ADAPTATION FUND

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25 September 2026

Adaptation Fund Board
Project and Programme Review Committee
Thirty-eighth Meeting
Bonn, Germany, 19-23 October 2026

PROPOSAL FOR BAHAMAS, BARBADOS, COLOMBIA, DOMINICAN REPUBLIC, GRENADA, JAMAICA, TRINIDAD AND TOBAGO, MEXICO

ADAPTATION FUND

CONCEPT NOTE FOR REGIONAL PROJECT/PROGRAMME

PART I: PROJECT/PROGRAMME INFORMATION

Title of Project/Programme: **Building resilience of climate-vulnerable coastal communities in the wider Caribbean region**

Countries: Bahamas, Barbados, Colombia, Dominican Republic, Grenada, Jamaica, Mexico, Trinidad & Tobago.

Thematic Focal Area[1]: Disaster risk reduction and early warning systems

Type of Implementing Entity: Multilateral Implementing Entity

Implementing Entity: United Nations Industrial Development Organisation (UNIDO)

Executing Entities: University of The Bahamas (BS); Coastal Zone Management Unit - Ministry of Environment and National Beautification, Green and Blue Economy and Caribbean Institute of Meteorology & Hydrology (BB); DIMAR (CO); Instituto Dominicano de Meteorologia (INDOMET) (DO); Ministry of Climate Resilience, the Environment and Renewable Energy (GD); Ministry of Water Environment and Climate Change (JM); Institute of Marine Affairs (TT); Centro de Investigación Científica y de Educación Superior de Ensenada Baja California (CICESE) and Centro de Investigación y de Estudios Avanzados del Instituto Politécnico (CINVESTAV) (MX); UNESCO (IOC and its Sub-Commission for the Caribbean (IOCARIBE); Euro-Mediterranean Centre on Climate Change (CMCC); UNIDO

Amount of Financing Requested: 29,996,869 Million (in U.S Dollars Equivalent)

Project Formulation Grant Request: Yes ☒ No ☐

Amount of Requested financing for PFG: 225,000 (in U.S Dollars Equivalent)

Letters of Endorsement (LOE) signed for all countries: Yes ☐ No ☐

NOTE: LOEs should be signed by the Designated Authority (DA). The signatory DA must be on file with the Adaptation Fund. To find the DA currently on file check this page: https://www.adaptation-fund.org/apply-funding/designated-authorities

Stage of Submission:

☐This proposal has been submitted before including at a different stage (pre-concept, concept) ☒ This is the first submission ever of the proposal at any stage

[1] Thematic areas are: Food security; Disaster risk reduction and early warning systems; Transboundary water management; Innovation in adaptation finance.

Project/Programme Background and Context:

The Wider Caribbean Region (WCR) encompasses the Caribbean Sea, the Gulf of Mexico, and parts of the Atlantic Ocean, including the island nations and territories of the Caribbean, as well as coastal regions of North, Central, and South America. It spans over 13 million km² and includes 38 countries and territories, covering diverse ecosystems such as coral reefs, mangroves, and rainforests. The region is characterized by its rich biodiversity, cultural diversity, and economic dependence on tourism, fisheries, and maritime trade. However, it is also highly vulnerable to natural disasters such as hurricanes, earthquakes, and rising sea levels due to climate change, making disaster risk reduction and environmental sustainability critical priorities.

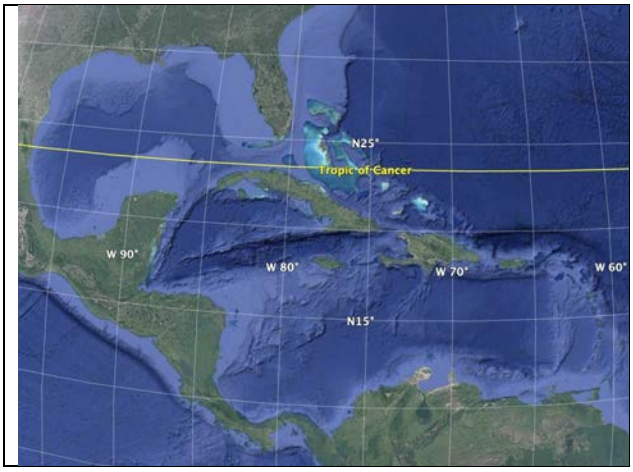

Fig. I.1 map of the Wider Caribbean region

The Wider Caribbean region is regarded as one of the most geopolitically diverse and complex regions in the world due to its geographical location, natural resources and the region's associated environmental challenges. Ocean science capacity and economic development differentiate Continental Coastal countries and the Caribbean Island countries and territories as two distinct regions. However, both are greatly dependent on the ocean and coastal resources.

The Organization of Eastern Caribbean States (OECS) acknowledges that the ocean and its resources present significant opportunities for economic diversification and wealth generation that can benefit everyone. The ocean's fundamental role in the region's economies and livelihoods highlights the need for enhanced coherence among the social, economic and environmental pillars of sustainable development. [OECS. 2020. Eastern Caribbean Regional Ocean Policy. Organisation of Eastern Caribbean States Commission.]

While there are many upper-middle-income Caribbean Island countries and territories in the region, most are also Small Island Developing States (SIDS), characterised by low resilience and high vulnerability to environmental impacts. These nations and territories are economically reliant on tourism and possess Exclusive Economic Zones (EEZs) that exceed their terrestrial areas. These extensive maritime domains underscore their significant responsibility for the sustainable development of ocean resources.

Awareness of the importance of ocean science and economic stability to their environmental stewardship is increasing. The need for science knowledge and capacity development for this region is highlighted in the “SIDS Accelerated Modalities of Action (SAMOA) Pathway” of 2014, and more recently in “The Antigua and Barbuda Agenda for SIDS (ABAS) May 2024 – A Renewed Declaration for Resilient Prosperity”. These frameworks emphasize the importance of building capacity in the following areas: i) climate change adaptation and mitigation strategies; ii) marine biodiversity conservation, including the establishment and management of Marine Protected Areas, sustainable fisheries management and marine pollution control; iii) ocean governance and the implementation of the United Nations Convention on the Law of the Sea (UNCLOS); iv) disaster risk reduction and resilience, including early warning systems, disaster preparedness, response and recovery, and building resilient coastal communities and infrastructure; v) blue economy, including sustainable resource management, value added processing, marketing and trade, and sustainable tourism practices; vi) enabling youth economic participation.

Climate-related drivers of the problem

Climate change poses significant threats to the economies and ecosystems of the Wider Caribbean Region, particularly impacting SIDS. Key concerns include GDP reductions, ecosystem degradation, and coastal erosion. The Wider Caribbean's heavy reliance on climate-sensitive sectors like coastal tourism and agriculture makes it vulnerable to climate-induced economic downturns. The increasing frequency and intensity of extreme events exacerbates financial strains. For instance, in August 2024, Grenada activated a "hurricane clause" to suspend $12.5 million in debt repayments following the devastation caused by Hurricane Beryl, highlighting the cyclical debt challenges faced by SIDS.

Projections indicate that sea levels in the Caribbean could rise by up to 15-50 cm by 2100 (CMEMS climate trends, https://marine.copernicus.eu/access-data/ocean-monitoring-indicators/global-ocean-mean-sea-level-trend-map-observations, Fig. I.2). This rise endangers infrastructure, freshwater resources, and the habitability of coastal regions. The consequences of rising sea levels in the Wider Caribbean are far-reaching. Coastal erosion is already reshaping shorelines, endangering critical infrastructure and tourism-dependent economies. Flooding risks are increasing, particularly during extreme weather events such as hurricanes, leading to higher storm surges and greater damage to urban areas and coastal lands. Additionally, marine and coastal ecosystems—including mangroves, coral reefs, and fisheries—face heightened stress and biodiversity loss, threatening food security and livelihoods. As these challenges grow, the need for resilient adaptation strategies, such as improved coastal defenses, sustainable land-use planning, and ecosystem conservation, becomes more urgent for the Wider Caribbean’s long-term sustainability. [Ref. Maitland, D.O., Richter, K., Raj, R.P. et al. Sci Rep 14, 10387 (2024)]

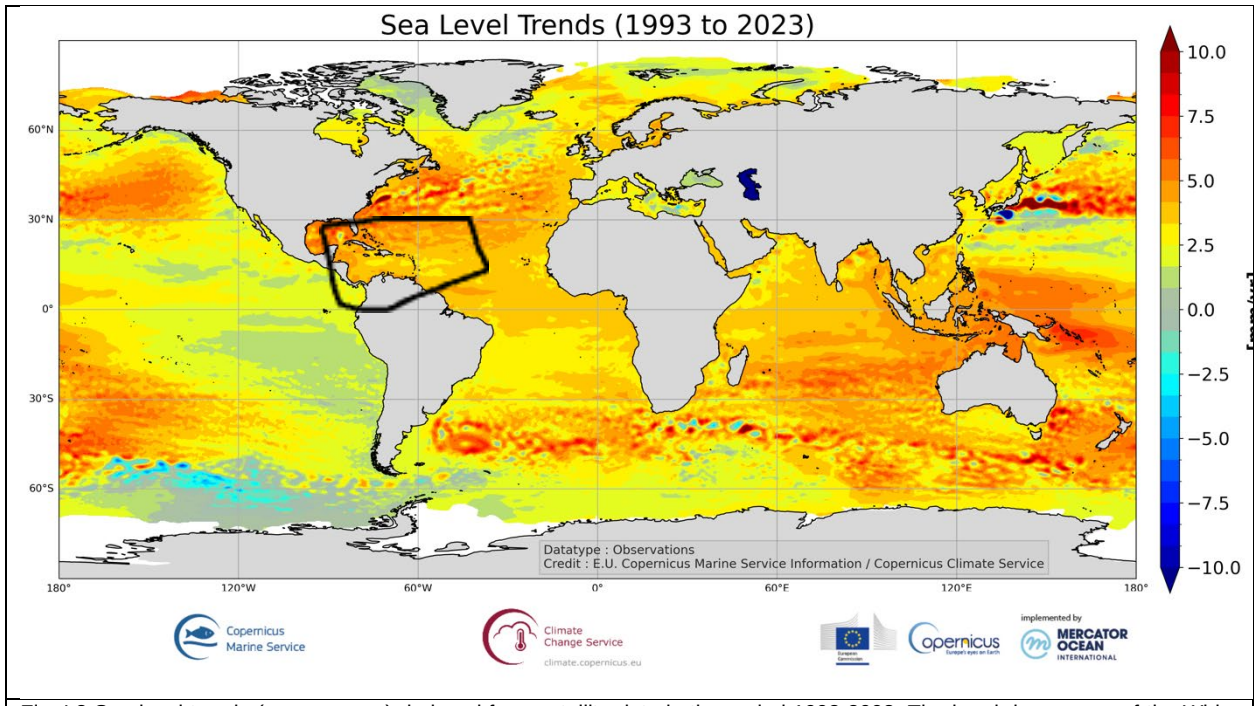

Fig. I.2 Sea level trends (mm per year) deduced from satellite data in the period 1993-2003. The hand-drawn area of the Wider Caribbean Sea shows the sea level rise is among the largest (yellow to red colours) in the planet.

The International Monetary Fund (IMF) has analyzed the disproportionate impact of natural disasters on small states. In its policy paper titled "Small States' Resilience to Natural Disasters and Climate Change: Role for the IMF," the IMF highlights that approximately 9% of natural disasters in small states result in damages exceeding 30% of their Gross Domestic Product (GDP). In contrast, such severe economic impacts occur in less than 1% of natural disasters affecting larger countries [IMF 2016]. This disparity underscores the heightened vulnerability of small states to natural disasters and the significant economic challenges they face in the aftermath of such events.

A major threat to the coastal economies of the Wider Caribbean area is ocean warming, illustrated in Fig. I.3. Elevated sea temperatures have led to widespread coral bleaching. In 2005, the Wider Caribbean experienced a significant bleaching event linked to increased sea surface temperatures, resulting in extensive coral mortality. Degraded coral reefs lead to declines in fish populations, threatening food security and livelihoods. For example, the Nassau grouper, once abundant, is now considered commercially extinct in the Caribbean due to overfishing and habitat loss. The deterioration of coral reefs undermines the appeal of the Caribbean as a prime destination for diving and snorkeling, potentially reducing tourism revenues. Coral reefs support a vast array of marine life. Their degradation leads to reduced biodiversity, affecting ecosystem balance and resilience. Healthy coral reefs act as natural barriers against storm surges and coastal erosion. Their decline increases the vulnerability of coastal communities to natural disasters. Rising temperatures have been associated with the spread of diseases such as Stony Coral Tissue Loss Disease (SCTLD), which has devastated coral populations in regions like Bonaire, leading to significant declines in coral cover.

While increasing SST on Wider Caribbean coral reefs is clearly a major concern, warming is not limited to reef locations. Additionally, rapid increases in ocean heat content across the region could drive an increase in other severe events such as increased storm/hurricane intensity and Marine Heat Waves (MHWs).

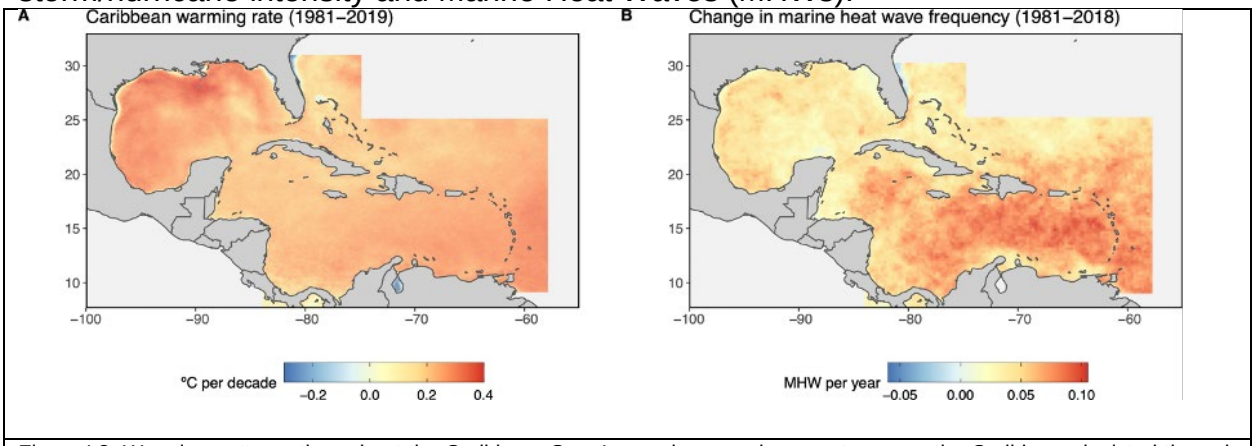

Figure I.3. Warming patterns throughout the Caribbean Sea. Increasing warming events across the Caribbean depicted through A) rate of SST change (°C per decade) from 1981 to 2019; mean slope 0.23 ± 0.07 °C per decade) and B) increasing marine heat wave events (slope of counts per year) [From Bove CB, Mudge L, Bruno JF (2022)].

Since 2017, the impact of extreme weather events and disasters from natural hazards has been severe. Hurricanes Irma and Maria, for instance, caused catastrophic economic damage in Dominica, equivalent to 192% of its 2016 GDP, and in Antigua and Barbuda, amounting to 9% of its 2016 GDP. Similarly, the volcanic eruption in Saint Vincent and the Grenadines in late 2020 resulted in total damages and losses equal to 18% of that year's GDP. In Haiti, the 2021 earthquake caused economic damage and losses equivalent to 11% of the country's 2019 GDP. [UNDP, 2017: Regional overview: Impact of hurricanes Irma and Maria. Conference supporting document. Report prepared with support of ACAPS, OCHOA and UNDP. 39pp.]

Despite the increasing frequency and severity of these events, progress in the implementation of disaster risk reduction measures, particularly multi-hazard early warning systems (MHEWS), remains insufficient. According to the Sendai Framework Monitoring System, only 17 out of 35 countries in the Americas and the Caribbean (49%) have reported advancements since 2015 on Target G, which focuses on the availability of and access to MHEWS and disaster risk information. Notably, this figure drops below 40% for countries reporting on Target G since 2020.

In 2022, only 26% of countries in the region reported having MHEWS in place. Even more concerning are the figures related to the percentage of populations exposed to disasters who are protected through pre-emptive evacuation following early warnings. These statistics underscore the urgent need to accelerate efforts in establishing and expanding comprehensive early warning systems across the region to mitigate the devastating socio-economic impacts of disasters. [The Americas and the Caribbean Multi-Hazard Early Warning Systems (MHEWS) Regional Multi-Stakeholder Forum 5 December 2024].

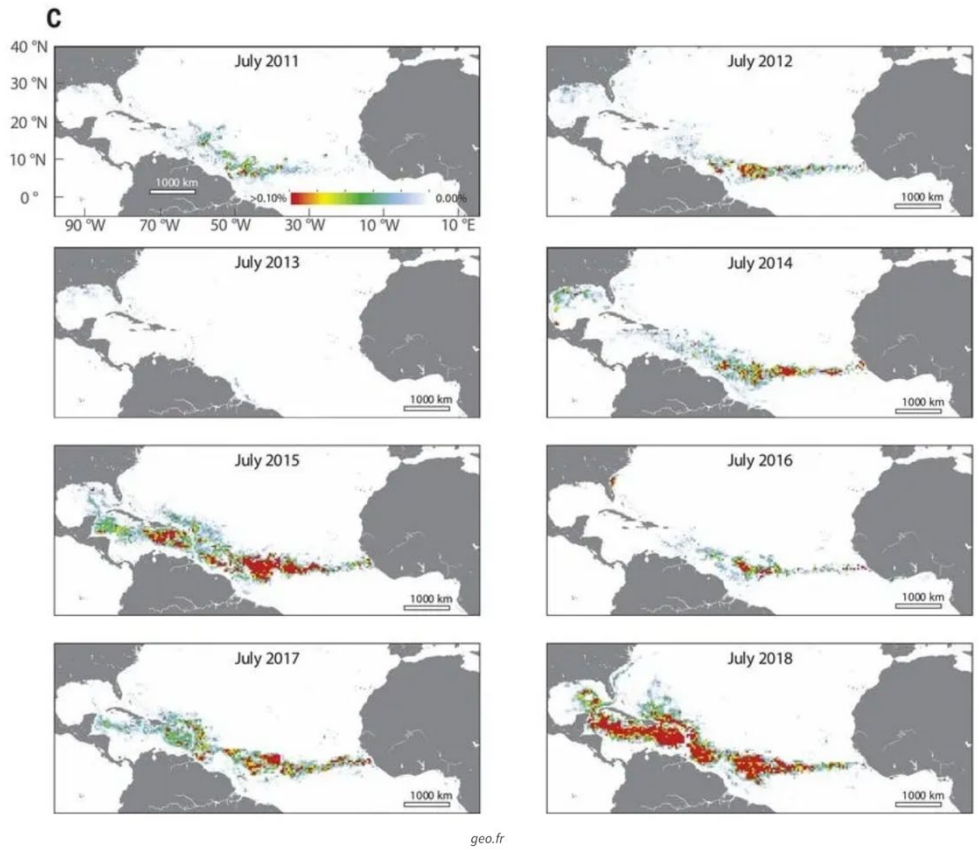

Fig. I.4 Satellite ocean color images of 8 different July years of Sargassum invasion in the Caribbean

Hurricanes impact livelihoods and key economic sectors including tourism, food production and infrastructure damage from storm surge could amount to USD 22 billion per year by 2050 and USD 46 billion per year by 2100, representing 10% and 22% of 2018 regional GDP. [Thomas A, Menke I, Serdeczny O. Loss and damage costing and financing mechanisms: Caribbean outlook. Climate Analytics. April 24, 2018]. Furthermore, if current trends persist, climate-related damages in the Wider Caribbean are projected to escalate from 5% of regional GDP in 2025 to over 20% by 2100, assuming no regional action is taken to mitigate or adapt to climate change [Adelle Thomas, et al. Climate Change and Small Island Developing States. Annual Review of Environment and Resources, Volume 45, 2020].

