

DOCUMENT OF THE INTER-AMERICAN BANK
MULTILATERAL INVESTMENT FUND

TRINIDAD AND TOBAGO

BUILDING ON VETIVER

TT-T1082

DONORS MEMORANDUM

This document was prepared by the project team comprised of: Vashtie Dookiesingh, MIF/CTT, Kavita Maharaj MIF/CTT, Gerard Alleng, CSD/CCS Anna Copplind, GCL/FOM. Ruth Ann Smith DSP/DVF, Greg Watson, CSD/CSD, Laura Natera MIF/GRU

This document contains confidential information relating to one or more of the ten exceptions of the Access to Information Policy and will be initially treated as confidential and made available only to Bank employees. The document will be disclosed and made available to the public upon approval.

CONTENTS

PROJECT INFORMATION	
I.	THE PROBLEM 1
A.	Problem Description 1
II.	THE INNOVATION PROPOSAL 4
A.	Project Description..... 4
B.	Project Results, Measurement, Monitoring and Evaluation 8
III.	ALIGNMENT WITH IDB GROUP, SCALABILITY, AND RISKS 9
A.	Alignment with IDB Group 9
B.	Scalability..... 10
C.	Project and Institutional Risks..... 11
IV.	INSTRUMENT AND BUDGET PROPOSAL 11
V.	EXECUTING AGENCY (EA) AND IMPLEMENTATION STRUCTURE 12
A.	Executing Agency(s) Description 12
B.	Implementation Structure and Mechanism 13
VI.	COMPLIANCE WITH MILESTONES AND SPECIAL FIDUCIARY ARRANGEMENTS 14
VII.	INFORMATION DISCLOSURE AND INTELLECTUAL PROPERTY** 14

PROJECT SUMMARY

TRINIDAD AND TOBAGO

BUILDING ON VETIVER

TT-T1082

In Trinidad and Tobago, competing demands and a lack of a comprehensive land use planning and development mechanism have led to unsustainable utilization, overuse and degradation of the country's land resources. Moreover, extreme climatic events and other natural disasters particularly tropical storms and landslides, have impacted adversely on the land resources of certain regions of the country. Low income and particularly rural communities in Trinidad and Tobago, face the challenges of damage to personal and public property and loss of livelihoods due to land degradation and movement. To address these challenges, IAMovement a nonprofit social and environmental advocacy organization¹ has proposed the pilot testing and empirical evaluation of vetiver systems² as a green bio engineering alternative in the mitigation and prevention of land slippage and erosion, and for rehabilitation of severely degraded lands. The key objective of the project is to demonstrate the economic, social, technical and environmental benefits of a community driven approach to using vetiver as an alternative solution to current practices in prevention and mitigation of soil erosion, land slippage and movement and rehabilitation of a range of terrains. 6-8 project sites in the country's northwestern hillside communities, northeastern quarry sites and southern coastal communities will be selected to test the efficacy of vetiver as an alternative to costly traditional infrastructure solutions. The project is structured to include deployment of 6-8 vetiver installations including 20 acres of degraded quarry lands, training of 50 local community members to propagate, implement and maintain the vetiver plants used, training of 20 women in communities in the design and fabrication of handicrafts using vetiver plants as a sustainable livelihood, development of a rigorous system for monitoring key parameters of the vetiver solution and dissemination of results to key stakeholders in both the public and private sectors positioning vetiver as a viable, cost effective green and sustainable infrastructure solution to rehabilitate degraded terrain and mitigate land erosion and slippage.

This project can be considered innovative as it features the cultivation of vetiver grass to reduce soil erosion, rehabilitate degraded terrain and mitigate land movement, implemented and managed by communities, and evaluated through a robust system for data gathering, analysis and collation to clearly demonstrate the economic, bioengineering and environmental impact of the vetiver system. Vetiver grass has been tested in other contexts and proven itself to be a cost-effective solution to mitigate land movement³ however, this intervention will feature the collection of crucial information on the technical, economic, social and environmental impacts of the solution, contributing to close a key knowledge gap on the benefits and limitations of vetiver's application. The project is aligned with the IDB Lab's Climate Smart Agriculture thematic area and addresses the cross cutting of climate change theme in the IDG's Country Strategy with Trinidad and

¹ [About IAMovement](#)

² The vetiver system is a system of soil and water conservation where the vetiver grass planted in hedgerow formation promotes soil and water conservation, site stabilization slowing rain and runoff. The vetiver system covers other applications including: land rehabilitation and gully control, slope stabilization, disaster mitigation, improvement of the interface of water and structures, water quality, remediation of polluted sites, agricultural uses etc.

