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&  
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La OF 2221800

Paramaribo, October 28, 2022

**Country Representative**  
**Inter-American Development Bank**  
**Country Office in Suriname**  
**Mr. Antonio Goncalves**  
Peter Bruneslaan 2-4  
Alhier

**Subject : Request Technical Cooperation (TC) for the Blue Carbon Restoration in the Bigi Pan  
MUMA, Suriname**

Dear Mr. Goncalves,

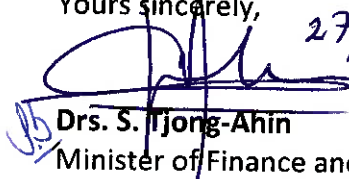
The Government of the Republic of Suriname hereby requests a Technical Cooperation (TC) for support to the "Blue Carbon Restoration in the Bigi Pan MUMA, Suriname" Project. Suriname has an extensive coastal mangrove fringe area as part of the coastal wetland system found along the Guianas coast. The objective of this project is to improve mangrove management in Suriname by applying an evidence-based approach, which will guide future conservation/restoration efforts, enhance the governance of these ecosystems, and promote sustainable livelihoods.

This request is in line with the operation RG-T3409: Regional Blue Carbon Monitoring, Reporting and Verification Mechanism, which will monitor the progress of the projects that are to be implemented under the Blue Carbon Fund.

The Ministry of Finance and Planning fully supports this initiative.

We thank you for your cooperation.

Yours sincerely,

 27/10/22  
**Drs. S. Ijong-Ahin**  
Minister of Finance and Planning a.i.



March 23, 2021

Bernadette Chapman  
Programme and policy  
International forests and NBS  
International nature, climate, and development  
Department for Environment, Food and Rural Affairs  
1st floor | Seacole Building | 2 Marsham Street | London | SW1P 4DF  
[bernadette.chapman@defra.gov.uk](mailto:bernadette.chapman@defra.gov.uk)

Dear Bernadette:

This Technical Consultation Document is in connection with the Administrative Agreement regarding the Establishment of the UK Blue Carbon Fund, signed on April 2, 2019, as it may be amended from time to time (the "Fund Agreement").

Below is a description of the "Blue Carbon Restoration in Bigi Pan MUMA, Suriname" Project. Unless we receive a written from you by close of business of XXXXX, 2021, communicated as per the Non-Objection Process outlined in Section 5.1 of the Fund Agreement, we will proceed to allocate \$1,520,000 of the Fund to this project, as per the provisions of Section 5.1 of the Fund Agreement.

#### I. BASIC FACTS

Type of Operation: NON-REIMBURSABLE  
Country: Suriname  
Project name: Blue Carbon Restoration in the Bigi Pan MUMA, Suriname  
Borrower/Beneficiary: Anton de Kom University of Suriname (AdeKUS)  
Executing Agency: AdeKUS  
Total project cost: \$1,520,000  
Total financing cost: \$1,705,000  
Financing breakdown:

Activity/Component	IDB/Fund Funding	Counterpart Funding	Total Funding
Component I. Site characterization and impacts assessment	\$170,000	\$15,000	\$185,000

Component II. Addressing the drivers of mangrove degradation in the Bigi Pan MUMA	\$1,000,000	\$125,000	\$1,125,000
Component III. Monitoring and evaluation	\$100,000	\$25,000	\$125,000
Component IV. Strengthening mangrove governance and local engagement in Suriname	\$150,000	\$15,000	\$165,000
Project Administration	\$100,000 (6.7%)	\$5,000	\$105,000
Total	\$1,520,000 (89%)	\$185,000 (11%)	\$1,705,000

## 1. PROJECT DESCRIPTION

- 1.1. Mangrove ecosystems provide a wide range of ecological and economic goods and services, such as raw materials and food, coastal protection, erosion control, water purification, maintenance of fisheries, carbon sequestration, tourism, recreation, education, and research.<sup>1</sup> They are considered some of the most carbon-dense ecosystems globally. Recent estimates of carbon stored (i.e., 6.4 billion metric tonnes) indicate a greater storage capacity than previously estimated (i.e., 4.19 billion metric tonnes).<sup>2,3</sup> These forests have suffered from the pressure exerted by drivers such as anthropogenic pressure, climate change (e.g., sea-level rise and microclimate variation), and other natural processes (e.g., mudbank dynamics). As a result, severe losses of their original total cover and hence interrupting the provision of its ecosystem services, have occurred.<sup>4</sup>
- 1.2. Suriname has an extensive coastal mangrove fringe area as part of the coastal wetland system found along the Guianas coast. Estimates of Suriname coverage range between 89,000-100,00 hectares,<sup>5</sup> around 2% of the world's total.<sup>6</sup> Despite the vast mangrove area and considering that more than two-thirds of the mangroves are protected, parts of the system have experienced a measure of degradation. The National Mangrove Strategy Suriname (NMS)<sup>7</sup> identifies two significant drivers of mangrove degradation: unsustainable human development and, more recently, climate change impacts. Impacts from unsustainable human activities related to agriculture, fishing, tourism, infrastructure, and urbanization have resulted in physical losses and the interruption of these systems' ecological functions.<sup>8</sup> Climate change-related stressors, especially sea-level rise (SLR), have

<sup>1</sup> Barbier et al. (2011). The Value of Estuarine and Coastal Ecosystem Services. Ecological Monographs.

<sup>2</sup> Donato et al. (2011). Mangroves among the most carbon-rich forests in the tropics. Nature Geoscience.

<sup>3</sup> Sanderman et al. (2018). A global map of mangrove forest soil carbon at 30 m spatial resolution. Environmental Research Letters.

<sup>4</sup> Bouillon et al. (2008). Mangrove Production and Carbon sinks: A revision of global budget estimates. Global Biogeochemical Cycles. 22. 1-12.

<sup>5</sup> WWF. (2015). Assessment of peri-urban coastal protection options in Paramaribo-Wanica, Suriname. World Wildlife Fund.

<sup>6</sup> Wip et al. (2019). Blue carbon and biodiversity within Suriname's mangrove forests using a multipurpose NFI. Paper presented at the 2019 conference of the International Union of Forest Research Organizations.

