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Report No:

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED {LOAN/CREDIT}

IN THE AMOUNT OF
SDR?? MILLION
(US$10 MILLION EQUIVALENT)

WITH PROPOSED CO-FINANCING FROM CIF IN THE AMOUNT OF
US$15 MILLION

TO THE

GOVERNMENT OF GRENADA

AND ON A

PROPOSED {LOAN/CREDIT}

IN THE AMOUNT OF
SDR?? MILLION
(US$10 MILLION EQUIVALENT)

WITH PROPOSED CO-FINANCING FROM CIF IN THE AMOUNT OF
US$10 MILLION

TO THE

GOVERNMENT OF SAINT VINCENT AND THE GRENADINES

FOR THE

DISASTER VULNERABILITY AND CLIMATE RISK REDUCTION PROJECT

{DATE}

This document is being made publicly available prior to Board consideration. This does not imply a presumed outcome. This document may be updated following Board consideration and the updated document will be made publicly available unless otherwise decided by the Board.

CURRENCY EQUIVALENTS

(Exchange Rate Effective {Date})

Currency Unit = Special Drawing Rights
SDR1.51 = US$1
US$0.66 = SDR1
FISCAL YEAR

January 1 – December 31

ABBREVIATIONS AND ACRONYMS

APL	Adaptable Program Loan
ACP	Africa Caribbean Pacific Program of the European Community
CAPRA	Central American Probabilistic Risk Assessment
CARICOM	Caribbean Community
CAS	Country Assistance Strategy
CCCCC	Caribbean Community Climate Chance Centre
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CCTV	Closed-Circuit Television
CDEMA	Caribbean Disaster Emergency Management Agency
CDERA	Caribbean Disaster Emergency Response Agency
CIDA	Canadian International Development Agency
CIF	Climate Investment Fund
CIMH	Caribbean Institute for Meteorology and Hydrology
CQS	Consultant Quality Selection
CUBiC	Caribbean Uniform Building Codes
CV	Curriculum Vitae
CWSA	Central Water and Sewage Authority
DaLA	Damage and Loss Assessment
DFID	UK Department for International Development
DRM	Disaster Risk Management
RDVRP	Regional Disaster Vulnerability Reduction Project
EA	Environmental Assessment
EC	Eastern Caribbean
ECLAC	Economic Commission for Latin America and the Caribbean
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
ERDMP	Emergency Recovery and Disaster Management Project
FBS	Fixed-Budget Selection
FDI	Foreign Development Investment
FGD	Focus Group Discussion
FM	Financial Management
FY	Fiscal Year
GCM	General Circulation Model
GDP	Gross Domestic Product

GFDRR	Global Facility for Disaster Reduction and Recovery
GIS	Geographic Information System
GNI	Gross National Income
GPS	Global Positioning System
GRENLEC	Grenada Electric Services, Ltd.
HDI	Human Development Index
HQ	Headquarters
IBRD	International Bank for Reconstruction and Development
ICAO	International Civil Aviation Organization
ICB	International Competitive Bidding
IDA	International Development Association
IFC	International Finance Corporation
IFR	Interim Financial Report
IL	Investment Lending
IMF	International Monetary Fund
IS	Implementation Support
ISP	Implementation Support Plan
JICA	Japan International Cooperation Agency
LCS	Least-Cost Selection
M&E	Monitoring and Evaluation
MBI	Maurice Bishop International
MEU	Monitoring and Evaluation Unit
MoFEP	Ministry of Finance and Economic Planning
MoHILPP	Ministry of Housing, Informal Human Settlements, Lands and Surveys, and Physical Planning
MoTW	Ministry of Transportation and Works
NaDMA	National Disaster Management Agency
NAWASA	National Water and Sewage Authority
NCAR	National Center for Atmospheric Research
NCB	National Competitive Bidding
NEMO	National Emergency Management Organization
NERO	National Emergency Response Organization
NOAA	National Oceanic and Atmospheric Adminstration
NPV	Net Present Value
OAS	Organization of American States
OECS	Organization of Eastern Caribbean States
OP/BP	Operational Policy/Bank Procedure
ORAF	Operational Risk Assessment Framework
OUCE	Oxford University Centre for the Environment
PA	Procurement Assistant
PAD	Project Appraisal Document
PAHO	Pan American Health Organization
PCU	Project Coordination Unit
PDO	Project Development Objective
PEFA	Public Expenditure and Financial Accountability
PFM	Public Financial Management

PFS	Project Financial Statements
PPCR	Pilot Program for Climate Resilience
PPF	Project Preparation Facility
PSIPMU	Public Sector Investment Program Management Unit
QBS	Quality-Based Selection
QCBS	Quality- and Cost-Based Selection
RAP	Resettlement Action Plan
RBF	Results-Based Financing
RCM	Regional Climate Model
RPF	Resettlement Policy Framework
RPM	Regional Procurement Manager
RPS	Regional Partnership Strategy
RS	Remote Sensing
SA	Social Assessment
SBD	Standard Bidding Document
SDS	Social Development Specialist
SGU	Saint George's University
SLR	Sea Level Rise
SMEs	Small and Medium Enterprises
SPI	Standard Precipitation Index
STC	Short-Term Consultant
SVG	Saint Vincent and the Grenadines
TOR	Terms of Reference
UNCHS	United Nations Center for Human Settlement
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIFEM	United Nations Development Fund for Women
UWI	University of the West Indies
VINLEC	Saint Vincent Electricity Services Limited

Regional Vice President:	Pamela Cox
Country Director:	Françoise Clottes
Sector Director:	Laura Tuck
Sector Manager:	Guang Zhe Chen
Task Team Leader:	Niels B. Holm-Nielsen

Table of Contents

PAD Data Sheet

OECS Disaster Vulnerability Reduction Project

PROJECT APPRAISAL DOCUMENT

Region: *Latin America and the Caribbean*
Sector Unit: *Urban, Water, and Disaster Risk Management Unit*

Date: Country Director: Françoise Clottes Sector Director: Laura Tuck Sector Manager: Guang Zhe Chen Team Leader: Niels B. Holm-Nielsen Project ID: P117871 Lending Instrument: Horizontal Adaptable Program Loan	Sector(s): Infrastructure (80 percent); Flood Protection (20 percent) Theme(s): Natural Disaster Management (15 percent); Climate Change (65 percent); Other Urban Development (15 percent); Land Administration and Management (5 percent) EA Category: Category B

Grenada RDVRP APL1 Project Financing Data:

Proposed terms:

[ ] Loan [x] Credit [x] Grant [ ] Guarantee [ ] Other:

Source	Total Amount
Total Project Cost:	**US$32,200,000**
Parallel Financing:	
GFDRR	US$1,000,000
Climate Investment Fund (PPCR-regional)	US$2,000,000
Borrower:	US$3,000,000
Total World Bank Financing:	**US$26,200,000**
Climate Investment Fund (PPCR)	US$16,200,000
IDA	US$10,000,000
National	US$3,500,000
Regional	US$6,500,000

Recipient: Grenada
Responsible Agency: Ministry of Finance, Planning, Economy, Energy, and Cooperatives
Contact Person: Timothy Antoine
Telephone No.: +1473 440-2928
Fax No.:
Email: timothy.antoine@gov.gd

Estimated Disbursements (Bank FY/US$ m)

FY	12	13	14	15	16	17
Annual	1	6	7	7	4	1.2
Cumulative	1	7	14	21	24	26.2

Saint Vincent and the Grenadines RDVRP APL2 Project Financing Data:

Proposed terms:

[ ] Loan [x] Credit [x] Grant [ ] Guarantee [ ] Other:

Source	Total Amount
Total Project Cost:	**US$24,000,000**
Parallel Financing:	
GFDRR	US$1,000,000
Climate Investment Fund (PPCR-regional)	US$2,000,000
Borrower:	US$1,000,000
Total World Bank Financing:	**US$20,000,000**
Climate Investment Fund (PPCR)	US$10,000,000
IDA	US$10,000,000
National	US$3,500,000
Regional	US$6,500,000

Recipient: Government of Saint Vincent and the Grenadines
Responsible Agency: Ministry of Finance and Economic Planning
Contact Person: Ms. Laura Anthony-Browne
Telephone No.: +1 784 457-1007
Fax No.: +1 784 456-2430
Email: office.finance@mail.gov.vc

Estimated Disbursements (Bank FY/US$ m)

FY	12	13	14	15	16	17
Annual	1	3	6	6	3	1
Cumulative	1	4	10	16	19	20

Project Implementation Period: September 2011 – August 2016
Expected effectiveness date: September 1, 2011
Expected closing date: August 31, 2016

Does the program depart from the CAS in content or other significant respects?	○ Yes x No
Does the program require any exceptions from Bank policies? Have these been approved/endorsed (as appropriate by Bank management? Is approval for any policy exception sought from the Board?	○ Yes x No N/A ○ Yes x No

Does the program meet the Regional criteria for readiness for implementation?	x Yes ○ No

Program Development Objective: The program aims at measurably reducing vulnerability to natural hazards and climate change impacts in the Eastern Caribbean. The project in Grenada aims at measurably reducing vulnerability to natural hazards and climate change impacts in Grenada and in the Eastern Caribbean. The project in Saint Vincent and the Grenadines aims at measurably reducing vulnerability to natural hazards and climate change impacts in Saint Vincent and the Grenadines and in the Eastern Caribbean.

Program Description:

Component 1 - Prevention and Adaptation Investments. The participating countries would implement a broad spectrum of interventions aimed at building resilience in public buildings and infrastructure.

Component 2 - Regional Platforms for Hazard and Risk Evaluation, and Applications for Improved Decision making and Building Practices. The project would support regional efforts in the Eastern Caribbean to build capacity to conduct assessment of natural risks and integrate such knowledge into policy- and decision-making for development investments, disaster risk mitigation, climate change adaptation and disaster response planning across sectors.

Component 3 – Emergency Recovery and Rehabilitation Mechanism. Following an adverse natural event, and subject to a Government's declaration of emergency in accordance with national law and the submission of a recovery action plan satisfactory to the Association, a participating Government would be able to request the Association to re-categorize financing or provide additional financing to cover early recovery and rehabilitation costs.

Component 4 - Project Management and Implementation Support. Would provide institutional support and capacity development for project management and implementation.

Safeguard policies triggered:	
Environmental Assessment (OP/BP 4.01)	[X] Yes [ ] No
Natural Habitats (OP/BP 4.04)	[X] Yes [ ] No
Forests (OP/BP 4.36)	[ ] Yes [X] No
Pest Management (OP 4.09)	[ ] Yes [X] No
Physical Cultural Resources (OP/BP 4.11)	[X] Yes [ ] No
Indigenous Peoples (OP/BP 4.10)	[ ] Yes [X] No
Involuntary Resettlement (OP/BP 4.12)	[X] Yes [ ] No
Safety of Dams (OP/BP 4.37)	[ ] Yes [X] No
Projects on International Waters (OP/BP 7.50)	[ ] Yes [X] No
Projects in Disputed Areas (OP/BP 7.60)	[ ] Yes [X] No

Conditions and Legal Covenants:

Financing Agreement Reference	Description of Condition/Covenant	Date Due

	The Recipient maintains appropriate staffing for project management	Throughout lifetime of the project
	The Recipient shall submit to the satisfaction of the Bank, an action plan to the Bank documenting: a state of national emergency due to an adverse natural event exist in its territory, list of eligible items to be financed, estimated financing needs, request for re-allocation or additional financing, and proposed implementation plan	Prior to disbursement for Component 3

1. Strategic Context

A. Eastern Caribbean Sub-Regional Context

1. The impacts of climate change are already being felt in the Caribbean. The small island economies are highly vulnerable to natural hazards because of their size, geography, and location. Climate shocks represent a dominant factor driving output fluctuations in the region[1] thus severely affecting development prospects. In the Eastern Caribbean, natural disasters account for on average almost 20 percent of the variance of real GDP growth[2] and the evidence shows that an adverse natural event in one country has a statistically significant spillover effect on neighboring countries in the region.

2. The Eastern Caribbean Central Bank (ECCB) identifies natural disasters as a key factor in contributing to volatility in its foreign reserve earnings. In part to mitigate against this, the ECCB maintains backing ratio of 90-100% of its monetary liabilities with foreign currency assets since the early 1990s, a strategy that has significant opportunity costs for the region.[3] Given the effects of climate change, exposure to natural hazards is likely to increase in the years to come. If current trends continue, US$350-870 million will likely be lost in the sub-region annually between 2015 and 2050 through declining fish catches, reduced tourism, and loss of shoreline protection associated with sea level rise, storm surge, and coral reef degradation.[4]

3. Most recently Hurricane Tomas caused loss of human life and significant economic losses and damages in Saint Lucia and Saint Vincent and the Grenadines in October 2010. Both governments requested World Bank support and financing for reconstruction and rehabilitation of damaged public buildings and infrastructure. The Saint Vincent and the Grenadines Hurricane Tomas ERL was approved by the Board of Executive Directors on January 10 2011, and the Saint Lucia Hurricane Tomas ERL was approved by the Board on March 11 2011.

4. It is therefore of critical importance for the Eastern Caribbean to find ways to achieve economic and social development that is more resilient to the climate they live in. The World Bank is currently supporting Caribbean-led efforts to increase climate resilience and decrease vulnerability to natural disasters. A concerted effort in this regard is taking place under the Caribbean Regional Pilot Program for Climate Resilience (PPCR)[5] which proceeds along two closely linked and complementary tracks (i) country based investments in six CARICOM members states—Haiti, Jamaica, Dominica, Grenada, St. Lucia, and St. Vincent and the Grenadines; and (ii) region-wide activities including data management and monitoring for improving understanding of climate risks and potential impacts, as necessary to take actions to enhance to enhance climate resilience, coupled with activities to tackle risks and vulnerabilities common to all Caribbean countries.

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[1] IMF, Macroeconomic Fluctuations in the Caribbean: the Role of Climatic and External Shocks, July 2009; p.21.
[2] Ibid.
[3] Benson et all, World Bank, Dominica: Natural Disasters and Economic Development in a Small Island State, 2001.
[4] The World Bank Group's Regional Partnership Strategy for the Organization of Eastern Caribbean States (OECS), 2010-2014 (Report #……..), discussed by the Executive Directors on DATE; p. 17
[5] The Pilot Program for Climate Resilience (PPCR) is one of the Climate Investment Funds (CIF) financing adaptation to climate change in IDA countries. The Caribbean Regional PPCR is one of two regional programs; the other regional program is for the Pacific Islands.

B. Sectoral and Institutional Context

4. The Eastern Caribbean has improved its disaster management over the past decade. Nevertheless, Eastern Caribbean governments are not able to manage natural hazard risk and climate risk strategically.[6]

5. A changing climate may further expose existing vulnerability and make the finding of efficient long term solutions more complex. In the short term reducing vulnerability and adapting to climate change should follow a "no regrets approach" where investments could be chosen based on observed vulnerability. In the medium term, there is a need to improve the information base on which national policy makers plan physical development and vulnerability reduction measures in order to strategically guide further vulnerability reduction based on facts and to enable the Eastern Caribbean countries adapt to a changing climate.

6. Assessing risks associated with climate change is complex. The countries in the sub-region must rely on the technical capacity of regional and global agencies for knowledge services and information regarding natural hazard risk and climate change. However, generating knowledge and information at a regional level that is useful for decision making at a national level is institutionally complex and such an approach requires simultaneous and iterative capacity building at both national and regional levels.

7. Due to these challenges, development decisions in the Eastern Caribbean currently do often not integrate disaster resilience and expected climate change impacts in decision-making processes. Responsibilities are dispersed among various government agencies including Ministries of Finance, Planning, Economy, Energy, Works, Physical Development, and Agriculture. Lacking an overall structure for analyzing and integrating risks in the development process, agencies normally operate in a relative information vacuum with limited resources, particularly in their capacity to analyze and integrate risk and climate change management in the development process. Data sharing among agencies is weak, largely due to limited capacity and lack of an overall mechanism to share information with low transaction costs.

C. Higher-Level Objectives to Which the Program Contributes

8. The World Bank Group's assistance to the Eastern Caribbean sub-region for the FY10-14 under the Bank's Regional Partnership Strategy (RPS) focuses on two strategic objectives. These are 1) building resilience and 2) enhancing competitiveness and stimulating growth over the medium term. The RPS notes that among the key challenges facing the sub-region are reducing vulnerability to adverse natural events. Historical data indicates that the sub-regional probability of a hurricane in any given year is approximately 18 percent, and it is widely acknowledged that natural events like hurricanes can cause major economic damage (an exogenous shock) resulting in significant public expenditures.

[6] See Disaster Risk Management in Latin America and the Caribbean Region: GFDRR Country Notes, 2010.

9. This regional program would contribute to vulnerability and risk reduction of the Eastern Caribbean Economic Union through a combination of civil works, capacity building, and institutional development activities at national and regional levels. These activities are designed to improve regional and national resilience to natural hazards and longer-term impacts resulting from climate change.

II. Program Development Objectives

A. Program Development Objectives

10. The program aims at measurably reducing vulnerability to natural hazards and climate change impacts in the Eastern Caribbean.

11. The project in Grenada aims at measurably reducing vulnerability to natural hazards and climate change impacts in Grenada and in the Eastern Caribbean.

12. The project in Saint Vincent and the Grenadines aims at measurably reducing vulnerability to natural hazards and climate change impacts in Saint Vincent and the Grenadines and in the Eastern Caribbean.

B. Program Beneficiaries

13. The program would have benefits for the Eastern Caribbean population in general due to the reduced risk of infrastructure failure and the increased capacity of participating governments to quickly rehabilitate damaged public infrastructure following an adverse natural event during the period of the program. The program would have specific benefits for people living in or using the geographical locations or public infrastructure that would have a reduced risk of failure as a consequence of the project interventions.

14. A successful creation of a regional backbone technology infrastructure that will allow countries and regional technical entities to collaborate on risk evaluations would significantly increase the ability of the participating countries to collaborate around understanding risk and devising risk reduction solutions. An open technology infrastructure would also be to the direct benefit of other countries in the region since once it is created, connecting more countries would be feasible at marginal costs. These regional activites would enable public entities and civil servants to better serve their respective populations through investment decisions that take climate risk into account and through improved physical planning.

15. Monitoring and evaluation mechanisms as well as quantitative and qualitative indicators to measure project progress and impact can be referenced in Annex 1: Results Framework and Monitoring and Annex 3: Implementation Arrangements.

C. Program Results Indicators

16. The achievement of the Program Development Objectives of the Regional Disaster Vulnerability Reduction Program would be measured using the following key indicators:

(a) Reduced risk of OECS population to failure of public buildings and infrastructure due to natural hazards or climate change impacts; and

(b) Increased capacity of OECS governments to identify and monitor climate risk and impacts.

III. Program Description

17. To reduce post disaster capital expenditure requirements, the economic losses due to malfunctioning infrastructure, and the risk of loss of life, participating countries would identify vulnerable structures to be retrofitted or rebuilt. The countries would follow a "no regrets approach" where investments have been chosen based on a high risk of structural failure to the 10 year event (category 1 hurricane, or M7.0 earthquake) in the case of buildings and bridges, or where annual flooding occurs in the case of flood management and urban drainage.

18. In order to address the institutional and technological challenges of generating a fact based ability to improve decision making for reducing climate change vulnerability, the program would support the creation of a regional backbone technology infrastructure and collaboration mechanisms that will allow countries and regional technical entities to collaborate on risk evaluations to provide reliable information on which to base planning and design decisions.

19. Technical assistance directly to regional technical agencies would be financed in parallel by complementary grants from PPCR (up to US$12 million through the Inter-American Development Bank), the Global Facility for Disaster Reduction and Recovery (GFDRR), and other sources. GFDRR grants would be executed by the Bank or through separate grant agreements signed with regional entities.

20. In spite of the vulnerability reduction investments that would be financed by the program, there will be a residual risk for two reasons. First, it is not economically viable to make investments to reduce the natural hazard and climate risk to zero, and second, the proposed risk reduction investments would only cover urgent risk reduction needs and longer term institutional improvements, and would therefore not be sufficient to reduce the majority of vulnerability across all public infrastructure in the Eastern Caribbean. In order for participating countries to cover part of the residual risk, the program integrates an emergency recovery mechanism that would compliment existing post disaster financing options. This mechanism could be activated in the event of an adverse natural event, following a declaration of national emergency.

A. Program Components

21. ***Component 1 - Prevention and Adaptation Investments.*** The participating countries would implement and test a broad spectrum of interventions aimed at reducing vulnerability in public buildings and infrastructure.

22. Sub-projects under this component would also fund supporting studies required for the development of works packages such as hydrologic/hydraulic studies, geotechnical studies, and

associated pre-engineering and engineering supervision activities required to support engineering design and safeguard compliance.

23. ***Component 2 - Regional Platforms for Hazard and Risk Evaluation, and Applications for Improved Decision making and Building Practices.*** The project would support regional efforts in the Eastern Caribbean to build capacity to conduct assessment of natural risks and integrate such knowledge into policy- and decision-making for development investments, disaster risk mitigation, climate change adaptation and disaster response planning across sectors.

24. The OECS countries have identified seven priority categories of investments for which they require better knowledge to build more climate resilient societies in the Eastern Caribbean. Pilot activities will be carried out in the following areas: (i) critical public infrastructure such as airports and hospitals[7]; (ii) other public infrastructure such as transport and water grids; (iii) government buildings; (iv) watershed management; (v) urban flood mitigation; (vi) coastal protection; and (vii) landslide risk reduction.

25. Through regional workshops and seminars, stakeholders such as the Ministries of Works and Physical Planning and technical regional agencies, would discuss approaches, share lessons learned and agree upon ways to harmonize policy on appropriate design and construction standards and methods for their cost efficient implementation to build climate resilience in public infrastructure.

26. The lessons learned and the prescriptions agreed on for design and construction standards and the cost efficient implementation of the same will be captured and subsequently published with the participation of a regional technical agency effectively creating a blue-print for building climate resilience in public infrastructure in the Eastern Caribbean. Besides the direct learning benefits to the Caribbean region as a whole, the Economic Union members would benefit collectively from the physical investments, since these interventions would help mitigate the negative externalities associated with adverse affects of future natural hazard shocks on the Economic Union as a whole.

27. Grenada would take the lead on piloting integrated approaches to urban flood mitigation (St. John's River in St. Georges). Saint Vincent and the Grenadines would take the lead on piloting integrated approaches to watershed management (Arnos Vale Watershed) and coastal protection (Georgetown). In collaboration with other countries from the region and the support of regional technical agencies, the respective Ministries of Works will take the lead on organizing the Eastern Caribbean regional knowledge sharing and learning process to develop and apply construction standards and methods in the selected areas. Grenada would also make necessary investments at its international airport to ensure continued operations in accordance with international aviation regulations. The airport functions as an important regional infrastructure in the regions emergency response capacity.

28. Additionally this component of the sub-projects would support the creation of a regional backbone technology infrastructure and collaboration mechanisms that will allow countries and

[7] Critical refers to the need to build to a higher standard since the cost and consequences of building failure are higher than for other infrastructure.

regional technical entities to collaborate on risk evaluations. This backbone infrastructure would include two platforms: (i) geospatial data management; and (ii) probabilistic disaster and climate risk assessment for multiple hazards such as hurricanes, earthquakes, flooding and drought. The sub-projects would finance activities such as (i) data collection and establishment of data sharing protocols, (ii) capacity building for generating and interpreting risk assessments, and (iii) development and sharing of risk assessment application for policy purposes. This includes financing of instruments and software for data collection, data management, and data analysis needed in each participating country to be part of the regional technology infrastructure.

29. Through a series of regional workshops and seminars over the life of the Program, stakeholders would share experiences and document lessons learned. This would form a central component of a training module for the University of the West Indies Open University Program, which is currently being established in parallel with a portion of the GFDRR financing.

30. With the agreement of participating countries, data collected and captured as well as the open risk assessment models would be made available to the public, allowing anyone who might be interested to contribute to the task of analyzing and understanding the existing and future risk.

31. ***Component 3 – Emergency Recovery and Rehabilitation Mechanism.*** Following an adverse natural event, and subject to: i) the Association's satisfaction that a situation of national emergency exists, ii) a Government's declaration of emergency in accordance with national law, and iii) the submission of a recovery action plan satisfactory to the Association that describes sub projects and activities to be financed, a Government may request the Association to re-categorize financing or provide additional financing to cover early recovery and rehabilitation costs.

32. The statistical likelihood of a category 1 hurricane making landfall in Grenada is 1/13 a year, and in Saint Vincent and the Grenadines it is 1/8 a year. However, no funds would be allocated to this component at the outset. If no adverse natural event occurs during the lifetime of the project, the component would never become active. This mechanism would complement the participating countries memberships of the Caribbean Catastrophe Risk Insurance Facility (CCRIF), since the trigger would be a declaration of emergency following an adverse natural event, rather than CCRIF's parametric trigger.

33. Under this component, expenditures on critical imports (imported or locally manufactured) required by the public / private sectors, and reconstruction / rehabilitation (civil works, goods, and services) of damaged infrastructure can be financed - as approved in OP/BP 8.00 April 2007. This provision applies to both self-standing emergency operations and to contingent components of investment operations.[8]

34. Below is a list of critical imports eligible under the component:

- Construction materials
- Water, land and air transport equipment, including spare parts
- Agricultural equipment and inputs (excluding pesticides)

[8] Under the OP/BP 8.0 the Association could agree to finance the reimbursement for expenditures on a positive list of imports.

- School supplies and equipment
- Medical supplies and equipment
- Petroleum and fuel products
- Construction equipment and industrial machinery
- Communications equipment
- Seeds and fertilizer
- Food and water containers and any other items which may be acceptable to the Bank and agreed to by the Borrower and the Bank

35. ***Component 4 - Project Management and Implementation Support.*** Activities under this component would relate to the institutional support and capacity development for project management and implementation. Activities would include training, staffing, and development activities associated with project execution, such as consulting services and support for:

(a) Preparation of designs and tender documents for execution and supervision of works, purchase of goods, and contracting of training activities;
(b) Preparation of project reporting;
(c) Processing of contracts including the evaluation of tenders, preparation of evaluation reports, selection of contractors, and negotiation and supervision of contracts;
(d) Liaising activities among the participating line ministries during project execution;
(e) Supervision of the quality of works;
(f) Specific training of staff in project management and execution; and
(g) Capacity building for accreditation from the UNFCCC Climate Adaptation Fund.

B. Program Financing

1. Lending Instrument

39. The proposed lending instrument for the sub-regional program is a horizontal Adaptable Program Loan (APL) implemented in parallel in the OECS. Currently, there are three confirmed participating countries: Grenada, Saint Lucia, and Saint Vincent and the Grenadines. Country projects in Grenada and Saint Vincent and the Grenadines would form the APL 1. Saint Lucia would constitute the second phase APL 2 of the program, and possible additional APLs would allow for the option of the remaining OECS countries, namely Antigua and Barbuda, Dominica, and Saint Kitts and Nevis, to participate in the program, if requested.

40. ***Rationale for Horizontal APL:*** The choice of the horizontal APL derives from a combination of the national and regional nature of disaster risk management and climate change adaptation in the Eastern Caribbean. There is a strongly shared sentiment of the need to collectively make progress on confronting climate change adaptation challenges in the region. However the countries are at different stages of readiness to devise and implement adaptation strategies. The horizontal APL provides a sufficiently linked by flexible instrument to allow the Eastern Caribbean countries to move forward together but at each of their own pace.

41. ***APL 1:*** Grenada and Saint Vincent and the Grenadines would be the first to develop and implement their respective projects. Both countries would follow the same project structure as outlined in the program description.

43. ***APL 2:*** Saint Lucia has requested to participate in the program and their project is expected to follow within 12 months after the approval of APL 1. The Saint Lucia project would follow the same project structure described for the program above.

44. ***APL 3:*** It is possible that other Eastern Caribbean states will follow later as they become ready and as they present viable disaster reduction investment plans. For Dominica, the program would follow the same structure and hold the same financing options as APL 1 and 2. Antigua and Barbuda and St. Kitts and Nevis could participate in the program with IBRD financing if their macro-economic environment allows and if they present viable disaster reduction investment plans.

2. Program Cost and Financing

Program Components	**Grenda CIF: 61% IDA: 39% (US$ million)**		**Saint Vincent and the Grenadines CIF: 50% IDA: 50% (US$ million)**		**Total CIF: 57% IDA: 43% (US$ million)**	
	Project Costs	**Percent of Financing**	**Project Costs**	**Percent of Financing**	**Project Cost**	**Percent of Financing**
1. Prevention and Adaptation Investments	12.8	49%	7.4	37%	20.2	44%
2. Regional Platforms for Hazard and Risk Evaluation, and Applications for Improved Decision making and Building Practices.	11.4	43%	10.8	54%	22.2	48%
3. Emergency Recovery and Rehabilitation Mechanism	0	0%	0	0%	0	0%
4. Project Management and Implementation Support	2.0	6%	1.8	9%	3.8	8%
Total Financing Required	**26.2**	**100%**	**20.0**	**100%**	**46.2**	**100%**

C. Lessons Learned and Reflected in the Program Design

45. The evaluation carried out by the World Bank following Hurricane Tomas in Saint Lucia in November 2010 indicated that risk reduction investments financed by the Bank over the past decade held up well and served their purposes when faced with a 1-in-500-year rainfall event.[9] Similar conclusions were reached in evaluation of school infrastructure in Grenada following Hurricane Ivan in 2004.[10] This and other evidence suggest that retrofitting, rehabilitation, and disaster risk mitigation investments pay off when faced with an adverse natural event.