Since 2011, the entire Caribbean has been impacted on economic, environmental and health levels, by the massive events of *Sargassum*, a pelagic brown algae that forms in the open sea. The clusters of algae drift for several kilometers before washing up on the coastlines, decomposing, invading the beaches inch by inch, and releasing hydrogen sulphide gas, and smell of rotten eggs characterises this gas. Beaching of *Sargassum* causes economic losses in the tourism and fisheries sector and also can impact on the health of coastal communities. There have been numerous studies, mainly since 2011, when the first invasions in large quantities started in the Caribbean. Solutions for this problem involve: early warning of *Sargassum* from satellite and forecast of its drift,

collection of *Sargassum* offshore and re-use of *Sargassum* in several industrial sectors, among others, bioplastic production and the pharmaceutical industry.

Addressing these interconnected and regional challenges requires a multifaceted approach: an institutional strengthening of the monitoring, research and technology infrastructure in the nations and a regional collaborative framework that will progressively include all countries in the region in participating in the data collection and analysis and the implementation of solutions.

Building on the UN Ocean Decade (2021-2030) framework, the proposed regional project aims to to **support national and regional adaptation strategies** in beneficiary countries by developing and applying advanced coastal prediction and decision-support tools. These evidence-based systems will accelerate the implementation of effective **resilience and adaptation solutions** through improved understanding and forecasting of coastal ocean dynamics.

Within this framework, the initiative will focus on four main pillars, based on the needs identified by stakeholders at Pilot Sites in the region:

1. **Early Warning Systems and Risk Assessment:** Strengthening hazard prediction and community preparedness to minimize coastal disaster impacts. Supporting the development of a cross-Wider Caribbean multi-hazard early warning system, that includes detection, forecasting and risk assessment capabilities for tsunamis, marine heat waves, hurricanes and tropical storms, storm surges, arrival of massive Sargassum to the coastal environments, hydrocarbon spills. These monitoring capabilities are critical for the sustainability of the livelihood of coastal communities and viability of coastal industries.
2. **Ecosystem Protection and Restoration:** Prioritizing the conservation of coral reefs, mangroves, and seagrasses to enhance biodiversity and natural defenses. Furthermore, identifying where mangrove, seagrass restoration will thrive in future climates, will inform planning and investments in business models for blue carbon and ecosystem-based systems for resilience building.
3. **Sustainable and Resilient Coastal Development:** For a region with significant economic dependence on marine and coastal resources and tourism, sustainable coastal development is essential, for example ecotourism and sustainable fishing. Furthermore, infrastructure and urban planning is best guided by science to ensure mitigation of risks, reduction of environmental degradation and resilience and adaptation to future conditions. The project's monitoring and forecasting system will be an essential support to the engagement of private sector involvement in the deployment of technological solutions and services for the collection of Sargassum, for cleanup and/or valorization.
4. **Coastal community resilience building and governance** to support ongoing adaptation and resilience. Community engagement and capacity building is needed to educate local populations and foster community-based adaptation strategies to enhance resilience. Development of governance will be necessary to support the ongoing evolution infrastructure and decision support tools to enhance coastal

resilience, and sustain regional collaboration.

Beneficiary countries and Pilot Sites

The project approach will be to focus on key Pilot Sites in eight beneficiary countries, enhancing the infrastructural and skills capacity, and developing a sustainable framework for governance and stakeholder engagement, so that services can be further sustainably expanded to other parts of each country. The map of Pilot Sites below shows the nine Pilot Sites (two in Mexico). Each Pilot Site represents a coastal area of maximum size 200km x 200km proposed by local partner institutions where priority needs and coastal stakeholders have been identified. In collaboration with the lead national institutions, a series of awareness raising and consultation with local communities on coastal typologies and vulnerabilities of coastal communities to climate hazards, identified nine locations representing a spectrum of ecosystem conditions and governance settings emerged as high-priority adaptation entry points The full proposal development phase will further include more in-depth consultation with vulnerable communities, stakeholders and marginalised groups to ensure the project will optimise adaptation measures to address the needs of populations on the ground.

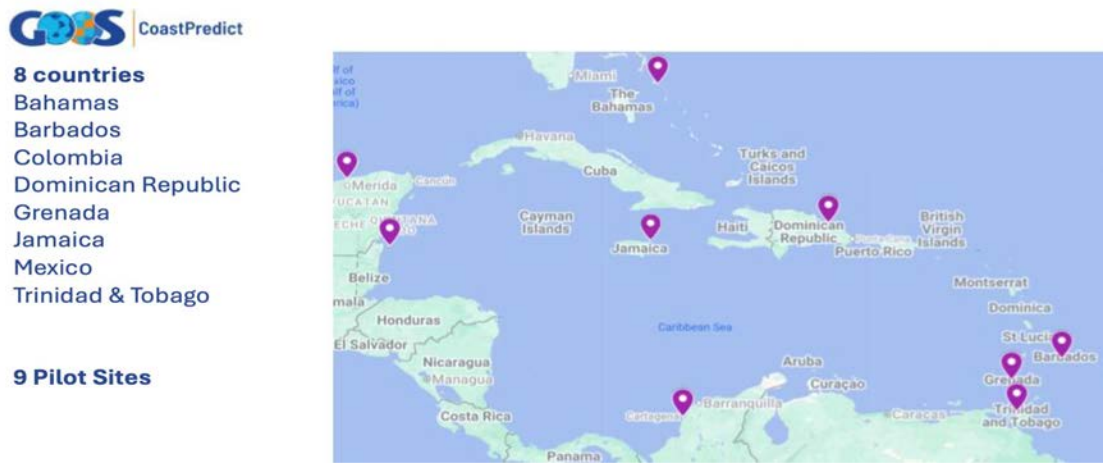

Fig. I.5 Map showing nine Pilot Sites identified for project implementation

Pilot Site consultation identified urgent needs across six thematic adaptation domains (Figure I.6) which impact critical economic sectors in the partner countries These thematic domains will inform component development, knowledge exchange, and scalable interventions across all the partner Caribbean countries.

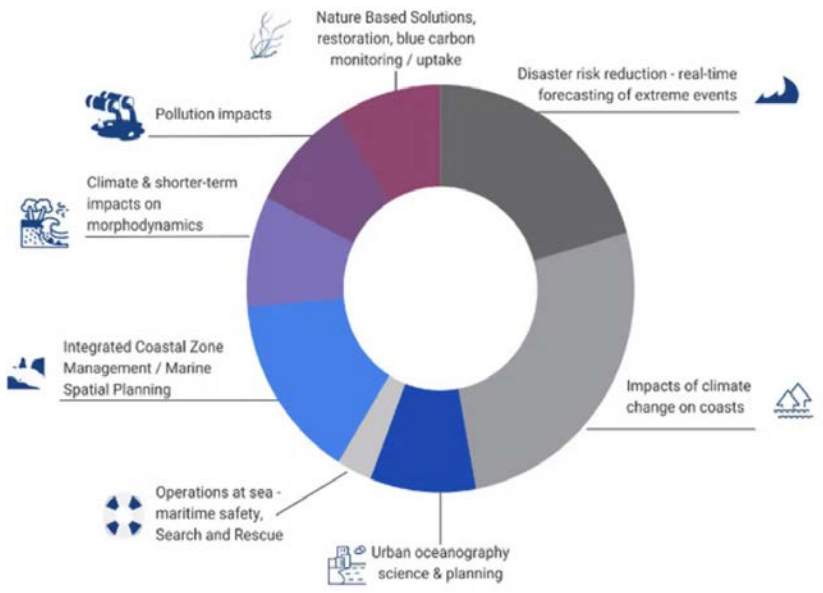

Fig. I.6 Thematic adaptation domains identified by Pilot Sites

Project/Programme Objectives:

The objectives of this project address the challenges described in the previous section by focusing on the needs of coastal and island communities and governing bodies to manage risk, plan for adaptation to a changing climate and increase resilience of coastal communities to climate related hazards. OBJ OBJ

The overarching objective is to strengthen national and regional capacity to monitor, predict, and assess coastal hazards and their risks in both the short and long term, and to deliver knowledge, evidence-based tools and solutions, to build the resilience of coastal communities.

The Project's Objectives are:

Objective 1. Enhance national infrastructure and capacity for ocean hazard monitoring. This includes co-design and implementation of fit-for-purpose, real-time coastal observing and cloud-based data management systems, integrating satellite and in situ data, for monitoring key coastal variables.

Objective 2. Reduce risk of exposure to extreme events.
This includes the development of advanced impact forecasting systems, integrating coastal numerical models and AI-based predictive approaches to address key regional hazards, including storm surges, sargassum influx, marine heatwaves, coastal erosion, hypoxic (low-oxygen) conditions, and pollution originating from both land- and sea-based sources.

Objective 3. Generate coastal climate projection information for adaptation planning.
This involves co-design and implementation of high-resolution coastal downscaling and ocean-climate projections for different climate futures, enabling local adaptation planning in relation to sea level rise, temperature and salinity variability, and ecosystem shifts.

Objective 4. Strengthen sustainable coastal economies & resilient communities.
This considers the co-design and implementation of tailored information and decision-support services for different user groups both private and public, including:

- Climate-resilient coastal zone planning and marine spatial management for deltas and archipelagos;
- Digital Twins and Nature-Based Solutions to support restoration and adaptation of mangroves, coral reefs, and seagrasses;
- Early warning and impact response systems for extreme sea level events, sargassum influx, marine heat waves and harmful algal blooms;
- Climate-smart fisheries and aquaculture management to ensure sustainable livelihoods;
- Enhanced safety of maritime transport, disaster preparedness, and regional coordination.

Objective 5. Strengthen institutional frameworks and private-sector participation.
The objective is to strengthen institutional collaboration and regional governance for long-term sustainability of the new observing and modelling capacity, including co-development of services and policy dialogues and capacity enhancement programs for coastal stakeholders and decision makers.

The objectives of this project are carefully designed to address the specific needs and gaps identified within the region. This approach ensures a cohesive and sustainable framework that enhances resilience, promotes long-term development, and fosters collaboration among key stakeholders to drive impactful change in the region.

Project/Programme Components and Financing

Project/ Programme Components	Expected Outcomes	Expected Outputs	Countries	Amount (US$)
1. **Enhance national infrastructure and capacity for ocean hazard monitoring**	1.1. Safer coastal livelihoods through evidence-based information on coastal hazards 1.2. Enhancement of coastal management solutions by digital technologies allowing standardized information sharing	1.1 Real time and delayed mode satellite and in situ data delivery at Pilot sites 1.2. Regional Cloud computing and storage platform for data processing, quality control and exchange in real time and delayed mode	Bahamas, Barbados, Colombia, Dominican Republic, Grenada, Jamaica, Mexico, Trinidad & Tobago	5,899,000

2. Impact Forecasting for coastal risk management	2.1 Enhanced preparedness of coastal communities to ocean hazards 2.2. Enhanced capacity to plan adaptive measures to multiple coastal hazards	2.1 Real-Time Impact Forecasting systems tailored to Pilot Site coastal areas. 2.2 Multi-Hazards Mapping (*Sargassum* influx, tsunami, sea level rise, extremes, pollution, erosion) identifying potential impacts 2.3 Predictive tools leveraging AI to enhance storm surge forecasting accuracy and lead times.	Bahamas, Barbados, Colombia, Dominican Republic, Grenada, Jamaica, Mexico, Trinidad & Tobago	5,230,000
3. Coastal climate downscaling for adaptation planning	3.1. Evidence based information to inform adaptation planning 3.2. Stakeholder-driven frameworks for adaptation, risk assessment, and management	3.1 Downscaled climate models and scenario-based projections 3.2 Hazard indicators, risk assessments complied 3.3 Tools and visualizations to support adaptation plans directed to policy implementations and decision-making.	Bahamas, Barbados, Colombia, Dominican Republic, Grenada, Jamaica, Mexico, Trinidad & Tobago	4,680,000
4.Decision support systems for sustainable coastal economies & communities	4.1.Strengthened institutional and operational capacity for risk-informed coastal management 4.2. Increased resilience and adaptive capacity of coastal communities, ecosystems, and blue-economy sectors	4.1 A complete set of Multi-hazard Early Warning Systems (MH-EWS) dedicated to specific risks 4.2 Assessment and reporting services for adaptation planning. 4.3 Case-specific Digital Twin for the Coastal Ocean (DTCO) 4.4 Decision support system for *Sargassum* management near coastal areas, and situational sea awareness and search and rescue	Bahamas, Barbados, Colombia, Dominican Republic, Grenada, Jamaica, Mexico, Trinidad & Tobago	4,763,000

5.Institutional & private sector engagement for sustainability	5.1.Empowered stakeholders and practitioners with skills and knowledge and capacity to apply the solutions locally and maintain them. 5.2.Private sector involvement for sustainable evolution and maintenance of the infrastructure and services. 5.3. Regional coordination through Coastal GOOS strategy and enhanced capacity for coastal and ocean monitoring. 5.4. Strengthened institutional framework in support of coastal resilience	5.1Workshops with local communities and private sector to train on the new technologies. 5.2 Business models for system sustainability of coastal business, including *Sargassum* economic exploitation 5.3 Regional coastal GOOS strategy and guidelines 5.4 Capacity enhancement through the coastal resilience school courses	Bahamas, Barbados, Colombia, Dominican Republic, Grenada, Jamaica, Mexico, Trinidad & Tobago	5,045,000
6. Project/Programme Execution cost				1,652,881
7. Total Project/Programme management Cost including monitoring and evaluation(10%)				27,269,881
8. Project/Programme Cycle Management Fee charged by the Implementing Entity (10%)				2,726,988
Amount of Financing Requested				29,996,869

The following tables illustrate how the project's outcomes and outputs align with the Adaptation Fund's strategic pillars (Table I.1) and expected results (Table I.2)

Table I.1: Project Outcomes classification by MTS Strategic Pillars

Outcome Classification by Strategic Pillars

Project Component	Project Outcomes	AF Strategic Pillar	Justification
1. Enhance national infrastructure and capacity for ocean hazard monitoring	1.1 Safer coastal livelihoods through evidence-based information on coastal hazards	Action	This outcome supports concrete adaptation action by reducing vulnerability of coastal livelihoods through the provision of actionable, evidence-based hazard information. It contributes to reduced vulnerability, strengthened resilience and enhanced adaptive capacity at the local level by implementing new monitoring networks and advanced data quality control and observational records analysis
	1.2 Enhancement of coastal management solutions by digital technologies allowing standardized information sharing	Innovation	This outcome is central to the Innovation pillar, as it develops and deploys digital cloud technologies, interoperable platforms and standardized data sharing best practices to modernize coastal adaptation practices and enable replication and scaling.
2. Impact Forecasting for coastal risk management	2.1 Enhanced preparedness of coastal communities to ocean hazards	Action	This outcome delivers direct, Local Level Adaptation benefits by improving preparedness and reducing risks from ocean hazards, fully aligned with the Action pillar's focus on tangible results for vulnerable communities. The numerical modelling will be deployed at local Institutions focuing on impact and vulenrabilities.
	2.2 Enhanced capacity to plan adaptive measures to multiple coastal hazards	Action	Strengthening planning capacity enables implementation of integrated, multi-hazard adaptation actions, a core objective of the Action pillar. This outcome will support for Locally Based Adaptation by developing tools for modelling the coastal data and deliver impact forecasts.
3. Coastal climate downscaling for adaptation planning	3.1 Evidence based information to inform adaptation planning	Action	Evidence-based products underpins high-quality and effective adaptation actions, ensuring decisions are robust and risk-informed. This outcome will ensure the provision of local climate downtargeted assessments of needs and possibly expand delivery channels.
	3.2 Stakeholder-driven frameworks for adaptation, risk assessment, and management	Action	Stakeholder-driven frameworks support inclusive, locally based adaptation action, consistent with AF principles on ownership and participation. This outcome wil define the nasis for monitroing climate change impacts and effects of remediation solutions at the Pilots Sites.
4.Decision support systems for sustainable coastal economies & communities	4.1 Strengthened institutional and operational capacity for risk-informed coastal management.	Action	Institutional and operational strengthening directly supports implementation of concrete adaptation actions and long-term sustainability, a core Action pillar objective. This outcome will develop targetedpeople-centered early warning systems and expand delivery channels. by using the cloud infrastructure.
	4.2 Increased resilience and adaptive capacity of coastal communities, ecosystems, and blue-economy sectors	Action	This outcome directly corresponds to the ultimate expected result of the Action pillar: enhanced resilience and adaptive capacity of vulnerable communities. It will help to define the potential areas where adaptation soluzions will be successful by a cooperation between public and private national and local Institutions.
5.Institutional & private sector engagement for sustainability	5.1 Empowered stakeholders and practitioners with skills and knowledge and capacity to apply the solutions locally and maintain them.	Learning and Sharing	This outcome directly strengthens capacity to capture, apply and disseminate learning, a core Learning & Sharing result. All previous outcomes will be subject to technical training.
	5.2 Private sector involvement for sustainable evolution and maintenance of the infrastructure and services.	Innovation	Involving the private sector introduces innovative business models, partnerships and service delivery mechanisms for adaptation. This outcome will involve the strategic planning of the scalability of solutions and the leverage of partnerships
	5.3 Regional coordination through Coastal GOOS strategy and enhanced capacity for coastal and ocean monitoring.	Learning and Sharing	This outcome directly advances regional knowledge partnerships, data sharing and south–south learning, central to the Learning & Sharing pillar. This out come will also Increase outreach and visibility of Fund's knowledge products and activities.
	5.4 Strengthened institutional framework in support of coastal resilience	Action	Strong institutional frameworks are essential for sustained implementation of adaptation actions and policy alignment. This outcome will strengthen long-term capacity of national and regional institutions to implement high quality and local-level adaptation.