<sup>7</sup> MASOFUR. 2019. National Mangrove Strategy Suriname. Mangrove Forum Suriname.

<sup>8</sup> NIMOS, SBB and UNIQUE (2017). Background study for REDD+ in Suriname: Multi-perspective analysis of drivers of deforestation, forest degradation and barriers to REDD+ activities. Paramaribo, Suriname.

disrupted sedimentation rates and altered these forests' hydrological balance, resulting in increased rates of coastal erosion and physical degradation. Even though the currently available literature has not addressed each of these drivers' relative importance, they are known to cause a compound effect that can threaten the health of ecosystems and communities that depend on their services and assets.

- 1.3. In both cases, the trends have been drastic, and today mangroves in Suriname have been diminished to half of their original cover. Consequently, it is expected that coastal settlements and productive agricultural areas that are located behind these systems could suffer severe impacts, mainly from loss of land, increased flooding, and salinization. In that sense, there is an urgent need to implement measures to reduce mangrove degradation drivers. This way, the ecosystem services they provide are maintained (e.g., coastal protection, biodiversity, nursery functions, carbon uptake), and the livelihoods of many coastal communities are protected.
- 1.4. Nationally, the Government of Suriname has implemented efforts to improve the protection and management of these systems, including establishing the Multiple Use Management Areas (MUMAS) as part of the Planning Law (Planwet) 1973. MUMAS are areas that fall under Category VI of IUCN's Protected Areas Categories (i.e., Protected area with sustainable use of natural resources), meaning they are protected, and the sustainable management of resources is allowed (Annex 1).<sup>9</sup> Additionally, under the Forest Management Act (2012), the MUMAs were defined as state land in which the sustainable use of natural resources is permitted. The MUMAs consist of fresh and brackish water ecosystems that have high productivity and serve as feeding and breeding grounds for large numbers of local and migratory bird species. These areas cover only free domain land, and exploitation licenses must be issued by the Suriname Forest Service (SBB) under the Ministry of Natural Resources.<sup>10</sup>
- 1.5. Over the last decade, mangrove restoration and conservation have also been acknowledged by decision-makers and stakeholders as critical elements of sustainable development policy. Instruments such as the National Climate Change Policy, Strategy and Action Plan for Suriname (2015), the Nationally Determined Contributions (NDC), and the National Adaptation Plan (NAP) have raised the attention towards acting upon the main drivers of mangrove degradation. As a result, a new National Mangrove Strategy (NMS) and management plans for several MUMAs were developed. In the case of the former, the instrument was developed by the Mangrove Forum Suriname and approved by the Government in late 2020. On the other hand, the Environment Framework Act (EFA) was enacted in early 2020 as the primary legal instrument to guide sustainable development in Suriname. The Act has important consideration for ecosystem restoration projects, ecotourism, fishing, and overall, the sustainable use of natural resources. It also establishes a new institutionality around environmental management in Suriname with the creation of the National Environment

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<sup>9</sup> IUCN. Guidelines for applying protected area management categories including IUCN WCPA best practice guidance on recognizing protected areas and assigning management categories and governance types. International Union for Conservation of Nature.

<sup>10</sup> MASOFUR. (2019). National Mangrove Strategy Suriname. Mangrove Forum Suriname.

Authority. Both the NMS and the EFA lack institutional support to ensure their implementation; hence, their enforcement is limited.

- 1.6. Also, technical and financial cooperation initiatives have been promoted in Suriname between local entities (e.g., SBB, Mangrove Forum Suriname, and the Anton de Kom University) and international partners (e.g., IDB, Wetlands International in sites such as the Weg naar Zee and the Bigi Pan MUMA.<sup>11</sup> Even though cooperation initiatives have had great results in mainstreaming the mangrove conservation agenda in Suriname, more science-based driven projects are expected. Also, new projects that cover the livelihood and governance dimensions of the mangrove degradation issue are required.
- 1.7. Despite this effort to improve the protection of mangrove ecosystems management, systemic barriers impact conservation and sustainable use efforts. **First, issues are surrounding weak governance arrangements related to the management of coastal protected areas, including those of the mangrove ecosystems<sup>12</sup>.** The institutional arrangements reflect a dispersion of roles and responsibilities among ministries and public institutions mainly caused by the change in the mandate to manage these ecosystems with every new Government and unclear legal frameworks. Also, mangrove management is perceived as a purely environmental issue, and the linkages with other sectors (e.g., agriculture, urban development, etc.) is disregarded. The situation translates into a dispersed institutionality and a lack of sectoral complementarity and coordination to address mangrove degradation as part of broader landscape dynamics.
- 1.8. Secondly, there is a limited understanding of the socio-ecological dynamics surrounding the drivers of change. As mentioned before, **Suriname has gone through various attempts at mangrove restoration/conservation efforts. Still, these have not been sufficiently supported by an evidence-based approach on the best options to address the drivers of degradation, namely in-situ measures such as Nature-based Solutions (NbS) (e.g., sediment trapping units-STU), natural regeneration, mangrove nurseries (Annex 2).<sup>13</sup>** There is also a persistent need to understand better the linkages between unsustainable livelihoods and mangrove degradation and the increasing effect of climate change in these ecosystems.
- 1.9. As a result of these barriers, many stakeholders' significant efforts to tackle mangrove ecosystem degradation are diminished. In that context, there is still a need to support government entities and local partners in providing technical and financial resources to strengthen governance arrangements (e.g., institutions, policies, strategies) and local capacities around mangrove management and to

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<sup>11</sup> Among the most important mangrove restoration projects in Suriname are UNDP's Suriname Global Climate Change Alliance (GCCA +), Conservation International's Building with Nature and several small-scale projects implemented by the Anton de Kom University Suriname.

<sup>12</sup> Djosetro and Hendrik Behagel. 2020. Building local support for a coastal protected area: Collaborative governance in the Bigi Pan Multiple Use Management Area of Suriname. Marine Policy, 112.

<sup>13</sup> Boskalis, (2012). Mangrove Project Suriname. CIE4061-09. Multidisciplinary Project.

<https://repository.tudelft.nl/islandora/object/uuid:e7c215e1-ac14-4b91-85e3-646c3e37b7d0/datastream/OBJ/download>

deploy evidence-based plans and strategies. It includes identifying the adequate restoration measures and actions to address unsustainable livelihoods affecting mangroves to ensure drivers of degradation are managed integrally.