46. Experience from the Colombia Natural Disaster Vulnerability and Reduction Program (2004) and the related Second Phase Project (2005) indicate that an integration of hazard risk information into territorial planning and investment decision making is institutionally complex and information-intensive. It requires simultaneous capacity building at various institutions and generating collaboration with academic and professional communities.

47. Work with the Caribbean Catastrophe Risk Insurance Facility and the Central American Probabilistic Risk Assessment has shown that accessing the right data will likely be the most limiting factor of successful improvement of policy makers' understanding of risk. Experience with CAPRA has also shown that risk models will not likely be absorbed by policy makers automatically. There is a need to combine the modeling with a technical assistance process, working closely with the decision makers whose decisions the effort is aimed at.

48. Past disaster emergencies in the Caribbean and elsewhere show that affected governments struggle to raise finances to cover emergency response and rehabilitation in the first 3-4 months following a disaster event. The CCRIF is an insurance pool that covers part of this financing need in accordance with the signed policy of each of its member countries. But as indicated in the aftermath of Hurricane Tomas, the Eastern Caribbean countries are still likely to face a liquidity constraint following a disaster event, and resort to the Bank and other international institutions for quick liquidity.

IV. Implementation

A. Institutional and Implementation Arrangements

49. Each project under the program would be implemented by a designated entity under the country's Ministry of Finance. In the case of Grenada and Saint Vincent and the Grenadines, the Ministries of Finance have specialized project management units with appropriate fiduciary- and safeguards-handling capacity built from a long experience in managing World Bank-financed projects.

50. For the implementation of civil works, each project management unit would rely on technical support for the descriptions for the bidding documents and for some of the implementation supervision from relevant line ministries, including the Ministries of Works,

[9] See [refer to WB unpublished report].
[10] See [refer to WB publication].

Education, Health, and the national disaster management agencies. More complex civil works would rely on the services of an independently contracted supervising engineer.

51. The respective project implementation units would manage environment and social safeguard aspects of country-specific projects under the program structure. These units already have project management capacity and have managed safeguards aspects of several World Bank projects investing in public infrastructure. The World Bank has worked closely with the Grenada and Saint Vincent and the Grenadines project management units to assess their capacity and possible needs for capacity strengthening to appropriately handle safeguards. For subsequent phases of the program, the World Bank would work closely with the project management units during project preparation to assess capacities and, when needed, measures to strengthen capacity would be described in the technical annex for each project.

B. Results Monitoring and Evaluation

52. The project management units would be responsible for monitoring of and reporting on performance indicators defined for each country's project under the program. This would be reported to the Bank in semi-annual project implementation progress reports. The project management units would rely on information from participating line ministries to inform sectoral results from project activities. The World Bank would update and report on the program level indicators on a semi-annual basis.

53. Baseline studies would be carried out at the beginning of the project to establish qualitative and quantitative baselines for result level indicators of the project. Additional studies would be carried out and compared to the established baseline at the completion of the project (4 months before the closing of the project). The expected costs for implementation of these activities would be drawn from Component 4 of the project.

C. Sustainability

54. The Governments of the Eastern Caribbean recognize that the sustainability of infrastructure investments and of their physical development planning in general is dependent on improving their understanding of adaptation options to strengthen their resiliency to disaster and climate risks. The disaster vulnerability reduction works and capacity-building initiatives at technical and policy levels implemented under the project would require the ownership of the participating national authorities and the participation and support of local communities as well as the continued support of regional technical agencies.

V. Key Risks and Mitigation Measures

55. As referenced in Annex 4: Operation Risk Assessment Framework (ORAF), key risks to achieving Project Development Objectives (PDOs) were identified along with mitigation measures to minimize the potential impact of these risks for each project under the program. The ORAF would also be used to monitor and re-assess risks and review mitigation measures during project implementation. There are no controversial aspects of the program.

56. The identified risks fall into the following four broad categories[11]: 1) Stakeholder Level Risks; 2) Operating Environment Level Risks; 3) Implementing Agency Level Risks; and 4) Project Level Risks. Correlating mitigation measures concentrate on the risks that have the potential to derail implementation and could affect the achievement of the PDOs.

57. The size of the countries limits their in-country human capital. This condition can lead to concentrated capacity transfer and capacity negation in the case of staff turn-over. The project would therefore aim to train existing government staff as well as new staff to ensure that national disaster and climate risk management capacity is built. In all participating countries, the program objectives and activities align with national policies and plans.

58. Implementing agency level risks would include inadequate capacity to handle the large number of contracts under the projects, inadequate coordination, quality control, and information sharing mechanisms across various agencies and levels (regional and national). The project would finance additional project management capacity. In order to improve government coordination and promote data and information sharing, the Bank is providing technical assistance in data management and risk modeling to relevant government institutions. To ensure quality control, the Bank would, in the context of project supervision, carry out independent inspections and plans to establish critical path inspection procedures and integrate them into construction contracts.

59. Sustainability of project activities after the lifespan of the project is not ensured, as the government has yet to establish systems to correlate climate impact data and design of climate-resistant infrastructure projects. This also includes establishing sufficient monitoring and evaluation systems.

VI. Appraisal Summary

A. Economic and Financial Analysis

60. The project would limit the fiscal shock caused by an adverse natural event. Direct losses that would be mitigated under the project include the retrofitting of social infrastructure such as schools and other public buildings that will be strengthened to resist hurricanes. The transport sector would be strengthened to avoid direct losses and the indirect economic losses due to lost access to markets. Institutional strengthening investments would be made to avoid further indirect losses by encouraging citizens to improve preparedness and enhance government response to major events.

[11] ***Stakeholder Level Risks:*** risks that could have an impact on the implementation of the project that teams need to be aware of and mitigate where possible;
Operating Environment Level Risks**:** country and institutional setting risks. Project teams should be aware of these risks but they are not expected to mitigate them at the project level (the teams should take them into account as they assess the specific project risks);
Implementing Agency Level Risks**:** where there is scope to influence the risk level through the operation (for example through mitigation measures and project design); and
Project Level Risks**:** where there is the most scope for mitigating and controlling risk levels through project design and implementation.

61. Net benefits have been calculated using the estimated damage-expenditures averted from a Category 1 hurricane, as expressed as a percentage of GDP, due to the mitigating investments of the disaster management project. The results of the baseline analysis demonstrate that the net present value (NPV) of the Grenada project is US$17.5 million and the economic internal rate of return (EIRR) is 26%. This figure is based on damage averted due to project investments valued at 10 percent of GDP in the case of the passage of a Category 1 hurricane. A Category 1 hurricane impacting Grenada is projected by the Caribbean Catastrophe Risk Insurance Facility to occur once every twelve years.

62. The net present value (NPV) of the St. Vincent and the Grenadines project is US$37.5 million and the EIRR is 92%. The higher NPV and EIRR for the St. Vincent and the Grenadines project is due to the higher probability that a Category 1 hurricane will cross over the country. Instead of once every twelve years like in Grenada, the likelihood of a similar event in St. Vincent and the Grenadines is measured to be once every eight years.

B. Technical Considerations

63. Proposed works and institutional strengthening activities would be evaluated for each project to ensure consistency with the short- and long-term objectives of the program. Specific works would be included based on a "no regrets" approach and priorities identified by the participating Governments. For Grenada and Saint Vincent and the Grenadines, site visits were made to each of the proposed works sites and a detailed review was conducted with each of the respective agencies to refine the proposed works program. In all cases, clear relationships between works and program objectives were identified, and supporting engineering and safeguard activities have been budgeted and included in the works program. Works generally involve the rehabilitation and retrofitting of selected infrastructure and public buildings and have been prioritized both within respective agencies and nationally by the Ministries of Finance. The proposed civil works are not complex activities and can be reasonably completed within the expected lifespan of the project.

64. Institutional strengthening activities comprise both training and regional capacity building, and equipment purchases. These are designed to improve national capacity for disaster risk assessment and climate change monitoring to support improved integration of risk management principles in national development and strengthening activities. Many of the institutional aspects provide fundamental capacity for planning and design and complement ongoing activities at the ministry level. In evaluating the institutional strengthening program, an assessment was done to review current institutional capacity as well as performance history. In all cases, plans and purchases serve to support and improve activities that are already operational within the respective ministries.

C. Financial Management

65. Project management units in the respective countries will be responsible for the financial management of each project. In Grenada and Saint Vincent and the Grenadines, these units have substantial experience with World Bank fiduciary guidelines and they are currently managing World Bank-financed projects.

66. ***Grenada.*** Grenada has a good legal framework for public financial management (PFM) and oversight. The overall PFM systems are working reasonably well, though they also have some challenges. The government is using a computerized accounting system (SmartStream). The current system does not capture the project expenditures financed by the World Bank. As such, the financial management of all World Bank-financed projects is ring-fenced in the PCU based in the Ministry of Finance, Planning, Economy, Energy, and Cooperatives. Overall, the financial management capacity in the PCU is adequate to meet the requirements of OP 10.02. The PCU has adequate financial management staff. The FM unit in the PCU has four staff and is headed by an experienced Financial Management Specialist. The PCU also has substantial experience with World Bank fiduciary guidelines and is currently managing four World Bank-financed projects. However, there are some areas which would require some further strengthening. These include introducing a system of "risk-based" internal audit and preparing an Operations Manual for the project, which would be agreed upon with the Government during project negotiation.

67. ***Saint Vincent and the Grenadines.*** The PFM system in St. Vincent and the Grenadines is still evolving. The Public Sector Investment Program Management Unit (PSIPMU) has a Financial Management Specialist who is conversant with the Bank's project financial management requirements. However, the overall performance of financial management for Bank-financed projects is mixed. Considering the work load and the complexity of this project, the Government would provide one additional financial management staff. Subject to appointment of an additional financial management staff, the overall financial management capacity of the PSIPMU would be adequate to meet the minimum financial management requirements of the Bank as per OP/BP 10.02.

68. ***Flow of Funds and Disbursement.*** The World Bank financing would be channeled primarily through a segregated Designated Account denominated in US Dollars, which would be opened by the Ministry of Finance of each respective country. The PCU and PSIPMU would also operate local currency accounts to finance project expenditures in the local currency, where funds from the US Dollars Designated Accounts would be periodically transferred to. These accounts would be operated in accordance with the procedures and guidelines set forth in the Bank's Disbursement Guidelines. Advances to the Designated Account would be made based on the forecast of the project eligible expenditures for a period of at least six months based on Interim Financial Reports (IFRs). The DAs would thus have a *Variable Ceiling*. Supporting documentation for expenditures made from the Designated Accounts would also be based on IFRs to be submitted by the PCU and PSIPMU separately. The IFRs would be submitted to IDA on a quarterly basis and no later than 45 days after the end of each quarter. The Project would also be able to use the Direct Payment and Reimbursement disbursement methods. Direct Payments would be documented by Records and Reimbursements by the IFRs.

69. ***External Audit.*** Two separate audit reports would be submitted by the PCU and PSIPMU. The Directors of Audit in Grenada and St. Vincent and the Grenadines do not have adequate capacity to audit the development projects. As such, the audit of the project would be conducted by private sector auditors to be appointed by the PCU and PSIPMU based on agreed terms of reference for the audits. The PCU and PSIPMU would prepare detailed terms of

reference for the auditors and submit them to the World Bank for review during the project appraisal. The audits would be conducted based on International Standards on Auditing or any other international standards acceptable to the Bank. The audit reports would be transmitted to the World Bank no later than six months after the end of the fiscal year.

D. Procurement

70. The project management units would carry out procurement in accordance with the World Bank's "Guidelines: Procurement Under IBRD Loans and IDA Credits" dated May 2004, revised October 2006, and May 2010; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers", dated May 2004, revised October 2006, and May 2010.

71. Both Grenada and Saint Vincent and the Grenadines have developed a procurement plan for the first eighteen months of project implementation. The procurement plan has been reviewed by the Bank's procurement specialist. The procurement plan would be updated in agreement with the World Bank annually or as required to reflect actual project implementation needs and improvements in institutional capacity.

72. The project management units have prepared an Operations Manual with specific chapters on procurement with sufficient detail on all the procedures and supporting structures and document responsibilities. A draft of the manual has been reviewed by the Bank.

73. In order to accommodate Component 3 - Emergency Response Contingent Credit, and notwithstanding the above, in the event of an adverse natural event, and provided the Government triggers Component 3, flexibility in the procurement of works, goods, and services such as the following may be put in place: (i) use of Stand-By Arrangements – where the borrower would be encouraged to undertake advance procurement. Stand-by arrangements allow for tendering and signing of draft contracts, for which implementation is triggered when an emergency occurs (such arrangements are common in the transport and power distribution sectors); (ii) applying higher prior-review thresholds; and/or (iii) using special procurement methods such as direct contracting, force account shopping, or other simpler procurement methods for the delivery of urgently needed goods and services. The procurement arrangements for the use of the above-mentioned procedures would require clearance by the World Bank Regional Procurement Manager's office prior to implementation.

74. With regard to procurement, the contingent component would specifically reference the provisions of OP/BP 8.00 for additional flexibility in procurement of goods, works, and consultant services in case of an emergency. The Rapid Response to Crises and Emergencies: Procedural Guidelines provides the World Bank with guidelines on streamlined procedures and processes applicable to emergency operations.

E. Social Considerations

75. ***Project-Level Social Assessment.*** In order to determine the magnitude of potential project impacts and to mainstream social considerations into individual project designs, project-level social assessments (SAs) were conducted during project preparation in order to a) serve as a baseline data collection tool; b) analyze the potential social impacts of project activities and

develop associated social indicators for monitoring and evaluating these impacts; c) assist in the identification of poor and vulnerable populations and ensure that the specific project activity objectives are acceptable to the intended beneficiaries; as well as to d) solicit stakeholder/beneficiary perspectives on the proposed intervention and promote their participation in project design. The findings of these assessments, including the outcomes of stakeholder consultations, would be integrated into project operations plans.

76. The social assessments point to the fact that overall project impacts and outcomes are expected to be positive for the populations of Grenada and St. Vincent and the Grenadines. The assessments further reveal the following:

77. ***Short- vs. Long-Term Impacts*.** While overall social impacts are expected to be positive, in the short term there are potential adverse and temporary impacts associated with disruptions to businesses, vehicular re-routing, as well as dirt, noise, and delays affecting traffic patterns. All of these are impacts of a short-term nature and are far outweighed by the expected positive long-term impacts.

78. ***Stand-Alone Social Assessments***. In addition to the project-level SAs which have been undertaken during project preparation, some activities under each project may require in-depth stand-alone Social Assessments due to the potential nature and magnitude of the social impacts. This is most likely in cases where resettlement plans are required as a condition of sub-project financing. These activities would be described in the individual project's technical annex and would be conducted using appropriately qualified consultants. The cost of these assessments should be budgeted for in the procurement plan and project budget.

79. ***Land Acquisition.*** Under Bank Social Safeguard requirements, it has been determined that several activities in Grenada and Saint Vincent and the Grenadines could involve land acquisition or resettlement, and the Involuntary Resettlement Safeguard (OP/BP 4.12) has been triggered. In Grenada, for example, the RDVRP activities impacts on land use, crops, buildings, and other property are expected to implicate approximately 14 of the possible 20 project sites and involve up to 100 people. Resettlement Policy Frameworks have been finalized for Grenada and St. Vincent and the Grenadines and will be disclosed prior to negotiation.

F. Environment

80. In accordance with Bank environmental safeguards requirements, this program has been classified as Category B in accordance with OP/BP 4.01 on Environmental Assessments. Works proposed under the program are largely rehabilitation and retrofitting of selected infrastructure and public buildings, and impacts are generally associated with the actual construction phase of the works activities. Limited new constructions could be included in individual projects. A significant portion of the project involves the purchase of goods and services.

81. As for any Category B project, the government would prepare an Environmental Assessment (EA) examining project activities and providing an environmental framework to guide project execution. These would include two groups of projects: those which will require a stand-alone Environmental Assessment and those comprising uncomplicated rehabilitation works

where the impacts are limited to the construction phase (e.g. repair and retrofitting). To address these activities, procedures would be included in the Operations Manual detailing requirements for a stand-alone Environmental Assessment and the screening of uncomplicated activities for the inclusion of environmental compliance contracting clauses to mitigate construction-related impacts.

82. For sub-projects requiring stand-alone EAs, the EAs would be completed prior to initiation of the works activities and would establish environmental requirements for the design and construction phase of the activity. Draft TORs would be included in the Operations Manual. All such projects in the procurement plans would be subject to prior review.

83. For uncomplicated activities, a screening procedure and draft construction contract clauses would be included in the Operations manual to be applied as needed to works construction contracts.

G. Other Safeguards Policies Triggered

84. Apart from OP/BP 4.01 on Environmental Assessment and OP/BP 4.12 on Involuntary Resettlement, the program could have insignificant impacts on natural habitats and cultural resources. As a precaution, the program has therefore triggered the safeguard policies for Natural Habitats (OP/BP 4.04) and Physical Cultural Resources (OP/BP 4.11).

85. In Saint Vincent and the Grenadines, there are communities of different etnic origin in some of the project areas, most notably in Sandy Bay. These communities, however, do not meet the definition of the World Bank Indigenous Peoples Safeguard Policy (OP/BP 4.20) and this policy is therefore not triggered. Nevertheless, in order to safeguard the rights of this poor and vulnerable population, and in the event that subprojects are implemented in this community, the social assessment for St. Vincent and the Grenadines has been designed in order to oversample this population and supplementary consultations and focus group discussions have been built into the methodology for the assessment.

86. No issues relating to the project were identified requiring specific attention that is not addressed under the Bank safeguard policy structure. Finally, no exceptions from Bank Safeguard policies are being sought under this project.

Annex 1: Results Framework and Monitoring

APL1 (Grenada and Saint Vincent and the Grenadines)

Program Development Objective (PDO): The program aims at measurably reducing vulnerability to natural hazards and the adverse impacts of climate change in the Eastern Caribbean. The project in Grenada aims at measurably reducing vulnerability to natural hazards and climate change impacts in Grenada and in the Eastern Caribbean. The project in Saint Vincent and the Grenadines aims at measurably reducing vulnerability to natural hazards and climate change impacts in Saint Vincent and the Grenadines and in the Eastern Caribbean.

PDO Level Results Indicators*	Core	Unit of Measure	Baseline	Cumulative Target Values**						Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
				YR 1	YR 2	YR3	YR 4	YR5	YR6				
PDO Indicator One: Reduced risk of OECS population to failure of public buildings and infrastructure due to natural hazards or climate change impacts.	☐	Number of daily users	Baseline to be established in year 1 (assessment at appraisal)	0	?? ( )	?? ( )	?? ( )	?? ( )	?? ( )	Twice a year	Semi-annual Project Progress Reports	Project management units	Measurement of reduced risk of OECS population to failure of public buildings and infrastructure
Grenada: Reduced risk of Grenada's population to failure of public infrastructure due to natural hazards or climate change impacts.	☐	Number of people	Baseline to be established in year 1 (assessment at appraisal)	0	?? ( )	?? ( )	?? ( )	?? ( )	?? ( )	Twice a year	Semi-annual Project Progress Reports	PCU; Ministry of Works, Physical Development and Public Utilities	Measurement of public buildings, roads and bridges structurally improved under the project
Saint Vincent: Reduced risk of SVG's population to failure of public buildings due to natural hazards or climate change impacts.	☐	Number of people	Baseline to be established in year 1 (assessment at appraisal)	0	?? ( )	?? ( )	?? ( )	?? ( )	?? ( )	Twice a year	MoTW supervision reports Semi-annual Project progress reports	PSIPMU; MoTW	Measurement of public buildings structurally improved financed by the project
PDO Indicator Two: Increased capacity of OECS governments to identify and monitor climate risk and impacts.	X	Number of people trained	6	14	14	18	18	18	18	Twice a year	Semi-annual Project Progress Reports Reports Records of	Project management units	Measurement of increased national capacity to capture and manage climate data as well as develop and

											the people trained and participated in trainings as well as instrumentation/software installed		utilize hazard models for improved decision-making
***Grenada*:** Number of government officials able to produce location specific exposure maps	X	Number of officials trained	2 technical officials with specific training on GIS analysis tools	6	6	8	8	8	8	Twice a year	Semi-annual Project Progress Reports Number of people participating on training Inventory report of instrumentation/software installed	PCU; NaDMA; Physical Planning Unit	Measurement of increased national capacity to capture and manage hazard and climate risk data.
***Saint Vincent*:** Number of government officials able to produce location specific exposure maps.	X	Number of officials trained	2 technical officials with specific training on GIS analysis tools	6	6	8	8	8	8	Twice a year	Semi-annual Project Progress Reports Number of people participating on training Inventory report of instrumentation/software installed	PSIPMU; NEMO; MoHILPP	Measurement of increased national capacity to capture and manage hazard and climate risk data.
GRENADA INTERMEDIATE RESULTS													
Component 1 Level Result (*Prevention and Adaptation Investments*)													
***Intermediate Result indicator one*:**		Number of people	Baseline to be	0	?? ( )	?? ( )	?? ( )	?? ( )	?? ( )	Twice a year	Semi-annual Project	PCU;	Measurement in reduction of

Reduced risk of Grenada's population to failure of roads and bridges due to natural hazards or climate change impacts.	☐		established in year 1 (assessment at appraisal)								Progress Reports	Ministry of Works, Physical Development and Public Utilities	number of user days of roads at decreased capacity due to floods, landslides or structural failure.
***Intermediate Result indicator two*:** Reduced risk of Grenada's population to failure of public buildings due to natural hazards or climate change impacts.	☐	Number of people	444 people currently at risk in public buildings targeted under the project	444	444	349	87	0	0	Twice a year	Semi-annual Project Progress Reports	PCU; Ministry of Works, Physical Development and Public Utilities, Ministry of Education	Measurement of public buildings structurally improved under the project
Output indicator: Designs and Pre-engineering/geotechnical studies completed for road protection and bridges rehabilitated under the project.	☐	Number of designs and pre-engineering/geotechnical studies completed	Currently 0 designs and Pre-engineering/geotechnical studies are complete	3	6	6	6	6	6	Twice a year	Semi-annual Project Progress Reports	PCU; Ministry of Works	Measurement in progress towards decreased risk of users to roads and bridge failure due to natural hazards or climate change impacts.
***Intermediate Result indicator three*:** Reduced risk of Grenada's population to potable water shortage due to natural hazards or climate change impacts.	☐	Number of people	Baseline to be established in year 1	0	?? ( )	?? ( )	?? ( )	?? ( )	?? ( )	Twice a year	Semi-annual Project Progress Reports	PCU; NAWASA	Measurement in reduction of number of people with less than full service[12] of the national water system managed by NAWASA due to natural hazards or climate change impacts such as drought
Output indicator: Number of gallons increase of water storage capacity as a result of the project	☐	Number of gallons of water	150,000 gallons of water (less than 1 day	0	0	150,000	0	450,000	450,000	Twice a year	Semi-annual Project Progress Reports	PCU; NAWASA	Measurement in increase of public water storage capacity as a result of the

[12] Less than full service is defined as any interruption of service due to water shortage experienced by a water user serviced by NAWASA.

			supply)										project
Component 2 Level Result (*Capacity Building for Hazard and Risk Evaluation and Applications for Improved Decision Making*)													
***Intermediate Result indicator One*:** Percentage of public buildings geo-referenced in a national exposure database	☐	Percent	There are currently 0 percent of public buildings in national exposure database	0	30	50	50	100	100	Twice a year	Semi-annual Project Progress Reports Number of public buildings included in exposure database Completion of database	PCU; NaDMA Physical Planning Unit	Measurement of increased national capacity to capture and analyze hazard exposure of public buildings
Output indicator: Public building geo-spatial information collected.	☐	Number of buildings	There are currently 0 public buildings in which geo-spatial information has been collected.	0	50	150	150	150	150	Twice a year	Semi-annual Project Progress Reports Number of public buildings included in exposure database	PCU; NaDMA Physical Planning Unit	Measurement of increased national capacity to capture hazard exposure of public buildings
Output indicator: Number of government officials who complete training on producing location specific exposure maps.	☐	Number of people	Currently on 2 technical officials have completed training on producing location specific exposure maps	6	6	8	8	8	8	Twice a year	Semi-annual Project Progress Reports Number of people participating on training Inventory report of instrumentation/software installed	PCU; NaDMA; Physical Planning Unit	Measurement of increased national capacity to capture and manage hazard and climate risk data.

Output indicator: Number of location specific exposure maps completed by staff trained under the project.	☐	Number of exposure maps	There are currently 0 exposure maps completed by staff trained under the project.	0	0	5	10	15	20	Twice a year	Semi-annual Project Progress Reports	PCU; NaDMA; Physical Planning Unit	Measurement of increased national capacity to analyze and manage hazard and climate risk data.
SAINT VINCENT AND THE GRENADINES INTERMEDIATE RESULTS													
Component 1 Level Result (*Prevention and Adaptation Investments*)													
***Intermediate Result indicator one*:** Reduced risk of SVG's population to flooding in areas with flood mitigation works financed by the project	☐	Number of people	Baseline to be established in year 1 (assessment at appraisal)	0	?? ( )	?? ( )	?? ( )	?? ( )	?? ( )	Twice a year	MoTW supervision reports Semi-annual Project progress reports	PSIPMU; MoTW	Measurement in reduction in number of people exposed to flooding
Output indicator: Number of gabion baskets used in construction of flood mitigation works	☐	Number of gabion baskets	0 gabion baskets financing under the project have been used	0	?? ( )	?? ( )	?? ( )	?? ( )	?? ( )	Twice a year	MoTW supervision reports Project progress reports	PSIPMU; MoTW	Measurement in progress towards decreased risk of flooding.
***Intermediate Result indicator two*:** Reduced risk of SVG's population to failure of roads and bridges due to natural hazards or climate change impacts.	☐	Number of people	Baseline to be established in year 1 (assessment at appraisal)	0	?? ( )	?? ( )	?? ( )	?? ( )	?? ( )	Twice a year	MoTW supervision reports Project progress reports	PSIPMU; MoTW	Measurement in reduction of number of user days of roads at decreased capacity due to floods, landslides or structural failure.
Output indicator: Designs and Pre-engineering/geotechnical studies	☐	Number of designs and pre-engineerin	Currently 0 designs and Pre-engineerin	0	?? ( )	?? ( )	?? ( )	?? ( )	?? ( )	Twice a year	Semi-annual Project Progress Reports	PSIPMU; MoTW	Measurement in progress towards decreased risk of users to roads and

completed for roads and bridges rehabilitated under the project.		g/geotechnical studies completed	g/geotechnical studies are complete										bridge failure due to natural hazards or climate change impacts.
Component 2 Level Result (*Capacity Building for Hazard and Risk Evaluation and Applications for Improved Decision Making*)													
***Intermediate Result indicator three*:** Percentage of public buildings geo-referenced in a national exposure database	☐	Percent	There are currently 0 percent of public buildings in national exposure database	0	30	50	50	100	100	Twice a year	Semi-annual Project Progress Reports Number of public buildings included in exposure database Completion of database	PSIPMU; NEMO; MoHILPP	Measurement of increased national capacity to capture and analyze hazard exposure of public buildings
Output indicator: Public building geo-spatial information collected.	☐	Number of buildings	There are currently 0 public buildings in which geo-spatial information has been collected.	0	?? ( )	?? ( )	?? ( )	?? ( )	?? ( )	Twice a year	Semi-annual Project Progress Reports Number of public buildings included in exposure database	PSIPMU; NEMO; MoHILPP	Measurement of increased national capacity to capture hazard exposure of public buildings
Output indicator: Number of government officials who complete training on producing location specific exposure maps.	☐	Number of people	Currently on 2 technical officials have completed training on producing location specific exposure maps	6	6	8	8	8	8	Twice a year	Semi-annual Project Progress Reports Number of people participating on training Inventory report of instrumentation/software	PSIPMU; NEMO; MoHILPP	Measurement of increased national capacity to capture and manage hazard and climate risk data.

											installed		
Output indicator: Number of location specific exposure maps completed by staff trained under the project.	☐	Number of exposure maps	There are currently 0 exposure maps completed by staff trained under the project.	0	?? ( )	?? ( )	?? ( )	?? ( )	?? ( )	Twice a year	Semi-annual Project Progress Reports	PSIPMU; NEMO; MoHILPP	Measurement of increased national capacity to analyze and manage hazard and climate risk data.

