advisory and Assessment System platform. A key goal of the Node is to convert air quality data and information from disparate sources to actionable information for sectors like health and energy.

2.11 In 2016, the CIMH in collaboration with regional air quality monitoring partners, and health sector professionals and institutions established the Caribbean Aerosol and Health Network (CAHN) to support effective integration of air quality information into health EWS in the Caribbean. A successful regional conference in October 2021 by EarthMedic and EarthNurse Foundation for Planetary Health³ showcased progress by facilitating interactions among regional air quality specialists and the medical community. However, the CAHN continues to face challenges due to the limited number of air quality observations on many islands and inadequate funding to support regional training workshops to facilitate interactions between the air quality community and the health sector community.

2.12 CIMH is currently in the process of procuring high-quality air quality monitoring stations through the EU funded Intra-ACP Climate Services and Related Applications programme. One will be placed in SVG and a possible second one in Barbados. It is expected that these stations will form the cornerstones of emerging national air quality monitoring systems in both countries. However, more stations remain necessary to expand the network across the Region.

³ [EarthMedic](#) and EarthNurse Foundation for Planetary Health is a global, non-profit organisation, which has a specialised focus on climate-vulnerable regions, primarily centered in the Caribbean Small Island Developing States. The organisation has several partners including CIMH, Pan American Health Organization (PAHO), and the UWI.

Climate Change and Health Research in the Caribbean

2.13 Climate change is significantly impacting health and health systems in the Caribbean through intensified climate disruptions, including hurricanes, rising sea levels, extreme heat, warming oceans, droughts, and their resulting increase in injuries, deaths, heat-related illnesses, vector-borne diseases, mental health disorders, and population displacement. Gender inequalities worsen these impacts on women, including livelihood disruptions, increased care burdens, heightened risk of displacement, and exposure to gender-based violence.

2.14 A recent World Health Organisation report highlighted a lack of related research publications in the Caribbean and Central America, prompting over twenty-five Caribbean and global organisations to sponsor a landmark Conference on CC and health in Small Island Developing States in October 2021. The conference aimed to establish an action-oriented research agenda for CC and health in the Caribbean. In late 2021, representatives from five core conference organisers⁴ initiated the Research for Action on Climate Change and Health in the Caribbean Project to develop a Caribbean Research for Action Agenda (CRAA) on CC and health. The CRAA integrated conference proceedings, research documents, the Caribbean Public Health Agency's State of Public Health in the Caribbean Report 2017-2018 on climate and health, peer-reviewed literature, gray literature, and expert and stakeholder consultations.

2.15 The proposed TA project will help consolidate on-going and prior initiatives by addressing gaps in coastal and marine monitoring, data availability, air quality monitoring and use for health-related alerts, and expertise in these areas.

CARIBBEAN INSTITUTE FOR METEOROLOGY AND HYDROLOGY

2.16 The CIMH is an Institution of CARICOM and the technical organ of the CMO. The mandate of the CIMH is to assist in improving and developing the meteorological and hydrological services as well as providing awareness of the benefits of meteorology and hydrology for the economic well-being of the sixteen CMO Member States⁵. This is achieved through training, research, investigations, and the provision of related specialised services and advice. The organisational structure is shown at Appendix 1.

2.17 In achieving its mandate, the CIMH has established an affiliation with the UWI, Cave Hill campus, where its primary responsibility is to deliver the Bachelor of Science programme in Meteorology in the Faculty of Pure and Applied Sciences. The CIMH is also recognised by WMO as (a) its designated Regional Training Centre in the Caribbean for Meteorology and Hydrology and related disciplines, (b) its designated Regional Instrument Centre for the Caribbean, (c) a Centre of Excellence in Satellite Meteorology Training, (d) its designated Regional Climate Centre for the Caribbean and (e) the Pan American Node of the Sand and Dust Storm Warning Alerting and Assessment System.

2.18 The CIMH hosts and manages the Caribbean Centre for Climate and Environmental Simulations established within the last decade in recognition of the Region's need for high-speed computing to support operational and research activities in meteorology, hydrology, climatology and marine science. In addition, the CIMH is the Climate Data Centre for CMO Member States and is recognised as the leading regional centre for research and development related to meteorology, hydrology, agro-meteorology and climate and their applications. More recently, the CIMH established the Regional Marine Forecast Centre to support

⁴ EarthMedic and EarthNurse Foundation for Planetary Health, the Emory Rollins School of Public Health, PAHO, the UWI, and the Center on Climate Change and Health at Yale School of Public Health.

⁵ Anguilla, Antigua and Barbuda, Barbados, Belize, British Virgin Islands, Cayman Islands, Dominica, Grenada, Guyana, Jamaica, Montserrat, St. Kitts and Nevis, Saint Lucia, SVG, Trinidad and Tobago, Turks and Caicos.

operational marine forecasting across the Region and to provide some of the science essential for improving marine governance and decision making.

2.19 The CIMH is active in such areas, including but not limited to environmental modelling, hydrological risk impacts forecasting and EWS development. The CIMH has strong collaborations with other regional institutions such as the Caribbean Disaster Emergency Management Agency, the Caribbean Community Climate Change Centre, the CCREEE, the Caribbean Tourism Organization, CDB and the Caribbean Agriculture Research and Development Institute in addition to national organisations in CMO Member States. The CIMH also has strong links with the international community inclusive of donor agencies, universities, research and development centres and intergovernmental organisations.

3. ISSUES AND CONSTRAINTS

3.01 Over the last decade, there has been a significant increase in the field of data science, with widespread applications across various scientific domains globally. However, the Caribbean has not kept pace with this trend, especially in leveraging data science to address crucial environmental challenges such as those related to weather, water, climate, and marine ecosystems, along with their cascading effects on sectors and socio-economic conditions.

3.02 In the Caribbean, the degradation of coastal and marine resources and ecosystems has significantly increased, facing threats from natural hazards, CC, and human activities. These challenges seriously jeopardise the health and viability of these vital resources for the Region. Many people, particularly the most vulnerable, including women, girls, boys, PWDs, fishermen and fisherwomen and indigenous and tribal people depend largely on these resources for their livelihoods and well-being. Sustainable management of coastal and marine resources is hindered by inadequate marine governance processes, resulting from limited human and technological capacities, along with insufficient data at varying spatio-temporal scales, and financial resources.

3.03 Limited availability of reliable and updated scientific data negatively affects the assessment of hazard risks and impacts to ecosystems and public health. Inadequate open data policies and specialised secure data sharing arrangements among key stakeholders hinder the Region's potential for deriving insights and analytics from weather, climate, air quality, and health data. Moreover, the lack of integration of climate and weather analysis from various stakeholders into decision-making processes poses challenges in comprehensively addressing regional issues such as food security, public health and tourism which arise from degraded coastal and marine ecosystems and air quality. Additionally, a critical challenge persists in the Region's insufficient capacity to fully harness the potential of data-driven solutions for complex problems.

3.04 Other challenges include the absence of robust frameworks to define, model, and mitigate the impact of cascading hazards, posing risks to communities in the Region and succinct documentation to guide policymakers on the impact of climate change on health so that policymakers, practitioners, and communities are informed by research that is context specific.

4. PROPOSAL

4.01 It is proposed that CDB approve a grant to CIMH in an amount not exceeding the equivalent of one million, five hundred and forty-two thousand, one hundred United States dollars (USD1,542,100) from CDB's SFR allocated from the CARE Programme to finance consultancy services and the procurement of goods and services aimed at strengthening institutional capacities for coastal and marine resource and air quality monitoring, impact-based forecasting, EWS, and resilience building in the Caribbean (The Project). The support includes:

- (a) Developing a marine observation and service platform that complements existing regional marine observation networks, including:
 - (i) Design and implementation of an optimal low-cost sustainable buoy network⁶ for coastal areas across the Region that continuously records and transmits in near-real time wave and swell heights among others to publicly accessible databases and modelling platforms⁷.
 - (ii) Engagement of a marine modeller to improve the existing and increase the number of marine forecasting products currently being run by the CIMH and strengthen CIMH's delivery of marine related training and research in the Region.
 - (iii) Building technical capacity through attachment/visits of CIMH staff to marine research institutions to enhance marine model development within the RMFSC.
- (b) Expanding air quality monitoring and modelling platforms across the region, including:
 - (i) Procurement and installation of at least two tapered element oscillating microbalance (TEOM) plus drone payload⁸ to support air quality monitoring in areas of concern in at least two countries⁹.
 - (ii) Internships to support air quality monitoring/modelling activities at CIMH and in equipment recipient countries.
- (c) Developing a regional strategic framework for enhancing air quality monitoring, modelling and early warning system, including:
 - (i) Engagement of a consultant to develop a regional air quality monitoring strategic framework.
 - (ii) A regional stakeholder workshop to support the development of a regional air quality monitoring strategic framework.
 - (iii) Publication and distribution of the regional strategic framework.
- (d) Completion of the expanded high-resolution ensemble of climate predictions for the Caribbean, including:
 - (i) Engagement of a climate modeler to support climate modelling activities at CIMH.
 - (ii) Development of climate ensemble model, along with a pilot sectoral application¹⁰.
 - (iii) Training workshop to further advance climate modelling application capacities across NMHSs and research institutions.
- (e) Developing/demonstrating a framework for defining, modelling and mitigating community-level impacts associated with cascading hazards, including:

⁶ Existing SoFAR Network across the Region (CIMH to provide link on the network and justification for direct selection).

⁷ Examples: Marine modelling platform and Caribbean DEWETRA platform at CIMH.

⁸ Air quality sensors attached to the drone for collection of air quality data.

⁹ Selection of countries will be guided by a gap analysis aimed at enhancing network coverage. The gap analysis is being done internally by CIMH, and this is expected to be completed by September 2024.

¹⁰ The energy sector is targeted based on prior work of CIMH with the CCREEE on energy potential on energy potential in a context of changing climate. CCREEE and CIMH collaborated with key stakeholders on climate-resilience planning and decision-making. The proposal sectoral application aims to enhance climate data resolution for use in the energy sector.

- (i) Engagement of a consultant to develop a framework of cascading hazards and associated risks within an impact-based forecasting workflow.
 - (ii) Demonstration workshop for the application of the framework on a selected watershed within one pilot country (Dominica)¹¹ where precipitation may trigger landslide and flood hazards along with other secondary hazards.
- (f) Demonstration of the application of data analytics to support climate services and environmental and disaster management planning, policy and decision-making in the Caribbean, including:
 - (i) Knowledge transfer workshop/seminar to further accelerate the integration of data analytics among the NMHSs to address the nexus between science and policy¹².
 - (ii) Preparation of a white paper outlining a comprehensive approach and partnership arrangements for integrating data analytics into national and regional policy and decision-making processes.
- (g) Gender and socially responsive technical report on climate change and health published and disseminated.
 - (i) Caribbean Research for Action Agenda published as a PAHO technical report¹³.
 - (ii) Caribbean Research for Action Agenda disseminated through various forums.

5. OUTCOME

5.01 The expected outcome of this project is improved marine and coastal, and air quality observation, impact-based forecasting, and EWS across the Caribbean.

5.02 A Results Monitoring Framework is presented at Appendix 2 and the Work Implementation Schedule at Appendix 3.

6. JUSTIFICATION AND BENEFITS

6.01 Over the past two decades, the Caribbean has made substantial progress in monitoring natural hazard risks, coastal and marine resources management, disaster risk assessment and management, and building resilience across key sectors. However, given the magnitude of the challenges, the Region still needs substantial support to enhance its resilience. The current constraints in climate and disaster data, expertise gaps, and inadequate relevant policies and strategies hinder progress towards climate and disaster resilience as well as sustainable development. To address these challenges, a strategic and holistic approach is imperative, involving strategic partnerships to mobilise expertise and scale up financing.

6.02 The proposed TA project will help advance marine observation, impact-based forecasting and EWS throughout the Caribbean. In particular, the project finances the expansion of a marine observation and service platform, complementing existing regional marine observation networks. It will expand the low-

¹¹ Dominica represents a good case-study as is prone to a range of natural hazards, including high winds, heavy rainfall, flooding, landslides, earthquakes, and volcanoes. Hurricane Maria hit the island in September 2017, resulting in significant damage to housing, agriculture, water and electrical utilities, as well as transportation networks, due to intense rainfall, severe winds, landslides, and flooding.

¹² Relevant national, regional and international entities such as university and industry.

¹³ EarthMedic and EarthNurse Foundation for Planetary Health will lead this publication and will work closely with its partners, including CIMH and PAHO.

cost Sofar Ocean Spotter buoy network with state-of-the-art smart mooring technology to support network standardisation through the deployment of instruments familiar to the region. Data from the platform will also support validation of marine prediction models hosted by the RMFSC and future ocean-based experiments. As part of this TA project, a technical visit of CIMH staff to COAPS will be supported to build upon past research and development efforts, promote continued collaboration and strengthen marine products and services. Therefore, the project financing can yield significant practical benefits across the Region, including enhanced hazard preparedness, targeted risk mitigation measures, support for key economic sectors like tourism and fisheries to anticipate and adapt to disruptions, safeguarding life and property, and ultimately enhancing climate resilience.

6.03 The TA project supports the enhancement of air quality monitoring, modelling and EWS at national and regional levels including the application of unmanned aerial vehicles (UAVs) for environmental monitoring and mapping. UAV assets at the CIMH are managed through the Centre for Water Resources, Hydrology, Geoscience and Earth Observation Applications. CIMH UAV operators have received training to ensure the responsible use and maintenance of UAV technologies. In addition, UAV operators are required to consult relevant authorities to ensure that country specific permits and approvals are acquired prior to the deployment and use of UAV assets in-country. CIMH is also in the process of drafting a standard operating procedure (SOP) document¹⁴ to guide the use and application of drone assets at the CIMH.

