

VOLUME TWO ANNEXES

REPORT ON A TECHNICAL REVIEW AND ASSESSMENT OF COMMUNITY-BASED DISASTER RISK MANAGEMENT IN OECS MEMBER STATES

Prepared for
Environment and Sustainable Development Unit (ESDU)
Organisation of Eastern Caribbean States (OECS)
Morne Fortune, Castries, Saint Lucia

By

Hazel Ann Todd (M.Sc.)

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ANNEX1:

TERMS OF REFERENCE :CONSULTANCY SERVICE: TECHNICAL REVIEW AND ASSESSMENT OF COMMUNITY-BASED DISASTER RISK MANAGEMENT IN THE OECS MAINSTREAMING DISASTER RISK MANAGEMENT IN OECS COUNTRIES

Technical Cooperation Agreement IDB-CDB No. ATN/OC-11176-RS

1.0 BACKGROUND

1.01 The nine countries of the Organisation of Eastern Caribbean States (OECS): Anguilla, Antigua and Barbuda, British Virgin Islands, Dominica, Grenada, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, face a common threat from natural hazards, including hurricanes, floods, landslides, earthquakes, volcanoes and tsunamis that have historically had a negative impact on their social and economic development. The Eastern Caribbean islands were identified in 2004 as being among the most vulnerable in the world. Such vulnerability is related to increases in the frequency and intensity of disaster events, compounded by population growth in high risk areas; relatively high levels of poverty; improper land use planning and environmental management; and the low economic capacity of these small tourism-based economies to cope with disaster losses associated with extreme events. The region is also likely to experience new threats and increased levels of disaster risk due to climate change.

1.02 In 2000, the OECS developed an Agenda on Disaster Response and Risk Reduction, which focused on: (a) building the OECS Secretariat's ability to conduct robust and thorough macro-socio-economic assessments after a disaster; and (b) assisting member countries to build national and community level resilience to disasters.

1.03 The Caribbean countries, including the OECS, have developed and adopted the Enhanced Comprehensive Disaster Management (CDM) framework for the period 2007-2011. The overarching purpose of the CDM framework is to strengthen regional, national and community level capacity for mitigation, management and coordinated response to natural and technological hazards, and the effects of climate change. The four expected outcomes of CDM are: (a) enhanced institutional support for CDM programme implementation at national and regional levels; (b) effective mechanism for management of CDM knowledge established; (c) disaster risk management (DRM) mainstreamed at national levels and incorporated into key sectors of national economies; and (d) enhanced community resilience to mitigate and respond to the adverse effects of climate change and disasters. The CDM framework was endorsed by the Caribbean Community's (CARICOM) Council for Trade and Economic Development (Environment) in April 2008.

1.04 In 2007, the OECS Secretariat identified community-based disaster risk management and its institutionalisation as major challenges to the mainstreaming of disaster risk management in the OECS countries. Specifically, the following gaps were identified: (a) the lack of a common methodology for multi-hazard risk reduction at the community level that is applicable to the OECS; (b) the need for simple tools to measure and monitor performance in disaster risk management at the community level; and (c) the need to implement appropriate methodologies and tools in vulnerable communities.

1.05 To address these needs, the Inter-American Development Bank (IDB), in cooperation with the Caribbean Development Bank (CDB) acting as the Executing Agency, is providing support to the

OECS for a two-year regional technical cooperation “Mainstreaming Disaster Risk Management (DRM) in the OECS Countries” (RG-T1319) within the framework of CDM. This technical cooperation will build on best practice disaster risk management tools and initiatives that have been developed and/or applied in the Caribbean. It has two components: Component 1, Institutional Strengthening of the OECS, and Component 2, Enhancing Disaster Resilience in Vulnerable, Low Income Communities.

1.06 The following activities will be financed under Component 1: (a) review and assessment of community-based DRM in the OECS; (b) development of a methodology for multi-hazard risk reduction in low income communities and design of a pilot project to test the methodology; (c) development of a community-based DRM benchmarking tool; and (d) interim workshop. Under Component 2, the following activities will be financed: (a) implementation of multi-hazard risk reduction methodology in two vulnerable low-income communities each in a different OECS country and preparation of a multimedia DRM toolkit; and (b) dissemination workshop. The OECS as implementing agency for the project, is desirous of retaining the services of an international individual consultant to conduct a technical review and assessment of communitybased DRM initiatives in the OECS.

2.0 OBJECTIVES

2.01 The overall objective of Component 1 of the technical cooperation is to strengthen institutional capacity of the OECS member countries and the OECS Secretariat in communitybased DRM. The specific objective of this study is to conduct a technical review and assessment of community-based DRM initiatives that have either been implemented or are being implemented in the nine OECS countries over the last twelve years. Among other results, the assessment is expected to generate the baseline information for the design of a methodology for multi-hazard risk reduction in low income communities as well as the development of a community-based DRM benchmarking tool.

3.0 SCOPE OF WORK

3.01 The Consultant will work under the direction and guidance of the Project Coordinator and will report directly to the Project Coordinator on all technical and administrative matters. Staff from the OECS-ESDU will provide technical, administrative and coordination support to the project. Intermittent travel in the region may be required to facilitate the completion of the consultancy.

The Consultant will: (a) Conduct a review and assessment, by desk study, of all community-based DRM initiatives, as well as other DRM initiatives with community component(s), conducted and/or planned in the nine member countries of the OECS during the period 1996-2008 paying particular attention to ex ante DRM initiatives.

The study shall include: (i) An inventory, wherever possible in quantitative terms, of all communitybased DRM initiatives, as well as other DRM initiatives with community component(s), in terms of their objectives, goals, results and outcomes.

The inventory should also include information on: executing agencies, funding institutions, implementation period, budget, location, involved groups, capacity building and training, impacts and other achievements, evaluations. The inventory should be presented in a tabular format accompanied by a descriptive commentary, and should relate directly to the four outcomes of the CDM framework as well as the six policy elements of DRM (risk identification, risk reduction,

financial protection and risk transfer, preparedness, response and rehabilitation and reconstruction);

(ii) A more detailed analysis of the methodology for a representative sample (minimum ten) of significant community-based DRM initiatives, including quality, relevance, applicability and sustainability in the OECS; actual versus expected results, outcomes and impacts; extent of community involvement; and sustainability. The projects selected will represent a range of different sizes, locations, implementation agencies and outcomes.

The ten initiatives are to be selected in consultation with the OECS and CDB; (iii) An identification and discussion of best practices, lessons learnt, gaps to be addressed, training needs, and other recommendations for the successful future implementation of community-based DRM initiatives in the OECS. This will be based on (i) and (ii) and will take into consideration the CDM framework. (b) Undertake travel within the OECS, if necessary and as agreed by the Project Coordinator and Head OECS-ESDU, to obtain in-depth information not available via desk study; (c) Prepare an inception report within two weeks of the start of the consultancy outlining the major information sources to be targeted; a draft layout of the inventory; and a work plan for completing the consultancy (d) Prepare a comprehensive draft report on the results obtained in (a) above; (e) After receipt of comments from the Project Coordinator, Head of OECS-ESDU, IDB, CDB and other reviewers, prepare a draft final report supplemented by a Powerpoint presentation; (f) Present the draft final report and Powerpoint presentation at the Interim Workshop to be organised by the OECS Secretariat, in one of the pilot countries to be determined by the OECS; (g) Prepare a final report, supported by a Powerpoint presentation, incorporating comments received at the Interim Workshop.

4.0 INPUTS

4.01 The OECS Secretariat will make available to the Consultant all relevant documentation to facilitate the completion of the consultancy.

ANNEX 2:

LIST OF PERSONS CONTACTED FOR THIS STUDY

ANGUILLA

Mr. Merwyn Foster Rogers
Permanent Secretary/NFP
Tel: (264) 497 2518
Fax: (264) 497 3389
Email: merwyn.rogers@gov.ai

Mr. Karim Hodge (NTFP)
Director of Environment
Tel: (264) 497 0217 ext 222
Fax: (264) 497 8534
Email: karim.hodge@gov.ai

Mrs. Elizabeth Klute
Director
Department of Disaster Management
Email: Elizabeth.klute@gov.ai

ANTIGUA

Mr. Clarence Pilgrim
Permanent Secretary/NFP
Tel.: (268) 462 1213
Fax: (268) 462 6104
Email: moa_gov_ag@yahoo.com

Chief Environment Officer
Tel.: (268) 462 4625
Fax: (268) 462 4625 / 562 2568
Email: mail@environmentdivision.info

BRITISH VIRGIN ISLANDS

Mr. Clyde Lettsome
Permanent Secretary/NFP
Tel: (284) 468 3701
Fax: (284) 494 4283

Mr. Bertrand Lettsome (NTFP)
Chief Conservation & Fisheries Officer
Tel: (284) 494 3429
Fax: (284) 494 2670
Email: bblettsome@hotmail.com

Ms. Sharleen Dabreo

Director
Department of Disaster Management
Tortola
BVI
Email: sdabero@surfbvi.com

Antigua

Mr. Philmore Mullin

Director
National Office of Disaster Services
Antigua
Email: nods@antigua.gov.ag

Dominica

Mr. Nathanael Isaacs

National Disaster Coordinator
Office of Disaster Management
Commonwealth of Dominica
Email: odmdominica@gmail.com

Grenada

Mr. Benedict Peters

National Disaster Coordinator
National Disaster Management Agency
Grenada
Email: nadma@caribsurf.com

St Kitts/Nevis

Mr. Carl Herbert

National Disaster Coordinator
National Emergency Management Agency
St Kitts/Nevis
Email: nemaskb@cable.net

St Lucia

Mr. Joachim Henry

St Lucia Social Development Fund
Executive Director
Castries
St Lucia
Email: info@slusdf.org

David Lewis
St Lucia Forestry Department
St Lucia
S_tylo@hotmail.com

Ms. Dawn French
Director
National Emergency Management
St Lucia
Email: slunemo@gmail.com

Mr. Julian Du Bois
Deputy Director
National Emergency management Organization
Email: slunemo@gmail.com

Montserrat

Mr Bennet Kirwan
Director
Disaster Management Coordination Agency
St John's
Montserrat
Email : dmca@gov.ms

Barbados

Ms. Pamela Knights
Documentalist
CDEMA
Email: Pamela.knights@cdema.org

Ms Andria Grosvenor
CDEMA
Email: Andria.Grosvenor@cdema.org

Red Cross

Nicole Williams
Disaster Management Officer
International Federation of Red Cross and Red Crescent Societies,
Caribbean Regional Representation Office
Email nicole.williams@ifrc.org

OECS Secretariat

Mr Cornelius Isaac
Project Coordinator
Mainstreaming DRM in the OECS
Environment and Sustainable Development Unit
Tel: (758) 455-9360

Email: cisaac@oecs.org

Mr David Popo
Programme Officer,
Environment & Sustainable Development Unit
Tel: (758) 455-6370
Email: dpopo@oecs.org

Ms Joan John-Norville
Programme Officer,
Environment & Sustainable Development Unit
Tel: (758) 455-6326
Email: jnorville@oecs.org

ANNEX 3:

Documents Reviewed

National Emergency Management Organisation (NEMO) St Vincent and the Grenadines 2007
Proposal-Government of St Vincent and the Grenadines Prepared by NEMO-Submitted to the OECS

Department of Disaster Management BVI

Proposal - Government of BVI Community Risk Reduction Project Prepared by the Department of Disaster Management BVI- Submitted to the OECS- June 2007

Department of Disaster Management BVI

Final Report - Government of BVI Community Risk Reduction Project Prepared by the Department of Disaster Management BVI- Submitted to the OECS- June 2008

Mosaic Proposal for Risk Reduction in BVI

Visit to Department of Disaster Management, Tortola BVI 22-23 March 2007

Department of Disaster Management BVI

OECS Drainage Project Public Meeting Notes 10 September 2007, 7.00 p.m

Mosaic Dominica Community-based, low cost landslide risk reduction –Summary of an initial visit to Dominica April 2005 - Mosaic Mapping Dominica

Mosaic Utilizing Community Based Approaches in Mitigating Landslides Hazard

Prof MG Anderson, Dr EA Holcombe University of Bristol, UK and David Popo OECS St Lucia

Implementing low-cost landslide risk reduction: A pilot study in unplanned housing areas of the Caribbean- Malcolm Anderson-Liz Holcombe-Rob Flory-Jean-Philippe Renaud

The Government of St Lucia- Rainwater Harvesting in the Fond D’or Watershed of St Lucia- A project to augment municipal water supply in drought prone regions- Mr. Raphael Eudovique and Mr. Lester Arnold – Final Report, March 2008

OECS St Lucia -The Way Forward an Integrated Watershed management Policy Framework for Three OECS Islands-Prepared by Cornelius Isaac, February, 2002