Table I.2: Projects expected outputs classified by MTS Expected results

Expected Outputs to MTS Expected Results

Project Component	Project Expected Output	Strategic Pillar	Expected_Result (MTS_Aligned)
1. Enhance national infrastructure and capacity for ocean hazard monitoring	1.1 Real time and delayed mode satellite and in situ data delivery at Pilot sites	Action	A1 – Vulnerability reduced & resilience strengthened
	1.2 Regional Cloud computing and storage platform for data processing, quality control and exchange in real time and delayed mode	Innovation	I3 – Access and capacities enhanced for innovation
2. Impact Forecasting for coastal risk management	2.1 Real-Time Impact Forecasting systems tailored to Pilot Site coastal areas.	Action	A1 – Vulnerability reduced & resilience strengthened
	2.2 Multi-Hazards Mapping sargassum influx, tsunami, sea level rise, extremes, pollution, erosion) identifying potential impacts	Action	A1 – Vulnerability reduced & resilience strengthened
	2.3 Predictive tools leveraging AI to enhance storm surge forecasting accuracy and lead times.	Action	A3 – Evidence generated & results scaled
3. Coastal climate downscaling for adaptation planning	3.1 Downscaled climate models and scenario-based projections	Action	A3 – Evidence generated & results scaled
	3.2 Hazard indicators, risk assessments complied	Action	A1 – Vulnerability reduced & resilience strengthened
	3.3 Tools and visualizations to support adaptation plans directed to policy implementations and decision-making.	Action	A2 – Access & institutional capacity enhanced
4.Decision support systems for sustainable coastal economies & communities	4.1 A complete set of Multi-hazard Early Warning Systems (MH-EWS) dedicated to specific risks	Action	A1 – Vulnerability reduced & resilience strengthened
	4.2 Assessment and reporting services for adaptation planning.	Action	A3 – Evidence generated & results scaled
	4.3 Case-specific Digital Twin for the Coastal Ocean (DTCO)	Action	A3 – Evidence generated & results scaled
	4.4 Decision Support System for Sargassum near the coastal areas, and Situational Sea Awareness and search and rescue	Action	A1 – Vulnerability reduced & resilience strengthened
5.Institutional & private sector engagement for sustainability	5.1 Workshops with local communities and private sector to train on the new technologies.	Learning and Sharing	L2 – Capacity to capture & disseminate learning strengthened
	5.2 Business models for system sustainability, including Sargassum economic exploitation	Innovation	I2 – Successful innovations replicated & scaled
	5.3 Regional coastal GOOS strategy and guidelines	Learning and Sharing	L1 – Knowledge generation & dissemination
	5.4 Capacity enhancement through the Coastal Resilience School Courses	Action	A2 – Institutional capacity enhanced

Legend: Table I.1& I. 2:
Strategic Pillar 1 Action: A1 – Vulnerability reduced, resilience strengthened, and adaptive capacity enhance; A2 – Access to finance and institutional capacities enhance.
A3 – Evidence for effective action generated and results replicated and scaled up
Strategic Pillar 2 Innovation: I1 – New innovations and risk-taking encouraged and accelerated; I2 – Successful innovations replicated and scaled up; I3 – Access and capacities enhanced for designing and implementing innovation; I4 – Evidence base generated and shared.
Strategic Pillar 3 Learning & Sharing: L1 – Knowledge generation and dissemination on effective and innovative local adaptation increased; L2 – Capacity to capture and disseminate learning strengthened; L3 – Knowledge partnerships expanded and outreach increased.

Projected Calendar:

Indicate the dates of the following milestones for the proposed project/programme

Milestones	**Expected Dates**
Start of Project/Programme Implementation	01/01/2027
Mid-term Review (if planned)	31/11/2029
Project/Programme Closing	31/12/2032
Terminal Evaluation	30/09/2032

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. **Describe the project/programme components, particularly focusing on the concrete adaptation activities, how these activities would contribute to climate resilience, and how they would build added value through the regional approach, compared to implementing similar activities in each country individually. For the case of a programme, show how the combination of individual projects would contribute to the overall increase in resilience.**

This project will improve beneficiary country communities' capacity to assess and predict coastal multi-hazards and risks from ocean weather extremes and climate change in the Caribbean. The methodology is designed to improve risk identification and decision making to enable community-driven adaptation measures.

More broadly, the project will build societal awareness and thereby resilience to the several weather and climate coastal threats, developing EWS and digital coastal services, as promoted by the Sendai Framework for Disaster Risk Reduction 2015-2030, to which the UN countries (including Caribbean countries) are committed.

According to the United Nations Office for Disaster Risk Reduction (UNISDR), the following are four key elements of EWS: I. risk knowledge; II. Monitoring and warning service; III. dissemination and communication; and IV. response capability. The project will advance the first three, while giving the basis for the response capabilities. The project will enhance risk knowledge and response capability with activities that map potential threats and implement low-cost adaptation measures to reduce community risk. Capacity strengthening, highlighted in the 2030 Agenda under SDG 13 Target 13.1, will also be addressed in all project components through training, institutional twinning, participatory planning, and knowledge exchange.

A core strength of this project is the regional approach and the Pilot Sites implementation strategy for MH-EWS and solutions. Deploying solutions across these varied Pilot Sites will facilitate the integration of coastal heterogeneity, regional connectivity, and solution scalability. Standardized data collection and modeling efforts within the Pilot Sites will provide a foundation for identifying and validating transferable solutions applicable across diverse coastal systems. The project emphasizes from the beginning a cloud digital infrastructure for data management and service deployment that will enhance sustainability of the evidence-based solutions and allow public private partnerships to grow in the future.
The sustainability of the regional approach is ensured by the presence of the executing entity being the UNESCO (IOC and its Sub-Commission for the Caribbean (IOCARIBE)), residing in the region, which ensures direct contact with national policy makers and research institutions in the single nations.

The project is directly aligned with four Adaptation Fund outcomes: Outcome 1 (Reduced exposure to climate change hazards and threats); Outcome 2 (Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses); Outcome 3 (Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level); and Outcome 4 (Improved policies and regulations that promote and enforce resilience).

The Components described below contribute to the Adaptation Fund Medium Term Strategy Strategic pillars 1-3 as presented in Table I.1 and I.2.

Component 1: Enhance national infrastructure and capacity for ocean hazard monitoring
This core component underpins all others - especially Components 2, 3, and 4 - by strengthening infrastructure, capacity, and human resources. It encompasses the enhancement of observation platforms (both conventional and low-cost) at the nine Pilot Sites, the improvement of data management and exchange systems, and the development of a regional cloud platform for processing real-time and delayed data. Additionally, it builds local institutional capacity in coastal ocean monitoring and promotes sustainability through training in data utilization, management, and cloud-based computing. These monitoring capabilities are critical for the sustainability of the livelihood of coastal communities and viability of coastal industries.

Output 1.1. Real time and delayed mode satellite and in situ data delivery at Pilot Sites

- These solutions are intended in support of modelling (both numerical and AI/ML), improving the accuracy and trustability of both short- and long-term predictions/projections and Digital Twins at the project Pilot Sites (Fig. I.5). The implementation will consider with high priority:
  1. High-resolution remote sensing data at the Pilot Sites delivery and analysis, considering the atmosphere-land-river-sea interfaces and subcomponents;
  2. Cost-efficient coastal observing networks, implemented and operational, including Citizen Science
  3. Upgraded traditional coastal stations and novel technology at selected Pilot Sites
  4. Engagement of local industrial and business sensor/platform providers for sustained and maintained observing systems.

Output 1.2 Regional Cloud computing and storage platform for data processing, quality control and exchange in real time and delayed mode

- This infrastructure is designed to support data sharing and computational activities at project Pilot Sites, initially with a regional scope and subsequently enabling scaling and interoperability across regions. The main outcomes/outputs are:
  1. Tailored Regional Cloud resources for accessible and usable observational and model data collected at Pilot Sites
  2. Cloud-based numerical modelling and AI/ML models
  3. Hubs for Web-based DSS, Digital Twins and other applications
  4. Interoperable cloud platforms across the Pilot Sites

Component 2: Impact forecasting for coastal risk management
This component enhances local capabilities to generate real-time and short-term (up to a few weeks) forecasts of ocean conditions, such as storm surge, waves, inundation, marine ecosystem behavior, and marine heatwaves in advance of extreme events. It also develops expertise in analyzing and predicting compound events with innovative AI-based methods, including coastal flooding and pollution. Hazard mapping will aid climate-resilient planning by delivering accurate and timely assessments for preparedness and risk management. The project intervention will support AI-enhanced predictive tools for forecasting of *Sargassum* influx, pollution dispersion models, and multi-hazard maps will be developed for managing climate and ocean risks that threaten livelihoods and coastal business.

Output 2.1 Real time impact forecasting systems tailored to Pilot Sites

Real time forecasting numerical models and operational chains, following international best practices, will be established or improved, calibrated and validated at each project Pilot Site. The models will include:

1. High resolution river-coast-ocean numerical models nested into global forecasting models and forced at the air-sea interface by global or regionally limited area atmospheric forecasts;
2. High resolution numerical wave models, both coupled and uncoupled to ocean current models (point 1 above) to forecast, including but not limited to, significant wave height, wave direction;
3. Coastal biogeochemical numerical models coupled to the river-coast-ocean numerical models outlined above forecasting oxygen, PH, phytoplankton biomass, etc.;
4. Different complexity coupled sediment-waves-currents and inundation models for coastal erosion.

Output 2.2 Multi-Hazards Mapping (e.g., *Sargassum* influx, tsunamis, sea level rise, extremes, pollution, erosion) identifying potential impacts

Using the Output 2.1 models, ensemble simulations will be carried out to sample the variability and quantify the uncertainty. Mapping of hazard will follow the best practices in oceanography that are:

1.Tsunami inundation maps for Pilot Sites following the standards of the Tsunami Program at UNESCO/IOC.
2. Mapping of sea level rise trends based upon long time series of downscaled sea level from global models for the past 30 years, compared with satellite altimetry data available for the same period.
3. Pollution mapping: generic source
4.Mapping of extremes based upon innovative statistical analysis tools applied to observation and numerical model output classifying the highest hazard coastal areas at each Pilot site
5.Coastal erosion mapping from satellite visible imagery for the past 30 years and concomitant in situ data from existing and new high efficiency stations implemented in Component 1

All products will be made available on interactive Atlas-like space on the cloud.

Output 2.3. Predictive tools leveraging AI to enhance storm surge forecasting accuracy and lead times.

AI forecasting will be implemented at selected sites allowing to optimize computing resources and allowing for simplified operational chains and timely information to be produced. The project will implement experimental forecasting for waves and sea level following international best practices.

Component 3: Coastal climate downscaling for adaptation planning

This component develops and provides high-resolution climate projections to inform coastal adaptation planning and risk evaluation. It supports evidence-based decision-making by using stakeholder-informed frameworks, climate hazard analyses, and tools designed to guide adaptation strategies and policy development. This component of the project supports coastal business intelligence. This will include projections identifying where mangrove, seagrass restoration will thrive in future climates, informing business and investment models for blue carbon and ecosystem-based production systems.

Output 3.1 Downscaled climate models and scenario-based projections

This output will be delivered after careful examination of the HPC and data management resources needed to carry out the projects. Shared Socioeconomic Pathways (SSPs) – used in IPCC AR6 – will be discussed with local stakeholders to find how many and which ones are the most desirable for coastal climate downscaling. Pilot Sites coastal downscaling with models delivered in component 2 will be done for 100 years on acquired HPC resources in the region. Validation for the historical period will be carried out with observations collected in Component 1

Output 3.2 Hazard indicators, risk assessments compiled

Climate downscaling for the coastal ocean is still in its early stages. Therefore, new downscaling frameworks and initiatives should prioritize accessibility, transferability of methodologies and outputs, and effective knowledge exchange. Following best practices, the design of regional climate downscaling frameworks, whether using numerical modelling or AI, should aim to support long-term development and build relocatable capabilities. From the available downscaling models, encompassing both waves, currents and biogeochemistry, hazard indices will be extracted, among others sea level rise along the coasts and in the bays, temperature anomalies and heatwave events, oxygen and PH projections.

Output 3.3 Tools and visualizations to support adaptation plans directed to policy implementations and decision-making.

The climate model downscaling projections produced previously will be stored following international, cloud-based standards on the regional Cloud system of Output 1.2. A software analysis package for visualization will be developed that will be interactive and designed with local policy makers and coastal managers.

Component 4: Decision support systems for sustainable coastal economies & resilient communities

This component provides decision support tools specifically tailored to local contexts, aimed at fostering sustainable coastal economies and communities. Building on the outputs of Components 1, 2, and 3, it includes customized, people-centered early warning systems, pollution and hazard mapping, and validated Digital Twins to support sustainable ocean planning and nature-based solutions.

Output 4.1 A complete set of Multi-hazard Early Warning Systems (MH-EWS) dedicated to specific risks

MH-EWS comprise: (a) risk knowledge through systematic data collection and assessment (Components 1–3); (b) hazard detection and forecasting, emphasizing impact-based predictions for storm surge, inundation, erosion, marine heatwaves, pollution, and ecosystem stressors such as algal blooms, acidification, and hypoxia. Storm surge and marine heatwave will be forecasted based on specific models (Component 2), while pollutant transport and *Sargassum* drift will be added in Component 4; (c) preparedness and response capacity (Component 5); and (d) risk communication and early warning, via multi-platform, multi-channel dissemination.

All these services will be implemented at the Pilot Sites.

Output 4.2 Assessment and reporting service for adaptation planning.

In parallel to the IPCC process, we aim to build capacity to produce assessment and special reports tailored to Pilot Sites and their regional contexts. Following IPCC working methods, Task Groups will use climate data from cloud repositories and downscaling products of this project to analyze coastal hazards. Their work will include: (1) defining

requirements and protocols for climate datasets; (2) developing user-friendly interfaces, similar to the IPCC Interactive Atlas; (3) engaging scientific experts to evaluate content and establish quality indicators; and (4) delivering reports in line with IPCC best practices.

Output 4.3 Case-specific Digital Twin for the Coastal Ocean (DTCO)

To manage priority risks at Pilot Sites, the Digital Twin for the Coastal Ocean (DTCO) will be employed. A DTCO is a digital replica of coastal systems, integrating models and observations to reproduce current and historical conditions. This tool enables governments and stakeholders to test management options - such as Nature-Based Solutions for erosion and flooding, habitat improvements within a safe virtual environment before real-world implementation. By providing scenario-based evidence, DTCOs strengthen decision-making, support effective adaptation planning, and advance coastal resilience and sustainable development.

Output 4.4 Decision support system for *sargassum* management near coastal areas, situational sea awareness (SSA) and search and rescue

Situational awareness, in the project context, entails the continuous comprehension and projection of the maritime environment. Specifically, it involves: real-time acquisition of environmental and operational data (Component 1 and 2) contextual analysis and correlation of this data to infer the current operational situation; the evolution of maritime conditions that may affect ongoing or planned activities at sea. SSA decision support system will use data fusion techniques and decision-support frameworks that can transform raw data into actionable information. A particularly critical application of SSA is in Search and Rescue (SAR) operations. The foundational Components 1 and 2 play a pivotal role in enabling SAR authorities, such as coastguards and maritime safety agencies, to deploy optimized, data-driven response strategies.

Component 5: Institutional & private sector engagement for sustainable coastal development.

This component supports long-term sustainability by fostering private sector participation and providing stakeholder training in the use of innovative monitoring and forecasting tools. It reinforces national institutional frameworks, enhances regional coordination through UNESCO (IOC and its Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)), and contributes to the development of a coastal GOOS strategy and sustainable business models. Additionally, it promotes knowledge sharing across p
Pilot Sites to refine and scale effective solutions.

Output 5.1 Workshops with local communities and private sector to train on the new technologies

The activities here will strengthen local capacity through tailored training and workshops with communities and the private sector. Activities will begin with needs assessments to ensure relevance, followed by the delivery of practical training supported by demonstrations and pilot applications. Dialogue and co-design processes will align community priorities with private sector opportunities, while train-the-trainer approaches will create local champions for sustained knowledge transfer. Post-training support, combined with monitoring and evaluation, will ensure adoption and generate evidence of impact. Lessons learned will guide scaling and replication to other communities and sectors, fostering long-term technology uptake and resilience. Workshops will bring together the key coastal users of the new services: local communities and cooperatives, municipal/state coastal authorities and civil protection, MPA/fisheries managers and

monitoring agencies, and the private sector (tourism, ports/logistics, aquaculture/seafood, and coastal-service SMEs).

Output 5.2 Business models for system sustainability of coastal businesses, including *Sargassum* economic exploitation

Business models for use of EWS and Decision Support System technologies will be developed through private sector engagement to generate new revenue opportunities to secure long-term sustainability and resilient coastal business, in alignment with national disaster risk management priorities. It will demonstrate the cost-benefit advantages of the use of of EWS and Decision Support Systems for planning and managing coastal businesses such as the collection and use of Sargassum. Local enterprises and institutions will be capacitated to operate and maintain the systems, supported by clear data-sharing and IP frameworks. This activity will co-develop viable business models to sustain the observing/forecasting services beyond the project by structuring public–private service agreements, cost-sharing and maintenance arrangements with coastal operators (tourism, ports, aquaculture/seafood, utilities and coastal-service SMEs). A dedicated track will support Sargassum value chains by linking forecasts to collection logistics and enabling partnerships with firms and communities for processing and valorization (e.g., fertilizers/soil improvers, biomaterials, energy), turning recurrent influxes into managed resources while reducing coastal impacts and disposal costs.

