

Non-reimbursable Technical Cooperation Document

I. Basic Information for TC

▪ Country/Region:	REGIONAL
▪ TC Name:	Regional Blue Carbon Monitoring, Reporting and Verification Mechanism
▪ TC Number:	RG-T3409
▪ Team Leader/Members:	Alleng, Gerard P. (CSD/CCS) Team Leader; Watson, Gregory (CSD/CSD) Alternate Team Leader; Acevedo Calle, Daniela (LEG/SGO); Ceva Alvarez, Mariana Daniela (CSD/CCS); Delgado, C. Raul (CSD/CCS); Esquivel Gallegos, Maricarmen (CSD/CCS); Flores Aguilar, Adrian (CSD/CCS); Gomez, Juan Carlos (CSD/CSD); Lefevre, Benoit Jean Marie (CSD/CCS); Lopez Aragon, Carmen Carolina (CID/CNI); Louis-Grant, Paula (VPC/FMP); Marin Luna, Andrea Belen (CSD/CCS); Ramsumair-John, Priya Elizabeth (CCB/CTT); Samayoa, Jorge Omar (CSD/CCS); Sandoval Pedroza, Jose Manuel (CSD/CCS); Valentine-Harry, Jeremy Leon (VPC/FMP)t (CSD/CCS); Lopez, Carolina (VPC/FMP); Louis-Grant, Paula (VPC/FMP); Ramsumair-John, Priya (CCB/CTT); Samayoa, Omar (CSD/CCS); Sandoval, Jose (CSD/CCS); Valentine-Harry, Jeremy (VPC/FMP)
▪ Taxonomy:	Research and Dissemination
▪ Operation Supported by the TC:	N/A
▪ Date of TC Abstract authorization:	30 Mar 2021
▪ Beneficiary:	UK Blue Carbon Fund countries
▪ Executing Agency and contact name:	The University Of The West Indies
▪ Donors providing funding:	UK Blue Carbon Fund(BLU)
▪ IDB Funding Requested:	US\$996,000.00
▪ Local counterpart funding, if any:	US\$140,000.00 (In-Kind)
▪ Disbursement period (Execution period):	60 months
▪ Required start date:	November 2022
▪ Types of consultants:	Firms and Individual Consultants
▪ Prepared by Unit:	CSD/CCS-Climate Change
▪ Unit of Disbursement Responsibility:	CCB/CTT-Ctry Off Trinidad & Tobago
▪ TC included in Country Strategy:	Yes
▪ TC included in CPD:	No
▪ Alignment to the Update to the Institutional Strategy 2010-2020:	Environmental sustainability; Gender equality; Productivity and innovation

II. Objectives and Justification

- 2.1 The purpose of this technical cooperation (TC) is to implement a monitoring, verification, and reporting (MRV) system for mangrove ecosystems that provides a science-based data platform on the sequestration and release of blue carbon in participant country sites of the United Kingdom Blue Carbon Fund of the IDB. Blue carbon, the carbon stored and sequestered in mangrove forests, seagrass meadows, and tidal salt marshes, is considered a cost-effective means to achieve positive climate change mitigation and adaptation outcomes. In total, mangroves account for around one percent of carbon sequestration (13.5 Gt/year), but as coastal habitats, they account for 14% of carbon sequestration. Most mangrove carbon is stored as large

pools in soil and dead roots. They have higher below- to above-ground carbon mass ratios than terrestrial trees, so any remarkable disturbance to these ecosystems could result in very high carbon emissions. Despite their small geographical space, mangroves provide a range of valuable ecological and economic resources, in particular many ecosystem services, such as: (i) nursery grounds for fish, mammals, and other aquatic fauna; (ii) seashore protection against erosion; (iii) nutrient retention; (iv) recreation and tourism; (v) carbon sequestration; (vi) water and air purification; (vii) waste assimilation; and (viii) traditional uses. In the context of carbon sequestration, blue forests are more effective carbon sinks — in both the short and long-term storage of carbon— than terrestrial forests.