- 1.10. Among the most important mangrove sites in Suriname is the Bigi Pan MUMA, which is located in Coronie and Nickerie and bordering the Atlantic Ocean. The area covers more than 67,900 hectares of wetland. Population estimates of the two districts are about 3,400 persons in Coronie and 36,600 persons in Nickerie. Economic activities in the area typically rely on coastal and marine ecosystem services and products,<sup>14</sup> including fish and shellfish resources (e.g., crab collection), ecotourism (e.g., eco-tours to Bigi Pan Muma, lodging, and birdwatching), agriculture (e.g., honey collection, rice production (large and small scale), citrus farming and coconut oil production), bananas, among others<sup>15</sup>.
- 1.11. The Bigi Pan MUMA is also an important carbon sink, a natural barrier against floods and storm surges, and a biodiversity reservoir. It is estimated that mangroves in the area can sequester around 475,300 tCO<sub>2</sub>/year (i.e., soil and living biomass). Also, these forests represent a significant buffer between the sea and terrestrial areas that help protect urban settlements and agricultural fields from storm surge and sea-level rise.<sup>16</sup> Finally, the site is internationally recognized as a birdwatching paradise.<sup>17</sup>
- 1.12. Reflecting on national trends, the Bigi Pan MUMA like other mangroves systems globally has been impacted by human intervention and climate change. The establishment of rice fields and associated channelization has altered water flow in the area and affected hydrological conditions in the area. Unsustainable agricultural practices such as the use of pesticides and herbicides and outdated spraying techniques have resulted in contamination, affecting local flora and fauna in the immediate relative short term. Consequently, more than 50% of the total black mangrove forested area and even some of the rice cultivation fields have been lost<sup>18</sup>. An assessment of the socio-economic impact of a 2006 flood event carried out by Simpson et al. (2012) indicates that agriculture losses accounted for 39 % of the total monetary damage.<sup>19</sup> Even though the area still maintains most of its ecological and scenic value, the Bigi Pan MUMA is showing signs of progressive degradation<sup>20</sup> and even the presence of a Mangrove Education Center located in Coronie,<sup>21</sup> has not been insufficient to reverse

<sup>14</sup> Local communities are those communities living in the Coronie and Nickerie Districts that rely on the ecosystem assets and services from the Bigi Pan. They act individually or collectively depending on their economic activity and association preferences.

<sup>15</sup> UNDP, 2013. Bigi Pan Management Plan 2013-2023. United Nations Development Program.

<sup>16</sup> Murray et al. (2011). Green Payments for Blue Carbon Economic Incentives for Protecting Threatened Coastal Habitats. Nicholas Institute Report. Duke University.

<sup>17</sup> The site is considered a Western Hemisphere Shorebird Reserve Network (WHSRN) since it supports hundreds of thousands of migratory shorebirds each year, specially Semipalmated Sandpiper (*Calidris pusilla*)

<sup>18</sup> GONINI. 2020. National Land Monitoring System of Suriname.

<sup>19</sup> Simpson, M. C., et al. 012. CARIBSAVE Climate Change Risk Atlas (CCCRA) - Suriname. DFID, AusAID and The CARIBSAVE Partnership, Barbados, West Indies.

<sup>20</sup> UNDP, 2013. Bigi Pan Management Plan 2013-2023. United Nations Development Program.

<sup>21</sup> The Mangrove Education Center Coronie plays a crucial role of educating and raising awareness among visitors and communities of the



the trend. In the medium and long term, there is the need to address the impacts of climate change on the system, but this can be rapidly upended depending on the rate of increase in global temperatures and ensuing impacts. Addressing these issues in a targeted manner will help (i) restore the site's ecological balance and ensure the maintenance of livelihoods of communities reliant on the assets and services provided by the mangroves; and (ii) increase the system's adaptive capacity to the impacts of climate change (assuming the rate of increase of global temperatures is stabilized).

- 1.13. The project's objective is to improve mangrove management in Suriname by applying an evidence-based approach, which will guide future conservation/restoration efforts, enhance the governance of these ecosystems, and promote sustainable livelihoods. The method employed and lessons learned from this project can be instructive and used as a template for other mangroves sites in the region with similar site-specific characteristics, namely dynamic wave environment, heavy sediment loading, significant loss of land along the seaward fringe, stabilization of sediment is required and where restoration is urgently needed.
- 1.14. To address mangrove degradation in the site, the project aims at restoring and conserving 3,400 hectares of mangrove forests (1,200 to be restored and 2,200 conserved). The **restoration** effort is expected to reduce the land loss on the seaward side of the system active erosion of the mangrove environment. It is anticipated that restoration/conservation efforts will positively impact the provision of ecosystem services (e.g., carbon sequestration capacity and biodiversity richness) and help address coastal erosion and sea-level rise.
- 1.15. Regarding the **conservation** approach, there is an emphasis on addressing the anthropogenic drivers of degradation through the sensitization of communities to the value and importance of mangroves and the identification and promotion of sustainable livelihoods and practices for coexistence. This latter aspect is of relevance in a context in which the economic situation of rural communities in Suriname has been heavily impacted by the crisis caused by the Coronavirus pandemic. The project will leverage the IDB experiences and knowledge in other projects to work with stakeholders to promote those activities compatible with mangroves' sustainable management (Annex 3).
- 1.16. The project also aims at working with governmental authorities to improve the governance arrangements around mangrove conservation in Suriname. Local capacities of central and local government institutions will be strengthened, and partnerships between the public, private sectors and local communities will be fostered. In the end, it is expected that institutions in Suriname will improve their knowledge and capacities to address mangrove-related issues, mainly enforcing the legal and policy frameworks.

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importance of mangrove ecosystems. This project envisages a close collaboration with the Center to address the sustainable livelihoods and educational aspects of the project.