³ (Agribusiness Incubator Program University of Hawaii, "Cost of Production and Market Opportunity for Vetiver Grass" 2009.),

Tobago 2016-2020 as well as the strategic objectives of the IDBG Institutional Strategy and IDB Invest's transversal themes related to climate change and environmental sustainability. Additionally, the project is aligned with the following Sustainable Development Goals: 10 Reduced Inequality, 13 Climate Action and 15 Life on Land

ANNEXES

ANNEX I	Results Matrix
ANNEX II	Budget Summary
ANNEX III	iDELTA

APPENDICES

Draft Resolution

AVAILABLE IN THE TECHNICAL DOCUMENTS SECTION OF IDB LAB PROJECT INFORMATION SYSTEM

ANNEX IV	Detailed Budget
ANNEX V	Diagnostic of Needs of the Executing Agency (DNA) [includes Integrity Due Diligence Analysis]
ANNEX VI	Reporting Requirements and Compliance with Milestones and Fiduciary Arrangements
ANNEX VII	Procurement Plan

ACRONYMS AND ABBREVIATIONS

DNA	Diagnostic of Executing Agency Needs
IDB/IDBG	Inter-American Development Bank/Inter-American Development Bank Group
IDB Invest	Inter-American Investment Corporation
IDB Lab	Multilateral Investment Fund
OCHA	United Nations Office for Coordination of Humanitarian Aid
GEF	Global Environmental Facility
EMA	Environmental Management Unit
NQCL	National Quarries Company Ltd
UNDP	United Nations Development Program
TVNI	The Vetiver Network International
IWEco	Integrating Water, Land and Ecosystems Management in Caribbean Small Island Developing States (GEF financed project)

PROJECT INFORMATION

TRINIDAD AND TOBAGO

BUILDING ON VETIVER

TT-T1082

Country and Geographic Location:	Trinidad and Tobago: 6-8 pilot sites in Trinidad within the North West Northern Range, North Eastern quarry sites and coastline and Southern coastal communities		
Executing Agency:	IAMovement		
Focus Area:	Climate Smart Agriculture		
Coordination with Other Donors/Bank Operations:			
Project Beneficiaries:	50 direct beneficiaries will be involved in training opportunities and implementation of the vetiver solutions, 6-8 communities at pilot test sites conservatively include 150-200 indirect beneficiaries		
Financing:	Technical Cooperation:	US\$ 403,000	42%
	Equity:		
	Loan:		
	Other (explain):		
	TOTAL IDB Lab FUNDING:	US\$ 403,000	
	Counterpart:	US\$ 554,350	58%
	Co-financing (if available; include a separate line for IDB Co-financing if applicable):		
	TOTAL PROJECT BUDGET:	US\$ 957,350	100%
Execution and Disbursement Period:	36 months of execution and 42 months of disbursement.		
Special Contractual Conditions:	Special conditions precedent to first disbursement will be: Submission of a signed Memorandum of Understanding between IAMovement and the Environmental Management Authority outlining collaboration on use of vetiver for quarry rehabilitation and selection of a Technical Coordinator		
Environmental and Social Impact Review	This operation was screened and classified as required by the IDB's safeguard policy (OP-703) October 5, 2018. Given the limited impacts and risks, the proposed category for the project is C.		
Unit responsible for disbursements	Trinidad and Tobago Country Office (CCB/CTT)		

I. The Problem

A. Problem Description

- 1.1. In Trinidad and Tobago, competing demands and a lack of a comprehensive land use planning and development mechanism have led to unsustainable utilization, overuse and degradation of the country's land resources. Moreover, extreme climatic events and other natural disasters particularly tropical storms and landslides, have impacted adversely on the land resources of certain regions of the country.⁴
- 1.2. Low income and particularly rural communities in Trinidad and Tobago, as well as other Small Island Developing States in the wider Caribbean, face the challenges of damage to personal and public property and loss of livelihoods due to land degradation and movement. Despite Trinidad and Tobago's energy wealth, a 2013 study by the Commonwealth Foundation estimated poverty levels at 20%⁵.
- 1.3. Key factors contributing to land movement and degradation in Trinidad and Tobago include mining activities, unregulated development in steep hillside communities, informal housing, lack of infrastructure maintenance, and extreme weather events, all of which can result in soil erosion, progressive soil failure, slippage and dramatic land slippage/slides⁶. This phenomenon is amplified by the effects of climate change⁷ manifested in extreme weather events. For example, in Trinidad and Tobago climate change has been manifested primarily in periods of extended drought followed by shorter periods of heavy rainfall. In cases where lands and land cover have been eroded due to extremely dry conditions, heavy rains and attendant flooding regularly destroys crops and personal and public property which is very costly to households. Owners and users of agricultural lands and public buildings/infrastructure such as schools, roads, culverts, water-ways and drainage systems are also affected. Most recently, in October 2018, the United Nations Office for Coordination of Humanitarian Aid (OCHA) and the local Ministry of Rural Development and Local Government reported that over a 4-day period, intense rainfall, attendant coastal and river flooding and landslides impacted 150,000 people (11% of the population) and 4,100 households in Trinidad and Tobago⁸.