Output 5.3 Coastal GOOS strategy for the region

The IOC-led GOOS program and CMCC will oversee the implementation of coastal observing with international standards to ensure the long-term sustainability fostering a structured and collaborative framework under IOC-led GOOS Regional Alliances and WMO regional associations. This solution will consider the implementation of a Coastal Resilience Requirement Review process and the extraction of best practices for observing and modelling for coastal risk assessment and management. This activity will be led by national EEs together with national oceanographic/meteorological services, marine and coastal environment authorities (incl. MPA and fisheries agencies), civil protection/disaster risk management bodies, port authorities, universities and observing networks, and regional partners (e.g., IOCARIBE/GOOS), ensuring the Coastal GOOS strategy reflects the needs of both policy makers and operational end-users across the region.

Output 5.4 Capacity enhancement through the coastal resilience school courses

Capacity building will build on previous experience and tested formats, such as the Coastal Resilience School and regionally tailored training programs such as COMPASS, which integrate science, practice, and innovation for coastal resilience. Training will expand to governmental institutions and sustainable ocean planning, while participatory approaches - through citizen science, industry collaboration, and Ocean Literacy initiatives - will broaden stakeholder engagement across the national Pilot Sites of the region. This activity will engage education authorities and schools together with local coastal governments and civil protection, MPA/fisheries managers and technical monitoring agencies, universities/training centres, and community and private-sector representatives (e.g., fishers' groups and tourism operators) to co-deliver Coastal Resilience School courses that build practical skills aligned with real decision-making needs.

B. **Describe how the project /programme would promote new and innovative solutions to climate change adaptation, such as new approaches, technologies and mechanisms.**

The proposed project will introduce and scale a new generation of digital, scientific, and participatory tools to support climate resilience and inform adaptation in Caribbean coastal and marine areas. This proposal positions the Caribbean as a frontrunner in innovation of coastal ocean monitoring and predicting systems for climate change preparedness and adaptation, of particular relevance to Small Island Developing States (SIDS), through regionally adapted and co-designed solutions.

The project's's innovation encompasses seven key elements:

1. **Citizen Science, Low-Cost Observations and Regional Innovation Networks.** To ensure community-driven adaptation and democratise innovation, the project will harness citizen science tools and participatory platforms. These include app-based reporting of coastal flooding or sargassum blooms, community-based sensor kits, and the integration of indigenous knowledge. Specifically, we will systematically integrate indigenous and traditional knowledge to ensure that locally rooted practices for risk reduction, resource use, and ecosystem stewardship inform the design of early warning systems, adaptation strategies, and Digital Twin applications. Caribbean Pilot Sites will be supported as innovation hubs to tailor, maintain and potentially commercialise climate services, reinforcing local digital capacity and ownership.
2. **Cloud based data management on an open, federated infrastructure for coastal resilience**, the ProtoCoast Cloud, already operating at the Euro-Mediterranean Center on Climate Change (CMCC) in collaboration with the European Grid Infrastructure (EGI), will be expanded through co-design to integrate a regional infrastructure for the Caribbean that will be interoperable with other cloud platforms and part of a federated global system. This infrastructure, fully open-source and transferable, will be essential for delivering data-driven adaptation services at local, national, and regional levels. The cloud will enable real-time access to observing systems, data storage, cloud-based computing capacity, numerical simulations, AI forecasts, and decision-support systems from a single integrated environment.
3. **Impact-Based People Centered Forecasting and Multi-Hazard Early Warning Systems** Using advanced machine learning techniques, *in situ* and remote sensing integration, the project will implement numerical modelling and AI-based nowcasting and forecasting tools tailored for coastal hazards such as storm surge, wave overtopping, sargassum influxes, and coastal erosion. The systems will be accessible via user-focused web portals and apps that will be available on the ProtoCoast cloud, enhancing preparedness in sectors ranging from fisheries to urban planning.
4. **High-Resolution Coastal Climate Downscaling and Risk Assessment.** Coastal zones are typically underrepresented in global climate models. The project will fill this gap through regionally validated climate downscaling experiments, conducted in alignment with IPCC and Cordex scenarios and national adaptation priorities. These models integrate coastal ocean and atmospheric processes, land-sea hydrology, urban runoff, marine biogeochemistry, and socio-ecological exposure to deliver location-specific climate projections, trend analyses, and scenario-based stress tests. Outputs will inform the development of digital twins and adaptive planning tools.
5. **Digital Twins for Sustainable Coastal Ocean Planning and Nature-Based Solutions.** A groundbreaking innovation is the implementation of dynamic **Digital Twins** - virtual representations of coastal systems that integrate physical, ecological, and economic

layers. These twins will simulate What If Scenarios for interventions such as nature-based and hybrid grey-green infrastructure, testing their performance against future climate scenarios. The Digital Twins serve as transparent and reproducible tools for stakeholder engagement, investment planning, and regulatory decision-making, enabling compliance simulations and scenario comparisons for resilience pathways.

6. **Decision Support Systems (DSS) and Web-Based Dashboards.** The project will deploy a suite of DSS customized to Caribbean pilot sites. These systems integrate hazard thresholds, real-time observations, forecast data, and stakeholder inputs. They will support national and municipal agencies in emergency preparedness, coastal protection zoning, sargassum event management, coastal erosion vulnerability mapping and marine spatial planning. Co-designed with end users, these tools will emphasize accessibility, multilingual interfaces, and local ownership.
7. **Regional cohesiveness.** The regional approach of this initiative will be transformative to optimise effectiveness and efficiency of the outputs overall, across the region. It will standardise and harmonise data across participating countries, and also address the persistent fragmentation of climate services in the Caribbean. The regional approach represents a major step towards scalable and evidence-based coastal adaptation. Each component will be delivered through modular “building blocks”, deployed at the Pilot Sites and adapted through gap analyses and co-design. A strong emphasis is placed on horizontal learning, with SIDS collaboration, innovation fellowships, and joint testing across pilot countries.

This systemic innovation approach - merging cutting-edge technology, participatory governance, and open-access infrastructures and regional collaboration - represents a transformative shift in how climate adaptation can be delivered for coastal communities. It replaces reactive, fragmented approaches with a unified digital backbone for planning, and action, enhancing the adaptive capacity of both institutions and communities.

C. **Describe how the project/programme would provide economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project/programme would avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund.**

The project’s sustained benefits - economic, social, and environmental - are closely interlinked and designed to be inclusive, scalable, and sustainable. Its regional evidence-based approach will build capacity and optimise decision making and investment for sustainable development and will set a replicable standard for climate adaptation specifically for coastal community resilience in SIDS in the region and coastal regions worldwide. In synthesis the key outcomes and beneficiaries at the regional level are:1) Reduced coastal risk and strengthened resilience for people, infrastructure, and key blue-economy sectors through improved monitoring, forecasting, and risk-informed planning. Beneficiaries are the coastal and island communities exposed to extreme events, flooding, erosion, ecosystem loss, and sea-level rise, ports, coastal business, maritime operators, and coastal infrastructure managers

2) Enhanced evidence-based decision-making for sustainable coastal development, enabled by digital twin tools, high-resolution climate projections, and scalable nature-based solutions that support shoreline protection, biodiversity conservation, carbon storage, and ecosystem services.

Main beneficiaries are coastal industries incl. tourism, coastal planners and infrastructure managers, local government agencies

3) Stronger institutional capacity and long-term adaptation systems, driven by improved coordination across national, state, and regional levels. Main beneficiaries are the DRR and EWS agencies, defence and safety agencies, national and local policy makers.

Economic Benefits

The economic benefits will contribute to both immediate livelihood protection and long-term regional development. The core aim of the project is to strengthen national and regional capacity (infrastructure and skills) to observe and respond to ocean and climate hazards. This includes the development of real-time data systems, a sustainable coastal observing network, and shared cloud infrastructure (Component 1). These technologies will directly support sectors critical to the Caribbean economy - such as fisheries, tourism, and maritime trade - by enabling better decision-making, reducing losses from environmental disasters, and improving long-term planning. Furthermore, the infrastructure developed will have potential to be a shared resource for use and benefit beyond the project's outputs and activities.

The project will co-deliver tailored decision-support systems (DSS) for coastal resilience with local stakeholders who will be the end-users of such systems (Component 4). These systems will inform investment decisions related to infrastructure development, marine spatial planning, fisheries and aquaculture planning, and climate-resilient tourism. The integration of Digital Twin technologies will allow governments, businesses and communities to simulate the impacts of interventions and choose cost-effective and environmentally sound strategies, to optimise investment in adaptation measures.

Capacity development is a critical aspect of the project that will support its longer-term sustainability. This will have economic benefits by supporting the growth of a skilled workforce capable of operating and maintaining climate monitoring systems, using predictive tools, leading sustainable development initiatives (Component 5) and local companies providing and supporting the digital infrastructure and services to deliver the project outputs. These opportunities will be inclusive and gender-sensitive, promoting women's participation in traditionally male-dominated fields such as ocean science, engineering, and digital technologies.

Overall, the project will support a diversified and resilient blue economy with an emphasis on enhancing local capacity with skilled professionals and local providers to maintain the systems developed. These economic benefits are aligned with the Adaptation Fund's ESP principles on access and equity, gender equality, and core labour rights and specific measures will be embedded in the project implementation to ensure these principles are implicit.

Social Benefits

The project aims to strengthen the social resilience of coastal populations across eight Caribbean countries, and furthermore to link solutions in different islands. Through Component 2, the project will implement People-Centered Multi-Hazard Early Warning Systems (PC-MHEWS). These systems will deliver timely, localised alerts for hazards such as storm surges, floods, marine heatwaves, and pollution events. Co-designed with community input, they will be tailored to the specific vulnerabilities and capacities of local populations, including coastal settlements, island communities, island fishery economies and indigenous communities.

A fundamental aspect of the project is an emphasis on participatory governance (Component 5) that will ensure local ownership of the project's outputs and through co-design and will ensure that vulnerable and marginalised groups are actively involved in adaptation planning and implementation. Stakeholder engagement processes under Component 5 will be designed to be inclusive, culturally appropriate, and accessible, particularly for women, indigenous groups, and people with disabilities. Community members will co-design the project outcomes, drawing on both scientific knowledge and traditional practices. This approach supports the principles of the ESP related to human rights, indigenous peoples, and public consultation.

The project will promote gender equality by ensuring that women and men have equal opportunities to participate in and benefit from project activities, as well as the representation of youths. Women will be represented in leadership roles during the design and deployment of DSS and climate resilience strategies. Gender-responsive training will be provided to ensure that women are not only beneficiaries but drivers of resilience efforts.

The project will support public health and safety by improving hazard prediction and warning dissemination. The PC-MH-EWS will reduce the risk of injury and death from extreme events. Resilient infrastructure planning, informed by coastal climate downscaling (Component 3), will protect water supplies, housing, and essential infrastructure and services in vulnerable communities. The project thus contributes to the long-term wellbeing of coastal populations, in compliance with the ESP principles of public health and social equity.

Environmental Benefits

A central aspect of the project is the protection and restoration of the region's coastal and marine ecosystems. Environmental benefits will be realised through the project outputs including in particular those that focus on nature-based solutions and pollution early warning. The project will enable national and regional authorities to assess current and future climate risks - including sea-level rise, ocean acidification, and temperature increases - and incorporate this information into adaptation planning. A central strategy for adaptation will be the use of nature-based solutions NBS, such as the restoration of mangroves, coral reefs, and seagrasses. These natural defenses provide multiple co-benefits: they reduce the impact of coastal hazards to communities, support biodiversity conservation, and sustain fisheries. The project will develop Digital Twin tools that allow stakeholders to simulate the effectiveness of various nature-based interventions before they are implemented. This reduces the risk of unintended ecological harm and ensures that restoration efforts are both scientifically grounded and cost-effective.

The project will also strengthen environmental monitoring. Component 1 will enhance coastal observing systems, enabling real-time detection of marine pollution, harmful algal blooms, and coral bleaching. This will empower authorities to take early action, reducing ecological damage and supporting ecosystem resilience. Furthermore, improved forecasting capacity will minimize the need for reactive emergency interventions, which may be ecologically disruptive and expensive.

D. Describe or provide an analysis of the cost-effectiveness of the proposed project/programme and explain how the regional approach would support cost-effectiveness.

The cost-effectiveness of the proposed project can be assessed in two ways: 1) A cost-effectiveness analysis of the project approach; and 2) an assessment of the efficiency and cost-effective aspects of project management.

1. Cost-Effectiveness of the Project Approach

Baseline Scenario: Without adaptation, climate-related impacts in the Wider Caribbean—including storm surges, sea-level rise, ocean warming, and pollution—are projected to result in annual economic losses of up to USD 22 billion by 2050 and USD 46 billion by 2100 (equivalent to 10–22% of 2018 GDP). These losses primarily affect tourism and critical infrastructure (Thomas et al., 2018; 2020). Reactive expenditures on disaster relief and recovery far exceed the cost of proactive Disaster Risk Reduction (DRR) measures, particularly when secondary impacts are considered.

Intervention Costs: Among DRR options, resettlement and infrastructure retrofitting are the most expensive and disruptive. Targeted infrastructure measures (e.g., drainage systems, coastal barriers) are also cost-intensive. In contrast, Multi-Hazard Early Warning Systems (MH-EWS), climate adaptation planning, remote sensing, low-cost sensor networks, and community-based preparedness (e.g., evacuation route mapping, hazard zoning) represent highly cost-effective, low-disruption alternatives.

The project prioritizes these low-cost, high-benefit interventions—namely MH-EWS, capacity building, and digital infrastructure—due to their scalability, adaptability, and immediate risk reduction potential. Cloud-based platforms and public-private partnerships will ensure computational cost-efficiency and long-term sustainability.

2. Cost-Efficient Project Management

A regional strategy enhances cost-efficiency through replication, knowledge transfer, and shared infrastructure. Pilot sites allow for targeted deployment of resources, aligning technical solutions with local environmental and socio-economic conditions.

The project leverages open-access satellite data and cost-effective in situ sensors for hazard and risk assessments. Outputs—such as real-time coastal monitoring, 15-day forecasts, and climate downscaling models—will be integrated on a regional cloud infrastructure following best practices in data sharing and service delivery.

Partnerships with existing national agencies, local private/non-profit sectors, and regional initiatives reduce transaction costs and strengthen the coastal services economy. The technical implementation draws on international best practices, incorporating global expertise in MH-EWS, Digital Twins, climate downscaling, and capacity development.

Training and educational components are embedded across all project activities, supporting long-term institutional and community resilience. These “no-regret” measures yield immediate co-benefits—e.g., improved preparedness and awareness—even in the absence of hazard events.

Regional workshops, academic partnerships, and cloud-based digital infrastructure ensure knowledge retention and intergenerational transfer. Private sector involvement in cloud services development enhances sustainability and fosters innovation.

In summary

- The DRR approach (MH-EWS, climate downscaling, Digital Twins) reduces high baseline economic losses from coastal hazards.
- Selected interventions are more cost-effective and socially acceptable than infrastructure-heavy alternatives.
- Cloud-based, regional-scale implementation accelerates service deployment and uptake of coastal risk solutions.
- Private sector participation ensures scalability and financial sustainability.
- Knowledge transfer from global coastal regions reinforces implementation efficiency and long-term impact.

E. **Describe how the project/programme is consistent with national or sub-national sustainable development strategies, including, where appropriate,**

national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist. If applicable, please refer to relevant regional plans and strategies where they exist.

Regional and Global Context Regional and global frameworks emphasis building ocean science capacity, enhancing resilience, and strengthening governance, by delivering coastal ocean forecasting, ecosystem-based adaptation, and marine spatial planning, the project will help countries implement regional commitments and achieve resilience objectives. The Organisation of Eastern Caribbean States (OECS, 2020) and IOCARIBE's *Medium-Term Strategic Science Plan (2023–2029)* call for coordinated action to reduce risks from ocean hazards, improve monitoring, and expand opportunities for a sustainable blue economy. The Antigua and Barbuda Agenda for SIDS (ABAS, 2024) stresses the importance of disaster risk reduction, biodiversity conservation, and sustainable ocean-based livelihoods. At IOCARIBE's XVII and XVIII Intergovernmental Sessions (2023, 2025), Member States endorsed the TAC ICHEWS project as key vehicle for advancing these priorities. Regionally, the project will support CARICOM's Climate Change Action Plan and the Cartagena Convention by fostering knowledge-sharing and cooperative management.

This project is proposed directly addresses:

- **IOCARIBE Strategic Science Plan (2023–2029):** by improving regional observing capacity, developing new coastal forecasting services, and fostering knowledge-sharing across TAC countries.
- **OECS priorities (2020):** by equipping SIDS with tools to manage climate-related risks, diversify economies through sustainable ocean uses, and strengthen integrated coastal management.
- **Antigua and Barbuda Agenda for SIDS (ABAS, 2024):** by advancing disaster risk reduction, building ocean science and forecasting capacity, and supporting biodiversity conservation as a foundation for resilient livelihoods.
- **TAC ICHEWS initiative (2023):** by embedding enhanced early warning systems and forecasting within a coordinated network of pilot sites tailored to local needs.
- **Global SDGs (SDGs 13, 14, 15):** by supporting climate action, conservation of marine ecosystems, and resilience of coastal communities while also contributing to poverty reduction and sustainable cities.
- **Cartagena Convention and SPAW Protocol** on marine biodiversity conservation, as well as the **Kunming-Montreal Global Biodiversity Framework**.

National alignments

The Bahamas: The Bahamas has not adopted a National Adaptation Plan, but the project aligns with the National Policy for the Adaptation to Climate Change (2005) by strengthening hazard monitoring, data management, and impact-based early warnings for coastal risks. Some specific measures that the project aligns with, related to coastal

and marine resources and fisheries include: 1. Continue, expand and strengthen coastal monitoring and data collection so as to facilitate decision making; 2. Promote and facilitate a national assessment of coastal areas and of coastal and fishery resources at risk; 3. Adopt short-, medium-, and long-term measures to protect coastlines and increase the resilience of coastal ecosystems. Such measures may include construction of coastal defence structures, enforcement of setbacks, and restoration of coastal wetlands; 4. Promote the restoration of damaged or destroyed coastal resources and ecosystems where possible and technically feasible; 5. Develop a comprehensive National Land Use Management Plan, which, inter alia, incorporates Climate Change concerns and which, based upon such concerns, makes prescriptions regarding the location of coastal developments; 6. Identify and promote alternative fishery and resource use activities where impacts on ecosystems and natural resources preclude the continuation of traditional activities; 7. Foster increased awareness and knowledge on the part of the general public regarding Climate Change impacts on the coastal and marine environment, through Public Education and Outreach (PEO) activities; and 8. Establish a Coastal Zone Management Unit to integrate coastal activities and compile Geographical Information System data sets for all the major islands of The Bahamas.