[https://www.sr.undp.org/content/suriname/en/home/presscenter/articles/2019/promoting\\_mangrove\\_through\\_educational\\_tourism.html](https://www.sr.undp.org/content/suriname/en/home/presscenter/articles/2019/promoting_mangrove_through_educational_tourism.html)



- 1.17. The project assumes that evidence-based mangrove sustainable management, the promotion of related sustainable livelihoods, and the improvement of governance arrangements including local stakeholder involvement and engagement in conservation-restoration efforts, will help address the drivers of degradation and reverse the trend in degradation. In the long-term, sustainable mangrove management (i.e., restoration and conservation) effectively increase the long-term provision of mangrove ecosystem services (i.e., blue carbon sequestration, climate change resilience, and biodiversity conservation)

## 2. DESCRIPTION OF ACTIVITIES AND OUTPUTS

**2.1. Component I - Site characterization and impacts assessment.** The main objective of this component is to assess site characteristics (i.e., social and ecological), including a detailed analysis of the drivers of degradation. Complementarily, an impact analysis of the proposed restoration areas is intended to determine which measures could effectively address the drivers. The main activities to be deployed as part of this component are:

- i) *Historical analysis and mapping of the mangrove areas on the Bigi Pan MUMA.* The site will be characterized in terms of its ecological attributes (i.e., biological, hydrological, and geomorphological attributes). Emphasis will be done on the ecosystem services the mangroves in the site provide to local communities, the country, and the region (i.e., carbon sequestration, biodiversity conservation, and climate change resilience). Also, a detailed blue carbon baseline for the Bigi Pan MUMA will be developed.
- ii) *Identification and analysis of site-specific drivers of mangrove degradation and corrective measures.* Historical data regarding land use, flooding, saltwater intrusion, and other associated natural processes will be undertaken. Emphasis will also be done on the socio-economic dynamics that serve as drivers of degradation (e.g., agriculture and urban development). The identification of the main drivers of degradation will allow identifying adequate restoration/conservation measures.

### 2.1.1. Outcome, outputs, and responsibilities:

- *Outcome:* Improve the understanding of mangrove ecosystem socio-ecological dynamics in the Bigi Pan MUMA through the generation of science-based evidence. Also, tailored measures for their sustainable management of these ecosystems are defined.
- *Output(s):* Bigi Pan MUMA Site assessment, including historical analysis, coverage mapping, and identification of drivers of degradation.
- *Responsibilities:* The Executing Agency (EA), with the IDB support, will oversee contracting and accompanying a specialized consultancy firm to deploy the site assessment.

**2.2. Component II - Addressing the drivers of mangrove degradation in the Bigi Pan MUMA.** The main objective of this component is to employ restoration and conservation activities at the site following the results of the assessment undertaken in Component 1. This component comprises the following activities:

- i) Implementation of NbS in the area to promote mangrove restoration and protect existing mangroves, as it is expected that a total of 50 STUs will be installed in a 200 hectares area;
- ii) Establishment of bamboo/walaba sustainable harvesting incentive program, which will ensure the availability of raw materials for the construction and maintenance of the STUs;
- iii) Establishment of a mangrove nursery and will include the construction of rudimentary infrastructure to support the restoration/protection tasks (e.g., water provision, water storage, piping, and pumps);
- iv) Implementation of alternative measures to tackle the drivers of mangrove degradation as identified in component 1. In parallel to the NbS, the site assessment will help identify any additional measures that will be needed to support mangrove restoration. These measures are intended to impact the hydrology of the area and to influence socio-economic drivers of degradation;
- v) Sustainable livelihoods promotion for mangrove conservation. This activity is intended to deploy environmental awareness and capacity building activities with local communities about the benefits of mangrove conservation and sustainable livelihoods. Special attention will be given to drivers directly related to local livelihoods, namely agricultural development. This activity seeks to promote transformational changes of current livelihoods to more sustainable alternatives. There will be collaboration with other IDB initiatives (Annex 3) to support individuals and small and medium-sized enterprises (SMEs) to adopt productive and/or commercial activities that foster mangrove conservation.

#### **2.2.1 Outcome, outputs, and responsibilities:**

- **Outcome:** Promote mangrove ecosystems are restoration/conservation and sustainable livelihoods in the Bigi Pan.
- **Output(s):** The output of this component is the restoration of 1200 hectares and the protection of 2200 hectares<sup>22</sup>. Also, sustainable livelihoods will be promoted through the training of 100 persons (with at least 50% being women and at-risk youth) in various topics such as mangrove conservation, climate-smart agriculture, ecotourism, sustainable development, among others.
- **Responsibilities:** The EA, with the support from the IDB, will ensure the provision of the local workforce for the implementation of the mangrove restoration/protection measures is achieved.

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<sup>22</sup> It is expected that restoration/conservation activities will allow the sequestration and avoided loss of 21,000 tCO<sub>2</sub>e/year.

**2.3.Component III - Monitoring and evaluation.** This component aims to establish the measures to address mangrove degradation and determine the parameters and tools to monitor their effectiveness. The main activities of this component are:

- i) *The elaboration of a Mangrove Restoration Management Plan (MP).* This Plan will detail the selected measures according to the site assessment deployed in Component I. These measures should be able to address drivers from both the social and the ecological perspectives. Prioritization of the measures will be done according to the available resources, namely human, technical, technological. It is expected that the Plan will also prioritize those measures that could improve the livelihoods of local communities. Local communities and stakeholders will be consulted during the development process to ensure the measures suit local capacities. The Plan will also identify capacity gaps that will be addressed as part of component IV.
- ii) *Elaboration of a Monitoring and Evaluation Plan (MEP).* This Plan will establish the parameters to measure the impact of the interventions on mangrove ecosystems. Once the MP has been set, specific indicators will be defined to complement the KPIs. A mid-term and final MEP assessment will measure progress and adjust any issue arising during the project implementation.
- iii) *Analysis of the improvement in biodiversity richness from restoration activities.* As the outputs of the restoration/conservation efforts are accomplished, there is a need to determine the improvement in the economic value of the rehabilitated areas to provide support and strengthen efforts for mangrove reforestation and conservation in other parts of the region. This activity includes an analysis of the improvement in biodiversity richness from restoration activities. As a result of the restoration/conservation efforts, an increase in the richness and abundance of certain species is expected. Bird species will be selected as indicator species to undergo monitoring activities in this component.