⁴ 2005 Report on the State of Land Resources in Trinidad and Tobago Chapter 1

⁵ Commonwealth Foundation, National Report: Trinidad and Tobago (2013). No recent census data has been released for Trinidad and Tobago, as a result, national statistics are not available

⁶ 2005 Report on the State of Land Resources in Trinidad and Tobago Chapter 3 [Link to Report](#)

⁷ [Link to Office of Disaster Preparedness and Management](#)

⁸ [Link to OCHA Infographic](#)

- 1.4. Lands which have been ‘developed’, built-upon, or where natural habitat and vegetation has been otherwise removed, are often also far more susceptible to the processes which cause land movement/erosion. Three (3) geographic areas in T&T which have been increasingly affected by these issues are: (i) watersheds in the northern mountain range of Trinidad, and mountainous parts of Tobago, especially affected by clearing of original forests for agriculture or quarrying (ii) the sapote or “heaving” clay lands of central and south Trinidad, and (iii) coastal areas on the south and east coasts of Trinidad. These areas are typically populated by low income communities engaged in subsistence farming, fishing and other small-scale livelihoods.
- 1.5. In the three (3) geographic examples listed above, the processes for land movement and associated damages differ based on soil characteristics (be it shale, residual soils, or ‘heaving clays’), nature’s forces including rainfall/drought, and proximity to the ocean in cases of coastal erosion. Traditional ways of tackling these issues are “reactive” rather than “preventative”, are often very costly, and carried out ‘after-the-fact’; where those affected often face distress and financial losses while they are forced to helplessly wait for publicly funded civil works to repair damages, often in the form of hard-engineered solutions. Rural communities in Trinidad, due to road and transportation challenges, have limited access to mainstream public services and often must wait days to receive basic assistance in the event of flooding, land slippage and other weather driven incidents. Although the state may provide some level of financial compensation in cases of extreme damage, the amounts paid are minimal at best, and as most low-income households and producers are uninsured, the impact of losses on family and producer livelihoods is significant.
- 1.6. To address these challenges, IAMovement has proposed the pilot testing and empirical evaluation of vetiver systems as a green bioengineering alternative in the mitigation and prevention of land slippage and erosion, and for rehabilitation of severely degraded lands in Trinidad and Tobago. In addition to stabilization of slopes and clay-based terrains, vetiver can be applied to rehabilitate lands degraded by quarrying. The proposed project will therefore introduce, test and demonstrate the use and benefits of vetiver, as a low-cost, green and sustainable, and easy-to-learn technology, in 6-8 test sites across Trinidad to demonstrate its uses and benefits as a sustainable infrastructure solution, as well as a solution for environmental rehabilitation of degraded lands. Test sites will be selected from areas in the country’s northern western hillside watersheds, rural north eastern and southern coastline communities.
- 1.7. In the northwest hillside region potential sites include communities within the country’s northern range, an area whose dominant geological features include river courses and critical watersheds. Communities in these areas are typically involved in hillside cultivation of short-term cash crops such as herbs and vegetables. Development of these informal hillside settlements

and unsustainable (slash and burn) cultivation practices have increased vulnerability to flooding and continued land slippage.⁹

- 1.8. In the northeastern region of the island, test sites will include degraded quarry lands, to demonstrate the contributions which vetiver can make towards a quarry rehabilitation program financed by the Global Environmental Facility (GEF), through the Environmental Management Authority (EMA) and GEF Small Grants Programme, and in partnership with the National Quarries Company Limited (NQCL)¹⁰. The beneficiary communities surrounding quarry sites fall within the Sangre Grande Regional Corporation, which is characterized by a high level of poverty and underdevelopment¹¹. This region of the country is largely rural and consists of 41 communities and a total population of over 65,000 people¹², other than quarry sites which is the dominant economic activity, land is either forested or used for small scale agriculture¹³. This region has consistently been among the poorest regions in the country¹⁴.
- 1.9. In the southern region, coastal sites targeted include Ortoire/Mayaro, a large coastal strip on southeastern border of Trinidad, and Quinam, on the south coast of Trinidad. Rural communities in these areas are characterized by young populations with low levels of education attainment and high unemployment.^{15 16} Data from the Trinidad and Tobago Human Development Atlas indicate that these southern communities are amongst the poorest in the country in terms of household income. The residents of this rural region face challenges accessing basic services and connecting to economic activities due to lack of reliable and cost-effective transportation connecting these communities to the nearest urban centers. Approximately 50% of this area consists of forest reserves with miles of beachfront and river courses. Residents in these communities are typically involved in subsistence agriculture, fishing logging and other micro business.¹⁷ These regions are highly prone to flooding, with a significant storm event in 2015 destroying the

⁹ "Municipality of Diego Martin Local Area Economic profile" Kairi Consultants Ltd.

¹⁰ National Quarries is a state-owned aggregate quarry that has 2040-acre sand and gravel quarry in Guaico, Sangre Grande with an employee base of 150-250 workers

¹¹ "Sixteenth (16th) Report of the Joint Select Committee Appointed to Inquire into and Report on Municipal Corporations and Service Commissions" November 25, 2014

¹² Central Statistical Community Register 2000

¹³ "Sixteenth (16th) Report of the Joint Select Committee Appointed to Inquire into and Report on Municipal Corporations and Service Commissions" November 25, 2014

¹⁴ Poverty data from Central Statistical Office 2012

¹⁵ According to the 2011 census the population of Mayaro/Rio Claro is 35,650 with an almost equal distribution in gender 48% female 52% male.

