AFB/PPRC.27/24
8 March, 2021

Adaptation Fund Board
Project and Programme Review Committee
Twenty-Seventh Meeting
Bonn, Germany (Virtually held) 22-23 March 2021

Agenda Item 8 b)

PROPOSAL FOR INNOVATION SMALL GRANT FOR DOMINICAN REPUBLIC

Background

1. At its thirtieth meeting, having considered document AFB/B.30/5/Rev.1, the Adaptation Fund Board decided:

> *(a) To adopt the medium-term strategy as amended by the Board, as contained in the Annex 1 of the document AFB/B.30/5/Rev.1 (the MTS); and*
>
> *(b) To request the secretariat:*
>
> *(i) To broadly disseminate the MTS and work with key stakeholders to build understanding and support;*
>
> *(ii) To prepare, under the supervision of the MTS task force, a draft implementation plan for operationalizing the MTS, containing a draft budget and addressing key assumptions and risks, including but not limited to funding and political risks, for consideration by the Board at its thirty-first meeting; and*
>
> *(iii) To draft, as part of the implementation plan, the updates/modifications to the operational policies and guidelines of the Adaptation Fund needed to facilitate implementation of the MTS, for consideration by the Board at its thirty-first meeting.*
>
> *(Decision B.30/42)*

2. Pursuant to decision B.30/42, subparagraph b (ii), the secretariat prepared a draft implementation plan for the MTS, including an assessment of assumptions and risks. The secretariat shared a version of the draft with the MTS task force for comments.

3. The draft implementation plan also contains suggestions for specific funding windows that might be opened under the MTS in complement of the Fund's existing funding windows for single-country and regional adaptation projects and readiness support projects. Following the approval of the implementation plan, the secretariat would present specific proposed details for each new funding window at subsequent meetings of the Board for its consideration, in accordance with the timeline contained in the implementation plan.

4. At its thirty-first meeting, the Adaptation Fund Board discussed the draft implementation plan for the MTS, and members of the Board proposed amendments to the document. The secretariat then presented a revised draft, in document AFB/B.31/5/Rev.1. Having considered that document, the Board decided:

> *(a) To approve the implementation plan for the medium-term strategy for the Fund for 2018–2022 contained in the Annex I to document AFB/B.31/5/Rev.1 (the plan);*
>
> *(b) To request the secretariat:*
>
> *[…]*
>
> *(iii) To prepare, for each proposed new type of grant and funding window, a specific document containing objectives, review criteria, expected grant*

sizes, implementation modalities, review process and other relevant features and submit it to the Board for its consideration in accordance with the tentative timeline contained in Annex I to document AFB/B.31/5/Rev.1, with input from the Board's committees;

(iv) Following consideration of the new types of support mentioned in subparagraph (b)(iii), to propose, as necessary, amendments to the Fund's operational policies and guidelines Fund to better facilitate the implementation of such new types of support; and

[…]

(Decision B.31/32)

5. At its thirty-second meeting, the Board considered document AFB/PPRC.23/4/Rev.2, *Program on Innovation: Small Grants Projects through Direct Access Modality,* and the Board decided:

(a) To approve the process for providing funding for innovation through small grants to National Implementing Entities (NIEs), as described in document AFB/PPRC.23/4/Rev.2, including the proposed objectives, review criteria, expected grant sizes, implementation modalities, review process and other relevant features as described in the document; and

(b) To request the secretariat to prepare the first request for proposals to NIEs for US$ 2 million, to be launched at the twenty-fourth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in December 2018.

(Decision B.32/4)

6. Subsequently, the first request for proposals to NIEs for US$ 2 million was launched at the UNFCCC Conference of the Parties in December 2018.

7. The secretariat is submitting to the PPRC the summary and, pursuant to decision B.17/15, the final technical review of the project, both prepared by the secretariat, along with the final submission of the proposal in the following section. In accordance with decision B.25.15, the proposal is submitted with changes between the initial submission and the revised version highlighted or with track changes.

ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT/PROGRAMME CATEGORY: Innovation Small Grant

Country/Region: **Dominican Republic**
Project Title: **Strengthening of a Replicable Micro Ecosystem for Accelerated Development of Technologies for Climate Change Adaptation of the Dominican Republic - Phase I - Disruptive Modular Dynamic Floating Breakwater Technology**
Thematic Focal Area:
Implementing Entity: **Instituto Dominicano de Desarrollo Integral (IDDI)**
AF Project ID: **AFRDG00048**
IE Project ID:
Requested Financing from Adaptation Fund (US Dollars): **248,734**
Reviewer and contact person: **Alyssa Gomes**
Co-reviewer(s): **Saliha Dobardzic, Eleanor Saunders, Claudia Lasprilla,**
IE Contact Person:

Technical Summary	The project aims to develop and test, in a small pilot community, a modular dynamic floating breakwater technology that will attenuate wave energy before reaching sandy beaches and therefore lowering the erosion potential of extreme climate events (storms, high seas and/or hurricanes). To promote is scale-up and usage, it will carry trainings among Caribbean Islands. The project aims to achieve its objectives through 4 main components: Component 1: Development of the technology including the prototype for testing at a wave tank facility (USD 0) Component 2: Selection of the beach community in Dominican Republic where the pilot testing of the technology will take place (USD 76,360) Component 3: Pilot test of prioritized adaptation technology in the selected community in Dominican Republic (USD 144,400) Component 4: Knowledge management to capture and disseminate lessons learned (USD 5,100) Requested financing overview: Project/Programme Execution Cost: USD 3,388 Total Project/Programme Cost: USD 229,248 Implementing Fee: USD 19,486 Financing Requested: USD 248,734

	The proposal outlines an entrepreneurial innovation that involves developing a new technology and business generation and the proposed iterative approach of rapid development coupled with testing both in lab and in situ and enabling redesign along the way is an innovative form of Research and Development. However, the initial technical review raised several issues such as the need for a number of clarifications related to development of the technology, phases of innovation, involvement of the local community and the environmental and social benefits as it is discussed in the number of Clarification Requests (CRs) and Corrective Action Request (CAR) raised in the review. The final technical review finds that the revised proposal has raised new questions on the full cost of adaptation reasoning. Furthermore, the target community and project site are yet undefined making it challenging to assess the characteristic of the target community (including gender disaggregated data) and gender differentiated impacts in the target sites. Details of the community management approach are also not explained. A number of clarifications have been addressed in the response sheet but are not sufficiently reflected in the proposal main text.
Date:	27 February 2021

Review Criteria	Questions	Comments	Comments
Country Eligibility	1. Is the country party to the Kyoto Protocol?	**Yes.**	-
Project Eligibility	1. Has the designated government authority for the Adaptation Fund endorsed the project/programme?	**Yes.** As per the endorsement letter dated February 4, 2021.	-
	2. Does the project / programme support concrete adaptation actions to assist the country in addressing adaptive capacity to the adverse effects of climate change and build in climate resilience?[1]	**Not clear.** The climate change adaptation reasoning and vulnerabilities is evident in the proposal. However, the proposal is about developing a proof of concept and subsequently testing it (i.e. Research and Development stage,	**CR1: Not addressed**. The proponent has modified the proposal to only consider the acceleration of the resulting proof of concept (components 2,3,4). In the revised proposal, the private company of the proposed micro ecosystem will

[1] *A concrete adaptation project/programme is defined as a set of activities aimed at addressing the adverse impacts of and risks posed by climate change. The activities shall aim at producing visible and tangible results on the ground by reducing vulnerability and increasing the adaptive capacity of human and natural systems to respond to the impacts of climate change, including climate variability. Adaptation*

		which is the earliest stage of innovation). This does not ensure that an effective will be developed, and therefore there is no assurance that the project will result in concrete adaptation actions. **CR1:** The proposal needs to explain why it is necessary to develop a proof of concept, as opposed to enable and accelerate an existing proof of concept. **CR2:** The proposal needs to provide a stronger justification as to why floating breakwaters was pre-selected as the desired solution, from the point of view of environmental, social and economic implications. In heavy storms, modular floating breakwaters might be subject to failure. Furthermore, if they come detached from their moorings, they could become a danger. It is not clear why the modular floating breakwaters are considered appropriate for the potential target sites, considering specific environmental circumstances (wave energy, height, etc.). **CR3:** The proposal needs to justify the effectiveness of the chosen technology to mitigate the impacts of	develop and finance the Component 1. However, this revision of the budget, raises a few questions - To what extent will activities financed by the AF be dependent on the outcomes of activities to be financed by the private sector? What would be the risks and implications for components 2,3 and 4 if component 1 is not successful in leveraging co-financing from the private sector for developing the proof of concept? As per the AF policy on the full-cost of adaptation reasoning, if there is co-financing, this should be untied from the delivery of the project/program outcomes and outputs - “For proposals with co-financed adaptation activities, the Adaptation Fund component should be able to deliver on its related outcomes and outputs regardless of the success of the co-financed component”. This assures that the AF can deliver on its outcomes and outputs and, at the same time co-financing that supports core project activities does not prevent work from moving forward on this account. **CR2: Partially Addressed,** as the information provided on pages 2 and 6. The proponent has justified the

projects/programmes can be implemented at the community, national, regional and transboundary level. Projects/programmes concern activities with a specific objective(s) and concrete outcome(s) and output(s) that are measurable, monitorable, and verifiable. (Source: Operational Policies and Guidelines, amended October 2017

		the anticipated wave height and energy in a variety of weather conditions in possible target areas. Please also clarify which target areas are considered, and what is known about wave characteristics.	selection of the chosen technology in comparison with two alternative solutions - fixed breakwater and beach nourishment solutions. However important elements in the response sheet related to operation of the floating breakwater (that it is raised from the sea floor just before extreme weather event and then lowered again to the sea floor when the event passes, therefore not affecting sediment movement for long periods) are not included in the proposal main text. The proposal would benefit from this addition as it would further justify the environmental benefits of the chosen approach. The IE has clarified that fix breakwaters are not environmentally friendly in the mid to long term, because they change permanently the sediment movement, and are expensive both to construct and to decommission. Related to the beach nourishment approach, the IE has clarified that is not feasible specifically in a small island context because the lack of access to sand nearby, and the steep bathymetry. From a social standpoint, the IE has clarified that relocation has the potential to introduce undesired social impacts, where local communities can be dislocated from their livelihoods (e.g. fishing). Development pressures and political interests may also result in problems in enforcing setback

			regulations. **CR3: Partially addressed.** The wave energy conditions are not known at this time, as the target location has not been pre-selected. Only once the wave energy conditions of the beach to protect are known, the geotextile curtains are chosen to dissipate energy in a manner to guarantee that the anchoring system does not fail. Please include the justification provided in the response sheet in the proposal main text. "…is designed to handle strong wave forces because the different wave energy dissipating elements (the geotextile curtains) are designed to pose resistance to the incoming wave gradually (that is, each dissipating energy curtain is designed to dissipate a small percentage of the wave energy)", including that the wave conditions will be evaluated during the preliminary environmental assessment of the selected beach of the selected coastal community.
		CR4: Please clarify the "type" of floating breakwater that will be considered (e.g. Reflective or Dissipative structures – box, pontoon, mat, tethered?). If so, please also provide the justifications. **CR5**: Please clarify whether materials that will be used for the prototype have been considered.	**CR4: Not clear.** The IE has clarified that the type of modular floating breakwater is of "dissipative structure" type, anchored to the sea floor in a single mooring. The justifications are briefly explained in all the proponent's answers in the response sheet. However, the proponents need to also include relevant information from the response sheet in the proposal main text.