Furthermore, the project supports Vision 2040 – National Development Plan priorities on resilient growth, coastal protection, and blue-economy development by providing decision-support tools and locally validated climate information. The programme is consistent with the Updated NDC (2022), which targets **a 30% GHG reduction by 2030**, by informing nature-based coastal restoration and other mitigation-co-benefit measures. It complements the 2024–25 debt-conversion for marine conservation (≈US$124 million) by supplying the data, forecasts, and digital tools needed to protect mangroves and seagrasses and to track conservation outcomes. Finally, the project reinforces implementation of the **Disaster Risk Management Act (2022)** and the National Standard for Disaster Risk Analysis (2025) by improving risk information, coastal vulnerability assessments, and interoperable multi-hazard early warning services.

Barbados: There is no formal National Adaptation Plan. The project will support implementation of the National Climate Change Policy (2012) by providing practical tools for climate risk management across sectors. It will address adaptation goals outlined in the updated NDC (2021), including net-zero by 2050. The project will strengthen the Integrated Coastal Zone Management Policy and the Coastal Risk Assessment and Management Programme (CRMP) by improving forecasting for flooding, erosion, and storm surge. It will also support food security and resilience under the Climate Smart Agriculture Strategy and contribute to green growth priorities in the Barbados Economic Recovery and Transformation (BERT) Plan.

Colombia: The project will address the National Climate Change Policy (PNACC, 2016) by enhancing forecasting and early warning for coastal risks. Specific alignment with the PNACC includes vulnerability assessments and tools to support adaptation planning that will support Ecosystems and Biodiversity protection; planning of Water and Coastal

Infrastructure; planning and resilience of Human Settlements, Coastal Urban Areas and Communities; adaptation and sustainability of productive sectors including coastal fisheries, tourism, ports, shipping; and engagement and planning for sustainable governance and sustainable coastal zone management.

The project will support the Integrated National Adaptation Program (INAP) through improved climate information and contribute to the Low Carbon Development Strategy (2024) by advancing ecosystem-based adaptation such as mangrove restoration. It will also inform national efforts like the Canal del Dique restoration by providing data to manage sediment flows and coastal morphodynamics. The project will provide tools to support Integrated Coastal Zone Management (ICZM), a national planning priority.

Dominican Republic: The project will support the updated NDC (2020) by addressing adaptation priorities in coastal resilience, disaster risk management, and ecosystems. It will strengthen the National Plan for Adaptation to Climate Change of the Dominican Republic (PNACC) by integrating improved monitoring, forecasting, and early warning into sectoral and local planning. The project will also address national goals for water resources, resilient cities, and biodiversity conservation by providing scientific evidence to inform ecosystem rehabilitation, climate-resilient urban development, and water management strategies.

Grenada: The project will address the Grenada National Sustainable Development Plan 2020-2035 and the ICZM Policy and Act (2018) by providing scientific data and capacity building to manage erosion, storm surges, and sea-level rise. It will support the National Adaptation Plan (NAP) and the National Biodiversity Strategy and Action Plan (NBSAP) by engaging communities in monitoring, improving technical capacity for spatial data management, and advancing ecosystem-based solutions. The project will respond to Grenada's low adaptive capacity by supplying the tools and evidence needed for resilience planning, consistent with the Disaster Resilience Strategy and Sendai Framework.

Jamaica: In Jamaica, the project aligns with national and sub-national frameworks, notably Vision 2030 Jamaica, which embeds hazard risk reduction and climate adaptation among its national outcomes [Government of Jamaica CLIMATE CHANGE POLICY FRAMEWORK FOR JAMAICA. Updated March 2023]. The updated **Climate Change Policy Framework (2023)** mandates mainstreaming resilience across sectors and participatory governance [Government of Jamaica CLIMATE CHANGE POLICY FRAMEWORK FOR JAMAICA. Updated March 2023]. The project is also consistent with PIOJ initiatives, which emphasize integrated climate resilience, sustainable development, and evidence-based policymaking. In addition, it supports the development of the **National Adaptation Plan (Ja-NAP)**, which seeks to institutionalize adaptation planning and strengthen public-private engagement. The project will complement these instruments by co-developing risk assessment tools, adaptation pathways, and decision-support platforms aligned with national priorities, while also advancing Jamaica's commitments under its **Adaptation Communication (2022)** [Jamaica's Adaptation Communication August 2022] and regional CARICOM climate agendas.

Mexico: The project will address the Estrategia Nacional de Cambio Climático- National Climate Change Strategy (ENACC, 2025), the General Climate Change Law, and the National Development Plan (PND, 2025-2030) by strengthening adaptation in coastal and marine ecosystems. It will support implementation of Mexico's Nationally Determined Contributions to the Paris Agreement and the National Biodiversity Strategy by improving management of critical ecosystems such as the Mesoamerican Barrier Reef System. At the pilot site in the Yucatán Shelf, the project will provide the observing and early warning systems needed to manage fisheries sanctuaries and marine protected areas, directly responding to identified monitoring gaps. In the Pilot Site in the Caribbean Sea, containing the Xcalak Park, a coastal laboratory for oceanic observation and monitoring will be established, contributing to the understanding and preservation of its coral valuable ecosystem services. By providing an interoperable national-to-local data pipeline (observations →forecasts →indicators), the project will strengthen Mexico's ENACC priorities on science-based decision making and monitoring of adaptation actions, enabling national and state authorities to track coastal risk reduction and ecosystem resilience outcomes in a transparent, comparable way.
Furthermore the project will align strictly with the environmental efforts planned in the 2025-2030 sectoral program for environment and natural resources, (Programa Sectorial de Medio Ambiente y Recursos Naturales (PROMARNAT)) launched in Sept 2025. The coastal integrated observing and modelling system, with cloud computing data management and services will be the natural support of all other policy driven interventions at the coasts. Furthermore the project will strengthen the capacities of SIMAR - https://simar.conabio.gob.mx/ - ensuring that there is complementarity of new information developed for the Pilot sites.
In Mexico, beneficiaries will be initially concentrated in the Yucatán Shelf and the Mexican Caribbean Pilot Sites. On the Yucatán Shelf, the project will serve coastal fishing communities and their households (including the octopus-fishery dependent families) and the authorities managing MPAs/fisheries sanctuaries currently affected by monitoring gaps (e.g., Bajos del Norte, Arrecife Alacranes; Ría Lagartos; Celestún, Dzilam de Bravo, El Cuyo, Chabihau).
In the Caribbean pilot site, beneficiaries are reef-dependent communities and local institutions, with initial focus on Xcalak National Park, including artisanal fishers, local tourism operators, and protected-area/state–federal agencies (e.g., relevant coastal authorities) using project monitoring/forecast services for hazards such as marine heatwaves, sargassum and extreme weather.

Trinidad and Tobago: There is strong alignment with the National Adaptation Plan (2024) across strategic focus areas including: Cross-sectoral integration; Risk-informed planning & pathways; Nature-based solutions and ecosystem resilience (e.g., mangroves, coastal buffers); Data, monitoring, capacity-building & governance.

The project will address the National ICZM Policy Framework and contribute to the Marine Spatial Plan for the Gulf of Paria by providing data, forecasting tools, and monitoring networks. It will support ICZM objectives to reduce disaster risks, strengthen pollution control, and promote inclusive governance through stakeholder engagement. By involving fishing communities in data collection and delivering products that inform policy,

the project will also address the National Climate Change Policy and National Biodiversity Strategy.

The project will directly support national frameworks by supplying the forecasting, data, and participatory processes needed to implement climate adaptation, coastal resilience, and sustainable development strategies. Across the eight countries, it will equip governments with the operational tools to deliver on their existing policies, NDCs, and plans, while reinforcing regional and global commitments.

F. Describe how the project/programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.

The project design considers alignment with the national technical standards, regulatory frameworks, and environmental safeguards of all participating countries. These countries share a common foundation of legal and procedural instruments governing the management of coastal and marine environments, public infrastructure, and disaster risk reduction. Notably the project's physical infrastructure refers mainly to installation of ocean-based observing instrumentation and equipment, rather than significant building infrastructure.

Where physical interventions are proposed - such as the installation of coastal monitoring stations, planning/demonstration of nature-based solutions, or the development of digital twin tools - the programme will comply fully with the relevant Environmental Impact Assessment (EIA) regulations. For example, Barbados requires EIAs under the Town and Country Development Planning Act, overseen by the Environmental Protection Department. In the Dominican Republic, such procedures fall under the General Law on Environment and Natural Resources (Law 64-00), while Trinidad & Tobago enforces its Environmental Management Act for coastal and environmental permitting. Mexico and Colombia also apply well-established national frameworks for environmental assessment in marine and coastal zones.

The project will ensure that national land-use and planning regulations are adhered to when planning coastal restoration or developing decision tools for infrastructure and urban development. For example, the Barbados Building Code, which sets structural and climate resilience standards for construction in hurricane-prone areas, and Mexico's Territorial Planning Law, which integrates disaster and climate risks into coastal development strategies. Similarly The Bahamas, infrastructure projects must follow guidelines issued by the Ministry of Works and Utilities, including requirements for hurricane-resistant design. The Project will secure any necessary permits in coordination with national authorities during the detailed design and pre-implementation phases and most importantly these rules will be included where relevant in the Digital Twins and planning tools.

For its digital infrastructure and information services, the project will observe national data governance and cybersecurity policies where these exist. These include standards for data privacy, storage, and interoperability - especially for early warning and meteo-oceanographic forecasting systems managed by national agencies. Where such standards are not yet formalized, the project will follow established international practices and promote compatibility with regional data-sharing networks supported by GOOS, WMO, UNESCO (IOC and its Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)), CIMH, and the Caribbean Community.

In accordance with the Environmental and Social Policy (ESP) of the Adaptation Fund, the project will launch an environmental and social screening process to identify potential risks and ensure that all components are assessed against the Fund's 15 principles - including biodiversity conservation, equitable access, gender equality, and the protection of indigenous peoples' rights. Most activities are expected to fall under Category C (low risk), given their non-invasive and digital nature. However, any component involving physical installation or modification of coastal areas will be monitored closely and, where needed, a tailored Environmental and Social Management Plan (ESMP) will be developed. Should any activity be considered Category B, appropriate mitigation measures will be implemented.

The project also aligns with the Adaptation Fund's Gender Policy. It will promote inclusive participation in the design, deployment, and governance of its services. Gender-disaggregated data will inform decision-making across all phases, helping to ensure that services and training reach women and underrepresented groups equitably. A project focal point will be designated to coordinate environmental, social, and gender safeguards across all countries.

To ensure consistency with local institutions, the project will harmonise its safeguards with existing frameworks and permitting processes. This includes coordination with the Secretariat of Environment and Natural Resources (SEMARNAT) in Mexico, the Ministry of Environment and Natural Resources in the Dominican Republic, the Environmental Management Authority (EMA) in Trinidad & Tobago, and the equivalent agencies in Barbados, The Bahamas, Colombia, Grenada and Jamaica. Where discrepancies exist between national policies and the Adaptation Fund's ESP, the project will apply the more rigorous standard.

Finally, the project will draw on the international experience of CMCC and the principles of best practices and international collaborations . These are built on openness, transparency, scientific co-creation, and broad public access. All digital services developed through the project will be released as open-source tools, ensuring that they remain freely available, adaptable, and inclusive - reinforcing long-term accountability and institutional sustainability.

G. Describe if there is duplication of project/programme with other funding sources, if any.

The proposal does not duplicate funding but builds directly upon prior and ongoing initiatives, for example Mexico's pilot early warning system for sargassum. Existing projects are complementary (reef insurance, sargassum use, blue carbon, integrated coastal management). The proposed project will fill gaps in predictive capacity, community engagement, and regional coordination and will support expansion, integration, and scaling of previous initiatives. While there are related projects and funding streams these were short-term relatively small-scale funding opportunities, the proposed project is complementary rather than duplicative, enhancing and scaling earlier pilots and aligning with broader regional and national strategies.

BAHAMAS

Ongoing efforts by the University of The Bahamas and private operators monitor localized coastal conditions. This proposal complements these by scaling to nationwide coverage, integrating numerical forecasts, and providing a sustained, systematic framework for biogeochemical and physical monitoring that benefits multiple sectors.

COLOMBIA

Cartagena has extensive ongoing monitoring and adaptation work (DIMAR's SIPSEM, CIOH programmes, ACCC adaptation project, and CONPES 4001 policy implementation). This

proposal builds upon these by consolidating long-term datasets, expanding operational oceanography, and linking national efforts to international networks such as UNESCO/IOC sea-level monitoring. It complements previous adaptation planning and strengthens Cartagena's role as a pilot for ecosystem-based management.

DOMINICAN REPUBLIC

The Dominican Republic was awarded USD 9,953,692 for a 4-year project "Enhancing climate resilience in San Cristóbal Province, Dominican Republic - Integrated Water Resources Management and Rural Development Programme." The Executing Entity was the Ministry of Environment and Natural Resources; National Institute for Water Supply and Sewerage, and NGOs. The main objective of the project was to increase the resilience and capacity to adapt to climate impacts and risks on the water resources of rural communities in the Province of San Cristóbal and contribute to the diversification of their livelihoods. (DR_Enhancing-Climate-Resilience_AF)

GRENADA

Past shoreline change analyses under the CME Programme and ongoing OECS BioSPACE/GEF-6 initiatives provide valuable baselines. The proposal does not duplicate but rather updates outdated data, incorporates hurricane-scale impact assessment, and expands community-based monitoring and capacity building, thus enhancing cost-effectiveness and alignment with regional biodiversity targets.

MEXICO

Mexico has built strong expertise in ocean observing and modelling through initiatives such as the CIGOM project, which advanced understanding of Yucatan Shelf dynamics, and territorial planning programmes (POETCY and POETY). Collaborative efforts involving Cinvestav, UNAM, and others under SACMyC have underscored the need for a Coastal Observatory and early warning systems for harmful algal blooms. SECIHTI (formerly CONAHCYT) has funded multiple relevant studies, including sargassum observation pilots, carbon flux research, and the establishment of LANCO (Oceanography and Coastal Resilience Labs). Additional support has come from UC Alianza and international modelling collaborations (e.g., CMCC, NOC). In parallel, coastal resilience initiatives in the Mexican Caribbean have emphasized nature-based solutions. Since 2014, The Nature Conservancy (TNC) has advanced coral reef protection, including through the Coastal Zone Management Trust in Quintana Roo. Projects such as "Resilient Coasts – Caribbean Sea" (2024–2026) and SIMAR's National Sargassum Strategy (including specialized collection vessels) address ecosystem restoration and sargassum management. Multilateral support (IDB, IDB Lab, CAF) has introduced innovation and financing for sargassum solutions, while NOAA and other partners contribute critical research on marine heatwaves and coral reef stress.

A 2022 CIGOM-led pilot for a Sargassum Observation and Early Warning System established a multi-institutional platform and prototype forecasting model. The current proposal builds on these foundations - consolidating outputs. IT seeks to refine predictive accuracy, expand operational capacity, and integrate resilience measures, complementing rather than duplicating past and ongoing efforts across Mexico's Gulf and Caribbean coasts.

TRINIDAD AND TOBAGO

Existing research by the Institute of Marine Affairs, PROCARIBE+ participation, and the National Climate Change Policy provide a strong baseline. This project avoids duplication by filling critical data gaps with new in situ ocean observations and translating complex data into community-relevant outputs, thereby complementing national and regional initiatives.

H. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

The project embeds a significant learning and knowledge exchange component. A key element of the approach is to ensure capacity enhancement through training as well as to leverage learnings across the region, exchanging lessons learnt between Pilot Sites. This will be achieved through a combination of structured stakeholder consultations, capacity building workshops, iterative operational testing, cloud-based knowledge sharing platforms (e.g. for model technology).

Capture of lessons learned
Throughout the project, consultation processes across all components serve as key entry points for co-developing solutions with local stakeholders, national authorities, and communities. These engagements are not limited to the design stage but are repeated at critical stages (e.g., operational testing phases for implementation of components 1, 2, 3, 4), allowing continuous feedback loops. This iterative approach ensures that operational challenges, successes, and innovations will be documented and transformed into shared lessons.

Model validation and quality assessments (part of components 2 and 3) also function as knowledge management. By explicitly testing uncertainties and assessing product usability with end-users, the project will systematically generate insights on technical performance, user relevance, and institutional uptake - information that is vital for refining both the science and its application.

Dissemination and Exchange Mechanisms
The regional cloud platform will serve as a knowledge hub. As well as storing observational and model data, it will provide tools for quality control, visualisation, and access to external datasets (Component 1). These features will make lessons learned accessible not only as reports but as living datasets and applications that can be interrogated, adapted, and reused by stakeholders across the region.

Interactive products such as a *Climate Scenario Atlas* (Component 3), web-based Decision Support System tools and Digital Twins (Component 4) will enhance this exchange by translating complex scientific results into user-friendly interfaces. These tools will be designed for iterative assessment with policy-makers and communities, allowing opportunities for shared learning and collaborative decision-making.

Capacity Enhancement
Training and education activities under Component 5 will be important for knowledge management. Workshops with local communities and coastal managers will provide bottom-up feedback channels while equipping participants to apply lessons in practice. Specialised training as part of various Components (incl. Component 1, 2, 3) (COMPASS programs and Coastal Resilience School courses) will train technical staff, students, and practitioners not only to implement and use the systems developed but also to contribute to their refinement. This capacity strengthening and experience feedback will ensure feedback from users and contribute to knowledge management.

Institutionalisation and global linkages
To ensure that lessons aren't fragmented the project will deliberately institutionalise knowledge management as part of Component 5. Building a regional Coastal GOOS strategy and linking solutions across world regions will ensure that experiences from the Pilot Sites are embedded into regional monitoring strategies and contribute to the Global Ocean Observing System. Component 5 will also develop a governance mechanism for sustained knowledge sharing and uptake beyond the project lifetime.