**2.3.1. Outcome, outputs, and responsibilities:**

- *Outcome:* Establish mangrove restoration-conservation measures and parameters to monitor their effectiveness.
- *Output(s):* The MP, the MEP, and the Assessment Report on the economic valuation of the restoration/conservation measures and improvement of the biological diversity. As part of this latter assessment, a biodiversity monitoring plan will be developed.
- *Responsibilities:* Consultancy firms will develop all the activities in this component with the supervision from the EA, the IDB, and with the technical advice from the Steering Committee (see Component IV).

**2.4. Component IV - Strengthening mangrove governance and local engagement in Suriname.** As mentioned in the introduction, one of the main barriers to mainstream mangrove sustainable management and restoration/conservation is the inadequate governance arrangements around MUMAS. This component aims to support the stakeholders' engagement (national and local governmental and non-governmental) in the restoration and conservation of mangroves in Suriname. The Site Assessment also supposes an in-depth analysis of the governance arrangements to propose corrective measures. The main activities of this component are:

- i) *Institutional capacities strengthening.* Relevant governmental entities, such as the Ministry of Spatial Planning and Environment, Ministry of Land Policy and Forest Management, District Commissions, and the National Environmental Authority, will be directly engaged in the project. Technical capacities dialogues for the entities mentioned above will be organized in subjects such as but not exclusive to environmental awareness, natural resource management in protected areas, climate change resilience, and environmental governance.
- ii) *Civil society and private sector partnerships strengthening.* This project aims to foster collaboration with relevant non-governmental and private sector stakeholders present in the area to promote sustainable livelihoods, sustainable mangrove management, and improve governance arrangements.<sup>23</sup> To do so, dialogues and training will be organized with them in topics like the ones specified in the previous point.<sup>24</sup>
- iii) *Knowledge products creation and dissemination.* Publications on the economic evaluation of mangroves, protection measures, and sustainable livelihood promotion will be created and disseminated with project participants and other relevant stakeholders of the program. These products are expected to complement and support the rest of the activities in all the components. Guidelines and publications are intended to strengthen stakeholder engagement, while workshops and dialogues are designed to enhance the institutional articulation at a government and local level.

#### **2.4.1 Outcome, outputs, and responsibilities:**

- *Outcome(s):* Improve stakeholders' (governmental and non-governmental) engagement and understanding of their roles and responsibilities in sustainable mangrove management.
- *Output(s):* Organization of institutional strengthening workshops and stakeholders' dialogues. Knowledge products will also be produced for different audiences.

<sup>23</sup> For example, The Green Heritage Fund, Mangrove Education Center Coronie, the Mangrove Forum Suriname-MASOFUR) and MSMEs (e.g., eco-tourism operations, small scale agriculture).

<sup>24</sup> To do so the project will leverage from the relations with stakeholders in ecotourism, fisheries and agriculture sector created in other IDB's operations as outlined in section 5.4.

- **Responsibilities:** The EA and the IDB will provide guidance and logistical support to the activities in this component.

**Execution period: 60 months**

### **3. EXPECTED RESULTS FRAMEWORK INDICATORS AND, WHEN AVAILABLE, PRELIMINARY EXPECTED RESULTS**

#### **3.1. Component I: Site characterization and impacts assessment.**

<b>Indicator</b>	<b>Target</b>
ICF KPI 14: Level of institutional knowledge of Blue Carbon issues in partner countries	Institutions and partners better understand blue carbon issues in the Bigi Pan MUMA site and the region.

#### **3.2. Component II: Addressing the drivers of mangrove degradation in the Bigi Pan MUMA**

<b>Indicator</b>	<b>Target</b>
ICF KPI 6: GHG avoided and reduced	21,600 tCO <sub>2</sub> e/ year avoided and captured (9,600 tCO <sub>2</sub> /ha/year sequestered, and 12,000 tCO <sub>2</sub> e/ha/year avoided. <sup>25</sup>
ICF KPI 8: Number of hectares where deforestation and degradation have been avoided or restoration has occurred through ICF support	In total, 1200 hectares of mangrove will be restored and 2200 conserved.
ICF KPI 10: Value of ecosystem services generated or protected	A relative increase in bird abundance is achieved, for example, Semipalmated Sandpiper ( <i>Calidris pusilla</i> )
# of forest-dependent people with livelihood benefits protected or improved because of support?	TDB
Communities adopting new sustainable practices of mangroves	TDB
Change in mangrove deforestation (degradation?) rate	TDB
# of sustainable business still in operation at the end of the project	TDB

<sup>25</sup> Based on a yearly sequestration and avoidance rate of 8 tCO<sub>2</sub>e/hectare and 6 tCO<sub>2</sub>e/hectare, respectively.

ICF KPI: 1: Number of people supported to better adapt to the effects of climate change as a result of ICF	At least 100 persons trained in mangrove restoration/conservation techniques, with at least 50% being women and at-risk youth
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### 3.3. Component II: Monitoring and Evaluation

Indicator	Target
ICF KPI 4: Number of people whose resilience has been improved	TBD

### 3.4. Component IV: Strengthening mangrove governance and local engagement in Suriname.

Indicator	Target
ICF KPI 14: Level of institutional knowledge of Blue Carbon issues in partner countries	TBD
ICF KPI 12: Amount of private resources mobilized	TBD
Change in local awareness of the economic and social value of mangroves in local communities	TBD

## 4. PROJECT AGENCIES

4.1 The project will be executed by Anton de Kom University of Suriname (AdeKUS), specifically by the Hydraulic Laboratory of the Department of Infrastructure (IS) of the Faculty of Technological Sciences (FTeW) (AdeKUS-FTeW-IS). The AdeKUS-FTeW-IS will hire individual consultants and/or firms under the Bank's procurement policies and procedures to implement the project's activities. A project management unit will be established to help manage the program. The project management unit will consist primarily of a finance/accounting specialist (part-time), a procurement officer (part-time), a project manager, and a project evaluation officer (part-time). These positions are necessary to manage the required inputs of the project and respond to the various requirements of Bank operations. A Project Steering Committee (PSC) will be put in place to accompany, evaluate, and advise the project's implementation. The PSC will be composed of the AdeKUS-FTeW-IS (as EA of the Project), IDB, local communities and the private sector representatives (to be defined), MAFOSUR, the National Environmental Authority (i.e., the National Institute for Environment & Development-NIMOS), the Ministry of Spatial Planning and Environment (i.e., The Foundation for Forest Management and Forest Supervision-SBB) and members of the international cooperation (to be defined) (e.g., United Nations Development Program, Conservation International, World Wildlife Fund). A technical advisory committee (TAC) will also be set up within the PSC to provide technical input and guidance to the program.