6.04 Resources under the TA project also support the expansion of high-resolution climate prediction ensembles for the Caribbean and extend financing to the application and demonstration of data analytics for climate services and environmental and disaster management planning, policy and decision-making. This will facilitate knowledge transfer to bridge the gap between science and policy inclusive of a comprehensive white paper that will be developed, outlining approaches and partnerships for integrating data analytics into national and regional policy and decision-making¹⁵.

6.05 The project will explore the development of a framework to define, model, and mitigate cascading hazard impacts at the community level with a demonstration of the framework in Dominica. The insights garnered from this exercise will help enhance EWS in the Caribbean, providing key stakeholders with valuable information to mitigate increased risks within climate-sensitive sectors, particularly in the face of anticipated intensification of major hurricanes and other extreme weather events due to CC.

6.06 The project will support the publication and dissemination of a technical report on CC and health, targeting diverse audiences such as researchers, advocates, policymakers, and practitioners. Wide dissemination of the report's key findings will enhance public awareness about CC and health challenges in the Caribbean.

6.07 The project offers a range of benefits, including strengthening institutional capacities of CIMH and NMHSs, and PAHO, and enhancing the capabilities of decision-makers and practitioners in climate-sensitive sectors. The project will help maintain the health and viability of marine resources and ecosystems, thereby ensuring the sustainability of livelihoods for individuals who rely on these resources, particularly the most vulnerable groups in the Region.

¹⁴ Completion of this SOP document is expected by September 2024.

¹⁵ Key stakeholders, including researchers, practitioners, and decision-makers in climate sensitive sectors (e.g. tourism, agriculture, water, health) will be targeted. CIMH is to provide a list of entities targeted in consistency with the budget for 30 regional representatives and 40 international representatives.

6.08 Based on CDB's Performance Rating System, the project has been assessed as highly satisfactory with an overall score of 3.5. A summary of the project performance score is shown in Table 1, and the detailed Performance Rating System at Appendix 4.

TABLE 1: PROJECT PERFORMANCE SCORE SUMMARY

Criteria	Relevance	Effectiveness	Efficiency	Sustainability	Overall Score Highly Satisfactory
Score	4	3	3	4	3.5

7. GENDER MARKER AND PERFORMANCE ASSESSMENT

7.01 The Project is assessed as marginally mainstreamed (MM) based on CDB's Gender Marker, having scored a total of two points. The gender marker is summarised in Table 2 below. Please see Appendix 5 for further details on the gender marker and performance assessment.

TABLE 2: GENDER MARKER SUMMARY

GM	Analysis	Design	Implementation	Monitoring and Evaluation	Score	Code
	0.5	0.5	0.5	0.5	2.00	MM

8. EXECUTION

8.01 The project will be executed by CIMH over a 27-month period. CIMH will assign from among its staff, prior to the first disbursement of the Grant, a Project Coordinator (PC) who will be directly responsible for coordinating the execution of all project activities, performing project supervision and quality control of deliverables. Duties and responsibilities of the PC are presented at Appendix 6. The qualifications and experience of the PC and of any person subsequently assigned to the position of the PC shall be acceptable to CDB. CIMH will report to the ACP-EU-CDB CARE Programme Manager at CDB.

8.02 The academic and technical sections of the CIMH will support the PC in reviewing technical documents and ensuring the quality of deliverables. The Administration Section of CIMH will provide support for managing the financial resources, procuring goods and services, and preparing financial reports. Consultants will be engaged to provide services as set out in the Terms of References (TOR) at Appendix 7A-7G. They will report directly to the PC. EarthMedic and EarthNurse Foundation for Planetary Health will support the implementation of Output 1.7 and will report directly to the PC. A letter of commitment has been provided as Appendix 8.

8.03 The first disbursement of the Grant is expected to occur by November 30, 2024, and the final disbursement by September 30, 2026.

9. COST AND FINANCING

9.01 The total cost of the project is estimated to be one million, eight hundred and twenty-four thousand, one hundred United States dollars (USD1,824,100). From this total, one million, five hundred and forty-

two thousand, one hundred United States dollars (USD1,542,100) will be provided by a grant through CDB from the CARE Programme, and two hundred and eighty-two thousand, United States dollars (USD282,000) represent the counterpart contribution from CIMH.

9.02 The Financing Plan is summarised in Table 3. The main activities and the detailed budget are presented at Appendix 9.

TABLE 3 – SUMMARY OF FINANCIAL PLAN

Sources of Financing	USD	%
CDB	1,542,100	85%
CIMH	282,000	15%
TOTAL	1,824,100	100%

10. PROCUREMENT

10.01 Procurement shall be in accordance with the Procurement Policy for Projects Financed by CDB (November 2019) and the Procurement Procedures for Projects Financed by CDB (January 2021). Eligible countries are CDB member countries and, for procurement financed through resources allocated to CDB under the EU CARE Programme, eligibility shall be extended to countries which are eligible for procurement under the EU CARE Programme, in accordance with the applicable [EU Eligibility Rules](#) that form part of the CDB-EU Financing Agreement for EU CARE. The Procurement Plan is shown at Appendix 10.

10.02 CDB's usual practice is to allow for the allocation of a maximum of 30% of the resources provided for in the TA for the procurement of goods such as equipment and related items. In this Project the equipment required to be purchased is critical to facilitate continuous recording and transmission in near-real time wave and swell heights to publicly accessible databases and modelling platforms. Additionally, at least two TEOM plus drone payload will be procured to support air quality monitoring. Thus, it is proposed that 54% of the financing provided by CDB be utilised for equipment. This is consistent with the CARE Contribution Agreement (FED/2021/426-057).

11. RISK ASSESSMENT AND MITIGATION

11.01 The identified risks have been classified according to their relevance to the implementation and operational phases of the Project. Table 4 summarises these risks and potential mitigation measures to address them. An environmental, social, and climate and disaster risk assessment is presented later in this section.

TABLE 4: SUMMARY OF RISKS AND MITIGATION MEASURES

Risk Category	Risk Type	Level of Risk	Description of Risk	Mitigation Measures	Residual Risk
Operational (Project Delivery)	Procurement	High	Delays in procurement due to limited bidding from potential firms/suppliers .	Procurement processes will start as early as feasible and widely advertised.	
Operational (Project Delivery)	Implementation	Moderate	Impact of adverse/extreme weather.	In-country activities involving NMHSs will be programmed outside of peak hurricane season.	Acceptable
Financial	Budgetary	Moderate	Increase in the cost of goods due to inflation.	A 15% contingency was added to the direct eligible cost to address potential variations during implementation.	Acceptable

Environmental, social, and climate and disaster risk assessment

11.02 This project aims to advance coastal and marine resource and air quality monitoring, impact-based forecasting, early warning systems, and resilience building in the Caribbean. It is anticipated to have no adverse environmental or social impacts. On the contrary, it represents a proactive and positive step toward mitigating the impacts of climate change in the region. By enhancing the capacities of key meteorological and hydrological institutions, the project ensures that accurate and timely information is available for making informed decisions. This is crucial for sectors such as agriculture, fisheries, and tourism, which are particularly sensitive to climate variations.

11.03 Furthermore, the focus on public awareness and education helps to foster a more informed and resilient community. Numerous people, including the most vulnerable populations: women, girls, boys, PWDs, fisherfolks and indigenous and tribal communities, will benefit significantly from this project. These groups rely heavily on coastal and marine resources for their livelihoods and well-being. By targeting vulnerable groups, the project acknowledges and addresses the disparate impacts of climate change. These efforts contribute to a more equitable approach to resilience building, ensuring that the benefits of the project are widely shared and that the most at-risk populations are better protected against climate-related disasters.

In summary, this project not only mitigates potential risks but also leverages opportunities to build a more resilient and informed Caribbean, capable of facing the challenges posed by CC.

12. RECOMMENDATION

12.01 It is recommended that CDB's Board of Directors approve a grant to CIMH of an amount not exceeding the equivalent of one million, five hundred and forty-two thousand, one hundred United States

dollars (USD1,542,100) from CDB's SFR allocated from resources provided under the CARE Programme to assist CIMH in financing consultancy services and the procurement of goods and services aimed at strengthening institutional capacities for coastal and marine resource and air quality monitoring, impact-based forecasting, early warning systems, and resilience building in the Caribbean, on CDB's standard terms and conditions, and on the following terms and conditions:

No.	Subject	Terms and Conditions of the Grant
1.	Parties	<p><u>Bank</u>: Caribbean Development Bank (CDB).</p> <p><u>Beneficiary</u>: Caribbean Institute for Meteorology and Hydrology (CIMH)</p>
2.	Amount of Grant	<p>The Bank agrees to make available to the Beneficiary by way of grant, an amount not exceeding the equivalent of one million, five hundred and forty-two thousand, one hundred United States dollars (USD1,542,100), from the Special Funds Resources (SFR) of the Bank allocated from the Caribbean Action for Resilience Enhancement (CARE) Programme (the Grant).</p>
3.	Purpose	<p>The purpose for which the Grant is being made is to assist the Beneficiary in financing consultancy services and the procurement of goods and services aimed at strengthening institutional capacities for coastal and marine resources management and air quality monitoring, impact-based forecasting, early warning systems, and resilience building in the Caribbean, more particularly described in paragraph 4.01 of the Paper (the Project).</p>
4.	Disbursement of Grant	<p>Except as the Bank may otherwise agree, disbursement of the Grant shall be made by the Bank to the Beneficiary as follows:</p> <p>(a) an amount not exceeding the equivalent of two hundred and thirty-one thousand, three hundred and fifteen United States dollars (USD231,315) shall be paid to the Beneficiary as an advance (the Advance) on account of expenditures in respect of the Project after receipt by the Bank of: (i) a request in writing from the Beneficiary for such funds; and (ii) evidence, acceptable to the Bank that the conditions precedent to first disbursement of the Grant have been satisfied; and</p> <p>(b) the balance of the Grant (the Balance) shall be paid to the Beneficiary periodically after receipt by the Bank of an account and documentation satisfactory to the Bank in support of expenditures incurred by the Beneficiary in respect of, and in connection with, the Project.</p> <p>The Bank shall not be under any obligation to make:</p> <p>(a) the first payment of an amount of the Balance until the Bank shall have received an account and documentation satisfactory to the Bank, in support of expenditures incurred by the Beneficiary with respect to the Advance;</p> <p>(b) any subsequent payment of an amount of the Balance until</p>

		<p>the Bank shall have received: (i) an account and documentation, satisfactory to the Bank, in support of expenditures incurred by the Beneficiary in respect of or in connection with the Project; and (ii) the requisite number of copies of the reports or other deliverables, in form and substance acceptable to the Bank, required to be furnished by the Beneficiary to the Bank in accordance with the Reporting Requirements (as defined below); and</p> <p>(c) payments exceeding the equivalent of one million, three hundred and eighty-seven thousand, eight hundred and ninety United States dollars (USD1,387,890) representing ninety percent (90%) of the amount of the Grant until the Bank shall have received: (i) the requisite number of copies of the reports or other deliverables, in form and substance acceptable to the Bank, required to be furnished by the Beneficiary to the Bank in accordance with the Reporting Requirements; and (ii) a certified statement of the expenditures incurred by the Beneficiary in respect of, and in connection with the Project.</p> <hr/> <p>The Beneficiary shall comply with the Bank's "<i>Disbursement Guidelines for CDB-Financed Projects</i>" published in January 2019, which may be amended from time to time by the Bank.</p>
5.	Period of Disbursement	<p>The Bank shall have received an application for first disbursement of the Grant by November 30, 2024, or such later date as may be specified in writing by the Bank.</p> <p>The Grant shall be disbursed up to September 30, 2026, or such later date as may be specified in writing by the Bank.</p>
6.	Procurement	<p>Except as provided below, procurement of goods, works and/or services to be financed from the Grant resources shall be in accordance with the following policy and procedures or such other policy or procedures as the Bank may from time to time specify in writing:</p> <p><i>Procurement Policy for Projects Financed by CDB (November 2019)</i></p> <p><i>Procurement Procedures for Projects Financed by CDB (January 2021)</i></p> <p>Eligibility for procurement shall be extended to countries eligible for procurement under EU-funded projects, which are not Member Countries of the Bank.</p> <p>The Beneficiary shall comply with the procurement requirements set out in the Procurement Plan. Any revisions to the Procurement Plan shall require the Bank's prior approval in writing.</p>

7.	Additional Condition(s) Precedent to First Disbursement	The Bank shall not be obliged to make the first disbursement of the Grant until the Beneficiary has furnished or caused to be furnished to the Bank, evidence acceptable to the Bank, that the Project Coordinator (PC) has been assigned.
8.	Project Implementation	Except as the Bank may otherwise agree, the Beneficiary shall implement the Project.
9.	Project Management	<p>The Beneficiary shall assign as PC, a person from among the staff of the Beneficiary, with qualifications and experience acceptable to the Bank, to carry out the Duties and Responsibilities of the Project Coordinator.</p> <p>The qualifications and experience of any person subsequently assigned to the position of PC shall be acceptable to the Bank.</p>
10.	Engagement Consultant(s) of	<p>The Beneficiary shall, in accordance with the procurement policy and procedures applicable to the Grant, select and engage consultants to provide the following consulting services (the Consulting Services) identified for financing by the Bank set out in Section III of the Procurement Plan in accordance with the applicable TORs for the Consulting Services:</p> <ul style="list-style-type: none"> (i) Marine Forecaster Services Consultant (ii) Consultancy services for expansion of air quality monitoring and predictions (iii) Air Quality Monitoring and Prediction Internship (3 interns) (iv) Consultancy services for cascading hazard workflow development (v) Climate modeller services consultant (vi) Publication and dissemination of the Caribbean research for action agenda on climate change and health consultancy (vii) Communication Internship <p>The Beneficiary shall, within a timeframe acceptable to the Bank, implement such recommendations arising from the Consulting Services, as may be acceptable to the Bank.</p>
11.	Beneficiary's Contribution to the Project	<p>Except as the Bank may otherwise agree, the Beneficiary shall:</p> <p>(a) meet or cause to be met:</p> <ul style="list-style-type: none"> (i) the cost of the items designated for financing by the Beneficiary in the Detailed Budget; (ii) any amount by which the cost of the Project exceeds the cost set out in the Detailed Budget; and (iii) the cost of any other items needed for the purpose of, or in connection with, the Project; and