Overall, learning and knowledge management are not treated as stand-alone activities but are integrated into every stage of the project cycle: from stakeholder consultations to operational testing, cloud-based data sharing, training and institutional strategies. This ensures that lessons learned are systematically captured, validated, transformed into accessible tools, and disseminated across communities, governments, and international networks. By doing so, the project creates not only immediate impact at Pilot Sites but also a scalable and transferable body of knowledge for coastal resilience.

I. Describe the consultative process, including the list of stakeholders consulted, undertaken during project/programme preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund.

In July 2023, CMCC initiated a survey to identify national partners interested in strengthening their Disaster Risk Reduction and Early Warning Systems through the development of Pilot Sites in their coastal zones. The survey helped highlight key priorities for enhancing coastal resilience, which now serve as the key basis for this project. Furthermore, to identify priority needs with respect to coastal resilience challenges, UNESCO (IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE))and CMCC carried out a series of consultations at different levels:

The consultation timeline includes:

- 2017-2024 The UN Decade of Ocean Science for Sustainable Development in the IOCARIBE Region - IOCARIBE Regional consultations on Decade outcomes e.g. ‘a safe ocean’, ‘a predicted ocean’.
- 2024 Consultation with UNESCO/IOC Member States
- 2024 - 2025 Consultations with Pilot Sites’ partners and key stakeholders (see list below)
- 2025 XVIII Intergovernmental session of UNESCO/IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)
- 2025 IOC Assembly consultation with UNESCO/IOC Member States
- Dec 2025 IOCARIBE carried out dedicated consultation workshops with primary stakeholders for each of the 8 nations involved in the Project

IOCARIBE has the overall responsibility for planning and coordinating, jointly with other UN organisations, the UN Decade of Ocean Science for Sustainable Development 2021–2030 (‘Ocean Decade’) in the Tropical Americas and the Caribbean Region (TAC).

In 2017 in the Tropical Americas and the Caribbean (TAC) Region, a co-design and consultative process included thousands of contributors, and brought together a diverse range of stakeholders, including scientists, policymakers, programme managers, government officials, United Nations agencies, international and regional organizations, representatives from tourism, oil and gas industry, maritime sector, private enterprises and non-governmental organizations. The Kick-off TAC Regional Conference (December 2021) focused on fostering regional partnerships for Decade Actions co-designed across a diversity of stakeholder groups. To enhance regional governance, the Conference recommended establishing National Decade Committees for the Ocean Decade to promote local and national collaboration. Regional priorities were identified and new, expanded stakeholder networks and partnerships were established in alignment with the Decade Outcomes. This co-design and consultative process was carried out through a series of workshops and meetings, which served to recognize knowledge gaps, barriers and needs in capacity development.

From this process, the UN Ocean Decade project “Integrating Coastal Hazards Warning System for the Tropical Americas and Caribbean (iCHEWS)” was developed through a co-design process with the engagement of over 80 ocean and disaster risk reduction professionals. The focus of this project is the Co-Design, Co-Production, and Co-Delivery of Integrated Multiple Coastal Hazard Early Warning Systems and Services for the Tropical Americas and Caribbean (TAC), considering:

- Monitoring and Warning
- Risk Knowledge
- Warning Dissemination and Communication
- Response Capabilities

These efforts are underpinned by capacity development, with linkages to regional and international efforts, as well as national and local priorities.

In December 2024, the IOCARIBE document "Building a Roadmap for the Implementation of the Ocean Decade in the Tropical Americas and Caribbean (TAC) Region" was presented at the Latin American and Caribbean Open Science Forum in San Andrés, Colombia. One of the 10 key priorities identified in the Roadmap is the implementation of decision-support tools for coastal community resilience.

Developing advanced decision support tools is essential to enhance the resilience of coastal communities facing region-specific climate challenges. Key barriers include:

- Uncertainty in risk and vulnerability assessments, especially in data-poor regions.
- Limited data infrastructure in underserved areas, hindering effective planning and response.
- Fragmented and short-term adaptation efforts, which fail to address evolving climate dynamics.
- Insufficient resources for digital innovation, including modelling, visualization, and data integration tools.

To overcome these challenges, a long-term, integrated, and adaptive planning approach is required. The ultimate goal is to establish science-based and inclusive policy and governance frameworks that support equitable coastal adaptation and contribute to the sustainable management of ocean systems.

Consultations with Pilot Sites’ local institutions and stakeholders - 2023-2025

Consultation meetings with the nine selected Pilot Sites’ local partner / leading institutions were carried out between June 2024 to June 2025 - a summary of these consultations is outlined in the Table below. These were significant consultation meetings with ‘intermediary’ stakeholders. Dedicated Pilot Site consultations were also carried out with Pilot Sites’ responsible / leading institutions. A list of these consultation meetings is included here:

24 May 2024 - Regional needs consultation and co-design

- Initial project scoping
- Attendees: Institute of Marine Affairs (Trinidad & Tobago), CIMH, IOCARIBE-GOOS, CMCC, TAC Task Force, UNESCO (IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)),University of Miami

14 June 2024 - Regional needs consultation and co-design

- Attendees: Institute of Marine Affairs (Trinidad & Tobago), CARICOOS, Instituto Dominicano de Meteorología (INDOMET), CMCC, IOCARIBE-GOOS, TAC Task Force, UNESCO (IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)), University of Miami

12 July 2024 - Regional needs consultation and co-design

- Attendees:: CICESE Mexico, Institute of Marine Affairs (Trinidad & Tobago), CARICOOS, TAC Task Force, IOCARIBE-GOOS, Colombian Commission of the Ocean, INDOMET, IOCARIBE Officer, University of Bologna, CMCC, University of Miami, UNESCO (IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)),

23 July 2024 - Western Caribbean needs consultation and co-design

- Attendees: CINVESTAV, Colombian Commission of the Ocean, CICESE, INVEMAR, TAC Task Force, UNESCO (IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)),, CMCC, University of Miami

5 September 2024 - Mexico needs consultation and co-design

- Attendees: CMCC,UNESCO (IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)),, CICESE Mexico

24 January 2025 - Barbados needs consultation

- Attendees: Barbados Coastal Zone Management Unit, CMCC, IOCARIBE Consultant

11 February 2025 - Trinidad & Tobago needs consultation and co-design

- Attendees: Institute of Marine Affairs (Trinidad & Tobago), CMCC, IOCARIBE Consultant, IOCARIBE-GOOS

19 March 2025 - Colombia needs consultation and co-design

- Attendees: CIOH-DIMAR, CMCC, TAC Task Force,UNESCO (IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)), IOCARIBE Consultant, IOCARIBE-GOOS

26 March 2025 - Mexico needs consultation and co-design

- Attendees: CICESE Mexico, CINVESTAV Mexico, CMCC, TAC Task Force,UNESCO (IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)), IOCARIBE Consultant, IOCARIBE-GOOS

21 January 2025 & 26 March 2025 - Dominican Republic needs consultation

- Attendees: Instituto Dominicano de Meteorología (INDOMET), IOCARIBE-GOOS

3 September - Technical workshop with DIMAR - CIOH (Colombian Pilot Site lead)

- Attendees: DIMAR-CIOH,UNESCO (IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)), CMCC

4 September - Barbados - stakeholders consultation on Barbados needs

- Attendees: Ministry of Environment and National Beautification, Green and Blue Economy, CZMU, CIMH, CMCC

8 September - IOCARIBE GOOS Experts and Pilot Site partners briefing

- Attendees: CARICOOS, CICESE Mexico, CIMH Barbados, Cinvestav Mexico, CMCC, Comisión Colombiana del Océano, CZMU Barbados, DIMAR-CIOH Colombia, EDF / FVON, GOOS, UNESCO (IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)), Grenada Ministry of Climate Resilience & The Environment, INDOMET Dominican Republic, Institute of Marine Affairs Trinidad & Tobago, IOCARIBE GOOS Experts group, TAC Ocean Decade Task Force, Ministry of Planning and Development Trinidad & Tobago, UNIDO, UNIDO - Regional office Barbados, University of The Bahamas

26 September - Technical Workshop with Pilot Site partners

- Attendees: UNESCO (IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)), Cinvestav Mexico, Smith-Warner International, Institute of Marine Affairs - Trinidad and Tobago, University of the Bahamas, INDOMET Dominican Republic, IOCARIBE GOOS Experts Group, CIMH Barbados, University of the West Indies, Smith-Warner International,

Dec 2025 - IOCARIBE consultation workshops with primary stakeholders for each of the 8 nations involved in the Project

During the full proposal development stage, a comprehensive field mission for consultation is planned, which will widen the consultation with local communities to present the proposed actions and the identified climate threats and gather feedback on previous adaptation strategies adopted by the community to manage these risks and further refine the proposed activities, including the needs for coastal observing and predicting to inform further adaptation. The consultation process will be extended to additional stakeholders at the government level, community-based organisations and additional public and private stakeholders to delve into technical feasibility and budgetary details of the prioritised measures and identify additional activities, if appropriate and

identify potential environmental and social risks in alignment with the provisions of the Environmental and Social Policy of the Adaptation Fund. Also, during the next stage, the Environmental and Social Management Plan will be developed, which will include a Stakeholder Consultation Plan aligned with the ESP of the Adaptation Fund. Consultations will also be held with organisations and agencies with competence in gender issues and with gender community-based organisations at the local level in order to identify and collect feedback on activities that address gender inclusivity and the design of the Gender Action Plan.

J. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

Without adaptation, climate-related impacts in the Wider Caribbean - including storm surges, sea-level rise, ocean warming, and pollution - are projected to result in annual economic losses of up to USD 22 billion by 2050 and USD 46 billion by 2100 (equivalent to 10-22% of 2018 GDP). These losses affect tourism, fisheries, and critical infrastructure, eroding the foundation of the region's economy and placing millions of livelihoods at risk (Thomas et al., 2018; 2020) and the effects are often disproportionately felt by vulnerable and marginalised communities. Beyond economic losses, the absence of adaptation strategies threatens the safety and quality of life of coastal populations, with increasing potential for displacement, disruptions to essential services, and loss of life.

Historically, reactive expenditures on disaster relief and recovery far exceed the costs of proactive Disaster Risk Reduction (DRR) measures, particularly when considering cascading secondary impacts on housing, health, and supply chains. Among DRR options, large-scale resettlement and infrastructure retrofitting are not only the most expensive but also socially disruptive. Traditional hard-engineering measures, such as drainage upgrades and coastal barriers, while necessary in some contexts, remain highly cost-intensive and often inaccessible to smaller island economies.

By contrast, the interventions prioritized in this project - Multi-Hazard Early Warning Systems (MH-EWS and climate adaptation planning to support community-based preparedness (such as evacuation route mapping and hazard zoning) - represent cost-effective, and low-disruption solutions. These measures directly reduce risks while building institutional and community capacity to respond more effectively to evolving threats. Importantly, their scalability and adaptability ensure relevance across diverse national and local contexts in the Wider Caribbean.

The requested funding will enable the establishment of the essential building blocks for long-term coastal resilience and adaptation planning. Investment in MH-EWS, capacity building, and digital infrastructure, supported through cloud-based platforms and public-private partnerships, will ensure computational efficiency, cost savings, and sustainability well beyond the life of the project. This proactive approach provides immediate protective benefits, reduces reliance on costly post-disaster relief, and fosters a pathway toward resilient economic development.

National and regional needs for adaptation funding already outpace available resources. By supporting this project, donors will help bridge the critical gap between growing risks and the capacity to respond. In doing so, they will not only safeguard the coastal economy - anchored in tourism, fisheries, and trade - but also protect the lives, health, and well-being of millions of people in the Caribbean. The full cost of adaptation is far outweighed by the avoided damages, making this investment both urgent and indispensable.

The activities outlined in this proposal are designed to establish and strengthen the infrastructure necessary for evidence-based coastal risk assessment and management. By their nature, these activities require significant capital investment, specialized technical expertise, sustained long-term operation and maintenance, and robust, continuous data processing capabilities. Accordingly, this project prioritizes the following interventions and associated costs:

i. Establishment and upgrading of observing systems and coastal monitoring infrastructure. An approximate total budget of 6,000,000 USD spread among the 5 different components, is allocated for the procurement of equipment and related personnel training, particularly during the first two years of the project. All procurement activities for this task will be centralized and managed by UNIDO.
The planned procurement includes, for all the nine Pilot Sites:

- Low-cost bathymetric survey systems
- Citizen science–based sea-level and atmospheric monitoring stations
- Drifting buoys for wave and pressure measurements
- Moored buoys for wave, physical, and biogeochemical observations
- Fishery Voluntary Observing Network sensors
- High-efficiency coastal video monitoring systems

All equipment costs will account for the necessary data transmission capabilities.
ii. Development of a regional cloud platform with interoperable data management, high-resolution modelling capacity, and AI/ML forecasting. The Cloud platform costs have been split between a procurement by UNIDO for general software acquisition for cloud services/training and hardware procurement by each country. This federated system will constitute the backbone of the regional cloud system. The total amount of procurement will amount to approximately 3,000,000 USD distributed between UNIDO and the EEs. Such strategy will empower the local infrastructure building, enhance capacity to locally manage the information collected and produced, maintaining however an adequate level of data sharing in the region. Procurement costs have been also split between the 5 years to ensure the continuous monitoring and improvement of the activities.
iii. Tailored multi-hazard early warning systems. EE personnel costs and travel for dedicated workshops make up the primary expenditures in this component of the project. In addition, the budget includes UNIDO-managed procurement of consultancy services for high- to very-high-resolution satellite data for coastal areas, as well as consultancy for calibration of satellite data with real-time observational data. Consultancy costs in this component may reach up to 1,000,000 USD.
iv. Tailored coastal climate scenario information. This component covers costs associated with procuring HPC resources and securing consultancy services to conduct the required climate downscaling scenarios for the Pilot Sites. All procurement activities will be fully managed by UNIDO during the central 2–3 years of the project. It is estimated around 2,000,000 USD.
v. Digital Twins and decision-support tools. This component will primarily cover EE personnel costs and training activities, including travel by local experts across the Pilot Sites. It also includes the organization of various co-design meetings led by UNESCO/IOC and UNIDO to determine the specific features of the Decision Support

System -such as visualization options, indicators, and interactive tools—that will enable local authorities to effectively use the products generated by the integrated monitoring and prediction systems.

vi. A comprehensive capacity-building and regional governance package. This part currently represents a significant share of expenditures, primarily due to personnel time and event-related costs linked to the Component 5 outputs. It covers the design and delivery of capacity-building courses for a wide range of stakeholders in the coastal management sector, including local private companies interested in coastal management consultancy services. Additionally, activities carried out by various EE personnel will focus on fostering public–private partnerships to support the maintenance of local infrastructure components. The Project Management Unit will meet virtually every three months, and in person every six months at a host country in the Caribbean. Technical committee meetings will be held primarily online, although a limited number may take place in person, which would involve travel and related EE personnel costs.

K. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project/programme.

Sustainability has been a guiding principle in the design of the project. From the beginning, theProject was conceived not as a stand-alone intervention, but as a foundation for long-term transformation in how Caribbean countries plan for and manage coastal climate and anthropogenic risks.

The project will transform the evidence-based assessment and management of coastal risks by addressing the necessary technical advancements with the following community-level adaptation benefits.

1. Direct Transmission of Climate Information to Local Decision-Makers

The proposed new observing, modelling and digital systems are designed to directly improve the accuracy, timeliness, and accessibility of climate risk information for local coastal communities, and municipal authorities. By developing fit-for-purpose and high-resolution observing, modelling and cloud computing, communities will receive actionable early-warning alerts, risk maps tailored to settlement and infrastructure planning and local climate change impact assessments. This enables households and local institutions to make earlier, safer, and better-informed decisions—reducing climate-related losses before they occur.

2. Community-Embedded Delivery Mechanisms

The project's Pilot Site strategy ensures that local communities, managers, policymakers, and researchers work together to identify the most pressing coastal resilience challenges and co-design practical solutions. Building on priorities highlighted through the consultative process described above, the project will develop user-friendly information tools that help integrate climate insights into key policy areas such as marine planning, disaster preparedness, and coastal protection.

At the regional level, the project will establish an open-access cloud system that draws from trusted local data sources and makes this information available across countries.

This approach helps overcome technological limitations faced by many local authorities and ensures that accurate, relevant information can be used where it is needed most.

3. Institutional Empowerment at the Local Level
By strengthening observation and prediction data governance and coordination, local governments gain the capacity to integrate climate risk information into planning, budgeting, and public-service delivery. This institutional strengthening is directly linked to **enhanced adaptive capacity**, because it ensures that local actors are not only recipients but **active managers** of climate information.

4. Monitoring and Evaluation Focused on Outcomes
The project will explicitly track how improved digital and institutional systems lead to behavioral change and risk reduction at the community level. Indicators will assess uptake and use of climate information, changes in adaptation behavior, and increased livelihood stability. This ensures that community-level adaptation benefits are not implicit but central and measurable.

The project builds on existing institutional capacity and interest already expressed during early consultations conducted through UNESCO (IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE))and national climate agencies. These discussions revealed both the demand and the readiness to work with digital tools that can support adaptation planning, hazard monitoring, and decision-making. National meteorological services, oceanographic institutes, local practitioners, and ministries responsible for the environment and disaster risk will play a direct role in the project - both as users and co-developers of the tools and systems. Their early involvement is key to ensuring that the services developed under the project are not only relevant, but effectively embedded in institutional routines.

Long-term institutional uptake will also be supported by structured training and mentorship. The project will include delivery of certified training programmes that are tailored to national institutions, local practitioners, and private sector, with an emphasis on practical use of forecasting, data interpretation, and coastal planning tools. These will be delivered in partnership with regional universities and technical institutes, helping to build a new generation of skilled professionals able to manage and evolve the services introduced through the project.

In parallel, the project will work to establish practical pathways for financial sustainability. These include building long-term ownership within national budgets, and identifying opportunities for cost-sharing or co-investment with the private sector - particularly in areas of cloud based services delivery and the ones where forecasting services can support risk reduction and business continuity. Examples include tourism operators, insurance providers, port authorities, and local technology firms. The project will engage these actors not only as beneficiaries, but as potential partners in sustaining or even expanding services over time. In some countries, innovation labs or challenge funds may be used to help local entrepreneurs develop add-on products or maintenance services based on the open tools delivered.

