CORAL REEF RESTORATION PROGRAM

RG-T2381

CERTIFICATION

I hereby certify that this operation was approved for financing under the Sustainable Energy and Climate Change Initiative (SECCI-SCI) through a communication dated on November 20, 2013 signed by Gerhard Lair, ORP/GCI. Also, I certified that resources from the Energy and Climate Change Initiative (SCI) are available for up to US$665,000 in order to finance the activities described and budgeted in this document. This certification reserves resources for the referenced project until November 29, 2013. The commitment and disbursement of these resources shall be made only by the Bank in US Dollars. The same currency shall be used to stipulate the remuneration and payments to consultants, except in the case of local consultants working in their own borrowing member country who shall have their remuneration defined and paid in the currency of such country. No resources of the Fund shall be made available to cover amounts greater than the amount certified herein above for the implementation of this operation. Amounts greater than the certified amount may arise from commitments on contracts denominated in a currency other than the Fund currency, resulting in currency exchange rate differences, for which the Fund is not at risk.

ORIGINAL SIGNED — 11/25/2013

Sonia M. Rivera
Chief
Grants and Co-Financing Management Unit
ORP/GCM

Date

APPROVAL

Approved by : ORIGINAL SIGNED — 11/27/2013

Walter Vergara
Division Chief
Climate Change and Sustainability Division
INE/CCS

Date

TC DOCUMENT
Coral Reef Restoration Project (RG-T2381)

I. BASIC INFORMATION FOR TC

▪ Country/Region:	Caribbean
▪ TC Name:	Coral Reef Restoration Program
▪ TC Number:	RG-T2381
▪ Team Leader/Members:	Team Leader: Gerard Alleng (INE/CCS); Team members: Walter Vergara (INE/CCS), Alfred Grunwaldt (INE/CCS), Sara Valero (INE/CCS), Ines Ferreira (INE/CCS), Michele Lemay (INE/RND), Javier Bedoya (LEG/SGO) and Milagros de Pomar (INE/CCS).
▪ Taxonomy	Research and Dissemination
▪ Date of TC Abstract authorization:	July 23rd 2013
▪ Beneficiary:	Belize and Jamaica
▪ Executing Agency and contact name:	Inter-American Development Bank, through its Climate Change and Sustainability Division (INE/CCS)
▪ Donors providing funding:	Fund for the Sustainable Energy and Climate Change IDB Special Program (SCI)[1]
▪ IDB Funding Requested:	US$665,000
▪ Local counterpart funding, if any:	US$165,000 (Provided in kind by the Caribbean Community Climate Change Center who will serve as a partner in the implementation of the program) [2]
▪ Disbursement (and execution) period:	22 months of disbursement, 18 months of execution.
▪ Required start date:	December 1st 2013
▪ Types of consultants:	Firms and Individual consultants
▪ Prepared by Unit:	INE/CCS
▪ Unit of Disbursement Responsibility:	INE
▪ TC Included in Country Strategy (y/n): ▪ TC included in CPD (y/n):	N N
▪ GCI-9 Sector Priority:	The project contributes to the following GCI-9 lending target: Climate change, sustainable (including renewable) energy, and environmental sustainability

II. OBJECTIVES AND JUSTIFICATION OF THE TC

2.1 The objective of this technical cooperation (TC) is to address knowledge gaps in the capability of coral species to survive climatic variation and change and, on this basis, support applied adaptation measures that will improve the resilience of these systems. The operation will involve coral restoration activities being carried out in Belize and Jamaica[3]

[1] Single Window Procedures deemed that other resources were not available for funding, SECCI Fund Eligibility Minutes are available (IDBDOCS38220660).

[2] A letter from the Caribbean Community Climate Change Center specifying this commitment will be required before the execution of the project.

[3] A letter of non-objection from the Planning Institute of Jamaica has been received. An official communication from the national liaison agency of Belize will be obtained prior to the initiation of the corresponding activities.

in order to develop a reef restoration program that could be replicated and/or scaled up to benefit other Caribbean countries. The choice of Jamaica and Belize for this program is based on historical and current track record of scientific experience and knowledge robustness on the subject, as well as the availability of research facilities in Jamaica, and the ongoing efforts of applied coral restoration work in Belize.

2.2 Caribbean nations are particularly vulnerable to the effects of climate change as a result of their small land masses, concentrations of population and infrastructure within narrow coastal zones, economic systems that are highly dependent on natural resources and vulnerable to exogenous shocks and limited institutional and human capacity. Expected impacts of climate change in the Caribbean region for the upcoming years include: (i) sea level rise; (ii) decreased mean annual precipitations; (iii) increased annual temperatures; (iv) increased sea surface temperature; and (v) increased storm activity and intensity. The implications of these changes on the socio-economic and environmental conditions are expected to be significant, which will include degradation of coastal ecosystems.[4]

2.3 Coastal coral reefs have been documented[5] as substantial economic services to coastal communities in the Caribbean. The value of these services, including primary loss in productivity of fisheries, coastal protection, tourism and others, has been estimated in US$5-11 billion/year. These ecosystems have been identified as one of the systems vulnerable (with high confidence) to the impacts of climate change, to the extent that even though impacts may vary across regions and localities, it is virtually certain that these will be overwhelmingly negative.[6] Thermal stresses, low adaptive capacity of coral reef systems together with small variations in sea surface temperatures are projected to increase the frequency of coral bleaching and morbidity.[7] The negative effects of these climate change related impacts will put reefs under additional stress as they are already experiencing anthropogenic stressors such as population growth, over-fishing and pollution increase, which are also likely to increase. Under these and the projected conditions, reefs that are already stressed may not survive or may be degraded to the extent that they could not be considered as functional or healthy. In order to provide some measure of resilience, coral reef rehabilitation practices will have to be implemented together with ecosystem management interventions (e.g. use of Marine Protected Areas).