## 5. STRATEGIC ALIGNMENT

- 5.1. *Alignment with UK Blue Carbon Fund eligibility criteria and thesis:* The underlying premise of the project is that in mangrove restoration, there is no one size fits all strategy, but it must be customized as locational characteristics – biophysical, micro-climatic, socio-economic, political conditions, etc, will dictate or determine the specific approach and activities undertaken. Thus, this Suriname project and others within the pipeline – Jamaica, Panama, MRV, etc. are being designed to function as templates or prototypes for other project sites with similar characteristics across the region. The lessons learned, both successes and challenges, will be promoted to be a type of resource vault for potential project developers within the region and globally. There will be a strong emphasis on codifying the lessons learned and active promotion and dissemination of the results to improve the understanding and implementation of blue carbon restoration programs. Specifically, the proposed project will serve as a demonstrative exercise to (i) highlight the importance of utilizing an evidence-based approach to a mangrove restoration site with high wave energy, a coastal environment in continuous flux, heavy sediment loading, and significant erosion (ii) the use of innovative NbS measures to mitigate the loss of land from coastal erosion and sea-level rise; highlight the importance of strengthening stakeholders engagement and governance arrangements around the sustainable management of mangroves.
- 5.2 *Alignment with IDB operations:* The Project is closely aligned with the local IDB programs that have relevance to it and will impact its sustainability. Annex 3 provides an outline in tabular form of the various programs and their intersection with the restoration project. The project is also aligned with the IDB's Natural Capital Lab programming, which seeks to develop projects that value the range of ecosystem services of a country's natural assets and develop nature-based solutions. The project will leverage and complement IDB Group activities in Suriname, including the IDB Proadapt' s program, which pilots and supports developing new and innovative methodologies, tools, and business models to help MSMEs in Latin America the Caribbean increase their climate resilience. Proadapt will examine ways to improve livelihoods amongst fisherfolks and other groups in and around the mangrove areas.<sup>26</sup> Finally, the project is aligned with the IDB country Strategy for Suriname, which considers adaptation to climate change and promotes diversified and sustainable economic activities as part of its priorities. This is also the case in the Update to IDBG's Institutional Strategy 2010-2020, which highlights climate change and sustainability as a key cross-cutting issue that hinders the region's development.
- 5.3. *Alignment with national and donor-funded programs:* The Project is aligned with national climate change and mangrove ecosystem management instruments, namely the Second Nationally Determined Contributions 2020 (NDC), the National Adaptation Plan (NAP), and the Bigi Pan MUMA Management Plan 2013-2023. The NDC establishes an unconditional contribution that by 2030 14% of its total land area will be categorized under a national protection system and to pursue the expansion of this system by increasing the percentage of forests and wetlands under protection to

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<sup>26</sup> For more synergies with IDB operations please see Annex 3.



at least 17% of the terrestrial area. The NAP, in its adaptation plan for the Sustainable Forest Management sector, establishes that mangrove planting, effective management, and rehabilitation should be pursued. The Plan also establishes that support for climate adaptation along the coastal region, including mangroves, should be provided. On the other hand, the Bigi Pan MUMA Management plan prescribes the restoration of mangrove areas. It promotes the management objectives for biodiversity, fisheries, research, ecotourism, public participation, and education and awareness. It is essential to highlight that these three instruments are also aligned to other relevant governance instruments such as the National Biodiversity Action Plan (Ministry of Labour, Technological Development and Environment, 2013), the National Forest Policy (2005), and the Suriname National REDD+ Strategy (2018).

Additionally the project aligns with other donor-funded programs within the area that focuses on increasing resilience within coastal communities. Specifically the project is expected to coordinate with the EU funded **“GCCA+ support for Climate Change Adaptation in Suriname – Phase 2: Resilience building through integrated water resource management, sustainable use and coastal ecosystems management (2020 -2023)”** program. The program is being implemented by UNDP and its objective is to support Suriname in adapting to the main effects of climate change by improving the management of water resources and coastal ecosystems to increase the well-being of coastal communities through gender-responsive capacity enhancement. One component of the program will focus on **“Increased resilience of coastal ecosystems and communities in the Nickerie and Coronie districts through gender responsive climate actions,”** which will directly complement the work of the restoration project. The second component of the EU-UNDP program focuses on improving governance at national level in the crucial sectors of water resource management and coastal zone management.

- 5.4. **Theory of Change:** Mangrove ecosystems in the Nickerie and Coronie Districts in the Northwest of Suriname have suffered from the pressure exerted by anthropogenic pressure, climate change (e.g., sea-level rise and microclimate variation), and other natural processes (e.g., mudbank dynamics), causing losses estimated in greater than 50% of their original total cover.<sup>27</sup> Despite local efforts (e.g., creation of the Bigi Pan MUMA, the creation of MASOFUR (Mangrove Forum Suriname), the enactment of the Environment Framework Act, among others), the trend in degradation has diminished the services these ecosystems provide (e.g., blue carbon sequestration and biodiversity conservation, climate change resilience, and livelihood creation) and has exacerbated the vulnerability to natural events of coastal settlements and economic activities (e.g., ecotourism, agriculture, etc.). In supporting the project with the technical and financial resources from IDB and the DEFRA Blue Carbon Fund, it is projected that a better understanding of the site's socio-ecological dynamics can be achieved, allowing the determination of the most appropriate corrective measures to address drivers of degradation and to promote the sustainable management of mangroves. Also,

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<sup>27</sup> Bouillon et al. (2008). Mangrove Production and Carbon sinks: A revision of global budget estimates. *Global Biogeochemical Cycles*. 22. 1-12.

by engaging key stakeholders (Government and non-governmental), concrete measures to improve mangroves' governance and promote sustainable livelihoods can be established. The main assumption of the project concept is that the implementation of science-based interventions and activities, combined with a solid and strategic institutional and community engagement, long-lasting and anchored mangrove sustainable management processes can be fostered, and the main socio-ecological drivers of degradation are addressed. As a result, ecosystem services (e.g., climate change resilience, carbon sequestration, etc.) can be assured and sustainable livelihoods promoted in the Bigi Pan MUMA.