OECS-NRMU Small Project Facility-Preliminary Application Form Northern Leeward Tourism Association-EcoTourism Development at the Troumaca Dam

OECS-History of Small Projects Facility

Consultation for Stakeholder in the Wingfield Watershed, St Kitts

Conference Room-Foundation for National Development, Basseterre April 10, 2000

Big Spring Heritage Site Implementation Project-Prepared by Big Spring Action Committee in Association with Anguilla National Trust-Government of Anguilla Submitted to: OECS NRMU March 2002

East End Conservation Project Anguilla- Prepared by: Anguilla National Trust in Partnership with Government of Anguilla and East End Community Committee- Submitted to OECS, 26 February 2002

Project Proposal St Lucia -Rapid Riverbank Stabilization within the Talvern Water Catchment- Submitted by the Talvern Water Catchment Group- The OECS NRMU- July 1999

Organization of American States-Executive Secretariat for Integral Development (SEDI)-Format for Presentation of Partnership for Development Proposals- Disaster Mitigation and Management Project, Nevis-May 2010

Assessing and Mapping Land Degradation-Case of the Southern Region of Saint Lucia- By Cornelius Isaac, Julius Polius, Adams Toussaint, Louis Ernest, Arlette St.Ville, Rebecca Rock, 2007
Caribbean Group for Cooperation in Economic Development, CGCED 24166 Vol. 1 June 2002

Natural Hazard Risk Management in the Caribbean: Good Practices and Country Case Studies- Discussion Draft

Caribbean Group for Cooperation In Economic Development, Natural Hazard Risk Management in the Caribbean: Good Practices and Country Case Studies, 24166 Vol. 2 June 2002

Caribbean Group for Cooperation In Economic Development, Revisiting the ChallengeCGCED 24166 Vol. 1 June 2002

Caribbean Disaster Management Project- Rivers/Sand Arrestation, **Evaluation conducted by: Shimboku Miyakawa** and Hiroshi Okukawa, KRI International Corp, 10 January 2009 – 27 January 2009

Status of hazard maps vulnerability assessments and digital maps in the Caribbean– Caribbean Mitigation capacity Building Project (CHAMP) Final Report, 2003

Caribbean Disaster Mitigation Project- Implemented by the Organization of American States Unit of Sustainable Development and Environment for the USAID Office of Foreign Disaster Assistance and the Caribbean Regional Program-September 1993 to December 1999, April 2001

The Earthquake Readiness Capacity Building Project, 2007- 2009-CDERA

One Year after Ivan - Lessons for the Caribbean-By CDERA -Bridgetown, September 7, 2005 (CDERA)

Comprehensive Disaster Management Harmonized Implementation Programme: Community Resilient Component- Annual and Semi Annual Report

Community-based disaster risk management- Critical guidelines- Asian Disaster Preparedness Center

Community-based disaster risk management- Field practitioners' handbook- Asian Disaster Preparedness Center

ANNEX: 4

AN INVENTORY OF OECS REGION ACTIVITIES RELATED TO CBDRM

OECS DRM : Protocol			
Name of Project:	Anguilla: East Pond Conservation Project		
Executing Agency	Anguilla National Trust	Funding Institution:	OECS
Other Institutional Partners	Govt. of Anguilla East End Community Committee	Government Depts. Involved:	Department of Physical Planning
		Implementation Period:	2001-2002
Total External Budget	122,500	Government Inputs:	GOA/ANT \$237,000
Location (s) of Project	Anguilla East End Pond		
Project Objective (s)	<p>This project is highly relevant to Disaster Risk Management because of its approach of engaging communities in sustainable environmental management; a fundamental requirement of many Community Based DRM projects.</p> <p>The East End Pond project aimed to: 1) provide critical management measures for the protection and management of one of Anguilla's wetlands; 2) provide a model for the management of wetlands; and 3) provide economic opportunities for the people of Anguilla. In addition, it intended:</p> <ol style="list-style-type: none"> 1. To heighten the national level of awareness and appreciation of wetland values and functions. 2. To build Anguillian capacity to demonstrate management of wetlands. 3. To monitor water quality to provide a database in support of maintenance of the ecological function of the wetlands. 4. To create economic opportunity and benefits to Anguillians and, particularly, residents of the East End Village. 5. To create an outdoor classroom for teaching about wetlands and protected areas. 		
Project Goals	1.To diversify tourism in a way that is environmentally acceptable.		

	<ol style="list-style-type: none"> 2. To demonstrate Anguilla's commitment to the RAMSAR Convention (<i>RAMSAR was extended to Anguilla in 1991</i>). 3. To demonstrate sustainable use of Anguilla's wetlands.
Brief Project Description	<p>Wetlands are vital for the maintenance of Anguilla's ecosystem and serves to protect the island's shorelines from wave actions, mitigate the impacts of floods, absorb pollutants, and provide habitats for animals and plants. . Many of the islands mangroves were lost during Hurricane Luis, which devastated the landscape in September 1995.</p> <p>Notwithstanding the ecological and economic benefits of salt ponds, wetlands remain one of the most threatened natural resources on the island. This is manifested by the increasing destruction and alteration of the wetlands over the years. The wetlands have been used as garbage dumps and in some instances have been reclaimed for other land use purposes.</p> <p>The project is intended to establish 2 bird watching facilities around the East End Pond, a boardwalk, on-site interpretation materials and public awareness materials for wider use in Anguilla. A management Plan for the East End Pond has been drafted and, through a separate initiative, an Interpretation Centre at the Old East End School building across the road from the pond is intended to be developed.</p> <p>The project will be implemented through a joint partnership arrangement between the Government of Anguilla and relevant non-governmental stakeholders. There is well organized Community Council which will be responsible for implementing the day-to-day workings of the project.</p>
Target Groups	Residents of East End Village
Inputs	<ol style="list-style-type: none"> 1. Conduct Community Meetings To Sustain Community Interest And Plan The Implementation Of The Activities 2. Preparation Of Management Plan 3. Vesting Of Property On The Anguilla National Trust 4. Design Of Boardwalk And Viewing Platforms 5. Replanting Of Trees On The Site 6. Hire/Utilize Technical Supervision TA 7. Design And Establish Trails 8. Preparation/Production Of Awareness Materials 9. Prepare Marketing Plan 10. Training
Outcomes	<p>Employment for Anguillians in eco tourism sites and attractions that are managed sustainably.</p> <p>Wetland conservation measures are incorporated into</p>

	<p>management plan for the site</p> <p>Adoption of Anguilla's National Wetland Policy (Draft) and the uptake of management measures.</p> <p>Conservation and maintenance of the flora and fauna of the site and employment of tour guides.</p> <p>Community participation in restoration of the site to an acceptable level.</p> <p>Effective management of wetlands by the DPP in collaboration with ANT and East End Community Council.</p> <p>Water quality monitoring reports produced and database established management.</p> <p>Pricing structure in place and operational at the site.</p> <p>Incorporation of wetlands management into the school curriculum.</p> <p>Renovation and preparation of building</p>
Impacts	<ol style="list-style-type: none"> 1. National level awareness and appreciation of wetland values and functions heightened. 2. Capacity of Anguillians to demonstrate management of wetlands developed. 3. Maintenance of the ecological function of the wetland demonstrated through water quality monitoring and database strengthening. 4. Economic opportunities and benefits particularly for East End village enhanced. 5. Outdoor classroom for teaching about wetlands and protected areas created. 6. Preservation and use of the Old East End School as an Interpretation Centre.
Was Project Evaluated? If so, Key Evaluation Findings	No data available
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	<p>The goal of the Management Plan is to ensure that the wetland is developed in a way that is environmentally and economically sustainable to the surrounding community and the wider island. The Anguilla National Trust, the East End Community Council in collaboration with the Department of Physical Planning have been responsible for formulating the Management Plan. In developing the plan there have been public consultations with the various stakeholders in order to factor in their concerns and issues into the plan</p>
Effective mechanism for management of CDM knowledge established	<p>The project hired a communication specialist to design a public awareness and education Programme. In designing the programme, the consultant will work closely with the East End Community Council, the Department of Physical Planning and the</p>

	Anguilla National Trust. The Awareness and Education programme will target the East End Pond Community and the general public.
DRM mainstreamed at national levels and incorporated into key sectors of national economies	The goal of the Management Plan is to ensure that the wetland is developed in a way that is environmentally and economically sustainable to the surrounding community and the wider island. The Anguilla National Trust, the East End Community Council in collaboration with the Department of Physical Planning have been responsible for formulating the Management Plan. In developing the plan there have been public consultations with the various stakeholders in order to factor in their concerns and issues into the plan. The objectives of the Management Plan are to: conserve the integrity of the natural resources of the wetland; increase awareness of the importance of the wetland; provide economic opportunities for the community; and preserve the socio-cultural significance of the Old East End School as an integral part of the wetland area. In addition, the plan will identify the institutional framework to address the issues and objectives of the project and also a financial system to guide the financial management of the area.
Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters	If the project is to have maximum impact and to mitigate the effects of some of the human activities and practices within the wetland, the target community must be adequately mobilized. The purpose of the mobilization is to ensure that the targeted community and all prospective beneficiaries understand the costs and benefits of the project, thereby, enabling greater ownership of the project. As part of the implementation phase, the project will conduct at least three community consultations to provide information on the ongoing activities and also to facilitate feedback from the community on various stages of the project cycle and to enable stakeholders to contribute to the development of the management plan.
DRM POLICY ELEMENT	
Risk Identification	Many of the islands mangroves were lost during Hurricane Luis, which devastated the landscape in September 1995. The East End Pond has two mangrove species, which include red mangrove <i>Rhizophora mangle</i> and buttonwood mangrove <i>Carnocarpus erectus</i> that are slowly reestablishing themselves. Anguilla's salt ponds are the only major wetlands on the island with the exception of a marshland area known as Savannah, located inland west of Rendezvous Bay. The salt ponds are located between the bays and upland watersheds and function as catchment basins, trapping runoff sediments, providing coastal protection from natural hazards
Risk reduction	The East End Pond project as conceived will endeavour to: 1) provide critical management measures for the protection and

	management of one of Anguilla's wetlands; 2) provide a model for the management of wetlands
Financial protection and risk transfer	N/A
Preparedness	N/A
Response	N/A
Rehabilitation and reconstruction	N/A

OECS DRM : Protocol			
Name of Project:	Government of BVI Community Risk Reduction Project		
Executing Agency	Dept. of Disaster Management, BVI	Funding Institution:	OECS /BVIG
Other Institutional Partners	UNDP	Government Department(s) Involved	Disaster Management
		Implementation Period:	2007-2008
Total External Budget	145,000	Government Inputs	102,8000
Location (s) of Project	Ghetto/Crab Lot, BVI		
Project Objective (s)	<p>The specific objectives of the project that were accomplished were:</p> <ul style="list-style-type: none"> • Establishment of appropriate interventions for flood risk reduction • Capacity building to protect Crab Lot from flooding • Sensitize the community and residents for long term strategies • Development of a participatory management system for risk reduction at the community level 		
Project Goals	"To reduce the landslide and flooding risks in the Crab		

	Lot community’.
Brief Project Description	<p>The Ghetto/Crab Lot Community Risk reduction project was a seven months intervention in an impoverished vulnerable urban community, and was funded by the UNDP under the OECS Secretariat’s Disaster Response and Risk Reduction Programme (DRRP).</p> <p>The activities of the programme focused on communities and households that are vulnerable to natural hazards such as landslides and floods.</p> <p>The residents of the area in collaboration with project partners assessed that the Ghetto/Crab Lot had the following problems:</p> <ol style="list-style-type: none"> 1. The community lies at the foot of a drainage basin and it serves as a conduit to the main drainage channel; 2. The channels running through the community were inadequate to handle the volumes of water they are expected to carry; 3. Some areas lacked drainage infrastructure leading to excess surface flooding in the community; 4. The surface profile inside the community was sporadic and was inadequate for draining surface water; 5. Existing drainage was blocked with debris from erosion upstream on hill slopes and ghuts.
Target Groups	<p>Ghetto/Crab Lots community.</p> <p>A community consultation was conducted (3 days) to confirm the surface water flow and culvert design from the Public Works Department.</p>
Inputs	<p>A community consultation was conducted (3 days) to confirm the surface water flow and culvert design from the Public Works Department.</p> <ul style="list-style-type: none"> • providing a set of construction implementation interventions related to ghut sidewall elevations and sediment trap; • modeling of water flows on slopes and within channels (in-house); • engaging key stakeholders to ensure ownership of the intervention. <p>Subsequent to the public meeting, field assessments were conducted with the members of the community, and the key stakeholders of the project to identify</p>

	<p>concerns and issues related to the proposed scope of works. Comments and concerns from the residents were addressed, and incorporated into the scope of works where applicable.</p> <p>All members of the community that were interested in being part of construction phase of the project were invited to submit their contact information and area of expertise to the project coordinators for potential work. The DDM liaised with the general contractors for the project in order to incorporate their skilled labour into the project and for the provision of petty contracts to those who were selected.</p>
Outcomes	<p>Two intense rainfall events have occurred following the completion of the project. The area was not affected by flood waters or backflow from the ghuts. The quality of life in the Crab Lot community has been improved.</p> <p>From the two events to date, it has been verified that there has been:</p> <ul style="list-style-type: none"> • Increased flow • Decreased drainage blockages • Decreased overtopping of channels • Elimination of back flow of water from the main drain • Reduced surface flow of water into the ghetto area.
Impacts	<p>There was no flooding into the Ghetto/Crab Lot community during the heavy rainfalls in June and July 2008. This is evidence that the adoption of the flood reducing measures were successful</p>
Was Project Evaluated? If so, Key Evaluation Findings	<p>YES (FINAL REPORT)</p> <ul style="list-style-type: none"> • Obstruction free drainage systems developed. All existing drainage infrastructure was cleared of erosion materials and obstructions through the utilization of community labour. Soil and plant material that have accumulated as a result from erosion of the upper slopes were cleared as well as the waste materials that come from littering from the surrounding community. • Increased diameters of culverts to accommodate flow capacity • Public support for remedial physical works fostered by public information campaign.