- 2.2 Data quantifying¹ blue carbon ecosystems and their pools is scarce, especially data on whole-ecosystem storage capacity. Carbon storage capacity is being continuously released because of land-use conversion. This trend can be reversed by developing mangrove restoration and conservation projects around the region. Currently, to obtain the data on mangrove sequestration, traditional methods typically consist of labor-intensive field collections, requiring the measurement of individual tree height and tree diameter at 1.3 meters over time. In mangrove forests, this is extremely challenging compared to other forest ecosystems because of the soft unconsolidated sediment and the intricate architecture of the mangrove forest landscape (i.e., aerial roots, prop roots, etc.). Wang *et al.* (2019) indicate that the challenging nature of fieldwork in mangrove forests is a key factor that accounts for the time lag in research on these systems compared to terrestrial forests. Even where technological advancements (e.g., the use of remote sensing platforms such as Synthetic Aperture Radar —SAR or LIDAR), have been applied to measure these mangrove carbon stocks, only a small number of structural parameters (mainly height) are estimated, and ground truth data is difficult to collect.² However, it may be possible to overcome this challenge by applying an innovative approach that can unveil the 3D architecture of a mangrove forest in a more comprehensive manner and, in so doing, will improve the estimation of the carbon stock of these critical ecosystems.
- 2.3 In 2019, the IDB, with support from the Department for Environment, Food and Rural Affairs of the United Kingdom (DEFRA), established the “UK Blue Carbon Fund” (the Fund) to finance projects that will help reduce climate change’s negative impacts on carbon sequestration. The regional MRV will be used to help monitor the progress of the projects that are to be implemented under the Fund. With this MRV system, the blue carbon projects of the Fund will be able to: (i) improve the valuation of ecosystem services provided by mangrove ecosystems; (ii) potentially include blue carbon data in participant countries’: (a) Nationally Determined Contributions (NDC); (b) Reduced Emissions from Deforestation and Forest Degradation (REDD+) schemes; (c) Sustainable Development Goals (SDG) programs; (d) National Communications to the United Nations Framework Convention on Climate Change; and (e) carbon markets programs; and (iii) utilize an MRV system for results-based payments under a reforestation program. There is a growing trend to support or encourage results-based actions for reforestation, conservation, or reduced deforestation. To effectively participate in or take advantage of these types of efforts, a key element of the results-based payment scheme will be a fully functional MRV.

¹ Wang et al, 2019. A review of remote sensing for mangrove forests: 1956-2018. *Remote Sensing of Environment* 231 (2019)

² Ibid.

- 2.4 The Regional MRV project will develop and implement a standardized MRV for the blue carbon captured in mangrove ecosystems for those LAC countries that are beneficiaries of the Fund, which will help the Bank report on the Fund's progress. By default, the approval of a country-specific project of the Fund will also include participation in the MRV project, as the information collected from all projects in the blue carbon program will be used for reporting on the Fund. The various methodologies used by projects should be reviewed as inputs for the development of a broader monitoring methodology. This includes the use of models being used in Panama (ATN/BB-18013-PN) and Jamaica (ATN/BB-17899-JA) and methodologies to be used in Colombia (GRT/BB-18615-CO). Estimates from these projects can be compared to estimates prepared using the system developed in this project to review accuracy. This will be useful to countries, as Article 5 1. of the Paris Agreement states that "Parties should take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases as referred to in Article 4, paragraph 1 (d) of the Convention, including forests". As a result, the country and region-specific data availability has become necessary, especially in the context of mangrove systems because of the growing global trend to incorporate the blue carbon storage services of mangroves into aspects of: (i) NDC, as it is estimated that at least 28 countries mention coastal wetlands including mangroves in terms of mitigation in their NDC (in addition to those that reference adaptation); (ii) REDD+ schemes (e.g., Suriname includes mangroves in its forest reference emission level); (iii) carbon trading initiatives; (iv) SDG, in particular, the attainment of SDG 14 —under the target of conserving by 2020 "at least 10 percent of coastal and marine areas, consistent with national and international law and based on the best available scientific information". The development of the regional MRV will indirectly contribute to building climate change resilience in the region by helping to increase the capacity to monitor the release and sequestration of blue carbon at project sites. Additionally, the mechanics of the regional MRV will benefit from a MRV project being implemented in Jamaica by the IDB (ATN/BT-17792-JA) on capacity building for transparency in alignment with the Paris Agreement on climate change. The TC will also benefit from lessons learned under an institutional capacity strengthening program which produced a MRV to monitor forests in Guyana (GRT/GF-13172-GY).
- 2.5 This operation is consistent with the "Update to the Institutional Strategy. Development Solutions that Reignite Growth and Improve Lives" (AB-3190-2) and is aligned with the development challenge of productivity and innovation, as it assists in the development of quality human capital in the area of training on the monitoring the functions of mangrove ecosystems. The project is also aligned with the cross-cutting theme of climate change and environmental sustainability as it intends to support the regeneration and preservation of a crucial ecosystem on which a myriad of factors depend (biodiversity, carbon sequestration, resilience to extreme weather events, local livelihoods, eco-tourism, to name just a few). Additionally, the operation is aligned with the Corporate Results Framework 2020-2023 (CRF) (GN-2727-12), specifically at Level 2 Priorities on Climate Change and Environmental Sustainability, as it pertains to supporting "habitat that is sustainably managed using ecosystem-based approaches". It is also aligned with the "Climate Change Sector Framework Document" (GN-2835-8) where it mentions the need for "a sustainable landscapes approach within sectors to align social, environmental and economic objectives". It is also consistent with the acknowledgment of innovation and knowledge generation for an effective climate-resilient and low-carbon development; it is also aligned with standard 6 (Biodiversity Conservation and Sustainable Management of Living Natural Resources) of the IDB's new Environmental and Social Policy Framework (ESPF)