***Please indicate whether the indicator is a Core Sector Indicator (see further http://coreindicators)**

****Target values should be entered for the years data will be available, not necessarily annually.**

Annex 2: Detailed Project Description

APL1 (Grenada and Saint Vincent and the Grenadines)

The program aims at measurably reducing vulnerability to natural hazards and the adverse impacts of climate change for the Eastern Caribbean Union and the countries of the Eastern Caribbean. The project in Grenada aims at measurably reducing vulnerability to natural hazards and climate change impacts in Grenada and in the Eastern Caribbean. The project in Saint Vincent and the Grenadines aims at measurably reducing vulnerability to natural hazards and climate change impacts in Saint Vincent and the Grenadines and in the Eastern Caribbean.

In order to achieve this, the program proposes four mutually reinforcing components, namely: 1) Prevention and Adaptation Investments; 2) Regional Platform for Hazard and Risk Evaluation, and Applications for Improved Decision making and Building Practices; 3) Emergency Response Contingent Credit; and 4) Project Management and Implementation Support.

A. Grenada Project Description

Component 1 - Prevention and Adaptation Investments (US$12.8 Million)

Grenada has disaster risk reduction and climate adaptation needs in all the seven priority areas identified by the Eastern Caribbean countries.[13] This component is designed to reduce physical vulnerability and pilot adaptive measures to build resilience to current and future climatic changes which will have primary benefits for Grenadians and derived benefits in terms of reduced vulnerability for the Eastern Caribbean Economic Union as a whole.

The investments include a suite of civil works activities designed to improve resilience to disaster events and adapt to impacts relating to climate change. The approach chosen is a "no regrets approach" where investments have been chosen based on a high risk of structural failure to the 10 year event (category 1 hurricane, or M7 earthquake) in the case of buildings and bridges, or where annual flooding occurs in the case of flood management and urban drainage. Activities include bridge construction; rehabilitation and retrofitting of physical infrastructure including schools and homes for the elderly; landslip risk reduction and flood mitigation; and specific improvement works targeted for two low-income communities. Works also include new construction and rehabilitation activities in the water sector to improve supply and resilience to drought events.

The project would fund supporting studies required for the development of works packages such as pre-engineering investigations (e.g. hydrologic/hydraulic studies, geotechnical investigations) and associated engineering activities required to support design and safeguard compliance. Works designs and construction would include the integration of national building code requirements and would be subjected to hazard/risk and climate change impact analysis in order to advance the design and construction of resilient infrastructure.

[13] (i) critical public infrastructure such as airports and hospitals; (ii) other public infrastructure such as transport and water grids; (iii) government buildings; (iv) watershed management; (v) urban flood mitigation; (vi) coastal protection; and (vii) landslide risk reduction

Sub-Component 1.1 – Infrastructure Investments

Aging infrastructure coupled with changing environmental conditions has resulted in a deterioration of existing infrastructure generating a high level of vulnerability to natural hazards. Historically, designs have been based on a limited analysis of past hazard events without consideration of impacts from anticipated changes in future land use and climate change. Additionally, continuing vulnerabilities exist relating to land slip, rock fall, and flooding, which, if left unattended, will continue to produce recurrent damage to infrastructure. Finally, under this sub-component, two low-income communities have been targeted for interventions designed to improve their resilience to disaster and climate change events.

Specific activities identified under this sub-component are summarized in the following table:

#	Sub-Project Component and Activities	Estimated Cost (US$)
1.1.1	**Community Infrastructure Development**	**$2,750,000**
1.1.2	**Rehabilitation of Bridges and Risk Reduction of Public Space**	**$5,690,000**
1.1.3	**Improved Resilience to Climate Risks in Water Supply System**	**$1,050,000**
	Sub-Total Component 1.1	**$9,490,000**

1.1.1. La Sagesse and Beausejour Community Infrastructure Development. In 2007, to make way for the Port Louis Marina Project, 27 families were relocated from the Mt. Pandy and Islander areas of Belmont, St. George parish, to La Sagesse, St. David parish. Similarly, the development of the Lagoon Marina and adjoining area triggered the involuntary relocation of 14 families from in and around the areas known as Mt. Pandy and Islander and were settled in Beausejour, St. George parish. Monies were made available by the developers of the project to facilitate the relocation process. However, without proper planning, design for infrastructure, or other activities designed to mitigate the impacts of resettlement, the families involved were left inadequate infrastructure. In addition, no legal titling or other land use or management arrangements were made for the land where the houses were constructed. A number of the houses were left unfinished, and some families were forced to complete the structures themselves.

Sub-Project Rationale. The relocated communities consist mainly of low-income households (primarily daily laborers) who are exposed to hurricanes, earthquakes, and landslide risk. The community does not have proper roads, which limits both their mobility in daily life and emergency service access for ambulances, police, and fire trucks. The absence of paved roads also presents some negative social impacts on the community, as children find it very difficult to attend school in the rainy season. Free running water due to lack of drainage and sewage systems represents one of the main challenges and exposes the community to risks associated with

landslides and soil erosion. By making technical designs and installing adequate infrastructure (drainage, roads, sewage system, and retaining structures, among others) in these communities, the proposed project would address the access problems, reduce the risks associated with the scarce management of wastewater and rainwater, and improve the life quality of these communities.

Sub-Project Beneficiaries. In addition to the 27 and 14 relocated families in La Sagesse and Beausejour, respectively, there are a total of 45 additional families living in the immediate communities that would benefit directly from this project. Residents living in close proximity would also benefit indirectly from the construction of roads and drains which would reduce the physical and social impediments now experienced. The new infrastructure in the communities would prevent unnecessary loss of lives by permitting faster access for the emergency service vehicles.

Proposed Investments. Works would be designed to improve community access and sanitation based on technical studies to be developed during the feasibility assessment phase of the project. Works may include road rehabilitation and construction, installation of sanitation infrastructure, and related risk reduction works. Although there is not currently an instability process, it is important to characterize the soils from the geotechnical point of view and to analyze erosion and slope stability, considering that this area has been built on a steep zone without technical considerations and without rain- or wastewater control. The improvement of roads, rain drainage, and sewage systems would attract new settlements that would increase the pressure of development on these zones. This is an additional reason to justify the necessity to develop slope stability analysis, designs, and mitigation works to ensure future safety of this community. Given the history associated with the relocation process and the vulnerability of the communities, the project would also conduct detailed social and environmental assessments to assure actions taken are compatible with community desires and in compliance with Bank safeguard policies.

1.1.2. Rehabilitation of Bridges and Risk Reduction of Public Space. Mitigation and construction works would be designed to stabilize areas prone to floods, rock falls, and landslides, and to protect vulnerable public infrastructure. Additionally, two critical bridges would be replaced. Flood mitigation and drainage works would be implemented along St. John's River, in the Mourne Rouge area, and along Dusty Highway. Floods are increasing in frequency every year, causing repeated damage to public and private property, disrupting local businesses, industrial activities, and generating closures of important transportation routes, affecting mobility and access to residential areas, among others. Rock fall, landslide, and erosion mitigation works would include (i) soil investigation and slope stability studies, technical designs, and construction works in four identified vulnerable areas (including Melville Street, Brizan, Sendall Tunnel, and Grand Anse Housing); and (ii) technical studies, construction of reinforced retaining wall structures, and installation of gabion baskets in six locations around Constantine for land slide control, and in two other sites near the Gouyave Market Square for erosion control. Adverse climatic conditions have increased the vulnerability of areas prone to rock falls, erosion, and landslides, in most cases causing blockages in the main roads and traffic disruption. The disruption has a negative economic impact on the road users and permanent cost to the Government in order to restore the road to its original condition. Finally, two vulnerable bridges, the Hubble Bridge and the Lance Bridge, both in the Gouyave area in St. John parish, would be

rehabilitated with higher construction standards. The Lance Bridge is on the main West coast road and the Hubble Bridge is the only by-pass that provides access to the North side of the valley inland.

Sub-Project Rationale. The technical design and construction of risk mitigation works for floods, rock falls, landslides, and erosion control, would reduce damage to public and private property, improve the mobility of population and other socio-economic effects caused by road blockage generated by rock falls or by water from floods. Moreover, comprehensive river management plans would reduce the environmental impact caused by the inadequate garbage disposal at rivers and channels. The rehabilitation and reconstruction of two critical bridges in Gouyave would improve the pathways of the road, passing from one line to two lines of traffic and thus allowing better flow and speed of the vehicles in normal and emergency situations.

***Sub-Project Beneficiaries*.** Direct beneficiaries include families and businesses living in the areas surrounding the civil works interventions, users of the national stadium, children and teachers who attend three educational institutions, persons needing assistance at the mental health hospital, tourists in the harbor and hotel sectors, and private or public service drivers, among others. In summary, the mitigation works would reduce the landslide and flood risk of some of the strategic infrastructure of the island like Gouyave, St. George's, and Beaussejour areas, etc. The mitigation works would also indirectly improve the quality of life of the inhabitants of the island due to the impact of these projects on river pollution reduction and road traffic improvement.

Proposed Investments. For the construction of flood control mitigation works, hydrological and hydraulic assessments should be carried out to determine flood causes and to delineate flood zones, and geomorphologic and geotechnical studies should be carried out in order to identify possible solutions and specific designs. Additionally, it is necessary to prepare a maintenance plan that includes activities related to periodical drainage cleaning and educational programs to change human behavior in relation to garbage management. Rock fall interventions require previous geotechnical studies to characterize soil and rock type, stability and kinematics capacity, trough index and compression tests, resistance analysis, and level of jointing, among others. Due to the initial instability problems in Constantine and the river erosion situation in Gouyave Market Square, it is necessary to carry out geotechnical characterization studies (shear strength parameters) on rainfall levels and pluvial hydrology to determine appropriate engineering solutions for each case. Improvements of bridge specifications should consider hydrological studies to define the design parameters in terms of maximum river level and flow. For all intervention sites, topographic surveys should be conducted, and rainfall and earthquake conditions must be analyzed as instability triggers.

1.1.3. Improved Resilience to Climate Risks in the Water Supply System. Reducing vulnerabilities in the water sector is a high-priority activity, as potable water is a critical lifeline service. The recent drought conditions experienced in Grenada highlighted the necessity for improvements in water storage capacity and operational resilience.

Project Rationale. By adding in-line storage capacity and providing back-up generator facilities, the system becomes both more efficient and less susceptible to outages during disaster events.

Currently, there is no storage capacity on the borehole supply system at Chemin. Water is pumped directly to consumers. Distribution requires constant pumping and when pumps are not operational, the service is cut. Additionally, there is currently no reserve supply allowing customers to receive water even when the source supply is interrupted.

Sub-Project Beneficiaries. Direct beneficiaries from the proposed investments would be the water customers in the respective service areas. The Chemin system serves approximately 4,000 persons, the Tufton Hall system supplies some 2,500 customers. The addition of storage capacity to these systems would also serve to reduce operating costs by eliminating the need for constant pump operation in order to provide customers with water. Finally, during an emergency, particularly where power is interrupted at these stations, the addition of generator capacity and storage volume would provide an estimated two days' supply to both communities. Finally, the Tufton Hall site regularly suffers from high turbidity in the raw water source common during the rainy season. By adding storage capacity, system outages would be reduced as the stored supply would be used to maintain service while source waters settle and become accessible.

Proposed Investments. Generally, the proposed investments would include engineering support, site preparation, and installation of tanks and appurtenances at the Chemin and the Tufton Hall locations. At both sites, specific investments under the proposed project would include (i) the construction of reinforced concrete tank bases and procurement and installation of glass-fused steel tanks; (ii) the procurement and installation of associated pumps and telemetric switching devices; and (iii) the procurement and installation of power generators for emergency back-up. Additionally, the project would support site security improvements with the installation of fencing, as well as site engineering studies, and facility test and commissioning activities.

Sub-Component 1.2 – Retrofitting and Design of Public Buildings

The government has identified priority public buildings in need of immediate retrofitting to improve disaster resilience. These structures include two schools used as public shelters and two homes for the elderly. Under this sub component, the project will support the analysis and evaluation of building performance with respect to expected hazards and retrofit the structures accordingly. Activities to be financed under this sub component include:

#	Sub-Project Component and Activities	Estimated Cost (USD)
1.2.1	**Rehabilitation of Schools to Reduce Their Vulnerability to Natural Hazards**	$2,850,000
1.2.2	**Reducing Vulnerabilities of Public Accommodation for the Elderly**	$460,000
	Sub-Total Component 1.2	**$3,310,000**

1.2.1 Rehabilitation of Schools to Reduce Their Vulnerability to Natural Hazards

Project Rationale. As is the case in most countries, Grenada has designated selected schools as emergency shelters under their National Disaster Management Plan. As part of an ongoing effort, the Government has been retrofitting schools in order to improve their disaster resistance and their performance as emergency shelters. Two schools have been selected to be included under this project.

Project Beneficiaries. Beneficiaries under this sub-component include citizens designated to use these schools as emergency shelters, students, and the Ministry of Education. While retrofitting improvements are designed to improve structural resilience of the selected facilities, the investments would also improve the quality of the structures as educational facilities. Improved building performance would also reduce the reconstruction requirement for these facilities after a disaster event, improving the Ministry's recovery capacity.

Proposed Investments. Investments under this project would focus on structural retrofitting activities designed to improve structural survivability in the event of a disaster. Improvements would include structural reinforcement, improvements to roofing, the addition of hurricane straps, as well as other similar activities. Specific requirements would be determined through an engineering assessment that would incorporate design requirements as presented in the regional building code (CuBIC) and engineering best practices to identify specific retrofit requirements. Once the assessment has been completed and the retrofit requirements established, the project would contract for the construction/installation of building improvements.

1.2.2 Reducing Vulnerabilities of Public Accommodation for the Elderly

Project Rationale. Three homes for the elderly have been identified for retrofitting activities to improve their resilience to wind and hurricane events. These facilities were chosen because they house a particularly vulnerable population and improving these structures would increase their resistance to damage from disaster and provide improved protection to a particularly vulnerable population segment.

Project Beneficiaries. Improvements made under this project are intended to directly benefit the residents of the three state-owned homes included under the project. Benefits would directly result in reduced risk from storm damage to residents and improved building survivability to reduce the potential of needing to relocate a vulnerable population after a disaster event.

Proposed Investments. Investments under this project would focus on structural retrofitting activities designed to improve structural survivability in the event of a disaster. Improvements would include structural reinforcement, improvements to roofing, the addition of hurricane straps, as well as other similar activities. Specific requirements would be determined through an engineering assessment that would incorporate design requirements as presented in the regional building code (CuBIC) and engineering best practices to identify specific retrofit requirements. Once the assessment has been completed and retrofit requirements established, the project would contract for the construction/installation of building improvements.

Component 2 – Regional Platforms for Hazard and Risk Evaluation, and Applications for Improved Decision making and Building Practices (US$11.4 Million)

Grenada has disaster risk reduction and climate adaptation needs in all the seven priority areas identified by the Eastern Caribbean countries.[14] This component would finance regional collaboration for capacity-building and knowledge-building around data management, risk analysis, climate change adaptation planning, and piloting an approach to building more climate resilient environments within one of the seven priority areas. It will also finance risk reduction at the international airport to ensure continuing operation of a critical regional infrastructure node.

For the purpose of generating a change in the region to standards of public sector civil works intestements Grenada has selected to pilot urban flood mitigation (St. John's River in St. Georges). In collaboration with other countries from the region and the support of regional technical agencies, the Ministry of Works and Physical Planning will take the lead on organizing the Eastern Caribbean regional knowledge sharing and learning process to develop and apply construction standards and methods for urban flood mitigation in the Eastern Caribbean.

The lessons learned and the prescriptions agreed on for design and construction standards and the cost efficient implementation of the same will be captured and subsequently published with the participation of a regional technical agency effectively creating a blue-print for building climate resilience in urban drainage in the Eastern Caribbean. Besides the direct learning benefits to the Caribbean region as a whole, the Economic Union members would benefit collectively from the physical investments, since these interventions would help mitigate the negative externalities associated with adverse affects of future natural hazard shocks on the Economic Union as a whole.

#	Project Component and Activities	Estimated Cost (USD)
2.1	Regional Collaboration for Natural Hazard Risk Analysis and Disaster Management	$2,400,000
2.2	Regional Collaboration for Urban Flood Risk Reduction	$4,600,000
2.3	Risk Reduction for Regional Interconnectivity (International Airport)	$4,400,000
	Sub-Total Component 2.1	**$11,400,000**

2.1 Regional Collaboration for Natural Hazard Risk Analysis and Disaster Management

[14] (i) critical public infrastructure such as airports and hospitals; (ii) other public infrastructure such as transport and water grids; (iii) government buildings; (iv) watershed management; (v) urban flood mitigation; (vi) coastal protection; and (vii) landslide risk reduction

The Eastern Caribbean aims to build capacity to conduct assessment of natural risks and integrate such assessments into policy- and decision-making for development investments, disaster risk mitigation and disaster response planning across sectors

Sub-Project Rationale. To improve data management and sharing capacity in the Eastern Caribbean, capacity building in use of open-source software for geospatial information (GeoNode) will be provided to a selected number of regional technical agencies (initially the following four regional technical agencies have expressed interest: the OECS Secretariat, the Disaster Risk Reduction Center at the University of the West Indies, the Caribbean Disaster Emergency Management Agency, and the Caribbean Community Climate Change Center) to facilitate the collaboration on data between countries and regional technical agencies. The highly scientific portions of risk modeling development would also occur at a regional level. The models would be built upon existing hazard and vulnerability studies in the region, such as CCRIF and the UWI risk atlas project. In Grenada capacity building and associated data collection and management tools for linking up with and using regional data management and risk analysis platforms in policy making will be provided to the Physical Planning Unit within Ministry of Works and to NADMA.

Sub-Project Beneficiaries. The direct beneficiary of this project component would be the Caribbean disaster risk management community, due to a significantly improved capacity to collaborate around probabilistic risk analysis. Since risk models and data management systems will be open coded, the experience of application of risk models for decision making in Grenada will be directly transferable to other countries at a marginal additional cost.

Project Investments. Workshops and knowledge management support would be organized to facilitate regional collaboration around applications of risk models for decision making. The project would provide training on Geographic Information Systems (GIS), disaster management planning, interpretation and application of risk models, GPS tools, information and database management, as well as provision of necessary goods for the establishment of the planning information system. Regional technical assistance processes for the elaboration of vulnerability assessments and strategic road maps for climate change adaptation would also be supported. Goods being purchased would include, but not be limited to, GIS software, work station and server equipment, minor repairs to existing emergency support facilities, and communications and response equipment.

2.2 Regional Collaboration for Urban Flood Risk Reduction.

The Ministry of Works and Physical Planning will take the lead on organizing the Eastern Caribbean regional knowledge sharing and learning process to develop and apply construction standards and methods for critical public infrastructure and urban flood mitigation in the Eastern Caribbean.

Sub-Project Rationale. Urban flooding has been increasing in the Eastern Caribbean in the past decade due to increased built up in the catchment areas, lack of appropriate maintenance of drainage infrastructure, and inadequate standards of the existing drainage infrastructure. Eastern Caribbean countries want to explore how to built and maintain this type of structures in a cost

effective manner. St Georges, the capital of Grenada suffers annual flooding from the St. John's River. Floods are increasing in frequency every year, causing repeated damage to public and private property, disrupting local businesses, industrial activities, and generating closures of important transportation routes, affecting mobility and access to residential areas, among others. This project was chosen as a pilot due to its relevance for all Eastern Caribbean countries as an example of how to handle urban flooding in a densely populated and economically important urban setting. Further it was chosen due to the technical and social complexity of the needed interventions.

Sub-Project Beneficiaries. The lessons learned and the prescriptions agreed on for design and construction standards and the cost efficient implementation of the same will be captured and subsequently published with the participation of a regional technical agency effectively creating a blue-print for building climate resilience in urban drainage in the Eastern Caribbean. Besides the direct learning benefits to the Caribbean region as a whole, the Economic Union members would benefit collectively from the physical investments, since these interventions would help mitigate the negative externalities associated with adverse affects of future natural hazard shocks on the Economic Union as a whole.

Proposed Investments. Workshops and knowledge management support would be organized to facilitate regional collaboration around identification and applications of methods and solutions. The construction of flood control mitigation works, hydrological and hydraulic assessments should be carried out to determine flood causes and to delineate flood zones, and geomorphologic and geotechnical studies should be carried out in order to identify possible solutions and specific designs. Additionally, it is necessary to prepare a maintenance plan that includes activities related to periodical drainage cleaning and educational programs to change human behavior in relation to garbage management.

2.3 Risk Reduction for Regional Interconnectivity (International Airport)

Sub-Project Rationale. In the event of disaster, Grenada's Maurice Bishop International Airport (MBIA) is the gate way to provide emergency relief locally as well as regionally. MBIA is the alternate airport for Trinidad and Tobago, Barbados and St. Vincent & the Grenadines. MBIA will also be able to provide air traffic support in emergency situations to the island of Saint Vincent. MBIA should be ready to provide to Grenada and the region, as needed, airport facilities and space for an emergency or disaster staging area. The continued operation of the Grenada's airport is therefore critical to the region as well as to Grenada. The airport authority has identified critical investments that are required both to maintain an adequate emergency response capability and to comply with operational standards as required by the International Civil Aviation Organization (ICAO). Aging emergency response equipment and deficiencies in operational equipment have been cited during recent ICAO airport certification inspections and must be addressed to maintain the operational certification. Absent investment in these purchases, Grenada and the region risk a downgrading of its airport certification. A downgrade in operational certification would prohibit most commercial aircraft from using the facility, crippling communications and tourism activities. The equipment identified under the proposed project would address the major deficiencies noted, allowing the airport to comply with ICAO requirements, and improving operational resilience and response capacity to disaster impacts.

Sub-Project Beneficiaries. The regions population in general will benefit from having the assurance of appropriate operating capacity at MBIA in the event of a disaster event affecting any of the neighbouring countries. Additionally, the tourism industry and the small individual businesses living off tourists will benefit from (and their livelihoods depend on) the continued operation of the airport facility. On a national scale, an airport closure would have devastating consequences for the Grenadan economy.

Proposed Investments. Activities to be financed under this sub-project would include: (i) procurement of rescue boats and two Rapid Intervention Vehicles for mainland and Carriacou airports; (ii) fire detection and alarm system installation; (iii) construction of water tanks; and (iv) critical operational equipment (Jaws of Life, etc.), (v) an airport vulnerability assessment study and a recurrent maintenance management study. Furthermore, the project activity would provide training on water rescue operations. These investments generally relate to the purchase of goods and are selected to address deficiencies cited during the ICAO inspections to permit the airports to retain their current ICAO operational certifications.

Component 3 – Emergency Recovery and Rehabilitation Mechanism

Due to the high risk of a catastrophic event in Grenada, a provisional component would be added under this project that would allow for rapid reallocation of the loan during an emergency, under streamlined procurement and disbursement procedures. The emergency mechanism component would be triggered, following an adverse natural event, by the official Government of Grenada declaration of a national emergency in accordance with the National Disaster (Emergency Powers) Act Cap 3 of the 1990 Revised Laws of Grenada.[15] In accordance with the Emegency Powers Act, the Prime Minster has authority to declare that a national disaster has occurred in Grenada when he is satisfied that supplies and service essential to the life of the community are likely to be endangered. Following this declaration, the Government could officially request reconstruction/rehabilitation financing under this component through a letter to the Country Director. In addition, the Government would be required to submit a recovery action plan indicating reconstruction/rehabilitation needs. The recovery action plan would outline the requested re-categorized financing or additional financing to cover early recovery and rehabilitation costs.

In the event of a declaration of a national emergenecy by the Prime Minister under Emegency Powers Act, the emergency mechanism component would be implemented following the rapid response procedures governed by OP/BP 8.00. Once triggered, OP/BP 8.00 facilitates rapid utilization of loan proceeds by minimizing the number of processing steps and modifying fiduciary and safeguard requirements so as to support rapid implementation. Disbursements are expected to be in the form of two types of expenditures, namely 1) critical imports, and 2) rehabiliation/reconstruction activities - including civil works and related good and services. Disbursements would be made against a positive list of eligible critical imports or the procurement of goods, works, and consultant services needed for the recipient's economic recovery. The final arrangements would be part of the written agreement between the recipient

[15] Source: OAS, Caribbean Legislation Emergency Project

and the Bank that is a condition for disbursement of this loan component. In addition to reallocation of funds from other components in this project, the contingent component may also serve as a conduit for additional financing from IDA in the event of an emergency.

Below is a list of critical imports eligible under the component:

- Construction materials
- Water, land and air transport equipment, including spare parts.
- Agricultural equipment and inputs (excluding pesticides).
- School supplies and equipment.
- Medical supplies and equipment.
- Petroleum and fuel products.
- Construction equipment and industrial machinery.
- Communications equipment.
- Seeds and fertilizer.
- Food and water containers and any other items which may be acceptable to the Bank and agreed to by the Borrower and the Bank.

Component 4 - Project Management and Implementation Support (US$2 Million)

Activities under this component relate to the institutional support and capacity development for project management and execution. Activities would include training, staffing, and development activities associated with project execution, such as consulting services, and support for:

a. Preparation of designs and tender documents for execution and supervision of works, purchase of goods, and contracting of training activities;
b. Preparation of project reporting;
c. Processing of contracts, including the evaluation of tenders, preparation of evaluation reports, selection of contractors, and negotiation and supervision of contracts;
d. Liaison activities among the participating line ministries during project execution;
e. Supervision of the quality of works;
f. Specific training of staff in project management and execution;
g. Capacity building for accreditation to the UNFCCC Climate Adaptation Fund; and
h. Other activities, as required, to provide support to the project management unit.

B. Saint Vincent and Grenadines Project Description

Component 1 - Prevention and Adaptation Investments (US$7.4 Million)

This component is designed to reduce physical vulnerability and limit the fiscal shock caused by adverse nautral events through the piloting of adaptive measures to build resilience to current and future climatic changes. It includes a broad set of works activities, such as drainage improvements, rehabilitation, reconstruction and retrofitting of bridges and roads, retrofitting of critical public buildings (including schools and emergency shelters), investments in satellite

emergency centers, and adaptive watershed to reef system measures. Civil works would be executed to include construction and rehabilitation of existing infrastructure in order to reduce their vulnerability to natural hazards and climate change. Works would focus on priority public infrastructure including transportation systems, educational facilities, and public utilities, and would include rehabilitation or construction of emergency shelters, re-enforcement of river and coastal defenses that protect key infrastructure and realignment, and rehabilitation of bridges. In Arnos Vale and Georgetown watershed to reef systems, civil works would be complemented by technical assistance activities designed to comprehensively build resilience throughout the identified systems.

Included under works is the potential for the design, development, and preparation of priority works construction projects such as a new hospital complex to assist the Government in engaging construction financing available from other donors in the region. Other infrastructure works would include construction of two Satellite Community Warehouses in identified sites and stockpiling of gabion baskets in order to ensure a reliable stock in case of future river and/or coastal defense malfunction.

The project would fund supporting studies required for the development of works and soft activity packages such as hydrologic/hydraulic investigations, geotechnical investigations, and associated pre-engineering and engineering activities required to support engineering design and safeguard compliance. During the execution of the identified activities, comprehensive measures would include the integration of building code requirements and land use planning according to coastal and river contours in the project development process, and would introduce hazard/risk analysis and climate change impact analysis to assist in the design and construction of resilient systems.

Sub-Component 1.1 – Disaster Risk Mitigation Infrastructure Investments

Aging and unmaintained infrastructure coupled with changing climatic conditions has facilitated the deterioration of existing public infrastructure, resulting in high levels of vulnerability to natural hazards. Historically, designs did not take into account impacts from anticipated changes in future land use and climate changes, and were based on a limited analysis of past hazard events. Additionally, existing vulnerabilities related to land slip, rock fall, and flooding, left unattended, will continue to exacerbate the iterative deterioration of critical infrastructure. Under this sub-component, the community emergency shelters of Kingstown and Dorsetshire Hill Government School would be retrofitted and satellite warehouses for Rose Hall and Sandy Bay would be constructed to improve community resilience and increase localized capacity to disaster and climate change events.

The majority of the proposed works are relatively small in nature and the project would support the technical studies required to produce engineering designs that integrate risk reduction and climate change effects in order to improve the long-term performance of the selected structures. Additionally, this sub-component would provide the necessary studies to support the relocation of the National Milton Cato Memorial Hospital to a safer location. Specific activities identified under this sub-component are summarized in the following table:

#	Sub-Project Component and Activities	Estimated Cost (USD)
1.1	**Retrofitting/Rehabilitation of Public Buildings**	**$4,200,000**
1.2	**Rehabilitation and Risk Reduction of Transportation Infrastructure**	**$3,200,000**
Sub-Total Component 1.1		**$7,400,000**

1.1 Retrofitting/Rehabilitation of Public Buildings

Background: The Government has identified critical, life-line structures in need of immediate retrofitting to improve disaster resilience. These structures include public shelters and emergency response support structures such as satellite warehouses. Under this sub-component, the project would support the analysis and evaluation of site-specific building performance with respect to expected hazards and retrofit the structures accordingly.