¹⁶ According to the most recent census only 39% of the population of Mayaro/Rio Claro possesses secondary and post-secondary education, which is 5% lower than what was observed for the national population.

¹⁷ "Mayaro/Rio Claro Regional Corporation Administrative Report. 2012-2013".

main access road and stranding several communities and resulting in significant reconstruction costs.

- 1.10. The introduction of vetiver in Trinidad's northwestern hillsides, northeastern and southern rural communities is a good fit in addressing last mile challenges, in that: (i) communities in rural areas tend to be characterized by poor households living and working in informally constructed structures which are particularly vulnerable, and (ii) subsistence farming or informal livelihoods, like small shop keeping, single car transportation services etc. are the main sources of income and are directly impacted by land movement / erosion and contamination.

II. The Innovation Proposal

A. Project Description

- 2.1. The key objective of the project is to demonstrate the economic, social and environmental benefits of a community driven approach to using vetiver as an alternative solution to current practices in prevention and mitigation of soil erosion, land slippage and movement and rehabilitation of a range of terrains in Trinidad and Tobago. The vetiver system (see paragraph 2.3) was employed by previous generations of hillside farmers in Trinidad and Tobago, but knowledge has been lost over time. IAMovement's associated local company Vetiver TT Ecological Engineering Solutions Ltd, in collaboration with the United Nations Development Program (UNDP), previously developed a model to combine traditional knowledge with bio engineering technology and community training to implement a small-scale pilot using vetiver in a rural hillside farming community (Vetiver Education and Empowerment Project)¹⁸. The results of the project in arresting erosion are visible and recognized by the community, but the financial and technical scope of the project did not include quantitative evaluation of the technical results. With support of the IDB Lab, this system will be tested by IAMovement in 6-8 different terrains in Trinidad's northwestern hillsides, north eastern quarry lands and coastal southern communities to demonstrate and rigorously evaluate the financial, technical, environmental and socio-economic benefits of the model. It is expected that the dissemination and communication of results achieved will encourage adoption of the system as a viable alternative to deliver sustainable infrastructure and environmental management of degraded areas
- 2.2. The project is structured to implement and assess use of vetiver as a green technology for mitigation of land movement as well as in the rehabilitation of degraded areas in Trinidad and Tobago. The implementation will be facilitated by local community members who will benefit from training and capacity building to ensure local ownership and engagement in cultivation, maintenance and management of vetiver systems in selected locations. A

¹⁸[Link to Information on Vetiver Education and Empowerment Project](#)

comprehensive monitoring and evaluation system will be designed and rolled out to measure, collate and report on the impact of the system, and this information will then be used in national and regional dissemination to key public and private stakeholders to encourage wider scale adoption of the system as a sustainable infrastructure solution in a range of terrains. The project results are intended to influence public and private investment in the vetiver system as a green bioengineering alternative to traditional and costly infrastructure repairs as a response to flood mitigation, land movement, erosion and rehabilitation of degraded terrains.

- 2.3. The vetiver system is a unique plant-based solution which uses vetiver grass as a bioengineering tool to solve many land and water related challenges. The best-practice methods for plant propagation, land preparation and installation, and maintenance during establishment are key to the system's success; and correctly implemented it can be used to assist greatly with slope stabilization, erosion control, soil and water conservation, and even phytoremediation¹⁹ (the treatment of contaminated lands and water). This is largely due to the extremely deep and fibrous root system of vetiver grass which can grow up to 10-feet deep within the first 2 years, while the root-systems for most other grasses do not grow much deeper than 1-foot. Studies have also shown that the tensile strength of the roots can be as much as 3-6 times higher than other common species of grass (up to 75MPa), and when correctly implemented, can increase overall strength and slope stability by 40%²⁰. Vetiver grass is also a proven phytoremediator and can absorb a wide range of nutrients and heavy metals. In this regard, vetiver has been used as a means of final-downstream treatment for commercial and industrial waste water facilities, and landfills globally. By testing the vetiver system technology in various physical environments, the data collected will examine how the technology responds to different slope gradients, cuts, different soil types, rainfall events as well as water salinity. Vetiver is a non-invasive, quick growing grass that can grow in various soil conditions and grows well in tropical conditions.²¹ "Once planted in strips the vetiver grass forms a barrier that slows the velocity of water and traps sediment and debris due to its deep root system. After initial planting a single vetiver row quickly multiplies and once propagated correctly it connects to adjoining plants to create a thick and sturdy grass hedge"²² These deep and wide hedges slow and spreads water runoff, forming terrace like benches at the face of the hedges. The species of vetiver that will be used is *Chrysopogon Zizanioides* which is noninvasive.

¹⁹ **Phytoremediation** is the direct use of living green plants for in situ, or in place, removal, degradation, or containment of contaminants in soils, sludges, sediments, surface water and groundwater

²⁰ Agribusiness Incubator Program University of Hawaii, "Cost of Production and Market Opportunity for Vetiver Grass" 2009

²¹ Agribusiness Incubator Program University of Hawaii, "Cost of Production and Market Opportunity for Vetiver Grass" 2009.