		CR6: Please clarify what is the maintenance cost of the technology and how will it be financed (medium and long term).	**CR5: Not clear.** The materials of the floating breakwater concept proposed will be aluminum pipes as floating and structuring elements and geotextiles as energy dissipating curtains. Please clarify maintenance costs of the aluminum pipes. **CR6: Not clear.** The proponent has clarified that the maintenance cost of the breakwaters will be financed by local or state governments in the medium and long term. Furthermore, the proponent anticipates that it is expected that maintenance cost will be mainly replacement or reparation of the geotextile material. However, the proposal needs to further clarify how the local and state government's participation for the anticipated maintenance costs will be ensured. Please also include all relevant information in the proposal main text. Well noted that in maintenance activities, women and girls will be considered for training in repairing geotextile components of the floating breakwater (as per p.9).
		CR7: Please clarify who will own the patent after the prototype is developed? Who will benefit from the royalties and exports? Floating breakwaters have the advantage of being detachable when	**CR7: Not clear.** Please include in the proposal main text, additional details from the explanation in response sheet for CR7. The proponent has explained that the Dominican Republic private company

		not in use, but the labor costs to replace the breakwater can be high. **CR8:** Provide details on who will provide the labor for installation and removal (e.g. Local government staff? Communities?) and how will be they be compensated for their labor? Please clarify where the prototype would be stored, who will cover the storage costs of the product when it is not in use and how much is the estimated costs for storage.	will own up to 49% of the American small business startup whose main purpose will be to raise private angel and venture capital in the United States. The rationale for the chosen financial architecture assumes that earlier stages of technology development until the beginning of scalation of the technology would generally require between US$ 1,000,000 to 2,000,000 and the scalation will need to be carried out by the private sector. It is expected that The US company in Florida will request funds in the future from both federal and venture capital in the US. The intellectual property will be owned by the mix enterprise in the US, where the Dominican Republic company has equity. This way the Dominican Republic enterprise can benefit from any sales in the world through royalties (Revised activity 2.4 on p.5 and 7). **CR8: Not clear.** The proponent has clarified that storage cost is not required as the modality of operation is to lower the floating breakwater (sink) when not in use during normal sea conditions.
	3. Does the project encourage or accelerate development of innovative adaptation practices, tools and technologies?	**Yes, but needs further development.** The proposal outlines an entrepreneurial innovation that involves patent generation and business generation. It has private sector integration that can support the	**CR9: Partially Addressed.** Please include in the proposal main text, additional details from the explanation in response sheet for CR9. The proponent has clarified that the proposed technology is being developed both locally and in the

		disbursement of risk and allow future scaling through innovative funding mechanisms such as patent revenue generation, licencing income, and private sector commitment to public adaptation actions. (p.11) This approach of rapid development coupled with testing both in lab and in situ and enabling redesign along the way is an innovative form of Research and Development. The proposal would benefit from addressing the below clarifications. **CR9:** Have the identified inventions been developed locally, or are they identified from elsewhere? The above clarification will have an impact on how much adaption the inventions may need to the local environment, and thus how much time needs to be dedicated here in the innovation process. **CR10:** Has the performance of the international micro-ecosystem for innovation been tracked or reviewed in any form? Feedback on the performance of the international micro-ecosystem for innovation from the approved desalination technology project (approved project) could be implemented into this (and / or other future) projects to ensure that the ecosystem remains innovative and	United States. The Replicable Micro Ecosystem for Accelerated Development of Technologies for Climate Change Adaptation of the Dominican Republic being strengthened in this proposal specializes in ideation, conceptualizing and developing technologies for Small Island Developing States with a lot of inputs of local human resources. All technologies to be developed by the micro ecosystem are modular, distributed and designed to be managed and operated by the target community. **CR10: Not addressed.** There is no evidence at this point, due to delays in implementation imposed by the pandemic. The project in Dominican Republic has only recently (in February 2021) begun implementation. The explanation in the response sheet further clarifies that the micro ecosystem has already been able to raise financial resources to start developing a technology and has identified a set of five additional technologies to be developed. By the end of the year 2021 the project is expected to have some measurable indicators of efficiency. **CR11: Not clear.** Please include in the proposal main text, additional details on the justification for Florida based “small

		integrates lessons learned. **CR11**: Please provide more information on the "small technology development company" in Florida, United States. Please provide reasons why this company was selected, how it is funded, why the Dominican company will own 49% of it. **CR12:** The proposed innovation "modular floating breakwaters" in not a novel technology, however given that innovation is context specific, please clarify why it is considered a breakthrough technology in the context of the legal and economic context of the Dominican Republic? **CR13:** The proposal needs to further explain how community buy-in and assimilation of the technology (assuming they will be the ones in charge of its usage) will be ensured.	technology development company", from the explanation in response sheet for CR11. **CR12: Not clear.** Please include in the proposal main text, additional details from the explanation in response sheet for CR12. The proponent has further clarified the contextual justification for the proposed intervention from a few important standpoints, namely : (i) The intervention was conceptualized with the thinking that it is going to be managed and operated by marginalized coastal communities, not common in industrialized countries; (ii) The proposed technology is more attractive because it is cheaper, and much easier to install than alternatives; and (iii) Small island countries tend to have coast with steep bathymetry, making the constructions of fixed structures very expensive, and the movement of large construction equipment difficult. **CR13: Partially addressed.** The project envisages buy-in from local communities but training them to operate breakwaters in such a manner that local, state or federal governments can hire these trained locals to do operating activities related to the breakwaters. During rough weather and emergency events, trained local

			personnel can be activated by local and state governments to raise and later, lower the breakwater. While the proposed approach for ensuring local buy-in is well noted, please include considerations (management measures) in case there are challenges to ensuring local buy-in for technology uptake. The above explanation in the response sheet for CR13 and proposed management measures could be included in Section III. B of the proposal template 'Describe the measures for financial and project / programme risk management'.
	4. Does the project help generate evidence base of effective, efficient adaptation practices, products or technologies, as a basis for potential scaling up?	**Not clear.** This would depend on the success of components 1, 2 and 3. If they are successful component 4 on KM will have high potential to capture and disseminate lessons learned to other Caribbean NIEs with similar challenges. However, component 1 is development of proof of concept which, based on the information provided in the proposal, is not assured to be successful. If it is successful, the set-up of the innovation micro-ecosystem gives high potential for scaling up and it should be acknowledged that this project can lead to scaling of the breakwater device[s] and furthermore help reveal during the process other SIDS relevant innovation areas.	**CR14: Partially Addressed** A few details from the explanation in the response sheet for CR14 have been provided on p.12. However, the proposal would benefit from including relevant information in *Section II. C 'Describe how the project encourages or accelerates development of innovative adaptation practices, tools or technologies and/or describe how the project helps generate evidence base of effective, efficient adaptation practices, products or technologies, as a basis for potential scaling up'.* The proposal anticipates that once the proof of concept is successful, the US small business company, where the Dominican Republic start-up will have up to 49%, will submit a Small Business Innovation and Research

		CR14: In the context of scaling up the project, please provide a brief description of phase II of the project. **CR15:** Please clarify the role of the private sector in the scale up plan.	grant proposal to the National Science Foundation (SBIR-NSF Phase I) proposal for US$ 250,000 that must be executed within 8 months. Then, if successfully executed, the US company is eligible to submit a SBIR-Phase II proposal for US$ 1,000,000. Parallel to this, the US company will develop Project Pitch to raise US$ 500,000 to a US$ 1,000,000 from US angel and venture capitalist. Furthermore, new proposals will be submitted to green fund such as clean tech funds, Global Environment Facility, and or AF for scaling within Dominican Republic and other islands in the Caribbean. Scaling up proposals will also be submitted to bilateral entities such as USAID, especially its Development Innovation Ventures (DIV) program **CR15: Addressed in the response to CR 11 and 14.**
	5. Does the project engage, empower and/or benefit the most vulnerable communities and social groups?	**Not clear.** Although the project says it will focus on marginalized and vulnerable groups (poorest rural communities), they have not yet selected the marginalized community where the prototype will be piloted. This is would be undertaken under component 2 of the project. **CR16:** Kindly provide more information on how the low-income coastal community will be selected (i.e. the selection criteria), and how the identified vulnerable groups will benefit	**CR16: Not addressed.** The proposal is considering one among several coastal communities both in the North East and the South West coasts of Dominican Republic that are being exposed to wave energy erosion during high seas and extreme weather events. However, a target community has not been identified. **CR17: Not clear.** The selected pilot area community would be involved in the deployment and testing of the prototype at the pilot site, as well as in the selection of the

		from the project? **CR17:** Please clarify if the selected pilot area community would be involved in the design, development, testing, and delivery of the project at the pilot site. The project proposes the development of community management approaches and the management of innovative pilot projects related to coastal protection. **CR18:** Provide details of the community management approaches that will be developed under the project. **CR19:** Please clarify how will local communities be incentivised to fully adopt the practice, including the installation and removal of the prototype, if needed.	specific location to place the prototype. However, they will not be involved in the design stage. **CR18: Not clear.** The proposal aims to use its experience and contacts in coastal communities to be able to have a management approach suitable to the selected community, involving community leaders and cooperatives. However, details of the community management approach are not explained to the extent an assessment is possible. **CR19: Not clear.** It is mentioned that the community will oversee management, operation and maintenance of not only the prototype but also of the future technologies that will be in place if the project is successful, especially fishing communities. However please refer to CR 13 above, whether additional clarifications are requested.
	6. Does the project advance gender equality and the empowerment of women and girls?	**Unclear.** The project has not identified the target community where the prototype will be piloted. The proposal does not discuss any gender dimensions relevant to the project. **CR20:** Please consider gender dimensions of the project and any ways in which the project can help advance gender equality.	**CR20: Not clear.** The proposal aims to ensure that the non-profit to be identified to transfer royalties, has women and girls as beneficiaries. Additionally, in maintenance activities, women and girls will be considered for training in repairing geotextile components of the floating breakwater. However, gender responsive considerations have not been systematically addressed in the

			proposal. For example, the proposal does not address how the modular floating breakwater will mitigate differentiated impacts on women and girls. The assessment is further impeded by the fact that the target community is yet unknown and therefore gender disaggregated data is also not known.
Resource Availability	1. Is the requested project funding within the parameters for small grants set by the Board?	**Yes.** (249,786 USD) **CAR1:** Kindly verify the sum of the 'Project components & financing' and section F of Part II as it amounts to USD 249,785. Please ensure the sum is correct throughout the document.	**CAR1: Addressed.**
	2. Is the Implementing Entity Management Fee at or below 8.5 per cent of the total project budget before the fee?	**Yes.** (19,582 USD equivalent to 8.5% of the total project budget) **CAR2:** Kindly rectify the disbursement schedule for the Implementing Entity Management Fee value (USD 22,971) as it combines the Executing Costs within the Implementing Entities fees.	**CAR2: Addressed.**
Implementation Arrangements	1. Is the project submitted through a National Implementing Entity accredited by the Board?	**Yes**, however accreditation expires on March 17th, 2021.	**-**
	2. Is the timeframe for the proposed activities adequate?	**Unclear.** **CR21:** Kindly clarify the feasibility of project activities in this rather short project period, given that the project includes the design, and building of a prototype, selecting the target community, environmental	**CR21: Addressed.** The project has included two additional months to implement Components 2 and 3, this to allow for better community consultation, environmental evaluation and definition of royalty transfer to the coastal community selected.

		assessments, testing of the prototype in a coastal community, and dissemination of lessons learned.	
	3. Is a summary breakdown of the budget for the proposed activities included?	**Yes.** **CR22:** Please clarify if the amount for developing the engineering blueprint/ proof of concept is sufficient and clarify if other funding will be provided from other sources.	**CR22: Not addressed.** The proposal aims to finance the entire component 1 through the micro ecosystem private sector partners and not with AF funds. This however raises the question on the full cost of adaptation reasoning. Please refer to CR 1

ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT/PROGRAMME CATEGORY: Innovation Small Grant

Country/Region: **Dominican Republic**
Project Title: **Strengthening of a Replicable Micro Ecosystem for Accelerated Development of Technologies for Climate Change Adaptation of the Dominican Republic - Phase I - Disruptive Modular Dynamic Floating Breakwater Technology**
Thematic Focal Area:
Implementing Entity: **Instituto Dominicano de Desarrollo Integral (IDDI)**
AF Project ID: **AFRDG00048**
IE Project ID:
Requested Financing from Adaptation Fund (US Dollars): **249,786**
Reviewer and contact person: **Alyssa Gomes**
Co-reviewer(s): **Saliha Dobardzic, Eleanor Saunders, Claudia Lasprilla, Imen Meliane**
IE Contact Person:

Technical Summary	The project aims to develop and test, in a small pilot community, a modular dynamic floating breakwater technology that will attenuate wave energy before reaching sandy beaches and therefore lowering the erosion potential of extreme climate events (storms, high seas and/or hurricanes). To promote is scale-up and usage, it will carry trainings among Caribbean Islands. The project aims to achieve its objectives through 4 main components: Component 1: Development of the technology including the prototype for testing at a wave tank facility (USD 70,350) Component 2: Selection of the beach community in Dominican Republic where the pilot testing of the technology will take place (USD 44,165) Component 3: Pilot test of prioritized adaptation technology in the selected community in Dominican Republic (USD 107,200) Component 4: Knowledge management to capture and disseminate lessons learned (USD 5,100) Requested financing overview: Project/Programme Execution Cost: USD 3,402

	Total Project/Programme Cost: USD 230,217 Implementing Fee: USD 19,658 Financing Requested: USD 249,786 The proposal outlines an entrepreneurial innovation that involves developing a new technology and business generation and the proposed iterative approach of rapid development coupled with testing both in lab and in situ and enabling redesign along the way is an innovative form of Research and Development. However, the initial technical review raises several issues such as the need for a number of clarifications related to development of the technology, phases of innovation, involvement of the local community and the environmental and social benefits as is discussed in the number of Clarification Requests (CRs) and Corrective Action Request (CAR) raised in the review.
Date:	02/04/2021

Review Criteria	Questions	Comments
Country Eligibility	1. Is the country party to the Kyoto Protocol?	**Yes.**
Project Eligibility	1. Has the designated government authority for the Adaptation Fund endorsed the project/programme?	**Yes.** As per the endorsement letter dated February 4, 2021.
	2. Does the project / programme support concrete adaptation actions to assist the country in addressing adaptive capacity to the adverse effects of climate change and build in climate resilience?[1]	**Not clear.** The climate change adaptation reasoning and vulnerabilities is evident in the proposal. However, the proposal is about developing a proof of concept and subsequently testing it (i.e. Research and Development stage, which is the earliest stage of innovation). This does not ensure that an effective will be developed, and therefore there is no assurance that the project will result in concrete adaptation actions.

[1] A concrete adaptation project/programme is defined as a set of activities aimed at addressing the adverse impacts of and risks posed by climate change. The activities shall aim at producing visible and tangible results on the ground by reducing vulnerability and increasing the adaptive capacity of human and natural systems to respond to the impacts of climate change, including climate variability. Adaptation projects/programmes can be implemented at the community, national, regional and transboundary level. Projects/programmes concern activities with a specific objective(s) and concrete outcome(s) and output(s) that are measurable, monitorable, and verifiable. (Source: Operational Policies and Guidelines, amended October 2017

		PROJECT PROPONENTS ANSWER: For more clarity as to why a floating breakwater was pre-selected as the desired solution, we will briefly describe the technology proposed and then clarify the different concerns mentioned below and in other parts in this document: The propriety technology (provisional patents in submission) is a floating breakwater anchored to the sea floor in a single point to allow rotation due to the direction of the incoming waves. Most of the times the wave direction in similar due to the proximity of the coast (100 to 200 meters) and the low depth in these locations (10 to 30 meters) where the breakwater would be put in place. The floating breakwater proposed is not a solid floating structure like the “box” type or “pontoon” type. It is a series of parallel floating pipes (usually around 30 centimeter of diameter and up to 12 meters in length) from which geotextiles hang like curtains (usually 12 meters length x 10 meters depth). These floating pipes are separated a few meters (usually 3 to 5 meters) and attached to each other with ropes, chains or equivalent minimum at each end. These geotextiles structures are permeable in a manner that each will reduce the wave energy a percentage. For example, if each curtain lowers (dissipates) the wave energy 10%, ten parallel floating modules will lower the energy close to 100%. Of course, each geotextile curtain will have lower permeability as the wave progresses through them when advancing to the coast. These “curtains” will have a weight bar at the bottom of them in order to maintain stretched and also are attached to each other with ropes, chains or equivalent minimum at each end. The philosophy of operation is that the breakwater is maintained submerged resting at the sea floor (by filling the floating pipes with water), and raised (by filling the floating pipes with air) when a storm or high seas are predicted.

		CR1: The proposal needs to explain why it is necessary to develop a proof of concept, as opposed to enable and accelerate an existing proof of concept. **PROJECT PROPONENTS ANSWER**: The proponents have the wrong idea that the innovation grant program of the Adaptation Fund could also finance proof of concepts, especially if part of the conceptualization of this disruptive technology was to be carried out in a beneficiary country like Dominican Republic. The private company of the proposed micro ecosystem will develop and finance the Component 1 of the reviewed proposal. The proponents will modify the proposal to only consider the acceleration of the resulting proof of concept. **CR2:** The proposal needs to provide a stronger justification as to why floating breakwaters was pre-selected as the desired solution, from the point of view of environmental, social and economic implications. **PROJECT PROPONENTS ANSWER**: The floating breakwater concept which operating philosophy is described briefly before **CR1,** was pre-selected precisely because it has much less environmental impacts that regular fixed breakwaters. Since the proposed floating breakwater concept only enters in operation during high seas and storms (that is, it is raised from the sea floor just before extreme weather event and then lowered again to the sea floor when the event passes), it is not floating during normal sea condition therefore not affecting sediment movement for long periods of time as fixed structures do. Also, since the proposed breakwater can be place in depth 10 to 30 meters, there is little visual impacts and capital expenditures are much lower than fixed structures at a similar depth.

		In heavy storms, modular floating breakwaters might be subject to failure. Furthermore, if they come detached from their moorings, they could become a danger. It is not clear why the modular floating breakwaters are considered appropriate for the potential target sites, considering specific environmental circumstances (wave energy, height, etc.). **PROJECT PROPONENTS ANSWER**: The floating breakwater concept which operating philosophy is described briefly before **CR1,** is designed to handle strong wave forces because the different wave energy dissipating elements (the geotextile curtains) are designed to pose resistance to the incoming wave gradually (that is, each dissipating energy curtain is designed to dissipate a small percentage of the wave energy). Once the wave energy conditions of the beach to protect are known, the geotextile curtains are chosen to dissipate energy in a manner to guarantee that the anchoring system does not fail. The conditions will be evaluated during the preliminary environmental assessment of the selected beach of the selected coastal community. Additionally, the proposed breakwater is made mostly of light materials (geotextiles) that do not have the inertia of large and heavy structures of other type of floating breakwaters (such as boxes and pontoons), therefore becoming less dangerous in the case of detachment. **CR3:** The proposal needs to justify the effectiveness of the chosen technology to mitigate the impacts of the anticipated wave height and energy in a variety of weather conditions in possible target areas. Please also clarify which target areas are considered, and what is known about wave characteristics.

		PROJECT PROPONENTS ANSWER: In industrialized countries, it is well known that fix breakwaters are not environmentally friendly in the mid to long term, basically because they change permanently the sediment movement, and are expensive both to construct and to decommission. Additionally, standard or common breakwaters have a visual impact. In the US there has been a tendency to replace the hard structure erosion control approach by a beach nourishment approach. But in island countries, the beach nourishment approach is difficult and costly because the lack of access to sand nearby, and the steep bathymetry. In the Caribbean, a typical wave height mean would be between 1.5 meters to 2.7 meters (Mark J Calverley, Wave Climate Study of the Caribbean Sea, 2005)
		CR4: Please clarify the "type" of floating breakwater that will be considered (e.g. Reflective or Dissipative structures – box, pontoon, mat, tethered?). If so, please also provide the justifications. **PROJECT PROPONENTS ANSWER**: The floating breakwater concept which operating philosophy is described briefly before **CR1** is of the "dissipative structure" type, anchored to the sea floor in a single mooring. The justifications are briefly explained in all the proponents answers above. **CR5**: Please clarify whether materials that will be used for the prototype have been considered. **PROJECT PROPONENTS ANSWER**: As described briefly before **CR1,** the materials of the floating breakwater concept proposed will be mostly aluminum pipes as floating and structuring elements and geotextiles as energy dissipating curtains.

		CR6: Please clarify what is the maintenance cost of the technology and how will it be financed (medium and long term). **PROJECT PROPONENTS ANSWER**: Even in industrialized or developed countries, the cost of installing and operating breakwaters to protect coastal communities, is generally responsibility of the local, state or federal governments. It is expected that the maintenance cost of the breakwaters will be financed by local or state governments in the medium and long term. The maintenance costs are expected to be low since it is considered that the operation of floating breakwater will be to raise it (float) and to lower it (sink) in the selected location. Since the breakwater is composed of metal floating pipes (probably aluminum) and geotextile dissipating curtains, it is expected that maintenance cost will be mainly replacement or reparation of the geotextile material.
		CR7: Please clarify who will own the patent after the prototype is developed? Who will benefit from the royalties and exports? **PROJECT PROPONENTS ANSWER**: The Replicable Micro Ecosystem for Accelerated Development of Technologies for Climate Change Adaptation of the Dominican Republic being strengthened in this proposal has defined that an ideal financial architecture to finance the earlier stages of technology development would be one that has private entities (small business) in both the United States and in beneficiary Adaptation Fund countries (Dominican Republic in this proposal). The reason for this architecture is because the earlier stages of technology development until the beginning of scalation of the technology would generally require between US$ 1,000,000 to 2,000,000 and the scalation will need to be carried out by the private sector.

		This kind of resources for the private sector can only be obtained in a few developed or industrialized countries such as the United States. For this reason, the Dominican Republic private company will own up to 49% of the American small business startup whose main purpose will be to raise private angel and venture capital in the US. The intellectual property will be owned be the mix enterprise in the US, where the Dominican Republic company has equity. This way the Dominican Republic enterprise can benefit from any sales in the world through royalties. Additionally, and similarly to the desalination proposal approved last year, a percentage of the royalties received by the Dominican Republic company will go to a non-profit entity to be identified and selected in the coastal community selected in Component 2 of this proposal. This international micro ecosystem of accelerated technological co-creation was described in some detail in the proposal for the innovation grant to develop a desalination technology that was approved for IDDI in September 23d, 2020 (Decision B.35.a-35.b/72). df Floating breakwaters have the advantage of being detachable when not in use, but the labor costs to replace the breakwater can be high. **PROJECT PROPONENTS ANSWER**: It is expected that the modality of operation is to lower the floating breakwater (sink) when not in used during normal sea conditions. This will be done by letting the air out of the floating elements of the breakwater. This is a low-cost labor operation. Additionally, the cost for the coastal community of no having the breakwater can be much higher than the labor cost of operating it. **CR8:** Provide details on who will provide the labor for installation and removal (e.g. Local government staff?