Satellite warehouses would be designed, constructed, and equipped under this sub-component. A total of two (2) community satellite warehouses would be established under the project at Rose Hall and Sandy Bay to store emergency equipment and supplies in close proximity to the respective communities. These facilities serve as community coordination centers and afford the opportunity to pre-position disaster response equipment at the local level.

Two (2) emergency shelters would be retrofitted under the project – complementing the three (3) emergency shelters funded under the Hurricane Tomas Emergency Recovery Project. The project would fund the complete retrofitting of Dorsetshire Hill and Kingstown Government Schools with installation of emergency equipment, sanitary facilities, and improved drainage.

Additionally, under this sub-component, the project would support the required designs to relocate the existing, aging Milton Cato Memorial Hospital in Kingstown to a new hospital complex.

Satellite Warehouses

Sub-Project Rationale. Saint Vincent and the Grenadines is a multi-island state, and due to its rugged topography, communities such as Sandy Bay and Rose Hall can easily become isolated in major disasters. The objective of this activity would therefore be to construct satellite warehouses in specific communities, to provide them with the capacity to respond to disasters at the community level.

Proposed Investments. The satellite warehouses would include a small office and washroom that can be used for meetings and converted into a Community Emergency Operations Center, and a storage facility for critical disaster response equipment. The warehouses would be managed by the local or district disaster committees.

Sub-Project Beneficiaries. Direct beneficiaries of the proposed satellite warehouses would include the members of the communities in Sandy Bay and Rose Hall – particularly persons in sub-standard housing and persons with social or environmental vulnerability to disasters.

Retrofitting of Emergency Shelters

Sub-Project Rationale. The Government of Saint Vincent and the Grenadines, under the auspices of the National Emergency Management Organization (NEMO), operates various emergency shelters throughout the main island of Saint Vincent and also select population centers in the Grenadines. Each year, NEMO, in collaboration with a host of partners, conducts a shelter inspection process aimed at identifying suitable structures (private and government-owned) to be used as emergency shelters. While there continue to be challenges, the need to have these buildings available and in good condition remains a top priority for the NEMO. Accordingly, NEMO has designated a total of 141 emergency shelters throughout St. Vincent and the Grenadines as of October 2010, an average of 9 per constituency.

During and after the passage of Hurricane Tomas in October of 2010, for example, over 1,000 individuals were housed in these various shelters. A number of shelters were identified for retrofitting in an effort to make them better able to withstand natural disasters and better protect persons seeking refuge after a disaster event. Shelters would also be outfitted with generators as back-up power supply.

Proposed Investments. The retrofitting of the Dorsetshire Hill and Kingstown Government School emergency shelters would include the installation of emergency equipment, sanitary facilities, and drainage improvements. These works are limited to replacement, rehabilitation, and improved disaster resistance capabilities in already existing areas. Specifically for the Kingstown Government School, which serves the communities of Lodge Village and Redemption Sharpes, additional site–specific proposed works include: repairs to the roof, replacement of doors and windows, and the installation of commercial-grade manual shutters, among other things. As for the Dorsetshire Hill Government School, the proposed retrofitting would include the refurbishment of a new roof, windows, doors, as well as upgrades to bathroom facilities (toilets and showers), kitchen facilities, and road access.

Sub-Project Beneficiaries. Direct beneficiaries of proposed interventions would include the school children and teachers of Dorsetshire Hill and Kingstown Government Schools (approximately 700 students), the communities of Dorsetshire and Kingstown (given that the buildings serve a dual purpose of primary school and community shelter), the Ministry of Education, and NEMO. It must be noted that the Dorsetshire Hill Government School is the only shelter available to the residents (approximately 1,064) in this community and is considered in less than disaster-ready condition.

Studies for the Relocation of the Milton Cato Memorial Hospital

Sub-Project Rationale. PAHO conducted a *Safe Hospital* study which highlighted that the Milton Cato Memorial Hospital was structurally unsound (vulnerable to Category 1 Hurricanes, flooding, etc.) and that operational conditions were below accepted standards. The study

underlined the dire structural inefficiencies of the building and operational conditions of the main General Hospital - the only one in the country. The study, therefore, recommended the building of a new hospital with higher construction standards at a new location.

Proposed Investments. Based on the number and scale of the issues uncovered in this study, the most feasible option appears to be the construction of a new hospital in a different location, with higher structural standards. Accordingly, the intervention has been proposed under the project which will undertake activities including the completion of feasibility studies, design, and other pre-construction activities for the new hospital.

Sub-Project Beneficiaries. The feasibility studies, design, and other pre-construction activities for the new hospital would eventually benefit the entire population of Saint Vincent and the Grenadines. The mitigation works would also indirectly improve the quality of care for all future patients of the main population center's only hospital.

1.2. Rehabilitation and Risk Reduction of Transportation Infrastructure

Background. Under this sub–component, the actions would be aimed at the rehabilitation of bridges and landslide stabilization in order to reduce the vulnerability of existing infrastructure. Technical designs for interventions would take into account parameters related to the hydrological and geotechnical characteristics specific to each of the zones, taking into account best available information on changing hydrological patterns.

Identified critical infrastructure includes the rehabilitation of bridges at South River (Bridge Road), Fenton Road (Dauphine), and Fenton Road (Green Hill).

South River Bridge is located in the city of Kingstown within an area of commercial activity. Because of the intersection of two tributaries of the river just before the bridge, during the rainy season the river level and flow stream increase considerably, which has led to the weakening of the bridge. This bridge connects Long Lane Upper with South River Road and allows the pass of light and heavy vehicles, helping the mobility of people and the commercial activity.

Fenton Road has been selected by the Government as an essential route to improve mobility between Kingstown and Arnos Vale. This road has performed as a bypass to Kingstown on several occasions. The road has two bridges which have deteriorated to the degree that they have rendered the route unsafe for use. This project would seek to replace these bridges to improve the long-term performance of the selected structures.

Slope Stabilization: Dark View (Road Realignment and Coastal Defense)

Dark View landslides usually affect Leeward Highway during the rainy season, disrupting traffic in the Northern communities such as Fitz-Hughes, Petit Bordel, and the town of Chateaubelair, which are only accessible by this route. In addition, there is evidence of coastal erosion that can affect the stability of the road.

Sub-Project Rationale. The rehabilitation of bridges and landslide risk mitigation are aimed at reducing the vulnerability of existing infrastructure in light of the increased amounts of water during the rainy season and as a result of hurricanes causing floods and landslides with increasing frequency and intensity. These interventions would improve population mobility and reduce socio-economic effects caused by traffic disruption or congestion.

Sub-Project Beneficiaries. The direct beneficiaries of these interventions would the people and businesses in the Kingstown area (South River), the population of Arnos Vale, and of the Northern communities (rural fishing communities) such as Fitz-Hughes, Petit Bordel, and the town of Chateaubelair. Indirectly, these interventions would help the general population due to improved mobility between different areas of Kingstown and the rest of the island. Moreover, they would have implications on the ability of persons to evacuate the capital or access critical services in the event of a disaster.

Proposed Investments. The design for each intervention would be done by the Ministry of Transport and Works. The improvement of the South River and Fenton bridge specifications should consider hydrological studies to define the design parameters in terms of maximum river level and flow stream. The proposed intervention for Dark View would address two issues: First, extensive coastal erosion that threatens the main road artery from the Northern communities. Second, it would address a severely unstable upper embankment of this roadway and the roadway realignment. The proposed interventions would include the construction of a sea wall in the former case and terracing of the embankment in the latter. The Dark View landslide interventions would require previous geotechnical characterization studies (shear strength parameters) of rainfall levels and pluvial hydrology to determine appropriate engineering solutions. For all intervention sites, topographic surveys should be conducted and rainfall and earthquake conditions must be analyzed as instability triggers. According to information from the Ministry of Works, one house in Dark View would require land acquisition and compliance with the Bank resettlement safeguards.

Component 2 - Regional Platform for Hazard and Risk Evaluation, and Applications for Improved Decision making and Building Practices (US$10.8 Million)

Saint Vincent and the Grenadines has disaster risk reduction and climate adaptation needs in all the seven priority areas identified by the Eastern Caribbean countries.[16] This component would finance regional collaboration for capacity-building and knowledge-building around data management, risk analysis, climate change adaptation planning, and piloting approach to building more climate resilient environments within two of the seven priority areas. It will also finance a pilot for climate change adaptation for atolls.

For the purpose of generating a change in the region to standards of public sector investments Saint Vincent and the Grenadines has selected to pilot watershed management (Arnos Vale Watershed) and coastal protection (Georgetown). In collaboration with other countries from the

[16] (i) critical public infrastructure such as airports and hospitals; (ii) other public infrastructure such as transport and water grids; (iii) government buildings; (iv) watershed management; (v) urban flood mitigation; (vi) coastal protection; and (vii) landslide risk reduction

region and the support of regional technical agencies, the Ministry of Works and Physical Planning will take the lead on organizing the Eastern Caribbean regional knowledge sharing and learning process to develop and apply climate change adaptation measures for watershed management and coastal protection.

This project would generate an understanding of how to incorporate fact-based knowledge regarding natural hazards and climate change and their risks to and impacts on the society, economy, and infrastructure into local development planning, as well as mitigation and adaptation activities across the region. The project component contains a series of capacity-building interventions across a series of sectors and actors in collaboration with regional technical agencies and other countries in the region.

The lessons learned regarding watershed management, coastal protection and climate change adaptation in attols will be captured and subsequently published with the participation of a regional technical agency effectively creating a blue-print for building climate resilience in the Eastern Caribbean. Besides the direct learning benefits to the Caribbean region as a whole, the Economic Union members would benefit collectively from the physical investments, since these interventions would help mitigate the negative externalities associated with adverse affects of future natural hazard shocks on the Economic Union as a whole.

#	Sub-Project Component and Activities	Estimated Cost (USD)
2.1	Regional Collaboration for Natural Hazard and Climate Change Risk Analysis and Disaster Management	$3,600,000
2.2	Regional Collaboration for Watershed Management	$3,200,000
2.3	Regional Collaboration for Coastal Protection	$3,500,000
2.4	Climate Change Adaptation Pilot Area: Union Island	$500,000
	Component 2	**$10,800,000**

Sub-Component 2.1 – Regional Collaboration for Natural Hazard and Climate Change Risk Analysis and Disaster Management

Saint Vincent and the Grenadines is committed to the regional effort in the Eastern Caribbean to build capacity to conduct assessment of natural risks and integrate such assessments into policy- and decision-making for development investments, disaster risk mitigation and disaster response planning across sectors

Sub-Project Rationale. Hydrometeorological information and analysis is important for all the Caribbean islands and particularly important to inform the chosen pilots in Saint Vincent and the Grenadines. The project would significantly strengthen the existing hydro-meteorological network (both physical equipment and human capacity) throughout the country. The project would provide training and capacity building for linking Saint Vincent and the Grenadines up

with the regional GeoNode platform and the regional probabilistic risk assessment platform and in collaboration with the Caribbean Institute for Meteorology and Hydrology, Saint Vincent and the Grenadines would organize training and capacity building for use of hydrological and meteorological information in development planning, climate change adaptation and disaster management.

Sub-Project Beneficiaries. The direct beneficiary of this project component would be the Caribbean disaster risk management and climate change adaptation communities, due to a significantly improved capacity to collaborate around use of hydrological and meteorological data for fact based climate change adaptation investment decisions. Since risk models and data management systems will be open coded, the experience of application of risk models for decision making in Saint Vincent and the Grenadines will be directly transferable to other countries at a marginal additional cost.

Proposed Investments. Workshops and knowledge management support would be organized to facilitate regional collaboration around applications of risk models for decision making. The project would include investments to strengthen hydro-climatological monitoring, analysis, and understanding. This component would help strengthening capacity of the Met Office for forecasting and intergovernmental coordination, communications equipment, and planning for linkages to global systems of climate tracking, in close collaboration with regional organizations and initiatives. Regional technical assistance processes for the elaboration of vulnerability assessments and climate risk assessments would also be supported. The project would provide technical support to build capacity and streamline the process within the Physical Planning Department for the enforcement of building codes. Goods being purchased would include, but not be limited to, GIS software, national emergency communications network equipment, work station and server equipment, minor repairs to existing emergency support facilities, and communications and response equipment.

Sub-component 2.2 - Regional Collaboration for Watershed Management

The Ministry of Transport and Works would take the lead on organizing the Eastern Caribbean regional knowledge sharing and learning process to develop and apply standards and methods for climate change adaptation in watersheds and for coastal protection in the Eastern Caribbean. The key to the chosen approach is the comprehensive integration of physical works, policy development and implementation, preventive measures, and other soft options. Activities would be focused within a vulnerable watershed-river-coastal system. The pilot area would implement and test a broad spectrum of ideas and interventions to build resilience within the identified systems.

Arnos Vale Watershed to Reef System

Background. Arnos Vale and neighbouring communities such as Fountain, Villa, and Belair, have undergone significant developments in recent years, including the construction of a number of major infrastructural projects. As a result of this development, flooding of the Warrawwarrow River has increased in recent years, threatening residents and a number of critical infrastructures including the E.T. Joshua Airport Arnos Vale Sporting Complex. Previous flood mitigation interventions have focused on sets of gabion walls along the river banks, which have experienced

structural failures leading to dramatic changes in flow, threatening their ability to adjust to and absorb disturbances. This has led to an increase in flood flows. Without any intervention, this will continue to threaten the lives and properties of residents, commercial enterprises, and a number of critical infrastructures along and near the river system.

Sub-Project Rationale. Integrated watershed management is a challenge for all countries in the Eastern Caribbean. Eastern Caribbean countries want to explore how to combine soft and hard measures for better results in a cost effective manner. According to climatic trends, flood events experienced in recent years in the Arnos Vale Watershed and Warrowarrow River system will continue to be exacerbated. The technical design and construction of risk mitigation works and adaptation measures to mitigate flooding and promote river erosion control would reduce damage to public and private property, improve the mobility of population, and offset other socio-economic effects caused by road blockage generated by water from floods. Moreover, comprehensive river management plans would reduce the environmental impact caused by the inadequate garbage disposal at rivers and channels.

***Sub-Project Beneficiaries*.** The lessons learned from this pilot on integrated watershed management will be captured and subsequently published with the participation of a regional technical agency providing valuable information for integrated watershed management in the region. Besides the direct learning benefits to the Caribbean region as a whole, direct beneficiaries of these interventions include the users of E. T. Joshua Airport (the only airport on the island of Saint Vincent), and the residents and commercial business enterprises of Arnos Vale.

Proposed Investments. Workshops and knowledge management support would be organized to facilitate regional collaboration around integrated watershed management. Construction works would include the installation of gabion baskets in Warrawarrow River and drainage improvements in Arnos Vale. For the design and construction river defense, hydrological and hydraulic assessments should be carried out in order to identify possible solutions and specific designs. It is advisable to review other technical solutions, as it has been shown that the use of gabions baskets may not be as effective. Additionally, it would be necessary to have a maintenance plan including activities related with periodical drainage cleaning and educational programs to change human behavior in relation with garbage management. In addition, some technical work in the form of soil testing, geological assessment, and ground water assessment and monitoring would be done through a consultant or a regional training institution. This activity would be done in the Arnos Vale Catchment, Warrowarrow River, and related coastal outlets system.

Sub-component 2.3 - Regional Collaboration for Coastal Protection

The Ministry of Transport and Works would take the lead on organizing the Eastern Caribbean regional knowledge sharing and learning process to develop and apply standards and methods for coastal protection taking into account climate change in the Eastern Caribbean.

Georgetown Coastal Protection

Background. Georgetown is a rural coastal community on the northeastern coast of Saint Vincent. It is the service center for the windward communities, particularly those north of the Rabacca Dry River. In recent years, the Government has made several large investments in the area, including the construction of an orphanage, reconstruction of the Georgetown Police Station, and in 2010, the completion of the School for Children with Special Needs. In addition, a Modern Medical Complex is being constructed which will provide diagnostic, surgical, laboratory, and dialysis services among other modern hospital services, and will significantly improve health care in Saint Vincent and the Grenadines. There are also advanced plans to construct a multi-million-dollar facility to house the Town Board Office, the Revenue Office, a Post Office, a branch of the National Commercial Bank, restaurants, and medium-sized shops in the vicinity of the proposed site. This will generate much needed economic activity and assist to further decentralize critical services to benefit these areas.

Sub-Project Rationale. Coastal erosion is a common and costly problem in the Eastern Caribbean. The Georgetown coast has suffered extensive erosion in the recent years. This project is designed to pilot a combination of soft and hard measures to reduce the risk to life, the environment, private property, and critical public infrastructure in a vulnerable coastal setting. At the site of the proposed works, this erosion threatens the main windward highway, the only playing field in Georgetown, other critical public infrastructure, private residences, and a number of restaurants and shops along the coast. The problem has been exacerbated by damage sustained by the passage of several hurricanes, including Tomas in October 2010, and now requires immediate attention.

Sub-Project Beneficiaries. The lessons learned from this pilot on coastal protection will be captured and subsequently published with the participation of a regional technical agency. Besides the direct learning benefits to the Caribbean region as a whole, direct beneficiaries would include the entire community of Georgetown. The coastal defense works and associated activities would also benefit neighboring communities and inhabitants surrounding the river systems outlets of the Georgetown area.

Proposed Investments. Workshops and knowledge management support would be organized to facilitate regional learning on how to develop appropriate coastal defenses in the context of climate change. Activities of this project would include the construction of coastal protection, designation and delineation of drainage channels and buffer zones in the Georgetown watershed, testing and monitoring of the enforcement of new building code provisions in the Georgetown community, appropriate numerical and physical modeling to determine optimum shoreline stabilization techniques for the Georgetown pilot area, including ecosystem conservation, and reduction of downstream impacts; and the assessment of climate change impacts on coastal and marine ecosystems and commercial fisheries.

2.4 Climate Change Adaptation Pilot Area: Union Island

Sub-Project Rationale. Union Island, the southernmost Grenadine Island, is an area that is highly vulnerable to climate change impacts and was therefore chosen as one of the three pilot areas within the project to engage in a comprehensive climate change adaptation intervention. The complex nature of the adverse impacts of climate change necessitates a comprehensive

approach to adaptation interventions. This need has led to the approach of conducting a series of interventions throughout the Union Island watershed. The pilot would allow for a more comprehensive understanding of the climate change profile and impacts for the island as well as for the conducting of certain specific interventions to reduce vulnerability (e.g. mangrove replanting). The pilot would create designs for a series of future interventions that would allow for a fully comprehensive adaptation intervention on Union Island.

Sub-Project Beneficiaries. The direct beneficiaries of this project would be the population of Union Island which will have a reduced level of vulnerability to climate change impacts due to the pilot and be prepared for further future vulnerability reduction activities. Additional beneficiaries would include the various government agencies and ministries involved in the pilot who would gain invaluable practical experience and lessons in practical and comprehensive climate change adaptation, which they could then replicate in other locations within Saint Vincent and the Grenadines.

Proposed Investments. This sub-component would conduct a geology assessment of Union Island as a single drainage basin inclusive of soil testing, ground water assessment, and monitoring. It would test the application of Union Island's Integrated Coastal Zone Management plan and the community awareness strategy; implement numerical and physical modeling techniques for Union Island on climate change adaptation (including accounting for downstream impacts, shoreline stabilization, and the development of specific engineering projects for Union Island); and implement forestry management activities and other soil and water conservation measures (e.g. the replanting of mangroves and other plant species in select areas, establishment of flying nurseries, possible establishment of terraces and sedimentation traps, supporting best practices in agriculture and agro-forestry, and other activities). Finally, the project would design and delineate drainage channels and buffer zones on Union Island and engage in definition of the legal and legislative implications of drainage channels for various communities as well as GIS mapping to record the drainage systems.

Component 3 – Emergency Response Contingent Credit (US$0)

Due to the high risk of a catastrophic event in Saint Vincent and the Grenadines, a provisional component will be added under this project that would allow for rapid reallocation of the loan during an emergency, under streamlined procurement and disbursement procedures. In the event of an emergency, the contingent component would be implemented following the rapid response procedures governed by OP/BP 8.00. Once triggered, OP/BP 8.00 facilitates rapid utilization of loan proceeds by minimizing the number of processing steps and modifying fiduciary and safeguard requirements so as to support rapid implementation. Disbursements are expected to be made against a positive list of critical imports or the procurement of goods, works, and consultant services needed for the recipient's economic recovery. The final arrangements would be part of the written agreement between recipient and the Bank that is a condition for disbursement of this loan component. In addition to reallocation of funds from other components in this project, the contingent component may also serve as a conduit for additional financing from IBRD in the event of an emergency.

Component 4 - Project Management and Implementation Support (US$1.8 Million)

Activities under this component relate to the institutional support and capacity development for project management and execution. Activities would include training, staffing, and development activities associated with project execution such as consulting services and support for:

a. Preparation of designs and tender documents for execution and supervision of works, purchase of goods, and contracting of training activities;
b. Preparation of project reporting;
c. Processing of contracts including the evaluation of tenders, preparation of evaluation reports, selection of contractors, and negotiation and supervision of contracts;
d. Liaison activities among the participating line ministries during project execution;
e. Supervision of the quality of works;
f. Specific training of staff in project management and execution;
g. Capacity building for accreditation to the UNFCCC Climate Adaptation Fund; and
h. Other activities, as required, to provide support to the PSIPMU.

Annex 3: Implementation Arrangements

APL1 (Grenada and Saint Vincent and the Grenadines)

Grenada

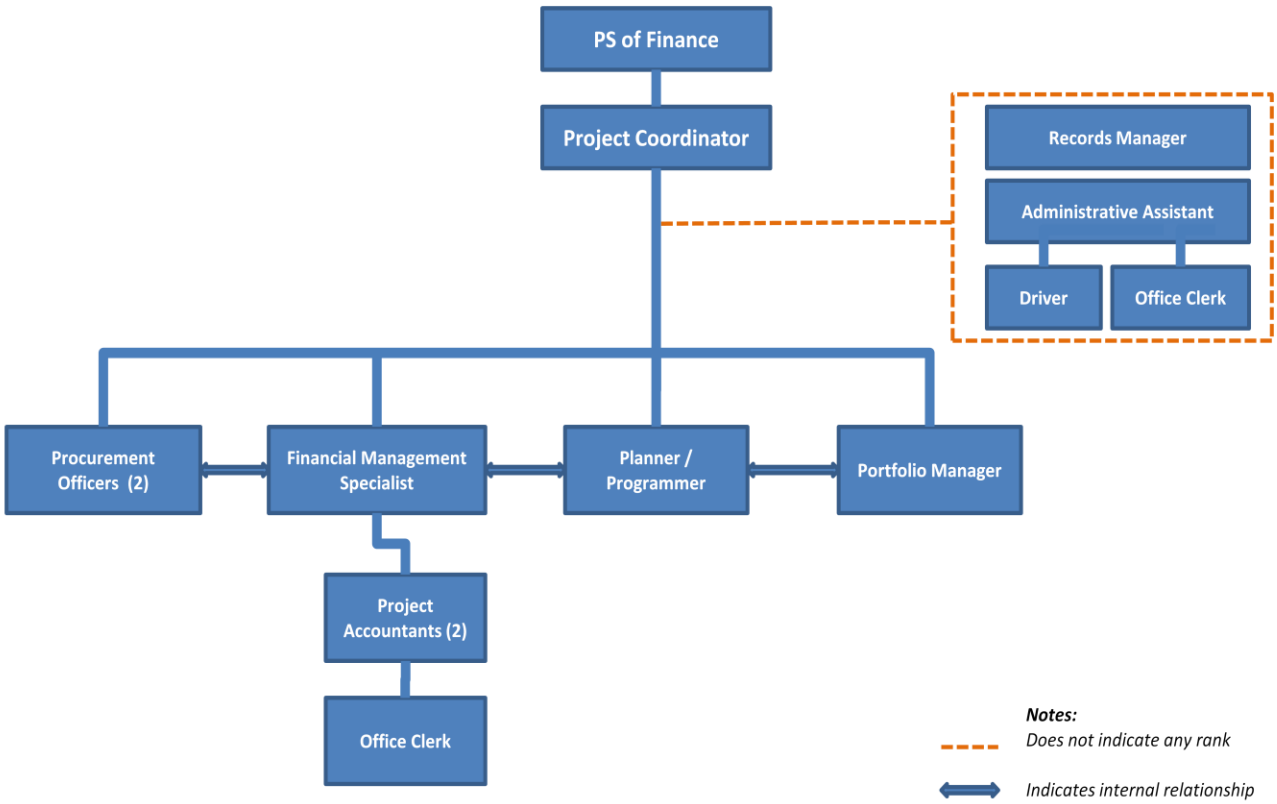
Proposed Project Administration Mechanisms. Procurement activities would be managed through the PCU. All contracting activities including bidding, contractor selection, and execution supervision would be managed through the PCU with the technical assistance of the participating line ministries. As needed, line ministries would provide technical support, particularly with respect to works projects. Line ministries would also provide technical documentation to support procurement activities and as needed, the PCU would engage the services of qualified specialists and engineers to assist with procurement and supervision. Participating ministries would provide technical staff to assist in contract supervision; however, the responsibility for the management of change orders and contract modifications would rest solely with the PCU.

PCU Capacity Analysis and Staffing Recommendations. During appraisal the Bank assessed the project implementation capacity of the PCU. This assessment was done as a compliment to the Bank's regular Financial Management and Procurement Capacity Assessments carried out at earlier stages during project preparation. The assessment focused on the following issues: 1) the workload of the PCU; 2) the cross sectoral nature of the RDVRP; 3) and the social and technical complexity of specific activities.

Current PCU Staffing and workload (March 2011)

The following chart illustrates current staffing and reporting of the PCU.

Figure 2 - Current PCU Organizational Chart



The PCU currently handles six World Bank financed projects as well as two additional projects with financing from the Caribbean Development Bank (CDB), for a total value of US$38.4 million. In 2012 the PCU is expecting to handle seven World Bank financed projects and two additional projects with financing from the CDB and the OPEC Fund for International Development (OFID), for a total value of US$60.6 million. From 2013 the workload is currently projected to drop to a total of six projects for a total value of US$56 million.

Below is a summary of projects currently managed by the PCU and projects under preparation to be managed by the PCU.

Projects Currently Managed by the PCU			
Project	**Budget**	Closing	**PCU Staff-Funded under the Project**[17]
1. OECS (Grenada) Skills for Inclusive Growth Project - World Bank	US$4.81 million (IDA) US$897,963 (GoG)	2013	- 3 staff covered under IDA funds - 1 staff covered under GoG funds
2. Grenada Technical Assistance Credit Project	US$2,815,000	August, 2012	- 2 staff covered under the IDA funds

[17] Staff include specialists and administrative support staff

- World Bank			
3. Public Sector Modernization and Improvement Project - World Bank	US$3.5 million	June, 2012	- 2 staff
4. OECS Education and Development Project - World Bank	US$11.2 million	June, 2011	- staff support to the PCU ended in December 2010
5. Strengthening of Personal Expenditure Management - World Bank	US$350,000	June, 2012	N/A
6. Smalls Farmers Initiative - World Bank	US$1.1 million	2013	N/A
7. Schools Rehabilitation and Reconstruction Project Phase I - CDB	US$8,657,000	September, 2009	N/A
8. Schools Rehabilitation and Reconstruction Project Phase II - CDB	US$5,967,463	November, 2012	N/A
Total Portfolio:	**US$38.4 million**		

Proposed Projects that will be Managed by the PCU in 2012			
Project	**Budget**	**Closing**	**PCU Staff-Funded under the Project[18]**
1. OECS (Grenada) Skills for Inclusive Growth Project - World Bank	US$4.81 million (IDA) US$897,963 (GoG)	2013	- 3 staff covered under IDA funds - 1 unit of staff covered under GoG funds
2. Grenada Technical Assistance Credit Project - World Bank	US$2,815,000	August 2012	- 2 staff covered under the IDA funds
3. Public Sector Modernization and Improvement Project - World Bank	US$3.5 million	June 2012	- 2 staff
4. Strengthening of Personal Expenditure Management - World Bank	US$350,000	June 2012	N/A
5. Smalls Farmers Initiative - World Bank	US$1.1 million	2013	N/A
6. Safety Net Advancement Project (SNAP) - World Bank	US$5 million	under preparation – likely till 2013	- Proposed to support 2 staff through 2013
7. Schools Rehabilitation and	US$5,967,463	November,	N/A

[18] Staff include specialists and administrative support staff

Reconstruction Project Phase II - CDB		2012	
8. Fund for International Development Phase 1 - OPEC	US$10.5 million	xx	N/A
9. Regional Disaster Vulnerability Reduction Project - World Bank	US$26.2 million	August, 2016	Refer to table 3
Total Portfolio:	**US$60.7 million**		

Fiduciary Capacity

Based on the significantly increased workload the PCU will need to add fiduciary capacity to appropriately ensure quality in project implementation.