	<ul style="list-style-type: none"> • Catchment basins for erosional materials constructed • Raised Ghut (drainage channel) Embankments and drainage alignment improved. • Installation of manholes and grid Information to contractors and professionals disseminated.
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	The results of the DRRP will be used to develop a community flood risk reduction model that can be applied throughout the Territory and throughout region
Effective mechanism for management of CDM knowledge established	Integration into the Safer Building Programme Course Material at H. Lavity Stoutt Community College.
DRM mainstreamed at national levels and incorporated into key sectors of national economies	Training for Professionals coordinated by the DDM; and Preparation of a best practice case study
Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters	<p>This project was successful in reducing the vulnerability of the community from flood and landslide hazards. Each objective that was defined in the project proposal was accomplished as defined below:</p> <p>Objective: To sensitize the Crab Lot community and residents for long term strategies:</p> <p>Completed Activity: Public Relations activities including:</p> <ul style="list-style-type: none"> • Public Meeting • Field investigations with participating community identified further phases (Phase II and III) of the project to be completed to enhance specific works completed during this project • Community participation in contractual works; all contractors used are members of the surrounding community • Television and radio advertisements to educate public on importance to maintain huts to prevent flooding

	<p>Objective: To establish appropriate interventions for flood risk reduction:</p> <p>Objective: To build capacity to protect Crab Lot from flooding.</p> <p>Completed activity:</p> <ul style="list-style-type: none"> • Identification of Phase II and Phase III for this project by members of the community to further the protection of the area from flooding • Continued PR programme to education public on importance of ghut maintenance • Local government training on hydrologic modeling for future works • DDM's Focus Programme aired on television identifying the activities of the project • Preparation of best practice case study. <p>Objective: To develop a participatory management system for risk reduction at the community level.</p> <p>Completed activities:</p> <ul style="list-style-type: none"> • Establish maintenance contract with members of the local community to maintain cleaning of the ghuts • Phase II and III projects will incorporate community members from conceptual to design to implementation through similar process followed in this project. <p>The incorporation of the community into the project allowed for personal insight to historical and current issues and also several practical recommendations resulted from consultation with the community; particularly the addition of Phase II and III of the project.</p>
DRM POLICY ELEMENT	
Risk Identification	Land slide and flooding risks in the Crab Lot community'.
Risk reduction	<p>' Completed activity:</p> <ul style="list-style-type: none"> • Replaced existing 6" culverts with 24" culverts leading into Crab Lot area from Long Bush Road to accommodate an increased flow capacity

	<ul style="list-style-type: none"> • Realign drains that intersect with the main drain to increase flow capacity • A manhole was installed to control and capture the surface flow from Joe's Hill and direct it into the covered ghut from Joe's Hill Road • Supplementary grids across the entrance to Crab Lot were constructed to ensure surface water flow at the junction of Main Street and Joe's Hill Road and Crab Lot are directed into covered ghut • Installation of kerbs • Cleaning of existing drainage structures • Four Sedimentation basins were constructed to control the introduction of sediments in the drainage channels. • The top of all open ghuts sidewalls were raised within the Crab Lot area, to an elevation datum corresponding to the absolute elevation of the top of the existing sidewalls of Long Bush ghut. This construction ensures flood protection of the entire Crab Lot area.
Financial protection and risk transfer	N/A
Preparedness	Maintenance contracts established at community level
Response	N/A
Rehabilitation and reconstruction	N/A

OECS DRM : Protocol			
Name of Project:	CCRIF Enhancing the Climate Risk and Adaptation Fact Base for the Caribbean - Economics of Climate Adaptation Initiative		
Executing Agency	CCRIF	Funding Institution:	WORLD BANK/CDB/EUROPEAN UNION/UK GOVERNMENT CANADA AND FRENCH GOVERNMENTS, IRELAND AND BURMUDA
Other Institutional Partners	PARTICIPATING GOVERNMENTS	Government Depts. Involved	
		Implementation Period:	2006-7
Total External Budget	Not available	Government Inputs	
Location (s) of Project	CARIBBEAN		
Project Objective (s)	Provide sound economic basis for the assessment of the place of risk transfer solutions such as catastrophic risk insurance within the overall arena of Adaptation to Climate Change and its links to Disaster Risk Management, including at Community level.		
Project Goals	To limit the financial impact of catastrophic hurricanes and earthquakes		
Brief Project Description	Recognizing that decision makers need a quantitative fact base to draw up sound adaptation strategies and business cases against this backdrop, the Caribbean Catastrophe Risk Insurance Facility (CCRIF) launched a study for the Caribbean region in February 2010.		
Target Groups	SMALL ISLAND DEVELOPING STATES IN THE CARIBBEAN		
Inputs	FROM 16 CARIBBEAN GOVERNMENTS		

Outcomes	<p>Based on the Economics of Climate Adaptation (ECA) methodology developed by the ECA Working Group², the study provides the facts and tools required to develop quantitative adaptation strategies that can be incorporated into national development plans to increase resilience against climate hazards. The fact base is built around two elements:</p> <p>A risk baseline, providing transparency on current and future expected losses from climate risks for three climate</p> <p>A consortium of public and private sector institutions including the Global Environment Facility (GEF), UNEP, Swiss Re, the Rockefeller Foundation, Climate Works, Standard Chartered, McKinsey & Company, and the European Union. See Appendix 1 for the methodology used.</p> <p>The assessment of the future risk baseline is based on the concept of total climate risk, i.e., the total future risk that could arise from adding the effects of climate change and economic growth to the current risk level</p> <p>An assessment of adaptation measures that could be taken, including an analysis of the expected costs and benefits of risk mitigation and transfer measures</p>
Impacts	<p>Provision of immediate liquidity through a range of affordable insurance products.</p> <p>REIMBURSEMENT FOR DAMAGES BASED ON POLICY</p>
Was Project Evaluated? If so, Key Evaluation Findings	NO: AN ECONOMIC STUDY OF IMPACT OF POTENTIAL DISASTERS AND CLIMATE CHANGE
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	Adopted by Caribbean governments as a risk pooling mechanism to mitigate economic risk from damaging effects of disasters
Effective mechanism for management of CDM knowledge established	PARTNERS WITH THE CCCC-which acts as a repository for regional climate change data
DRM mainstreamed at national levels and incorporated into key sectors of national economies	<p>OWNED OPERATED AND REGISTERED IN THE CARIBBEAN FOR CARIBBEAN GOVERNMENTS</p> <p>Provides the opportunity for Caribbean Governments to purchase earthquake and hurricane insurance</p>

Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters	N/A
DRM POLICY ELEMENT	
Risk Identification	<p>Based on the Economics of Climate Adaptation (ECA) methodology developed by the ECA Working Group², the study provides the facts and tools required to develop quantitative adaptation strategies that can be incorporated into national development plans to increase resilience against climate hazards. The fact base is built around two elements:</p> <p>A risk baseline, providing transparency on current and future expected losses from climate risks for three climate</p> <p>A consortium of public and private sector institutions including the Global Environment Facility (GEF), UNEP, Swiss Re, the Rockefeller Foundation, Climate Works, Standard Chartered, McKinsey & Company, and the European Union. See Appendix 1 for the methodology used.</p> <p>The assessment of the future risk baseline is based on the concept of total climate risk, i.e., the total future risk that could arise from adding the effects of climate change and economic growth to the current risk level.</p> <p>An assessment of adaptation measures that could be taken, including an analysis of the expected costs and benefits of risk mitigation and transfer measures.</p> <p>The analysis focused on quantifying the potential impact of climate change on three relevant natural hazards:</p> <p>Hurricane---induced wind damage Coastal flooding/storm surge. Inland flooding due to both hurricanes and non---tropical systems</p> <p>Among the hazards considered, hurricane---induced wind damage has the largest damage potential, accounting for up to 90% of the overall damage. The contribution of coastal flooding/storm surge to total damage is higher in low---lying countries.</p> <p>Larger countries are more likely to be hit by a strong hurricane by virtue of the area they cover, although hurricanes have a lower relative impact. Smaller countries are hit</p>

	more rarely on average, but with more devastating effects.
Risk reduction	<p>Based on the Economics of Climate Adaptation (ECA) methodology developed by the ECA Working Group², the study provides the facts and tools required to develop quantitative adaptation strategies that can be incorporated into national development plans to increase resilience against climate hazards. The fact base is built around two elements:</p> <p>A risk baseline, providing transparency on current and future expected losses from climate risks for three climate</p> <p>A consortium of public and private sector institutions including the Global Environment Facility (GEF), UNEP, Swiss Re, the Rockefeller Foundation, Climate Works, Standard Chartered, McKinsey & Company, and the European Union. See Appendix 1 for the methodology used.</p> <p>The assessment of the future risk baseline is based on the concept of total climate risk, i.e., the total future risk that could arise from adding the effects of climate change and economic growth to the current risk level.</p> <p>An assessment of adaptation measures that could be taken, including an analysis of the expected costs and benefits of risk mitigation and transfer measures</p> <p>Some countries can avoid up to 90% of the expected damage by implementing cost-effective adaptation measures</p> <p>The difference in the share of the expected loss that can be averted cost-effectively is driven by several factors. The main drivers are:</p> <p>Value of buildings - High-value assets justify higher investments to increase their resilience. For example, the average value of a residential building in Dominica is approximately USD 30,000, compared to a value of approximately USD 650,000 in Cayman Islands. The amount of money that can be spent cost-effectively to protect a residential building in Cayman Islands is therefore proportionally larger.</p> <p>Importance of coastal flooding/storm surge - The risk from coastal flooding/storm surge can be mitigated more cost-effectively than wind hazard. Low-lying countries such as Cayman Islands (where coastal flooding/storm surge accounts for around 45% of the damage) can therefore increase their resilience in a more economically effective manner than a mountainous country such as Dominica</p>

	<p>(where coastal flooding/storm surge accounts for only some 15% of the potential damage).</p> <p>It is important to underline that the findings discussed above are based purely on economic considerations. However, decision makers have to consider further important elements, such as safeguarding life, and the human cost of misery. As a consequence, the results of the study do not imply that risk mitigation should not be pursued in all countries. Our findings suggest rather that the focus of an adaptation strategy in countries where only a small share of the damage can be averted cost effectively (e.g., Dominica and St. Lucia) should rely on the following two principles:</p> <p>Using suitable risk mitigation initiatives to protect human lives and building on risk transfer solutions to protect economic assets.</p>
Financial protection and risk transfer	<p>In St. Lucia, for instance, only a small share of the expected loss can be averted cost-effectively using risk mitigation measures. To address the residual risk beyond this level, it is economically more effective to purchase a risk transfer solution than to implement further risk mitigation measures.</p>
Preparedness	<p>When the results have been finalised, they may be applied in several ways. A number of Caribbean countries have already started working on their National Adaptation Programmes of Action (NAPAs). The fact base provided by this study can augment the development and review of these national adaptation strategies. For example, the study prioritises areas and sectors at risk and provides clear inputs for building an economically viable portfolio of adaptation initiatives designed to increase each countries plan.</p>
Response	<p>Allow quick access to insurance pay outs facilitating a rapid and effective response</p>
Rehabilitation and reconstruction	<p>The use and access to parametric insurance provides short term liquidity to Caribbean governments when a policy is triggered thus allowing for quick rehabilitation and reconstruction of affected areas</p>