since it seeks to promote the sustainable management of natural resources through the adoption of practices that integrate conservation needs and development priorities. Finally, the operation is also aligned with the objectives of the Bank's Natural Capital Lab since the blue carbon MRV activities could represent the foundation for new conservation and financial innovation initiatives in the region.

- 2.6 The project is aligned with the following country strategies from countries of the Fund that have projects in implementation under the Fund: (i) [IDB Group Country Strategy With Jamaica 2016–2021](#), specifically related to the cross cutting theme of climate change resilience and climate change mitigation; (ii) [IDB Group Country Strategy With Panama 2021-2024](#), on environmental sustainability and climate change; and (iii) [IDB Group Country Strategy With Colombia \(2019-2022\)](#), on climate change and the preservation of natural capital; (iv) [IDB Group Country Strategy With Honduras \(2019-2022\)](#), on digital innovation and climate change resilience; (v) [IDB Group Country Strategy Update with Belize 2020-2021](#), on climate change and disaster risk management; (vi) [IDB Country Strategy with Nicaragua \(2012-2017\)](#), on climate change vulnerability reduction, adaptation and mitigation; (vii) [IDB Group Country Strategy with Haiti 2017-2021](#), on resilience to climate change; (viii) [IDB Group Strategy with Guyana 2017-2021](#), on climate change; (ix) [IDB Group Strategy with the Dominican Republic 2017-2020](#), on protection of the environment and adaptation to climate change for sustainable economic development; (x) [IDB Group Country Strategy with Suriname \(2021-2025\)](#), on climate change resilience; (xi) [IDB country strategy with Ecuador \(2018-2021\)](#), on climate change adaptation and mitigation, and; (xii) [IDB country strategy with Guatemala 2017-2020](#), on climate change adaptation and mitigation. The project is also aligned with IDB's Vision 2025 and CCB's strategic vision of Build Forward, as both aim at promoting digital innovation and resilience enhancement to economies in the region

III. Description of Activities/Components and Budget

- 3.1 **Component 1. Development of standardized MRV system (US\$376,000).** The main objective of this component is to develop an MRV system utilizing an innovative approach that improves the estimation of blue carbon stocks within mangroves systems. The primary activities are: (i) assessment of monitoring and reporting protocols at project sites; (ii) identification of baseline conditions as reference points, using existing project information where possible, to create or augment high-resolution mangrove cover baseline maps; (iii) determination of carbon stocks, using a 3D Imaging ground-based Laser Scanner and Python/Anaconda programming analysis and a carbon analyzer (available at the UWI facility in Trinidad and Tobago); and (iv) establishment of standardized MRV protocol to report on results from project sites.
- 3.2 **Component 2. Institutional capacity building (US\$270,000).** The main objective of this component is to improve the capacity of stakeholders in the utilization of technologies to monitor blue carbon systems. The project will ensure that there is adequate representation and participation of women and vulnerable groups in the training activities. The primary activities are: (i) training of project management units and local partners/stakeholders that are implementing or associated with UK Blue Carbon Fund projects or similar natural resource management programs within participating countries. The training will be on the use of an innovative measurement methodology based on laser technology and programming code for carbon stock analysis; (ii) preparation and publication of technical articles or reports on the methodology and recommendations on MRV for mangrove forests; and (iii) a joint regional paper on the comparison of technical attributes of the Fund's project sites.