		(b) provide all other inputs required for the punctual and efficient implementation of the Project, which are not being financed by the Bank.
12.	Reports and Information	Except as the Bank may otherwise agree, the Beneficiary shall furnish or cause to be furnished to the Bank the reports and information required to be furnished to the Bank in accordance with the Duties and Responsibilities of the Project Coordinator and the TOR(s) for the Consulting Services , in the form specified therein, or in such form or forms as the Bank may require, not later than the times specified therein for so doing (Reporting Requirements).
13.	Additional Event(s) of Suspension, Cancellation and Refund	The Bank shall be entitled to suspend, cancel or require a refund of the Grant, or any part thereof, if the whole or any part of the CARE Programme resources is suspended, cancelled or required to be refunded.
14.	CARE Programme Conditions	<p><u>Information and Visibility:</u></p> <p>Unless the European Commission requests or agrees otherwise, the Beneficiary shall take all appropriate measures to publicise the fact that the Project has received funding from the European Union (EU). Information given to the press, as well as all related publicity material, official notices, reports and publications shall acknowledge that the Project was carried out "with funding by the European Union" and shall display the EU logo (twelve yellow stars on a blue background) in an appropriate way. Publications by the Beneficiary pertaining to the Project, in whatever form and whatever medium, including the internet, shall carry the following disclaimer: "This document was produced with the financial assistance of the European Union. The views expressed herein can in no way be taken to reflect the official opinion of the European Union." Such measures shall be carried out in accordance with the Communication and Visibility Requirements for EU External Action published by the European Commission, or with any other guidelines agreed between the European Commission and the Bank.</p> <p><u>Access and financial checks:</u></p> <p>The Beneficiary shall allow the European Commission, or any authorised representatives, to conduct desk reviews and on-the-spot checks on the use made of the CARE Programme resources on the basis of supporting accounting documents and any other document related to the financing of the Project.</p> <p>The Beneficiary agrees that the European Anti-Fraud Office (OLAF) may carry out investigations, including on-the-spot checks and inspections, in accordance with the provisions laid down by EU law for the protection of the financial interests of the EU against fraud, corruption and any other illegal activity.</p>

		The Beneficiary undertakes to provide officials of the European Commission, OLAF and the European Court of Auditors and their authorised agents, upon request, information and access to any documents and computerised data concerning the technical and financial management of operations financed under the Agreement, as well as grant them access to sites and premises at which such operations are carried out. The Beneficiary shall take all necessary measures to facilitate these checks in accordance with its Regulations and Rules.
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SUPPORTING DOCUMENTATION:

Appendix 1:	CIMH Organisational Structure
Appendix 2:	Results Monitoring Framework
Appendix 3:	Work Implementation Schedule
Appendix 4	Performance Rating System
Appendix 5	Gender Marker
Appendix 6	Duties and Responsibilities of the Project Coordinator
Appendix 7A	TOR Marine Forecaster Services
Appendix 7B	TOR Expansion of Air Quality Monitoring and Prediction
Appendix 7C	TOR Air Quality Monitoring and Prediction Internships
Appendix 7D	TOR Cascading Hazard Workflow Development
Appendix 7E	TOR Climate Modeller Services
Appendix 7F	TOR Publication and Dissemination of the Caribbean Research for Action Agenda on CC and Health Consultancy
Appendix 7G	TOR Communication Internship
Appendix 8	Letter of Commitment from EarthMedic and EarthNurse Foundation for Planetary Health
Appendix 9	Detailed Budget
Appendix 10	Procurement Plan

THE CARIBBEAN INSTITUTE OF METEOROLOGY AND HYDROLOGY
ORGANISATIONAL STRUCTURE

1.01 Organigram/Board Composition: the CIMH is managed by a Board of Governors which is composed of 16 members, each nominated by the parent Ministry under which the National Meteorological and Hydrological Service (NMHS) aligns. The representative is often either the Permanent Secretary from the Ministry who may at times be represented by, or accompanied by, the Director of the NMHS. The Chairman of the Board of Governors is the Permanent Secretary of the Ministry under which the Barbados Meteorological Service is aligned.

1.02 Reporting relationship to parent Ministry: the CIMH does not report directly to a national Ministry. In recent years, the Principal has been reporting to the Board of Governors twice per year, at the annual meeting of the Board of Governors and at the annual mid-year meeting. The Principal of the CIMH and the Chairman of the Board of Governors report annually to the Caribbean Meteorological Council (CMC).

1.03 Number of personnel: the CIMH has an effective staff complement of approximately 50 persons, the majority of whom are focused on technical areas of training, research and development in areas of meteorology, hydrology, climatology, marine science, instrumentation, data management and IT. Other staff provide administrative and facility management support.

1.04 Work programme, key products and services: the annual work programme of the technical staff include:

- (a) ***Training*** - the CIMH conducts a series of in-house vocational training programmes annually that support capacity building in NMHSs. The CIMH also manages the Bachelor of Science programme in Meteorology at the University of the West Indies Cave Hill Campus where it delivers a series of courses annually in support of the programme. Staff also support graduate level training at the University of the West Indies. The CIMH also delivers a suite of online continuing professional development courses annually.
- (b) ***Research and Development*** - most of the technical staff at CIMH are engaged in various levels of research and development activities related to meteorology, hydrology/water resources management, climatology/climate services and marine science. Much of this work integrates into a broad range of multi-hazard early warning systems aligned with climate, weather and water sensitive sectors. In addition, the work feeds into improving and identifying new opportunities in agriculture and food security, tourism, water resources management, energy and health services among others.
- (c) ***Climate Services (WMO Designate Regional Climate Centre for the Caribbean - RCC)*** - co-design, co-develop and co-deliver climate services for climate sensitive sectors. Develop and deliver regional climate outlooks and climate bulletins. Conduct research leading to improvements in the range and quality of regional and national climate services. Conduct training as needed. Coordinate the Wet and Dry Season Caribbean Climate Outlook Forum (CariCOF) as well as coordinate the Caribbean Early Warning Information System Across Climate Timescales Partner Consortium annual meeting and activities. Publish peer review articles. The RCC supports resource mobilisation to advance the development and delivery of climate services across the region.
- (d) ***WMO Designate Regional Instruments Centre (RIC)*** - coordinates capacity building in CMO Member States in the design, management and maintenance of instrument networks. The RIC is actively engaged in the calibration of meteorological instruments as well as the

design and management of regional hydro-meteorological networks and increasingly the management and deployment of marine related observation networks. The RIC also supports resource mobilisation efforts related to the strengthening of regional observation and early warning systems. The RIC is an integral part of the regional system that facilitates the real-time collection and movement of high-quality meteorological, hydrological, marine and climate data around the region.

- (e) ***Centre for Water Resources, Hydrology, Geo-Sciences and Earth Observation Applications*** - delivers annual training in operational hydrology, water resources management, water quality monitoring, geographic information systems (GIS), remote sensing and geophysics among others. The Centre supports resource mobilisation as well as the deployment and maintenance of hydro-meteorological observation and early warning systems. The Centre is actively engaged in a range of hydrological and earth science modelling efforts across the region to support efficient and effective resources management and risk assessments among others. The Centre manages several regional platforms including the online Caribbean Dewetra Platform which integrates a range of disparate data to support disaster risk reduction, planning and development. The Centre coordinates the Caribbean Weather and Climate Ready Nations programme.
- (f) ***Regional Marine Forecast Support Centre*** - the Centre was established in 2021 to support enhancing and improving all aspects of marine governance in the Caribbean Sea and adjacent oceans. The Centre is focused on the delivery of a suite of daily products including 7-day significant wave-height, salinity, temperature, chlorophyll and current forecasts. These and related products are made available to the public. In August 2023, the Moisture and Aerosol Gradients/Physics of Inversion Evolution (MAGPIE) field campaign which includes CIMH as a partner, installed a Spotter Buoy (similar to that proposed for procurement under this proposal) off the east coast of Barbados to measure a suite of marine parameters including sea surface temperature, wave height, wave spread, wave period and wave speed and direction. The data sampled from the network will support research as well as verification of the marine models currently being generated by CIMH. The CIMH also manages a coastal sea level monitoring station at Consett Bay, St. John, Barbados. The data from this station is made available to the public and is used by CIMH for model verification purposes.
- (g) ***WMO Designated Pan-American Node of the Global Sand & Dust Storm Warning Assessment and Advisory System (SDS-WAS)*** - designated in 2017, the Node supports the coordination and reporting of sand and dust storm related activities as well as any air quality activities in the Pan-American region. In the Caribbean region, the Node collaborates with Caribbean Aerosol and Health Network (CAHN) on the development of a suite of early warning products and services for the regional health and energy sectors. The Node is in the process of developing a region-wide real-time air quality monitoring network to complement CIMH's regional air quality modelling platform.
- (h) ***Caribbean Centre for Climate and Environmental Simulations (CCCES)*** - the CCCES has been operating since 2015. The CCCES effectively consolidates all of CIMH's computational infrastructure into a single framework, infrastructure and management unit. All of CIMH's model outputs, including daily regional high-resolution model outputs, are produced using the resources of the CCCES. These include (a) 7-day high-resolution predictions; (b) daily 2 - 5 day high-resolution weather prediction products; (c) all coupled high-resolution hydro-meteorological simulations focused on flood early warning; and (d) high-resolution climate models. The platform is open to researchers across the Caribbean.

RESULTS MONITORING FRAMEWORK

	Results chain	Indicator	Baseline	Target	Source and mean of verification	Assumptions
Impact	Enhance regional resilience to climate risks and impacts.					
Outcome	Outcome 1 - Improved coastal and marine and air quality observation, impact-based forecasting, and early warning systems across the Caribbean.	Number of persons (disaggregated by sex) who have acknowledged acquiring skills in impact-based forecasting and/or climate data analytics.	(0) December 2023	(15) September 2026	Survey of trainees from project activities.	National and regional agencies/stakeholders are engaged and actively participate in the project.
Outputs	Output 1.1 - A marine observation and service platform that complements existing regional marine observation networks developed.	Number of marine monitoring stations added to the marine monitoring network.	(2) December 2023	(50) December 2025	CIMH progress reports. CIMH installation reports. CDB supervisory reports.	Procurements are executed in accordance with the project implementation plan.
		Number of persons trained in installation and maintenance in marine monitoring stations (disaggregated by sex)	(0) December 2023	(30) June 2026	CIMH progress reports.	Capacity building activities are executed in accordance with the project implementation plan.
		Number of marine products upgraded or developed.	(3) September 2023	(4) April 2025	CIMH progress reports. New (upgraded) products publicly accessible on existing CIMH portal.	Portal/Application is operational for hosting products.
		Number of CIMH staff trained in the development of marine products.	(0) - January 2024	(2) November 2025	Mission report. CIMH progress reports.	Capacity building activities are executed in accordance with the project implementation plan.
	Output 1.2 - Air quality monitoring and modelling platforms across the region expanded.	Number of air quality monitoring stations added to the air quality monitoring network.	(3) - January 2024	(5) November 2025	CIMH installation reports. CIMH progress reports. CDB supervisory reports.	Procurements are executed in accordance with the project implementation plan.

	Results chain	Indicator	Baseline	Target	Source and mean of verification	Assumptions
		Number of interns engaged to work with air quality data.	(0) - January 2024	(3) - June 2026	Intern reports. CIMH progress reports.	Qualified interns applied for the available positions.
	Output 1.3 - A regional strategic framework for enhancing air quality monitoring, modelling and early warning system developed.	Number of regional strategic frameworks developed.	(0) - January 2024	(1) - June 2025	Published strategy.	Consultancies are executed in accordance with the project implementation plan.
		Number of regional organisations with enhanced awareness about air quality monitoring strategic framework.	(0) - January 2024	(5) - December 2025	Consultant reports. CIMH progress reports. CDB supervisory reports.	
	Output 1.4 - Expanded high-resolution ensemble of climate predictions for the Caribbean region completed.	Number of high-resolution climate prediction outputs for the Caribbean accessible.	(0) - January 2024	(3) - March 2025	Consultant reports. CIMH progress reports.	Consultancies and capacity building activities are executed in accordance with the project implementation plan.
		Number of persons trained on the application of sectoral climate data disaggregated by sex.	(0) - January 2024	(15) - March 2025	CDB supervisory reports.	
	Output 1.5 - Framework for defining, modelling and mitigating community-level impacts associated with cascading hazards developed and demonstrated.	Number of frameworks developed and presented to regional disaster management personnel and/or first responders.	(0) - December 2023	(1) - March 2026	Consultant reports. CIMH progress reports. CDB supervisory reports. Demonstrated framework.	Consultancies and capacity building activities are executed in accordance with the project implementation plan.
	Output 1.6 - Application of data analytics to support climate services and environmental and disaster management planning, policy and decision-making in the Caribbean demonstrated.	Number of persons (disaggregated by sex) engaged in the awareness of data analytics methodologies for enhancing climate services, environmental and disaster management policy.	(3) - December 2023	(43) -May 2026	CIMH progress reports. CDB supervisory reports.	Consultancies and capacity building activities are executed in accordance with the project implementation plan.