OECS DRM : Protocol			
Name of Project:	Status of Hazard Maps, Vulnerability Assessments and Digital Maps in the Caribbean: Final Report		
Executing Agency	CDERA	Funding Institution	JICA/CIDA
Other Institutional Partners	OAS	Government Depts Involved	Participating Governments
		Government Inputs	Not available
Total External Budget	Not available		
Location (s) of Project	16 CDERA Participating States, Haiti, Martinique, Surinam and Puerto -Rico		
Project Objective (s)	<p>This survey contributed to CBRDM in the OECS region by clarifying the availability and status of vulnerability assessments and hazard mapping among the Member States; which would be an essential input into subsequent processes of CBRDM planning and implementation.</p> <p>The objectives of the Survey were as follows:</p> <ol style="list-style-type: none"> 1. To determine the status of hazard maps and vulnerability assessment studies and their use in the socio-economic planning and management of the Caribbean. 2. To determine critical success factors, gaps and best practices in the preparation and use of hazard maps and vulnerability assessment studies in the Caribbean. 3. To compile a database of hazard maps, vulnerability assessment reports, and digital maps available in the Caribbean. 		
Project Goals	<p>The output of this study will first be used by CADM project for the preparation of its sustainability plan. CADM is currently carrying out pilot projects in three countries with the objective to establish a partnership among CDERA, regional and national institutions, which will carry out flood hazard mapping and community disaster management planning in all member countries, sustainably following the CADM project in the future. This study provides key</p>		

	information required for the preparation of the sustainability plan and at the implementation stage thereafter.
Brief Project Description	The people and fragile economies of Caribbean territories are vulnerable to the regular occurrence of hazards that often result in disasters crippling their economies. Efforts to map and assess these hazards and the elements that are vulnerable to them have been done at different scales, times, costs, and by different funding agencies. To reduce the vulnerability of the Caribbean to the devastating effects of hazards in an effective and efficient manner, there is need for comprehensive documentation on the nature of the hazards, their spatial extent, frequency of occurrence and their effects.
Target Groups	16 CDERA Member States
Inputs	The output of this study will first be used by CADM project for the preparation of its sustainability plan. CADM is currently carrying out pilot projects in three countries with the objective to establish a partnership among CDERA, regional and national institutions, which will carry out flood hazard mapping and community disaster management planning in all member countries, sustainably following the CADM project in the future. This study provides key information required for the preparation of the sustainability plan and at the implementation stage thereafter.
Outcomes	Database of hazard maps and vulnerability assessments
Impacts	Hazard mitigation Planning using vulnerability assessments in participating countries
Was Project Evaluated? If so, Key Evaluation Findings	Not available
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	<p>The users of hazard maps cut across the spectrum of governmental agencies, NGOs, and the general public. Each uses these maps to inform public or private land use decisions. The critical success factors of hazard mapping initiatives in the region are the following:</p> <ul style="list-style-type: none"> a. Leadership of regional organizations with commitment to serve countries in the region b. Determination of national organizations to pursue hazard mapping recognizing this as an important initial step for disaster management c. Effective collaboration among local agencies d. Vested interest of the affected local communities

- e. Continuous monitoring of the hazardous event
- f. Use of digital methods in the preparation of the maps

In order to reduce the impacts of these deficiencies, the following recommendations are offered.

Production, Dissemination, Use, and Updating

- j. There is a need to institutionalize hazard mapping in the region to develop a standardized methodology, to review/improve hazard maps produced, to disseminate to users, to monitor the impacts of hazard maps and to develop regional capacity for hazard mapping and their uses. The most practical way will be to establish a partnership of existing regional organizations as pursued by CADM project for flood hazard mapping. Establishment of new agencies such as the Seismic Research Unit will also be considered as an alternative way.
- k. Copies of the database and other products generated by regional or externally funded projects should be provided to local agencies charged with the responsibility of producing and maintaining hazard maps, vulnerability assessments and digital maps.
- l. The use of hazard mapping, vulnerability assessment studies in development-related activities should be actively encouraged.
- m. The production and dissemination of hazard maps should be mandated by law if the reduction of vulnerability to hazard through the building of more resilient society is to be achieved.
- n. A more user-centred approach to the production and dissemination of hazard maps should be pursued as a matter of urgency.
- o. The designated national agencies should be provided with the resources needed Status of Hazard Maps, Vulnerability Assessments and Digital Maps in the Caribbean: Final Report *CDERA December 2003* 57 for effective dissemination of the outputs of the hazard mapping, vulnerability assessment studies and digital mapping data in the country/territory.
- p. Adequate funding should be provided for the building of capacity in disaster mitigation. This would ensure a reduction of loss of life, property and the biophysical environment. The current disaster-trigger approach and reliance on external funding cannot adequately be used to support the long-term nature of the effects of natural hazards in the region.
- q. There is a need to obtain feedback from the project stakeholders before the final reports of hazard mapping and vulnerability assessment studies are published.
- r. A national record of users and uses of hazard maps and vulnerability assessment results should be maintained.

Role of National Agencies

- f. There is urgent need to upgrade the infrastructure of National

	<p>Disaster Offices so as to ensure that the use of hazard maps is fully integrated into their routine activities.</p> <p>g. In each country, a national agency should be designated as the repository of hazard mapping, vulnerability assessment studies and digital mapping data.</p> <p>h. A national coordinating body should be designated with the responsibility to specify, monitor and coordinate activities relating to hazard mapping, vulnerability assessment studies and digital mapping data production in the country/territory.</p> <p>i. A national clearinghouse should be established with responsibility to specify, monitor, evaluate, and disseminate digital mapping in the country/territory.</p> <p>j. National Disaster Offices should be adequately informed and involved in every hazard mapping and vulnerability assessment study to be undertaken in each country/territory. This study has created the infrastructure needed to ensure that information on hazard mapping, vulnerability assessment studies and digital mapping can be easily collected and disseminated. It is necessary therefore that this infrastructure be maintained.</p>
Effective mechanism for management of CDM knowledge established	<p>This study has created the infrastructure needed to ensure that information on hazard mapping, vulnerability assessment studies and digital mapping can be easily collected and disseminated. It is necessary therefore that this infrastructure be maintained.</p>
DRM mainstreamed at national levels and incorporated into key sectors of national economies	<p>Hazard mapping and vulnerability assessment are the important first steps for any initiative for disaster reduction. In promoting these activities for CDERA member states on the long-term basis in future, it is essential first of all to know their current status and to compile a database of relevant information and materials.</p>
Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters	<p>The CDM project intends to establish within the project period of three years an institutional scheme for flood hazard mapping and community disaster management planning for all CDERA member states in the future. Information on hazard maps, vulnerability assessment studies and digital maps are essential for planning such future activities</p> <p>Two approaches to hazard mapping have been instituted in the Caribbean: region-wide hazard mapping and local hazard map. Regional hazard mapping is used for mapping hazards that are regional in extent and effects. These are mainly wind, surge, storm and seismic hazards. Local hazard mapping focus mainly on in-country flood, landslide, volcanic activities and erosion. The Seismic Research Unit of The University of the West Indies has produced two major sets of seismic hazard maps for the region. In addition to these, Puerto Rico, Martinique, the British Virgin Islands (BVI), Haiti, and Jamaica have undertaken seismic hazard maps for their respective territory/country.</p>

	<p>The regional seismic hazard maps were produced at low resolution (0.25°) while the Martinique map has a resolution of 1:10,000.</p> <p>A regional storm-related, wind, and surge [SWS] hazard mapping with a resolution of 1km was produced for the region through the OAS/CDMP. Country/Territory focused SWS hazard mapping were produced for Belize, Jamaica, BVI, Haiti, Jamaica, Martinique, Bahamas, Montserrat, Puerto Rico and St. Kitts and Nevis. Volcanic hazard maps exist for Dominica, Grenada, Martinique, Montserrat, St. Kitts and St. Lucia. These are mainly of medium scale (1:25,000) with the exception of Martinique (1:10,000). The inadequacy of these medium scale maps for community-level planning as expressed by the end users.</p>
DRM POLICY ELEMENT	
Risk Identification	The CADM project intends to establish within the project period of three years an institutional scheme for flood hazard mapping and community disaster management planning for all CDERA member states in the future.
Risk reduction	Hazard mapping and vulnerability assessment are the important first steps for any initiative for disaster reduction
Financial protection and risk transfer	N/A
Preparedness	The Caribbean is highly prone to natural hazards. Climatic hazards such as strong winds and heavy rains associated with annual tropical depressions, storms and hurricanes often give rise to floods and landslides. Volcanic eruptions and earthquakes have led to loss of life and property. The emerging phenomena\on of global climate change is felt with increase in the effects of drought and fire. The experience of these hazards has caused the local, national and regional agencies of the region to embark on various forms of hazard mapping and vulnerability assessment studies aimed at reducing the impact of natural disasters.
Response	N/A
Rehabilitation and reconstruction	N/A

OECS DRM : Protocol			
Name of Project:	Enhancing Disaster Preparedness in the Caribbean		
Executing Agency	United Nations Development Programme (UNDP)	Funding Institution: Aid Office)	European Union through ECHO (Humanitarian
Other Institutional Partners	Caribbean Disaster Emergency Response Agency	Government Department(s) Involved	UWI-Faculty of Engineering, St. Augustine, UTECH Jamaica, CARIMAC Mona, UWI-Library Mona, CXC, OAS, USAID/OFDA, IFRCS, CANA, CBU. CANTO, ITU, CARIPEDA, PAHO, UNESCO
		Implementation Period:	1999-2003
Total External Budget	Euros 1.2 million	Government Inputs	Not available
Location (s) of Project	CARIBBEAN REGION		
Project Objective (s)	<p>There are seven (7) specific objectives of this Project, each of them focusing on a critical area. These are highlighted in the attached Log. They focus on the following:</p> <p>Specific Objective 1: Enhancing School Disaster Preparedness planning</p> <p>Specific Objective 2: Enhancing the Capacity for Emergency Broadcast</p>		

	<p>Specific Objective 3: Development of National policies, Procedures and Skills for Managing Relief Supply Operations during Disasters</p> <p>Specific Objective 4: Enhancing Management of Disaster Information</p> <p>Specific Objective 5: Enhancement of Telecommunications Services in the Region</p> <p>Specific Objective 6: Enhancement of Emergency Communications</p> <p>Specific Objective 7: Enhancement of Community Disaster Planning</p>
Project Goals	<p>The general objective of this Project is to:</p> <p><i>Mobilize resources for the strengthening of disaster management in the Caribbean region. It specifically aims to consolidate initial interventions by CDERA and other institutions that were designed to facilitate the development of a long term regional programme in disaster preparedness for schools, emergency broadcast and community disaster preparedness.</i></p>
Brief Project Description	<p>The Enhancing Disaster Preparedness in the Caribbean project was conceived as a three-year project and commenced in March 1, 1999. The general objective is to strengthen disaster management activities in the Caribbean region. Specifically to facilitate the development of a long-term regional programme in disaster preparedness for schools, relief supplies management, emergency broadcast and telecommunications and community disaster preparedness.</p>
Target Groups	<p>Beneficiary Countries: Anguilla, Antigua and Barbuda, Bahamas, Barbados, Belize, BVI, Dominica, Grenada, Guyana, Montserrat, St Kitts/Nevis, St Lucia, St Vincent and The Grenadines, Trinidad and Tobago, and Turks and Caicos</p>
Inputs	<p>TECHNICAL ASSISTANCE FROM CDERA AND OTHER PARTNER ORGANIZATIONS</p>
Outcomes	<p>4 National Consultations- 60 persons trained Flood Preparedness Checklist –5,000 cop School disaster preparedness manual, interactive class material for secondary school disaster materials material for schools and video Disaster Mitigation Policy Guidelines for adoption by Executives of Ministry of Education</p>

Impacts	<p>The project received tremendous support at the national level. Local disaster management offices attended to essential logistics on the ground in most cases providing financial support to the initiative. Ministers of Government, Permanent Secretaries of Ministries responsible for disaster management and the office of the Head of State endorsed the initiatives by attending opening ceremonies. Consequently the project received excellent local coverage through the media. All the documents produced were circulated to the relevant Ministries and the National Disaster Offices. Being Participating States of CDERA these territories could reproduce the material locally using the electronic copies supplied in the packages</p>
Was Project Evaluated? If so, Key Evaluation Findings	
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	<p>This project is appropriately named "Enhancing Disaster Preparedness in the Caribbean region". The activities highlighted are in recognition of the variety of disaster management activities being planned or undertaken in the region and existing critical gaps. The Project is intended to cultivate a consistent and permanent approach to following as it relates to disaster management:</p> <ul style="list-style-type: none"> • School Disaster Preparedness • Emergency Planning • Community Disaster Planning • Emergency broadcast services and facilities in the region <p>It therefore contains a set of catalytic activities designed to address and consolidate disaster preparedness interventions in these areas in the region and further entrench disaster awareness and preparedness. This is an integral part of the CDERA Work Programme for 1999 and those being planned for 2000-2001.</p>
Effective mechanism for management of CDM knowledge established	<p>The Documentation Center of the Caribbean Disaster Emergency Response Agency is located in Barbados at the Headquarters of CDERA Coordinating Unit. CDERA is an inter-governmental regional disaster management organization that was established in September 1991 and has responsibility for coordinating the regional response mechanism in the event of disasters. The Agency, however, addresses all aspects of disaster management in its efforts to increase the disaster management capabilities of its 16 member states and the wider Caribbean.</p> <p>The Documentation Center fulfills in part one of the functions of the Agency, which is, to serve as a "clearing house for relevant information and intelligence in all matters relating to disasters, including current research being undertaken in all related</p>