2.4 The proposed program is consistent with other coral reef related initiatives currently being implemented/developed in the Caribbean region such as: (i) the work undertaken by the Adaptation Fund in Belize on ecosystem-based marine conservation and climate adaptation measures to strengthen the Barrier reef's resilience; and (ii) the Australian Government Overseas Aid Program, which funded the Biodiversity Offsets program for the Caribbean region to promote sustainable development by improving the ability of CARICOM nations to manage coral reefs in a changing climate. The program is also consistent with the region's "*Climate change and the Caribbean: a regional framework for achieving development resilient to climate change (2010-2015),"* a key strategic initiative for

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[4] CARIBSAVE, *Quantification and Magnitude of Losses and Damages Resulting from the Impacts of Climate Change*, available at http://www.caribsave.org/assets/files/SeaLvlRise-UNDP-CARIBSAVE-SummDoc2010.pdf (2012).

[5] Vergara et al, 2009. *The Consequences of Climate-induced Coral Loss in the Caribbean by 2050–2080*. In: Environment Matters at the World Bank. Valuing Coastal and Marine Ecosystems Services. The World Bank, Washington DC.

[6] Intergovernmental Panel on Climate Change, *IPCC Fourth Assessment Report: Climate Change* (2007).

[7] Ibid.

CARICOM nations in building resilience to climate change.[8] In addition, it will be able to provide input into the proposed coral reef restoration component under the loan "Coastal Risk Assessment and Management Program" (2463/OC-BA), currently being implemented by the Bank in Barbados. The project is also linked to the technical cooperation "Piloting the integration of CZM and CC Adaptation in Tobago" (ATN/OC-13321-TT), under which a coral reef early warning system will be installed to monitor changing water conditions.

2.5 The proposed project contributes to the following the Ninth General Increase in the Resources of the Bank (GCI-9) lending target areas: (i) supporting development in small and vulnerable countries; and (ii) climate change, sustainable (including renewable) energy, and environmental sustainability. The operation is also consistent with several priorities outlined in IDB´s Country Strategy with Jamaica (2012-2014)[9] where disaster risk management and climate change adaptation are referred to as cross cutting themes[10] that will help mitigate fiscal and social impacts posed by extreme climatic events.

III. DESCRIPTION OF ACTIVITIES/COMPONENTS AND BUDGET

3.1 **Component 1. Understanding the resilience of corals**: Under this component, the following activities will be developed: (i) identification of species including their genetic structure, that are already naturally self-selecting in the current Jamaican marine environment, on the basis that they are survivors of frequent climatic impacts ranging from storm and bleaching events to increased freshwater runoff. It is noted that the conditions within the Jamaica marine environment represents an extreme situation where stressors to coral reefs including anthropogenic sources are very acute (e.g. heavy overfishing particularly of herbivores; significant coastal development); and (ii) identification of most suitable and cost effective coral culture techniques for the Caribbean under different locational and climate change scenarios. The analytical work will be done at the Discovery Bay Marine Laboratory (DBML), University of the West Indies (UWI) in Jamaica.

3.2 The expected outputs of this component are: (a) increased knowledge about climate change resilient coral species; and (b) identification of most suitable coral culture techniques for restoration of reefs under different locational and climate change scenarios in the Caribbean. The expected outcome of this component is the development of a more robust scientific basis that will support decision making processes in regards to the long term preservation of coral reefs.

3.3 **Component 2. Applied Adaptation:** Under this component, the following activities will be developed: (i) support the implementation and expansion of propagation and restoration practices in identified sites in the Placencia area of Belize and the north coast of Jamaica. The restoration work in Belize will be managed by the non-profit group "Fragments of Hope" that already has successfully implemented coral propagation and restoration measures in the marine protected area of Placencia. The interventions in Jamaica will consist of a limited propagation and restoration exercise led by the DBML in collaboration with Fragments of Hope; and (ii) development of a juvenile coral rearing program for spawners at the DBML, UWI; Jamaica. Special attention will be paid to slow growing corals as these are a natural part of the ecosystems and are important in order to ensure diversity.

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[8] Information on linkages with initiatives in Jamaica, Belize and the Caribbean region.

[9] The Country Strategy for Belize 2013-2017 is currently under preparation.

[10] It is also a cross-cutting theme in the new draft country programming of Belize.

3.4 The expected outputs of this component are: (a) increase of propagation and restoration work in the Caribbean; and (b) creation of a program for rearing juvenile corals in order to ensure sustainability of efforts and maintain diversity. The expected outcome of this component will be an expanded area of restored reef within the selected program areas and a start up on a seed bank for corals.