	Results chain	Indicator	Baseline	Target	Source and mean of verification	Assumptions
		Number of white papers published on data analytics methodologies for enhancing climate services, environmental and disaster management policy.	(0) - December 2023	(1) - June 2026	Published white paper.	
	Output 1.7 - Technical report on climate change and health published and disseminated	Number of published PAHO technical reports on climate and health.	0 – January 2024	1 – December 2025	CIMH progress reports. CDB supervisory reports. Published PAHO report.	Consultancies and internships are executed in accordance with the project implementation plan.

WORK IMPLEMENTATION SCHEDULE

[illegible]

[illegible]

[illegible]

PERFORMANCE RATING SYSTEM

Criteria	Score	Justification
Relevance	4	Governments in the Caribbean are increasingly acknowledging the wealth within their marine ecosystems. They are enhancing governance frameworks, establishing ministries dedicated to the Blue Economy, and expressing support for SDG 14, which emphasizes the sustainable use of oceans and marine resources for development. The proposed TA aligns with the Revised Regional Framework for Achieving Development Resilient to Climate Change (2023-2033). The project scope is consistent with CIMH's mandate, CDB's "Climate Resilience Strategy 2019-2024" and the strategic objective of building environmental resilience as presented in CDB's Strategic Plan Update 2022-2024. It aligns with the ACP EU-CDB Caribbean Action for Resilience Enhancement (CARE) priorities of enhancing climate resilience building efforts in CDB BMCs, particularly CARE's expected outcomes of "Improving governance on disaster risk management (DRM) and climate change adaptation in the Borrowing Member Countries (BMCs) of CDB" and "strengthening evidence-based and gender sensitive decision-making and financial response of the BMCs to climate change effects and natural hazards".
Effectiveness	3	The project is informed by previous similar initiatives, especially the CDB-funded project "Expanded Weather and Climate Forecasting and Innovative Product and Service Development and Delivery in the Caribbean" executed by CIMH from 2017- 2022, which supported the assessment and feasibility study for the RMFSC. This has facilitated effective collaboration between CIMH and CSGM/UWI in developing high-resolution ensemble climate predictions for the Caribbean. The experience and expertise of CIMH in implementing these types of projects and collaboration with key institutions in the region, including CDB, CSGM/UWI and CCCCC, will help deliver on the project outputs and achieve project expected outcomes.
Efficiency	3	CIMH has a successful track record in executing CDB-funded projects. This will facilitate compliance with CDB procedures for efficient project implementation. Potential risks to project implementation are identified along with feasible risk mitigation measures. Costs for implementing project activities have been thoroughly evaluated. The expected cost of this Project is considered reasonable, and the activities and deliverables are expected to be achieved within the established timeframe and budget.
Sustainability	4	The project is well-articulated to complement prior and on-going initiatives to improve coastal and marine resources management and climate resilience in the region. The project's scope aligns with the mandates of CIMH and other key partner institutions like UWI/CSGM and CCCCC, presenting an opportunity to build on its achievements. With a strong technical programme and a dedicated staff specialising in weather, water and climate applications, CIMH is well-positioned to collaborate effectively with key partners. This collaboration is likely to result in the design and successful implementation of relevant initiatives to consolidate project achievements beyond its conclusion.
Overall Score	3.5	Highly Satisfactory

GENDER MARKER

Project Cycle Stage	Criteria	Score
Analysis: Introduction/ Background/ Preparation	Consultations with women/girls/men/boys and relevant gender-related or sector-related public or private organisations have taken place.	0.0
	Social analysis identifies gender issues and priorities.	0.25
	Macroeconomic analysis identifies gender issues and priorities	0.25
	To address the needs of women/girls and men/boys concrete interventions to reduce existing gender disparities have been designed. Effect on project outcome is direct.	0.5
	Project objective / outcome includes gender equality.	0.0
Implementation: Execution	Implementation arrangements (gender mainstreaming capacity building or gender expertise in implementing agency) to enhance the gender capacity of the implementing agency. Effect on project outcome is indirect.	0.5
	Terms of reference of project coordinating unit / project management unit include responsibilities of gender mainstreaming, especially at the levels of the project coordinator/director and the M&E officer	0.0
	Sex-disaggregated data included in the baselines, indicators and targets of the RMF.	0.0
	<i>Or</i>	<i>Or</i>
	Collection of sex-disaggregated data required for M&E (stated and budgeted in Project)	0.0
	At least one gender-specific indicator at the outcome and/or output level in the RMF.	0.5
Maximum Score:		2
Marginally Mainstreamed: the project has limited potential to contribute to gender equality		

DUTIES AND RESPONSIBILITIES OF THE PROJECT COORDINATOR

1. The primary responsibility of the Project Coordinator (PC) is to give technical and administrative oversight for the project, coordinate the execution of all project activities to ensure quality of deliverables and that project objectives are achieved.
2. The duties and responsibilities of the PC will also include, but are not limited to:
 - (a) managing the selection and engagement of consultants, and the procurement of goods and services;
 - (b) updating the Procurement Plan as necessary and at least annually;
 - (c) facilitating the Caribbean Institute for Meteorology and Hydrology (CIMH) and key external stakeholder consultations;
 - (d) liaising with the Caribbean Development Bank (CDB) on all technical, administrative and financial aspects of the project;
 - (e) liaising with EarthMedic and EarthNurse Foundation for Planetary Health as required;
 - (f) coordinating production of various communication and visibility materials, as required;
 - (g) reviewing technical documents related to the project and preparing and submitting progress reports to CDB; and
 - (h) executing any other tasks as assigned by CIMH to facilitate the successful completion of the project.
3. The PC must have recognised credentials (Masters degree or higher) in Environment Sciences, Climatology, Hydrology, Project Management or related fields, and at least seven years' experience in Project and Programme Management is required. The PC shall also have a good understanding of climate early warning systems; coastal and marine ecosystems management and strong communication skills.
4. The PC will be required to provide the following reports and deliverables to CDB:
 - (a) an Inception Report within two weeks of the signing of the Grant Agreement and a revised implementation schedule of all key activities;
 - (b) Bi-Monthly progress reports following the Inception Report until the end of the assignment; and
 - (c) A Project Completion Report within two months following the end of the assignment.

DRAFT TERMS OF REFERENCE

MARINE FORECASTER SERVICES CONSULTANT

1. BACKGROUND

1.01 The Caribbean Institute for Meteorology and Hydrology (CIMH) is an Institution of the Caribbean Community (CARICOM) and the technical Organ of the Caribbean Meteorological Organization (CMO). The mandate of the CIMH is to assist in improving and developing the meteorological and hydrological services as well as providing awareness of the benefits of meteorology and hydrology for the economic well-being of the sixteen (16) CMO Member States. This is achieved through training, research, investigations, and the provision of related specialised services and advice.

1.02 In achieving its mandate, the CIMH has established an affiliation with the University of the West Indies, Cave Hill campus, where its primary responsibility is to deliver the B.Sc. programme in Meteorology in the Faculty of Pure and Applied Sciences. The CIMH is also recognised by the World Meteorological Organization as (a) its designated Regional Training Centre in the Caribbean for Meteorology and Hydrology and related disciplines, (b) its designated Regional Instrument Centre for the Caribbean, (c) a Centre of Excellence in Satellite Meteorology Training, (d) its designated Regional Climate Centre for the Caribbean and (e) the Pan American Node of the Sand and Dust Storm Warning Alerting and Assessment System.

1.03 The CIMH hosts and manages the Caribbean Centre for Climate and Environmental Simulations established within the last decade in recognition of the region's need for high-speed computing to support operational and research activities in meteorology, hydrology, climatology and marine science. In addition, the CIMH is the Climate Data Centre for CMO Member States and is recognised as the leading regional centre for research and development related to meteorology, hydrology, agro-meteorology and climate and their applications. More recently, the CIMH established the Regional Marine Forecast Centre to support operational marine forecasting across the region and to provide some of the science essential for improving marine governance and decision making.

1.04 The CIMH is active in such areas, including but not limited to environmental modeling, hydrological risk impacts forecasting and early warning system development. The CIMH has strong collaborations with other regional institutions such as the Caribbean Disaster Emergency Management Agency, the Caribbean Community Climate Change Centre, the Caribbean Centre for Renewable Energy and Energy Efficiency, the Caribbean Tourism Organization, the Caribbean Development Bank and the Caribbean Agriculture Research and Development Institute in addition to national organisations in CMO Member States. The CIMH also has strong links with the international community inclusive of donor agencies, universities, research and development centres and intergovernmental organisations.

1.05 Small Island Developing States (SIDS) are defined as largely coastal as they have a large coastal area to land mass ratio. This often means that SIDS have marine exclusion zones and related resources that are significantly greater than their land mass. As a result, the coastal and marine environment plays a critical role in the evolution of nearly all aspects of SIDS including their socio-economic development. The Caribbean region relies heavily on its marine ecosystem for its food security with fisheries providing a significant low-cost component of the daily protein diet of many persons. Marine related activities such as fisheries, tourism, recreation, shipping and mineral resource mining among others contribute significantly to the sustainable development of the region through jobs and revenue generated. Although the marine environment contributes significantly to regional economies, marine related and influenced natural and anthropogenic hazards pose significant threats to the sustainable development of the region. For example, an outcome of climate change is sea level rise which will inundate low lying coastlines and communities

across the region destroying lives and livelihoods in the process. This situation will be further exacerbated by storm surges and significant waves related to the passage of significant weather events through the region or north-westerly swells emanating from North America. Elevated sea surface temperatures provide the heat that drives many of the significant weather events across the region. Under future climates, increased sea surface temperatures and their increased occurrences compared to present day are anticipated to support intensification of severe weather events further exacerbating coastal inundation, coastal erosion and the destruction of coastal marine ecosystems and habitats leading to significant socio-economic impacts.

1.06 Caribbean states are heavily dependent on oil and gas imports to address their increasing energy demands. To address this problem and reduce the Region's dependence on external sources of energy, offshore oil and gas production in the Southern Caribbean has increased significantly with Guyana joining Trinidad and Tobago and Suriname in the offshore production and export of petroleum products. This increased industrial activity in the marine environment poses significant threats to marine ecosystems in the Caribbean given the northerly marine currents that transport water and sediment from South America to the Caribbean. These northerly currents are also responsible for the movement of significant freshwater plumes from South American rivers, in particular, the Amazon and Orinoco rivers, to the Caribbean. These plumes alter the chemical and physical properties of the marine environment in and around Caribbean islands leading to impacts to marine biodiversity including fisheries. With changes to the climate over the watersheds feeding these river systems, coupled with changes in land use in many of these watersheds, there is a growing concern related to the periodic and long-term evolution of marine water quality in the Caribbean and its long-term impacts on the region's biodiversity. Over the last two decades, these changes to marine biodiversity in the region are being seen with the increasing persistence and regularity of sargassum seaweed across the region which impacts fisheries, the usability of beaches for tourism and degrades air quality in coastal regions when it decays.

1.07 Improving marine governance processes in the Caribbean to sustainably manage the region's marine resources and ecosystems, requires human capacity, technological capacity and a range of data at varying spatio-temporal scales. To support addressing some of these areas, the Board of Governors of the CIMH and the Caribbean Meteorological Council approved the establishment of a Regional Marine Forecast Support Centre (RMFSC) to be supported and managed through the CIMH based on recommendations from a feasibility study executed by OEA Technologies in 2020 under the ACP-EU-CDB-NDRM programme. The specific aims of the RMFSC include (a) support for the development of capacity within National Meteorological and Hydrological Services (NMHSs) and other national institutions within CMO Member States to develop, deliver and interpret marine meteorological forecasts and associated impacts within their respective jurisdictions; (b) deliver in a sustainable manner marine forecast, monitoring and early warning supporting products and services for the wider Caribbean Sea and adjacent oceans at spatial and temporal scales that meet the needs of stakeholders including disaster management, fisher folk, coastal zone management, marine transport, security/search and rescue, and tourism; and (c) improve the understanding of deep ocean circulation processes and their role in influencing the region's climate systems and related food supply systems.

1.08 Under the ACP-EU-CDB-NDRM programme, staff at the CIMH also received training in marine forecasting and was provided with train-the-trainer material to build further capacity and enhance regional marine forecasting related training programmes. This capacity building effort led to the development at the CIMH of prototype operational marine forecasting applications including but not limited to deep ocean circulation, free surface and surface currents. Model development was subsequently enhanced in 2023 through technical visits to the Center for Ocean-Atmospheric Prediction Studies and HR Wallingford under the USAID funded Strengthening Disaster and Climate Resilience programme that was executed by the CIMH. The outputs for the prototype marine applications are currently hosted by the CIMH and continue to be under development.

2. OBJECTIVES

2.01 The focus of this consultancy is to enhance marine products produced by the CIMH and strengthen the delivery of marine related training and research across the region and in particular the member states of the CIMH and borrowing member countries of the Caribbean Development Bank.

3. SCOPE OF WORK

3.01 The specific duties and responsibilities of the Consultant include:

- (a) Assess the operational workflows currently used for prototype model development and visualisation.
- (b) Enhancing marine related products currently being produced. (e.g. model setup, validation)
- (c) Increase the number of marine products/services offered through the RMFSC at CIMH.
- (d) Strengthening the CIMH's capacity for research and the delivery of training programmes in marine forecasting to NMHSs and the stakeholders across the Caribbean.