The procurement team in the PCU currently consists of two procurement officers. The procurement capacity assessment concluded that there is a need to increase the number of staff and to improve quality. The assessment proposes that the PCU hire a procurement assistant in order to reduce the burden of performing routine tasks from the two procurement officers. One procurement officer's contract is ending. A possible new procurement officer may need to receive additional training in Bank procurement guidelines and in contract administration. The project coordinating unit would maintain throughout the project life a team comprising at least two procurement officers and a procurement assistant with appropriate qualifications and experience.

The financial management capacity assessment conducted in September of 2010 concluded that the overall financial management capacity of the PCU is adequate. The Financial Management (FM) unit in the PCU has four staff and is headed by an experienced FM Specialist. The support staff in the PCU is quite experienced, but only one of the support staff is a qualified accountant. There is a need for additional training, in particular of the supporting staff.

Technical Capacity

Due to the large number of civil works under the RDVRP that will be expected to internalize best available climate change information in design and execution, it will be needed for the PCU to add the appropriate technical capacity. It is recommended that the PCU contract a Project Engineer to provide critical path inspections and engineering reviews of designs and related contract documentation. The project engineer would report to the PCU Director and liaise closely with the engineers from the Ministry of Works.

The RDVRP is also likely to finance activities that would require that the Government has successfully acquired additional land or resettlement in accordance with the Resettlement Policy Framework prepared for the RDVRP. In order to ensure timely action and high standards for the

needed land acquisition it will be necessary for the PCU to engage the support of a part time Social Development Specialist.

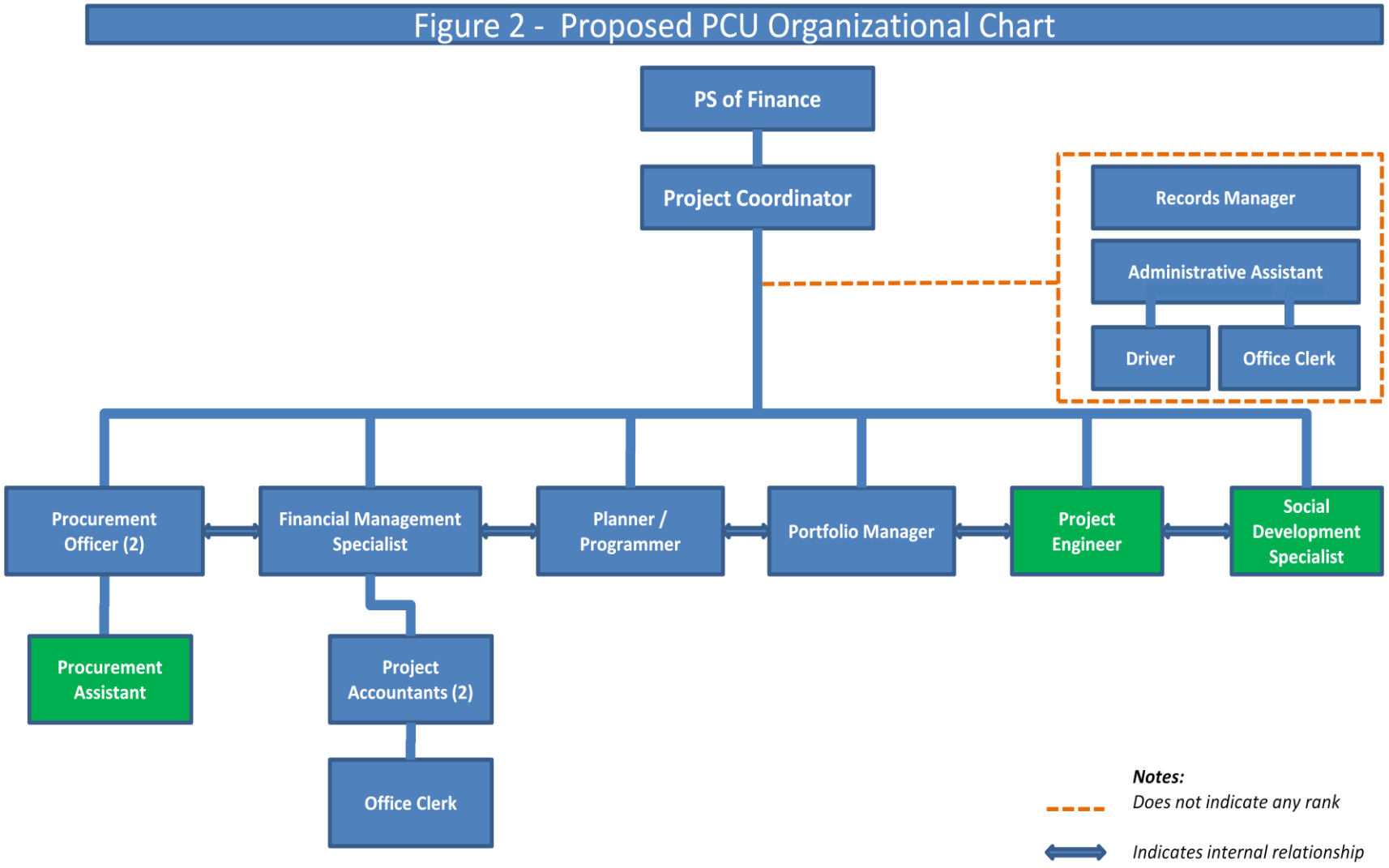
Proposed PCU Staffing for successful project implementation

Based on these capacity development needs of the PCU, and taking into account the existing project funds linked to each existing staff position, it will be necessary for the RDVRP to finance a significant amount of the needed PCU capacity. The table below references the staff and timeframe of remuneration costs of the PCU that would be funded under the RDVRP.

Proposed Staffing Funded under the RDVRP		
Position	**Estimated Cost (US$)**	**Timeframe**
(a) Project Engineer	$300,000	5 years
(b) Financial Management Specialist	$125,000	3 years
(c) Accountant	$130,000	4 years
(d) Accountant	$130,000	4 years
(e) Procurement Specialist	$208,000	5 years
(f) Procurement Specialist	$108,000	3 years
(g) Procurement Assistant	$70,000	5 years
(h) Social Development Specialist (part time)	$114,000	5 years
(i) Driver	$42,000	3 years
(j) Project Coordinator	$227,000	5 years
(k) Administrative Assistant	$96,000	5 years
(l) Records Manager	$60,000	5 years
(m) Clerks (funded by GoG)	N/A	5 years
Total	**$1,610,000**	

The proposed PCU Organization Chart, which takes into account new positions proposed to assist with RDVRP implementation, can be referenced in the chart below.

Proposed PCU Organization Chart

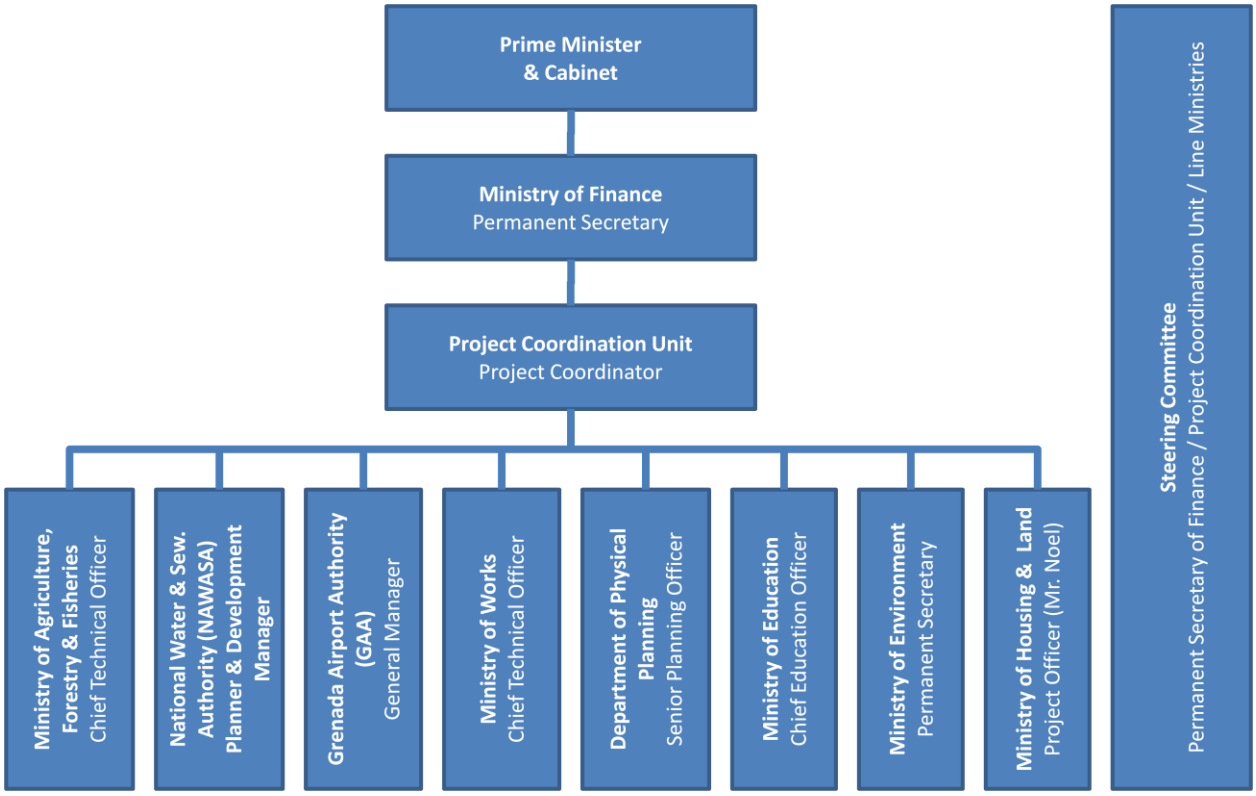


Project Steering Committee

The Steering Committee will be responsible for review periodic reports on project implementation as submitted by the Project Coordinator and make decisions thereon: It shall be established under the auspices of the MOF and be comprised of the Ministry of Agriculture, NAWASA, GAA, Ministry of Works, Ministry of Environment, Ministry of Housing and Lands, which can be referenced in the organigram below. It will be chaired by the Permanent Secretary of MOF or as designated by the Permanent Secretary of MOF. The Additional representatives will come from the organizations participating in the implementation of the project and will include: a representative from the ministry of works, MBIA, NADMA, the Ministry of Housing, the Ministry of Education. The Permanent Secretary of MOF can appoint additional members to the Steering Committee as deemed necessary. The PCU will also be represented.

Below are the proposed institutional arrangements under the project shown in an organigram:

Figure 1 - Institutional Arrangements



A. Financial Management

Grenada has a good legal framework for public financial management and oversight. Article 75-82 of the Grenada Constitution provides for the public finance and oversight arrangements.

Besides, the Public Financial Management Act and Audit Act of 2007 provide a good legal basis for public financial management (PFM) and oversight. The 2010 PFM Performance Report, which was prepared using PEFA performance indicators, found significant strength in the PFM system in Grenada in a number of areas. These include comprehensiveness of budget information, extent of unreported government expenditures, transparency of tax payer's obligation and liabilities, scope, nature, and follow-up of external audit, etc. The report found a number of challenges in some areas. These are the legislative scrutiny of budget law and external audit reports, internal control and audit, predictability in the availability of funds for commitment of government expenditures, etc. The Government is using a computerized accounting system, currently using SmartStream. The current system does not capture the project expenditures financed by the World Bank. As such, the financial management of all World Bank-financed projects is ring-fenced in a PCU based in the Ministry of Finance, Planning, Economy, Energy and Cooperatives.

Project Financial Management. Overall, the financial management capacity in the PCU in the Ministry of Finance is adequate. The PCU has adequate financial management staff. The FM unit in the PCU has four staff and is headed by an experienced Financial Management Specialist. The support staff in the PCU are also quite experienced. The PCU also has substantial experience with World Bank fiduciary guidelines and is currently managing four World Bank-financed projects. However, there are some areas which would require some further strengthening. These include introducing a system of "risk-based" internal audit and preparing an Operations Manual for the project. The following are the details on financial management:

- ***Accounting and Reporting.*** The PCU is currently using a computerized accounting system, which would be adequate for preparing timely financial reports for the project. The project would prepare quarterly Interim Financial Reports and submit them to the World Bank within 45 days from the end of each quarter. The PCU would require preparing an Operations Manual for the project, which would document the project implementation system, rules and procedures, and also the formats for Interim Financial Reports (IFRs) of the project. A new chart of accounts would be required for the Project.

- ***Internal Control.*** Although the overall control environment is good, there is scope for strengthening the internal control environment in the PCU. Currently, there is no system of internal audit in the development projects in Grenada. To strengthen the control environment, the Government could introduce a system of internal auditing of the project expenditures. This would ensure that all expenditures from the projects are made for their intended purpose and increase donors' confidence in the Government's systems and processes. Initially, one Internal Auditor could be appointed by the project for conducting internal audit of the project cost based on a "risk-based" audit plan.

- ***Auditing.*** The Director of Audit in Grenada does not have adequate capacity to audit the development projects. As such, the audit of the project would be conducted by a private sector auditor to be appointed by the PCU based on agreed-upon terms of reference for the audit. The PCU would prepare detailed terms of reference for the audit and submit them to the World Bank for review during the project appraisal. The audit would be conducted based on International Standards on Auditing or any other international standards

acceptable to the Bank. The audit report would be transmitted to the World Bank no later than six months after the end of the fiscal year.

B. Disbursement Arrangements and Flow of Funds

The funds from the project would be channeled to the project through a Designated Account denominated in US Dollars, which would be opened by the PCU in a commercial bank acceptable to the Bank. The PCU would operate a local currency account, to finance project expenditures in local currency. The funds from the US Dollar Designated Account would be periodically transferred to a local currency account. This account would be operated in accordance with the procedures and guidelines set forth in the Bank's Disbursement Handbook. Proceeds of the credit/PPF would be disbursed to the US Dollar denominated designated account managed by the PCU following project effectiveness and/or Bank's agreement to provide PPF. Disbursements for the project would be made based on "Report-Based Disbursement" procedures (using Interim Financial Reports - IFRs) submitted to the Bank on a quarterly basis within 45 days after the end of each quarter. The PCU financial management staff has some experience in using "Report-Based Disbursement". However, further training would be required for refreshing their knowledge in "Report-Based Disbursements" and "e-submission of disbursement applications".

Table 1: Expenditures by Component

Component/Category	Total (US$)	Percent of Financing
Component 1: Prevention and Mitigation Investment		
Component 2: Capacity Building to establish a regional platform for Hazard and Risk Evaluation, and Applications for Improved Decision Making		
Component 3: Emergency Response Contingent Credit		
Component 4: Project Management and Implementation	2,000,000	
Front-End Fees (One-Time Payment to the World Bank)		
Total	26,200,000	100%

C. Procurement Arrangements

Procurement for the proposed project would be carried out in accordance with the World Bank's "Guidelines: Procurement Under IBRD Loans and IDA Credits" dated May 2004, revised October 2006, and May 2010; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004, revised October 2006, and May 2010, as well as the provisions stipulated in the Legal Agreement. The general description of various items under different expenditure categories is described below. For each contract to be financed by the Loan/Credit, the different procurement methods or consultant selection methods, the need for prequalification, estimated costs, prior review requirements, and time frame are agreed between the Borrower and the Bank project team in the Procurement Plan. The Procurement Plan would be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

Procurement of Works. Works procured under the project would include various civil works activities ranging from retrofitting of homes for the aged, rehabilitation of several schools, and mitigation works against floods and rock falls to land slips construction and strengthening of several reservoirs. About 66 percent of the civil works procurement would involve International Competitive Bidding (ICB) and the remaining 34 percent would involve National Competitive Bidding (NCB). Standard Bidding documents for NCB would be reviewed and agreed with or made satisfactory to the Bank.

Procurement of eligible civil works contracts financed full or partially by the Bank, estimated to cost US$1.5 million (equivalent) or above per contract and not exceeding US$10.4 million in the aggregate, would be procured under the ICB method of procurement. Civil works contracts each estimated to cost between US$150,000 and US$1.5 million equivalent and not exceeding US$7.2 million in the aggregate, would be procured through National Competitive Bidding procedures. Small civil works contracts estimated to cost less than US$150,000 per contract may be procured through shopping under lump-sum fixed-price contracts awarded on the basis of quotations obtained from at least three qualified domestic contractors in response to a written invitation. The invitation shall include a detailed description of the works, including basic specifications, relevant drawings, the required completion date, and a basic form of agreement acceptable to the Bank. The award shall be made to the contractor that offers the lowest price quoted for the required work, and has the experience and resources to complete the work satisfactorily.

Procurement of Goods. Goods procured under the project would include fire fittings, equipment, and appliances, purchase and installation of computers, servers, and accessories, GIS remote sensing hardware and software, equipment for emergency communication, purchase and installation of several water tanks, an emergency radio broadcasting station, rescue boats for the MBI, etc. in the aggregate to cost about US$7.19 million, of which an estimated total of US$3.2 million would be procured following the ICB method of procurement; and an estimated amount of US$1.5 m to be used for the procurement of specialized equipment for emergency communication which would be procured following the Direct Contracting method of procurement. This method of procurement is considered desirable because of system compatibility and efficiency of operation. The Grenada Emergency Operations Center has recently acquired most of its emergency equipment from a competitively selected supplier and the proposed acquisition of equipment under the proposed project would only be an extension of badly needed equipment to make the system complete and self-standing. Goods with contract values greater than US$25,000 and less than US$150,000 per contract with an aggregate value not exceeding US$2.4 million may be procured under the NCB method of procurement. Small items of the shelf goods whose values do not exceed US$25,000 and whose aggregate value does not exceed US$670,000 may be procured using the shopping method of procurement.

Selection of Consultants. Consultant services under this project would be contracted to help undertake studies in the areas of, inter alia, environmental and social assessments, design and supervision of rock fall, land slip, and flood mitigation, training services in data management, watershed analysis, GPS, GIS remote sensing, and digital data capturing.

Firms. Consultancy contracts for carrying out environmental and social assessment for La Sagesse and Beausejour; design and supervision of rock fall and land slip civil works activities; design and supervision of flood mitigation civil works; and design and supervision of rehabilitation of selected schools contracts for firms would be procured using the QCBS and other methods agreed upon in the Financing Agreement with the aggregate estimated cost not to exceed US$1.1 million.

Individual Consultants. All other consultant contracts, such as specialized advisory services as well as GIS and GPS training, etc., would be awarded to individual consultants selected by comparison of qualifications of three candidates and hired in accordance with the provisions of Paragraph 5.1 through 5.4 of the consultant guidelines, up to an aggregate amount of US$760,000.

In exceptional cases, single-source contracting may be used with previous agreement of the Bank and in accordance with the provisions of Paragraph 5.4 of the consultant guidelines.

1. Procurement Procedures for Contingent Emergency Response

Flexibility in the procurement of works, goods, and services such as the following may be put in place: (i) use of Stand-By Arrangements, where the borrower would be encouraged to undertake advance procurement. Stand-by arrangements allow for tendering and signing of draft contracts, for which implementation is triggered when an emergency occurs (such arrangements are common in the transport and power distribution sectors); (ii) applying higher prior-review thresholds; or (iii) using special procurement methods such as direct contracting, force account shopping, and other simpler procurement methods for the delivery of urgently needed goods and services. The procurement arrangements for the use of the abovementioned procedures would be cleared by the RPM's office prior to implementation.

2. Operating Cost

PCU staff salaries, sundry items, office supplies, office rentals, vehicle operation costs, and other operating costs would be financed by the loan/credit proceeds up to an aggregate amount of US$2 million and would be procured under procedures acceptable to the Bank.

D. Environmental and Social Arrangements

Expected Social Development Outcomes. A project-level social assessment was conducted during project preparation to study the likely benefits and possible adverse effects of the proposed RDVRP activities. The assessment was conducted using a mix of quantitative and qualitative research methods. The social assessment pointed to the fact that overall project impacts and outcomes are expected to be positive for the population of Grenada.

Beneficiaries. Project beneficiaries include elderly residents in public facilities; pupils and teachers currently inhabiting dilapidated schools; communities, businesses, public services in flood-prone and landslide-prone areas; communities frequenting roads and bridges in various states of disrepair, etc. The projects target some of the poorest and most vulnerable communities

in the OECS. For example, the Community Infrastructure Development Component of the Grenada project implicates poor communities in La Sagesse and Beausejour, the members of which were former squatters and were moved off crown lands by the Government in order to make way for developers. Beneficiaries include both direct and indirect beneficiaries.

Benefits would be felt in the form of improved infrastructure and in the case of Beausejour and La Sagesse, the infrastructure would make possible the provisioning/delivery of a range of public services, including access to emergency services and solid waste collection services currently denied to the community.

***Psycho-Social Benefits*.** The social assessment conducted during the preparation of the Grenada project noted that potential social impacts include "psycho-social" and emotional benefits derived from a greater sense of physical safety as well as (for example, in the context of the rehabilitation of school infrastructure) improvements in conditions conducive to learning and teaching.

The following table presents an overview of the project beneficiaries (both direct and indirect) and likely benefits for each activity:

Project Activity	Beneficiaries	Benefits
Holy Cross R.C. School Rehabilitation Location: Munich	Direct: 87 people (staff+ students) Indirect: 3,500 including 425 primary indirect beneficiaries	*Physically safer building *Reduction in risk of personal injury *More spacious facility *More conducive environment for teaching and learning *Reduction in disruption to school activities *Rehabilitated hurricane shelter *Psycho-social benefits
Cadrona Home for the Aged	Direct: 37 people (staff + residents) Indirect: 300 (including 195 primary indirect beneficiaries – i.e. family members of staff and residents)	*Physically safer building *Reduction in risk of personal injury
La Sagesse Relocated Community: Infrastructural Vulnerability Mitigation Relocated Persons from Mt. Pandy/Islander	Direct: 27 families (108 people) Indirect: indeterminate number of persons from surrounding community, including friends/relatives of residents	*Improvement in road access *Ability to delivery of building materials *Access to emergency services (waste disposal, public health) *Reduced housing vulnerability to land slippage

		and rock fall *Safer commuting environment
Water Storage Reservoir and Generator House for Chemin Borehole Water Supply System Location Option: Old Westerhall, St. David	Direct: 4,000 (local communities and employees of local factories, tourist sites, SME's, schools, etc.) Indirect: indeterminate number of persons	*Uninterrupted water supply
Water Storage Reservoir and Generator House for Chemin Borehole Water Supply System Location Option: Marian, St. George's	Direct: 7,000 (local communities and employees of local factories, tourist sites, SME's, schools, etc.) Indirect: indeterminate number of persons	*Uninterrupted water supply
Water Storage: Construction of New Observatory Reservoir Town of St. George's	Direct: 4,300 (1,831 males, 2,469 females). Beneficiaries include residents and employees of over 100 enterprises, occupants and clients of 2 large malls, HQ of 6 major denominational churches serving thousands of worshipers; HQ of 4 major banks, etc. (see social assessment for further details) Indirect: indeterminate number of persons	*Uninterrupted water supply *Aversion of health risks
Dusty Highway Flooding Mitigation Location: Drain Between Dusty Highway and MB Highway Into Prickly Bay	Direct: estimated 360 persons (employees of approx. 20 small, medium, and large businesses – including 10 households with an estimated 30 occupants)	*Reduction and removal of property damage caused by flooding; loss of furnishings; loss of business income earnings; loss of service delivery opportunities and other inconveniences
Morne Rouge Flooding Mitigation Location: Grand Anse Round About Area, South St. George's)	Direct: 1,500 persons (including 700 employees of 80 businesses and institutions, 500 stay-over guests at 6 hotels, and 300 students at SGU Campus Halls)	*Reduction and removal of flooding inconveniences

	Indirect: indeterminate number of persons	
Grand Anse Housing Scheme Rock Fall Mitigation Location: Circular Drive	Direct: 64 persons (16 residences) Indirect: indeterminate number of persons	*Removal of risk/threat of rock falls *"Peace of mind"
Sendal Tunnel Rock Fall Mitigation	Direct: 17,000 (including population of St. George's, commuters, pedestrians including local students and government complex workers) Indirect: indeterminate number of persons	*Mitigation of risk of rock falls
Flooding Mitigation Location: River Road, St. George's	Direct: 1,700 persons (including 25 enterprises, 75 households/residences, and 3 schools) Indirect: indeterminate number of persons	*Mitigation of flooding risks and related inconveniences
Constantine Land Slip Mitigation Locaiton: 6 Land Slips Along the Constantine Main Road	Direct: 3 seasonal business establishments Indirect: 110 minibus owners/operators transporting an estimated 5,200 passengers daily. Private vehicle owners, trucks, etc.	*Mitigation of land slip risks and related inconveniences
Beausejour Community Infrastructure Vulnerability Mitigation Original Residents and Relocated Persons from Mt. Pandy	Direct: 32 families (estimated 128 people). This includes 17 households relocated and 13 households originally resident Indirect: indeterminate number of persons from the surrounding communities	*Construction of public infrastructure *Receipt of emergency public services *Easier access to solid waste disposal *Improved public health outcomes *Reduced housing vulnerability to land slippage and rock fall with erection of retaining structures
Brizian Rock Fall Mitigation	Direct: 15 nearby homes (75 persons)	*Mitigation of rock fall tragedies and inconveniences

	Indirect: indeterminate – including bus owners/operators and bus passengers (including cruise ship passengers)	
Land Slip Mitigation Location: 4 Land Slips Along Gouyave Estate/ Market Square Main Road	Direct: none Indirect: indeterminate including minibus owners/operators and passengers	*Mitigation of land slip tragedies and inconveniences
Bridge Replacement Lance Bridge – Gouyave Town	Direct: population of the Parish of St. John – estimated 9,486 persons Indirect: indeterminate number of persons from surrounding communities and general public	*Mitigation of risks caused by old and decaying bridge structure
Bridge Replacement Hubble Bridge	Direct: 75 households (375 people); 254 students and 17 teachers of the lone primary school within the community Indirect: indeterminate	*Reduction of travel distance for residents from 1 to 2.5 miles to 20 to 50 feet *Improved and faster service delivery
Hills View Home for the Aged: Retrofitting to Reduce Vulnerability	Direct: 58 persons (including staff and residents) Indirect: 400 people including 300 “primary indirect beneficiaries” (family or household members of staff and residents)	*Physically safer building *More comfortable service and residential environment *Reduction in risk of personal injury *Improved safety in the face of natural hazards *Reduction in stress and concern
Water Storage Tufton Hall Reservoir (Clear Well) Construction	Direct: 2,500 people (including residents and institutions) Indirect: indeterminate number of people including persons who work in the town of Victoria but live elsewhere	*Constant supply of water for 48 hours whenever the dam is closed rather than the current 4-hour supply. Supply stoppage occurs several times per month for at least six months per year, particularly in the rainy season. * Good water supply ensuring maintenance and preservation of good hygiene and sanitation practices and minimization of

		illnesses
St. Patrick's Anglican School Rehabilitation	Direct: 262 people (including staff and students) Indirect: 2,600 people including 1,032 "primary indirect beneficiaries" consisting of family or household members of staff and students	*Physically safer building *Increased comfort *Reduction in the risk of personal injury to staff and students *More conducive environment for teaching and learning *Reduction in potential disruption to school activity likely caused by natural hazards *Improved condition of hurricane shelter

In the mid to long term, the project would have positive impacts, although short-term disturbances during construction would likely result in some inconveniences.

Land Acquisition. Several activities have been determined to involve land acquisition and the Involuntary Resettlement Safeguard (OP/BP 4.12) has been triggered. An RPF has been prepared and is currently being finalized prior to disclosure. The RPF indicates that the RDVRP activities' impacts on land use, crops, buildings, and other property are expected to include approximately 14 of the possible 20 project sites. Only small numbers of persons are likely to be impacted in any significant way and this is with respect to the Lance Bridge Replacement. The number of affected persons is solely based on the final bridge design and could range from less than 4 households and two businesses (affecting possibly 20 persons in total) in the case of a single-lane bridge with pedestrian sidewalks to 45 persons, 8 households, and 2 businesses including resettlement in case of a two-lane design. No other site presents these variables, although 14 possible sites would involve some loss of land use, crop losses, building modifications, or other property effects.

Institutional Capacity. During project preparation, the institutional capacity of the PCU to undertake the social assessment and monitor safeguard compliance was assessed. It was concluded that the PCU serves a fiduciary function and does not have staff with the requisite social development credentials. A consultant has therefore been hired to undertake the social assessment and the RPF. Given the potential significant social impacts generated by the project and the triggering of OP/BP 4.12 by several sub-components, the PCU would, throughout the implementation of the project, retain appropriately skilled staff to supervise the project elements involving land acquisition and/or resettlement. Additionally, the Operations Manual would identify focal persons in each of the relevant Government Ministries/implementing agencies who would liaise directly with the PCU on these issues.