		Communities?) and how will be they be compensated for their labor? Please clarify where the prototype would be stored, who will cover the storage costs of the product when it is not in use and how much is the estimated costs for storage. **PROJECT PROPONENTS ANSWER**: Even in industrialized or developed countries, the cost of installing and operating breakwaters to protect coastal communities, is generally responsibility of the local, state or federal governments. For the purpose of marginalized coastal communities in SIDS like Dominican Republic, training of communities that will have floating breakwaters in place can be programed in such a manner that local, state or federal governments can hire these trained locals to do operating activities related to the breakwaters, similarly the way that local governments hire local people to clean streets. As mentioned before, it is expected that the modality of operation is to lower the floating breakwater (sink) when not in used during normal sea conditions, so no storage will be necessary.
	3. Does the project encourage or accelerate development of innovative adaptation practices, tools and technologies?	**Yes, but needs further development.** The proposal outlines an entrepreneurial innovation that involves patent generation and business generation. It has private sector integration that can support the disbursement of risk and allow future scaling through innovative funding mechanisms such as patent revenue generation, licencing income, and private sector commitment to public adaptation actions. (p.11)

		This approach of rapid development coupled with testing both in lab and in situ and enabling redesign along the way is an innovative form of Research and Development. The proposal would benefit from addressing the below clarifications. **CR9:** Have the identified inventions been developed locally, or are they identified from elsewhere? The above clarification will have an impact on how much adaption the inventions may need to the local environment, and thus how much time needs to be dedicated here in the innovation process. **PROJECT PROPONENTS ANSWER**: As discussed in **CR7**, the invention is being developed both locally and elsewhere, but mainly locally. The Replicable Micro Ecosystem for Accelerated Development of Technologies for Climate Change Adaptation of the Dominican Republic being strengthened in this proposal specializes in idealizing, conceptualizing and developing technologies for Small Island Developing States with a lot of inputs of local human resources. All technologies to be developed by the micro ecosystem are modular, distributed and designed to be managed and operated by community people. **CR10:** Has the performance of the international micro-ecosystem for innovation been tracked or reviewed in any form? **PROJECT PROPONENTS ANSWER**: The Replicable Micro Ecosystem for Accelerated Development of Technologies for Climate Change Adaptation of the Dominican Republic being strengthened in this proposal was conceptualized two years ago. It already has signed MOU with key players in both the US and Dominican Republic, including universities,

		small business enterprises, NGOs and business associations. The micro ecosystem has already been able to raise financial resources to start developing a technology and has identified a set of five additional technologies to be developed. By the end of this year, we expect to have some measurable indicators of efficiency and success. Feedback on the performance of the international micro-ecosystem for innovation from the approved desalination technology project (approved project) could be implemented into this (and / or other future) projects to ensure that the ecosystem remains innovative and integrates lessons learned. **PROJECT PROPONENTS ANSWER**: We agree. If it was not for the pandemic, that delayed to desalination project about eight months, we would have some indication of efficiency already. The desalination project started February 2021. **CR11**: Please provide more information on the "small technology development company" in Florida, United States. Please provide reasons why this company was selected, how it is funded, why the Dominican Republic company will own 49% of it. **PROJECT PROPONENTS ANSWER**: Innovation and Development LLC is a small Hispanic minority owned company registered in Florida in 2011 that provided consulting services in innovation and climate change. Lately the company has been concentrating in technology development and dedicated to conceptualized, carry out proof a concepts, patent and license technologies related to climate change adaptation and mitigation in coastal communities. It is starting with the development of a disruptive modular dynamic floating breakwater. The US

		company already have some patents related to floating breakwater technologies, including a USPTO Patent Titled "MODULAR SUBMERGIBLE BREAKWATER FOR LOWERING WATER WAVE KINETIC ENERGY ESPECIALLY DURING STORMS OR ROUGH WATERS" (US9410300B2). The patent was granted on August 2016 (this in not the patentable concept considered in this proposal but gives an idea of the experience of this company. As explain in **CR7**, the kind of financial resources for the private sector to develop disruptive technologies can only be obtained in a few developed or industrialized countries such as the United States. For this reason, the Dominican Republic private company will own up to 49% of the American small business startup whose main purpose will be to raise private angel and venture capital in the US. **CR12:** The proposed innovation "modular floating breakwaters" in not a novel technology, however given that innovation is context specific, please clarify why it is considered a breakthrough technology in the context of the legal and economic context of the Dominican Republic? **PROJECT PROPONENTS ANSWER**: Although "modular floating breakwaters" is not a novel technology, the concept considered in this proposal is disruptive and new, since it was conceptualized thinking that was going to be managed and operated by marginalized coastal communities, not common in industrialized countries. And the non-obviousness of the concept is very disruptive. In the cultural, legal and economic context of Dominican Republic (and of most SIDS), the proposed technology is more attractive because it is cheaper, and much easy to install than alternatives. Also, island countries tend to have coast with steep bathymetry, making the constructions of fixed structures very expensive, and the movement of large construction equipment difficult.

		CR13: The proposal needs to further explain how community buy-in and assimilation of the technology (assuming they will be the ones in charge of its usage) will be ensured. **PROJECT PROPONENTS ANSWER**: As mentioned in **CR8**, for the purpose of marginalized coastal communities in SIDS like Dominican Republic, training of communities that will have floating breakwaters in place can be programed in such a manner that local, state or federal governments can hire these trained locals to do operating activities related to the breakwaters, similarly the way that local governments hire local people to clean streets. During rough weather and emergency events, trained local personnel can be activated by local and state governments to raise (and after, lower the breakwater). Additionally, as explain briefly in **CR7**, and similarly to the desalination proposal approved last year, a percentage of the royalties received by the Dominican Republic company will go to a non-profit entity to be identified and selected in the coastal community selected in Component 2 of this proposal. A specific activity to define a royalty transfer mechanism was added to Component 2 of the revised proposal (Activity 2.4)
	4. Does the project help generate evidence base of effective, efficient adaptation practices, products or technologies, as a basis for potential scaling up?	**Not clear.** This would depend on the success of components 1, 2 and 3. If they are successful component 4 on KM will have high potential to capture and disseminate lessons learned to other Caribbean NIEs with similar challenges. However, component 1 is development of proof of concept which, based on the information provided in the proposal, is not assured to be successful. **PROJECT PROPONENTS ANSWER**: As described in **CR1**, the proponents have the wrong idea that the innovation

		grant program of the Adaptation Fund could also finance proof of concepts, especially if part of the conceptualization of this disruptive technology was to be carried out in a beneficiary country like Dominican Republic. The private company of the proposed micro ecosystem will develop and finance the Component 1 of the reviewed proposal. The proponents will modify the proposal to only consider the acceleration of the resulting proof of concept. Therefore, AF fund will only finance a project starting with Component 2, that would consider a successful proof of concept. If Component 1 fails, the grant will not be used. By the methodology of idealization and conceptualization used by the international micro ecosystem in charge of the project, which includes pivoting in case of proof-of-concept failure, it is highly unlikely that the proposed concept would fail. Due to the typical schedule of approval of innovation grants by AF, the Component 1 of the project, that will be financed by the private companies of the micro ecosystem, will be concluded before signing a contract between IDDI and AF. A condition before signing the contract could be demonstration that the concept proposed works. If it is successful, the set-up of the innovation micro-ecosystem gives high potential for scaling up and it should be acknowledged that this project can lead to scaling of the breakwater device[s] and furthermore help reveal during the process other SIDS relevant innovation areas. **PROJECT PROPONENTS ANSWER**: This is precisely the mission and objective of the Replicable Micro Ecosystem for Accelerated Development of Technologies for Climate Change Adaptation of the Dominican Republic being strengthened in this proposal

		CR14: In the context of scaling up the project, please provide a brief description of phase II of the project. **PROJECT PROPONENTS ANSWER**: Phase II of the project will be carried out when, based on a successful proof of concept, a minimum viable product is tested in a selected beach of a selected coastal community in Dominican Republic. Once the proof of concept is successful, the US small business company, where the Dominican Republic startup will have up to 49%, will submit a Small Business Innovation and Research grant proposal to the National Science Foundation (SBIR-NSF Phase I) proposal for US$ 250,000 that must be executed within 8 months. Then, if successfully executed, the US company is eligible to submit a SBIR-Phase II proposal for US$ 1,000,000. Parallel to this, the US company will develop Project Pitch to raise US$ 500,000 to a US$ 1,000,000 from US angel and venture capitalist. Additionally, new proposals will be submitted to green fund such as clean tech funds, Global Environment Facility, and or AF for scaling within Dominican Republic and other islands in the Caribbean. Furthermore, scaling proposals will be submitted to bilateral entities such as USAID, especially its Development Innovation Ventures (DIV) program. **CR15:** Please clarify the role of the private sector in the scale up plan. **PROJECT PROPONENTS ANSWER**: The role of the private sector is explained in the answer above.

	5. Does the project engage, empower and/or benefit the most vulnerable communities and social groups?	**Not clear.** Although the project says it will focus on marginalized and vulnerable groups (poorest rural communities), they have not yet selected the marginalized community where the prototype will be piloted. This is would be undertaken under component 2 of the project. **CR16:** Kindly provide more information on how the low-income coastal community will be selected (i.e. the selection criteria), and how the identified vulnerable groups will benefit from the project? **PROJECT PROPONENTS ANSWER**: There are several coastal communities both in the North East and the South West coasts of Dominican Republic that are being exposed to wave energy erosion during high seas and extreme weather events. This is because the angle of these communities when facing the incoming waves. Many of these communities tend to be poor or marginalized. For example, in the province of Barahona, after San Rafael, the action of waves is eroding several beaches, and artisanal fishermen have a hard time bringing their catch and boat to land during high seas. In many of these locations, the direction and intensity of waves is highly predictable. For the purpose of this project, a location will be chosen that would allow both a higher potential of social benefits and an appropriate bathymetry for ease in the anchoring of a the prototype. **CR17:** Please clarify if the selected pilot area community would be involved in the design, development, testing, and delivery of the project at the pilot site. **PROJECT PROPONENTS ANSWER**: The selected pilot area community would be involved in the project, especially in the deployment and testing of the prototype at the pilot

		site. Also, in the selection of the specific location to place the prototype. The project proposes the development of community management approaches and the management of innovative pilot projects related to coastal protection. **CR18:** Provide details of the community management approaches that will be developed under the project. **PROJECT PROPONENTS ANSWER**: The project proponents, especially IDDI, will use its experience and contacts in coastal communities to be able to have a management approach potable to the selected community. For example, in the desalination project, the approach to community leaders and cooperatives in Montecristi will be carried out with the help of a well known and respected NGO that is from the community. **CR19:** Please clarify how will local communities be incentivised to fully adopt the practice, including the installation and removal of the prototype, if needed. **PROJECT PROPONENTS ANSWER**: It is expected by design of the technology and the project, that the community will be in charge of management, operation and maintenance of not only the prototype but also of the future technologies that will be in place if the project is successful, especially fishing communities. There is a specific activity to train the community for this purpose.
	6. Does the project advance gender equality and the empowerment of women and girls?	**Unclear.**

		The project has not identified the target community where the prototype will be piloted. The proposal does not discuss any gender dimensions relevant to the project. **CR20:** Please consider gender dimensions of the project and any ways in which the project can help advance gender equality. **PROJECT PROPONENTS ANSWER**: As mentioned in **CR7** and **CR13**, and similarly to the desalination proposal approved last year, a percentage of the royalties received by the Dominican Republic company will go to a non-profit entity to be identified and selected in the coastal community selected in Component 2 of this proposal. Consideration will be given to assure that this non-profit to be identified to transfer royalties, has women and girls as beneficiaries. Additionally, in maintenance activities, women and girls can be considered for training in repairing geotextile components of the floating breakwater.
Resource Availability	1. Is the requested project funding within the parameters for small grants set by the Board?	**Yes.** (249,786 USD) **CAR1:** Kindly verify the sum of the 'Project components & financing' and section F of Part II as it amounts to USD 249,785. Please ensure the sum is correct throughout the document. **PROJECT PROPONENTS ANSWER**: The amounts will be corrected. In the revised proposal the total amount will be US$ 248,734.
	2. Is the Implementing Entity Management Fee at or below 8.5 per cent of the total project budget before the fee?	**Yes.** (19,582 USD equivalent to 8.5% of the total project budget)

		CAR2: Kindly rectify the disbursement schedule for the Implementing Entity Management Fee value (USD 22,971) as it combines the Executing Costs within the Implementing Entities fees. **PROJECT PROPONENTS ANSWER**: The amounts will be corrected in the disbursement schedule. In the revised proposal the Implementing Entity Management Fee will be US$ 19,486.
Implementation Arrangements	1. Is the project submitted through a National Implementing Entity accredited by the Board?	**Yes**, however accreditation expires on March 17th, 2021.
	2. Is the timeframe for the proposed activities adequate?	**Unclear.** **CR21:** Kindly clarify the feasibility of project activities in this rather short project period, given that the project includes the design, and building of a prototype, selecting the target community, environmental assessments, testing of the prototype in a coastal community, and dissemination of lessons learned. **PROJECT PROPONENTS ANSWER**: Two additional months were added to implement Components 2 and 3, this to allow for better community consultation, environmental evaluation and definition of royalty transfer to the coastal community selected.
	3. Is a summary breakdown of the budget for the proposed activities included?	**Yes.** **CR22:** Please clarify if the amount for developing the engineering blueprint/ proof of concept is sufficient and clarify if other funding will be provided from other sources. **PROJECT PROPONENTS ANSWER**: As mentioned in **CR1**, the Component 1 will be financed by the micro ecosystem private sector partners and not with AF funds.

		The amounts to develop this component is sufficient. This is mainly because the average salaries in Latin America are lower than in the US.