²² Agribusiness Incubator Program University of Hawaii, "Cost of Production and Market Opportunity for Vetiver Grass" 2009.

- 2.4. The major benefits of vetiver over conventional engineering are its low cost and longevity. It is estimated that the cost of installation is 30% of the cost of traditional construction methods²³ Additionally, the long-term maintenance costs are low. In contrast to conventional engineering structures, green technology improves as the vegetative cover matures. The plant is capable of surviving for decades with little to no maintenance. Therefore, the use of vetiver is ideal in rural locations where maintenance can be difficult and expensive.
- 2.5. This project can be considered innovative as it features the cultivation of vetiver grass to reduce soil erosion, rehabilitate degraded terrain and mitigate land movement in Trinidad and Tobago, implemented and managed by communities, and evaluated through a system for data gathering, analysis and collation in key areas to clearly demonstrate the economic, bioengineering and environmental impact of the vetiver system. Vetiver grass has been tested in other contexts and proven itself to be a cost-effective solution to mitigate land movement²⁴ however, this intervention will feature the collection of crucial information on the technical, economic, social and environmental impacts of the solution, contributing to close a key knowledge gap on the benefits and limitations of vetiver's application. Rigorous capture analysis and dissemination of key economic, social environmental results of vetiver can demonstrate its use as a green bioengineering solution to address many challenges and damages to natural terrain and infrastructure caused by climate change and unsustainable development practices and can be used to model the system as a sustainable infrastructure solution to support wider adoption and scaling.
- 2.6. Implementation of this innovative model will involve four key interlocking components as follows:
- 2.7. **Component I: Deployment of the Vetiver System solutions (IDB Lab US \$165,790, Counterpart US \$295,450):** This component will focus on the identification and selection of between 6 to 8 sites for implementation of the vetiver system in a range of applications including rehabilitation of abandoned quarry lands; slope stabilization and soil and water conservation to build back topsoil and promote groundwater recharge; coastal and river bank protection to mitigate erosion and flooding; and stabilization of clay based terrains that are susceptible to land movement and attendant damage to roads and other infrastructure. This component will also focus on the engagement and training of groups and individuals within selected communities in the installation and maintenance of the vetiver solution in the targeted sites, thereby building localized knowledge and capacity that will be important for scaling beyond the project. Key outcome indicators will include the implementation of vetiver pilots in 6-8 sites covering 20 acres to demonstrate the application and benefits of the system in various terrains and the training and engagement of approximately 50 persons at community

²³ Troung, Van and Pinners, 2008

²⁴ (Agribusiness Incubator Program University of Hawaii, "Cost of Production and Market Opportunity for Vetiver Grass" 2009.)

level. Although the gender composition of trainees cannot be predicted, results tracking for this indicator will include gender aggregation.

- 2.8. **Component II: Results analysis, monitoring and evaluation (IDB Lab US \$96,000, Counterpart US \$100,000):** The collation of key empirical data on impact of the use of vetiver as an alternative green bioengineering solution is a critical input to influence wider scale adoption by public and private actors. This component will involve the design and implementation of a system for data gathering, analysis and collation in key areas to clearly demonstrate economic, bioengineering and environmental impact of the vetiver pilots. Key parameters to be measured include direct costs of deployment and maintenance, geotechnical, hydrology and engineering data, as well as data on the social and environmental benefits of the system such as carbon sequestration estimates, water quality testing, and topsoil regeneration. The outcome indicator will be the development and implementation of robust monitoring and evaluation system to capture and collate results of the pilot test sites.
- 2.9. **Component III: Sustainable handicrafts and green enterprise development (IDB Lab US \$31,400, Counterpart US \$22,200):** Vetiver plants can provide materials for the fabrication of a range of vetiver handicrafts that can generate income particularly for women in participating communities. This component will focus on training and technical and marketing support for 20 female community members in the design, fabrication of and marketing of crafts made from vetiver plant materials. Participants will also receive training in sustainable approaches to harvesting the materials needed so as not to compromise the vetiver pilot sites as well as in organizing microbusiness for vetiver system implementation and maintenance. The key targeted outcome is that by project completion 30 persons are generating income through craft production as well as/or vetiver propagation and cultivation through the skills and experience acquired.
- 2.10. **Component IV: Knowledge Dissemination for Scaling (IDB Lab US \$23,000, Counterpart US \$49,000) :** This component will focus on the collation and preparation of the impact of the project and the dissemination of results at a national and regional level using short videos and other media as well as use of regional forums, networks and targeted social media channels to ensure effective and efficient dissemination and reach. The Executing Agency will also develop and implement a focused and highly targeted stakeholder engagement and communication strategy for key public and private sector actors specifically designed to deliver the technical and economic data that can make a case for and influence broader adoption of the vetiver solution in public and private infrastructure development programs. The key outcomes include the development of the Vetiver Network West Indies web based platform for knowledge dissemination and engagement/connection of stakeholders in the Caribbean region, as well as presentation of the project in 1 private sector forum for developers, private quarry operators, conservationists, engineers, researchers and community activists, and 1 public sector forum for policy makers, managers and technical staff within the National Quarries Company Limited, the Ministry of Works and Transport, the Ministry of Rural Development and Local Government, the

Ministry of Housing and Urban Development, the Tobago House of Assembly Division of Infrastructure Quarries and Environment, the Environmental Management Authority and the Ministry of Planning and Development as well as relevant international development agencies/partners.