Environment. In accordance with Bank environmental safeguard requirements, this project has been classified as Category B in accordance with OP/BP 4.01 on Environmental Assessments. Works proposed under the project are largely rehabilitation and retrofitting of selected infrastructure and impacts would generally be associated with the actual construction phase of

the works activities. Limited new constructions have been proposed for inclusion in the project and relate to the installation of access roads and services in two select communities where the Government has previously relocated families under a previous government initiative. The vast majority of works involve rehabilitation or retrofitting of existing structures to include bridges, clinics, retrofitting of dwellings, and land slip and rock fall mitigation activities. A significant portion of the project involves the purchase of goods and services.

As for any Category B project, the Government has prepared an Environmental Assessment (EA) examining project activities and providing an environmental framework to guide project execution. Two groups of projects have been identified. These are those which will require a stand-alone Environmental Assessment and those comprising uncomplicated rehabilitation works where the impacts are limited to the construction phase (e.g. repair and retrofitting). To address these activities, procedures have been included in the Operations Manual detailing requirements for a stand-alone Environmental Assessment and the screening of uncomplicated activities for the inclusion of environmental compliance contracting clauses to mitigate construction-related impacts.

Projects requiring an EA have been identified and contracting requirements have been incorporated into the procurement plan. EAs would be completed during the preparation of works activities and would establish environmental requirements for the design and construction phase of the activity. Draft TORs are included in the Operations Manual. All such projects are subject to prior review.

For uncomplicated activities, a screening procedure and draft construction contract clauses are included in the Operations Manual to be applied as needed to works construction contracts.

As identified in the EA, construction activities are located in urban centers and along vulnerable roadway areas with respect to land slip and rock fall. No projects affecting sensitive habitats, coastal zones, or involving any additional application of environmentally related safeguard policy have been included.

Supervision for environmental compliance would be managed through the PCU under Bank Supervision. In addition to Bank requirements, the PCU would also be responsible for ensuring the proper application of any national environmental requirements.

Other Safeguards Policies Triggered. Apart from Environmental Assessment OP/BP 4.01 and Involuntary Resettlement OP/BP 4.12, no other Bank safeguard requirements were identified affecting the implementation of the project. No issues relating to the project were identified as requiring specific attention that are not addressed under the Bank safeguard policy structure. Finally, no exceptions from Bank Safeguard policies are being sought under this project.

E. Monitoring and Evaluation

Project Monitoring and Evaluation. The project is aiming at outcomes related to disaster mitigation aspects and improvements in institutional capacities that meet the overall Program outcomes; and specific outputs related to individual components.

Major Outcomes Expected from the Project. The major outcomes expected from the project include: (a) Reduced risk of target population to climate hazards through capacity strengthening and reduced vulnerability in key sectors through (i) capacity built to identify and monitor climate risk at the national level and (ii) strengthened institutional capacity at the national and regional level towards managing disasters; (b) Reduced vulnerability of public and select private infrastructure and climate proofing of existing infrastructure investments through (i) construction/strengthening/relocation of risk mitigation infrastructure, (ii) improved potable water security, and (iii) international airport safety standards met; (c) Strengthened institutional capacity for disaster risk management; and (d) A disaster risk financing mechanism in place. Corresponding indicators (quantitative and qualitative) for the measurement of these outcomes are included in the Results Framework developed for the project.

Institutional Issues. The project monitoring and evaluation system would consist of a three-tier level at the PCU, Line Ministries, and Field Level, and supplemented with consultants and World Bank missions. The regular reporting of these agencies and updating of implementation progress data drawn from the updates by the stakeholders in the project at difference levels/activities would assist the PCU in providing timely interventions at appropriate levels to remove impediments in project implementation and building capacity of stakeholders involved in and benefitting from the project.

Data Collection. Primary data relating to population, demography, and other scientific studies would be drawn from national accredited institutions and local administration to develop project plans. During implementation, project progress and impact data would be collected from all stakeholders, viz. beneficiary communities, implementing agencies or line ministries, and consultants, as well as implementation progress reports and World Bank monitoring missions. The costs toward the establishment of a monitoring system within the PCU with technical assistance from the MEU and housed within the Ministry of Finance, Planning, Economy, Energy and Cooperatives, and impact and supplementary support of impact assessment reports are financed under Component 4 of the project, including costs generated by the PCU, implementing agencies or line ministries, and consultants during the process of generating reports on a monthly and quarterly basis.

Capacity. Institutions engaged in/associated with the project have the basic capacities to avail necessary information/data. To ensure timely completion of envisaged activities under the project, the institutions are also supported by consultants, and other community and national-level stakeholders proposed to be engaged in the project. The cost toward supplementary support would be drawn from Component 4 under the project.

Saint Vincent and the Grenadines

Project Administration Mechanisms. The PSIPMU currently located in the MoFEP would be responsible for managing the procurement and financial management aspects of the project. The PSIPMU is implementing two Bank-financed projects. All contracting activity including bidding, contractor selection, execution, and supervision would be managed through the PSIPMU with the technical assistance of the participating line ministries. As needed, line ministries would provide technical support particularly with respect to works projects. Line ministries would also provide technical documentation to support procurement activities and as needed, the PSIPMU would engage the services of qualified specialists and engineers to assist with procurement and supervision. Participating ministries would provide technical staff to assist in contract supervision; however, the responsibility for the management of change orders and contract modifications would rest solely with the PSIPMU.

During the procurement process, the PSIPMU would convene such technical committees as necessary for the design, evaluation, and supervision of contracts to ensure the active participation of the beneficiary agency.

Given the emphasis on works represented under the project portfolio, the Government would include civil engineering support within the PSIPMU to provide technical assessments and overall technical quality assurance/quality control during works activities. This support may take the form of a contracted engineer to provide critical path inspections and engineering reviews of designs and related contract documentation.

A. Financial Management

The PSIPMU has a Financial Management Specialist who is conversant with the Bank's project financial management requirements. However, the overall performance of financial management for Bank-financed projects is mixed. Considering the work load and the complexity of this project, the Government would provide an additional financial management staff. Subject to appointment of an additional financial management staff, the overall financial management capacity of the PSIPMU would be adequate to meet the minimum financial management requirements of the Bank as per OP/BP 10.02. The following are the details of the financial management arrangements:

- ***Accounting and Reporting.*** The Government is currently using QuickBooks accounting systems for accounting of development projects, which would be adequate to prepare timely financial reports for the project. In addition, the Government would require preparing an Operations Manual for the project, which would include the implementation arrangements, rules and procedures, and also the formats for quarterly Interim Financial Reports of the project. The Operations Manual would be made available for review by the Bank during appraisal of the project. The interim financial reports and the annual financial statements would be prepared by the PSIPMU in US dollars.

- ***Internal Control.*** The Government would strengthen the control environment by conducting internal audits of the project activities. The MoFEP would prepare a "risk-

based" internal audit plan to conduct internal audits of the project activities and share a summary of the findings of the report with the Bank during project supervision. The cost of the internal audit would be borne by the project.

B. Disbursement Arrangements and Flow of Funds

There would be one designated account opened for the project proceeds, managed by the PSIPMU. Project funds would flow from the Bank loan, by direct payments or via the Designated Account (DA), which would be replenished on a transactional basis using Statements of Expenditure and full documentation as appropriate. The accounts would be opened by the PSIPMU in a commercial bank acceptable to Bank. Foreign currency amounts would be either paid directly to foreign suppliers or exchanged as needed in local currency, to cover eligible expenditure payments in local currency to suppliers, from the designated accounts into local currency transfer accounts also opened by the PSIPMU in a commercial bank acceptable to the Bank. Details of expenditures against contracts that would require full documentation and expenditures that may be submitted under Statement of Expenditures are provided in the Disbursement Letter. The risk associated with funds flow and disbursement is considered as moderate after mitigating measures.

Table 1: Expenditures by Component

Component/Category	Total (US$)	Percent of Financing
Component 1: Prevention and Mitigation Investments		
Component 2: Capacity Building to establish a regional platform for Hazard and Risk Evaluation, and Applications for Improved Decision Making		
Component 3: Emergency Response Contingent Credit		
Component 4: Project Management and Implementation		
Front-End Fees (One-Time Payment to the World Bank)		
Total		

External Audits. The Directorate of Audit in St. Vincent and the Grenadines does not have adequate capacity to conduct audits of development projects. As such, annual financial audits of the Project financial statements would be conducted by an auditor to be appointed by the PSIPMU acceptable to the Bank as per agreed upon terms of reference. Project financial statements (PFS) would include: (i) Sources and Use of Funds, (ii) Statements of Expenditures, and (iii) a Statement of Designated Account including notes to financial statements, and a bank reconciliation statement. The PSIPMU would require preparing detailed terms of reference for the audit of the project and submitting them to the World Bank for review during the project appraisal. The audit would be conducted based on International Standards on Auditing or any

other acceptable international standards on auditing. The audit report would be transmitted to the World Bank no later than six months after the end of the fiscal year.

Supervision Plan. As part of its project supervision missions, the Bank would conduct risk-based financial management supervisions at appropriate intervals. During project implementation, the Bank would supervise the project's financial management arrangements in the following ways: (a) review the project's quarterly interim financial reports as well as the project's annual audited financial statements and auditor's management letter, remedial actions recommended in the auditor's Management Letters; (b) during IDA's on-site supervision missions, review the following key areas: (i) project accounting and internal control systems; (ii) budgeting and financial planning arrangements; (iii) disbursement management and financial flows, as applicable; and (iv) any incidences of corrupt practices involving project resources; and (c) conduct joint financial management and procurement contract post reviews once per year.

C. Procurement

The PSIPMU has been implementing World Bank-financed projects for almost eight years and is well versed in World Bank procurement guidelines and procedures. This entity would be responsible for carrying out procurement under the project.

Procurement Arrangements. Procurement for the proposed project would be carried out in accordance with World Bank's "*Guidelines: Procurement Under IBRD Loans and IDA Credits",* published in May 2004, revised October 2006 and May 2010; and *"Guidelines: Selection and Employment of Consultants by World Bank Borrowers",* published in May 2004, revised in October 2006 and May 2010.

The PSIPMU has developed a procurement plan (dated November 12, 2010) for the first 18 months of project implementation. This plan provides the basis for the procurement methods as well as the schedule as to when each of the procurement items identified in the plan would proceed through the procurement cycle. This plan would be finalized and agreed on with the Borrower and the Project Team and would be available in the office of the PSIPMU, in the project database, and on the World Bank external website. The procurement plan would be updated in agreement with the Project Team annually or as required to reflect actual project implementation needs and improvements in institutional capacity. The various items under different expenditure categories are described in general below. For each contract to be financed by the loan, the different procurement methods or consultant selection methods, the need for pre-qualification, estimated costs, prior review requirements, and timeframe are agreed on between the Borrower and the Bank in the Procurement Plan.

Procurement of Works. Works procured under the project would consist of several civil works contracts. Packages for integrated network of infrastructure are estimated at approximately US$4.473 million, which would include construction of a gabion wall for river defense, rehabilitation of bridges, construction of satellite warehouses, and retrofitting of emergency shelters. Procurement would be carried out using the Bank's standard bidding documents (SBDs) for all for international competitive bidding (ICB). Standard bidding documents for national

competitive bidding (NCB) and shopping for small-value contracts would be agreed on with the Bank.

Procurement of Goods. Goods procured under the project, estimated to cost a total of US$XXXX million, would include equipment for institutional strengthening, emergency communication, gabion baskets, equipment for satellite warehouses, and equipment for emergency shelters. Procurement would be carried out under the ICB method of procurement, using the Bank's standard bidding document (SBD).

Selection of Consultants. Consultant services, estimated at approximately US$2XXX million, would include technical assistance (training) services for institutional strengthening and hazard risk analysis, design and supervision of civil works for rehabilitation of school infrastructure, shelters and community centers, river defense, road repair and slope stabilization, salaries for project coordination unit staff, and technical and financial audits. Selection methods for consultant contracts are agreed upon in the Financing Agreement.

Capacity. A recent Bank procurement capacity assessment was carried out in August 2010. The assessment report indicates that the overall risk of the PSIPMU carrying out procurement was determined to be "Average". The assessment reviewed the organizational structure of the PSIPMU, and in particular, the procurement functions of the staff. The existing procurement staff, comprised of two procurement officers and one procurement assistant, work on projects financed by several international agencies, including the World Bank. The Bank assessment mission has discussed the inapplicability of the Public Procurement Financial and Audit Act (PPFAA) of 1964 on World Bank-financed projects and it has been agreed with the Government that the procurement staff would utilize the procurement guidelines and procedures of the financing entity. Hence, procurement for the proposed project would be carried out following World Bank guidelines. The PSIPMU staff has handled projects financed by the World Bank for several years. However, the level of knowledge of the staff on World Bank procurement, particularly on contract management, is limited. With additional training in World Bank procurement as well as other donor procurement procedures, it would be possible to improve the performance of the PSIPMU staff in handling procurement for the proposed RDVRP.

Procurement Methods and Prior Review Threshold. In addition to the action plan detailed above, the procurement thresholds and methods that are presented below would further mitigate the procurement risks identified. Furthermore, it is recommended that supervision missions be carried out every six months, with procurement Post Review by the Bank once every year.

Table 2: Thresholds for Procurement Methods and Prior Review

Expenditure Category	Contract Value (Thresholds) US$ Thousands	Procurement Method	Contracts Subject to Prior Review
1. Works			
	>1,500	ICB	All
	150 – 1,500	NCB	1st Three

			Contracts
	<150	Shopping	None
	Regardless of Value	Direct Contracting	All
2. Goods			
	>150	ICB	All
	25-150	NCB	1st Three Contracts
	<25	Shopping	None
	Regardless of Value	Direct Contracting	All
3. Consulting Services			
-3.1 Firms	>100	QCBS,QBS,FBS, LCS	All
	<100	QCBS,QBS,FBS, LCS and CQS	1st Three Contracts
	Regardless of Value	Single Source	All
-3.2 Individuals	Regardless of Value	Comparison of 3 CVs in Accordance with Chapter V of the Guidelines	TORs

Note: QCBS = Quality and Cost-Based Selection; QBS = Quality-Based Selection; FBS = Fixed-Budget Selection; LCS = Least-Cost Selection; CQS = Selection Based on Consultant Qualifications.

D. Environmental and Social Arrangements

Social Assessment and Social Safeguards. A project-level social assessment is currently being undertaken and a Resettlement Policy Framework is being finalized. The development of the RPF and the Social Assessment is the responsibility of the Social Development Specialist (SDS) within the Social Policy Unit of the PSMPMU. The SDS has worked with the Ministry of Housing, Informal Human Settlements, Lands and Surveys, and Physical Planning (MoHILPP) during the preparations and implementations of the Resettlement Action Plan (RAP) and Social Impact Assessments since MoHILPP is responsible for processing land acquisition on the Island. A Chief Technical Officer within the MoHILPP has been assigned to work with the Social Specialist throughout the course of the project. The capacity of the SDS to manage the social and safeguard aspects of the project during implementation has been assessed to be weak. It was therefore determined that a part-time social safeguards specialist be hired during project implementation to assist the SDS.

Social Assessment. A Social Assessment for the project is currently being finalized prior to project appraisal. Research methods for the assessment have been finalized; sixteen (16) field facilitators have been trained and field research was launched on January 24, 2011. By February 4, field research on St. Vincent had been completed. Field research was planned for the Grenadine Islands of Bequia and Canouan beginning the week of February 7, 2011. Nineteen (19) research sites were identified in total. It is expected that the research will generate 350 interviews and at least four (4) Focus Group Discussions (FGDs). These results will be captured and written up in the PAD prior to appraisal.

Sandy Bay. While the current list of planned activities under the project does not include interventions in Sandy Bay (the main location of the Island's Garifuna population) and while it has been determined that the Bank's Indigenous Peoples Policy does not apply, social assessment research efforts have been intensified in Sandy Bay in case of future activities. In response to the Bank's request for extra due diligence in the Sandy Bay community, the team had adopted a larger sample size in Sandy Bay than in other communities and had essentially over-sampled the area (25 interviews). The final version of the social assessment will devote a specific section to the analysis of the Sandy Bay information.

Involuntary Resettlement and Land Acquisition. The project would likely entail small amounts of land acquisition. Project activities that could possibly trigger land acquisition include slope stabilization and coastal defense efforts. The RPF currently being finalized will be summarized and included in the PAD prior to project appraisal. In addition, the RPF will be disclosed in country and by the Bank as per OP 4.12.

Environment. During project preparation, the Government completed a project-level environmental assessment. During the assessment, the Government identified 12 candidate projects of sufficient potential impact as to require the preparation of environmental assessments under Bank safeguard policies OP/BP 4.01. These projects will be subject to prior review.

An environmental screening procedure and application requirement is included in the project Operations Manual and, in the case of works whose impacts relate to the construction phase, a set of standard environmental performance contract clauses has been provided.

The PSIPMU would initiate screening procedures as required and would modify construction contracts as needed in the case of rehabilitation works. Specific works included in the portfolio have been assessed as needing EAs prior to final design and execution. The PSIPMU would ensure that EA findings are included in works contracts and that contracts require the implementation of recommended Environmental Management Plans.

Environmental Assessment TORs will be forwarded to the Bank for review. The produced EAs would be forwarded to the Bank for review prior to the development of specific works contracts. All works contracts requiring an EA would be subject to prior review and supervision missions would review project activities with respect to environmental compliance.

Finally, no issues have been identified that are not otherwise considered in the application of Bank safeguard policies.

E. Monitoring and Evaluation

Project Monitoring and Evaluation. The project is aiming at outcomes related to disaster mitigation aspects and improvements in institutional capacities that meet the overall Program outcomes; and specific outputs related to individual components.

Major Outcomes Expected from the Project. The major outcomes expected from the project include: (a) Reduced risk of target population to climate hazards through capacity strengthening and reduced vulnerability in key sectors through capacity built to identify and monitor climate risk at the national level; (b) Reduced vulnerability of public infrastructure and emergency communications in place through strengthened emergency management capacity and improved effectiveness of risk reduction investments; (c) Strengthened institutional capacity for disaster risk management; and (d) A disaster risk financing mechanism in place. Corresponding indicators (quantitative and qualitative) for the measurement of these outcomes are included in the Results Framework developed for the project.

Institutional Issues. The project monitoring and evaluation system would consist of a three-tier level at the PSIPMU, line Ministries (particularly MoTW and NEMO), and field level, and supplemented with consultants and World Bank missions. The regular reporting of these agencies and updating of implementation progress data drawn from the updates by the stakeholders in the project at different levels/activities would assist the PSIPMU in providing timely interventions at appropriate levels to remove impediments in project implementation and build capacity of stakeholders involved in and benefitting from the project.

Data Collection. Primary data relating to population, demography, and other scientific studies would be drawn from national accredited institutions and local administration to develop project plans. During implementation, project progress and impact data would be collected from all stakeholders, viz. beneficiary communities, implementing agencies or line ministries, and consultants, as well as from implementation progress reports and World Bank monitoring missions. The costs toward the establishment of a monitoring system within the PSIPMU with technical assistance from the MEU and housed within the MoFEP, and impact and supplementary support of impact assessment reports are financed under Component 4 of the project including costs generated by the PSIPMU, implementing agencies or line ministries, and consultants during the process of generating reports on a monthly and quarterly basis.

Capacity. Institutions engaged in/associated with the project have the basic capacities to avail necessary information/data. To ensure timely completion of envisaged activities under the project, the institutions are also supported by consultants, and other community and national-level stakeholders proposed to be engaged in the project. The costs toward supplementary support would be drawn from Component 4 under the project.

Annex 4: Operational Risk Assessment Framework (ORAF)

Grenada

Project Development Objectives	
The program aims at measurably reducing vulnerability to natural hazards and the adverse impacts of climate change in the Eastern Caribbean.	
PDO Level Results Indicators:	**Indicator One**: Reduced risk of OECS population to failure of public buildings and infrastructure due to natural hazards or climate change impacts.
	Indicator Two: Increased capacity of OECS governments to identify and monitor climate risk and impacts.

Risk Category	Risk Rating	Risk Description	Proposed Mitigation Measures
Project Stakeholder Risks	**Low-L**	The risk that users of public buildings and infrastructure are dissatisfied with the civil works works financed under the project.	The elements to be financed under the projects have been chosen based on observed deficiencies and vulnerability and in processes involving the beneficiary communities. The communities are likely to be supportive of the interventions since they perceive a direct benefit from them.
Implementing Agency Risks	**Medium-L**	There is risk of poor coordination of project activities across various agencies and levels (regional and national); risk of inadequate mechanisms to ensure quality control; risk of elite capture and of distortion in the monitoring and reporting of project performance indicators; and risk of fraudulent claims.	Provide for independent inspections through contract and training for ministries in inspection and quality control practices. Establish critical path inspection and procedures and integrate them into construction contracts. Augment national capacity with contract engineers and training. With additional training in ethics and fraud and corruption, it will be possible to enhance the performance of the fiduciary staff in the PCU and reduce the risk level.
Project Risks			
• Design	**Medium-L**	Physical environmental data insufficient for design of climate-resistant infrastructure projects	The project would build country and regional capacity for strengthening the understanding of climate change adaptation needs throughout the lifetime of the

		Project activities are located in numerous areas spread over a wide but accessible geographical area. Scope of rehabilitation works grows with discovery of hidden damages during construction. Data sharing is complicated in the Caribbean. A more efficient approach to understanding and addressing climate change in the Caribbean will require better sharing of information among many different agencies at the national and regional level. Data monopolies will have to be broken down.	project. The proposed civil works under the project would retrofit existing infrastructure that is vulnerable to current climate risks. The budget for extra incentives reflected in the larger national investment plan that was appraised as part of the project preparation process can be complemented by additional donor partner or Government funds, if required. The project team would provide detailed inspections at the pre-engineering stage to minimize hidden damage impacts. The project, through complementing the PPCR, would seek to build capacity at both the regional and national levels, including institutional strengthening for multiple ministries across a shared data platform to insure maximum distribution of analytical capacity.
• Social and Environmental	**Medium-I**	Purchase of private lands for project works would require application of resettlement safeguards as it relates to land acquisition. Specific civil works may require separate Environmental Assessments. Separate Social Assessments including periodic consultations with affected communities may be required.	Adequate Bank Supervision and training in safeguard application Projects requiring safeguards would be subject to prior review. The Bank has years of experience working with resettlement of people from high-risk areas. Tools such as a handbook published by the Bank in January 2010 are now available to help inform these processes. If any Government should ask for the Bank's support in this regard, the team would bring in a resettlement specialist to advise the Government on how to handle the process and on the application of OP 4.12. Adequate Bank Supervision and training in safeguard application Projects requiring safeguards would be subject to prior review. Project should also emphasize compliance with national environmental policies in addition to

			Bank safeguards. Specific civil works (including La Sagesse and Beausejour) may require separate Social Assessments.
• Program and Donor	**Low-I**	Grenada has submited its PPCR proposals by March 7 and expect to have a positive answer from the CIF prior to Negotiation.	For implementation Bank procedures and operational policies will be followed. The Bank team has been supporting Grenada in their preparation of their financing request to the CIF, and expects the CIF to evaluate the proposal favorably.
• Delivery Quality	**Medium-L**	Future funding is not secured as the Government has not established systems to correlate climate impact data and design of climate-resistant infrastructure projects; this also includes establishing sufficient monitoring and evaluation systems, representing a risk to the sustainability of the model.	The Pilot Program for Climate Resilience is a multi-phased donor-funded project that would support project activities after the life of the project; in addition, a commitment will be sought from the Government to cover project activities after the project.

Overall Risk Rating at Preparation	Overall Risk Rating During Implementation	Comments
Medium-L	**Medium-L**	The rating of Medium-L for preparation is associated with the strong Government commitment to building national climate change resilience as well as the fact that Grenada has implemented large amounts of civil works in the past under Bank-funded disaster management and disaster recovery projects. The same rating for implementation reflects the higher risks of the project history in the region, which are variable and general encounters problems where national policy change is sought as one of the project objectives.

Saint Vincent and the Grenadines

Project Development Objectives	
The program aims at measurably reducing vulnerability to natural hazards and the adverse impacts of climate change in the Eastern Caribbean.	
PDO Level Results Indicators:	**Indicator One**: Reduced risk of OECS population to failure of public buildings and infrastructure due to natural hazards or climate change impacts.
	Indicator Two: Increased capacity of OECS governments to identify and monitor climate risk and impacts.

Risk Category	Risk Rating	Risk Description	Proposed Mitigation Measures
Project Stakeholder Risks	**Low-L**	The risk that users of public buildings and infrastructure are dissatisfied with the civil works works financed under the project. Borrower relations and donor relations do not represent risks, since project objectives are closely aligned with past and ongoing projects and national policies.	The elements to be financed under the projects have been chosen based on observed deficiencies and vulnerability and in processes involving the beneficiary communities. The communities are likely to be supportive of the interventions since they perceive a direct benefit from them.
Implementing Agency Risks	**Medium-L**	There is a risk that the addition of two new large World Bank projects will over burden the PSIPMU staff, and if additional support is not provided, the quality of procurement output and coordination across various agencies and levels (regional and national) may be compromised. Risk of inadequate mechanisms to ensure quality control	It is agreed thatall procurement decisions andactivities will be carried out by the PSIPMU while implementing agencies will be responsible for all technical inputs. The PSIPMU is currently in the process of consolidating donor-financed project management. Should there be a need to increase capacity, the current staff could be complemented by hiring short term consultants during peak periods of procurement activity. Efficiency of the existing staff could also be improved through additional training in procurement and contract management. A new procurement officer, FM staff, procurement assistant and project engineer will be added to the current PSIMPU. Provide for independent inspections through contract and training for ministries in inspection and quality control practices.

			Establish critical path inspection and procedures through OECS regional collaborative efforts and integrate them into construction contracts. Augment national capacity with contract engineers (noted above) and training.
Project Risks			
• Design	**Medium-L**	Physical environmental data insufficient for design of climate resistant infrastructure projects. Project activities are located in numerous areas spread over a wide but accessible geographical area. Scope of rehabilitation works grows with discovery of hidden damages during construction. Rehabilitation of older infrastructure may put improvements at risk due to existing design deficiencies.	The project will build country and regional capacity for strengthening the understanding of climate change adaptation needs throughout the lifetime of the project. The proposed civil works under the project will retrofit existing infrastructure that is vulnerable to current climate risks. The budget for extra incentives can be complemented by additional donor partner or government funds; if required. The project team will provide for detailed inspections at the pre-engineering stage to minimize hidden damage impacts. Project works activities will be constructed in conformance with current adopted Building Code standards. PSIMPU project engineer will review engineering assessments produced for rehabilitation works and MoTW will provide trained inspectors in accordance with current code enforcement procedures. The project will seek to build capacity at both regional and national levels, including institutional strengthening for multiple ministries across a shared data platform to insure maximum distribution of analytical capacity
• Social and Environmental		Purchase of private lands for project works will require application of resettlement safeguards as it relates to land acquisition.	Adequate Bank Supervision and training in safeguard application. Projects requiring safeguard will be subject to prior review.

	Medium-I	Uncomplicated works require screening and the application of standard environmental contract clauses. River defense, coastal defense and road realignment works will require the preparation of Environmental Assessments during project execution.	The Bank has years of experience working with resettlement of people from high risk areas. Tools such as a handbook published by the Bank in January 2010 are now available to help inform these processes. If any government ask for the Bank's support in this regard, the team would bring in a resettlement specialist to help advise the Government on how to handle the process and on the application of OP4.12. Adequate Bank Supervision and training in safeguard application. Projects requiring safeguard will be subject to prior review. Projects should also emphasize compliance with national environmental policies in addition to Bank Safeguards
• Program and Donor	**Low-I**	The project follows the successful implementation of the Emergency Recovery and Disaster Management Project (2002-2006), which will compliment the Pilot Program for Climate Resilience co-financing. Saint Vincent and the Grenadines has submited its PPCR proposals by March 7 and expect to have a positive answer from the CIF prior to Negotiation.	For implementation Bank procedures and operational policies will be followed. The Bank team has been supporting the government in their preparation of their financing request to the CIF, and expects the CIF to evaluate the proposal favorably.
• Delivery Quality	**Medium-L**	Future funding is not secured as the Government has not established systems to correlate climate impact data and design of climate-resistant infrastructure projects; this also includes establishing sufficient monitoring and evaluation systems, representing a risk to the sustainability of the model.	The Pilot Program for Climate Resilience is a multi-phased donor-funded project that would support project activities after the life of the project; in addition, a commitment will be sought from the Government to cover project activities after the project.