Institutional sustainability is achieved by embedding the project within the existing policy frameworks and operational mandates of national agencies. In the Project's countries the designated national EEs will integrate project outputs directly into their statutory responsibilities. This alignment ensures that early warning systems, monitoring tools, and decision-support services become part of ongoing national operations rather than temporary project activities.

Finally, the project is designed to be scalable and replicable. Its architecture allows for future integration with national digital systems and with other SIDS. As part of this network, countries will benefit from ongoing knowledge exchange, shared maintenance of tools, and access to updates and improvements over time.

By combining institutional anchoring, technical transfer, regional collaboration, and stakeholder engagement, the project lays the groundwork for outcomes that are not only sustainable, but positioned to grow in relevance and impact long after the project concludes.

L. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project/programme.

Checklist of environmental and social principles	**No further assessment required for compliance**	**Potential impacts and risks – further assessment and management required for compliance**
Compliance with the Law		*Countries' EIA requirements will be examined and assessments will be conducted to comply.*
Access and Equity		*Protocol will be adopted to address and risk that there will be unequal representation of women or marginalised communities, for example in community consultation activities.*
Marginalized and Vulnerable Groups		*Protocol will be considered to address and risk that there will be unequal representation of women or marginalised communities, for example in community consultation activities.*
Human Rights		*Potential risk of non-compliance with human rights will be examined to determine if any provision should be made to mitigate risk.*
Gender Equity and Women's Empowerment		*Protocols will be adopted to address any risk that there will be unequal representation of women for example in community consultation or capacity enhancement activities.*
Core Labour Rights		*Any potential risks / impacts will be assessed.*
Indigenous Peoples		*All stakeholders will be mapped to ensure adequate representation in the consultation process.*
Involuntary Resettlement	*x*	

Protection of Natural Habitats		*Any potential environmental risks / impacts will be assessed.*
Conservation of Biological Diversity		*Any potential environmental risks / impacts will be assessed.*
Climate Change		*There may be a potential risk / impact related to establishment of infrastructure, including cloud infrastructure, leading to 'extra' energy use. This will be assessed to address risk mitigation.*
Pollution Prevention and Resource Efficiency		*Any potential environmental risks / impacts will be assessed.*
Public Health		*Any potential risks / impacts will be assessed.*
Physical and Cultural Heritage		*All heritage sites will be identified to manage risk / potential impact on these.*
Lands and Soil Conservation		*Any potential environmental risks / impacts will be assessed.*

PART III: IMPLEMENTATION ARRANGEMENTS

A. Project Alignment with the Results Framework of the Adaptation Fund

Project Objective(s)	Project Objective Indicator(s)	Adaptation Fund Outcome	Adaptation Fund Outcome Indicator	Grant Amount (USD)
Objective 1 Enhance national infrastructure and capacity for ocean hazard monitoring This includes co-design and implementation of fit-for-purpose, real-time coastal observing and cloud-based data management systems, integrating satellite and in situ data, for monitoring key coastal variables.	1.1.1 # of integrated coastal early warning systems implemented 1.1.2 # of people covered by early warning systems implemented	Outcome 1: Reduced exposure to climate-related hazards and threats	Indicator 1: People using improved climate-related threat and hazard information	3,000,000
	1.2.1# of data management best practices developed for different coastal observations 1.2.2 # of cloud servers interfaced and operational	Outcome 8: Innovation for effective, long-term adaptation to climate change accelerated, encouraged, and enabled to scale up	Indicator 8.1: Innovations successfully reaching scale up that demonstrate local innovation participation and/or local innovation benefit	2,899,000

Objective 2 Reduce risk of exposure to extreme events This includes the development of advanced impact forecasting systems, integrating coastal numerical models and AI-based predictive approaches to address key regional hazards, including storm surges, sargassum influx, marine heatwaves, coastal erosion, hypoxic (low-oxygen) conditions, and pollution originating from both land- and sea-based sources.	2.1.1 # of people using improved real-time impact forecasting systems tailored for local communities including AI-based systems for storm surge forecasting	Outcome 1: Reduced exposure to climate-related hazards and threats	Indicator 1: People using improved climate-related threat and hazard information	4,000,000
	2.2.1 # of improved protocols for hazard mapping adopted for local communities	Outcome 7: Improved policies and regulations that promote and enforce resilience measures	Indicator 7: Policies, strategies, and/or plans adopted, implemented, and/or enforced that integrate climate risk and resilience considerations	1,230,000
Objective 3 Generate coastal climate projection information for adaptation planning This involves co-design and implementation of high-resolution coastal downscaling and ocean-climate projections for different climate futures, enabling local adaptation planning in relation to sea level rise, temperature and salinity variability, and ecosystem shifts;	3.1.1 # people informed by downscaled climate projections validated against local observations 3.1.2 # people informed by climate risk assessment reports produced and disseminated	Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes	Indicator 3.1: People with strengthened awareness of climate change risks and how to better address them	3,000,000
	3.2.1 # of coastal adaptation plans integrating validated projections 3.2.2 # of stakeholder consultations/participatory events conducted	Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	Indicator 2: Institutions with strengthened capacity to understand and better address climate risks and resilience	1,680,000
Objective 4 Strengthen sustainable coastal economies & resilient communities This considers the co-design and implementation of tailored information and decision-support	4.1.1 # of institutional partners using project services 4.1.2 # of scenarios inserted in adaptation plans	Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress	Indicator 5: Ecosystems and natural resources brought under protection, restoration, or improved management in response to climate	1,763,000

services for different user groups.			variability and change	
		Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	Indicator 6.1: People adopting improved and/or new climate resilient livelihood practices	3,000,000
Objective 5 Strengthen institutional frameworks and private-sector participation The objective is to strengthen institutional collaboration and regional governance for long-term sustainability of the new observing and modelling capacity, including co-development of services and policy dialogues and capacity enhancement programs for coastal stakeholders and decision makers.	5.1.1 % of trained stakeholders reporting improved ability to apply/maintain solutions 5.2.1 # of private sector partnerships formalized (MoUs, PPPs, business models) 5.2.2 # of private enterprises trained/engaged for Sargassum exploitation 5.3.1 # of joint regional coastal observing or modelling protocols established under coastal GOOS strategy 5.4.1 # of institutional agreements/strategies integrating project outputs into national strategies	Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes	Indicator 3.2: People implementing new or improved adaptation actions	1,500,000
		Outcome 7: Improved policies and regulations that promote and enforce resilience measures	Indicator 7: Policies, strategies, and/or plans adopted, implemented, and/or enforced that integrate climate risk and resilience considerations	2,545,000
		Outcome 8: Innovation for effective, long-term adaptation to climate change accelerated, encouraged, and enabled to scale up	Indicator 8.1: Innovations successfully reaching scale up that demonstrate local participation and/or local innovation benefit	1,000,000
Total objective level grant amount				25,617,000
Project Outcome(s)	**Project Outcome Indicator(s)**	**Adaptation Fund Output**	**Adaptation Fund Output Indicator**	**Grant Amount (USD)**

1.1 Safer coastal livelihoods through evidence-based information on coastal hazards	1.1.1 # of integrated coastal monitoring systems implemented	Output 1.2 Targeted population groups covered by warning and advisory services for climate-related hazards and threats	Indicator: 1.2.1 Early warning systems established or improved	3,000,000
1.2 Enhancement of coastal management solutions by digital technologies, allowing standardized information sharing	1.2.1 # of data management, cloud and other best practices and innovations co-designed and operational to address local community needs.	Output 8.1: Innovations identified and piloted which collectively enhance local innovation capacity & contribute to the development of local, national, and regional adaptation innovation ecosystems	Indicator 8.1.2: Innovations piloted that demonstrate local participation and/or local innovation benefit.	2,899,000
2.1 Enhanced preparedness of coastal communities to ocean hazards	2.1.1 # of Real-Time Impact Forecasting systems tailored to community needs including AI-based forecasting for storm surge			4,000,000
2.2 Enhanced capacity to plan adaptive measures to multiple coastal hazards	2.2.1 # of improved protocols for hazard mapping adapted for coastal communities	Output 7.1: Improved integration of climate-resilience strategies into country development plans	Indicator 7.1.1: Policies, strategies, and/or plans developed or adjusted to integrate climate risk considerations	1,230,000
3.1 Evidence-based information to inform adaptation planning	3.1.1 # of downscaled climate projections validated against local observations 3.1.2 # of climate risk assessment reports produced and disseminated	Output 3.2: Strengthened the capacity of national and subnational stakeholders and entities to capture and disseminate knowledge and learning	Indicator 3.2.1: Climate resilience knowledge products and/or tools developed and shared with stakeholders	3,000,000

3.2 Stakeholder-driven frameworks for adaptation, risk assessment, and management	3.2.1 # of coastal adaptation plans integrating validated projections 3.2.2 # of stakeholder consultations/participatory events conducted	Output 2.1: Strengthened capacity of institutions to understand and better address climate risks	Indicator 2.1.1: Institutions supported to strengthen capacity to understand and address climate risks and resilience	1,680,000
4.1 Strengthened institutional and operational capacity for risk-informed coastal management.	4.1.1 # of institutional partners using project services 4.2.1 # of strategies/plans endorsed/adopted by local or national authorities	Output 6 Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	Indicator 6.1: People adopting improved and/or new climate resilient livelihood practices	3,000,000
4.2. Increased resilience and adaptive capacity of coastal communities, ecosystems, and blue-economy sectors	4.2.1 # of institutions and private operators using services 4.2.2 # of strategies/plans endorsed/adopted by local or national authorities for coastal adaptation and management	Output 5: Vulnerable ecosystem services and natural resource assets strengthened in response to climate change impacts, including variability	Indicator 5.1.1: Ecosystems and natural resources targeted by activities to improve protection, restoration, and/or management	1,763,000
5.1.Empowered stakeholders and practitioners with skills and knowledge and capacity to apply the solutions locally and maintain them.	5.1.1 % of trained stakeholders reporting improved ability to apply/maintain solutions	Output 3.3: Increased ownership of adaptation and climate risk reduction processes	Indicator 3.3.1: Number of local institutions and/or communities responsible for decision-making over how adaptation solutions are defined, prioritized, designed, and/or implemented	1,500,000
5.2 Private sector involvement for sustainable evolution and maintenance of	5.2.1 # of private sector partnerships formalized (MoUs, PPPs, business models)	Output 8.1: Innovations identified and piloted that collectively	Indicator 8.1.2: Innovations piloted that demonstrate local innovation participation and/or	1,000,000

the infrastructure and services	5.2.2 # of private enterprises trained/engaged for Sargassum exploitation	enhance local innovation capacity and contribute to the development of local, national and regional adaptation innovation ecosystems	local innovation benefit	
5.3 Regional coordination through Coastal GOOS strategy and enhanced capacity for coastal and ocean monitoring.	5.3.1 # of joint regional coastal observing or modelling protocols established under coastal GOOS strategy	Output 7.1: Improved integration of climate-resilience strategies into country development plans	Indicator 7.1.1: Policies, strategies, and/or plans developed or adjusted to integrate climate risk considerations	1,545,000
5.4 Strengthened institutional framework in support of coastal resilience	5.4.1 # of institutional agreements/strategies integrating project outputs into national strategies	Output 8.2: Innovations identified and piloted which build the adaptation innovation evidence-base and institutional capacity	Indicator 8.2.1: Innovation-focused knowledge products disseminated and/or learning events facilitated that support and enable innovation capacity at a local, national, and/or regional level	1,000,000
Total outcome level grant amount				25,617,000

B. Implementation Arrangements

The project will be implemented by the United Nations Industrial Development Organization (UNIDO), which will serve as the Implementing Entity. UNIDO will be responsible for several key aspects of the project, including overall project coordination and oversight to ensure alignment with the Adaptation Fund's objectives and national adaptation priorities. It will also manage financial aspects, ensuring transparency and accountability in the utilization of funds. As an implementing agency, it will provide technical support and capacity building, offering guidance on resilient coastal businesses, facilitating knowledge exchange, and strengthening institutional capacities. Moreover, UNIDO will oversee monitoring, evaluation, and learning (MEL) processes to assess project progress, identify challenges, and incorporate adaptive management strategies.

National execution

At national level, the project will be executed by national entities in each of the eight partner countries who will be responsible for the day-to-day execution of the project. They would be responsible for the project activities related to observing predicting, services, stakeholder engagement at national and local levels and ensure that the interventions are locally driven and aligned with national policies. Four key stakeholder groups will be engaged in each country: civil society; coastal managers and practitioners in the public

and private sectors; policymakers at local and national levels. Further details of national and local level execution for each country and national executing entity will be defined in project design stage.

Regional execution and knowledge sharing

UNESCO (IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)), will coordinate regional stakeholder engagement and support community involvement in the co-design process. It will be responsible for the project outputs on coastal GOOS strategy and guidelines under component 5. UNESCO-IOC has led regional and intergovernmental consultations with policymakers and integrated science-based coastal resilience principles into the Global Ocean Observing System. UNESCO-IOC will also be responsible for sharing knowledge among the partner countries.

CMCC will be partly responsible for different outputs in all components including: cloud development, observing system network design, early warning systems and numerical modelling, climate downscaling and Digital Twins. Drawing on its extensive experience in observing systems to develop Multi-Hazard Early Warning Systems (MH-EWS) for complex regional seas such as the Mediterranean, CMCC will ensure best practices for coastal resilience in the project.

As part of the project execution function (not under the fee for IE acting as part of the EE) UNIDO will lead the execution of the project mid –term and a final independent evaluation which will be conducted as per UNIDO and the AF requirements and standards. The independent project evaluation will support learning, continuous improvement and accountability, and provide information about results and practices. UNIDO will also be responsible for one (1) output under component 5: “Institutional & private sector engagement for sustainability”. It will oversee the development of business models for use of EWS and Decision Support Systems for resilient coastal businesses. Furthermore, UNIDO will be responsible for the procurement of international goods and services.

Governance and Oversight: Project Steering Committee (PSC)

A Project Steering Committee (PSC) will be set up at the regional level to provide strategic oversight, risk adaptation, and performance monitoring throughout the project. The PSC will ensure that the project aligns with national policies and regional adaptation frameworks, facilitating coordination among the eight countries to avoid duplication of efforts. It will also address implementation challenges, ensuring effective resource allocation. The PSC will also support regional cooperation by engaging with other initiatives in the region fostering collaboration and sharing of knowledge and resources.

The PSC will include representatives from: UNIDO (Implementing Entity); National Designated Authorities of the partner countries (Alternating Chairs); National Execution Entities of the partner countries (National Execution Lead; UNESCO IOC (Regional EE); CMCC (Technical EE).

A Project Management Unit (PMU) will be set up under UNESCO-IOC, to serve as the operational backbone, coordinating day-to-day implementation across all pilot countries, consolidating technical and financial reporting, managing the regional delivery schedule, and ensuring that national EE activities remain synchronized and mutually reinforcing. It

will facilitate regular (virtual quarterly and in-person semi-annually) among the national and international EEs.

Technical Committees composed of technical leads from the national EEs and the project's scientific/operational partners will be established to facilitate maintaining common technical standards (observations, modelling, cloud/data governance, EWS), validate methods and quality assurance, and drive peer-learning so that each pilot's solutions are interoperable, scalable, and readily transferable across the region.

Project governance structure

Legal Context

It is expected that each set of activities to be implemented in the target countries will be governed by the provisions of the Standard Basic Cooperation Agreement concluded between the Government of the recipient country concerned and UNIDO or – in the absence of such an agreement – by one of the following: (i) the Standard Basic Assistance Agreement concluded between the recipient country and UNDP, (ii) the Technical Assistance Agreements concluded between the recipient country and the United Nations and specialized agencies, or (iii) the Basic Terms and Conditions Governing UNIDO Projects.

PART IV: ENDORSEMENT BY GOVERNMENTS AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement on behalf of the government[2]

Mrs. Rochelle W. Newbold, Special Policy Advisor, Climate Change and Environmental Matters, Office of the Prime Minister, Bahamas	November 13, 2025
Mr. David Leacock, Permanent Secretary (Ag.) Ministry of Environment and National Beautification, Green and Blue Economy (MENB), Barbados	November 17, 2025
Ms. Daniela Duran Gonzalez, Head of the Office of International Affairs (Chief of the International Cooperation Office), Ministry of Environment and Sustainable Development, Colombia	December 17, 2025
Ana Emilia Pimentel, Vice-minister of Climate Change and Sustainability, Ministry of Environment and Natural Resources, Dominican Republic	November 13, 2025
Hon. Lennox Andrews, Minister for Economic Development, Planning, and Cooperatives; Agriculture, Forestry and Lands; Blue Economy and Marine Affairs, Grenada	October 21, 2025
Dr. Dale Webber, Ambassador, Special Envoy for Climate Change, Environment, Ocean, and the Blue Economy, Ministry of Water, Environment and Climate Change, Jamaica	November 6, 2025
Mr. Sanjay Singh, Permanent Secretary, Ministry of Planning, Economic Affairs and Development, Trinidad and Tobago	November 7, 2025
Ms. Regina Rosales Talamas, Director General, Ministry of Finance and Public Credit, Public Credit and International Affairs Unit, Mexico	January 30, 2026

[2] 6. Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

B. Implementing Entity certification

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (**The Bahamas:** NAP to CC (2005) Vision 2040 – NDP; Updated NDC (2022) Disaster Risk Management Act (2022) and the National Standard for Disaster Risk Analysis (2025). **Barbados:** National Climate Change Policy (2012), NDC (2021), ICZM Policy and the Coastal Risk Assessment and Management Programme (CRMP) Economic Recovery and Transformation (BERT) Plan. **Colombia:** National Climate Change Policy (PNACC, 2016), Integrated National Adaptation Program (INAP), Low Carbon Development Strategy (2024). **Dominican Republic:** NDC (2020), National Plan for Adaptation to Climate Change of the Dominican Republic (PNACC). **Grenada:** Grenada National Sustainable Development Plan 2020-2035, ICZM Policy and Act (2018), NAP, National Biodiversity Strategy and Action Plan (NBSAP).**Jamaica**: Vision 2030 Jamaica, Government of Jamaica CLIMATE CHANGE POLICY FRAMEWORK FOR JAMAICA (2023); Climate Change Policy Framework (2023); PIOJ initiatives, (Ja-NAP), Adaptation Communication (2022). **Mexico:** Estrategia Nacional de Cambio Climático- National Climate Change Strategy (ENACC, 2025), General Climate Change Law, the National Development Plan (PND, 2025-2030). **Trinidad and Tobago:** NAP (2024), National ICZM Policy (2023), National Climate Change Policy and National Biodiversity Strategy) and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
Name & Signature Ganna Onysko Ms. Ganna Onysko Senior GEF, GCF, AF Coordinator Division of Funding Partner Relations Directorate of Global Partnerships and External Relations United Nations Industrial Development Organization - UNIDO Implementing Entity Coordinator	
Date: *February 6, 2026*	Tel. and email: +43 1 26026 3708 g.onysko@unido.org
Project Contact Person: Yvonne Lokko	
Tel. And Email: +43 1 260263737 / y.lokko@unido.org	

Annex 1: Letters of Endorsement

Annex 1.1 Letter of Endorsement Bahamas

OFFICE OF THE PRIME MINISTER
Sir Cecil Wallace Whitfield Centre
Nassau, New Providence
The Bahamas
Tel: (242) 702-5500

No. OPM/CCC/GEN
In Replying Please
Quote this Number

November 13, 2025

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Building resilience of climate-vulnerable coastal communities in the wider Caribbean region

In my capacity as designated authority for the Adaptation Fund in The Bahamas, I confirm that the above regional project proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by United Nations Industrial Development Organization (UNIDO) and executed by University of The Bahamas and partial execution by international Executing Entities: UNESCO IOC, Euro-Mediterranean Centre on Climate Change (CMCC) and UNIDO.