B. Project Results, Measurement, Monitoring and Evaluation

- 2.11. The project demonstrates alignment with the following Sustainable Development Goals: 10 Reduced Inequality, 13 Climate Action and 15 Life on Land.
- 2.12. The key systemic impacts of the project realizable through scaling and replication, will be the rehabilitation of degraded lands (such as quarries), and the increased resilience of coastal and clay-based areas/communities to flooding and erosion. The project supports reducing vulnerability of low-income communities to loss of property and livelihoods associated with land movement, erosion and attendant flooding caused in periods of intense rainfall. Levels of crop losses are expected to be reduced, as rehabilitated land will be less prone to erosion and flooding. Targeted areas include abandoned quarry sites in the south east of Trinidad where approximately 20 acres of degraded and vegetation-free quarry land will be rehabilitated, and 15-20 community members will be trained and certified as “Quarry Rehabilitation Champions”. These persons will learn all about the vetiver system for use in protecting their private and surrounding public lands but will also be trained in its specific use to rehabilitate degraded quarry lands; as well as complementary processes such as biomass mulching to create topsoil and retain soil moisture.
- 2.13. Implementation of the vetiver system will also include planting of several types of trees that are beneficial in carbon and nitrogen sequestering, as well as indigenous trees of fruiting and hardwood varieties. Throughout the project, a total of 80,000 vetiver plants will be installed in hedgerow formation, and based on comparative estimates, the carbon sequestration resulting from rehabilitated lands may be approximately 200 metric tons, after 5-10 years. 200 trees will also be installed in the quarry site locations, and an estimated 100 tons of waste material (including sawdust, tree and leaf vegetal waste, sargassum seaweed, etc.) will be diverted to these quarry sites and placed correctly for topsoil rebuilding. At other pilot sites included in this project, in the northern range, as well as in a selected area of vulnerable coastline communities where erosion is taking place, an additional 50 community members will be trained and educated in the vetiver system, through educational workshops and direct participation in implementation and maintenance of the pilot project. Training of 20 women in participating communities in design and production of beautiful, useful and zero carbon handicrafts made from vetiver is also another avenue where there is exciting potential for increasing livelihoods of communities.
- 2.14. Based on the project intervention logic and expected impacts 100% of the total IDB Lab funding for this project is invested in climate change mitigation

and adaptation activities according to the [joint MDB²⁵ approach on climate finance tracking](#). This contributes to the IDB Group's goal of increasing the financing of projects related to climate change to 30% of total approvals by the end of 2020.

- 2.15. The project includes a specific component focused on measurement and reporting on results and in addition the project technical coordinator will gather all qualitative and quantitative data to monitor and document project results during project execution. The Project Status Report will be completed by the technical coordinator every six months and will be updated on an ongoing basis as required and the Final Project Status Report will be completed on project close. In addition, a final evaluation will be conducted and will focus on scaling and ensuring sustainability of the intervention beyond the period of IDB Lab's investment.

III. Alignment with IDB Group, Scalability, and Risks

A. Alignment with IDB Group

- 3.1 The project will focus on training members of rural communities at test sites in propagation, implementation and maintenance of the vetiver system. Such communities given their agricultural heritage are very savvy in propagation, installation and care of plants which is translatable into skills required for implementation of vetiver systems. Furthermore, added benefits of soil and water conservation which the vetiver is proven to support, and associated topsoil rebuilding through bio-mass production, are excellent added benefits to rural communities engaged in farming and the project therefore demonstrates an excellent fit with the IDB Lab's Climate Smart Agriculture agenda. The use of the vetiver system to address climate challenges affecting erosion and land movement in rural farming communities is consistent with IDB Lab's focus on applying efficient resources to protect the environment and to implement best available practices and technologies in the mitigation of climate change impacts. The proposed project aligns well with the IDB Lab's portfolio in Climate Smart Agriculture locally and regionally. By way of example, in Trinidad and Tobago, the IDB Lab's current project "Making Agriculture Profitable and Sustainable" (TT-T1073) focuses on improving farming practices to reduce watershed contamination; and in this regard, the vetiver system as a known phytoremediator²⁶ can play a role, where hedgerows can slow down and absorb contaminants in runoff entering both water sources and neighboring lands. The regional IDB Lab/PROADAPT operation in St. Lucia (RG-T2935) is geared towards Climate Resilience Investment in the Agricultural sector, and the proposed project again can play a partnering role, sharing both knowledge and technology.