Overall Risk Rating at Preparation	Overall Risk Rating During Implementation	Comments
Medium-L	**Medium-L**	The rating of Medium-L for preparation is associated with the strong Government commitment to building national climate change resilience as well as the fact that Saint Vincent and the Grenadines has implemented large amounts of civil works in the past under Bank-funded disaster management projects. The same rating for implementation reflects the higher risks of the project history in the region, which are variable and general encounters problems where national policy change is sought as one of the project objectives.

Annex 5: Implementation Support Plan

The APL1 (Grenada) and APL2 (Saint Vincent and the Grenadines) are both the largest projects the Bank has ever financed with these clients. Both involve infrastructure investments across different sectors that involve the triggering of various environment and social safeguards. Appropriate implementation would require hands-on implementation support in both technical and fiduciary aspects of project implementation.

What would be the main focus in terms of support to implementation during:

Time	Focus	Skills Needed	Resource Estimate
First Twelve Months	Initiate resettlement procedures. Initiate technical studies and contracts for civil works. Initiate risk identification and assessment capacity building activities.	Fiduciary and technical	$150,000
12-48 Months	Contracting and implementation of civil works. Finalizing resettlement activities. Finalizing capacity-building activities.	Fiduciary and technical	$450,000
48-60 Months	Finalizing civil works.	Fiduciary	$600,000

Skills Mix Required:

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Procurement Support	12 staff weeks, or 60 STC days each year the first 3 years. Subsequently possibly less.	4 trips to each country each year in the first 3 years. Subsequently possibly less.	Our procurement colleagues are not likely to be able to provide us with this kind of hands-on support. Past experience with infrastructure investment projects in the Eastern Caribbean have shown that they will only implement successfully if we can provide this type of hands-on support. The project supervision budget would have to include financing for this support.
Social Specialist	8 staff weeks each year the first 3 years. Subsequently as	2 trips to each country each year the first 3 years.	The expected resettlement or land acquisition is not complex, but the clients have little

	needed.	Subsequently as needed.	experience working within World Bank safeguard guidelines, so close implementation support in this area is needed.
Environmental Specialist	8 staff weeks each year the first 3 years. Subsequently as needed.	2 trips to each country each year the first 3 years. Subsequently as needed.	
GIS Data Management Support	8 staff weeks or 50 STC days each year the first 3 years. Subsequently as needed.	2 trips to each country each year the first 3 years. Subsequently as needed.	This service is likely to have to be covered by a consultant. The capacity building of the technical agencies would require sustained technical support.
Disaster Risk Assessment Expert	8 staff weeks or 50 STC days each year the first 3 years. Subsequently as needed.	2 trips to each country each year the first 3 years. Subsequently as needed.	This service has to be covered by a consultant. The capacity building of the technical agencies would require sustained technical support.
Coastal Engineer	6 staff weeks or 40 STC days each year the first 3 years. Subsequently as needed.	1 trip to each country each year the first 3 years. Subsequently as needed.	This service is likely to have to be covered by a consultant.
Structural Engineer/Landslide Expert	8 staff weeks or 50 STC days each year the first 3 years. Subsequently as needed.	2 trips to each country each year the first 3 years. Subsequently as needed.	This service is likely to have to be covered by a consultant. The capacity building of the technical agencies would require sustained technical support.

Annex 6: Team Composition

World Bank Staff and Consultants Who Worked on the Project

Name	Title	Unit
Niels Holm-Nielsen	TTL, Sr. Disaster Risk Management Specialist	LCSUW
Tiguist Fisseha	Urban Development Consultant	LCSUW
Miguel-Santiago de Oliveira	Sr. Finance Officer	
Edith Mwenda	Sr. Counsel	LEGAF
Gerald Meier	Sr. Environment Specialist Consultant	LCSUW
Seyoum Solomon	Sr. Operations Consultant	LCSUW
Yao Wottor	Senior Procurement Specialist	LCSPT
Yingwei Wu	Senior Procurement Specialist	LCSPT
Sahar Safaie	Disaster Risk Assessment Consultant	GFDRR
Justin Locke	Disaster Risk Management Consultant	LCSUW
Galen Evans	Junior Professional Associate/GIS	LCSUW
Diana Rubiano	Landslide Specialist Consultant	LCSUW
Yaa Oppong	Sr. Social Development Specialist	SDV
Mozammal Hoque	Sr. Financial Management Specialist	LCSFM
Oscar Apodaca	Operations Analyst	LCSUW
Rossella Della Monica	Disaster Risk Management Consultant	LCSUW
Ana F. Daza	Language Program Assistant	LCSUW
Marc Forni	Economist Consultant	LCSUW
Margaret Arnold	Peer reviewer	
Zoe Trohanis	Peer reviewer	
Ross Gartley	Peer reviewer	

Annex 7: Economic and Financial Analysis

Empirical evidence strongly supports regional spillover effects within the Eastern Caribbean following natural disasters through economic channels. Natural disasters have a strong macroeconomic impact, including large effects on fiscal and external balances, pointing to an important role for precautionary measures.[19] In addition, when a natural disaster inflicts damage equivalent to more than 2 percent of the affected country's GDP, exports decline and imports increase resulting in a median increase in the current account deficit of equal to 10.8 percent of GDP.[20] Following a natural disaster, a country's physical capital stock is often times depleted to a very high extent (see Figure 1 below). This depletion leads to a parallel downward shift of the growth path indicating that there will be a "catching-up" period before the capital stock and growth will reach their previous levels. Economic growth in ECCU as a region is strongly and statistically significantly correlated with growth in each member country (see Figure 2 below). The bilateral growth-spillovers are also very large between countries. Thus a hit to one country has important negative spillover effects for growth in the other countries in the region.

Figure 1. Capital stock depletion due to a natural disaster.

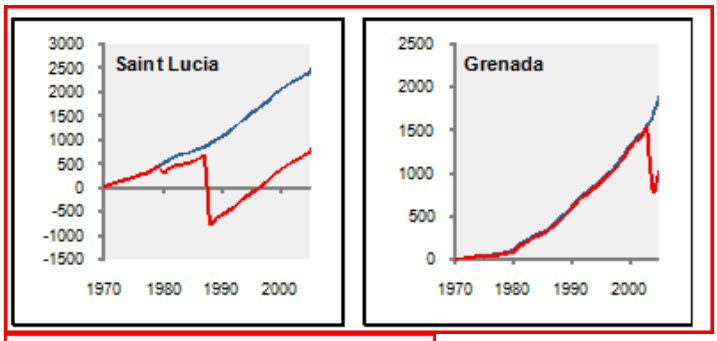
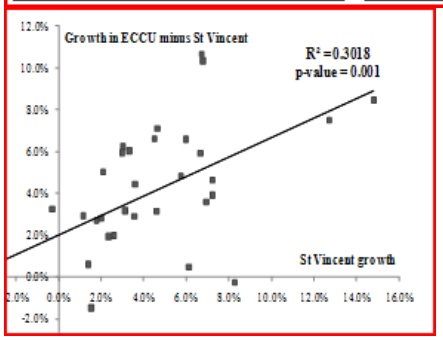
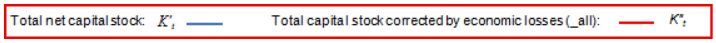


Figure 2. Economic Growth in OECS/ECCU member countries.



[19] IMF (2004) finds that the median public debt-to-GDP ratio increased sharply by a cumulative 6.5 percentage points over three years following a disaster.

[20] See IMF (2004), Crowards (2000) and World Bank Caribbean Economic Overview (2002) which underscore that while domestic policy could play an important role in mitigating the adverse effects of natural disasters, regional coordination is vital given both cross-country spill over effects on growth and the limited fiscal space available to individual countries. The sustainability of the Monetary Union precludes the active use of monetary policy and requires fiscal policy coordination and prudence. Improving the precautionary mechanisms for addressing natural disasters is vital, particularly since poor households are unable to access market mechanisms that would help them protect consumption in the face of income shocks. Households are likely to forego necessities, including expenditure on health and education, as a coping mechanism in the event of a disaster. In the face of limited personal savings, reliance for support in the aftermath of a disaster is largely on public agencies and donors.



The RDVRP would mitigate a significant negative externality by helping to reduce the risk associated with climactic shocks to the individual countries and to the OECS Economic Union as a whole, through better construction practices and other precautionary arrangements to mitigate the impact of natural disasters before they happen, with a view to bringing greater stability to output fluctuations and real GDP growth.

The economic rationale for disaster management and mitigation is based on the premise that improved recuperative capacity of the economy will lower any adverse longer-term impacts on the country's economic growth trajectory. The costs of disasters can be broken down into two parts, firstly the opportunity cost of not being able to safeguard the population and their property, and secondly the opportunity cost of lost economic activity, especially if damages to physical infrastructure cause prolonged disruptions in economic activity.

Direct losses that would be mitigated under the project include the retrofitting of social infrastructure such as schools and other public buildings that would be strengthened to resist hurricanes. The transport sector would be strengthened to avoid direct losses and the indirect economic losses due to lost access to markets. Institutional strengthening investments would be made to avoid further indirect losses by encouraging citizens to improve preparedness and enhance government response to major events.

Losses from a hurricane are uncertain and are therefore measured by probability of occurrence. If an event is projected to occur once every ten years, the annual expected loss is 10 percent of actual expected damage. Actual expected damage would vary based on the intensity of the event. High-intensity events occur less often but bring more damage than more frequent lower-intensity events.

In the past six years, two Eastern Caribbean countries have been directly impacted by the passage of a hurricane. In 2004, Hurricane Ivan – a Category 3 storm – caused losses in Grenada in excess of 200 percent of GDP, or US$890 million. In 2010, Hurricane Tomas – a Category 1 storm – caused losses in St Lucia of 43 percent of GDP, or US$330 million. As can be seen in Table 1 below, according to the Caribbean Catastrophe Risk Insurance Facility, Hurricane Ivan was a 1-in-35-year event while Hurricane Tomas was a 1-in-8-year event.

Table 1 – Average Hurricane Return Periods

Country	Category 1	Category 2	Category 3
Grenada	13 years	27 years	35 years
St. Lucia	8 years	18 years	35 years
St. Vincent	8 years	18 years	27 years

Source: CCRIF Country Risk Studies, 2006

Assumptions. The purpose of the economic analysis is to consider the cost of institutional strengthening and physical mitigation with the present and future costs averted from pursuing

such investments. The project's costs are defined as the direct investment associated with the project, while the imputed benefits are defined as the future costs foregone due to a more rapid recovery and limited need to rebuild strengthened infrastructure.

A discount rate of 12 percent will be applied to the costs and benefits in order to calculate the NPV and economic internal rate of return (EIRR) for the project as a whole. For the project's purposes, the NPV calculations are more important, since a zero NPV will yield a positive EIRR, and the economic analysis is generally more concerned with a positive NPV for the project. The benefits of the investments are assumed to have a duration of 20 years.

The baseline analysis assumes that the project would mitigate losses equal to 10 percent of GDP in the event of a Category 1 hurricane. This figure is based on actual losses averted by previous disaster risk management projects in the Caribbean, in particular, Grenada after Hurricane Ivan. Upon project completion, it was demonstrated that the US$11 million Emergency Recovery and Disaster Management Project (ERDMP) mitigated losses equivalent to 7.5 percent of GDP caused by Hurricane Ivan.

The size of the proposed project is double that of the Grenada ERDMP, which implies that the project would mitigate 15 percent of losses in the event of a major Category 3 hurricane similar to Ivan. The baseline assumption for this analysis is the passage of a Category 1 hurricane, which would cause damages similar to Hurricane Tomas. A lower-intensity event causes less damage and therefore, the project mitigates less loss as a share of GDP. Therefore, the damages averted from the passage of a Category 1 hurricane are equivalent to 10 percent of GDP.

Statistical Analysis. The analysis below examines the net benefits of the project. Benefits have been calculated using the estimated damage-expenditures averted from a Category 1 hurricane, as expressed as a percentage of GDP, due to the mitigating investments of the disaster management project. Table 2 below shows the planned project costs and benefits derived from the investment. The results of the baseline analysis demonstrate that the present value of the project at its inception is US$17.5 million and the EIRR is 26%

Table 2 – Grenada Net Present Value Analysis

USD ('000)s	2012	2013	2014	2015	2016	2032
Prevention and Adaptation Investments						
Community Infrastructure Development	$ 219.9	$ 366.5	$ 366.5	$ 366.5	$ 146.6	
Rehabilitation of bridges and risk reduction of public space	1,748.6	2,914.3	2,914.3	2,914.3	1,165.7	
Improved Resilience to climate risks in Water Supply System	136.5	227.5	227.5	227.5	91.0	
Risk reduction for critical infrastructure	660.2	1,100.3	1,100.3	1,100.3	440.1	
Rehabilitation of schools to reduce their vulnerability to natural haza	427.5	712.5	712.5	712.5	285.0	
Reducing vulnerabilities of accommodation for the Elderly	68.6	114.3	114.3	114.3	45.7	
Capacity Building for Improved Response and Decision Making	195.0	325.0	325.0	325.0	130.0	
Data development and analysis						
Improved Understanding of Hazard Risk and Climate Change Impacts						
Capacity Building for Risk Management						
Project Management	150.0	250.0	250.0	250.0	100.0	
Total Costs	3,606.2	6,010.3	6,010.3	6,010.3	2,404.1	
Benefits	762.5	2,033.3	3,304.2	4,575.0	5,083.3	5,083.3
NPV	(2,843.7)	(3,976.9)	(2,706.1)	(1,435.3)	2,679.2	5,083.3
	-	-	-	-	-	-
EIRR = 26%						
Total NVP = US$ 17.5 million						

The net present value of the St. Vincent and the Grenadines project is US$37.5 million and the EIRR is 92%, as demonstrated in Table 3. The higher NPV for the St. Vincent and the Grenadines project is due to the higher probability that a Category 1 hurricane will cross over the country. Instead of once every twelve years like Grenada, the likelihood of an event here is measured to be once every eight years.

Table 3 – St. Vincent Net Present Value Analysis

USD ('000)s	2012	2013	2014	2015	2016	2032
Prevention and Adaptation Investments						
Retrofitting public buildings	$ 600.0	$ 1,000.0	$ 1,000.0	$ 1,000.0	$ 400.0	
Rehabilitation and retrofitting of transportation infrastructure	397.5	662.5	662.5	662.5	265.0	
Flood mitigation works	519.0	865.0	865.0	865.0	346.0	
Coastal Defense works	285.0	475.0	475.0	475.0	190.0	
Capacity Building for Improved Response and Decision Making	195.0	325.0	325.0	325.0	130.0	
Data development and analysis						
Improved Understanding of Hazard Risk and Climate Change Impacts						
Capacity Building for Risk Management						
Project Management	200.0	200.0	200.0	200.0	200.0	
Total Costs	2,196.5	3,527.5	3,527.5	3,527.5	1,531.0	
Benefits	1,031.3	2,750.0	4,468.8	6,187.5	6,875.0	6,875.0
NPV	(1,165.3)	(777.5)	941.3	2,660.0	5,344.0	6,875.0
EIRR = 92%						
Total NVP = US$ 38.5 million						

This figure represents the losses averted from the passage of a Category 1 hurricane. However, project benefits would be captured from losses averted due to other adverse natural events, in particular, earthquakes and excess rainfall. Retrofitted infrastructure would be designed to withstand the impact of earthquakes. As can be seen in Table 4 below, the CCRIF measured the probability of a significant earthquake in Eastern Caribbean. Given limited data on earthquake losses in recent years, expected benefits from earthquake losses averted were not measured.

Table 4 – Average Earthquake Return Periods

Country	6.0	6.5	7.0
Grenada	21 years	43 years	100 years
St. Lucia	60 years	100 years	100 years
St. Vincent	50 years	75 years	100 years

Source: CCRIF Country Risk Studies, 2006

The steep topography and unplanned development in areas vulnerable to landslides as well as flooding due to excess rainfall pose a significant risk to Eastern Caribbean countries. Losses from landslides and flooding occur on an annual basis and can be in excess of loss caused by wind shear from a hurricane in affected areas. Despite the significant losses from excess rainfall, because they are typically localized, a comprehensive analysis of the damage is not completed. Measuring benefits to losses averted from such events cannot be accurately completed, but they are assumed to be significant. Approximately half of the investments identified in the proposed project aim to reduce the risk of landslides and floods.

Focused solely on hurricane loss, the analysis captures only a portion of the benefits of the project. The project's US$17.5 million and US$37.5 million NPV for Grenada and St. Vincent and the Grenadines, respectively, is an underestimation of the actual benefits accrued. During project implementation, a portion of the institutional strengthening investments would be directed to improved hazard and risk mapping, which may lead to more precise loss estimates from landslides and flooding at project completion.

Annex 8: Grenada Country and Institutional Context

A. Country Context

Grenada, which includes the two smaller islands of Carriacou and Petit Martinique to its north, is the southernmost of the Windward Islands and supports a population of approximately 105,552 (2008). The GNI per capita is US$5,710 (2008 est. Atlas methodology).

Despite high growth rates in the last decade, poverty rates have increased drastically. The average per capita growth rate between 1998 and 2008 has been over 2 percent per year, yet it did not translate into a reduction in poverty. While indigent rates dropped significantly from 1998 to 2008, the percentage of poor people increased from 32 percent in 1998/99 and reached 38 percent of the population in 2007/08. According to the most recent Country Poverty Assessment, the unemployment rate stood at 25 percent in June 2008. Grenada was ranked 74th out of 182 countries in UNDP's 2007 Human Development Index.[21]

Following the Marxist military coup and subsequent US invasion in 1983, power has fluctuated regularly between the New National Party and the New Democratic Party, with the latter securing re-election during the most recent election in 2008.

Grenada's economic performance has been adversely affected by the challenging global environment. After reaching 2.2 percent in 2008, economic growth is estimated to have declined to -7.7 percent in 2009. A worldwide financing drought has reduced the availability of funds for foreign direct investment (FDI) projects, including key tourism-related investments. As a result, activity in the construction sector, which has been a significant driver of growth in recent years, is projected to fall significantly in 2009-10. Tourism arrivals and remittances are expected to decline further. Residential, tourism-related, public-sector, and private commercial activity are expected to recover slowly, with growth breaking the three percent mark only in 2014. The main near- and medium-term risks include a deeper and more protracted global slowdown, increased financial stress and larger retrenchment of capital inflows, and damage from natural disasters.

B. Sectoral and Institutional Context

Climate and Hazard Risk Profile. As is the case with most of the islands in the Eastern Caribbean, Grenada is susceptible to a variety of natural hazards including volcanic, seismic, storm, flood, and land slip activity. Additionally, as a small island state, Grenada is vulnerable to climate change impacts particularly with respect to storm events, changing rainfall patterns, and sea level rise.

The rainfall pattern of Grenada is unimodal, with the mid-summer dry spell that is typical of more northern Caribbean islands being almost indistinguishable. The wet season peaks between August and November. This corresponds to peak Atlantic hurricane activity from which Grenada may experience residual effects, if not direct hits. The dry season falls in the period of

[21] The Human Development Report publishes the values for the Human Development Index with a two-year lag time. The 2007 HDI values were thus published in 2009. There is no overall HDI value (for 2008) for Grenada in the 2010 Human Development Report.

January to May, during which the smaller islands of Petit Martinique and Carriacou are susceptible to extreme drought conditions. On average, Grenada receives 1150 mm of rain per year. However, inter-annual variability is evident in the reversal of long-term trends between drying in the mid-1990s and wetter conditions in the 2000s.

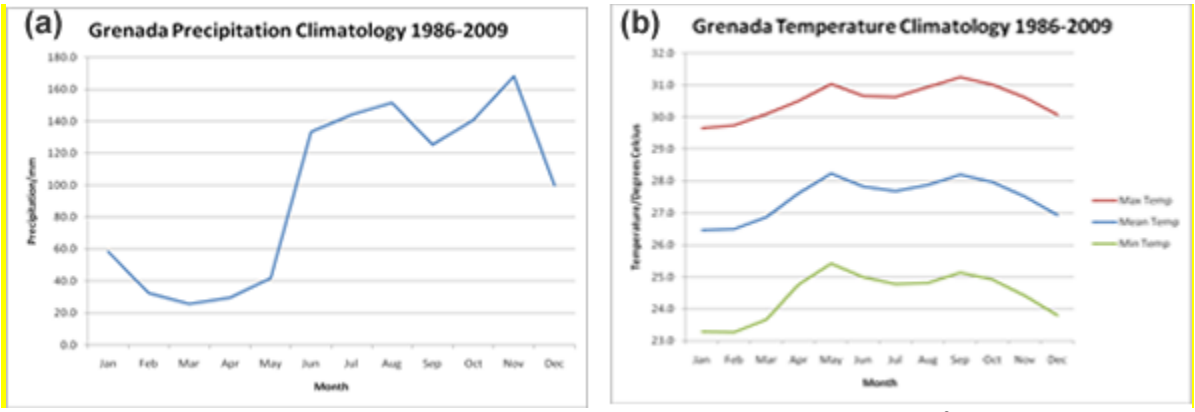


Figure 1. (a). Mean monthly precipitation (mm/month); (b). Maximum and minimum temperatures (^{o}C) for Grenada with respect to 1986 - 2009 (Maurice Bishop International Airport).

Temperatures do not display large variance generally, but greatest variability occurs in monthly minimum temperatures. Over the past two decades, temperatures have also shown a reversal in trends between cooling in the early 1990s and warming in the 2000s. Annual mean temperatures are on average 27.5^{o}C, while mean annual maximum and minimum temperatures are 35.5^{o}C and 24.4^{o}C, respectively.

Regional climate models (RCMs) project mean drying over the course of the century, with persistence of inter-annual variability (INSMET, 2010). Distinction between the dry and wet seasons may also be reduced, since possible decreases in rainfall in the wet season could exceed that of the dry season. RCMs project an increase in temperatures throughout this century. Annual warming could exceed 3^{o}C by the end of the century, and greatest seasonal warming is projected for the September to November season.

Drought in Grenada is not very prevalent, as evidenced by the Standardized Precipitation Index (SPI hereafter) graph shown below for rainfall over the period 1986-2008. The figure shows that the island experienced two major droughts, one in 1995 and another between 2009 and 2010. There were also other periods of drought scattered throughout the time period. These cyclical dry-wet periods are a regional feature of Caribbean rainfall, making them seasonal events. It should be noted that some years are drier than others. Such periods of intense drying negatively affect, *inter alia*, the banana industry, for example in 2010 when there was a fall of 17 percent in production.

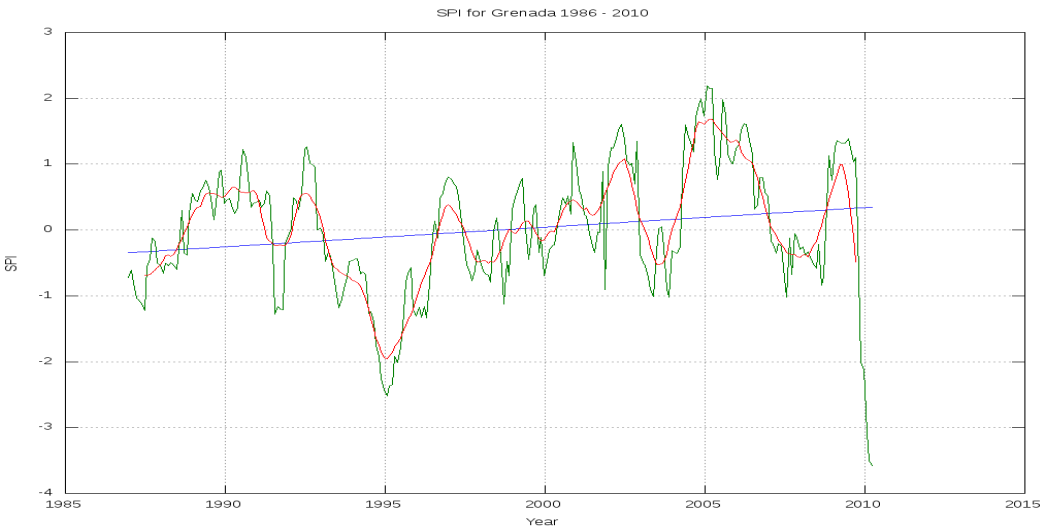


Figure 2. SPI graph for Maurice Bishop International Airport in Grenada for the period 1986 – 2008.[22]

Occurring in November 1975 and totalling US$4.7 million in losses, Grenada experienced its only flood in 110 years [EM-DAT (WHO Emergency Event Database, 2011)]. Due to the rarity of this extreme event and the cost of prevention, the country remains vulnerable to major flooding.

Though its location at the southern tip of the Antillean chain makes hurricane landfall rare, the country has experienced substantial damage during these encounters, as exampled by Hurricanes Janet (1955) and Lenny (1999) (UNFCCC, 2000). In the last decade, there have been at least two systems that affected Grenada. In 2004, Hurricane Ivan made landfall as a Category 3 hurricane with sustained winds of 140 mph. A total of 28 persons were killed and the gross costs of the damage were estimated at twice the GDP of the country at the time (US$889 million) (Mimura et al., 2007; ECLAC Economic Survey, 2005). The nutmeg industry, the country's main export crop, was extensively affected and still faces significant recovery challenges. The following year (2005) brought the aggravating effects of Hurricane Emily to the island, which further retarded recovery, particularly in the face of inadequate insurance coverage.

Sea level rise (SLR) and associated erosion are very real threats to the economic base of the country, which depends heavily on tourism and agriculture. Maurice Bishop International Airport is considered by Simpson et al. (2010) to be the most vulnerable CARICOM airport in the event of a 1-meter rise in sea level (mid-range climate scenario), since it is likely that there would be complete inundation of the runway. Simpson et al. further projected that SLR would also likely result in the loss in Grenada of 11 percent and 18 percent of tourist resorts under 1- and 2-meter rise, respectively. The rebuilding of these resorts could cost between 14 percent and 34 percent of GDP in 2080 under medium or high SLR scenarios. Under a mid-range scenario, an estimated 3 percent of agricultural lands could be lost and could incur annual costs of US$4 million in 2050. An additional 10 percent loss could be brought on by a 1-in-100 year storm surge event under the same scenario. With SLR also comes the exacerbation of any tsunamis or

[22] Above zero, the period was wet - the more positive, the wetter. Below zero, the period was dry - the more negative, the drier. The green line is SPI; the blue, the trend line; and the red, the running mean.

sea waves that may result from an eruption of the active submarine volcano Kick-'em-Jenny, which is located north of Grenada (Simpson et al., 2010; UNFCCC, 2000).

In Grenada, the gender inequality level is fairly high, according to a UNIFEM presentation made in October 2010. This inequality is reflected in the differentiation in impacts and recovery from climate variability and change, including extremes. For example, an assessment done on gender inequality concluded that the country needs to consider the extreme vulnerability of female-headed households to major disasters like hurricanes. This was the group most affected by such storms as Ivan (2004) and Emily (2005), as these women and their families are low-income earners. Other groups that were affected were the elderly and the disabled, whose primary caregivers were women. The impacts on these groups were emphasized by inadequacies both prior to and following the natural disasters.

On September 7, 2004, Hurricane Ivan - one of the strongest storms ever to strike the Caribbean region - passed directly over Grenada, decimating the housing stock, severely damaging the nutmeg plantations, and inflicting significant damage on the tourism sector. An Organization of Eastern Caribbean States (OECS) assessment team estimated the damage at US$900 million, more than 200 percent of the 2003 Gross Domestic Product (GDP), two thirds of which was housing stock.

Apart from the impacts associated with the direct passage of hurricanes, Grenada is highly susceptible to land slip and coastal effects of storm surge and wave action. While passing well north of Grenada, the effects of Hurricane Omar in 2008 manifested in large waves impacting the coast and flooding the capital, Saint George's. Land slip is a regular occurrence, owing to the island's mountainous terrain and volcanic origins.

Effects of climate change are typically insidious and manifest in variations from historical conditions. Local and sub-regional data are presently not available to evaluate the specific effects of climate change for Grenada, but global and coarse regional data indicate that rising sea levels and changes in storm patterns are changing the country's risk profile. As is the case with most Caribbean islands, infrastructure designs are in the best of cases based on historical hazard data, which do not allow for the integration of future climate change into the design process. Current trends in climate modeling suggest that while Grenada will face the same suite of hazards it currently experiences, the intensity, frequency, and duration appears to be changing. For example, some current estimates suggest that storms are trending toward longer intervals between occurrences, but greater rainfall intensity. This has the effect of increasing drought vulnerability and increased exposure to land slip, flooding, and related phenomena. Coastal effects of sea level rise are already being felt in the capital, Saint George's, as flooding of the commercial area around the port is occurring with increased frequency.

Institutional Profile. For the past fifteen years, Grenada has been developing its disaster preparedness and response capacity through a variety of national and regional programs. In 2000, Grenada began executing the Emergency Recovery and Disaster Preparedness Project, part of a larger program involving five OECS countries. Activities under this project were designed to strengthen preparedness and response capacity through investments in infrastructure, institutional capacity building, and community-based initiatives in disaster preparedness and

awareness. Institutional strengthening activities related to training and development of the National Disaster Management Agency (NaDMA, formerly known as National Emergency Response Organization, NERO) and strengthening of community-level response committees.