## **6. IDENTIFICATION OF POTENTIAL RISKS**

- 6.1. The main risk anticipated for the project is that changes in ocean hydrodynamics will negatively impact the mangrove rehabilitation efforts. Stormy weather associated with high swells and strong waves may damage the permeable wooden fences. To mitigate this risk, regular monitoring and repair will be required. The local community will play an essential role in this effort, especially with the restoration of the wooden fences.
- 6.2. Another significant risk is associated with the sustainability of the proposed interventions and activities. Mangrove restoration/conservation and the promotion of sustainable livelihoods are directly dependent on partners' active involvement and the availability of financial and technical resources. The project seeks to ensure local partners' engagement and strengthen governance frameworks around protecting mangrove ecosystems to address this risk. As part of the activities in Component 4, potential financial mechanisms for mangrove conservation will be explored. Also, it is expected that the technical and managerial capacities of the EA will be further strengthened to ensure the long-term sustainability of the project.
- 6.3. There is a potential risk associated with the availability of sustainable bamboo and wood sources for STU construction. The construction of these structures is raw material demanding (400 pieces of bamboo and 1400 walaba wood poles per STU). Hence, this project aims at sourcing materials that are sustainably harvested and that otherwise would be discarded. Through the establishment of an incentive mechanism, it is expected that a sufficient supply of raw materials will be ensured. The use of alternative sustainably harvested materials will be considered if the bamboo and wallaba are scarce according to Wetland International guidelines.<sup>28</sup>
- 6.4. The coronavirus pandemic is currently restricting economic activity (e.g., labour), travel, and gatherings. This could delay the different phases of the project, mainly design, implementation. The government and stakeholder attention may also be elsewhere, making initial execution difficult or economic solutions more challenging. Virtual gatherings and establishing adequate communication and information channels with stakeholders will be set to address this risk. Sanitary protocols

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<sup>28</sup> Wetlands International. (2020). Permeable structures: Building with nature to restore eroding tropical muddy coasts. Technical Guidelines #13.

according to government guidelines and best practices will be defined for field workers and collaborators. It is expected that by the moment of implementation, the COVID-19 crisis will be overcome.

- 6.5. The project also faces the risk of institutional dispersion and lack of engagement. The environmental institutionality in Suriname is suffering changes since the enactment of the Environment Framework Act. To address this risk, the project will leverage the work of other IDB initiatives (see Annex 3) to improve institutional engagement. It is expected that the Blue Carbon Project will be included as part of the IDB efforts to mainstream climate change into decision-making in Suriname.

## 7. Environmental and Social Classification

- 7.1. The team will classify the Project under ESG once UK pre-screening is completed.

For an operation with reimbursable and non-reimbursable components, one TCD will be submitted, including the applicable elements above.

## 8. Timeline for Approval

- 8.1. An indicative timeline for the project's approval based on the norms and procedures of the Bank is given below. The initiation of the internal approval process is dependent on the clearance by DEFRA of the concept note.

Activities	Timeline (2021)											
1. Project Document Approval	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
i. Technical cooperation abstract approval												
ii. Technical cooperation document approval includes quality and risk review (QRR) stage												
2. Eligibility of Project for 1 <sup>st</sup> disbursement	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
i. Technical cooperation agreement signed												
ii. Conditions precedent for 1 <sup>st</sup> disburse attained												
iii. 1 <sup>st</sup> disbursement												

Sincerely,

Gerard Alleng, Climate Change Sr. Specialist, Sustainable Islands Platform Coordinator

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## Annex 1. Multiple Use Management Areas (MUMA) in Suriname

Suriname has four Multiple Use Management Areas (Table 1). The **Nature Protection Law of 1954** was the first legal instrument to include provisions for establishing these areas. The **Planning Law of 1973** later considered a special form of protection and management by the Government through the designation and creation of the Special Management Area (i.e., MUMAs). Recent Ministerial Orders such as the L-2 Decree establish the four Multiple Use Management Areas in Suriname's estuarine zone, namely MUMAS. These orders authorized the Minister responsible for land policy, today the Ministry of Land Policy and Forest Management to have the authority over these management areas by Ministerial Order.

According to the Mangrove Strategy Suriname, the area of the MUMAs consists of fresh and brackish water ecosystems, which have high productivity and serves as feeding and breeding grounds for large numbers of local and migratory bird species. It is also a nursery ground for fish and shrimp. MUMAs in Suriname are considered IUCN Category VI sites (e.g., Protected Area with sustainable use of natural resources). The MUMAs officially cover only free domain land, meaning that domain land issued before these Ministerial Orders came into effect is not a part of the MUMA.

Table 1. MUMAS in Suriname

MUMA	Area (hectares)
North Coronie	27,200
North Commewijne-Marowijne	61,500
Bigi Pan	<b>67,900</b>
North Saramacca	88,400

Source: The Suriname Conservation Foundation, 2007.

## Annex 2. Measures for mangrove Restoration.

The selection of measures to restore mangrove ecosystems in the Bigi Pan MUMA will depend directly on the site assessment (Component 1) and the elaboration of the Mangrove Restoration Management Plan. Based on the available literature, in Suriname and the Guianas region, three measures are envisioned as potential:

1. **Sediment Trapping Units (STUs):** This option mimics mangroves' structural properties' intricate root system to attenuate wave action and create conditions conducive to mangrove colonization.<sup>29</sup> The STUs are built out of plant material (e.g., bamboo, wallaba wood) and create sheltered zones with reduced flow velocities and wave impact that facilitates the accretion of suspended sediments.<sup>30,31</sup> The STUs provide suitable conditions for mangrove restoration in degraded areas by (i) providing a stable area for the establishment and growth of mangrove juveniles; (ii) supporting a steeper seabed gradient in front of the mangroves; (iii) providing the coastal mangroves for a greater tolerance to bed deepening on the seaward side.<sup>32</sup>

*Image 1. Mangrove restoration at Weg naar Zee, Suriname.  
Credit. Naipal, Sieuwnath.*



<sup>29</sup> Winterwerp et al. (2020). Managing erosion of mangrove-mud coasts with permeable dams – lessons learned. *Ecological Engineering*. 158.