4. QUALIFICATIONS AND EXPERIENCE

4.01 The Consultant is required to have recognised credentials (with strong preference being given to candidates with MSc and PhD degrees) in either Meteorology, Marine Science, Oceanography, Marine Meteorology or related disciplines. In addition, the Consultant must have:

- (a) more than ten (10) years of experience delivering training in areas of marine forecasting and the development of marine forecasting products to a broad range of stakeholders;
- (b) experience building marine forecasting programmes;
- (c) experience working with developing countries, particularly in the Caribbean.
- (d) Excellent communication and interpersonal skills, with the ability to engage and collaborate with diverse stakeholders.

5. REPORTING AND DELIVERABLES

5.01 The Consultant will report to the Project Coordinator and is required:

- (a) Assessment report on the current operational workflows for prototype marine model application.
- (b) Report on enhanced and new marine product/service delivery.
- (c) Report detailing possible areas of research and training programmes inclusive of technical/financial/human resources required.
- (d) Training syllabi for internal training programme for the CIMH staff along with identification of a proposed programme for advanced study for a least one member of staff

6. DURATION

6.01 The contract will be for a total of 42.5 man-days over a duration not exceeding eight (8) months.
Indicative level of effort:

NO.	BROAD ACTIVITY	DAYS
1.	Inception Meeting - Familiarisation Meeting; Aligning Expectations and Finalising roles and responsibilities and schedules.	2.5
2.	Assessment Of Existing Workflows - Assess the operational workflows currently used for prototype model development and visualisation.	5
3.	Marine Model Enhancement -Enhance marine related products currently being produced. (e.g. model setup, validation)	20
4.	Develop New Marine Products/Services - Increase the number of marine products/services offered through the RMFSC at CIMH	10
5.	Build CIMH's Capacity for Research and Delivery of Training in Marine Forecasting - Strengthening the CIMH's capacity for research and the delivery of training programmes in marine forecasting to NMHSs and the stakeholders across the Caribbean.	5
	Total man days	42.5

DRAFT TERMS OF REFERENCE**CONSULTANCY SERVICES FOR EXPANSION OF AIR QUALITY MONITORING AND PREDICTIONS****1. BACKGROUND**

1.01 Air quality in urban centres in the Caribbean is declining due to increasing urbanization and associated anthropogenic factors such as exhaust from vehicular traffic with noticeable declines observed during rush hour periods. Air quality in such areas is also often impacted by dust generated from construction activities, local and global industrial activity. In the case of the latter, these changes over Barbados are being monitored through the Advanced Global Atmospheric Gases Experiment (AGAGE) facility at Ragged Point, St. Philip, managed by Bristol University. The AGAGE facility samples over 30 chemical species every 20 minutes. Locally, the Government of Barbados, similar to other Governments across the Caribbean, periodically monitors air quality across the island, including in urban areas. The need to monitor air quality over islands in the Caribbean was highlighted during the eruption of the La Soufriere volcano on St. Vincent and the Grenadines in which significant quantities of volcanic ash and gas covered significant portions of the island and neighbouring islands with little to no monitoring of air quality over affected islands - little ability to qualitatively link the decline in air quality to health impacts. Similarly, the decline in air quality during periods of elevated brush fire occurrences and the associated health impacts are not typically monitored and documented.

1.02 To support the more effective integration of air quality information into health early warning systems in the Caribbean, the CIMH, along with regional air quality monitoring partners and health sector professionals and institutions, established the Caribbean Aerosol and Health Network (CAHN). It is recognized that the CAHN has the potential to contribute significantly to improving the link between air quality and health outcomes in the Region. However, its full potential has not been achieved due to (a) the limited number of air quality observations on many islands in the region which limit the development and implementation air quality early warning systems and (b) limited funding to support regional training workshops to facilitate interactions between the air quality community and the health sector community. The CIMH is in the process of procuring at least one high-quality air quality monitoring station through the EU funded ClimSA programme - one to be placed on St. Vincent and the Grenadines and a possible second to be placed on Barbados. It is expected that these stations will form the cornerstones of emerging national air quality monitoring systems in both countries. In a complementary effort, at least two (2) air quality monitoring stations identical to those procured under the ClimSA programme will be deployed in Belize and Jamaica to jumpstart expansion of systematic air quality measurements on those islands and transfer knowledge through the CAHN to identify air quality products and services of interest to the health sector.

1.03 Over the last decade, the CIMH has embarked on programmes that support air quality monitoring and prediction across the region and have linked these to health and energy impacts. In 2017, the WMO designated the CIMH as the Pan American Node in its Sand and Dust Storm Warning and Advisory and Assessment System (SDS-WAS) platform. A key goal of the Node is to convert air quality data and information from disparate sources to actionable information for the health sector and other relevant sectors such as the energy sector.

2. OBJECTIVES

2.01 The focus of this consultancy is to develop a strategy for expanded air quality monitoring and predictions to support early warning systems and impact-based forecasting in the region and in particular the member states of the CIMH and borrowing member countries of the Caribbean Development Bank.

3. SCOPE OF WORK

3.01 Within the framework of the Caribbean Action for Resilience Programme, the specific duties and responsibilities of the consultant include:

- (a) The review of existing air quality monitoring and prediction platforms in the Region;
- (b) The development of a regional strategic framework for expanding air quality monitoring and predictions in the Caribbean; and
- (c) Integration of air quality monitoring and predictions into impact-based forecasting workflows

4. QUALIFICATIONS AND EXPERIENCE

4.01 The consultant is required to have recognised credentials (with strong preference being given to candidates with MSc and PhD degrees in either Atmospheric Science, Meteorology or related disciplines. In addition, the consultant should have:

- (a) At least ten (10) years experience working with air quality monitoring/modelling platforms;
- (b) experience delivering strategic frameworks;
- (c) experience working within developing countries, particularly in the Caribbean;
- (d) Excellent communication and interpersonal skills, with the ability to engage and collaborate with diverse stakeholders; and
- (e) Proficiency in English is essential. Proficiency in French or Dutch is an asset.

5. REPORTING AND DELIVERABLES

5.01 The Consultant will report to the Project Coordinator and is required to produce the following deliverables:

- (a) Inception Report summarising inception meeting findings. The report should also include an updated proposal/implementation plan for the consultancy.
- (b) Assessment Report - including a review of existing air quality monitoring and prediction platforms in the region.
- (c) Delivery of consultation session with relevant regional stakeholders for the finalization of the regional strategic framework.
- (d) Regional strategic framework for expanding air quality monitoring and prediction.
- (e) Report/Presentation on regional strategic framework inclusive of the Integration of Impact-based Forecasting Workflows

6. DURATION

The contract will be for a total of 37.5 man-days over a duration not exceeding twelve (12) months.

NO.	BROAD ACTIVITY	MAN DAYS
1.	Inception meeting - Familiarisation meeting; aligning expectations and finalising roles and responsibilities and schedules.	2.5
2.	Assessment of existing air quality capabilities - a review of existing air quality monitoring and prediction platforms in the Region.	10
3.	Development of air quality strategic framework - consultation session with relevant regional stakeholders for the finalisation of the regional strategic framework.	20
4.	Report/presentation on air quality strategic framework.	5
	Total man days	37.5

DRAFT TERMS OF REFERENCE

AIR QUALITY MONITORING AND PREDICTION INTERNSHIP

1. BACKGROUND

1.01 The Caribbean Institute for Meteorology and Hydrology (CIMH) is an Institution of the Caribbean Community (CARICOM) and the technical Organ of the Caribbean Meteorological Organization (CMO). The mandate of the CIMH is to assist in improving and developing the meteorological and hydrological services as well as providing awareness of the benefits of meteorology and hydrology for the economic well-being of the sixteen (16) CMO Member States. This is achieved through training, research, investigations, and the provision of related specialised services and advice.

1.02 In achieving its mandate, the CIMH has established an affiliation with the University of the West Indies, Cave Hill campus, where its primary responsibility is to deliver the B.Sc. programme in Meteorology in the Faculty of Pure and Applied Sciences. The CIMH is also recognised by the World Meteorological Organization as (a) its designated Regional Training Centre in the Caribbean for Meteorology and Hydrology and related disciplines, (b) its designated Regional Instrument Centre for the Caribbean, (c) a Centre of Excellence in Satellite Meteorology Training, (d) its designated Regional Climate Centre for the Caribbean and (e) the Pan American Node of the Sand and Dust Storm Warning Alerting and Assessment System.

1.03 The CIMH hosts and manages the Caribbean Centre for Climate and Environmental Simulations established within the last decade in recognition of the region's need for high-speed computing to support operational and research activities in meteorology, hydrology, climatology and marine science. In addition, the CIMH is the Climate Data Centre for CMO Member States and is recognised as the leading regional centre for research and development related to meteorology, hydrology, agro-meteorology and climate and their applications. More recently, the CIMH established the Regional Marine Forecast Centre to support operational marine forecasting across the region and to provide some of the science essential for improving marine governance and decision making.

1.04 The CIMH is active in such areas, including but not limited to environmental modeling, hydrological risk impacts forecasting and early warning system development. The CIMH has strong collaborations with other regional institutions such as the Caribbean Disaster Emergency Management Agency (CDEMA), the Caribbean Community Climate Change Centre, the Caribbean Centre for Renewable Energy and Energy Efficiency, the Caribbean Tourism Organization, the Caribbean Development Bank and the Caribbean Agriculture Research and Development Institute in addition to national organisations in CMO Member States. The CIMH also has strong links with the international community inclusive of donor agencies, universities, research and development centres and intergovernmental organisations.

1.05 Air quality in urban centres in the Caribbean is declining due to increasing urbanization and associated anthropogenic factors such as exhaust from vehicular traffic with noticeable declines observed during rush hour periods. Air quality in such areas is also often impacted by dust generated from construction activities, local and global industrial activity. In the case of the latter, these changes over Barbados are being monitored through the Advanced Global Atmospheric Gases Experiment (AGAGE) facility at Ragged Point, St. Philip, managed by Bristol University. The AGAGE facility samples over 30 chemical species every 20 minutes. Locally, the Government of Barbados, similar to other Governments across the Caribbean, periodically monitors air quality across the island, including in urban areas. The need to monitor air quality over islands in the Caribbean was highlighted during the eruption of the La Soufriere volcano on St. Vincent and the Grenadines in which significant quantities of volcanic ash and gas covered

significant portions of the island and neighboring islands with little to no monitoring of air quality over affected islands - little ability to qualitatively link the decline in air quality to health impacts. Similarly, the decline in air quality during periods of elevated brush fire occurrences and the associated health impacts are not typically monitored and documented.

1.06 To support the more effective integration of air quality information into health early warning systems in the Caribbean, the CIMH, along with regional air quality monitoring partners and health sector professionals and institutions, established the Caribbean Aerosol and Health Network (CAHN). It is recognized that the CAHN has the potential to contribute significantly to improving the link between air quality and health outcomes in the region. However, its full potential has not been achieved due to (a) the limited number of air quality observations on many islands in the region which limit the development and implementation air quality early warning systems and (b) limited funding to support regional training workshops to facilitate interactions between the air quality community and the health sector community. The CIMH is in the process of procuring at least one high-quality air quality monitoring station through the EU funded ClimSA programme - one to be placed on St. Vincent and the Grenadines and a possible second to be placed on Barbados. It is expected that these stations will form the cornerstones of emerging national air quality monitoring systems in both countries. In a complementary effort, at least two air quality monitoring stations identical to those procured under the ClimSA programme will be deployed in Belize and Jamaica to jumpstart expansion of systematic air quality measurements on those islands and transfer knowledge through the CAHN to identify air quality products and services of interest to the health sector.

1.07 Over the last decade, the CIMH has embarked on programmes that support air quality monitoring and prediction across the region and have linked these to health and energy impacts. In 2017, the WMO designated the CIMH as the Pan American Node in its Sand and Dust Storm Warning and Advisory and Assessment System (SDS-WAS) platform. A key goal of the Node is to convert air quality data and information from disparate sources to actionable information for the health sector and other relevant sectors such as the energy sector.

2. OBJECTIVES

2.01 The focus of this internship is to support the expansion of air quality monitoring and prediction activities across the region and in particular the member states of the CIMH and borrowing member countries of the Caribbean Development Bank.

3. SCOPE OF WORK

3.01 The specific duties and responsibilities of the intern include:

- (a) Site reconnaissance and placement of air quality monitoring equipment.
- (b) Support for the installation and commissioning of air quality monitoring equipment.
- (c) Support for the enhancement of air quality modelling platforms at the CIMH.

4. QUALIFICATIONS AND EXPERIENCE

4.01 The intern is required to have recognised credentials (with strong preference being given to candidates with MSc and PhD degrees) in either Atmospheric Science, Meteorology or related disciplines. Specifically, the candidate must be currently registered in an MSc or PhD programme or have completed the MSc or PhD in the last 1-3 years. In addition, the intern should have:

- (a) General knowledge of meteorological observation/modelling platforms;
- (b) Experience working within the Caribbean;
- (c) Excellent research, communication and interpersonal skills, with the ability to engage and collaborate with diverse stakeholders;
- (d) Proficiency in English is essential. Proficiency in French or Dutch is an asset.

5. REPORTING AND DELIVERABLES

- 5.01 The Intern will prepare monthly progress reports and a final report of internship to the Project Coordinator.

6. INTERNSHIP ARRANGEMENTS AND DURATION

- 6.01 The remunerated internship contract will be for a duration of not exceeding eight months. The candidates are expected to reside in Barbados for the duration of the internship unless otherwise agreed. Overseas travel may be required.