3.5 **Component 3. Information dissemination**: This component will be comprised of the following activities: (i) dissemination of information (including best practices of propagation techniques and lessons learned) from components 1 and 2 to research institutions and laboratories and public sector entities with a mandate for coral reef protection or coastal zone management in the Caribbean, through technical workshops; (ii) development and implementation of a public education program for schools and communities in Belize and Jamaica in order to raise awareness and community engagement in coral reef preservation and restoration; and (iii) a campaign to help increase private sector involvement in the coral reef restoration efforts. A cost/benefit analysis of the services provided by reefs in the immediate restoration sites will be carried out to demonstrate to the private sector the benefits of preserving and restoring these ecosystems. The information dissemination work will be done at the DBML, UWI, in close collaboration with the non-profit group "Fragments of Hope" in Belize.

3.6 The expected outputs of this component are: (i) increase in the exchange of communication and information on restoration in the region; (ii) an education program for schools and communities on coral reefs; and (iii) an awareness program for the private sector on the benefits of reef restoration and preservation. The main outcome of this component will be a better understanding among communities, private sector and academia of coral reefs and the importance of preserving them in a changing climate.

Indicative Results Matrix									
	Unit	**Baseline**		**Year 1**		**Year 2**		**Expected Completion Date**	**Data Source**
		Value	**Year**	**Planned**	**Actual**	**Planned**	**Actual**		
Number of studies on the resilience of coral reefs	**#**	**0**	**2014**						
• # of studies on corals resiliency	#	0	2014	1				January 2015	
• # of resilient species identified	#	0	2014	5		5		January 2015	
Number of applied adaptation programs developed/expanded	**#**	**0**	**2014**						
• # of restoration sites supported in Belize and Jamaica	#	0	2014	1		1		September 2015	
• # of juvenile coral rearing programs developed in Jamaica	#	0	2014	1				June 2015	
Number of knowledge transfer program	**#**	**0**	**2014**						

developed									
• # of workshops carried out to disseminate the findings of the project	#	0	2014	1		1		September 2015	
• # of public education programs established for schools and communities	#	0	2014	1		1		June 2015	
• # of sensitization campaigns established to raise awareness among the private sector	#	0	2014	0		1		March 2015	

3.7 The estimated total cost of this TC is US$830,000, with US$665,000 to be financed with non-reimbursable resources from the Bank, and a local counterpart contribution of US$165,000 (in kind), to be provided by the Caribbean Community Climate Change Centre (CCCCC) in Belize.

Activity/Component	Description	IDB Funding (US$)	Counterpart Funding (US$)	Total Funding (US$)
Component 1: Understanding the resilience of corals Activity 1. Identification of resilient coral species.	(i) Identification of most resilient species in terms of pH, temperature, wave action and sea level rise, including their genetic structure.	125,000	-	**125,000**
Activity 2. Analysis of most suitable and cost effective coral culture techniques for the Caribbean.	(ii) Identification of most suitable and cost effective coral culture techniques for the Caribbean.	30,000		**30,000**
Component 2: Applied Adaptation Activity 1. Support to propagation sites in Belize and Jamaica	(i) Support provided to restoration sites in the Placencia area of Belize and Jamaica	240,000	165,000	**405,000**
Activity 2. Development of juvenile coral rearing program for spawners.	(ii) Program for the rearing juvenile corals to maintain ecological and structural diversity within coral reefs.	70,000	-	**70,000**
Component 3: Information Dissemination Activity 1. Dissemination of coral restoration practices and programs	(i) Information generated from the genetic and adaptation work will be disseminated to public sector entities, research institutions and laboratories in the Caribbean	40,000	-	**40,000**
	(ii) Development of a school and communities public awareness program	30,000	-	**30,000**

	(iii) Private sector involvement campaign	50,000	-	**50,000**
Project Coordination	For the management of the project.	30,000	-	**30,000**
Sub-Total		615,000	165,000	780,000
Administrative Budget (Monitoring and Evaluation)		50,000	-	**50,000**
TOTAL		**665,000**	**165,000**	**830,000**

3.8 **Monitoring and evaluation:** The work of the consultants and their compliance with the Terms of Reference (TOR) for this project will be monitored by INE/CCS and independently evaluated. This project will be evaluated on the basis of the intermediary and final products listed in the TOR. The TOR will detail the contents expected in the various reports, and adherence to the requirements in the TOR will be ensured by the project team and supported by a Technical Advisory Committee (TAC) comprised of members of the CCCCC, UWI personnel from Jamaica, Barbados and Trinidad & Tobago, and at least one additional coral reef specialist (to be identified).

3.9 **Technical and basic responsibility:** INE/CCS will have technical supervision of the program in collaboration with INE/RND, and basic responsibility for the execution of the Program. The IDB Country Offices in Jamaica (CJA) and Belize (CBL) will have the responsibility for field supervision (when necessary) of the consulting services to be contracted in coordination with the INE/CCS and INE/RND. The main contacts in CJA and CBL will be the Operations Analyst in Jamaica and, in Belize's case, the resident RND specialist assisted by the Operations Analyst.