	<p>institutions".</p> <p>The Center is founded on the collection and organization of the now defunct Pan Caribbean Disaster Preparedness and Prevention Project Documentation Center.</p> <p>Over the years CDERA has added to that collection and has recently received financial support from the European Community Humanitarian Office Disaster Preparedness Program(DIPECHO) to reactivate the Documentation Center. The Center is now ready to offer an improved disaster information service to its member states and the wider Caribbean.</p> <p>PURPOSE OF THE DOCUMENTATION CENTER</p> <p>To facilitate access to information on all aspects of disasters, disaster management and related areas with particular reference to the Caribbean in an effort to improve the regional capacity in disaster preparedness and disaster reduction.</p> <p>Specific Goals</p> <ul style="list-style-type: none"> • To improve and broaden the CDERA/CU in-house capacity to gather, process and disseminate disaster and related information that is pertinent to its member states and the wider Caribbean. • To support the National Disaster Offices of the Participating States in the establishment and maintenance of information centers • To collaborate with its Partners, Disaster Information Agencies and other relevant groups/agencies to enhance and strengthen the Region's capacity in the management of disaster information.
<p>DRM mainstreamed at national levels and incorporated into key sectors of national economies</p>	<p>The project promoted Community Disaster Planning at the regional and national level. Fifteen participants were trained as instructors in Community Disaster Preparedness on April 16-19, 1999 in St. Lucia. The group (including 9 regional participants) ranged from Community leaders to Disaster Management Coordinators at the national level. All were instructed in the issues relating to Disaster Management, Community Disaster Preparedness and Planning, Community Hazard Analysis and Community Participation and Resource Mobilization</p>
<p>Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters</p>	<p>Within 4 months of their training, these instructors transferred some of the skills learned to 36 community leaders and residents in the islands of Anguilla June 29-30, 1999 and St. Kitts/Nevis August 24-25, 1999 through the CARIPEDA sensitization programme.</p>

DRM POLICY ELEMENT	
Risk Identification	<p>Year 3 of the project was to enhance disaster preparedness in the Caribbean with a distinct focus on the flood hazard.</p> <p>In reviewing the work of capacity enhancement within the first two years and the emerging needs of CDERA Participating States, it was recognized that the third year intervention must focus on enhancing disaster preparedness for the flood hazard. This is in keeping with the Status of the Disaster Preparedness in CDERA Participating States conducted in May 2001, which identified floods as the most common event - occurring in 90 per cent of Participating States in the five years prior to the study. In contrast only 25 per cent of these countries had any plans to guide disaster management activities for this hazard. It is against this background that Year 3 of the project addressed flood hazard.</p>
Risk reduction	Strengthen disaster management activities in the Caribbean
Financial protection and risk transfer	N/A
Preparedness	The project has enhanced the capacity for sustainable school disaster preparedness planning and education programme in the region. This is significant given the use of schools as shelters in disaster response and the more than US\$ 100 million procured for education reform (including retrofitting and new capital projects) in the region at present.
Response	<p>The project enhanced the capacity of emergency broadcast in the region. This need arose from the disruption to broadcast communications in such events as Hurricane Hugo the 1995 Hurricane season in the region and the Montserrat Volcanic emergency. This project would advance the initiatives of UNESCO (- 1996) and CDERA PAHO and UNESCO (- 1995).</p> <p>The CDERA/DIPECHO Project (1999) developed <i>Guidelines and a Manual for Emergency Broadcast Procedures</i> helping station managers implement a preparedness and response plan. The approach was to use the input and recommendations of disaster managers and media practitioners to develop the material at a <i>Workshop in Emergency Broadcast Procedures</i> on October 7-8, 1999, Barbados. The venue was specifically identified to allow the regional media houses (CBU and CANA) to participate in the <i>Guideline</i> development and for the economy of operation, allowing nine regional media representatives to also contribute to receive training and to contribute to the discussions. Using this Guideline, the Caribbean Institute of Mass Communications completed the <i>Manual of Policies and Procedures for Emergency Broadcasting in the</i></p>

	<p><i>Region.</i></p> <p>The practicing media professionals from the region, including representatives from Montserrat (volcano crisis 1995-99), Belize (Mitch 1998) and the Bahamas (Hurricane Floyd 1999) gave valuable insight to the challenges faced. The discussions with two senior representatives from the regional amateur radio society at this workshop created a more comprehensive <i>Guideline</i> document as many local radio stations did not have redundant broadcast equipment. The participants emphasized the timeliness and value of the workshop. In light of their own experiences and those of their neighbors the regional media houses were seeking to develop their own in-house procedures and anticipated the release of the Manual.</p>
Rehabilitation and reconstruction	<p>The project developed national policies, procedures and skills for managing relief supply operations in the event of disasters. This was achieved through regional training and discussions and training at the national level in four countries. This initiative was in response to:</p> <ul style="list-style-type: none"> a. Insufficient trained personnel to manage the relief operations; b. The absence of policy guidelines or standard operating procedures for relief supply management in National Disaster Plans and inadequate information management arrangements.

OECS DRM : Protocol			
Name of Project:	Natural Hazard Risk Management in the Caribbean: Good Practices and Country Case studies		
Executing Agency	Caribbean Group for Cooperation in Economic Development (CGCED)	Funding Institution:	World Bank
Other Institutional Partners	Caribbean Countries, International financial institutions, bilateral donors,	Government Depts	N/A

	non-governmental organizations, and private sector enterprise	Involved:	
Total External Budget	SELF FUNDED	Implementation Period:	1977
Location (s) of Project	CARIBBEAN/OECS	Government Inputs:	Not available
Project Objective (s)	The purpose of this study was to identify appropriate actions, agencies and levels for hazard risk management in the region. The results were used to identify good practices for natural hazard risk management, to highlight successful examples of these practices and to clarify significant risk management gaps in the region. In addition to their use within this project, the identified risk management good practices are intended to provide guidance and information for individuals, governments and organizations on useful hazard risk management interventions.		
Project Goals	This study focused exclusively on policies and practices for long-term natural hazard risk management.		
Brief Project Description	The first step in this process was to review existing natural hazard risk management practices and select appropriate or "good" activities. Activities were identified as good practices based on tangible, measurable outcomes, the capability of replication and the appropriateness for use within the Caribbean. The review process considered the principal dimensions of natural hazard risk management (risk identification, risk reduction, and risk transfer) and appropriate levels (local, national, region) for implementing the identified practice. Definitions of these risk management dimensions and actors are included in the following section		
Target Groups	CARIBBEAN COUNTRIES		
Inputs	Bi- annual meeting and studies		
Outcomes	Improvements in DRR projects based on Best practices. Overview of disaster risk and challenges in the Caribbean and OECS Countries		
Impacts	Caribbean consultants with risk management expertise carried out these assessments. In each of the study countries-and at the OECS and CARICOM levels-the consultants were charged with the following tasks: a. Contact appropriate government and private-sector representatives to determine risk identification and risk reduction practices currently in place. b. Determine, as appropriate to the local situation, the gaps between identified current practices and established good practices (i.e., where the actual practice is insufficient or where there is no		

	comparable actual practice) and identify appropriate recommendations to address the gaps in practice. c. For each country, produce two matrices, which describe 1) actual practices and 2) the gaps in practice.
Was Project Evaluated? If so, Key Evaluation Findings	<p>In March 2002, a two-day regional meeting was convened in Kingston, Jamaica, to review the results of the actual practice assessments and a draft of the document <i>Natural Hazard Risk Management in the Caribbean: Revisiting the Challenge</i>. Participants in the meeting represented national disaster and environmental agencies, CDERA, the Caribbean Development Bank, USAID, UNDP, the World Bank and the OAS/USDE. The results of the discussions at this meeting were used to update and prepare a final draft of the main report, <i>Natural Hazard Risk Management in the Caribbean: Revisiting the Challenge</i>. Upon completion of the detailed assessments, a series of matrices were developed. These documents are compiled in this technical annex.</p> <p>Annex 1: Matrices of natural hazard risk management good practices for risk identification, risk reduction and risk transfer. Annex 2: Matrices of actual practice and gaps in practice in each of the study territories and for the OECS sub region and the CARICOM region. Annex 3: A summary table highlighting Caribbean examples for major risk management good practices.</p> <p>The findings of and recommendations resulting from this work are described in the paper <i>Natural Hazard Risk Management in the Caribbean: Revisiting the Challenge</i></p>
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	<p>Hazard assessment and mapping programs regularly supported by organizations such as the World Bank, USAID and CIDA.</p> <p>Disaster management legislation under development in most countries with assistance from CDERA.</p>
Effective mechanism for management of CDM knowledge established	Significant hazard mapping and assessment expertise exists within the University of the West Indies, but this role is not adequately funded CDERA documented best practices in recovery efforts after hurricane Lenny. ECLAC has developed useful surveys for post-event economic impact assessment.
DRM mainstreamed at national levels and incorporated into key sectors of national economies	Hazard considerations prominently included in St George's Declaration of Principles for Environmental Sustainability in the OECS. Model physical planning legislation and building code and guidelines address hazard concerns.

	<p>Business and industry represented on disaster coordination mechanisms in a number of countries</p> <p>OECS Common insurance legislation is under development World Bank has developed a proposal for such a mechanism. A proposal for a regional risk pool mechanism has been developed by the World Bank Regional bodies have promoted risk pooling, but with limited effect.</p> <p>An increasing number of insurance companies have developed and promote schemes that provide risk reduction incentives.</p> <p>Knowledge of the links between environmental quality and hazards is growing. Disaster committees are active in most countries.</p>
Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters	<p>The study identified that building codes have been developed (and subsequently approved) in all countries, except for St. Vincent. Most new public buildings conform to codes and standards.</p> <p>Information on appropriate building techniques have been developed and distributed in most countries, although some materials are out of print.</p> <p>Local disaster committees established in most countries, with varying levels of activity</p>
DRM POLICY ELEMENT	
Risk Identification	<p>Comprehensive series of hazard maps recently developed in subject to the effects of the hazards are Antigua/Barbuda and St. Kitts/Nevis.</p> <p>These maps have been presented mapped. Publicly. In Antigua/Barbuda, national-scale maps have been distributed.</p> <p>* Easy to use hazard maps are publicly to local disaster committees. available for all significant hazards. * Flood hazard maps are available to communities in St. Lucia.</p> <p>* Generally, communities have little access to hazard maps.</p> <p><i>Jamaica</i></p> <p>* Community groups in Portland trained in use of hazard maps.</p> <p>* UWI is developing atlases for use by small communities to inform home building and purchase (initially in Kingston/St. Andrew).</p> <p>* Generally, communities have little access to hazard maps.</p>
Risk reduction	<p>Community vulnerability awareness varies with hazard impact history.</p> <p><i>Vulnerabilities</i></p> <p>* Some housing and public facilities can be found in hazardous areas</p> <p>* Vulnerable housing and public facilities throughout the sub-region. Schools located in vulnerable locations have located in hazard zones identified. Been identified in Antigua/Barbuda, Dominica and St. Lucia.</p>

* Community groups are aware of the link Kitts/Nevis. Critical facilities generally located in vulnerable locations between environmental quality and identified in Antigua/Barbuda, the BVI and St. Kitts/Nevis.

vulnerability, and monitor the local knowledge of the links between environmental quality and hazards is environment for degradation.

* Growing. Reported to be strong in Antigua/Barbuda and St. Kitts/Nevis.

* Local disaster committees have disaster committees are active in most countries, although mechanisms identified highly vulnerable development for channeling information to national-level agencies are weak. In the BVI and infrastructure and convey this and St. Vincent, committees assist with shelter vulnerability assessments.

Information to government.

* Highly vulnerable groups, settlements *Jamaica* and facilities identified. * Communities assist the disaster office with identification of vulnerable groups and with maintenance of information on emergency shelters.

* Disaster committees have been established in most, but not all communities.

Vulnerability and Risk Assessment Eastern Caribbean

* Highly vulnerable populations groups, * Information on vulnerable population groups and facilities available, but facilities and locations identified. Risk use of this information to prioritize risk management interventions is reduction actions prioritized based social, limited.