ADAPTATION FUND

PROGRAMME ON INNOVATION: SMALL GRANT PROJECT PROPOSAL

PART I: PROJECT INFORMATION

Country:	Dominican Republic
Title of Project:	Strengthening of a Replicable Micro Ecosystem for Accelerated Development of Technologies for Climate Change Adaptation of the Dominican Republic - Phase I - Disruptive Modular Dynamic Floating Breakwater Technology
National Implementing Entity:	Instituto Dominicano de Desarrollo Integral (IDDI)
Executing Entity/ies:	IDDI
Amount of Financing Requested:	US$248,734

Deleted: US$249,786

Project Background and Context:

Agenda 21 of the Earth Summit held in Rio De Janeiro, Brazil, June 1992 recognized SIDS as a group of countries with special environment and development challenges. At present, there are fifty-eight SIDS designated by the United Nations (UN), out of which 38 are UN members while 20 are non-UN members or associate members of regional commissions. These SIDS are spread over three regions – the Caribbean, the Pacific, and AIMS (Atlantic, Indian Ocean, Mediterranean, and the South China Sea). SIDS share a common vulnerability to climate change-induced sea level rise (SLR), changes in sea surface temperature, precipitation, and extreme events. This vulnerability mostly stems from their low elevation and densely populated coastal areas. Climate change manifests itself in many ways such as changes in sea levels, storm surges, and sea surface temperatures. Dominican Republic is a SIDS.

Many SIDS are dependent on single economic sectors such as tourism, especially sandy beach tourism, that provide the main source of employment and economic growth. In the Caribbean region, tourism created one in four new jobs and contributed to 20% of the total visitor exports in 2019. While the economic damages of a storm in a rural area might not be comparable to the impact on a developed coast, the resilience of rural communities is usually much lower. Impacts due to extreme events are particularly challenging for SIDS given their high exposure and vulnerability to tropical cyclones, as revealed during Hurricane Dorian in 2019 and Hurricanes Maria and Irma in 2017. Devastating hurricanes in the Caribbean in 2017 revealed the non-economic loss and damage associated with prolonged climate-induced displacement of entire populations of islands due to the complete destruction of their communities. Projected increases in sea level will therefore encroach into this intensely developed area, and act to exacerbate

erosion and flooding conditions. For the Caribbean region, the Fifth IPCC report predicts from 0.5 to 0.6 meters of sea level rise for the year 2100. It is therefore critical that island nations in the region consider how, when and which sections of their coastlines will need to be protected from this increasing risk.

When considering coastal zone management and developing coastal protection for the Caribbean context, there are many factors that must be taken into account, including:

• The use of beach nourishment - Sand nourishment is often a preferred “soft engineering” approach to coastal enhancement. However, sand supply can be limited or expensive. In addition, as a stand-alone activity, beach nourishment requires ongoing maintenance, and governments and developers are often hesitant to commit to activities with such recurring costs.

• Logistics of construction material - The extreme waves from hurricanes often dictate the need for either large rock armor or concrete armor units for coastal defense. Large boulders sometimes cannot be transported on the small roadways, and concrete can be an expensive material for the usually limited construction budgets. Access from the sea is in many cases not practical due to the unprotected coastal zones on the Atlantic side of these islands.

• The applicability of retreat - Relocation and the enforcement of sound setback regulations is a means of reducing coastal vulnerability. However, relocation has the potential to introduce undesired social impacts. Local residents can be dislocated from their livelihoods (e.g. fishing). Development pressures and political interests may also result in problems in enforcing setback regulations.

The Caribbean region is therefore faced with the challenge of developing appropriate strategies to deal with coastal erosion in a unique environment, giving consideration to climate change impacts. In Dominican Republic, under normal swell conditions, the net littoral drift is established from East to West, which marks clear patterns of accumulation and erosion on the beaches. The prevalence of coastal drift in an east-west direction and the existence of sources of sand supply that are upstream of the drifting area (be they rivers, submarine banks, dune chains, etc.) make the beaches behave in a stable manner for most of the year.

However, there are atypical phenomena that cause waves to reach the shores in the opposite direction than usual. Among these phenomena, the cold fronts stand out, which can reverse the direction of coastal drift. When the waves come from places that do not have sufficient sand reserves to supply the beaches, or the entrance of sand is limited by natural obstacles, a setback of the coastline occurs. If the phenomenon continues for several days or even weeks, erosion problems intensify and losses as significant as those that occur during the passage of hurricanes can occur. Generally, with the reestablishment of normal conditions, the supply of sand to the beaches also recovers and the situation returns to normal. However, many of the cliffs formed by the waves remain as evidence of the retreat of the coastline. The results of these erosive processes related to the inversion of the littoral drift due to changes in wave direction can be seen on the beaches of Cabarete or Las Terrenas.

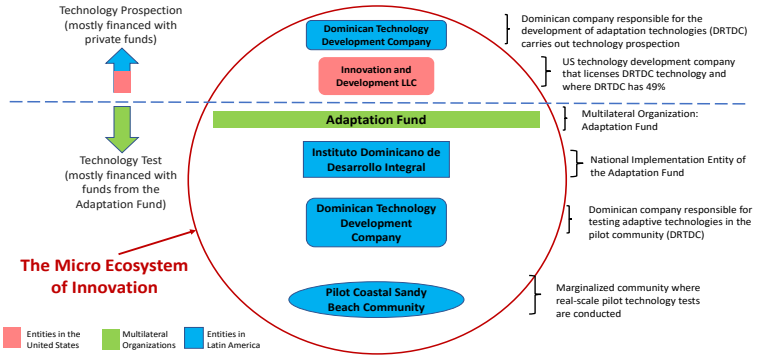
In a disruptive way, these technologies can be developed through a process of co-creation between Dominican private companies and small and medium-sized companies in the United States, including those with Dominican partners residing or citizens of the US.

The overall objective of the project is the acceleration of the development of climate change adaptation and mitigation technologies in marine-coastal areas, especially island countries (large and SIDS), through the strengthening of an international micro ecosystem of accelerated

technological co-creation that it is already in formation and that was explain in some detail in the innovation grant to develop a desalination technology that was approved for IDDI in September 23d, 2020 (Decision B.35.a-35.b/72). This ecosystem has already identified a set of specific technologies that, when developed, will have a significant impact on the communities to be used and in both an accelerated productive adaptation, and mitigation of greenhouse gases once commercialized globally (Figure 1 presents the micro ecosystem for the development of the floating breakwater objective of this proposal).

Figure 1

Micro Ecosystem for Accelerated Development of a Disruptive Modular Dynamic Floating Breakwater Technology in the Dominican Republic - Phase I



Project Objectives:

The purpose of the innovation project is to develop and test in a small pilot community a disruptive technology that will attenuate wave energy before reaching sandy beaches therefore lowering the erosion potential of extreme climate events (storms, high seas and/or hurricanes). This technology is a modular dynamic floating breakwater. This general objective will be achieved through three specific objectives:

a) Development of a modular dynamic floating breakwater technology including the Prototype for Testing at a Wave Tank Facility and continue the strengthening of an international innovation micro ecosystem (already established) for the accelerated development of climate change adaptation technologies.
b) The design, establishment and implementation of a process to test the technology in a marginalized coastal community, including the selection and awareness of pilot communities, and the training of these communities for the management and operation of adaptation technologies; and
c) The design and establishment of a knowledge management process to capture and disseminate the lessons learned.

Projected Calendar:

Milestones	Expected Dates
Beginning of Project implementation	July 2021

Deleted: June

Project closure	October 2022
Terminal evaluation	February 2023

Project Components and Financing:

Project Components	Expected Conc
COMPONENT 1 - Development of the Technology including the Prototype for Testing at a Wave Tank Facility	**Activity 1.1:** Develop the basic and de preliminary prototypes of two embodime tested in a wave generating tank or prototypes concluded and prototypes built
	Activity 1.2: Preliminary Proof of concep prototypes in wave tank or pool in c operational philosophies and develop stakeholders. **Outputs:** a) Final Prototype
	Activity 1.3: Develop the basic and de selected prototype to be tested in wave t testing of an anchorage system. **Outputs**:
	Activity 1.4: Carry out all necessary testi or pool including the design and testing c and removal operational procedures an efficiencie. **Outputs:** a) Selected prototyp
COMPONENT 2 - Selection of the beach community in Dominican Republic where the pilot testing will take place	**Activity 2.1:** Selection of the coastal adaptation technology. **Outputs:** a) (Minimum Viable Product) selected
	Activity 2.2: Consultation and aware community where new pilot adaptation te Community selected for testing the minim consulted and sensitized; b) Community se
	Activity 2.3: Selection of the site (beach) new pilot adaptation technology will be t Consultation with stakeholder of the site t
COMPONENT 3 - Pilot test of prioritized adaptation technology in the selected community in Dominican Republic	**Activity 3.1:** Preliminary Environmental floating dynamic breakwater technology Environmental assessment report obtainec
	Activity 3.2: Based on the research re adapt the technology to best practices hardware to the basic breakwater concep with design modifications included to t **Outputs:** a) Larger prototype built
	Activity 3.3: Performing all the necess selected community, including the ope placement. **Outputs:** a) Larger prototype community
	Activity 3.4: Development of a prelimin Manual developed
	Activity 3.5 Development of final re **Outputs:** a) Final reports developed
COMPONENT 4 - Knowledge management to capture and disseminate lessons learned	**Activity 4.1:** Workshop to disseminate less of the Adaptation Fund in the Caribbea National Implementation Entities and Fo 15 Caribbean island countries sensitized adaptation project; b) Partnerships estab Possible request for funds for Phase II Adaptation Fund and / or request for Full S

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Project Components	Expected Concrete Outputs	Expected Outcomes	Amount (US$)
COMPONENT 1 Development of the Technology including the Prototype for Testing at a Wave Tank Facility	**Activity 1.1:** Develop the basic and detailed engineering blueprint of the preliminary prototypes of two embodiments of the floating breakwater to be tested in a wave generating tank or pool. **Outputs:** a) Design of the prototypes concluded and prototypes built	Accelerated development of appropriate size adaptation technologies (floating breakwater). . Incorporation of the private sector from the beginning in both the design of technologies: Proof of concept of the technology carried out	TO BE FINANCED BY THE COMPANY
	Activity 1.2: Preliminary Proof of concept of both breakwater embodiment prototypes in wave tank or pool in order to test basic hypothesis and operational philosophies and develop film for discussions with major stakeholders. **Outputs:** a) Final Prototype selected; film of testing made.		TO BE FINANCED BY THE COMPANY
	Activity 1.3: Develop the basic and detailed engineering blueprint of the selected prototype to be tested in wave tank or pool including the design and testing of an anchorage system. **Outputs:** a) Selected prototype built		TO BE FINANCED BY THE COMPANY
	Activity 1.4: Carry out all necessary testing of second prototype in wave tank or pool including the design and testing of an anchorage system, deployment and removal operational procedures and measure wave energy reduction efficiencie. **Outputs:** a) Selected prototype tested at wave facility		TO BE FINANCED BY THE COMPANY
		TOTAL COMPONENT 1	**0**
COMPONENT 2 Selection of the beach community in Dominican Republic where the pilot testing will take place	**Activity 2.1:** Selection of the coastal community to test the new pilot adaptation technology. **Outputs:** a) Community to test the prototitpe (Minimum Viable Product) selected	Coastal community with sandy beach selected, sesibilized and trained	35.410
	Activity 2.2: Consultation and awareness and training of the coastal community where new pilot adaptation technology will be tested. **Outputs:** a) Community selected for testing the minimum viable product of the technology consulted and sensitized; b) Community selected trained		20.800
	Activity 2.3: Selection of the site (beach) in the coastal community where the new pilot adaptation technology will be tested. **Outputs:** a) Site selected; b) Consultation with stakeholder of the site to carry out the test established.		13.350
	Activity 2.4: Definition of a Mechanism to Transfer a % of the Royalties received by the Dominican Republic Private Company for the Sales of the Technology to a Non-Profit entity to be identified in the selected Coastal Community. **Outputs:** a) A disruptive mechanism to transfer a % of royalties to the selected coastal community established.		6.800
		TOTAL COMPONENT 2	**76.360**
COMPONENT 3 Pilot test of prioritized adaptation technology in the selected community in Dominican Republic	**Activity 3.1:** Preliminary Environmental Assessment Evaluation to test the floating dynamic breakwater technology in the pilot community. **Outputs:** Environmental assessment report obtained	Disrupted modular floating breakwater tested in a real environment	31.800
	Activity 3.2: Based on the research results, make design modifications to adapt the technology to best practices, including additional features and hardware to the basic breakwater concept. Rebuild a robust larger prototype with design modifications included to be tested in the pilot community. **Outputs:** a) Larger prototype built		80.500
	Activity 3.3: Performing all the necessary tests of the prototype in the selected community, including the operational procedures of technology placement. **Outputs:** a) Larger prototype tested at the pilot beach in the pilot community		19.700
	Activity 3.4: Development of a preliminary operating manual. **Outputs:** a) Manual developed		6.200
	Activity 3.5 Development of final research and development reports. **Outputs:** a) Final reports developed		6.200
		TOTAL COMPONENT 3	**144.400**
COMPONENT 4 Knowledge management to capture and disseminate lessons learned	**Activity 4.1:** Workshop to disseminate lessons learned for NIEs and focal points of the Adaptation Fund in the Caribbean Islands. **Outputs:** a) At least 15 National Implementation Entities and Focal Points of the Adaptation Fund in 15 Caribbean island countries sensitized and trained on the results of the adaptation project; b) Partnerships established for Phase II of the project; c) Possible request for funds for Phase II of the project developed for the Adaptation Fund and / or request for Full Size Regional Project for the GEF.	Strategy to replicate the project in other Caribbean islands initiated. Different entities of adaptation to climate change are incorporated into replica projects in their countries. Possibility to request multilateral funds together several countries	5.100
		TOTAL COMPONENT 4	**5.100**
		Total Project Costs without Execution Fees	**225.860**
		Executing cost fee by IDDI (1,5%)	**3.388**
		Total cost of the Project	**229.248**
		Implementation fee (8,5%)	**19.486**
		Amount of financing requested	**248.734**