<sup>30</sup> Winterwerp, et al. (2013). Defining Eco-Morphodynamic Requirements for Rehabilitating Eroding Mangrove-Mud Coasts. *Wetlands*.

<sup>31</sup> Wetlands International. (2020). Permeable structures: Building with nature to restore eroding tropical muddy coasts. *Technical Guidelines #13*.

<sup>32</sup> WB. (2017). Coastal Resilience Assessment Paramaribo, Suriname. The World Bank Group.



The technique has gained relevance over the last years due to its ability to address coastal erosion issues affecting mangrove ecosystems. Projects in Indonesia, Thailand, Guyana, and Suriname have shown encouraging results in their capacity to foster mangrove re-colonization and stabilization of coastlines that are experiencing high rates of erosion (Image 1).<sup>33, 34</sup> The use of technologies such as STUs, represents a suitable alternative to restore mangroves in contrast to the use of structures such as concrete dikes, tires, or sandbags, which may lead to structural failure and have high costs.

2. **Natural Regeneration:** Mangrove forests have an efficient ecological mechanism for natural regeneration, especially in areas within mangrove stands where considerable site degradation has not taken place. Natural regeneration is achieved when mangrove forests can grow naturally. This regeneration process is preceded by the reduction of stressors that originated the degradation in the first place. Natural regeneration allows for avoiding mono-species planting, leading to non-functional mangroves with limited benefits and low resilience. In this regard, planting seedlings in the wrong places, such as in areas not previously covered by mangroves, can damage other ecosystems or block sediment and water flows.<sup>35</sup>

*Image 2. Natural mangrove regeneration in Suriname.  
Credit. Wetlands International, 2020.*



<sup>33</sup> Winterwerp, et al. (2016). Building with nature: sustainable protection of mangrove coasts. 5th International Seminar. Bali.

<sup>34</sup> Tonneijck F (2013) Building with Nature Indonesia. Opportunities for CC adaptation and Mitigation. Wetlands International/ Mangrove Capital. UNFCCC Bonn 2013.

<sup>35</sup> WI. Experts draw attention to a successful method of mangrove regeneration on International Mangrove Day. Wetlands International.



3. **Mangrove Planting (Mangrove Nurseries):** Mangrove planting and establishing the seedlings' nurseries are a common and popular measure developed worldwide. Nevertheless, attention has been raised because most planting efforts fail to restore functional mangrove forests. Like natural mangrove regeneration, good ecological conditions need to be in place for seedlings to grow and become functional.<sup>36</sup>

*Image 3. Mangrove planting in Suriname.  
Credit. Wetlands International, 2020.*



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<sup>36</sup> WI. Mangrove restoration: to plant or not to plant? Wetlands International.

### Annex 3. Synergies band alignment of proposed restoration project and IDB operations

The proposed project is expected to leverage the connections, knowledge, and technical resources from other IDB operations (Table 2).

**Table 2. Synergies between the proposed projects and IDB operations**

Project details	Objective	Synergies with Blue Carbon project
<b>Precision Farming (SU-T1111).</b> The project is executed by Green Wings, <sup>37</sup> a non-profit organization based in Suriname.	The project objective is to contribute to the environmentally sustainable rice production by small rice farmers in Suriname, including the districts within the Bigi Pan Muma, namely, Coronie and Nickerie.	The executing agency is currently deploying pilot projects in Nickerie to incorporate low-chemical rice production and other non-contaminant practices (e.g., drone utilization, reduction of chemical drift, and exposure). It is expected that the proposed project will help scale-up the activities of the project in other parts of Nickerie and/or the Bigi Pan, such as Coronie. The proposed project is also expected to enhance the executing agency's impact and visibility to reach replicability and sustainability after both initiatives end their cycle.
<b>Business Climate and Innovation Program, I (SU-L1049).</b> The IDB executes the project with the collaboration of the Office of the Vice President of Suriname.	The project objective to promote the value-added of private sector activity by enhancing business climate and innovation	By creating a business and innovation climate in Suriname, this project will enable potential sustainable activities in the Bigi Pan to find a better business and development environment. Even though the loan is in its last stages of implementation, it is expected that the current project will leverage all the experiences and contacts accumulated in the previous six years.
<b>Community Conservation of Mangroves (SU-T1135).</b> The project is implemented by the Green Heritage Fund Suriname and the IDB Lab. <sup>38</sup>	The project objective is to engage, train and empower rural communities in the conservation and sustainable management of mangrove ecosystems in Suriname.	The current Blue Carbon project has excellent synergies with this initiative. Through Community Based Mangrove Management (CBMM) promotion, the project seeks to engage local communities to identify sustainable livelihoods. The CBMM model aims to ensure the generation of sustainable livelihoods for the coastal communities via their engagement and active support in the sustainable management of mangrove forest

<sup>37</sup> <https://greenwingss.com/index.php/en/>

<sup>38</sup> <https://greenfundsuriname.org/>

		resources. Both projects are expected to work articulately with local communities in promoting sustainable livelihoods.
<b>Mainstreaming Climate Change into decision-making (SU-1117) The project is implemented by the IDB.</b>	<p>The operation's objective is to support the mainstreaming of climate change in the National Development Plan of Suriname to enable evidence-based decision-making that is inclusive and transparent and considers the impacts of climate variability in multiple sectors.</p>	<p>By mainstreaming climate change mitigation and adaptation into decision-making in Suriname, this initiative will allow to better position the Blue Carbon project into the Government's agenda. All the efforts towards supporting the institutional strengthening could complement the Blue Carbon project's activities to improve governance arrangements for mangroves' sustainable use.</p> <p>The Blue Carbon project will also leverage the inputs from one assessment generated as part of this operation, the State of the Environment Report (SoE). The SoE presents an evaluation of climate scenarios and sectoral risk assessment. One of the analyzed sites is the Bigi Pan; hence specific risks and future climate considerations can be drawn from the SoE.</p> <p>As part of this project, the IDB also supports elaborating the new Climate Change Policy and Action Plan. It is expected that the experiences from the Blue Carbon project could positively influence the adaptation considerations of this policy.</p>