IV. EXECUTING AGENCY AND EXECUTION STRUCTURE

4.1 **Executing agency:** This operation will be Bank executed by the Climate Change and Sustainability Division (INE/CCS). The **Caribbean Community Climate Change Centre (CCCCC)** will be a partner in the implementation of the program providing in kind support to the program. CCCCC has previous experience working in the region on coral reef preservation and restoration related projects and has ongoing coral reef program that has synergies with the proposed program. It will provide input into the technical reports and will be part of the Technical Advisory Committee. The Bank will ensure that activities and products are delivered and implemented in a timely manner and meet all quality requirements. INE/CCS will have the role of overall supervision and implementation of the project and will also provide technical support to the counterparts, the activities and the products. All of the products will be subject to quality control by the project team.

4.2 **Executing structure:** INE/CCS will be responsible for the execution of the program, and for hiring the consulting services and monitoring of the TC. For the implementation of the proposed work, the DBML at UWI Jamaica, and Fragments of Hope Ltd in Belize, will be contracted under single sourced selection procurement for both entities. The DBML has exceptional institutional and human capacity to undertake the analytical work required given its history in the field of coral reef research in Jamaica and the Caribbean.[11] The DBML has over 40 years of experience in the field of coral reef ecology and has the associated onsite (i.e. laboratory facilities, database center) and offshore (operates within a marine protected area) resources to facilitate the successful execution of activities related to this TC. This is in agreement with the Bank's document GN-2350-9, paragraph 3.10 (Section III), in consideration of the appropriateness of a single-source selection when a

[11] Recent related projects of the DBML can be found at: http://www.uwimona.edu.jm/cms/research.html

firm has experience of exceptional worth for the assignment. Fragments of Hope has been involved in the successful propagation of corals in southern reef areas of Belize for the past 7 years, with restoration sites established at Laughing Bird Caye, Placencia, that have demonstrated stability and survivability. The methodology developed under the program is applicable to other reef areas in the region and has been disseminated through various training workshops.[12] The support and utilization of the Fragments of Hope program under the TC is in agreement with GN-2350-9, paragraph 3.10 (Section III), in consideration of the appropriateness of a single-source selection when a firm has experience of exceptional worth for the assignment.

4.3 **Procurement:** The project will finance different consultancies to be carried out by the consulting firms previously identified. Given the technical nature of the tasks to be undertaken there are no other consulting firms/institutes that can adequately perform these tasks to international standards. For the selection and contracting of individual consultants, the project team will apply the norms of IDB Human Resources and for consulting firms and for logistic expenses will apply the Policies for the Selection and Contracting of Consultants Financed by the Bank (GN-2350-9). No exceptions to these policies are foreseen.

V. MAJOR ISSUES

5.1 The main risks that the team has anticipated for the project are: (i) the expected products may not meet the quality criteria required for this project. To mitigate this risk it will be ensured that the TAC closely provides oversight over the work of the consultants and exhaustively reviews the products to ensure the required quality; and (ii) difficulty in collaboration as consultants are located in Belize and Jamaica which presents a challenge to ensure the mutually beneficial aspect of the project in terms of knowledge transfer, activity implementation and communication. This will be mitigated by having the project executed by the Bank which will act as the intermediary and facilitator.

VI. EXCEPTIONS TO BANK POLICY

6.1 There are no exceptions to any of the Bank's policies.

VII. ENVIRONMENTAL AND SOCIAL STRATEGY

7.1 It is not anticipated that the activities to be financed in this TC will have negative direct social or environmental impacts. According to the Bank's Safeguards Screening Toolkit (see Safeguard Policy Filter and Safeguard Screening Forms), this operation's classification is "C": (i) no environmental or social risks; (ii) direct contribution to solve an environmental issue".

ANNEXES

Annex I. Terms of Reference.
Annex II. Procurement Plan.

[12] http://fragmentsofhopebelize.files.wordpress.com/2013/07/casestudy.pdf

TERMS OF REFERENCE

CORAL REEF RESTORATION PROGRAM – UNDERSTANDING THE RESILIENCE OF CORALS

RG-T2381

I. BACKGROUND

1.1 Caribbean nations are particularly vulnerable to the effects of climate change as a result of their relative isolation, small land masses, concentrations of population and infrastructure in coastal areas, limited economic bases, high dependence on international tourism and climate-sensitive ecosystems and limited financial, technical, and institutional capacity for adaptation. Expected impacts of climate change in the Caribbean region for the upcoming years include: (i) sea level rise (SLR); (ii) decreased mean annual precipitations; (iii) increased annual temperatures; (iv) increased sea surface temperature; and (v) increased storm activity and intensity. The implications of these changes on the socio-economic and environmental conditions are expected to be significant, which will include degradation of coastal ecosystems.