PART II: PROJECT JUSTIFICATION

A. Describe the project components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience.

A disruptive innovative approach for small community coastal management protection during extreme weather events

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There are basically to general approaches to control erosion in coastal communities:

a) Through the construction of hard structures; and
b) Through the design and implementation of "soft" tools and methodologies.

But when trying to protect sandy beaches, the hard structure approach has serious disadvantages: 1) it is expensive (US$ 5,000 to 20,000/lineal meter); 2) a permanent structure is put in place to manage a few extreme events a year, the rest of the time the structure in place creates a series of environmental problem; 3) if the sandy beach is oriented to tourism (local or international), it loses attractiveness with hard structures. Also, for these sandy beaches, especially in the Caribbean, a soft approach like beach nourishment is expensive and usually there is no extra sand available to carry it out, and the placing of mangroves will make the beaches also unattractive to tourism.

The approach proposed in our project (the placement of a disruptive modular dynamic floating breakwater) is unique because the technology is used only when extreme event happens (high seas, storms and hurricanes), acting similarly to a hard structure but removed just after the extreme event is gone. The placement of the technology takes hours to a couple of days and the removal just hours. It is design to be managed and operated by local community people.

To develop the technology in an accelerated way, the newly formed micro innovation ecosystem not only considers an efficient technical process or methodology for its development, but also the process of structured leverage of financial resources to be able to carry out said technological development in an accelerated manner and joint between companies in the Dominican Republic and small and medium enterprises in the United States.

To demonstrate that it is possible to accelerate the joint development or co-creation of technologies for adaptation to climate change in an appropriate scale and in a volume that has an impact, a four-component project / program is outlined:

COMPONENT 1 - Development of the Technology including the Prototype for Testing at a Wave Tank Facility (TO BE FINANCED BY THE PRIVATE SECTOR OF THE MICRO ECOSYSTEM AND NOT BY THE ADAPTATION FUND)

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This component will develop and test, at a laboratory level, an appropriate technology for adaptation to climate change of coastal communities (reduction of erosion of sandy beach coastal communities through a disruptive modular dynamic floating breakwater for coastal protection). Since the prospection and conceptualization of the technology has been carried out between Dominican Republic and US private entities, the result of the component also will strengthen an existing international micro-ecosystem of accelerated technological co-creation to test an innovative mechanism for financing the early stages of technological development. This

micro ecosystem includes the linking of creative private companies in the Dominican Republic and small and medium enterprises in the United States, with public organizations specializing in the financing of early stages of technological development, and bilateral and multilateral partners for the financing of proof of concepts and minimum viable products. Also, it includes the definition of a strategy to replicate the accelerated innovation co-creation model at a global level.

For the execution of this component, the following activities will be carried out (NOT TO BE FINANCED BY THE ADAPTATION FUND):

Activity 1.1: Develop the basic and detailed engineering blueprint of the preliminary prototypes of two embodiments of the floating breakwater to be tested in a wave generating tank or pool. Build the prototypes

Activity 1.2: Preliminary Proof of concept of both breakwater embodiment prototypes in a wave tank or pool facility in order to test basic hypothesis and operational philosophies and develop film for discussions with major stakeholders. Select the most efficient embodiment of the two prototypes

Activity 1.3: Develop the basic and detailed engineering blueprint of the robust prototype to be tested in wave tank or pool including the design and testing of an anchorage system. Build the prototype

Activity 1.4: Carry out all necessary testing of second prototype in wave tank or pool including the design and testing of an anchorage system, deployment and removal operational procedures and measure wave energy reduction efficiencies

COMPONENT 2 - Selection of the beach community in Dominican Republic where the pilot testing of the technology will take place

Once the proof of concept of the disruptive modular floating breakwater has been established under controlled conditions, the Component 2 will be carried out to identify an appropriate coastal rural community where their livelihood depends on sandy beaches that might be heavily impacted during high seas, storms or hurricanes. Ideally, for the testing of the first prototype for real environment, the pilot beach should be relatively small in length and housing or other relevant infrastructure should be close to the breaking of the waves. Also, if local and national people use these beaches for pleasure it is also of interest.

Activity 2.1: Selection of the coastal community to test the new pilot adaptation technology

Activity 2.2: Consultation and awareness and training of the coastal community where new pilot adaptation technology will be tested

Activity 2.3: Selection of the site in the coastal community where the new pilot adaptation technology will be tested

Activity 2.4: Definition of a Mechanism to Transfer a % of the Royalties received by the Dominican Republic Private Company for the Sales of the Technology to a Non-Profit entity to be identified in the selected Coastal Community

COMPONENT 3 - Pilot test of prioritized adaptation technology in the selected community in Dominican Republic

Once the specific beach in a specific coastal community has been identified, a preliminary environmental assessment will be carried out. Since the prototype is small and removable and would not be installed for more that a few days (one or two weeks), it is expected to have minimum impact on the environment. Additionally, the floating breakwater technology is oriented only to be used during storms and high seas or hurricanes where there is a high probability that the sandy beach will be eroded, and this type of technology is oriented to lower the wave energy. Also, during this component, the technology at small scale will be tested to evaluate its efficiency in reducing erosion in the pilot beach.

Activity 3.1: Preliminary Environmental Assessment Evaluation to test the floating dynamic breakwater technology in the pilot community

Activity 3.2: Based on the research results, make design modifications to adapt the technology to best practices, including additional features and hardware to the basic breakwater concept. Rebuild a robust larger prototype with design modifications included to be tested in the pilot community

Activity 3.3: Performing all the necessary tests of the prototype in the selected community, including the operational procedures of technology placement

Activity 3.4: Development of a preliminary operating manual

Activity 3.5: Development of final research and development reports

COMPONENT 4 - Knowledge management to capture and disseminate lessons learned

Activity 4.1: Workshop to disseminate lessons learned for NIEs and focal points of the Adaptation Fund in the Caribbean Islands

B. Describe how the project provides 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 will avoid or mitigate negative impacts, in line with the Environmental and Social Policy of the Adaptation Fund.

Communities served with adaptive technology, starting with the pilot coastal community to be selected, will lower their problems associated will losing sand in sandy beaches due to erosion during high seas, storms and hurricanes. A different with fixed breakwater, especially those that have a part above water, is the proposed technology does not pretend to eliminate all energy in the waves but to lowered to a large percentage. Also, the proposed technology will only be

used (put in place) previous to high seas events or storms or hurricanes to lower the impacts of such events in the sandy beaches.

The project does not contemplate negative environmental and / or social impacts. On the contrary, it is oriented to minimize environmental and social impacts of the destructive forces of high energy waves during extreme weather events. Also, it is the intention of the project promoters to train local coastal communities with sandy beaches so that they are the ones who manage and operate the floating breakwaters, creating local jobs.

For the private sector, the technology will generate revenue through international licenses (royalties) and exports. Similarly to the desalination proposal approved last year, a percentage of the royalties received by the Dominican Republic company will go to a non-profit entity to be identified and selected in the coastal community selected in Component 2 of this proposal. A specific activity to define a royalty transfer mechanism was added to Component 2 of this revised proposal (Activity 2.4). Consideration will be given to assure that this non-profit to be identified to transfer royalties, has women and girls as beneficiaries. Additionally, in maintenance activities, women and girls can be considered for training in repairing geotextile components of the floating breakwater.

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C. Describe how the project encourages or accelerates development of innovative adaptation practices, tools or technologies and/or describe how the project helps generate evidence base of effective, efficient adaptation practices, products or technologies, as a basis for potential scaling up

The development of an appropriate modular floating breakwater technology will result in the strengthening of the international micro ecosystem of innovation for the accelerated development of climate change adaptation technologies. This micro ecosystem is considered unique, not only because it focuses on adaptation to climate change but because for the first time it approaches the development of appropriate technologies to through a co-creation process, where the prioritization of what technologies to develop and their conceptualization is mainly carried out by companies in developing countries (Dominican Republic in this case) and the leverage of resources is combined with private sector resources from States United and multilateral resources from multilateral funds such as the Adaptation Fund. All the technologies to be developed by the micro ecosystem will be modular and of appropriate size for island countries, especially SIDS. They will be designed for easy transport, assembly and operation by local communities.

D. Please confirm whether the project meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and is in line with the Environmental and Social Policy of the Adaptation Fund.

The Program is aligned with the National Development Strategy, which states that the DR "fairly and effectively manages the risks and protection of the environment and natural resources and promotes adequate adaptation to climate change" as one of its four pillars. Likewise, the Program is consistent with both the National Environment Policy and the National Climate Change Policy. This commitment is supported by several documents, including the National Policy on Climate Change, the Climate Compatible Development Plan (CCDP), and the National Adaptation Plan of Action (NAPA-DR). The participation of Santiago de los Caballeros, the second largest city in the Dominican Republic, in the 100 Resilient Cities network, signals the government's commitment to become more resilient to physical, social and economic

challenges, as well as disaster exposure. In addition, the Program includes the main PNACC-RD recommendations:

- The vulnerability of poor communities and vulnerable groups will be a priority for the country, due to threats of climate change in human settlements and infrastructure.
- Institutional and community capacities will be strengthened to provide adequate responses to climate change problems and increase resilience.
- It is essential to promote partnerships that include the private sector and civil society to address climate change in areas with limited or low income; and
- Addressing climate change and its impacts needs to mobilize additional financial resources and capital to manage risks and promote technologies and innovation.

One of the key aspects of the proposed project is the development of community management approaches and the management of innovative pilot projects related to coastal protection, especially of sandy beaches during storms, high seas and hurricanes, which do not have significant environmental impacts normally associated with the development of large infrastructure. Infrastructure investment is expected to be made as part of government and community programs to improve coastal protection and resilience. The project is in line with the Environmental and Social Policy of the Adaptation Fund.

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

As the technologies to be generated by the proposed ecosystem, including the first on disruptive modular floating breakwater, and its modularity and dimensions are oriented to island countries, it is considered to have a two-day workshop with about 15 NIEs and Focal Points of the Adaptation Fund from of Caribbean islands. In this workshop, not only will the results of an accelerated development of appropriate technologies be presented, but alliances and partners will be established for the design and implementation of Phase II of the project, which would involve scaling in three to four Caribbean islands. The workshop will also present a draft request for funds for Phase II to either the Adaptation Fund or other possible clean tech funds available.

F. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project. Describe how the project will engage, empower and/or benefit the most vulnerable communities and social groups, including gender considerations, in line with the Environmental and Social Policy of the Adaptation Fund.

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	The program complies with the relevant national laws, regulations and policies; and complies with the country's relevant legal framework for environmental protection and local rural development.	**Low:** Low potential risks related to compliance with the law are expected during the implementation of the Environmental and Social Impact Assessment (EIAS).
Access and equity	The intervention logic of the project is to provide benefits in the most vulnerable communities, with fair and equitable access to activities, equipment, resources and training throughout the planning and execution	**Very low:** project interventions guarantee access and equity to sensitive groups, especially women (heads of household or single mothers) and young people.

	phases. All individuals or groups that request participation will have the same opportunity to benefit from the adaptation activities proposed by the project. The eligibility criteria of the program are clear and transparent and defined together with the relevant stakeholders. The interventions of the project plan to remove barriers such as: difficulty of access to job opportunities;	
Marginalized and vulnerable groups	The program focuses on marginalized and vulnerable groups (poorest rural communities) and aims to help them improve their living conditions and quality of life, which are already compromised by poor local development, poverty, lack of access to opportunities, deficit infrastructure and Climate change. The project will include all members of the community and will be careful not to exclude (by action or omission) Dominicans of Haitian descent and Haitian immigrants (especially those with questionable immigration status) and their families. The program does not have a negative impact on these groups.	**Low:** the project has observed the appropriate environmental and social safeguards. These include: Community detection; environmental and social impact assessment, including needs and conflicts; Open, free and informed consultations with key stakeholder groups. It is considered to prepare a contingency plan if applicable.
Human rights	The Program respects the fundamental rights of people in the areas subject to intervention: it does not affect their freedom, nor does it discriminate the participation or benefits for people regardless of their condition, age, sex, political or religious affiliation, etc. In addition, the Program does not integrate any activity contrary to the laws or traditions of the people. Participation in the program will be voluntary and free for all people.	**Very Low**: all program activities and interventions have been developed and designed within the framework of international and national human rights. Through participatory approaches, people and communities will be consulted to avoid any impact on human rights.

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

Small Island Developing States (SIDS) are vulnerable to a range of shocks and stresses, and are particularly affected by climate change. SIDS are often geographically remote, spatially dispersed, and low-lying. They are often highly exposed to global disruption, with undiversified economies, small domestic markets, and dependence on only one or two rapidly growing urban centers. From densely populated urban centers of the Philippines and Taiwan, to atolls and archipelagos of the Caribbean, Asian-Pacific and Indian Ocean, over 600 million people living on islands are at risk. On the one hand, natural hazards such as cyclones, floods and storm-surges, exacerbated by climate change, in addition to geo-hazards specific to some islands represent major threats for the people, assets and economies of SIDS. Coastal erosion is a common problem affecting about 75% of the world's shorelines, producing not only beach loss but also a deterioration of scenic quality, that is becoming a problem that hinders economic growth of many SIDS. Tools and technologies to handle extreme weather events that generate high energy eroding waves, specifically during the duration of these events, is a priority that would not only lower the cost of adaptation, but also minimize environmental and social impacts in comparison with the available technologies that exist currently.

The Project aims to test a new and disruptive modular dynamic floating breakwater technology in a low-income community in the Dominican Republic, where a minimum viable product prototype will be tested. To do this, it is requesting US $ 249,786 from the Adaptation Fund. However, if the test is successful, and a profitable business model is proven, an escalation to

thousands of modular floating breakwaters is expected over the next five years, lowering the energy of waves eroding sandy beaches but with a much lower initial investment compared with fixed structural alternatives. Fixed breakwaters are quite expensive (US$ 5,000 to 20,000/lineal meter) for the protection of marginalized coastal communities. The investment of the Adaptation Fund is contributing to create a global market for modular floating breakwaters oriented to be placed in a distributed manner and with lower capital costs and only to be deployed just previous to extreme weather events in coastal communities. Once the event has passed, the floating technology is either submerged or removed.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation.

The project will be executed by the Dominican Institute of Integral Development (IDDI) with the help of a micro ecosystem of international innovation with the following members or partners (see Figure 1): A technological development company in the Dominican Republic; a small technology development company in Florida, United States (Innovation and Development LLC) responsible for the international patent protection of the technology, a wave generating facility to test the technology, all of them coordinated by the IDDI that serves as the implementing and executing entity. The Dominican company will own 49% of the small business in the United States. The US company will request funds in the future from both federal and venture capital in the US.

B. Describe the measures for financial and project / programme risk management.

The project has lowered its financial risk by diversifying its sources of financing which consider multilateral, bilateral, federal/public resources as well as private financing for the financing of the first four stages of the technology development process (from problem identification, solution idealization, international protection of industrial property, and proof of concept and minimum viable product). The financing of all activities related to proof of concept will be financed only by the private partners of the international micro ecosystem. Activities related to the minimum viable product and community selection, training and environmental assessment considered in the project will come from Adaptation Fund resources and will not depend on the obtention of private financing. The future Phase II of the project will finance the scaling up of the technology through the US private partner (through the Small Business Innovation Research Program of the National Science Foundation (SBIR NSF) or through venture capital to the scaling up of the technology. Some scaling up of the technology will be pursue by the international micro ecosystem through bilateral and multilateral entities in Phase II.

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

M&E Arrangements: The results of Monitoring and Evaluation (M&E) will be to provide project updates, risk assessments and any Program change required. In summary, M&E will provide answers, in a systematic way, on the progress and success of the Program and its partners in achieving the desired outcomes and outputs. This includes community's progress on climate adaptation. Given the nature of the Program, PMU will contract the services of a M&E officer to be responsible for data collection, compilation, and project monitoring and reporting, as well as operational support and additional assistance in the design and implementation throughout the Program, adjusting projects outcomes and activities according to a changing context. It is important to remain flexible to and learn from inevitable unforeseen in the operational landscape using an adaptive management approach. Reporting will take place on a quarterly basis in accordance with AF standards. The monitoring and reporting plan involve an iterative approach to collecting data and improving the Program design and its proposed interventions. The Program will start following and inception workshop with key stakeholders, IDDI, PMU and M&E officer assigning and clarifying the Program purpose, roles and responsibilities, and addressing any outstanding barriers. There are specific budget lines dedicated for M&E to ensure that the necessary resources are allocated to execute the M&E framework. The Program comprehensive M&E framework will meet the Adaptation Fund's policy and drawing on the IDDI safeguards formalized under the Accreditation process.

M&E Budget: The costs associated to implement the M&E system are detailed below.

Table 1: Costs Associated with Implementing M&E

Type of M&E Activity	Budget (USD) (Excluding PMU time)	Timeframe
Initiation Workshop and report	US 1.000	Within the first 2 months.
Means of verification of Program expected results.		Start, mid and end of Program (during evaluation cycle).
Periodic status/progress reports	US$ 500	Quarterly
Mid-term Evaluation	US 1.000	At the mid-point of Program implementation.
Final evaluation	US 1.000	At least 3 months before the end of Program.
Program terminal report	US 1.000	At least 3 months before the end of Program.
Audit		
Visits to field sites		Program lifespan.
ESTIMATED TOTAL (USD)	US$ 4.500	

D. Include a simple results framework for the project proposal, including milestones, targets and indicators.

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Project Components	Milestones
COMPONENT 1 Development of the Technology including the Prototype for Testing at a Wave Tank Facility	**Activity 1.1:** Develop the basic and detailed enginee the preliminary prototypes of two embodiments breakwater to be tested in a wave generating **Outputs:** a) Design of the prototypes concluded and
	Activity 1.2: Preliminary Proof of concept of b embodiment prototypes in wave tank or pool in or hypothesis and operational philosophies and d discussions with major stakeholders. **Outputs:** a) selected; film of testing made.
	Activity 1.3: Develop the basic and detailed enginee the selected prototype to be tested in wave tank the design and testing of an anchorage system. **Outp** prototype built
	Activity 1.4: Carry out all necessary testing of sec wave tank or pool including the design and testing system, deployment and removal operational measure wave energy reduction efficiencie. **Outp** prototype tested at wave facility
COMPONENT 2 Selection of the beach community in Dominican Republic where the pilot testing will take place	**Activity 2.1:** Selection of the coastal community to t adaptation technology. **Outputs:** a) Commur prototitpe (Minimum Viable Product) selected
	Activity 2.2: Consultation and awareness and train community where new pilot adaptation technolog **Outputs:** a) Community selected for testing the product of the technology consulted and sensitized selected trained
	Activity 2.3: Selection of the site (beach) in the co where the new pilot adaptation technology will be t a) Site selected; b) Consultation with stakeholder of out the test established.
COMPONENT 3 Pilot test of prioritized adaptation technology in the selected community in Dominican Republic	**Activity 3.1:** Preliminary Environmental Assessment E the floating dynamic breakwater technology in the **Outputs:** Environmental assessment report obtained
	Activity 3.2: Based on the research resul modifications to adapt the technology to best pra additional features and hardware to the basic brea Rebuild a robust larger prototype with design modif to be tested in the pilot community. **Outputs:** a) t built
	Activity 3.3: Performing all the necessary tests of the selected community, including the operationa technology placement. **Outputs:** a) Larger prototy pilot beach in the pilot community
	Activity 3.4: Development of a preliminary op **Outputs:** a) Manual developed
	Activity 3.5 Development of final research and devel **Outputs:** a) Final reports developed
COMPONENT 4 Knowledge management to capture and disseminate lessons learned	**Activity 4.1:** Workshop to disseminate lessons learn focal points of the Adaptation Fund in the Ca **Outputs:** a) At least 15 National Implementation E Points of the Adaptation Fund in 15 Caribbean sensitized and trained on the results of the adapt Partnerships established for Phase II of the pro request for funds for Phase II of the project de Adaptation Fund and / or request for Full Size Reg the GEF.