Economic and environmental impacts.

* Mechanisms for hazard self-assessment and environmental monitoring

* Hazard vulnerability self-assessment not widely available and environmental systems are generally not well techniques and environmental indicators protected. St. Kitts/Nevis has conducted community level training on land made available for use by local groups.

Degradation

Local findings based on these incorporated

* Hazard awareness and risk management not well integrated into into government programs. Government programs outside of disaster management.

* Government programs across all sectors

* In the BVI, vulnerability assessments conducted under the Hazard and incorporate hazard awareness and risk Risk Assessment Study.

Management Jamaica

* Government maintains and uses a *aica* current inventory of critical facilities,

	<ul style="list-style-type: none"> * Environmental indicators developed and tracked at the national level which includes assessments of * Government lacks a comprehensive inventory of critical facilities. <p><i>Vulnerability and Risk Assessment Eastern Caribbean, Jamaica</i></p> <ul style="list-style-type: none"> * Primary hazard impacts and remedies * With few exceptions (tourism, electrical generation), comprehensive compiled for each sector, including public hazard impact studies have not been undertaken for most sectors and private assets. * Safer building certification programs do not currently exist. * Safer building "seal of approval" * Local insurance companies do not typically have sufficient hazard and program developed and implemented. risk information available for comprehensive risk assessments of * Environmental impact assessments portfolios. conducted, including hazards. * Link between development decisions, * Hazard considerations prominently included in St George's Declaration environmental degradation and hazard of Principles for Environmental Sustainability in the OECS. <p>Impacts given full consideration in sub- a Model physical planning legislation and building code and guidelines regional charters, model documents and address hazard concerns.</p>
Financial protection and risk transfer	<p><i>Hazard Mapping Eastern Caribbean, Jamaica</i></p> <p>Business/industry and government</p> <ul style="list-style-type: none"> * Hazard map information generally not widely shared between cooperate on a formal process to identify government and business/industry, hazardous areas and critical facilities. * Expertise to conduct vulnerability assessment generally available * Business/industry share hazard maps and each country. <p><i>Self- and Market Insurance Eastern Caribbean and Jamaica</i></p> <p>All residential and commercial</p> <ul style="list-style-type: none"> * Commercial properties with remaining mortgage balances typically properties insured to actual value. insured. Many middle and upper income properties insured. The majority. * Housing-related NGOs offer hurricane- of lower income properties are not insured and many are uninsurable. * Resistant home improvement programs. There is no compulsory insurance coverage. Group insurance programs available. * Hurricane-resistant home improvement programs exist in selected participants. * Countries. Group insurance programs generally not available for lower income groups, St. Lucia excepted. <p><i>Eastern Caribbean and Jamaica</i></p> <ul style="list-style-type: none"> * Government allocates contingent * Governments do not typically allocate contingent funds, although some disaster funding in annual budget, based on countries have funds

	<p>available at the Central Bank for contingencies. Actuarial probabilities.</p> <ul style="list-style-type: none"> * Insurance regulatory function exists and is staffed * Insurance regulatory function lacks appropriate training. * Adequately empowered and funded * Insurance regulators do not have available hazard maps for reviewing trained staff. Catastrophe peril liabilities. * Insurance regulator oversees * Insurer classification system not implemented or consistent implementation of hazard maps governing * Disaster offices promote risk reduction, but not typically for insurability insurers' level of catastrophe peril purposes. * Simplified insurer classification system, <p><i>Public Asset Coverage and Pooling Eastern Caribbean and Jamaica</i></p> <ul style="list-style-type: none"> * Government makes policy decision to a Typically only selected government facilities insured. St. Kitts/Nevis insure critical public properties to reduce has made policy decision to cover all assets. Risk pooling not typically financial risk. Risk pooling used to lower used. Insurance price contracts. * No public fund/mechanism exists to indemnify poor. * Public fund or mechanism established to * Properties owned by statutory bodies often insured. Indemnify poor, with preference for individuals who have undertaken risk. <p><i>Risk Financing Eastern Caribbean and Jamaica</i></p> <p>Government has taken on some external credits to support reconstruction and mitigation for disaster events.</p> <ul style="list-style-type: none"> * Most governments do source external credit for reconstruction and mitigation efforts, typically from commercial lenders.
<p>Preparedness</p>	<p>Hazard maps developed and distributed.</p> <ul style="list-style-type: none"> * Local governments do not exist in most Eastern Caribbean states. * Critical facility inventories compiled * Comprehensive critical facility inventories have been completed in made available. Antigua/Barbuda, the BVI and St. Kitts/Nevis * In St. Lucia, the Castries City Council has assumed some local disaster management functions, including shelter assessments <p><i>Jamaica</i></p> <ul style="list-style-type: none"> * Maps and facility inventories completed for selected parishes (e.g. Portland) * Vulnerable public facilities, including * Development control and critical facility management is carried out by emergency shelters, identified. Facility the central government uses appropriate to facility vulnerability. * Vulnerability assessments not typically available to guide decisions * Gaps in development controls allowing about proper and safe use

	<p>of facilities development in hazardous areas identified.</p> <ul style="list-style-type: none"> * Post-disaster assessments not used extensively. * Causes of hazard-related damage are studied and remedies are broadly disseminated.
Response	<p><i>Hazard mapping procedures</i></p> <ul style="list-style-type: none"> * Hazard mapping activities typically undertaken as part of post-disaster mechanisms developed and initiated. response or as a component of focused projects, presenting difficulties in Information collected is made widely integrating separate hazard maps. Assessments often undertaken by available. Disaster office promotes its use external consultants, with limited local capacity building in public and private sector investment * A full hazard map series has been developed for the BVI. <p><i>Decisions Jamaica</i></p> <ul style="list-style-type: none"> * Mapping initiatives within the central government and NEPA include the development of map standards. The disaster office refers to and promotes the use of available hazard info. * Hazard maps exist for portions of the country for storm surge, landslide, seismic and flood hazards.
Rehabilitation and reconstruction	<p><i>Post-disaster Measures</i></p> <ul style="list-style-type: none"> * Lending agencies apply explicit risk reduction conditions in post-disaster recovery lending. Post-disaster recovery lending often focused on rapid recovery, rather than risk reduction.

OECS DRM : Protocol			
Name of Project:	Disaster Mitigation and Management Project, Nevis		
Executing Agency	Govt. of St. Kitts and Nevis	Funding Institution:	ORGANIZATION OF AMERICAN STATES
Other Institutional Partners	Nil	Government Depts. Involved	Disaster Management Department
		Implementation Period:	2010 - 2011
Total External Budget	US\$70,000	Government Inputs	\$23,500
Location (s) of Project	St Kitts/Nevis		
Project Objective (s)	<p>One of the elements of this project, which commenced in June 2010, was designed to increase the role of communities in DRM, through initial activities to raise awareness of both the general public and of school children, who are expected to make an increasing contribution to DRM as they move into adulthood. The overall objective was to streamline disaster management by focusing on pre-disaster processes including:</p> <ul style="list-style-type: none"> (i) Mitigation (ii) Impact assessment capabilities (iii) Focused legislation (iv) Regulatory standards (v) Evaluation and enhancement of organizational capabilities (vi) Public awareness (vii) The production of Disaster Management Plans. 		
Project Goals	To prepare the Nevisian economy and infrastructure to withstand and effectively respond to the effects of devastating hurricanes and other frequently occurring natural disasters.		
Brief Project Description	<p>Given the continued susceptibility of the Caribbean region to various hazards including hurricanes, coupled with the likelihood that this exposure is expected to continue and possibly even be exacerbated, this project addressed some of these needs. It is identifying current risks and assisting in mitigating those risks through streamlined planning of economic development, physical development, disaster management, and tourism-related policies. The project is designed as a multi-lateral and multi-agency project, receiving inputs and producing benefits across the board.</p>		

Target Groups	<p>The People of St. Kitts and Nevis Primary and Secondary School Students</p> <p>Nevis Historical & Conservation Society (NHCS)</p> <p>The Tourism Sector</p> <p>Includes “at risk” populations.</p>
Inputs	<p>Technical assistance to develop a more comprehensive Nevis Disaster Management Plan, incorporating Natural Hazard Impact Assessment (NHIA) procedures as standard development assessments.</p> <p>Training key personnel in conducting NHIA’s as standard assessment procedure.</p> <p>Developing a schools-based disaster preparedness program to create greater awareness and education.</p> <p>Providing equipment to encourage the use of information and communication technologies and to cater to training needs.</p> <p>Coordinating workshops to streamline all new disaster management processes.</p> <p>Public Awareness Campaign</p>
Outcomes	<p>Upgraded policies and procedures within the Economic Planning, Physical Planning, Disaster Management, and Tourism Departments of the Nevis Island Administration (NIA)</p> <p>Focus of new procedures on Disaster Preparedness, Management and Mitigation</p> <p>Disaster management and mitigation issues addressed at the project development stage</p> <p>Enhanced capabilities within departments</p>
Impacts	<p>Capacity Strengthening for Economic Planning Department</p> <p>Capacity Strengthening for Physical Planning Department</p> <p>Capacity Strengthening for Disaster Management Department</p> <p>Streamlining of all new Department procedures, public awareness, and sensitization of Ministry of Tourism</p>
Was Project Evaluated? If so, Key Evaluation Findings	<p>This project is nearing completion and no progress documents or evaluations are publicly available.</p>
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	<p>Institution of the Natural Hazard Impact Assessment (NHIA) as a standard part of the Environmental Impact Assessment (EIA)</p> <p>Establishment of mechanisms including catastrophic insurance policies, and a contingency/crisis preparedness plan.</p>

	Improved public awareness with respect to disaster preparedness requirements.
Effective mechanism for management of CDM knowledge established	Streamlining of all new Department Procedures, public awareness and sensitization of Ministry of Tourism
DRM mainstreamed at national levels and incorporated into key sectors of national economies	<p>Upgraded policies and procedures within the Economic Planning, Physical Planning, Disaster Management, and Tourism Departments of the Nevis Island Administration (NIA)</p> <p>Focus of new procedures on Disaster Preparedness, Management and Mitigation</p> <p>Disaster management and mitigation issues addressed at the project development stage</p> <p>Enhanced capabilities within departments</p> <p>Alignment of all new policies with other departments', and with regional and international standards. Project aims to mainstream disaster management by focusing on pre-disaster processes including:</p> <ul style="list-style-type: none"> (i) Mitigation (ii) Impact assessment capabilities (iii) Focused legislation (iv) Regulatory standards (v) Evaluation and enhancement of organizational capabilities (vi) Public awareness (vii) The production of Disaster Management Plans. <p>Upgraded policies and procedures within the Economic Planning, Physical Planning, Disaster Management, and Tourism Departments of the Nevis Island Administration (NIA)</p>
Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters	<p>Public awareness campaigns executed</p> <p>Disaster preparedness school programs established in all primary and secondary school. "Buy-In" of general public and commitment to education by schools.</p>
DRM POLICY ELEMENT	
Risk Identification	Capacity Strengthening for Disaster Management Department
Risk reduction	Vulnerability reduction through programme initiatives
Financial protection and	Establishment of mechanisms including catastrophic insurance

risk transfer	policies, and a contingency/crisis preparedness plan.
Preparedness	Mainstreaming disaster management by focusing on pre-disaster processes.
Response	N/A
Rehabilitation and reconstruction	Training personnel to enforce existing and new regulations and standards and to execute accurate EIA's

OECS DRM : Protocol			
Name of Project:	AN INTEGRATED WATERSHED MANAGEMENT POLICY FRAMEWORK FOR THREE OECS ISLANDS		
Executing Agency	OECS Natural Resources Management Unit	Funding Institution:	N/A
Other Institutional Partners	STUDY	Government Depts. Involved	N/A
		Implementation Period:	1998
Total External Budget	Not available	Government Inputs	Not available
Location (s) of Project	St Kitts/St Lucia and St Vincent and the Grenadines		
Project Objective (s)	The purpose of this report is to present findings of a review of Lessons Learned under the OECS-NRMU Watershed Program and consequently provide considerations on the way forward, including a Policy framework for integrated watershed management. One may define watershed management as the sustainable use of land, water, vegetation, and other natural resources on a watershed basis.		
Project Goals			
Brief Project Description	The organization of Eastern Caribbean States (OECS) through its Natural Resources Management Unit (NRMU) has invested in community-based projects at Talvan in St. Lucia, Marriaqua in St.		