²⁵ Multilateral Development Bank

²⁶ **Phytoremediation** is the direct use of living green plants for in situ, or in place, removal, degradation, or containment of contaminants in soils, sludges, sediments, surface water and groundwater

- 3.2 The project supports the cross-cutting theme of climate change in the IDBG's Country Strategy with Trinidad and Tobago 2016-2020 and addresses climate risks, specifically flood and erosion which are highlighted in the Country Strategy as affecting Trinidad and Tobago's coastal zones and creating vulnerabilities for physical infrastructure along the coast, including roads and settlements. Additionally, the project is aligned to the IDBG's strategic development challenge of social inclusion and equality and the cross-cutting theme of climate change and environmental sustainability. The project is also aligned with IDB Invest's strategic development objectives, specifically the transversal theme of environmental and social sustainability.
- 3.3 In Trinidad and Tobago, the IDB is also currently exploring a project for "Climate-resilient Coastal Infrastructure and Management" TT-L1054 in Trinidad & Tobago with the Ministry of Works and Transport; findings from the coastal protection pilot portion of this project can potentially demonstrate the efficacy and efficiency of vetiver as a green technology to mitigate coastal erosion. The pilot project also has potential synergies and applications within the IDBG Caribbean Country Department's Sustainable Island's initiative and the Natural Capital Lab. In terms of knowledge, vetiver system complements a growing portfolio of technologies and knowledge needed to address erosion and flooding due to impacts of climate changes such as rising sea levels and extreme drought followed by intense rainfall patterns, in small island states within the wider Caribbean.

B. Scalability

- 3.4 The scaling strategy for the project is to collate and disseminate the cost, environmental, engineering and social impact of utilizing vetiver solutions in a range of terrains in Trinidad and Tobago to demonstrate the benefits of this system to private and public sector stakeholders. In this regard the project is structured to include a dedicated component for measurement of results (Component II) and a dedicated component for knowledge sharing and scaling (Component IV). The project will facilitate the distillation of key data and lessons learned in 3 other applications, specifically quarry lands, coastal areas and low-lying areas with clay-based soil, which will demonstrate and position the technology as a viable option to address land movement, soil erosion and rehabilitation in varying conditions and will assist IAMovement in pursuing other national and potential regional pathways to scale. The results of the project will include a comprehensive analysis of empirical data on the use of the vetiver system as a sustainable infrastructure solution and will be disseminated to targeted private developers and engineers as well as technical and executive managers of key public sector agencies such as the Ministry of Works and Transport (responsible for roads and drainage), the Environmental Management Authority and the Ministry of Planning and Development. In addition, IAMovement will be creating a regional online web-platform called "The

Vetiver Network West Indies”, to aid in connecting stakeholders throughout the Caribbean who are using vetiver or interested implementing this solution.

IV. Project and Institutional Risks

- 4.1 **Project External Risk:** Partners for the project include National Agencies (National Quarries and the Environmental Management Authority); an election resulting in political change could disrupt personal relationships built within these organizations. As a mitigation measure, this project is being launched where there are still 2+ years before elections, which should see the project sufficiently advanced or completed before any political party change
- 4.2 **Social/Technical Risk:** There is a risk that Vetiver pilot sites may be damaged by public agencies responsible for clearing grass and bush on roadsides and public areas. To mitigate this risk, project pilot sites will be clearly marked with appropriate signage.
- 4.3 **Social/Technical Risk:** Members of the community whom are selected to be ‘leads/champions’ do not remain committed and fall-off during the program. This risk will be mitigated by ensuring key project team members as well as partners with established track records and experience in community partnerships, assist in screening, selection of implementation leaders and through delivery of capacity building, coaching and recognition throughout the implementation process
- 4.4 **Institutional Risks:** Institutional risk was assessed as low in the project Diagnostic Needs Assessment. Although IAMovement has demonstrated capacity to implement projects, it is a small organization and the core team will be therefore strengthened by a dedicated technical coordinator to support project implementation, a dedicated resource for monitoring and evaluation and part time external support in fiduciary management

V. Instrument and Budget Proposal

- 5.1 The project has a total cost of US \$957,350 of which US \$403,000 (42%) will be provided by the IDB Lab, and US \$554,350 (58%) by the counterpart.
- 5.2 The instrument to be used is a grant as the project is intended to profile and demonstrate the benefits of vetiver as a sustainable infrastructure solution led by a nonprofit agency IAMovement. IDB Lab financing will be used to pilot and advance the adoption of vetiver grass as a conservation and sustainable infrastructure resource.
- 5.3 Retroactive Recognition of Counterpart Funds. The sum of US \$75,000 expended up to 9 months prior to project approval will be retroactively recognized as counterpart resourcing.

Project Categories	IDB Lab	Counterpart	Total
Component 1: Deployment of the vetiver solution	165,790	295,450	461,240
Component II: Results analysis, monitoring and evaluation	96,000	100,000	196,000
Component III: Sustainable handicrafts and green enterprise development	31,400	22,200	53,600
Component IV: Knowledge Dissemination and Scaling	23,000	49,000	72,000
Project Administration (Executing Unit costs)	71,200	80,200	151,400
Final Evaluation	5,000		5,000
Ex Post Reviews	3,000		3,000
Contingencies	7,610	7,500	15,110
Grand Total	403,000	554,350	957,350
% of Financing	42	58	100