Sincerely,

Mrs. Rochelle Newbold

Special Policy Advisor on Climate Change and Environmental Matters
Office of the Prime Minister
Nassau, The Bahamas

C: Permanent secretary, Office of The Prime Minister

Annex 1.2 Letter of Endorsement Barbados

MINISTRY OF ENVIRONMENT
AND NATIONAL BEAUTIFICATION,
GREEN AND BLUE ECONOMY

MENB

REF. NO: UNEP 13/1/1 Vol. III **DATE:** November 17, 2025

The Manager
Adaptation Fund Board Secretariat
c/o Global Environment Facility
Mail stop: N 7-700
1818 H Street NW
Washington DC 20433
United States of America

Dear Mr. Ollikainen

Endorsement of proposal for the "Building Resilience of Climate-Vulnerable Coastal Communities in the Wider Caribbean Region (Resi-Carib)" Project.

In my capacity as Designated Authority for the Adaptation Fund in Barbados, I confirm that the above-mentioned regional proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Barbados.

Accordingly, I am pleased to endorse the above-mentioned regional proposal with support from the Adaptation Fund. If approved, the project will be implemented by the United Nations Industrial Development Organization (UNIDO) and executed by the Coastal Zone Management Unit, Ministry of Environment and National Beautification, Green and Blue Economy & the Caribbean Institute for Meteorology and Hydrology (CIMH) and partial execution by international Executing Entities: United Nations Educational, Scientific and Cultural Organization - Intergovernmental Oceanographic Commission (UNESCO-IOC), Euro-Mediterranean Centre on Climate Change (CMCC) and UNIDO.

Yours sincerely

David D. Leacock
Permanent Secretary (Ag.)
Designated Authority

DDL/rg

9TH & 10TH FLRS., WARRENS TOWERS II
WARRENS, ST MICHAEL BB 12001, BARBADOS
TEL NO.: (246) 535-4350 FAX NO.: (246) 535-4377

Annex 1.3 Letter of Endorsement Colombia

Ambiente

Bogotá, D. C. December 2025

Al responder por favor citese este número **14002025E2046646**	
Fecha Radicado: **2025-12-17 12:56:06**	
Codigo de Verificación: **db43b**	Folios: **1**
Radicador: **Ventanilla Minambiente**	Anexos: **0**
Ministerio de Ambiente y Desarrollo Sostenible	

ADAPTATION FUND BOARD
cc. Adaptation Fund Board Secretariat
Email: submissions@adaptation-fund.org
Secretariat@Adaptation-Fund.org
Washington, D.C.

Subject: Endorsement Letter – CoastPredict Regional Project "Building resilience of climate-vulnerable coastal communities in the Wider Caribbean Region" (Resi-Carib)

In my capacity as Designated Authority for the Adaptation Fund in Colombia, I confirm that the regional project proposal *"Building resilience of climate-vulnerable coastal communities in the Wider Caribbean Region (Resi-Carib)"* is in accordance with national and regional priorities for strengthening coastal resilience and advancing climate change adaptation in Colombia.

Accordingly, I am pleased to endorse the aforementioned project proposal for submission to the Adaptation Fund. If approved, the project will be implemented by the United Nations Industrial Development Organization (UNIDO) as the Implementing Entity, with execution by DIMAR, other national entities and international partners, including UNESCO/IOC, CMCC, and UNIDO.

Sincerely,

DANIELA DURÁN GONZÁLEZ
Primary Designated Authority – Adaptation Fund
Chief of the International Cooperation Office
Ministry Of Environment and Sustainable Development
Prepared by: Natalia Cáceres Triana

Los arriba firmantes declaramos que hemos revisado el presente documento y lo encontramos ajustado a las normas y disposiciones legales y/o técnicas vigentes y, por lo tanto, bajo nuestra responsabilidad lo presentamos para la firma del Remitente

Ministerio de Ambiente y Desarrollo Sostenible
Dirección: Calle 37 #8 - 40, Bogotá D.C., Colombia
Conmutador: (+57) 601 332 3400 - 3133463676
Línea Gratuita: (+57) 01 8000 919301

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Annex 1.4 Letter of Endorsement Dominican Republic

GOBIERNO DE LA
REPÚBLICA DOMINICANA
MEDIO AMBIENTE

Dominican Republic
November 13th, 2025.

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement for Building resilience of climate-vulnerable coastal communities in the Wider Caribbean Region (Resi-Carib).

In my capacity as primary contact from the designated authority for the Adaptation Fund in the Dominican Republic, I confirm that the above regional concept note is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Dominican Republic.

Accordingly, I am pleased to endorse the above concept note with support from the Adaptation Fund. If approved, the project/programme will be implemented by United Nations Industrial Development Organization (UNIDO) and executed by Instituto Dominicano de Meteorologia (INDOMET) and partial execution by international Executing Entities: UNESCO/IOC, Euro-Mediterranean Centre on Climate Change (CMCC) and UNIDO.

Sincerely,

MINISTERIO DE MEDIO AMBIENTE Y RECURSOS NATURALES
DIRECCIÓN DE MECANISMOS FINANCIEROS Y MANEJO DE PORTAFOLIOS
GOBIERNO DE LA REPÚBLICA DOMINICANA
MEDIO AMBIENTE

Ana Emilia Pimentel
Primary Contact from the Designated Authority to the Adaptation Fund
Dominican Republic

AEP/ICB/mgb

Avenida Cayetano Germosén esquina Gregorio Luperón El Pedregal Santo Domingo República Dominicana
TELÉFONO 809 567 4300 LINEA VERDE(WHATSAPP) 849 356 6400 809 200 6400 AMBIENTE.GOB.DO

Annex 1.5 Letter of Endorsement Grenada

Ref. No. .....
In replying the above Number and date of this letter should be quoted.

Tel. No.: 1 (473) 440-2708
Email: ps@eda.gov.gd
registry@eda.gov.gd

MINISTRY OF ECONOMIC DEVELOPMENT,
PLANNING, AND CO-OPERATIVES
3RD FLOOR, MINISTERIAL COMPLEX,
SIR ERIC M. GAIRY
BOTANICAL GARDENS,
ST. GEORGE'S,
GRENADA, W.I.

October 21, 2025

The Adaptation Fund Board
c/o Adaptation Fund Secretariat
Email: Secretariat@Adaptation-Fund.org

Dear Sir/Madam,

Subject: Endorsement letter for Building resilience of climate-vulnerable coastal communities in the Wider Caribbean Region (Resi-Carib)

In my capacity as designated authority for the Adaptation Fund in the State of Grenada, I confirm that the above regional project proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in *the State of Grenada*.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by United Nations Industrial Development Organization (UNIDO) and executed by the Ministry of Climate Resilience, the Environment and Renewable Energy and partial execution by international Executing Entities: UNESCO/IOC, Euro-Mediterranean Centre on Climate Change (CMCC) and UNIDO.

Sincerely,

Hon. Lennox Andrews
Minister for Economic Development, Planning, and Cooperatives; Agriculture, Forestry and Lands; Blue Economy and Marine Affairs.

Annex 1.6 Letter of Endorsement Jamaica

MINISTRY OF WATER, ENVIRONMENT & CLIMATE CHANGE

16A Half Way Tree Road, Kingston 5
Telephone No.: (876) 633-7500, Ext 2500
Email: psoffice@mlca.gov.jm

ANY REPLY OR SUBSEQUENT REFERENCE TO THIS COMMUNICATION SHOULD BE ADDRESSED TO THE PERMANENT SECRETARY

November 6, 2025

The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat

Dear Members of the Adaptation Fund Board:

Re: Endorsement for Building resilience of climate-vulnerable coastal communities in the Wider Caribbean Region (Resi-Carib

In my capacity as designated authority for the Adaptation Fund in Jamaica, I confirm that the above regional project/programme proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Jamaica.

Accordingly, I am pleased to endorse the above project/programme proposal with support from the Adaptation Fund. If approved, the project/programme will be implemented by the United Nations Industrial Development Organization (UNIDO) and executed by the Ministry of Water, Environment and Climate Change (formerly the Ministry of Economic Growth and Job Creation), and partially executed by international Executing Entities: UNESCO/IOC, Euro-Mediterranean Centre on Climate Change (CMCC), and UNIDO.

Sincerely,

Hon. Matthew Samuda, MP
Minister

Ambassador Dale Webber
National Designated Authority's
Primary Contact

Copied to: Mr. Wayne O. Robertson, JP
Permanent Secretary
Ministry of Water, Environment and Climate Change

Ambassador Dale Webber
Special Envoy for Climate Change, Environment, Ocean, and the Blue Economy
Ministry of Water, Environment and Climate Change

Annex 1.7 Letter of Endorsement Trinidad and Tobago

Government of the Republic of Trinidad and Tobago
Ministry of Planning, Economic Affairs and Development
Office of the Permanent Secretary

Ref: PEAD(EPPD): 14/5/9

November 7, 2025

The Adaptation Fund
c/o Adaptation Fund Board Secretariat
1899 Pennsylvania Avenue NW
Washington DC 20433
United States of America

Re: Endorsement for *Building resilience of climate-vulnerable coastal communities in the Wider Caribbean Region (Resi-Carib)*

In my capacity as designated authority for the Adaptation Fund in Trinidad and Tobago, I confirm that the above regional project proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Trinidad and Tobago.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by the United Nations Industrial Development Organization (UNIDO) and executed by the Institute of Marine Affairs and partial execution by international Executing Entities UNESCO/IOC, Euro-Mediterranean Centre on Climate Change (CMCCC) and UNIDO.

Sincerely,

Mr. Sanjay Singh
Permanent Secretary (Ag.)
Ministry of Planning, Economic Affairs and Development
PERMANENT SECRETARY
MINISTRY OF PLANNING, ECONOMIC
AFFAIRS AND DEVELOPMENT

cc: Dr. Ava Maxam, Director, Institute of Marine Affairs

Level 14, Eric Williams Financial Building, Independence Square, Port-of-Spain, Trinidad and Tobago, WI
Telephone: (868) 612-3000 Ext: 1406|1421|2184
Sanjay.Singh@planning.gov.tt

Annex 1.8 Letter of Endorsement Mexico

Hacienda
Secretaría de Hacienda y Crédito Público

ADAPTATION FUND

Subsecretaria de Hacienda y Crédito Público
Unidad de Crédito Público y Asuntos Internacionales de Hacienda
Dirección General encargada de Foros Internacionales y Financiamiento Sostenible

Oficio No. 305.- F.-005/2026
Mexico City, January 30th, 2025

Letter of Endorsement by Government of Mexico

Ministry of Finance and Public Credit

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email:Secretariat@Adaptation.Fund.org
Fax: 202522 3240/5

Subject: Endorsement for **"Building resilience of climate-vulnerable coastal communities in the Wider Caribbean Region (Resi-Carib)."**

In my capacity as primary contact point (with signing authority) of Mexico´s Designated Authority, the Ministry of Finance and Public Credit, before the Adaptation Fund, I confirm that the above regional project proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Mexico.

Accordingly, I am pleased to endorse the above project/programme proposal with support from the Adaptation Fund. If approved, the project will be implemented by the United Nations Industrial Development Organization (UNIDO) and executed by the Center for Scientific Research and Higher Education of Ensenada, Baja California (Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California, CICESE) and the Center for Research and Advanced Studies of the National Polytechnic Institute (Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional, CINVESTAV) and partially executed by International Executing Entities: UNESCO / IOC, Euro_Mediterranean Centre on Climate Change (CMCC), and UNIDO.

Sincerely,

Regina Rosales T.

Regina Rosales Talamas
Primary Contact Point (with signing auhority),
Director General in the Ministry of Finance and Public Credit, Public Credit and International Affairs Unit, regina_rosales@hacienda.gob.mx,
Ph. (+52) 55 3688 1704).

2026 año de Margarita Maza

Revised PFG Submission Form[1]

Project Formulation Grant (PFG)

Submission Date: 06 February 2026

Adaptation Fund Project ID:

Country/ies: Bahamas, Barbados, Colombia, Dominican Republic, Grenada, Jamaica, Mexico, Trinidad & Tobago

Title of Project/ Programme: Building resilience of climate-vulnerable coastal communities in the wider Caribbean region

Type of IE (NIE/RIE/MIE): MIE

Implementing Entity: United Nations Industrial Development Organization (UNIDO),

Executing Entity/ies: UNIDO, UNESCO (IOC and its Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)), Euro-Mediterranean Center on Climate Change (CMCC)

A. Project Preparation Timeframe

Start date of PFG	01 June 2026
Completion date of PFG	31 December 2026

B. Proposed Project Preparation Activities ($)

List of Proposed Project Preparation Activities	Output of the PFG Activities	US$ Amount	Budget note[2] (Based on Lead Organization)
Consultation, Data Collection, and Technical Assessments	**Deliverable 1:** workshops with target communities and stakeholders' engagement, **Deliverable 2**: prepare a baseline report documenting national/regional priorities,	119,000	1) International and National support staff: US$ 30,000 (UNESCO 10000, CMCC 10000; UNIDO 10000) 2) International and National travel: US$ 22,000 (UNESCO 6000 UNIDO 16000,)

[1] As presented in AFB/PPRC.33/40 Annex 1.

[2] The proposal should include a detailed budget with budget notes indicating the break- down of costs at the activity level. It should also include a budget on the Implementing Entity management fee use.

	projects, roadmap for implementation, and indicators/targets **Deliverable 3:** database information of hazards and vulnerabilities for target coastal areas;		3) Meetings and workshop expenses: US$ 48,000 (UNESCO 48000) 4) Contracted reports: US$ 19,000 (UNESCO 6000, CMCC 13000),
Assessment reports	**Deliverable 4:** Environmental & social risk assessment (ESS) report **Deliverable 5:** Proposed adaptation solutions' environmental sustainability & financial feasibility analysis	32,000	4) Contracted Reports: US$ 32,000 (UNIDO 32000)
Preparation of the AF Submission Package and Revision Process	**Deliverable 6:** Undertake a due diligence assessment of target national Ees-HACT (Harmonized approach to cash transfer - one per country) **Deliverable 7:** Full proposal drafting **Deliverable 8:** Regional validation workshop (virtual)	51,500	1) International and National support staff: US$ 10,000 (UNIDO 10000) 2) Contracted report: US$ 41,500 (UNESCO 4000; CMCC 12000, UNIDO 25500)
Implementing-Entity management fee (Agency fee)	10%	22,500	Technical and admin support services.
Total Project Formulation Grant		225,000	

Please describe below each of the PFG activities and provide justifications for their need and for the funding required:

Description of the required activity	Justification for the need and for the amount
Consultation, Data Collection, and Technical Assessments	Need to consult with the Pilot Site communities as well as the national stakeholders. Additionally, we need to start collection evidence-based climate information as well as vulnerability at target sites. Workshop and ESS reports should be prepared to support the full proposal. This will entail organizing 4 (maximum of 8) regional meetings, with national partners and regional stakeholders to co-design the national project components, within an overall regional and scientific operational framework, and initiates the co-design of these with key stakeholders for delivery. Cost will cover travel to the workshop sites for international and national experts and meeting expenditures, as well as expert report writing.
Preparation of specific assessment reports	Need to create specific assessment reports to do due diligence, inform and support the preparation of the full proposal
Preparation of the AF Submission Package and Revision Process	This activity will gather the results of all the assessments conducted during the preparation of the full fledge project proposal, following the template of the Adaptation fund and the requirements of UNIDO. The full-fledge proposal will be presented to all key stakeholders for validation during a regional virtual workshop. The drafting and

	compiling of the project proposal will be conducted by the EE and national adaptation experts.

For LLA Projects only:

If requesting additional funding for LLA projects to enable devolving decision making to the local level, please specify the activities that would directly serve to enable devolving decision making to the lowest appropriate level and enable local actors to make informed decisions on how adaptation actions are defined, prioritized, designed, and implemented:

Please provide justifications for their need and for additional funding required:

C. Implementing Entity

This request has been prepared in accordance with the Adaptation Fund Board's procedures and meets the Adaptation Fund's criteria for project identification and formulation.

Implementing Entity Coordinator, IE Name	Ms. Ganna Onysko Senior GEF, GCF, AF Coordinator Division of Funding Partner Relations Directorate of Global Partnerships and External Relations United Nations Industrial Development Organization - UNIDO Implementing Entity Coordinator Tel. and email: +43 1 26026 3708 TO: g.onysko@unido.org CC: gef@unido.org / glo@unido.org / f.haidara@unido.org		
Signature	Ganna Onysko	Date (Month, day, year)	February 6, 2026
Project Contact Person	Ms. Yvonne LOKKO Head IET/AGR/AIB Email: y.lokko@unido.org Work Phone: +43 1 26026 3737		
Telephone	Work Phone: +43 1 26026 3708		
Email Address	g.onysko@unido.org CC: gef@unido.org / glo@unido.org / f.haidara@unido.org		