1.2 Coastal Coral reefs have been documented (Vergara et al, 2009) substantial economic services to coastal communities in the Caribbean. The value of services provided by corals in the Caribbean, including primary loss in productivity of fisheries, coastal protection, tourism and others has been estimated in US$5-11 billion/year. These ecosystems have been identified as one of the systems vulnerable (with high confidence) to the impacts of climate change, to the extent that even though impacts may vary across regions and localities, it is virtually certain that these will be overwhelmingly negative. Thermal stresses, low adaptive capacity of coral reef systems together with small variations in sea surface temperatures are projected to increase the frequency of coral bleaching and morbidity. The negative effects of these climate change related impacts will put reefs under additional stress as they are already experiencing anthropogenic stressors such as population growth, over-fishing and pollution increase, which are also likely to increase. Under these and the projected conditions, reefs that are already stressed may not survive or may be degraded to the extent that they could not be considered as functional or healthy. In order to provide some measure of resilience, coral reef rehabilitation practices will have to be implemented together with ecosystem management interventions (e.g. use of Marine Protected Areas).

1.3 In light of this context, the Climate Change and Sustainability Division (INE/CCS) of the Inter-American Development Bank (IDB) has developed a program with the objective of addressing knowledge gaps in the capability of coral species to survive climatic variation and change, such as sea level rise and increased acidity, and on this basis support adaptation measures that will improve the resilience of these systems. The operation will involve activities being carried out in Belize and Jamaica in order to develop a reef restoration program that could be replicated and/or scaled up to benefit other Caribbean countries.

II. CONSULTANCY OBJECTIVES

2.1 The objective of this consultancy is to: (i) identify coral species, including their genetic structure, that are already naturally self-selecting in the current Jamaican marine

environment, on the basis that they are survivors of frequent climatic impacts ranging from storm and bleaching events to increased freshwater runoff; (ii) to select most suitable and cost effective coral culture techniques for the Caribbean under different locational and climate change scenarios; (iii) to develop a juvenile coral rearing program for spawners (paying special attention to slow growing corals) at the Discovery Bay Marine Laboratory of the University of West Indies (UWI) in Jamaica; (iv) to lead on the undertaking of a limited propagation and restoration exercise for the northern coast of Jamaica; and (v) contribute to the information dissemination component of the program in collaboration with other stakeholders.

2.2 Type of consultancy: Consulting Firm. The amount of the contract includes all expenses that might incur during the development of this assignment (i.e. gathering of data, travel, printing and publishing of the report, etc).

2.3 Duration: 18 months.

2.4 Place of work: the consultancy will take place in the firm's country of origin and in Belize.

2.5 Means of payment: Remuneration will be processed as defined in section VI "Schedule of Payments".

III. ACTIVITIES AND DELIVERABLES

3.1 The consulting team assigned to this task will collaborate when needed with relevant international and national regional institutions including the Caribbean Community Climate Change Center (CCCCC) and Fragments of Hope (Belize) - and will work in close collaboration with the team at the IDB.

3.2 Specific activities to be undertaken include:

i. Identification of species including their genetic structure, that are already naturally self-selecting in the current Jamaican marine environment, on the basis that they are survivors of frequent climatic impacts ranging from storm and bleaching events to increased freshwater runoff;

ii. Identification of most suitable and cost effective coral culture techniques for the Caribbean under different locational and climate change scenarios;

iii. Development of a juvenile coral rearing program for spawners at the Discovery Bay Marine Laboratory, UWI, Jamaica. Special attention will be paid to slow growing corals as these are a natural part of the ecosystems and are important in order to ensure diversity;

iv. To carry out a limited propagation and restoration exercise for the northern coast of Jamaica;

v. Lead the Information Dissemination Component of the TC program, which will include:

   a. Dissemination of information from the program to public sector entities with a mandate on coral reef protection, coastal zone management or

climate change adaptation, research institutions and laboratories in the Caribbean through technical workshops;

b. Development and implementation of a public education program for schools and communities in Belize and Jamaica in order to raise awareness and community engagement in coral reef preservation and restoration; and

c. Development and implementation of a campaign to help increase private sector involvement in the coral reef restoration efforts. A cost/benefit analysis of the services provided by reefs in the immediate restoration sites will be carried out to demonstrate to the private sector the benefits of preserving and restoring these ecosystems.

vi. The consultant is expected to collaborate with the consultancy firm undertaking the coral restoration activities in Belize; and

vii. Other activities deemed necessary for the successful completion of the work.

3.3 Expected outputs from this consultancy are:

i. Increased knowledge about climate change resilient coral species;

ii. Identification of most suitable coral culture techniques for restoration of reefs under different climate scenarios and locations in the Caribbean. The different proposed techniques will be accompanied by a cost-benefit analyses in order to provide a more informed selection of options;

iii. Creation of a program for rearing juvenile corals in order to ensure sustainability of efforts and maintain diversity;

iv. Increased propagation and restoration work in Jamaica.

v. Improved communication and information exchange systems and practices in the region;

vi. Development of an education program for schools and communities on coral reefs; and

vii. Increased awareness of the private sector in the involvement of reef restoration and preservation.

IV. DELIVERABLES[1]

4.1 The consultancy will be responsible for submitting the following interim and final deliverables:

i. Work plan to be submitted within 3 weeks after signature of the contract.