- 3.3 **Component 3. Knowledge development and dissemination (US\$255,000).** The main objective of this component is to promote the exchange of data and sharing of lessons learned among all participating countries of the Fund. The primary activities are: (i) development of a regional database and knowledge-sharing platform for all Fund project sites, which will be managed by the St. Augustine Center for Innovation and Entrepreneurship (STACIE). The platform will collate, analyze, and synthesize information collected from all Fund project sites. This will allow testing hypotheses about carbon sequestration patterns at a regional level; (ii) creation of a community of practice to share information and lessons across the project sites, share information and lessons across the region, and be open to various entities and sites even where no active restoration is taking place. Each site will be asked to present their lessons learned and suggest good practices to other sites; and (iii) dissemination of appropriate information and awareness program on the results of the various blue carbon projects. It is expected that the project will utilize webinars, roundtables, conferences, workshops, etc., where possible, to disseminate information and share results.
- 3.4 The project administration (estimated at US\$95,000) entails one individual consultant as a project manager (part-time); a consulting firm will be hired to carry out the operation's audit; and an individual consultant will carry out a midterm and a final evaluation.
- 3.5 This operation, which will be funded with US\$996,000 from the UK Blue Carbon Fund (BLU), is aligned with the Fund's objective of promoting the sustainable management of mangrove forests. US\$140,000 will be provided as in-kind local counterpart by STACIE (the executing agency). The in-kind contribution will consist of: (i) access to the carbon analyzer necessary for determining the content of carbon in field samples; and (ii) access to workshop and training facilities and platforms for capacity building of project stakeholders.

Indicative Budget (US\$)

Activity/Component Description	IDB/Fund	Counterpart	Total
Component 1. Development of standardized MRV system	376,000	100,000	476,000
Component 2. Institutional Capacity Building	270,000	40,000	310,000
Component 3. Knowledge development and dissemination	255,000	0	255,000
Project Manager	55,000	0	55,000
Audit	20,000	0	20,000
Final Evaluation	20,000	0	20,000
Total	996,000	140,000	1,136,000

IV. Executing Agency and Execution Structure

- 4.1 This operation will be executed by the University of the West Indies (UWI) in St. Augustine, Trinidad and Tobago, through its research, innovation and entrepreneurship center (STACIE). STACIE is implementing a pilot project on mangrove monitoring in Trinidad and Tobago and Jamaica using the ground-based 3D imaging laser technique that will be the template for the regional MRV. The project is funded by the British Commonwealth and Foreign Service Office. UWI has also led regional programs including the Caribbean Sea Ecosystem Assessment (CARSEA), which was part of the global Millennium Ecosystem Assessment, that involved the assessment of ecosystem services of Caribbean basin countries including Colombia and Panama.³ UWI also works with other institutions, namely: the United States Department of Agriculture (USDA); the United States Agency for International

³ <https://www.millenniumassessment.org/en/SGA.Carsea.html>;
<https://www.cbd.int/doc/meetings/mar/rwebsa-wcar-01/other/rwebsa-wcar-01-crfm-03-en.pdf>

Development (USAID); the Dutch Ministry of Agriculture; Development and Cooperation – EuropeAid; the Nature and Food Quality and the Centre for International Cooperation in Agronomic Research for Development (CIRAD) (France); and the University of Cambridge Centre for Earth Observation (CEO).

- 4.2 An evaluation of the institutional capacity of STACIE was performed in October 2021 using the IDB's Institutional Capacity Assessment Platform (ICAP) tool and included a review of the relevant documentation —its [Financial Code](#) and the [Procurement Policies and Procedures Guide](#), to corroborate the findings of the assessment. The evaluation indicated that the program has a low to medium fiduciary risk, and as such, STACIE will have the capacity to execute the operation based on its current structures and fiduciary systems and once the project management unit has been established. It has also been recommended that training for familiarity with the IDB's policies and procedures should be provided to STACIE once the operation is approved. A Project Management Unit (PMU) will be created to manage the program, together with a Technical Advisory Committee (TAC) and a Project Steering Committee (PSC), which will provide technical and managerial oversight. The PMU will consist primarily of a project manager and in-kind finance and accounting, and STACIE will provide procurement resources. The project manager's post is key to managing the inputs of the project and complying with the fiduciary requirements of the IDB. The hiring of the project manager as well as the establishment of the PMU, will be conditions precedent to the first disbursement of the resources of the TC. The TAC will be established to help guide the project and may comprise representatives from the University of Cambridge Centre for Earth Observation (CEO), National Aeronautics and Space Administration (NASA) Goddard Space Flight Center, and other technical experts. The TAC will provide technical guidance on wetlands restoration, climate change considerations, blue carbon assessment, and wetlands research and monitoring, respectively. The PSC will consist of but not exclusive to, representatives from the projects in Jamaica (ATN/BB-17899-JA), Panama (ATN/BB-18013-PN), and Colombia (GRT/BB-18615-CO), the *Universidad de Los Andes Colombia*, the UWI Global Institute for Climate Smart and Resilient Development, and *Instituto de Investigaciones Marinas y Costeras*, Colombia (INVEMAR). During the implementation of the project, the PMU will coordinate all activities with local IDB country offices facilitated through the involvement of CSD/CCS specialists in these country offices. There will also be collaboration between the projects and MRV project to ensure coordination of in-country activities.
- 4.3 STACIE will be responsible for: (i) the program's technical, administrative, and operational management; (ii) the procurement of works, goods, and services; (iii) the preparation of disbursement requests; (iv) the preparation and update of annual work plans and the procurement plan, among others; (v) the submission of program management reports —the Annual Operation Plan, Semi-Annual Reports, and final evaluation reports; (vi) the monitoring, supervision, and inspection of works and service contracts. STACIE will designate the person(s) to represent it in all acts relating to the execution of the Agreement of the Technical Cooperation and submission of signatures as a condition precedent to the first disbursement of resources; and (vii) overall financial oversight of the project.
- 4.4 The execution period for the operation will be fifty-eight (58) months, and the disbursement period will be sixty (60) months. STACIE will be responsible for all the procurement, hiring, and acquisitions that have been foreseen to complete this TC. The procurement of goods, works, and services and the selection of consultants will be carried out following IDB policies and guidelines related to: (i) Procurement of