DRAFT TERMS OF REFERENCE

CONSULTANCY SERVICES FOR CASCADING HAZARD WORKFLOW DEVELOPMENT

1. BACKGROUND

1.01 The Caribbean Institute for Meteorology and Hydrology (CIMH) is an Institution of the Caribbean Community (CARICOM) and the technical Organ of the Caribbean Meteorological Organization (CMO). The mandate of the CIMH is to assist in improving and developing the meteorological and hydrological services as well as providing awareness of the benefits of meteorology and hydrology for the economic well-being of the sixteen (16) CMO Member States. This is achieved through training, research, investigations, and the provision of related specialised services and advice.

1.02 In achieving its mandate, the CIMH has established an affiliation with the University of the West Indies, Cave Hill campus, where its primary responsibility is to deliver the B.Sc. programme in Meteorology in the Faculty of Pure and Applied Sciences. The CIMH is also recognised by the World Meteorological Organization as (a) its designated Regional Training Centre in the Caribbean for Meteorology and Hydrology and related disciplines, (b) its designated Regional Instrument Centre for the Caribbean, (c) a Centre of Excellence in Satellite Meteorology Training, (d) its designated Regional Climate Centre for the Caribbean and (e) the Pan American Node of the Sand and Dust Storm Warning Alerting and Assessment System.

1.03 The CIMH hosts and manages the Caribbean Centre for Climate and Environmental Simulations established within the last decade in recognition of the Region's need for high-speed computing to support operational and research activities in meteorology, hydrology, climatology and marine science. In addition, the CIMH is the Climate Data Centre for CMO Member States and is recognised as the leading regional centre for research and development related to meteorology, hydrology, agro-meteorology and climate and their applications. More recently, the CIMH established the Regional Marine Forecast Centre to support operational marine forecasting across the region and to provide some of the science essential for improving marine governance and decision making.

1.04 The CIMH is active in such areas, including but not limited to environmental modeling, hydrological risk impacts forecasting and early warning system development. The CIMH has strong collaborations with other regional institutions such as the Caribbean Disaster Emergency Management Agency, the Caribbean Community Climate Change Centre, the Caribbean Centre for Renewable Energy and Energy Efficiency, the Caribbean Tourism Organization, the Caribbean Development Bank and the Caribbean Agriculture Research and Development Institute in addition to national organisations in CMO Member States. The CIMH also has strong links with the international community inclusive of donor agencies, universities, research and development centres and intergovernmental organisations.

1.05 The Caribbean region is globally recognized as being extremely vulnerable to disasters from natural hazards. These include tropical storms and significant rainfall events that may trigger secondary hazards such as flooding and landslides. It is expected that the rate of occurrence of such extreme events will increase under a changing climate. Within the last decade, considerable attention has been given to the concepts of cascading hazards, impact-based forecasting (IBF) and forecast-based financing (FBF). Within the Caribbean context, IBF is being delivered through the Weather and Climate Ready Nations (WCRN) programme. For the IBF and FBF frameworks to deliver on their potential, forecasting tools and workflows need to be mainstreamed. Enhancing flood forecasting workflows through the integration of numerical weather prediction outputs provides disaster management officials with early warning information to mitigate impacts and reduce losses. Delivery of such information through the application of IBF concepts improves alerting and warning for at risk communities.

1.06 The multiplicity of coincident primary and cascading hazards, their socio-economic implications and the need to develop appropriate and related early warning systems to risk-inform communities is recognized and has been increasingly discussed in recent years. Notwithstanding, little effort has been expended to build appropriate modeling systems to fully understand, predict and mitigate risks to communities posed by cascading hazards. The project aims to explore frameworks for defining, modeling and mitigating community level impacts from cascading hazards. The outputs from the work will be used to strengthen IBF in the Caribbean through the exploration and mapping of cascading hazards and their impacts on communities supported by a review and documentation of impacts to communities associated with specific hazard events. Such events are expected to increase in frequency under a changing climate with a shift towards more intense storms and severe precipitation events expected by the end of the century resulting in increased risk to climate sensitive sectors.

2. OBJECTIVES

2.01 The focus of this consultancy is to strengthen impact-based forecasting through the exploration of frameworks for defining, modelling and mitigating community-level impacts associated with cascading hazards.

3. SCOPE OF WORK

3.01 The specific duties and responsibilities of the Consultant include:

- (a) Design and delivery of a framework for consideration of cascading hazards including precipitation, landslide and flooding in a watershed and integration into early warning system design.
- (b) Demonstration of the application of the framework on a watershed in one (1) pilot country at demonstration workshop

4. QUALIFICATIONS AND EXPERIENCE

4.01 The Consultant is required to have recognised credentials (with strong preference being given to candidates with MSc and PhD degrees) in either Hydrology, Geography or related disciplines. In addition, the Consultant must have:

- (a) more than ten (10) years of experience working with hydrological and/or earth systems modeling;
- (b) experience working with developing countries, particularly in the Caribbean.
- (c) Excellent communication and interpersonal skills, with the ability to engage and collaborate with diverse stakeholders.
- (d) Proficiency in English is essential. Proficiency in French or Dutch is an asset.

5. REPORTING AND DELIVERABLES

5.01 The Consultant will report to the Project Coordinator and is required:

- (a) Inception Report.

- (b) Report on the consideration of cascading hazards within an impact-based forecasting workflow.
- (c) Demonstration of the application of the framework on a watershed in one (1) pilot country

6. DURATION

The contract will be for a total of 37.5 man-days, over a duration not exceeding eight (8) months. Indicative level of effort:

NO.	BROAD ACTIVITY	MAN DAYS
1.	Inception meeting - Familiarisation Meeting; Aligning Expectations and Finalizing roles and responsibilities and schedules.	2.5
2.	Design and delivery of framework - Design, development and delivery of framework.	30
3.	Demonstration of the application of the framework - facilitation of two-day demonstration workshop (in-country) of framework focussed on a watershed in one pilot country.	5
	Total man days	37.5

DRAFT TERMS OF REFERENCE

CLIMATE MODELLER SERVICES CONSULTANT

1. BACKGROUND

1.01 The Caribbean Institute for Meteorology and Hydrology (CIMH) is an Institution of the Caribbean Community (CARICOM) and the technical Organ of the Caribbean Meteorological Organization (CMO). The mandate of the CIMH is to assist in improving and developing the meteorological and hydrological services as well as providing awareness of the benefits of meteorology and hydrology for the economic well-being of the sixteen (16) CMO Member States. This is achieved through training, research, investigations, and the provision of related specialised services and advice.

1.02 In achieving its mandate, the CIMH has established an affiliation with the University of the West Indies, Cave Hill campus, where its primary responsibility is to deliver the B.Sc. programme in Meteorology in the Faculty of Pure and Applied Sciences. The CIMH is also recognised by the World Meteorological Organization as (a) its designated Regional Training Centre in the Caribbean for Meteorology and Hydrology and related disciplines, (b) its designated Regional Instrument Centre for the Caribbean, (c) a Centre of Excellence in Satellite Meteorology Training, (d) its designated Regional Climate Centre for the Caribbean and (e) the Pan American Node of the Sand and Dust Storm Warning Alerting and Assessment System.

1.03 The CIMH hosts and manages the Caribbean Centre for Climate and Environmental Simulations established within the last decade in recognition of the region's need for high-speed computing to support operational and research activities in meteorology, hydrology, climatology and marine science. In addition, the CIMH is the Climate Data Centre for CMO Member States and is recognised as the leading regional centre for research and development related to meteorology, hydrology, agro-meteorology and climate and their applications. More recently, the CIMH established the Regional Marine Forecast Centre to support operational marine forecasting across the region and to provide some of the science essential for improving marine governance and decision making.

1.04 The CIMH is active in such areas, including but not limited to environmental modeling, hydrological risk impacts forecasting and early warning system development. The CIMH has strong collaborations with other regional institutions such as the Caribbean Disaster Emergency Management Agency, the Caribbean Community Climate Change Centre, the Caribbean Centre for Renewable Energy and Energy Efficiency, the Caribbean Tourism Organization, the Caribbean Development Bank and the Caribbean Agriculture Research and Development Institute in addition to national organisations in CMO Member States. The CIMH also has strong links with the international community inclusive of donor agencies, universities, research and development centres and intergovernmental organisations.

1.05 Long-term climate change and increasing climate variability represent fundamental challenges that individually and collectively threaten the long-term sustainable development of Caribbean states. Over the last two decades, it has become abundantly clear that the Caribbean region will have to focus significant effort and resources adapting to climate change and increasing climate variability through, in part, the building of resilience in climate sensitive sectors such as agriculture, disaster risk management, water resources management and health among others. Given the limited human and economic resources of the Caribbean region, the region's adaptation strategy must be well designed and efficiently implemented to maximize the return on investment. Germain to achieving this outcome are high-resolution short-term and long-term climate projections that are appropriately scaled to address sectoral planning and development concerns down to the community level.

1.06 Increased temperatures and a drier climate have the potential to disrupt the production of renewable energy (e.g. solar, hydro-power) if resilience strategies aren't implemented. Building sectoral resilience requires an assessment of risk of which the first step is risk identification. This can be achieved in part through the development and application of high-resolution ensemble of future climate predictions aimed at sectoral applications. Under ACP-EU-CDB-NDRM programme, the CIMH and the Climate Studies Group Mona (CSGM) collaborated to commence the development of high-resolution ensemble climate predictions for the Caribbean. The effort included the determination of (a) the storage requirements for boundary data and other pre-processed files, (b) the optimal size for the model domains, (c) storage requirements for model outputs, (d) the most efficient virtual machine configuration and (e) computational effort. RegCM4 downscaled for GFDL (RCP 8.5), HadGEM (RCP 4.5, 2.6 & 8.5) and CNRM (RCP 4.5) were completed for the 20-km resolution domain using a computational platform rented from a commercial cloud computing service. Downscaling to the 10 km remains to be completed in addition to the development and application of weather research forecast for climate to generate a multi-model ensemble.

2. OBJECTIVES

2.01 The focus of this consultancy is to complete the downscaling of regional climate models for varying Representative Concentration Pathways (RCPs) and to further advance capacity development activities that commenced under the 10th European Development Fund African Caribbean Pacific- European Union- Caribbean Development Bank Natural Disaster Risk Management in CARIFORUM Countries (ACP-EU-CDB-NDRM) Programme aimed at enhancing climate modeling skills as well as developing skill towards the development of a cadre of regional professionals capable of efficiently utilizing the ensembles for sectoral and other applications.

3. SCOPE OF WORK

3.01 The specific duties and responsibilities of the Consultant include:

- (a) Review of the climate model outputs generated under the ACP-EU-CDB-NDRM programme engagement with CSGM.
- (b) Advance the climate model development activities that commenced under the ACP-EU-CDB-NDRM programme towards the availability of downscaled climate projection data for sectoral applications.
- (c) Strengthening the application of climate modelling outputs within the Caribbean through the delivery of training to across National Meteorological and Hydrological Services (NMHSs) and research institutions.

4. QUALIFICATIONS AND EXPERIENCE

4.01 The Consultant is required to have recognised credentials (with strong preference being given to candidates with PhD degrees) in either Meteorology, Climatology or related disciplines. In addition, the Consultant must have:

- (a) more than ten (10) years of experience applying and downscaling regional climate models
- (b) more than ten (10) years delivering training in climate modelling to a broad range of stakeholders;
- (c) experience working with developing countries, particularly in the Caribbean.

- (d) Excellent communication and interpersonal skills, with the ability to engage and collaborate with diverse stakeholders.
- (e) Proficiency in English is essential. Proficiency in French or Dutch is an asset.

5. REPORTING AND DELIVERABLES

5.01 The Consultant will report to the Project Coordinator and is required:

- (a) Inception report inclusive of proposed training outline.
- (b) Assessment report of the review of existing climate models and products.
- (c) Report on the climate model development and application.
- (d) Report on training inclusive of training materials, participant list and pre- and post-evaluation.

6. DURATION

The contract will be for a total of 37.5 man-days, over a duration not exceeding eight (8) months. Indicative level of effort:

NO	BROAD ACTIVITY	MAN DAYS
1.	Inception meeting - Familiarisation Meeting; Aligning Expectations and Finalising roles and responsibilities and schedules.	2.5
2.	Assessment of existing climate model outputs - Review of the climate model outputs generated under the ACP-EU-CDB-NDRM programme engagement with CSGM.	5
3.	Advance climate model activities - Advance the climate model development activities that commenced under the ACP-EU-CDB-NDRM programme towards the availability of downscaled climate projection data for sectoral applications.	20
4.	Strengthening the application of climate modelling outputs within the Caribbean - Deliver training to National Meteorological and Hydrological Services (NMHSs), CIMH and research institutions.	10
	Total man days	37.5

DRAFT TERMS OF REFERENCE**PUBLICATION AND DISSEMINATION OF THE CARIBBEAN RESEARCH FOR ACTION
AGENDA ON CLIMATE CHANGE AND HEALTH CONSULTANCY****1. BACKGROUND**

1.01 The Caribbean Institute for Meteorology and Hydrology (CIMH) is an Institution of the Caribbean Community (CARICOM) and the technical Organ of the Caribbean Meteorological Organization (CMO). The mandate of the CIMH is to assist in improving and developing the meteorological and hydrological services as well as providing awareness of the benefits of meteorology and hydrology for the economic well-being of the sixteen CMO Member States. This is achieved through training, research, investigations, and the provision of related specialised services and advice.