While efforts to improve disaster management capacity have been advancing, the integration of climate change considerations in the development process has yet to occur. A major factor inhibiting this process is the lack of reliable data on which to base future planning and design decisions. Additionally, institutionalization of climate change in national development processes is in its infancy and will require a multi-sectoral approach involving numerous agencies within the Government of Grenada.

Disaster resilience and climate change are fundamentally related in that future climate impacts serve to modify the hazard profile for Grenada. Current infrastructure has been constructed based on historical trends and loosely integrated performance criteria to avoid foreseeable damage from hazard events. Aging infrastructure, particularly with respect to transportation and lifeline facilities (shelters, health clinics, etc.), is particularly vulnerable as it was built without consideration of future climate impacts in its design.

On a broader scale, there is little evidence that development decisions have integrated disaster resilience and climate change in even the most fundamental of processes. Responsibilities are dispersed among various government agencies including the Ministry of Finance, Planning, Economy, Energy and Cooperatives, the Ministry of Works, Physical Development and Public Utilities, and the Ministry of Agriculture. Lacking an overall structure for analyzing and integrating risks in the development process, each agency operates in a relative vacuum with limited resources, particularly in the capacity to analyze and integrate risk and climate change management in the development process. Data sharing among agencies is weak, largely due to limited capacity and lack of an overall mechanism to freely share information.

Infrastructure. Much of the basic island infrastructure was constructed during the colonial period and is aging and exposed to changing environmental conditions. Roads have been severely impacted by land slips and erosion. Drinking water systems are presently inadequate to meet national demand and changing rainfall profiles for the island suggest that existing systems are not able to cope with changing rainfall cycles and land use patterns. Additionally, public facilities such as health clinics and disaster shelter systems are in need of retrofitting and rehabilitation to cope with changing environmental patterns.

Among the more visible impacts is the increased frequency of flooding of the portside areas (Carnage) of the capital, Saint George's. Observations over the past 20 years suggest that sea level rise has contributed to increased tidal flooding of the commercial area adjacent to the harbor. This is the principal trade zone for the island and a major hub for tourism activity, particularly with respect to the cruise ship industry.

Agriculture was severely impacted by Hurricane Ivan and the loss of nutmeg plantations had a major impact on the national economy. Changes in rainfall patterns have apparently affected agricultural systems and the demand for irrigation, for example, has apparently increased as

Grenada seeks alternative agricultural activities to replace hurricane-damaged systems. Changes in irrigation requirements place additional stresses on already stressed water resources.

Annex 9: Saint Vincent and the Grenadines Country and Institutional Context

A. Country Context

Saint Vincent and the Grenadines (SVG) is located between Grenada, to the south, and Saint Lucia, to the north, and is one of the states comprising the Windward Island group. SVG consists of 32 islands with Saint Vincent, the northernmost island, accounting for 90 percent of the total land area and population of the country. The total population of SVG is 109,117 (2008). GNI per capita is US$8,770 and has a poverty headcount index of about 30 percent as of 2007/08 and an estimated unemployment rate of about 21 percent. SVG ranks 85th out of 182 countries in the 2007 UNDP Human Development Index.

The central government recorded an overall deficit equivalent to 1.7 percent of Gross Domestic Product (GDP) in 2008 (US$33.3 million), down from 3.6 percent of GDP in 2007 (US$53.3 million). This reduction can be attributed to larger grant inflows (60.5 percent higher) and a decline in capital expenditure (by 7.3 percent). Increased expenditures (at 27.2 percent of GDP, up from 25.3 percent) are a direct result of higher spending on personal emoluments, goods and services, and interest payments.

The current administration, representing the Unity Labour Party, has been in power since December 2005. Elections were held in December 2010. The Unity Labour Party that has been in power since 2001, following 15 years of rule by the New Democratic Party, was re-elected with a slim margin.

As expected, SVG's economic performance was negatively impacted by the global financial crisis. Economic activity in SVG is estimated to have contracted by 1.1 percent in 2009, following a mere percentage point growth in 2008. 2010 first quarter reports indicate further declines in the construction and agricultural sectors, as well as persistent weakness in tourist stay-over arrivals. However, a 55 percent increase in cruise ship arrivals has helped offset the decline in stay-over arrivals.

B. Sectoral and Institutional Context

Climate and Hazard Risk Profile. Like all the islands in the region, SVG is a volcanic island characterized by deeply dissected terrain and a coastal zone largely composed of steep cliffs reaching to the sea. There are limited areas where coastal access is possible, mostly located on the western or leeward side of Saint Vincent and the neighboring islands.

SVG is exposed to a range of natural hazards. Most important are hazards stemming from weather-related phenomena such as winds, rainfall, hurricanes, and drought. The islands experience an annual hurricane season from June to November, followed by a rainy season from November to January. The dry season extends typically from February to May.

Rainfall on the island averages at 2190 mm per year, placing it among the wetter of the Caribbean islands. Annual rainfall follows a unimodal pattern, with a June-November wet season and January-May dry season. The island experiences nearly 70 percent of its total rainfall

during the wet season and peak rainfall corresponds with peak hurricane activity in the region. Inter-annual variability of rainfall is distinct in the climate records of the island, but there is no statistically significant long-term trend towards wetter or drier conditions. Variation in rainfall is also seen with changes in elevation across the islands.

Temperature shows very little mean variation throughout the year, but can reach a maximum of 31°C during summer months and a minimum of 23°C in February. Like rainfall, temperatures also vary on an inter-annual cycle, but show no statistically significant long-term trend. Maximum temperatures, however, are increasing at a faster rate than minimum temperatures. There is also a trend of longer warm spells and more warm days and nights. By contrast, the number of cool days and nights is decreasing.

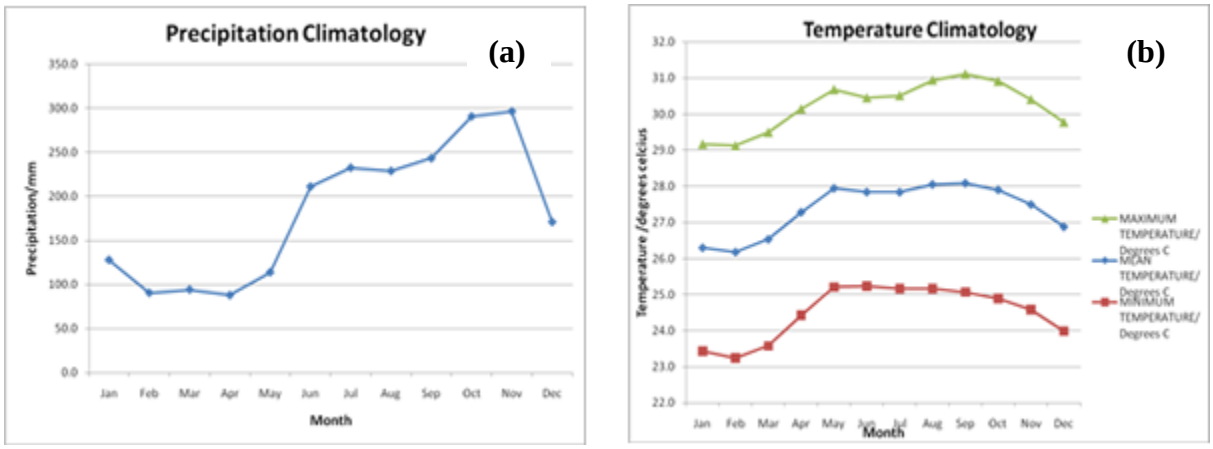


Figure 1. (a) Mean annual monthly rainfall (mm/month) and (b) climatology of minimum, maximum, and mean temperature (°C) for Saint Vincent (ET Joshua Airport 1987 -2008).

General circulation models (GCMs) project a reduction in annual rainfall of up to 58 percent by the end of the century. Greatest seasonal drying is projected for the summer months, but the existing dry season may also become drier. GCMs indicate increases in temperature of nearly 1.5°C per decade (1.5°C per annum) over the next century, with greatest seasonal warming occurring in December-February (McSweeney et al., 2008).

Major droughts in St. Vincent and the Grenadines have occurred three times in the 21-year period spanning 1987-2008, each lasting more than six months. The Standardized Precipitation Index (SPI) graph below shows that the longest drought lasted around 3 years between 2001 and 2004. Also noticeable is a cyclical pattern of drought and heavy rainfall. Since the country's economy depends on agriculture, a meteorological drought can have adverse effects. For example, the ECLAC report of 2001-2002 states that banana production was down by 27 percent due partly to leaf spot disease and drought conditions.

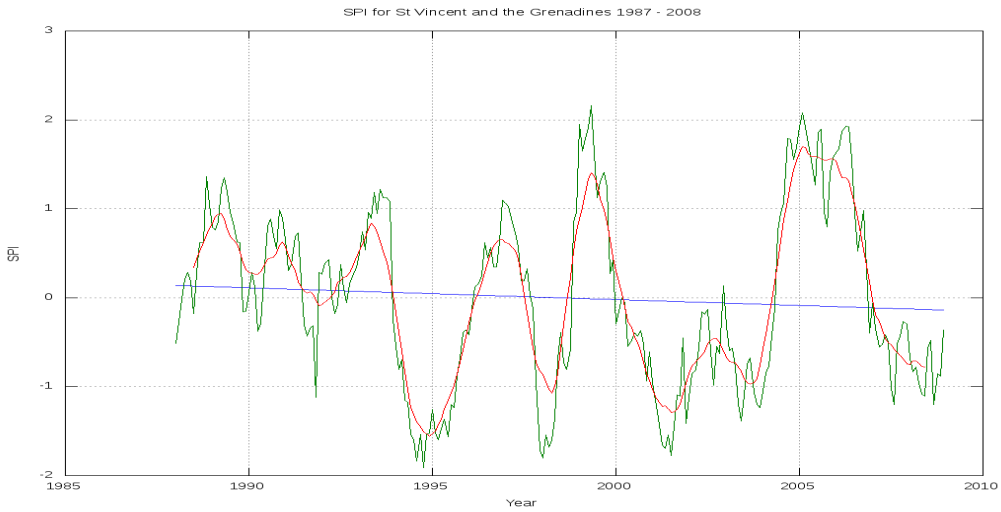


Figure 2. SPI graph for ET Joshua in St. Vincent and the Grenadines over the period 1987 – 2008.[23]

During the last century, four floods have been classified as major disasters [EM-DAT (WHO Emergency Event Database), 2011]. The worst of these affected 1,000 people and cost the country US$5 million in 1987. EM-DAT further reports that the flood of 1992 affected 200 people and killed three. The rarity of this type of event makes the country more vulnerable, as preparation for it is not a priority.

In the recent past, few hurricanes have made landfall on St. Vincent and the Grenadines. Nonetheless, the islands' location at the southern edge of the Atlantic hurricane belt makes them prone to the effect of tropical storm activity. The islands have been impacted by tropical storms such as Lenny (1999) which caused US$142,000 (EC$386,250) in damages (UNFCCC, 2000), and Tomas (2010) which caused landslides, devastated crops, and displaced many citizens from their homes.

Due to the size, location, and limited coastline of the islands, they are highly vulnerable to erosion, inundation, and storm surges resulting from sea level rise (SLR). According to the Simpson et al. (2010) report, St. Vincent and the Grenadines are projected to lose 2 percent of agricultural lands, 67 percent of sea ports, and nearly half the number of airports under a 1-meter rise in sea levels. Being heavily dependent on the agricultural industry and the export of these products, such losses would devastate the economy of St. Vincent and the Grenadines. The projected loss of 10 percent of tourist resorts can only worsen this devastation. Under a 1-meter rise scenario, a 1-in-100 year storm surge event would also cause severe damages to infrastructure and livelihood, since such an event could bring with it surges of 4.5 m and loss of 3 percent of the population and 7 percent of agricultural lands. Under a mid-range rise scenario, capital costs of infrastructure and land losses could approach US$445 million in 2050. By 2080, that cost could increase to US$1,290 million. Also associated with SLR is an exacerbation of any tsunamis or sea waves that may result from an eruption of the active submarine volcano Kick-'em-Jenny, which is located south of the Grenadines.

[23] Above zero, the period was wet - the more positive, the wetter. Below zero, the period was dry - the more negative, the drier. The green line is SPI; the blue, the trend line; and the red, the running mean.

According to the Millennium Development Goals Report by ECLAC (2009), 68 percent of female heads of households have never been married, and 18 percent of them are previously married or separated. Coupled with higher unemployment rates among women, these households are most vulnerable to climate change. These suffer the most during any kind of natural disaster, particularly in cases of lack of access to resources and lack of adequate finances to procure food, medical attention, and water (CIDA, 2005).

On October 30, 2010, Hurricane Tomas, a Category 1 hurricane on the Saffir-Simpson hurricane wind scale, made landfall in SVG, causing significant damages. Wind speeds were estimated at 75 mph (120 km/hr), with gusts reaching up to 90 mph. Damages were generated to private homes, public buildings and infrastructure, roads, and power systems. National disaster areas were formally declared by the Government of SVG in accordance with the SVG National Emergency and Disaster Management Act (2006), from Park Hill to Sandy Bay on the Windward side and Belle Isle to Fitz Hughes on the northwestern side of the island. The agriculture sector was decimated, with estimated losses in excess of US$25 million. Losses to banana crops were major. In excess of six hundred homes were damaged and over 1,200 persons were displaced by the storm (1.2 percent of the population). Government buildings suffered damages, with eight schools badly damaged. Other losses related to infrastructure were primarily concentrated to road damage due to land slip and damage to buildings from wind. Over 26 percent of the population was severely impacted.

Effects of climate change are typically insidious and manifest in variations from historical conditions. Local and sub-regional data are presently not available to evaluate the specific effects of climate change for SVG, but global and coarse regional data indicate that rising sea levels and changes in storm patterns are changing the country's risk profile. As is the case with most Caribbean islands, infrastructure designs are based on historical data which do not allow for the integration of future climate change into the design process. Current trends in climate modeling suggest that while SVG will face the same suite of hazards it currently experiences, the intensity, frequency, and duration appears to be changing. For example, current estimates suggest that storms are trending toward fewer in number but greater in rainfall intensity. This has the effect of increasing drought vulnerability and increased exposure to land slips, flooding, and related phenomena.

In addition to meteorological hazards, SVG is exposed to seismic and volcanic hazards. Soufriere is a large and active volcano located on the north end of Saint Vincent and has erupted twice in the past hundred or so years. The latest eruption was in 1979 when a characteristic cloud of super-heated gasses (Nuee Ardente) flowed down the mountain slopes, causing an estimated US$100 million in damages. No lives were lost. A previous eruption in 1902 produced a similar super-heated gas cloud, killing 1,680 persons.

Institutional. For the past fifteen years, SVG has been developing its disaster preparedness and response capacity through a variety of national and regional programs. In 2002, SVG began executing the Emergency Recovery and Disaster Preparedness Project (2002-2006), part of a larger program involving five OECS countries. Activities under this project were designed to strengthen preparedness and response capacity through investments in infrastructure, institutional capacity building, and community-based initiatives in disaster preparedness and awareness.

Infrastructure funded under the project included retrofitting and construction of lifeline facilities focused on roads, sea defenses, a national disaster office, and shelters. Institutional strengthening activities related to training and development of the National Emergency Management Organization (NEMO) and strengthening of community-level response committees.

Disaster resilience and climate change are fundamentally related in that future climate impacts serve to modify the hazard profile for SVG. Current infrastructure has been constructed based on historical trends and loosely integrate performance criteria to avoid foreseeable damage from hazard events. Aging infrastructure, particularly with respect to transportation and lifeline facilities (shelters, health clinics, etc.), is particularly vulnerable, as it was built without consideration of future climate impacts in the design process.

As part of an OECS regional effort, a draft uniform building code was developed and presented to member states for national modification and approval at the Forum on Building Codes and Standards in the Caribbean and Central America, held in Puerto Rico in September 1998. SVG also recently approved a complementary national building standards policy. However, while current construction practices in SVG include a basic application of these building standards, particularly in the tourism sector, building codes are not officially enforced. Building standards are largely driven by the insurance and mortgage industries and have yet to be applied to civil society on a broad scale. Inspection and enforcement is limited and much of the construction in Saint Vincent occurs without benefit of a systematic inspection program.

On a broader scale, development decisions have yet to integrate disaster resilience and climate change in even the most fundamental of processes. Responsibilities are dispersed among various government agencies, including the Ministry of Finance and Economic Planning (MoFEP), NEMO, the Ministry of Housing, Informal Human Settlements, Lands and Surveys and Physical Planning (MoHILPP), the Ministry of Transport and Works (MoTW), and the Ministry of Agriculture, Forestry and Fisheries. Lacking an overall structure for analyzing and integrating risks in the development process, each agency operates in a relative vacuum with limited resources, particularly in the capacity to analyze and integrate risk and climate change management in the development process. Data sharing among agencies is weak largely due to limited capacity and lack of an overall mechanism to freely share information.

Infrastructure. Much of the basic island infrastructure was constructed during the colonial period and is aging and exposed to changing environmental conditions. Roads have been severely impacted by land slips and erosion. Additionally, public facilities such as health clinics and disaster shelter systems are in need of retrofitting and rehabilitation to cope with changing environmental patterns.

Among the more visible impacts is coastal and streamside erosion. Observations over the past 20 years suggest that sea level rise has contributed to increased undermining of coastal road structures. Land use patterns have impacted watershed discharges, resulting in increased discharge volumes during storm events. Bridges designed using historical storm data are now experiencing increased damage due to changes in stream flow characteristics.

Health and education infrastructure is aging and showing signs of deterioration, particularly as a result of changing environmental conditions. The main hospital for the island is vulnerable to wind and flooding and the Government of SVG is seeking to relocate the facility to a more appropriate location.

Annex 10: Selected Ongoing Climate Change Adaptation and Disaster Risk Management-Related Initiatives

Country	Project/Program	Area	Financing	Implementing Agency	Other Partner Institutions/Projects	Brief Description	Duration	Value (Approx.)	Link to the Caribbean Regional CC Strategy
Regional	Caribbean Carbon Neutral Tourism Program	Climate Resilience	IDB	CCCCC	N/A	Assist the Caribbean region in responding to climate change by enhancing its climate resilience. The specific objectives are to devise ways of attracting new resources of financing for: (1) the scaling-up of low-carbon investment in tourism sector, and (2) reducing the sector's vulnerability to climate change.	2009-2011	US$1,088,550	Strategic Element (SE) 3.1 - Goal 6
Regional	Regional Monitoring and Evaluation System for DRM and Climate Change Adaptation in the Caribbean Tourism Sector	Climate Resilience	IDB/Regional Public Good Initiative	CDEMA	Caribbean Tourism Association	Mainstream Comprehensive Disaster Management in the tourism sector in the Caribbean. The purpose is to develop a regional monitoring, evaluation, and reporting information system for disaster risk management and climate change adaptation in the tourism sector, as a Regional Public Good.	2010-2013	US$1,050,000	SE 3.1
Regional	Caribbean Disaster Management (CADM) Project Phase II	Disaster Mitigation	JICA	CDEMA	N/A	Strengthen institutional mechanisms to mitigate damages in the CDEMA-participating states (Belize, Dominica, Grenada, Guyana, and Saint Lucia), especially against flood hazards. Expected results are (1) early flood analysis and flood hazard maps in pilot countries, (2) establishment and implementation of early warning systems for flood hazards in the five pilot states, and (3) hydrological database at CIMH.	April 2009-December 2011		SE 3.2 Goal 5
Regional	Adaptation for Climate Change and Disaster Mitigation: Township Planning Strategies for Storm Surge in the Caribbean.	Climate Resilience	IDB/Netherlands Environmental Partnership Trust Fund	CDERA	N/A	Assist Caribbean countries in the development of adaptation strategies needed to deal with the impact of natural disasters and severe weather events anticipated to occur in association with climate change, and to strengthen their capacity for adaptation to this phenomenon. The specific focus will be on developing the capacity and methodology for incorporating risk analysis into the long-term development strategies of town planners and emergency managers.	4 years, completed in 2009	US$250,000	SE 3.1 Goal 2

Country	Project/Program	Area	Financing	Implementing Agency	Other Partner Institutions/Projects	Brief Description	Duration	Value (Approx.)	Link to the Caribbean Regional CC Strategy
Regional	Regional Framework for an Integrated Observation Network for Environmental Change in the Wider Caribbean	Climate Resilience	IDB/Regional Public Goods Initiative	CCCCC	NOAA	The goal of the project is to contribute to building regional capacity to respond to the challenges and adverse impact of climate change adaptation in the Caribbean. The purpose is to develop a regional strategy and action plan for the establishment of an open access observation network for environmental change in the wider Caribbean region, as a Regional Public Good.	2010-2013	US$750,000	
Regional	Mainstreaming Disaster Risk Management in OECS Countries	Disaster Risk Management	IDB/ Disaster Prevention Fund	CDB	OECS Secretariat	The project will support the mainstreaming of disaster risk management in the OECS. The specific objectives are to (a) strengthen institutional capacity of the OECS member countries and its Secretariat in community-based disaster risk management; and to (b) enhance disaster resilience in vulnerable, low-income communities.	2008-2011	US$400,000	
Regional	Climate Change Modeling for Latin America and the Caribbean	Climate Change	IDB	IDB	National Center for Atmospheric Research (NCAR)	The project aims to support the development of a science and technology transfer program between the LAC scientific community and the National Center for Atmospheric Research (NCAR), which will contribute to build or strengthen existing capacity for the generation, analysis, and visualization of climate, climate variability, and climate change data and its integration in vulnerability and impact assessments.	2009-2011	US$1,200,000	SE 3.1 Goal 1
Regional	Caribbean Risk Atlas Project	Climate Resilience	WB	UWI	CIMH, CDEMA, and CCCCC	The objective of the project is to build capacity in theCaribbean Region to analyze disaster risk in terms of potential losses and to use this type of analysis in the development of comprehensive risk management strategies. The project will seek to institutionalize the use of probabilistic loss analysis in regional planning activities as a risk reduction mechanism for future development planning.	2009-2011	US$510,000	SE 3.1 Goal 1

Country	Project/Program	Area	Financing	Implementing Agency	Other Partner Institutions/Projects	Brief Description	Duration	Value (Approx.)	Link to the Caribbean Regional CC Strategy
Regional	Caribbean Emergency Legislation Project	Climate Resilience	WB	CARICOM/ OAS	CDEMA	The objective of the project is to build legislative capacity to enhance the legal and institutional framework for state of emergency budget appropriation in the Dominican Republic and CARICOM Member Countries. It aims to raise awareness among government decision makers and make recommendations to improve legislative channels and administrative procedures during and immediately after the occurrence of a natural disaster.	2008-2011	US$350,000	SE 3.1 Goal 4
Regional	Disaster Risk Reduction in the Health Sector of CARICOM Member States	Disaster Risk Management	CIDA	PAHO	Participating Country Health Disaster Coordinators	Hospital safety index & post-disaster plans for mental health	2008-2013	CAN$2.5 million	SE 3.1 Goals 1,2 and 3
Regional	CDM Harmonized Implementation Program	Comprehensive Disaster Management	CIDA	CDEMA	DFID & OECS	National capacity strengthening for DRM & community resiliency	2008-2013	US$8 million (CAN$3 million -CIDA)	SE 3.1 Goals 1,2 and 3
Regional	Canada-Caribbean DRM Fund	Disaster Risk Management	CIDA	CIDA	N/A	Small grants for community-based DRR	2007-2012	CAN$3.0 million	SE 3.1 Goals 1,2 and 3

Country	Project/Program	Area	Financing	Implementing Agency	Other Partner Institutions/Projects	Brief Description	Duration	Value (Approx.)	Link to the Caribbean Regional CC Strategy
Regional	Mainstreaming Climate Change into Disaster Management for the Caribbean Region	Climate Resilience	Government of Austria	CDEMA		Strengthen regional, national, and community-level capacity for mitigation, management, and coordinated response to natural and technological hazards and the effects of climate change through: (1) developing a regional program and plan of action for mainstreaming climate change in the disaster risk management agenda in the region; (2) building community resilience through enhancement of the existing Community Disaster Planning Training Manual to include a component on climate change, establishment of a cadre of trainers, and community-based disaster management training, and deepening coordination for advancing community-based planning initiatives; and (3) strengthening the sub-regional response units to more effectively coordinate response operations on behalf of the member states in their sub-region when disaster events occur.	2009-2011	US$880,150	SE 3.1 Goal 2
Regional	Integrating Coastal and Watershed Management in the Small Island Developing States of the Caribbean (IWCAM)	CC Adaptation	GEF	UNDP	Co-Financed	The long-term goal is to enhance the capacity of the countries to plan and manage their aquatic resources and ecosystems on a sustainable basis. The project recognizes the integrated and interlinked nature of watersheds and coastal areas in small islands and aims to develop a more sectorally coordinated management approach, both at the national and the regional level, with a strong emphasis on an expanded role for all stakeholders within a participatory management framework.	2006-		SE 3.1 Goal 2

Country	Project/Program	Area	Financing	Implementing Agency	Other Partner Institutions/Projects	Brief Description	Duration	Value (Approx.)	Link to the Caribbean Regional CC Strategy
Regional	Comprehensive Disaster Management - Harmonised Implementation Programme (CDM-HIP)	DRR + CC	DFID	CDEMA		Support for the regional Comprehensive Disaster Management (CDM) Strategy - assisting the Caribbean Disaster and Emergency Management Agency (CDEMA) to a) strengthen institutional support for CDM Program implementation at national and regional levels; b) build community resilience (e.g. safer building and landslide protection for the most vulnerable) in CDERA states/ territories to mitigate, respond to, and recover from the adverse effects of climate variability and change and disasters.	April 2009-March 2013	£2,400,000	
Regional	Caribbean Review of Economics of Climate Change (RECC)	CC, Environment, and Energy	DFID	UN ECLAC and CCCCC		Caribbean governments (12 with DFID funding) will be provided with an economic assessment of the impacts of climate change looking at key vulnerable sectors with different socioeconomic development scenarios and emission trajectories. This includes costs and benefits of inaction (known as business as usual or baseline) versus adaptation to reduce vulnerability, and transition towards sustainable low-carbon economy. It will include analysis of poverty, equity, and gender where possible The program also includes training of professionals across the region in modeling the economic impacts of climate change and adaptation to boost technical capacity in this area.	June 2009-January 2011	£750,000	

Country	Project/Program	Area	Financing	Implementing Agency	Other Partner Institutions/Projects	Brief Description	Duration	Value (Approx.)	Link to the Caribbean Regional CC Strategy
Regional	Caribbean Climate Change Risk Atlas (CARIBSAVE CCRA)	CC + DRR	DFID Caribbean	OUCE and CCCCC		Climate Change Country Risk Profiles and Plans for the tourism and related sectors will be produced for 10 countries (the Bahamas, Jamaica, Barbados, Dominican Republic, Turks and Caicos, St. Lucia, Anguilla, St. Kitts, Suriname, and Grenada). They will contribute to the design and implementation of an effective Comprehensive Disaster Management (CDM) program in these countries. Other outputs include increased public awareness, media communication material (e.g. three new films), and strengthened institutional capacity and knowledge base of the regional climate modeling group.	March 2010-June 2011	£750,000	
Regional	CCCCC/Regional Task Force Support	CC	DFID Caribbean	CCCCC		Development of Caribbean Strategy to address CC risks and support for regional engagement and international negotiations on CC response planning and strategy implementation.	October 2007-June 2010	£179,290	
Regional	Copenhagen and Beyond - Capacity Building for CARICOM Policy Makers Involved in Climate Change Negotiations	CC + Energy	DFID Caribbean	UNDP (with CCCCC)		Prepare CARICOM leaders for UNFCCC Copenhagen negotiations and facilitate regional efforts of the task force through support of modeling impacts to provide information for COP 15 of 1,5 vs. 2.0 degree warming scenarios; renewable energy initiatives (sector assessment and implementation strategy); and a communication web portal.	September 2009- June 2010	£149,664	
Regional	Guyana Flood Mitigation- WB Conservancy Dam/Cunha Canal Rehabilitation Works * TBC	DRR/CC Adaptation	DFID Caribbean co-fund the World Bank's Global Environment Facility's (GEF) Project	WB / Govt. of Guyana		To adapt to climate change and reduce flood risk from the East Demerara Water Conservancy (EDWC) by increasing discharge capacity through the Cuhna Canal.	2009- TBC	£750,000	
Regional	Cooperation Program in CCA/DRR Integration (name to be defined)	CC/DRM	Govt. of Australia through AUSAID	CDEMA		CC Adaptation and DRM - priorities to be determined. Draft Program will be available July 2010.	2011-2015	TBD (US$60 million to be available to region over 4 years	