Goods and Works financed by the IDB (GN-2349-15); (ii) Policies for the Selection and Contracting of Consultants Financed by the Inter-American Development Bank (GN-2350-15). To this end, the STACIE will establish a specific, separate bank account to manage the project's resources. This will be a condition for the first disbursement. The project will be supervised by the team leader of the TC and a focal point at the IDB Trinidad and Tobago Country Office.

- 4.5 The project will leverage collaboration with the University of Cambridge Centre for Earth Observation (CEO) to support its implementation. CEO is a world-leading research center on the remote sensing of environmental change that uses high-resolution remote sensing to understand how forests respond to global environmental changes, including logging, land management, and climate change, addressing critical issues in ecology and conversation.
- 4.6 The direct beneficiaries of the project will be the executing agencies and national collaborating entities from the various blue carbon projects under the Fund. To date these are: (i) UWI's Centre for Solutions for Development Countries (ATN/BB-17899-JA); National Environment and Planning Agency, Jamaica; (ii) National Audubon Society (ATN/BB-18013-PN); Ministerio de Ambiente Panama; (iii) *Conservación Internacional Colombia/Puerta De Oro Empresa De Desarrollo Caribe* (GRT/BB-18615-CO); *Ministerio de Ambiente y Desarrollo Sostenible (MADS)*, Colombia; *Distrito de Barranquilla*; *Corporaciones Autónomas Regionales de los Valles del Sinú y de San Jorge (CVS)*; la *Corporación Autónoma Regional de Sucre (Carsucre)*, Colombia. Additional beneficiaries will be added in the future from those participating countries that are eligible under the Fund, as project concept ideas that were proposed in the initial pipeline developed during the creation of the Fund, are required to be first approved by DEFRA and then permitted to move to the next stage of project development and approval by the Bank.⁴

V. Major Issues

- 5.1 The main risk is a lack of human resources within the various project management units, to adequately implement the protocols of the MRV system. To mitigate this risk, the program will identify potential resources from each blue carbon project (i.e., from project teams, researcher institutions, government agencies, universities, coastal communities, etc.) for basic training in mangrove ecology and monitoring, ensuring that more than five persons are trained from each project
- 5.2 There is a risk associated with the COVID-19 pandemic regarding the implementation of the project, including coordination of activities, field visits, and in-person training. To mitigate this risk, the use of virtual field visits, virtual training platforms and virtual engagements will be utilized for all components of the program.
- 5.3 There is a risk associated with coordinating and executing the project over multiple countries. To mitigate this risk, the PSC will include at least one representative from a participating country so as to ensure adequate coordination, timely communication, and effective management of the project. Also, the MRV's inherent objective is to facilitate information gathering and exchange and overall coordination between projects, which provides an additional layer of mitigation.

⁴ For future beneficiaries, non-objection to participate in the MRV will be requested from the corresponding liaison entity with the IDB.

VI. Exceptions to Bank Policy

6.1 No exceptions to Bank policy were identified for this operation.

VII. Environmental and Social Strategy

7.1 Given the nature of the project, there are no associated environmental or social risks. Per the Environment and Safeguards Compliance Policy of the Bank (OP-703), the operation has been classified as Category “C,” meaning that no environmental assessment studies or consultations are required for this operation (see the [Safeguards Screening Form](#) and the [Safeguards Policy Filter](#)).

Required Annexes

[Request from the Client - RG-T3409](#)

[Results Matrix - RG-T3409](#)

[Terms of Reference - RG-T3409](#)

[Procurement Plan - RG-T3409](#)