[1]Every report submitted to the Bank for review must be sent in one electronic file that should include cover, main document, and all annexes in MSWord format and MS Excel where appropriate. All final reports must be submitted to the Bank in one electronic file that should include cover, main document, and all annexes using PDF format. Zip files will not be accepted as final reports, due to regulations from the Records Management Section.

ii. Progress reports (4) to be submitted every four (4) months after the signature of the contract.

iii. Final report to be submitted at the end of the consultancy.

V. SUPERVISION

5.1 The overall supervision of this contract, including approval for payments, will be the responsibility of the Climate Change and Sustainability Division (INE/CCS) through Gerard Alleng, Climate Change Senior Specialist.

VI. SCHEDULE OF PAYMENTS

6.1 The modality for payment of services is a lump sum disbursed according to the following schedule:

i. 20% upon and submission and approval of the work plan.

ii. 30% upon delivery and approval of the first progress report.

iii. 30% upon delivery and approval of the second progress report.

iv.

v. 10% upon delivery and approval of a draft final report.

vi. 10% upon delivery and acceptance by the Bank of a revised final report in which comments and suggestions were taken into account.

VII. QUALIFICATIONS

7.1 Expertise: The proposed team leader must hold a Doctorate Degree in Biology, Environment, Marine Sciences or in a related discipline. A minimum of 10 years of experience on scientific research focused on marine ecosystems, wildlife conservation, climate change and/or environmental issues is required. The candidate must have a proven publication record as well as the ability to lead a team of scientists. Good communication skills and proficiency in English is highly desirable. The proposed team must include, at minimum, the following:

i. Marine biologist/botanist/zoologist with over 10 years of experience working in the Caribbean.

ii. Economist with experience in natural resource valuation and cost-benefit analyses.

iii. Coral reef ecologist with understanding of climate change impacts and adaptation options who has experience in coral reef restoration and/or genetic analyses of coral species.

iv. Education and outreach specialist with a background in marine science and/or coastal zone management.

7.2 Experience: The firm must have access to a wide variety of coral reef resources and no less than 10 years developing research and studies on the genetics of coral reef species, reef restoration and related work. Proven track record on the analysis of

climate change impacts on corals, vulnerability and adaptation measures is required. In addition, the firm should be part of a regional network of research and academic institutions.

7.3 Languages: English.

7.4 Skills: Strong analytical skills on probabilistic hazard assessment, vulnerability assessment, water evaluation, abiotic stress phenotyping, cost-benefit analysis, ability to conduct calculation and assessment on natural hazardous impacts associated with climate change; produce high quality written and visual communication products.

VIII. INDICATIVE BUDGET

8.1 The expected budget for this consultancy is as follows:

Components	**Activities**	**Outputs**	**Cost (US$)**
Component 1: Understanding the resilience of corals	Activity 1. Identification of resilient coral species.	1. Island-wide collection of coral species from different locations. 2. Survey of the status and health of corals (and recruit where needed) on adjoining reefs 3. Monitoring program - monitoring of harvested area to develop a "Recovery Model" for area based on growth rate, area covered and rebound speed. 4. One genome study of coral species (includes laboratory analysis of resilient genets)	125,000
	Activity 2. Analysis of most suitable and cost effective coral culture techniques for the Caribbean.	1. One study of coral culture techniques for restoration to determine suitability and cost effectiveness under different climate scenarios and locations in the Caribbean.	30,000
Component 2: Applied Adaptation	Activity 1. Support to propagation sites in Belize and Jamaica	1. Propagation and restoration program on north coast of Jamaica	40,000
	Activity 2. Development of juvenile coral rearing program for spawners	1. Establishment of in-water nursery with clones of resilient "cla-gens". 2. Establishment of artificial structures at sites of original donor populations with "cla-gens". 3. Monitoring Program of artificial reef structures 4. Production program of coral brood stock and eggs	70,000
Component 3: Information Dissemination	Activity 1. Dissemination of coral restoration practices and programs	1. One technical workshop to disseminate information to public sector entities, research institutions and laboratories in the Caribbean; Three peer reviewed publications	35,000
		2. One public education program for schools and communities in Belize and Jamaica	15,000
		3. One private sector campaign to help increase private sector involvement in the coral reef restoration efforts, including a cost benefit analysis of restoration efforts of coral reefs.	35,000
TOTAL			350,000

TERMS OF REFERENCE
CORAL REEF RESTORATION PROGRAM – APPLIED ADAPTATION
RG-T2381

I. BACKGROUND

1.1 Caribbean nations are particularly vulnerable to the effects of climate change as a result of their relative isolation, small land masses, concentrations of population and infrastructure in coastal areas, limited economic bases, high dependence on international tourism and climate-sensitive ecosystems and limited financial, technical, and institutional capacity for adaptation. Expected impacts of climate change in the Caribbean region for the upcoming years include: (i) sea level rise (SLR); (ii) decreased mean annual precipitations; (iii) increased annual temperatures; (iv) increased sea surface temperature; and (v) increased storm activity and intensity. The implications of these changes on the socio-economic and environmental conditions are expected to be significant, which will include degradation of coastal ecosystems.