Project Components	Milestones	Targets	Indicators
COMPONENT 1 - Development of the Technology including the Prototype for Testing at a Wave Tank Facility (TO BE FINANCED ONLY BY THE PRIVATE COMPANIES OF THE INTERNATIONAL MICRO ECOSYSTEM, NOT AF)	**Activity 1.1:** Develop the basic and detailed engineering blueprint of the preliminary prototypes of two embodiments of the floating breakwater to be tested in a wave generating tank or pool. **Outputs:** a) Design of the prototypes concluded and prototypes built	Design and construction of two preliminary floating breakwater prototypes to be tested in a "laboratory" environment (a wave generating facitily)	a) Two prototypes built
	Activity 1.2: Preliminary Proof of concept of both breakwater embodiment prototypes in wave tank or pool in order to test basic hypothesis and operational philosophies and develop film for discussions with major stakeholders. **Outputs:** a) Final Prototype selected; film of testing made.		b) Two prototypes tested in a controlled facility and most effective prototype chosen
	Activity 1.3: Develop the basic and detailed engineering blueprint of the selected prototype to be tested in wave tank or pool including the design and testing of an anchorage system. **Outputs:** a) Selected prototype built		c) Most effective prototype built with an appropriate anchorage system
	Activity 1.4: Carry out all necessary testing of second prototype in wave tank or pool including the design and testing of an anchorage system, deployment and removal operational procedures and measure wave energy reduction efficiencie. **Outputs:** a) Selected prototype tested at wave facility		d) Most effective prototype tested and research report generated
COMPONENT 2 - Selection of the beach community in Dominican Republic where the pilot testing will take place	**Activity 2.1:** Selection of the coastal community to test the new pilot adaptation technology. **Outputs:** a) Community to test the prototitpe (Minimum Viable Product) selected	Coastal community with sandy beach selected, sesibilized and trained	a) Community to test the prototitpe (Minimum Viable Product) selected
	Activity 2.2: Consultation and awareness and training of the coastal community where new pilot adaptation technology will be tested. **Outputs:** a) Community selected for testing the minimum viable product of the technology consulted and sensitized; b) Community selected trained		b) Community selected trained
	Activity 2.3: Selection of the site (beach) in the coastal community where the new pilot adaptation technology will be tested. **Outputs:** a) Site selected; b) Consultation with stakeholder of the site to carry out the test established.		a) Site selected; b) Consultation with stakeholder of the site to carry out the test established.
	Activity 2.4: Definition of a Mechanism to Transfer a % of the Royalties received by the Dominican Republic Private Company for the Sales of the Technology to a Non-Profit entity to be identified in the selected Coastal Community. **Outputs:** a) A disruptive mechanism to transfer a % of royalties to the selected coastal community established.		a) A disruptive mechanism to transfer a % of royalties to the selected coastal community established.
COMPONENT 3 Pilot test of prioritized adaptation technology in the selected community in Dominican Republic	**Activity 3.1:** Preliminary Environmental Assessment Evaluation to test the floating dynamic breakwater technology in the pilot community. **Outputs:** Environmental assessment report obtained	Disrupted modular floating breakwater tested in a real environment	Environmental assessment report obtained
	Activity 3.2: Based on the research results, make design modifications to adapt the technology to best practices, including additional features and hardware to the basic breakwater concept. Rebuild a robust larger prototype with design modifications included to be tested in the pilot community. **Outputs:** a) Larger prototype built		b) Most effective prototype built for a real environment test at pilot beach
	Activity 3.3: Performing all the necessary tests of the prototype in the selected community, including the operational procedures of technology placement. **Outputs:** a) Larger prototype tested at the pilot beach in the pilot community		c) Most effective prototype tested in a real environment
	Activity 3.4: Development of a preliminary operating manual. **Outputs:** a) Manual developed		d) Operating manual report
	Activity 3.5 Development of final research and development reports. **Outputs:** a) Final reports developed		e) Final report with real environment testing result
COMPONENT 4 - Knowledge management to capture and disseminate lessons learned	**Activity 4.1:** Workshop to disseminate lessons learned for NIEs and focal points of the Adaptation Fund in the Caribbean Islands. **Outputs:** a) At least 15 National Implementation Entities and Focal Points of the Adaptation Fund in 15 Caribbean island countries sensitized and trained on the results of the adaptation project; b) Partnerships established for Phase II of the project; c) Possible request for funds for Phase II of the project developed for the Adaptation Fund and / or request for Full Size Regional Project for the GEF.	Strategy to replicate the project in other Caribbean islands initiated. Different entities of adaptation to climate change are incorporated into replica projects in their countries. Possibility to request multilateral funds together several countries	a) Workshop attended by at least 15 National Implementation Entities and Focal Points of the Adaptation Fund in 15 Caribbean island countries; b) Partnerships established for Phase II of the project; c) request for funds for Phase II of the project developed for the Adaptation Fund and / or request for Full Size Regional Project for the GEF.

E. Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund

The project is expected to contribute to the following "Expected Results of Strategic Focus 2: Innovation" of the Adaptation Fund:

- ER1: successful innovations implemented. Innovative adaptation practices, tools and technologies that have proven successful in a country extended to new countries / regions.
- ER3: new innovations encouraged and accelerated. Development of innovative adaptation practices, tools and technologies encouraged and accelerated.
- ER4 - Base of evidence generated. Evidence of effective and efficient adaptation practices, products and technologies generated as a basis for the implementation of entities and other funds to assess the expansion

F. Include a budget, including a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

Activity	1	2
COMPONENT 1 - Development of the Technolo		
Activity 1.1: Develop the basic and detailed engineering blueprint of the preliminary prototypes of two embodiments of the floating breakwater to be tested in a wave generating tank or pool. Build the prototypes		
Activity 1.2: Preliminary Proof of concept of both breakwater embodiment prototypes in wave tank or pool in order to test basic hypothesis and operational philosophies and develop film for discussions with major stakeholders. Select the most efficient embodiment of the two prototypes		
Activity 1.3: Develop the basic and detailed engineering blueprint of the robust prototype to be tested in wave tank or pool including the design and testing of an anchorage system. Build the prototype		
Activity 1.4: Carry out all necessary testing of second prototype in wave tank or pool including the design and testing of an anchorage system, deployment and removal operational procedures and measure wave energy reduction efficiencies		
COMPONENT 2 - Selection of the beach commun		
Activity 2.1: Selection of the coastal community to test the new pilot adaptation technology		
Activity 2.2: Consultation and awareness and training of the coastal community where new pilot adaptation technology will be tested		
Activity 2.3: Selection of the site in the coastal community where the new pilot adaptation technology will be tested		
COMPONENT 3 - Pilot test of prioritized adaptatio		
Activity 3.1: Preliminary Environmental Assessment Evaluation to test the floating dynamic breakwater technology in the pilot community		
Activity 3.2: Based on the research results, make design modifications to adapt the technology to best practices, including additional features and hardware to the basic breakwater concept. Rebuild a robust larger prototype with design modifications included to be tested in the pilot community		
Activity 3.3: Performing all the necessary tests of the prototype in the selected community, including the operational procedures of technology placement		
Activity 3.4: Development of a preliminary operating manual		
Activity 3.5: Development of final research and development reports		
COMPONENT 4 - Knowledge manag		
Activity 4.1: Workshop to disseminate lessons learned for NIEs and focal points of the Adaptation Fund in the Caribbean Islands		

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Activity	MONTHS 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total Costs to be Financed by AF
COMPONENT 1 - Development of the Technology including the Prototype for Testing at a Wave Tank Facility																			
Activity 1.1: Develop the basic and detailed engineering blueprint of the preliminary prototypes of two embodiments of the floating breakwater to be tested in a wave generating tank or pool. Build the prototypes																			TO BE FINANCED BY THE COMPANY
Activity 1.2: Preliminary Proof of concept of both breakwater embodiment prototypes in wave tank or pool in order to test basic hypothesis and operational philosophies and develop film for discussions with major stakeholders. Select the most efficient embodiment of the two prototypes																			TO BE FINANCED BY THE COMPANY
Activity 1.3: Develop the basic and detailed engineering blueprint of the robust prototype to be tested in wave tank or pool including the design and testing of an anchorage system. Build the prototype																			TO BE FINANCED BY THE COMPANY
Activity 1.4: Carry out all necessary testing of second prototype in wave tank or pool including the design and testing of an anchorage system, deployment and removal operational procedures and measure wave energy reduction efficiencies																			TO BE FINANCED BY THE COMPANY
COMPONENT 2 - Selection of the beach community in Dominican Republic where the pilot testing will take place																			
Activity 2.1: Selection of the coastal community to test the new pilot adaptation technology																			35.410
Activity 2.2: Consultation and awareness and training of the coastal community where new pilot adaptation technology will be tested																			20.800
Activity 2.3: Selection of the site in the coastal community where the new pilot adaptation technology will be tested																			13.350
Activity 2.4: Definition of a Mechanism to Transfer a % of the Royalties received by the Dominican Republic Private Company for the Sales of the Technology to a Non-Profit entity to be identified in the selected Coastal Community																			6.800
COMPONENT 3 - Pilot test of prioritized adaptation technology in the selected community in Dominican Republic																			
Activity 3.1: Preliminary Environmental Assessment Evaluation to test the floating dynamic breakwater technology in the pilot community																			31.800
Activity 3.2: Based on the research results, make design modifications to adapt the technology to best practices, including additional features and hardware to the basic breakwater concept. Rebuild a robust larger prototype with design modifications included to be tested in the pilot community																			80.500
Activity 3.3: Performing all the necessary tests of the prototype in the selected community, including the operational procedures of technology placement																			19.700
Activity 3.4: Development of a preliminary operating manual																			6.200
Activity 3.5: Development of final research and development reports																			6.200
COMPONENT 4 - Knowledge management to capture and disseminate lessons learned																			
Activity 4.1: Workshop to disseminate lessons learned for NIEs and focal points of the Adaptation Fund in the Caribbean Islands																			5.100
Total Project Costs without Execution Fees																			225.860
IDDI Cost of Execution (1,5%)																			3.388
Total Costs of Project																			229.248
IDDI Cost of Implementation (8,5%)																			19.486
TOTAL																			*248.734*

G. Include a disbursement schedule with time-bound milestones

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	Upon signature of Agreement	Dis
Schedule date	jun-21	
Program funds	70,350	
Implementing Entity Fee	9,382	
Total	**79,732**	

	Upon signature of Agreement	1st Disbursement	2nd Disbursement	3rd Disbursement	Total (US$)
Schedule date	jun-21		oct-21	may-22	
Program funds	77,505		146,566	5,177	229,248
Implementing Entity Fee	6,588		12,458	440	19,486
Total	**84,093**		**159,024**	**5,617**	**248,734**

Milestones of the project:

a) Presentation of the statutes and documents of the company in the United States where the Dominican company of technological development has 49%;
b) Filing of the two provisional applications for patents in the United States (the USPTO);
c) Presentation of the results of the floating dynamic breakwater prototype laboratory test at a wave tank or facility;
d) Presentation of the selection report, sensitization of the pilot community where the minimum viable product and the specific placement and operation site will be tested;
e) Presentation of the results of the floating dynamic breakwater prototype test in the selected community;
f) Presentation of the Preliminary Operation Manual of the floating dynamic breakwater prototype; and
g) Presentation of final reports and report the workshop to disseminate lessons learned for NIEs and focal points of the Adaptation Fund in the Caribbean Islands.

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

A. **Record of endorsement on behalf of the government**

(Enter Name, Position, Ministry) *Orlando Jorge Mera, National Designated Authority, Minister, Ministry of Environment, Dom. Rep.*	Date*: (January 18, 2021)*

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 (National Development Strategy, National Communications to UNFCCC, National Policy on Climate Change, and Dominican Republic's National Action Plan for Climate Change Adaptation) 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.	
David Luther, Executive Director, Dominican Institute of Integral Development -IDDI Implementing Entity Coordinator	
Date: *(January, 12, 2021)*	Tel. and email: +18095341077/ dluther@iddi.org
Project Contact Person: David Luther (Executive Director)	
Tel. And Email: +18095341077/ dluther@iddi.org	

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Deleted: *Pedro Garcia*

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Deleted: *Director of Climate Change*

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ADAPTATION FUND

República Dominicana

Santo Domingo, D.N.
Enero 18 de 2021

A: Junta Directiva del Fondo de Adaptación
c/o Secretaría de la Junta Directiva
correo: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Asunto: No objeción a los proyectos de pequeñas subvenciones de acceso directo "Fortalecimiento de un Micro Ecosistema Replicable para el Desarrollo Acelerado de Tecnologías para la Adaptación al Cambio Climático de la República Dominicana – Fase 1 – Tecnología Rompeolas Flotante Dinámica Modular Disruptiva".

En mi capacidad de Autoridad Nacional Designada para el Fondo de Adaptación en la República Dominicana, confirmo que la propuesta de subvención nacional citada en el asunto está de acuerdo con las prioridades del gobierno, al implementar actividades de adaptación para reducir los efectos adversos y riesgos del cambio climático en el país.

En ese sentido, me complace endosar la propuesta de subvención con el apoyo del Fondo de Adaptación. De ser aprobado, el proyecto será implementado por el Instituto Dominicano de Desarrollo Integral (IDDI) y ejecutado por el Ministerio de Medio Ambiente y Recursos Naturales y ONGs locales.

Muy atentamente,

Milagros De Camps
Viceministra de Cooperación Internacional
Ministerio de Medio Ambiente y Recursos Naturales

MINISTERIO DE MEDIO AMBIENTE Y RECURSOS NATURALES
GOBIERNO DE LA REPÚBLICA DOMINICANA
VICEMINISTERIO DE COOPERACIÓN INTERNACIONAL

ADAPTATION FUND

Dominican Republic

January 18, 2021

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

Subject: Endorsement for the small grants projects through direct access modality entitled "Strengthening of a Replicable Micro Ecosystem for Accelerated Development of Technologies for Climate Change Adaptation of the |Dominican Republic - Phase I - Disruptive Modular Dynamic Floating Breakwater Technology".

In my capacity as designated authority for the Adaptation Fund in Dominican Republic, I confirm that the above national grant 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 Dominican Republic.

Accordingly, I am pleased to endorse the above grant proposal with support from the Adaptation Fund. If approved, the project will be implemented by Dominican Institute of Integral Development (IDDI) and executed by the Ministry of Environment and Natural Resources; and community-based NGOs.

Sincerely,

Milagros De Camps
Viceminister of International Cooperation
Ministry of Environment and Natural Resources