VI. Executing Agency (EA) and Implementation Structure

A. Executing Agency(s) Description

- 6.1 IAMovement will be the Executing Agency of this project and will sign the agreement with the Bank. IAMovement was established in 2014 as a nonprofit by a group of young professionals and entrepreneurs wishing to drive positive social and environmental change in Trinidad and Tobago through education and advocacy and through partnerships to test community level solutions that promote environmental sustainability and climate resilience. IAMovement is governed by a board of directors, the organization is structured to support its key operations in marketing and communications, digital content and social media management, project implementation and recruitment and capacity building for volunteers as well as communities. To date IAMovement has executed projects in partnership with a range of national and multinational partners including most recently (i) piloting the use of Vetiver System for slope stabilization in a hillside agricultural community in partnership with UNDP Small Grants Programme (ii) rehabilitation of lands degraded by quarrying with the Environmental Management Authority (EMA) under the global environmental fund “Integrating Water, Land and Ecosystems Management in Caribbean Small Island Developing States”. (GEF-IWEco) and (iii) Production and dissemination of animated videos educating the population on Energy Efficiency and Renewable Energies in partnership with the National Gas Company of Trinidad and Tobago Based on previous and current experience with the implementation of small-scale vetiver sites, and given the partnerships that have been forged with other relevant national and international actors, IAMovement is ideally positioned to provide the technical leadership in implementing the proposed project

- 6.2 IAMovement is closely affiliated with the Vetiver TT Ecological Engineering Solutions Ltd, a young company specializing in commercial applications of the vetiver solutions. Jonathan Barcant²⁷ one of the key founders of IAMovement is also a co-founder and Managing Director and civil engineer at Vetiver TT Ecological Engineering. Vetiver TT Ecological Engineering Services is focused on commercial applications of vetiver for private and public sector clients and in the scope of this project, will provide technical advice and support to IAMovement and specifically the project team in the implementation of vetiver systems, and in structuring parameters for capture and collation of results.
- 6.3 Jonathan Barcant the key founder of IAMovement is a member of the board of The Vetiver Network International (TVNI), a 25-year old global non-profit organization focused on the sharing of knowledge and expertise on vetiver system applications and benefits. The TNVI will support IAMovement in dissemination and promotion of project results. Additionally, IAMovement is developing a regional online web-platform called “The Vetiver Network West Indies (TVNWI)”, to aid in connecting stakeholders throughout the Caribbean who are using vetiver or interested implementing this solution.
- 6.4 At project sites located in degraded quarry lands, IAMovement will be working in close partnership with the Environmental Management Authority as the implementation partner for the IWEco project as well as with National Quarries Company Ltd; a state enterprise which owns and operates several key quarrying locations in Northeast Trinidad. The EMA through the IWEco project will be providing some counterpart financing for the proposed IDB Lab project.

B. Implementation Structure and Mechanism

- 6.5 IAMovement will establish an executing unit and the necessary structure to execute project activities and manage project resources effectively and efficiently. IAMovement will also be responsible for providing progress reports on project implementation. Details on the structure of the execution unit and reporting requirements are in Annex V in the project technical files.
- 6.6 To ensure focused delivery of the proposed project IAMovement will contract a full-time technical coordinator responsible for the organization, roll out and management of key activities. IAMovement’s board and network will provide technical oversight and quality assurance and will also take the lead in forging and managing partnerships with key stakeholders and communities involved in implementation. In addition, IAMovement will contract a dedicated resource for the roll out and management of the project’s monitoring and evaluation system. This resource will focus on data gathering, collation, analysis and reporting. The project team will also receive support from a part time resource in financial and administrative management requirements of the project.

²⁷ Mr. Barcant has been recognized locally and regionally for his contributions to environmental sustainability and positive social change, most recently he received the 2018 Regional Commonwealth Youth Award for the Caribbean and Americas, for Excellence in Development.

VII. Compliance with Milestones and Special Fiduciary Arrangements

- 7.1 Disbursement by Results, Fiduciary Arrangements. The Executing Agency will adhere to the standard IDB Lab disbursement by results, Bank procurement policy²⁸ and financial management²⁹ arrangements as specified in Annex VI and VII, and any changes or future policy and procedures

VIII. Information Disclosure

- 8.1 **Information Disclosure.** This document contains confidential information relating to one or more of the ten exceptions of the Access to Information Policy and will be initially treated as confidential and made available only to Bank employees. The document will be disclosed and made available to the public upon approval.^{30 31}
- 8.2 **Intellectual Property.** All work financed by the IDB Lab and the results obtained under the Project will be the intellectual property of the IDB. The IDB will grant a non-exclusive and free license to the Executing Agency, including the rights of dissemination, reproduction and publication in any medium of any product. The dissemination, reproduction and publication must indicate that it has been financed by the IDB Lab. For these purposes, any use of the name or logo of the Inter-American Development Bank or the IDB Lab / Multilateral Investment Fund, by the Executing Agency for any purpose, requires prior written authorization from the IDB

²⁸ Link to the Policy: [Procurement of Works and Goods Policy](#)

²⁹ Link to the document [Financial Management Operational Guidelines](#)

³⁰ [Link to the Access to Information Policy](#)

³¹ [Link to the MIF Document Classification](#)