1.2 Coastal Coral reefs have been documented (Vergara et al, 2009) substantial economic services to coastal communities in the Caribbean. The value of services provided by corals in the Caribbean, including primary loss in productivity of fisheries, coastal protection, tourism and others has been estimated in US$5-11 billion/year. These ecosystems have been identified as one of the systems vulnerable (with high confidence) to the impacts of climate change, to the extent that even though impacts may vary across regions and localities, it is virtually certain that these will be overwhelmingly negative. Thermal stresses, low adaptive capacity of coral reef systems together with small variations in sea surface temperatures are projected to increase the frequency of coral bleaching and morbidity. The negative effects of these climate change related impacts will put reefs under additional stress as they are already experiencing anthropogenic stressors such as population growth, over-fishing and pollution increase, which are also likely to increase. Under these and the projected conditions, reefs that are already stressed may not survive or may be degraded to the extent that they could not be considered as functional or healthy. In order to provide some measure of resilience, coral reef rehabilitation practices will have to be implemented together with ecosystem management interventions (e.g. use of Marine Protected Areas).

1.3 In light of this context, the Climate Change and Sustainability Division (INE/CCS) of the Inter-American Development Bank (IDB) has developed a program with the objective of addressing knowledge gaps in the capability of coral species to survive climatic variation and change, such as sea level rise and increased acidity, and on this basis support adaptation measures that will improve the resilience of these systems. The operation will involve activities being carried out in Belize and Jamaica in order to develop a reef restoration program that could be replicated and/or scaled up to benefit other Caribbean countries.

II. CONSULTANCY OBJECTIVES

2.1 The objective of this consultancy is to support the implementation and expansion of propagation and restoration practices in identified sites in the Placencia area of Belize

and the north coast of Jamaica. The firm is also expected to contribute to the information dissemination component of the program in collaboration with other stakeholders.

2.2 Type of consultancy: Consulting Firm. The amount of the contract includes all expenses that might incur during the development of this assignment (i.e. gathering of data, travel, printing and publishing of the report, etc).

2.3 Duration: 18 months.

2.4 Place of work: The consultancy will take place in the firm's country of origin.

2.5 Means of payment: Remuneration will be processed as defined in section VI "Schedule of Payments".

III. ACTIVITIES AND DELIVERABLES

3.1 The consulting team assigned to this task will collaborate when needed with relevant international and national regional institutions, primarily the Caribbean Community Climate Change Center (CCCCC) and the University of the West Indies (UWI), Mona Jamaica and will work in close collaboration with the team at the IDB.

3.2 Specific activities to be undertaken include:

i. Undertake reef propagation and restoration work in selected sites in the marine protected area of Placencia (Belize), implementing already successful nursery and restoration techniques and expanding the work to other areas to be identified. The interventions in Jamaica will consist of a limited propagation and restoration exercise led by another consulting firm but this firm will be expected to collaborate and contribute to the efforts being undertaken in Jamaica;

ii. Contribute to the Information Dissemination Component of the program, which could include:

   a. Dissemination of information from the program to research institutions and laboratories in the Caribbean through technical workshops;

   b. Development and implementation of a public education program for schools and communities in Belize and Jamaica in order to raise awareness and community engagement in coral reef preservation and restoration; and

   c. Development and implementation of a campaign to help increase private sector involvement in the coral reef restoration efforts in Belize and Jamaica.

iii. Other activities deemed necessary for the successful completion of the work.

3.3 Expected outputs from this consultancy are:

i. Transfer of knowledge on successful propagation techniques and lessons learnt.

ii. Increased propagation and restoration work in Belize and Jamaica.

iii. Improved communication and information exchange systems and practices in the region;

iv. Development of an education program for schools and communities on coral reefs; and

v. Increased awareness of the private sector in the involvement of reef restoration and preservation.

IV. DELIVERABLES[2]

4.1 The consultancy will be responsible for submitting the following interim and final deliverables:

i. Work plan to be submitted within 3 weeks after signature of the contract.
ii. Progress reports (3) to be submitted every five (5) months.
iii. Final report to be submitted at the end of the consultancy.

V. SUPERVISION

5.1 The overall supervision of this contract, including approval for payments, will be the responsibility of the Climate Change and Sustainability Division (INE/CCS) through Gerard Alleng, Climate Change Senior Specialist.

VI. SCHEDULE OF PAYMENTS

6.1 The modality for payment of services is a lump sum disbursed according to the following schedule:

i. 20% upon and submission and approval of the work plan.
ii. 20% upon delivery and approval of the first progress report.
iii. 20% upon delivery and approval of the second progress report.
iv. 20% upon delivery and approval of a draft final report.
v. 20% upon delivery and acceptance by the Bank of a revised final report in which comments and suggestions were taken into account.

VII. QUALIFICATIONS

7.1 Expertise: The proposed team leader must hold a Bacherlor's Degree in Biology, Environment, Marine Sciences or in a related discipline. A minimum of 10 years of experience in coral reef research and at least five years' experience in coral reef restoration is required. The candidate must have a proven track record of working with international organizations on environmental issues. Good communication skills and

[2]Every report submitted to the Bank for review must be sent in one electronic file that should include cover, main document, and all annexes in MSWord format and MS Excel where appropriate. All final reports must be submitted to the Bank in one electronic file that should include cover, main document, and all annexes using PDF format. Zip files will not be accepted as final reports, due to regulations from the Records Management Section.

proficiency in English is highly desirable. The proposed team must include, at minimum, the following:

i. A community representative with experience in coral reef restoration.
ii. Two representatives from marine research institutions working on coral reefs.
iii. Education outreach specialist with a background in marine science and/or coastal zone management.