1.09 In achieving its mandate, the CIMH has established an affiliation with the University of the West Indies, Cave Hill campus, where its primary responsibility is to deliver the B.Sc. programme in Meteorology in the Faculty of Pure and Applied Sciences. The CIMH is also recognised by the World Meteorological Organization as (a) its designated Regional Training Centre in the Caribbean for Meteorology and Hydrology and related disciplines, (b) its designated Regional Instrument Centre for the Caribbean, (c) a Centre of Excellence in Satellite Meteorology Training, (d) its designated Regional Climate Centre for the Caribbean and (e) the Pan American Node of the Sand and Dust Storm Warning Alerting and Assessment System.

1.02 The CIMH hosts and manages the Caribbean Centre for Climate and Environmental Simulations established within the last decade in recognition of the region's need for high-speed computing to support operational and research activities in meteorology, hydrology, climatology and marine science. In addition, the CIMH is the Climate Data Centre for CMO Member States and is recognised as the leading regional centre for research and development related to meteorology, hydrology, agro-meteorology and climate and their applications. More recently, the CIMH established the Regional Marine Forecast Centre to support operational marine forecasting across the region and to provide some of the science essential for improving marine governance and decision making.

1.10 The CIMH is active in such areas, including but not limited to environmental modeling, hydrological risk impacts forecasting and early warning system development. The CIMH has strong collaborations with other regional institutions such as the Caribbean Disaster Emergency Management Agency (CDEMA), the Caribbean Community Climate Change Centre, the Caribbean Centre for Renewable Energy and Energy Efficiency, the Caribbean Tourism Organization, the Caribbean Development Bank and the Caribbean Agriculture Research and Development Institute in addition to national organisations in CMO Member States. The CIMH also has strong links with the international community inclusive of donor agencies, universities, research and development centres and intergovernmental organisations.

1.03 EarthMedic and EarthNurse was founded in 2020 to mobilise health professionals and others to face the climate and health crisis through advocacy, training, research, and partnerships, beginning in the Caribbean. In January 2021, the NGO was legally incorporated as a not-for-profit, with their headquarters in Trinidad and Tobago. EarthMedic and EarthNurse collaborated with the CIMH in 2022-2024 on delivery of regional, live-virtual training courses on climate change and health for health professionals and others, which reached over 600 persons in over 30 countries.

1.04 Climate change, along with the related crises of pollution and loss of biodiversity, represents the greatest threat to public health in the 21st Century. Climate change is having multiple adverse health effects

in the Caribbean, one of the most vulnerable regions in the world to the effects of the climate crisis. Climate disruptions in the region are at an all-time high, with intense hurricanes, floods and landslides, accelerating sea level rise, extreme heat, warming oceans, and drought causing increased injuries and deaths, heat-related illness, vector borne diseases, mental health disorders, non-communicable diseases, and population displacement.

1.05 In response to this climate/health crisis, in 2021 representatives from five partner institutions -- EarthMedic and EarthNurse Foundation for Planetary Health, the Emory Rollins School of Public Health, the Pan American Health Organization, the University of the West Indies, and the Center on Climate Change and Health at Yale School of Public Health - formed the Research for Action on Climate Change and Health in the Caribbean Project (R4ACCHCP) to develop a Caribbean Research for Action Agenda (CRAA) on climate change and health, and which is now complete. Development of the CRAA was supported by a small grant from the US National Oceanic and Atmospheric Administration (NOAA).

1.06 The CRAA has identified 18 research priority areas in four domains:

1. **Health** impacts, exposures and vulnerability
2. **Adaptation**, planning and resilience for health
3. **Mitigation** actions and health co-benefits
4. **Resources and engagement** for climate change and health action

1.07 As a member and co-chair of the R4ACCHCP consortium which developed the CRAA, EarthMedic and EarthNurse is now seeking partnerships to help disseminate and implement the CRAA.

1.08 The dissemination process commenced with the publication of a 150,000-word, unabridged version of the CRAA in early 2024 on the websites of the five partner organisations. This is the first comprehensive climate and health research agenda for the Caribbean, representing literally hundreds of inputs from experts from the region and beyond. Other parts of the dissemination strategy which complement this proposal include publication of a peer-reviewed paper of 3,500 words on the CRAA aimed at the academic and research community.

2. OBJECTIVES

2.01 The focus of this consultancy is to publish a Pan American Health Organisation (PAHO) technical report (circa 30,000 words) and a policy brief on climate change and health based on the CRAA target a broad audience working in fields related to climate, public health, policy-making, teachers and researchers, advocates, practitioners, civil society organizations and the general public.

3. SCOPE OF WORK

3.01 Within the framework of the Caribbean Action for Resilience Programme, the specific duties and responsibilities of the consultant include:

- (a) Biweekly meetings with the chairs of the R4ACCHCP to review progress of the technical report and receive feedback for further edits.
- (b) Condensing and refining the original CRAA into a 30,000-word PAHO technical report and arranging for publication of same in virtual and hard copy format.
- (c) Prepare a related policy brief of key points for Ministers and senior officials.

4. QUALIFICATIONS AND EXPERIENCE

4.01 The Consultant Team member must have:

- (a) At least five (5) years' experience publishing technical reports;
- (b) Experience working in Developing and Least Developed Countries including SIDS;
- (c) Excellent communication and interpersonal skills, with the ability to engage and collaborate with diverse stakeholders;
- (d) Proficiency in English is essential. Proficiency in French or Dutch is an asset.

5. REPORTING AND DELIVERABLES

5.01 The Consultant will report to the Project Coordinator and is required to:

- (a) Plan of action for development of PAHO report (due at end of 2nd week of contract).
- (b) Drafts of each chapter of report to be submitted to R4ACCHCP chairs as completed.
- (c) Final draft of PAHO Technical Report submitted to R4ACCHCP chairs, CDB and CIMH.
- (d) Presentation on PAHO technical report development process and final product to R4ACCHCP committee and CIMH.
- (e) Preparation of a 4-page policy brief of key points arising from the agenda for ministers and senior officials to aid engagement.

6. DURATION

6.01 The contract will be for a duration not exceeding five months.

DRAFT TERMS OF REFERENCE

COMMUNICATION INTERNSHIP

1. BACKGROUND

1.01 The Caribbean Institute for Meteorology and Hydrology (CIMH) is an Institution of the Caribbean Community (CARICOM) and the technical Organ of the Caribbean Meteorological Organization (CMO). The mandate of the CIMH is to assist in improving and developing the meteorological and hydrological services as well as providing awareness of the benefits of meteorology and hydrology for the economic well-being of the sixteen CMO Member States. This is achieved through training, research, investigations, and the provision of related specialised services and advice.

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1.04 The CIMH is active in such areas, including but not limited to environmental modeling, hydrological risk impacts forecasting and early warning system development. The CIMH has strong collaborations with other regional institutions such as the Caribbean Disaster Emergency Management Agency, the Caribbean Community Climate Change Centre, the Caribbean Centre for Renewable Energy and Energy Efficiency, the Caribbean Tourism Organization, the Caribbean Development Bank and the Caribbean Agriculture Research and Development Institute in addition to national organisations in CMO Member States. The CIMH also has strong links with the international community inclusive of donor agencies, universities, research and development centres and intergovernmental organisations.

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1.06 Climate change, along with the related crises of pollution and loss of biodiversity, represents the greatest threat to public health in the 21st Century. Climate change is having multiple adverse health effects in the Caribbean, one of the most vulnerable regions in the world to the effects of the climate crisis. Climate disruptions in the region are at an all-time high, with intense hurricanes, floods and landslides, accelerating sea level rise, extreme heat, warming oceans, and drought causing increased injuries and deaths, heat-related illness, vector borne diseases, mental health disorders, non-communicable diseases, and population displacement.

1.07 In response to this climate/health crisis, in 2021 representatives from five partner institutions - EarthMedic and EarthNurse Foundation for Planetary Health, the Emory Rollins School of Public Health, the Pan American Health Organization, the University of the West Indies, and the Center on Climate Change and Health at Yale School of Public Health -- formed the Research for Action on Climate Change and Health in the Caribbean Project (R4ACCHCP) to develop a Caribbean Research for Action Agenda (CRAA) on climate change and health, and which is now complete. Development of the CRAA was supported by a small grant from the US National Oceanic and Atmospheric Administration (NOAA).

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- (c) **Mitigation** actions and health co-benefits.
- (d) **Resources and engagement** for climate change and health action.

1.09 As a member and co-chair of the R4ACCHCP consortium which developed the CRAA, EarthMedic and EarthNurse is now seeking partnerships to help disseminate and implement the CRAA.

1.10 The dissemination process commenced with the publication of a 150,000-word, unabridged version of the CRAA in early 2024 on the websites of the five partner organisations. This is the first comprehensive climate and health research agenda for the Caribbean, representing literally hundreds of inputs from experts from the region and beyond. Other parts of the dissemination strategy which complement this proposal include publication of a peer-reviewed paper of 3,500 words on the CRAA aimed at the academic and research community.

2. OBJECTIVES

2.01 The focus of this internship is to disseminate the Caribbean Research for Action Agenda (CRAA) and promote its use by national authorities and regional institutions, lecturers and researchers, funding agencies and partners, civil society organisations, and professionals interested in climate and health action.

3. SCOPE OF WORK

3.01 Within the framework of the Caribbean Action for Resilience Programme, the specific duties and responsibilities of the intern include:

- (a) Participation in online R4ACCHCP coordinating committee meetings and climate and health online webinar workshops.
- (b) Support the dissemination of the CRAA and promotion of its use throughout the Caribbean using a range of media and mechanisms.
- (c) Create a plan and content outline for a joint podcast series with CIMH/EarthMedic highlighting topics from the agenda.
- (d) Liaise with the CIMH Communication Specialist to develop an animated infographic to publicize the agenda.
- (e) Develop and implement effective communication strategies that build awareness of and the use of the CRAA.

4. QUALIFICATIONS AND EXPERIENCE

4.01 The intern is required to have recognised credentials (with strong preference being given to candidates with BSc and MSc degrees) in either Communications Studies, Mass Communications, Journalism or Public Relations. Specifically, the candidate must be currently registered in an BSc or MSc programme or have completed the BSc or MSc in the last 1-3 years. In addition, the intern should have:

- (a) General knowledge of climate change impacts;
- (b) Experience working within the Caribbean;
- (c) Excellent research, communication and interpersonal skills, with the ability to engage and collaborate with diverse stakeholders;
- (d) Proficiency in English is essential. Proficiency in French or Dutch is an asset.

5. REPORTING AND DELIVERABLES

5.01 The Consultant will report to the Project Coordinator and is required:

- (a) Monthly progress reports;
- (b) quarterly progress reports;
- (c) animated infographic and communication strategy; and
- (d) final report on internship activities.

6. INTERNSHIP ARRANGEMENTS AND DURATION

6.01 The remunerated contract internship will be for a duration not exceeding six months. The candidate is expected to reside in Barbados for the duration of the internship unless otherwise agreed.

LETTER OF COMMITMENT



March 28, 2024

David A. Farrell, PhD
Principal
Caribbean Institute for Meteorology and Hydrology
Husbands
St. James
Barbados

Dear Dr Farrell,

Re: Letter of Commitment

The EarthMedic and EarthNurse Foundation for Planetary Health is pleased to provide a letter of commitment confirming the intention to work closely with the Caribbean Institute for Meteorology and Hydrology (CIMH) to successfully implement the activities under Output 1.7 of the project entitled "Strengthening institutional capacities for coastal and marine resources management and impact-based forecasting for planning, decision making and resilience building in the Caribbean" financed through the Caribbean Development Bank (CDB) Caribbean Action for Resilience Enhancement (CARE) programme.

This will include the mechanisms for oversight, review of the deliverables and coordination with CIMH during project implementation. The EarthMedic and EarthNurse Foundation for Planetary Health looks forward to collaborating with the CIMH towards a successful execution of the programmed activities under Output 1.7. Yours sincerely,

A handwritten signature in black ink, appearing to read "C. James Hospedales".

Dr. C. James Hospedales
Executive Director and Founder
EarthMedic and EarthNurse Foundation for Planetary Health.

20 Terracita Drive
Lady Chancellor Hill
Port of Spain
Trinidad and Tobago

Phone: 1 868 303 7521
Email: jameshospedales@earthmedic.com
Website: <https://earthmedic.com>
Twitter: @Earth_Medic

DETAILED BUDGET

Project Component	Contribution (USD)		
	CDB	CIMH	TOTAL
Output 1 A marine observation and service platform that complements existing regional marine observation networks developed			
1.1 An optimal low-cost sustainable buoy network designed and implemented for the near-coastal areas across the region that continuously records and transmits in near-real time wave and swell heights among others to publicly accessible databases and modelling platforms			
Procurement of Buoys			
Buoy installation Airfare			
Buoy installation Per Diem			
Buoy installation costs			
2-day Installation/Maintenance Workshop			
Airfare	651,600	66,0000	717,600
Per Diem			
Room Rental			
Catering			
Transportation			
Counterpart Support			
Sub-Total	651,600	66,0000	717,600
1.2 Marine Modeller engaged to (i) improve existing marine products currently being run by the CIMH, (ii) increase the number of marine products currently being run by CIMH and (iii) strengthen CIMH's delivery of marine related training and research in the region			
Consultancy - Enhance Marine Model Development and Capacity Building - Professional Fees			
Consultant – Airfare			
Consultant - Per Diem	41,510	20,000	61,510
Counterpart Support			
Sub-Total	41,510	20,000	61,510
1.3 Technical capacity built through attachment/visits to marine research institutions to enhance marine model developmen17360 within the Regional Marine Forecast Support Centre			
Airfare			
Per Diem			
Ground Transportation	43,360	0.00	43,360
Computational Services to support model development			
Sub-Total	43,360	0.00	43,360
Sub-Total Output 1	736,470	86,000	822,470
Output 2. Air quality monitoring and modeling platforms across the region expanded			
2.1 At least two (2) TEOMs station plus payload procured and installed to support air quality monitoring in areas of concern in at least two countries			
Procurement of 2 TEOMs			
Installation of TEOMs			
Installation of TEOMs			
Installation of TEOMs (127,870	30,000	157,870
Procurement of Drone Payloads			
Procurement of Drone Payloads			
Counterpart Support			
Sub-Total	127,870	30,000	157,870
2.2 Internships executed to support air quality monitoring/modelling activities at CIMH and in equipment recipient countries.			

Project Component	Contribution (USD)		
	CDB	CIMH	TOTAL
Stipend			
3 interns - Airfare	42,600	6,000	48,600
3 interns -Relocation Fee			
Counterpart Support			
Sub-Total	42,600	6,000	48,600
Sub-Total Output 2	170,470	36,000	206,470
Output 3 A regional strategy for enhancing air quality monitoring, modeling and early warning system developed			
3.1 Regional stakeholder workshop convened to support the development of a regional air quality monitoring strategic framework			
Participants Airfare			
Participants Per Diem	6,430	10,000	16,430
Catering			
Transportation			
Counterpart Support			
Sub-Total	6,430	10,000	16,430
3.2 Regional air quality monitoring strategic framework developed through consultancy services			
Consultancy - Strategy for Air Quality Monitoring and Applications -Professional Fees			
Expert Airfare			
Expert Per Diem	36,080	15,000	51,080
Counterpart Support			
Sub-Total	36,080	15,000	51,080
3.3 Newly developed strategic framework is published and distributed among relevant stakeholders			
Design services			
E-Publication/Digital Flipbook			
Printing	6,250	15,000	21,250
Counterpart Support			
Sub-Total	6,250	15,000	21,250
Sub-total Output 3	48,760	40,000	88,760
Output 4. Expanded high-resolution ensemble of climate predictions for the Caribbean			
4.1 Climate modeler contracted to support climate modelling activities at CIMH			
Consultancy - Modelling and Sectoral Application of High-Resolution Climate Ensemble - Professional Fees			
Workshop airfare	37,010	15,000	52,010
Workshop per diem			
Counterpart Support			
Sub-Total	37,010	15,000	52,010
4.2 Climate ensemble model developed and piloted re sectoral application			
Model Development and Implementation (Computational Cloud Services + Storage)	80,000	30,000	110,000
Counterpart Support			
Sub-Total	80,000	30,000	110,000

Project Component	Contribution (USD)		
	CDB	CIMH	TOTAL
4.3 Training workshop convened to further advance climate modelling application capacities across NMHSs and research institutions			
Participants Airfare			
Participants Per Diem			
Catering - Local Participants	41,000	10,000	51,000
Transportation			
Counterpart Support			
Sub-Total	41,000	10,000	51,000
Sub-total 4	158,010	55,000	213,010
Output 5 Framework for defining, modeling and mitigating community-level impacts associated with cascading hazards developed and demonstrated			
5.1 A framework of cascading hazards and associated risks within an impact-based forecasting workflow developed through consultancy			
Consultancy - Development of cascading hazards framework + Demonstration Workshop			
Airfare International			
Per Diem International	41,080	10,000	51,080
Data collection			
Counterpart Support			
Sub-Total	41,080	10,000	51,080
5.2 Demonstration workshop showing the elements of the cascading framework on a selected watershed where precipitation may trigger landslide and flood hazards along with other secondary hazards convened, to illustrate how the cascading system can risk-inform early warning system design and implementation			
Airfare Regional			
Per Diem Regional			
Catering - Local Participants	3,640	10,000	13,640
Counterpart Support			
Sub-Total	3,640	10,000	13,640
Sub-Total 5	44,720	20,000	64,720
Output 6 - Application of data analytics to support climate services and environmental and disaster management planning, policy and decision-making in the Caribbean demonstrated			
6.1 Knowledge transfer workshop/seminar convened to further accelerate the integration of data analytics to address the nexus between science and policy			
Airfare International			
Per Diem International			
Airfare Regional			
Per Diem Regional	116,120	20,000	136,120
Room Rental			
Catering - Local Participants			
Transportation			
Counterpart Support			
Sub-Total	116,120	20,000	136,120

6.2 A white paper developed outlining a comprehensive approach and partnership arrangements for integrating data analytics into national and regional policy and decision-making frameworks aimed at enhancing regional resilience to climate change			
Data collection and Publishing (White paper publication)			
Counterpart Support	10,000	5,000	15,000
Sub-Total	10,000	5,000	15,000
Sub-Total 6	126,120	25,000	151,120
Output 7 - Technical report on climate change and health published and disseminated.			
7.1 Caribbean Research for Action Agenda published as a PAHO technical report			
Consultancy - Blue Sky: preparation of PAHO technical report			
Printing/postage of summary PAHO technical report hard copies	28,000	10,000	38,000
Counterpart Support			
Sub-Total	28,000	10,000	38,000
Activity 7.2 Caribbean Research for Action Agenda disseminated through various forums			
R4ACCHCP Members Airfare (International conferences/meetings)			
R4ACCHCP Member Airfare (Regional conferences/meetings)			
R4ACCHCP Members Per Diem (International Caribbean Conferences/meetings)			
R4ACCHCP Member Per diem (Regional Caribbean Conferences/meetings)	19,410	10,000	29,410
1 Intern – stipend			
1 Intern – airfare			
1 Intern - relocation Fee			
Counterpart Support			
Sub-Total	19,410	10,000.00	29,410
Sub-Total 7	47,410	20,000	67,410
Total Activities 1-7	1,331,960	282,000	1,613,960
Bank Transfer Fees	10,000	0	10,000
Contingency	200,140		200,140
Total	1,542,100	282,000	1,824,100

PROCUREMENT PLAN**I. General****1. Project Information**

Country: Regional

Grantee: Caribbean Institute for Meteorology and Hydrology (CIMH)

Project Name: Strengthening Institutional Capacities for Coastal and Marine Resources Management and Impact-Based Forecasting for Planning, Decision-making and Resilience Building in the Caribbean

Project Implementing Agency (PIA): CIMH

2. **Bank's Approval Date of the Procurement Plan: August 1, 2024**

3. **This Procurement Plan is valid until:** August 1, 2024 - September 1, 2026

II. Goods and Works and Non-Consulting Services

1. **Prior Review Threshold:** Procurement decision subject to Prior Review by the Bank as stated in the Procurement Procedures:

	Selection Method	Prior Review Threshold (USD)	Comments
1.	Limited Bidding (LB)	≥ 12,000	
2.	Direct Selection (DS)	≥ 12,000	

1. **Reference to (if any) Project Operational/Procurement Manual:** Procurement Policy for Projects Financed by CDB (November, 2019) and Procurement Procedures for Projects Financed by CDB (January, 2021).

2. **Any Other Special Procurement Arrangements:** CDB financing is being provided through resources allocated to CDB under the Caribbean Action for Resilience Enhancement (CARE) Programme. As per the requirements of the CARE Contribution Agreement, eligibility shall be extended to countries which are eligible for procurement under EU-Funded projects, which are not CDB member countries, in accordance with the [EU Eligibility Rules](#).

[illegible]

Ref No.	Contract (Description)	Estimated Cost (USD)	Selection Method	Prequalification (Yes/No)	Regional Preference (Yes/No)	Review by Bank (Prior/Post)	Expected Bid – Opening Date	Comments
(d)	CIMH Staff airfare (2 trips)	██████	DS	No	No	Post	October 2024	
(e)	Transportation (2 trips)	██████	LB National	No	No	Post	October 2024	
(f)	Platform to support model development	██████	LB International	No	No	Post	October 2024	
Activity 2.1 At least two (2) TEOMs station plus payload procured and installed to support air quality monitoring in areas of concern in at least two countries								
(a)	TEOMs (2)	██████	LB International	No	No	Prior	July 2024	
(b)	Drone Payloads (2)	██████	LB International	No	No	Post	October 2024	
Activity 3.1 Regional stakeholder workshop convened to support the development of a regional air quality monitoring strategic framework								
(a)	Airfare (3)	██████	DS	No	No	Post	February 2025	
(b)	Catering (10 locals)	██████	LB National	No	No	Post	February 2025	
(c)	Transportation (3)	██████	LB National	No	No	Post	February 2025	
Activity 3.3 Newly developed strategic framework is published and distributed among relevant stakeholders								
(a)	Design, e-Publication/digital flipbook and printing services	██████	LB International	No	No	Post	May 2025	
Activity 4.2 Climate ensemble model developed and piloted re sectoral application								
(a)	Computational Cloud Services + Storage	██████	LB International	No	No	Prior	February 2025	
Activity 4.3 Training workshop convened to further advance climate modelling application capacities across NMHSs and research institutions								
(a)	Participants' airfare (15)	██████	DS	No	No	Post	April 2025	

Ref No.	Contract (Description)	Estimated Cost (USD)	Selection Method	Prequalification (Yes/No)	Regional Preference (Yes/No)	Review by Bank (Prior/Post)	Expected Bid – Opening Date	Comments
(b)	Catering (25 locals)	██████	LB National	No	No	Post	April 2025	
(c)	Participants’ transportation	██████	LB National	No	No	Post	April 2025	
Activity 5.2 Demonstration workshop showing the elements of the cascading framework on a selected watershed where precipitation may trigger landslide and flood hazards along with other secondary hazards convened, to illustrate how the cascading system can risk-inform early warning system design and implementation								
(a)	Airfare (2)	██████	DS	No	No	Post	March 2026	
(b)	Catering	██████	LB National	No	No	Post	March 2026	
Activity 6.1 Knowledge transfer workshop/seminar convened to further accelerate the integration of data analytics to address the nexus between science and policy								
(a)	Airfare (70)	██████	DS	No	No	Post	February 2026	
(b)	Venue rental and catering	██████	LB National	No	No	Post	February 2026	
(c)	Transportation (70)	██████	LB National	No	No	Post	February 2026	
Activity 6.2 A white paper developed outlining a comprehensive approach and partnership arrangements for integrating data analytics into national and regional policy and decision-making frameworks aimed at enhancing regional resilience to climate change								
(a)	Data Collection and Publishing	██████	LB International	No	No	Post	May 2026	
Activity 7.2 Caribbean Research for Action Agenda disseminated through various forums								
(a)	Airfare - 2 international and 1 regional conference (2 R4ACCHCP members)	██████	DS	No	No	Post	August 2024	

III. Consulting Services

1. **Prior Review Threshold:** Procurement decision subject to Prior Review by the Bank as stated in the Procurement Procedures:

	Selection Method	Prior Review Threshold (USD)	Comments
1.	Individual Consultant Selection (ICS)	≥12,000	

2. **Reference to (if any) Project Operational/Procurement Manual:** Procurement Policy for Projects Financed by CDB (2019) and *the Procurement Procedures for Projects Financed by CDB (January, 2021)*
3. **Any Other Special Procurement Arrangements:** Financing shall be provided under the CARE agreement and thus, in accordance with that agreement, eligibility shall be extended to countries which are eligible for procurement under the EU-funded Programme, which are not CDB member countries, in accordance with the EU Eligibility Rules
4. **Procurement Packages with Selection Methods and Time Schedule**

Ref No.	Assignment (Description)	Estimated Cost (USD)	Selection Method	Review Bank (Prior/Post)	Expected Proposal Submission Date	Comment
(a)	Marine Forecaster Services Consultant	_____	ICS	Prior	November 2024	
(b)	Consultancy services for expansion of air quality monitoring and predictions	_____	ICS	Prior	November 2024	
(c)	Air Quality Monitoring and Prediction Internship (3 interns)	_____	ICS	Prior	July 2024	
(d)	Consultancy services for cascading hazard workflow development	_____	ICS	Prior	April 2025	
(e)	Climate modeller services consultant	_____	ICS	Prior	February 2025	
(f)	Publication and dissemination of the Caribbean research for action agenda on climate change and health consultancy	_____	DS	Prior		Blue Sky Development authored an unabridged version of the CRAA available at Research for action on climate change and health in the Caribbean . They were selected as a sole source contractor by Earth Medic and partners under a previous initiative to facilitate the work because of their experience with development of the Caribbean HIV/AIDS Research Agenda and the Caribbean Health Research Agenda.

						<p>Additionally, Blue Sky's principal, Dr Caroline Allen, had coordinated the preparation of the CARPHA 2017-2018 State of Public Health Report in the Caribbean on Climate Change and Health.</p> <p>The intention is to engage Blue Sky again to develop and publish as a PAHO Technical report a more succinct version of the CRAA. As co-authors of the original source material, Blue Sky will have a unique intellectual command of the material and methods needed to produce this technical report.</p>
(g)	Communication Internship		ICS	Post	September 2024	

IV. Implementing Agency Procurement Capacity Building Activities with Time Schedule

In this section the agreed Procurement Capacity Building Activities are listed with time schedule.

No.	Expected Outcome/ Activity Description	Estimated Cost	Estimated Duration (Days)	Start Date	Comments
1.	Project launch workshop (virtual or in-person) with CDB and Implementing Agency to increase the capacity of Implementing Agency to follow CDB's procurement procedures	0	2	Q3 2024	
2.	Increased capacity of Implementing Agency to undertake procurement in accordance with CDB's Procurement Procedures through CDB's Online Procurement Training.	0	5	Q3 2024	

This information is withheld in accordance with one or more of the exceptions to disclosure under the Bank's Information Disclosure Policy.