7.2 Experience: The firm must have experience in coral reef restoration, working with communities, private sector and governmental institutions on a program of coral reef restoration.

7.3 Languages: English.

VIII. INDICATIVE BUDGET

8.2 The expected budget for this consultancy is as follows:

Components	**Activities**	**Outputs**	**Cost (US$)**
Component 2: Applied Adaptation	Activity 1. Support to propagation sites in Belize and Jamaica	1. Production and installation of eleven nursery tables.	40,000
		2. Out-planting program of coral fragments to reef sites	60,000
		3. Monitoring program of restorations sites (e.g. use of data loggers and ICT system)	100,000
Component 3: Information Dissemination	Activity 1. Dissemination of coral restoration practices and programs	1. Participation in dissemination of information to public sector entities, research institutions and laboratories in the Caribbean;	5,000
		2. Assist and implement a public education program for schools and communities.	15,000
		3. Assist and implement a private sector campaign to help increase private sector involvement in the coral reef restoration efforts.	15,000
TOTAL			235,000

Inter-American Development Bank -VPC/FMP

PROCUREMENT PLAN FOR NON-REIMBURSABLE TECHNICAL COOPERATIONS

Country: Regional (LAC)	**Executing agency:** BID	**Public or private sector:** Public
Project number: RG-T2381	**Title of Project:** Coral Reef Restoration Program	
Period covered by the plan: December 2013- June 2015		
Threshold for ex post review of procurements:	**Goods and works (in US$):**_____	**Consulting services(in US$):**__ 635,000

Item No.	Ref. AWP	Description (1)	Estimated contract cost (US$)	Procurement Method (2)	Review of procurement (ex-ante or ex-post) (3)	Source of financing and percentage		Estimated date of the procurement notice or start of the contract	Technical review by the PTL (4)	Comments
						IDB %	Local/other %			
1		**Consulting Services 1**								
		The objective of this consultancy is to: (i) identify coral species, including their genetic structure, that are already naturally self-selecting in the current Jamaican marine environment, on the basis that they are survivors of frequent climatic impacts ranging from storm and bleaching events to increased freshwater runoff; (ii) select most suitable and cost effective coral culture techniques for the Caribbean under different locational and climate change scenarios; (iii) develop a juvenile coral rearing program for spawners (paying special attention to slow growing corals) at the Discovery Bay Marine Laboratory of the University of West Indies (UWI) in Jamaica; (iv) undertake limited propagation and restoration exercise for the northern coast of Jamaica; and (v) lead on information dissemination for the program in collaboration with other stakeholders.	350,000	SSS	N/A	100	-	Q2 2014		Justification provided in the TC Document (Section IV). Detail of the activities (and its corresponding budget) to be performed from each Component by this Consultancy is included in the TORs.
2		**Consulting Services 2**								
		The objective of this consultancy is to (i) support the implementation and expansion of propagation and restoration practices in identified sites in the Placencia area of Belize and the north coast of Jamaica; and (ii) contribute to the information dissemination component of the program in collaboration with other stakeholders.	235,000	SSS	N/A	100		Q2 2014		Justification provided in the TC Document (Section IV). Detail of the activities (and its corresponding budget) to be performed from each Component by this Consultancy is included in the TORs.
3		**Monitoring and Evaluation**	50,000	QCNI/QCII	N/A	100	-	Q4 2015		
4		**Project Coordination**	30,000	N/A	N/A	100	-	N/A		

Total	665,000	Prepared by: Sara Valero	Date: October 2013	

(1) Grouping together of similar procurement is recommended, such as computer hardware, publications, travel, etc. If there are a number of similar individual contracts to be executed at different times, they can be grouped together under a single heading, with an explanation in the comments column indicating the average individual amount and the period during which the contract would be executed. For example: an export promotion project that includes travel to participate in fairs would have an item called "airfare for fairs", an estimated total value od US$5,000, and an explanation in the Comments column: "This is for approximately four different airfares to participate in fairs in the region in years X and X1".

(2) **Goods and works:** CB: Competitive bidding; PC: Price comparison; DC: Direct contracting.

(2) **Consulting firms:** CQS: Selection Based on the Consultants' Qualifications; QCBS: Quality and cost-based selection; LCS: Least Cost Selection; FBS: Selection under a Fixed Budget; SSS: Single Source Selection; QBS: Quality Based selection.

(2) **Individual consultants:** IICQ: International Individual Consultant Selection Based on Qualifications; SSS: Single Source Selection.

(3) **Ex ante/ex post review:** In general, depending on the institutional capacity and level of risk associated with the procurement, ex post review is the standard modality. Ex ante review can be specified for critical or complex process.

(4) **Technical review**: The PTL will use this column to define those procurement he/she considers "critical"or "complex"that require ex ante review of the terms of reference, technical specifications, reports, outputs, or other items.