	Vincent, and Wingfield in St. Kitts. The general purpose of this program was to improve the quantity and quality of water flowing through the watersheds. This was done through participatory mechanisms involving rural communities, grassroots organizations, local social actors and government institutions.
Target Groups	COMMUNITIES IN WATERSHED IN STUDY COUNTRIES
Inputs	<p>St. Lucia: Talvan Water Catchment: The Talvan Watershed is in the north east of the country, within in the Marquis Watershed.</p> <p>Building awareness within adjacent communities on water supply issues related to the Talvan intake (Figure 2);</p> <ul style="list-style-type: none"> - Mobilization of community members around the issues of water quality and quantity; - Installation of rehabilitation measures aimed at reducing water pollution; - Group strengthening exercises. <p>St. Vincent: Marriaqua Watershed: The Marriaqua watershed is situated in the southeastern part of St. Vincent and the Grenadines. Most project activities concentrated on reduction of erosion within the upper watershed areas.</p> <p>The main activities carried out under this project included:</p> <ul style="list-style-type: none"> - Community consultations/mobilization; - Implementation of riverbank stabilization and general soil and water conservation measures; - Public awareness/education exercises; - Institutional strengthening of the Forestry Department as the lead executing agency; - Formation of a core group of stakeholders for the purpose of promoting, guiding, and evaluating the project. <p>St.Kitts The Wingfield watershed is located in the southern central part of the island (Figure 4). It covers approximately 9.0 km². The Wingfield Watershed Project has implemented the following activities:</p> <ul style="list-style-type: none"> - Construction of a nature trail Community consultations Public awareness exercises - Mapping and demarcation of the Natural park and its Nature Trail Networks
Outcomes	

Impacts	<p>In all three projects, there seemed to be a lack of systematic planning towards sustaining benefits to community members after the OECS-NRMU project ends. For example, while it can be assumed that benefits will continue from the Wingfield Nature Trail, no deliberate consultation has taken place to discuss anticipated barriers to continued benefits such as political interference, group dis-function, and member mobility out of the communities.</p>
Was Project Evaluated? If so, Key Evaluation Findings	<p>While the institutional arrangements for project implementation in the three islands have general similarities, they do contain some important differences. They all recognize that the design, planning, and implementation of watershed management interventions are for the benefit of the communities concerned as well as for other sectors. They also recognize that technical consultations with a variety of agencies can potentially increase the number of different activities to be implemented by the project. Therefore, they have instituted technical advisory committees comprising of several government, public, and private agencies as an essential attribute for success. The composition of these technical committees are also similar due to similarity in the types of natural resources and land uses found within the watersheds.</p> <p>The differences that do exist are as a direct result of the processes that gave rise to the participatory structures, as well as the capacity of the lead agencies, to coordinate and sustain the various contributions and adopt appropriate strategies.</p> <p>The Talvan Water Catchment Group and its collaborative structures with the Forestry Department were formed before the inception of the Talvan project. Group members, as well as other landowners and farmers directly affected by the project, were consulted while the project document was being developed. This may be the single most important factor that led to a successful participatory implementation phase. This is in contrast with the St. Vincent experience, where the Marriaqua community was not consulted prior to the project-implementation phase, and the core group in the watershed created as a product of the project. Therefore, one may conclude that because members of the Marriaqua community were not involved in the project development phase of the exercise, a sense of community ownership of the process did not get established. Additionally, the specific role of the core group vis-a-vis that of the Forestry Department was very confusing to participants, including staff of the Forestry Department who, upon reflection, described themselves as inexperienced, insufficiently trained, and not capable of effectively implementing a strategy to ensure proper functioning of the core group.</p> <p>The main lesson here is that, while St. Lucia and St. Kitts appear to be ahead of St. Vincent in terms of the functioning of their participatory structures, it may be ill advised to present any of these models as standard solutions. This is based on the fact that attitudes and behavior of local people towards proper natural resource management in terms of the level of recognition of the need to</p>

	<p>organize themselves for that purpose, and the enabling environment for participatory institutional development are different. Therefore, the establishment of structures for implementing watershed projects must be locally negotiated, whereby compromised structures acceptable to all stakeholders can be adopted on the basis of project site realities, available resources, and local capacity. Such a process may give consideration to the potential viability of a range of possible institutional arrangements rather than a predetermined model.</p> <p>The level of commitment shown by individual members of the technical advisory committees was an area of concern to project managers. While the organization that they represent expressed full support for watershed initiatives, it was usually left to the individual to determine his/her level of involvement, commitment, and allocation of time to project activities. This had the effect of undermining the ability of lead agencies to effectively coordinate the work of committee members so as to achieve a sustained integration of efforts. This was considered a major issue in St. Vincent and to a lesser degree in St. Lucia and St. Kitts. A possible solution to this issue is for stakeholder agencies to ensure that work done by officers be treated as an integral part of their normal duties and that of the agency which they represent, as they relate to watershed management. They need to give due recognition and support to the contributions made by individuals serving on the technical advisory committees. It is also important to find ways to decrease indifference towards strategic watershed initiatives at the top level and prevent this indifference from permeating downwards, perhaps by sensitizing that level to the importance of an integrated watershed and water catchment approach before the implementation of watershed projects.</p>
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	<p>The program implemented training activities very early in the project life. This was done upon recognizing that technical capacity of project personnel was a key factor guaranteeing sustainability. Although project participants expressed the need for more training, they however, agreed that their ability to analyze and deal with their social and environmental situation was enhanced. It was also expressed that although technical capacity building should continue, organization capacity building must be given priority at this point in time.</p>
Effective mechanism for management of CDM knowledge established	N/A
DRM mainstreamed at	

<p>national levels and incorporated into key sectors of national economies</p>	<p>Review if current legislation will be pursued to facilitate implementation of this policy. It will incorporate new values and approaches to Integrated Watershed Management, address critical institutional issues, guide sustainable development of watershed resources and provide legal basis to protect and conserve local biodiversity</p>
<p>Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters</p>	<p>St. Lucia Talvern: In 1998, a group of farmers came together after an intensive water resources sensitization workshop conducted by the Forestry Department. Their main objective was to address the issue of poor water quality harvested from the Talvern intake. This community-based group known as the Talvern Water Catchment Group subsequently received institutional and financial assistance from the OECS secretariat through its Natural Resources Management Unit, for the development and implementation of a “Riverbank Rehabilitation Project”.</p> <p>A main achievement of the project in St. Lucia was a reduction in dependency on outside support for help in dealing effectively with government bureaucracy. Members of the Talvan Water Catchment Group have established informal linkages with government officials and the private sector from which they have benefited. For example, they independently service the group’s bank account and have dealt directly with the Ministry of Community Development on matters pertaining to registration. Additionally, their connections with the Forestry Department of the Ministry of Agriculture have also brought significant recognition as described earlier. This indicates that, given the right combination of incentives, the groups possess a higher capacity to continue developing into mature and independent entities.</p> <p>St. Vincent Marriaqua: The Forestry Department was the lead agency involved in implementing the project. However, in July 1999, a core group consisting of people from communities within the watershed and other stakeholder organizations was formed. The core group comprised representatives of the Forestry Department, the Water and Sewage Authority, Ministry of Agriculture, Ministry of Health, the Police, Ministry of Community Development, Farmers and Teachers. An elaborate “Terms of Reference” articulating the role of this core group in the project was developed. However, the core group did not function as expected. As a result, the staff of the Forestry Department carried out most of the activities.</p> <p>St. Kitts Wingfield</p> <p>The Ministry of Health and Environment is the executing agency for the project. A project manager supervises all project operations. Technical, institutional, and administrative support are provided by</p>

a steering committee comprising both government and non-government organizations. A core group comprising resident stakeholders of the watershed was also organized. This core group is the mechanism responsible for ensuring community participating in the project. The steering committee and the core group jointly hosted several activities such as a “Watershed Awareness Day”, with the overall coordination done by the project manager.

Overall

One of the early lessons learned from this program is that “participation is critical if investments in watershed management and in rural communities are to pay off” (OECS Environmental Review, 2001). However, direct or indirect benefits to participants must be clarified early in the process if full participation and process ownership has to be sustained. Generally, if natural resource management does not directly address the immediate concerns of people living within the affected communities in the short-term, they will most likely not consider it a priority.

The experience arising out of this program clearly indicates that several factors such as encouragement, awareness, demonstration, and direct or indirect monetary incentives can sustain community and agency enthusiasm for participation in the short-term.

The issue of monetary reward is an extremely important one in St. Vincent and the Grenadines. It surfaced repeatedly in reports to the OECS-NRMU and most recently, in discussions for purposes of this consultation, with a farmer serving on the Core Group of the Marriaqua watershed. The relative success of the Talvan Water Catchment Group proves that monetary reward is not always the only source of motivation, given that the group was engaged in voluntary riverbank stabilization before financial assistance was given to them. In this situation, payment is seen as an incentive rather than wages and the participants continue to feel that they are owners of the project.

The main lesson here is that it is important that an analysis of the immediate basic concerns of community members be undertaken prior to project development. This is necessary so as to ascertain the types and level of benefits aspired for by members, the capacity of the program to meet those needs, and to facilitate their sustained participation in project activities towards integrated natural resource conservation. It was also suggested that this analysis include exploration of possibilities for financial incentives to project leaders to offset non-scheduled project related work.

An important lesson learned from the watershed program is that, it is not enough for members of a participatory process to know that the work being done is of value to the environment. Public awareness and recognition of that work is an extremely powerful morale booster to group members. It also enhances the enabling

	<p>environment through which they can receive support for their work, opportunities for direct personal benefits, and initiation of similar watershed activities elsewhere on the island.</p> <p>In fact, the level of public awareness of the importance of watershed management was described as “very low”, by several members of the three projects. It is therefore, an important necessity for the groups to continue promoting changes in values and attitudes for greater public consciousness, participation, and involvement, towards an ecologically healthier watershed and improved water supply. Awareness programs must continue until people at all levels have internalized good watershed management values and translate them into concrete actions and support for watershed activities, programs, and policies.</p> <p>Leadership capacity was one of the most critical factors in implementation project activities. This speaks to both the lead agencies as well as leadership of farmer and community groups participating in the project. The qualities most spoken about were visionary, focus, ability to resolve conflicts, time management skills, and political acumen. A significant weakness of the program was that it did not address the issue of building leadership capacity and succession as a strategic human resource solution.</p>
DRM POLICY ELEMENT	
Risk Identification	WATERSHED MANAGEMENT
Risk reduction	Lessons learned to be implemented as part of OECS Watershed Management Programme
Financial protection and risk transfer	N/A
Preparedness	N/A
Response	N/A
Rehabilitation and reconstruction	N/A

OECS DRM : Protocol			
Name of Project:	ASSESSING AND MAPPING LAND DEGRADATION; Case of the Southern Region of Saint Lucia-		
Executing Agency	STUDY	Funding Institution:	Not available
Other Institutional Partners	Not available	Government Depts. Involved	Not available
		Implementation Period:	2007
Total External Budget	Not available	Government Inputs	Not available
Location (s) of Project	Vieux Fort, Choiseul, Toumassee		
Project Objective (s)	<p>This project is relevant to CBDRM, since it addresses the issues of land degradation and watershed management, both of which relate to potential disasters such as floods, landslides and drought. Mapping such hazards is an essential prerequisite to managing them.</p> <p>SPECIFIC OBJECTIVE OF STUDY</p> <ul style="list-style-type: none"> • Conduct an assessment of land degradation sites in the south of Saint Lucia; • Develop a system for classifying land degradation in St. Lucia and further to that classify the degraded lands in the south of Saint Lucia; • Map all degraded lands in the south of Saint Lucia according to classification system developed and present maps of the degraded lands; • Present a final report of the study conducted, to include the methodology used to classify the degraded lands and the areas used to conduct the study, and all relevant information to support the final outcome and outputs. 		
Project Goals	Present a final report of the study conducted, to include the methodology used to classify the degraded lands and the areas used to conduct the study, and all relevant information to support the final outcome and outputs		

Brief Project Description	Land degradation and desertification continue to threaten the livelihoods of millions of people worldwide. It is a process that is present in both poor and rich countries. Saint Lucia, as this report will show, is not and has never been immune from the effects of land degradation, and therefore has to contribute its share of effort towards the management and control of this global problem
Target Groups	Classification study of potential benefit to all residents susceptible to disasters associated with land degradation.
Inputs	A limited field investigation was carried out in the target area hereafter referred to as the Test Site
Outcomes	<p>The influence of land use on runoff and soil loss on two small watersheds under contrasting land management regimes was investigated (Cox et al, 2005). The authors found that the soil losses from an intensively cultivated agricultural watershed were 20-times higher in magnitude than that of a forested watershed both for peak rainfall event and for total duration of the analysis.</p> <p>For 1992-2002, it was found that 10, 288 acres of forests was lost in 12 years representing 22.5% over the period or 1.9% per year.</p>
Impacts	Develop a system for classifying land degradation in St. Lucia and further to that classify the degraded lands in the south of Saint Lucia; Map all degraded lands in the south of Saint Lucia according to classification system developed and present maps of the degraded lands.
Was Project Evaluated? If so, Key Evaluation Findings	NOT AVAILABLE
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	
Effective mechanism for management of CDM knowledge established	N/A
DRM mainstreamed at national levels and incorporated into key sectors of national economies	It is important to protect Troumassee from future degradation and to enhance the ability for the others to continue to recover at a faster rate. Some of these measures may include the introduction of sustainable livelihoods projects, zoning along with others such as land conservation education, policy and legislative interventions.

Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters	<p>Through the introduction of sustainable livelihoods projects, zoning along with others such as land conservation education, policy and legislative interventions</p>
DRM POLICY ELEMENT	
Risk Identification	<p><i>Inventory and mapping Landslides and debris Flows</i></p> <p>Assessments of land degradation due landslides and debris flows for St. Lucia was first reported by Prior and Ho, 1972 where they investigated coastal and mountain slope instability on the islands of St. Lucia and Barbados. They found that the majority of these slides originated on slopes steeper than 35 percent, the existence of complex slides involving shallow movement of the soil mantle, and that montmorillonite clay in the soils tended to produce flow-type failures on St. Lucia. In 1985, a landslide inventory and a hazard map was prepared using aerial photographs and field surveys (DeGraff in 1985). DeGraff reported that the high landslide frequency can be accounted for by isostatic adjustment processes related to elevated volcanic terrain and down-cutting by streams. The 1985 landslide risk map was updated in 1992 (Hunting Technical Services Ltd. 1997.) The latest reported study involved the preparation of a debris risk severity map, showing debris flows and slides. It was an attempt to map the actual occurrences of debris slides and flows after the passage of tropical storm, Debbie in 1995. Categories of information shown on the map are “Extreme severity, High severity, Moderate severity, Low severity, and Unclassified” (CDERA, 2003).</p> <p>Given the extent to which soils in the area seem to be degraded it may be useful to develop a simple way of classifying degraded lands such that appropriate action may be taken. Given the processes that operate in bringing about land degradation it is being suggested that the classification of degraded lands be based on the following four parameters: 1. 2. 3. 4.</p> <p>Slope of land Effective soil depth Soil stability – using aggregate strength as a measure Plant support capacity. This approach focuses on the ability of the site in question to recover its productive capacity over time.</p> <p>Indiscriminate use of forests and the encroachment on protected areas of watersheds have resulted in significant changes in the water-retention capacity of the soil. See Figures 3-1, 3-2, and 3-3. Changes in rainfall patterns have been associated with serious droughts in some countries resulting in water shortages, sometimes over extended periods. Extreme weather events have had significant impact on St. Lucia's watersheds.</p>

	<p>In spite of the apparent success in secondary succession in the Vieux Fort watershed in recent time, it must be noted that agriculture (22.13 %) and urban development (20.11%) represent two significant human induced land degradation culprits. According to table 4-1 below, urban development and agriculture activities has increase 23.25 percent between 1942 and 2004. Urban development alone has increased more than 18 percent between 1942 and 2004. This is a very serious cause for concern because the rate of urban development if not checked will be the new land degradation “kid on the block” and can have severe impact on the landscape in the future.</p> <p>Urban development in the Choiseul watershed continues to show similar pattern of increase as in the Vieux Fort watershed. Table 4-2 indicate that urban development cover was 4.49 percent in 1942 and in 2004 it increased to 36.11 percent; an increase of 31.62 percent in 62 years.</p> <p><i>Troumassee Watershed</i></p> <p>Human induced vegetation degradation activities in this watershed are also less dramatic when compared to the other two watersheds. Moreover, the forests provide a more contiguous cove over the watershed. While the degradation in this watershed is less dramatic, evidence of human induce land degradation activities was also apparent. The human activities seems to be focused in the 28.85 percent of unclassified lands in table 4- 3 and described by Beard in 1949 as shifting agriculture. The unclassified lands appear to be diminishing to urban development (12.01%), agriculture (7.47%) and dry scrub forest in disperse with agriculture (5.37 %).</p>
Risk reduction	<p>Although there is an apparent increase in the area of the natural vegetation when compared to the 1940s, however, it must be stated that the vegetation of Vieux Fort and Choiseul Watershed is still far from a satisfactory state of recovery from historical degradation. The current observations are the Choiseul watershed is the worst degraded followed by the Vieux Fort watershed. Troumassee is classified as the least degraded. Given that the natural vegetative cover of these watersheds continue to be under pressure from human induced activities, such as farming, urbanization and deforestation, it is necessary to continually develop and implement measures to mitigate these human induced impacts. It is important to protect Troumassee from future degradation and to enhance the ability for the others to continue to recover at a faster rate. Some of these measures may include the introduction of sustainable livelihoods projects, zoning along with others such as land conservation education, policy and legislative interventions.</p>

Financial protection and risk transfer	N/A
Preparedness	N/A
Response	N/A
Rehabilitation and reconstruction	N/A

OECS DRM : Protocol			
Name of Project:	Water Management Plan for Drought Conditions		
Executing Agency	Government of Saint Lucia -WASCO	Funding Institution:	
Other Institutional Partners	WATER BOTTLING COMPANIES, SLHTA, Manufacturing Association, Chamber of Commerce, Met Service, Chief Medical Officer, Chief Agricultural Service and Forestry Division, Environmental Health Dept, Water Resources Management Unit, Commissioner of Police, Chief of Police, Chief Fire Officer Caribbean Health Institute	Government Depts. Involved	WASCO, Ministry of Commerce, Tourism, Physical Planning, Public Works
		Implementation Period:	June 2003
Total External Budget	NOT AVAILABLE	Government Inputs	NOT AVAILABLE
Location (s) of Project	ST LUCIA		
Project Objective (s)	THE PLAN IS A GUIDE FOR HANDLING DROUGHT CODITIONS IN ST LUCIA		
Project Goals	EFFECTIVE DROUGHT RESPONSE		
Brief Project Description	Saint Lucia is viewed as a water rich island; the drought conditions		

	<p>in 2001 reminded us that Saint Lucia is susceptible to drought. The fact that drought conditions will reoccur in Saint Lucia is the reason for the Water Management Plan for Drought Conditions. This plan provides a framework for preparing for and responding to future droughts to minimize conflicts and negative impacts on Saint Lucia's natural resources and economy.</p> <p>Principle Nine of the St. Georges Declaration of Principles for Environmental Sustainability in the Organization of Eastern Caribbean States [OECS]. Where each member state agrees to:</p> <ol style="list-style-type: none"> 1. Establish at the community, national and regional levels appropriate and relevant integrated frameworks to prevent, prepare for, respond to, recover from and mitigate the causes and impacts of natural phenomena on the environment and to prevent man made disasters; 2. Exchange information with each other, relating to the experiences and lessons to be learnt from the causes and impacts of natural and man made hazards and phenomena on its environment.
Target Groups	ST LUCIA
Inputs	Ongoing Water management activities and technical assistance to communities and individuals facing water supply emergencies
Outcomes	Water conservation techniques
Impacts	DROUGHT MITIGATION
Was Project Evaluated? If so, Key Evaluation Findings	NOT AVAILABLE
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	<p>Saint Lucia is viewed as a water rich island; the drought conditions in 2001 reminded us that Saint Lucia is susceptible to drought. The fact that drought conditions will reoccur in Saint Lucia is the reason for the Water Management Plan for Drought Conditions. This plan provides a framework for preparing for and responding to future droughts to minimize conflicts and negative impacts on Saint Lucia's natural resources and economy.</p> <p>ASSUMPTIONS</p> <ol style="list-style-type: none"> 1. That WASCO is the lead responder to Drought situations. 2. A large scale Drought emergency will result in increased demands for/on personnel at WASCO

3. That the Government of Saint Lucia shall respond to a National Disaster.

4. That Emergencies in Saint Lucia may be categorised in two ways:

- Those that are preceded by a build-up [slow onset] period, which can provide WASCO and NEMO with advance warnings, which is used to facilitate timely and effective activation of national arrangements.
- Other emergencies occur with little or no advance warning thus requiring mobilization and almost instant commitment of resources, with prompt support from the Government of Saint Lucia just prior to or after the onset of such emergencies.

The National Emergency Management Organisation [NEMO] must be notified of any MAJOR activations. This is necessary to allow for the rapid coordination of resources should the incident escalate to a level requiring National mobilisation..

DROUGHT RESPONSE

ACTIONS

The Agency Drought Coordination Matrix shown on the last page identifies specific actions to be taken by various agencies in a staged response to decreasing water supply in Saint Lucia.

1. Convening the Drought Task Force

The Drought Task Force will be convened by the Managing Director of WASCO when the Country enters a drought watch (as defined in the Drought Matrix) to provide coordination and communication between agencies and institutions affected by drought and to provide a central information source for the news media.

2. Intensification of Monitoring and Assistance

In drought periods the Managing Director WASCO will shift Division priorities and reassign staff as needed to support Drought Task Force activities, intensify monitoring efforts, provide for increased communication with water appropriators, and effectively respond to increased water use conflicts and requests for advice and technical assistance.

3. Dissemination of Information to the Public

WASCO will take the lead role in communicating the extent and intensity of drought conditions to the public. WASCO staff will prepare summary data and public service announcements to convey accurate and timely information on drought conditions across Saint Lucia.

4. Implementation of Mandatory Restrictions

Water & Sewage Act No. 14 of 2005 Division 3 Emergencies Section 10-1 Where on the advice of the agency the Minister is satisfied that by reason of an exceptional shortage of rain, or contamination of water, a serious deficiency of supplies of water

	<p>exists or is threatened, the Minister shall forthwith, by Order published in the Gazette, in at least two newspapers in the general weekly circulation in Saint Lucia and by any other media declare a water-related emergency ...</p> <p>5. Activation of the National Emergency Response Mechanism A major situation, which threatens population centres, will require that WASCO receives support for its control and management. This will be coordinated by the National Emergency Operations Centre (NEOC). The decision to advise the NEMO Secretariat of the need for additional support will be made by the Chairman of the Drought Task Force in consultation with the Permanent Secretary – Ministry of Public Utilities.</p> <p>6. Declaration of a Water Deficiency Disaster The Prime Minister is empowered to declare an Emergency/Disaster by executive order. If ordered, WASCO may adopt and enforce emergency water conservation restrictions that limit lawn sprinkling, vehicle washing, golf course and park irrigation, and other nonessential uses.</p>
Effective mechanism for management of CDM knowledge established	<p>It is recognized that to achieve the capacity and competency that will allow staff to function smoothly during a response, training must be an ongoing component of professional development. The following subjects shall be presented, but by no means is limited to:</p> <ol style="list-style-type: none"> 1. Introduction to Disaster Management [IDM] 2. Emergency Operations Centre Management 3. Incident Command System [ICS] 4. Telecommunications
DRM mainstreamed at national levels and incorporated into key sectors of national economies	<p>This Emergency Response Plan is a guide for Member Agencies of NEMO into the way a Drought shall be handled. Every Agency Member is to be aware of the existence of this plan and is to be fully knowledgeable of their roles and responsibilities in any disaster as set out in the Standing Operating Procedures [SOP]. This plan shall be stored in an area where every Agency Member has easy access to. Should a disaster occur during the absence of the Head, Staff should have easy recourse to the plan. The plan is to be renewed annually by the Task Force with a revised copy being submitted to the Director NEMO no later than March 31st of that year.</p> <p>Drought Task Force (members)</p> <p>Water and Sewerage Commission – Chair General Manager Water Companies Representatives of Government and private sector.</p> <p>In pursuit of its key objective of integrating CDM into its development planning process, WASCO intends to weave CDM</p>

	<p>practices into its corporate life through the effective realisation of the recommended Intermediate Results.</p> <p>Ongoing Management Activities WASCO has primary responsibility for the provision of water supply services, which includes the abstraction, treatment and distribution.</p> <p>Monitoring of Hydrologic Conditions undertaken by the Saint Lucia Met Serves and the Hydrological Department of the Ministry of Agriculture. Under the new Act, the Water Resource Management Agency has overall responsibility to manage the water resources. It is expected that once this agency is fully functional these activities will fall under their perview as they are responsible for issue water abstraction licenses and permits.</p> <p>Regulation of Water Abstraction To ensure the availability of this source for future generations the Ministry of Agriculture through the Water Resource Management Agency is expected to manage water use to avoid over- abstraction.</p> <p>Emergency and Conservation Planning Public water consumers, serving more than 1,000 people should have an emergency and conservation plan. These plans will address procedures to be taken during periods of limited water supplies. WASCO is willing to work with agencies to develop guidelines for plan development.</p> <p>Information and Technical Assistance In addition to the Saint Lucia Met Services, the Hydrological Department of the Ministry of Agriculture is also a source of data on precipitation, stream flow and ground water levels. WASCO will also provide general advice and technical assistance to individuals and communities facing water supply emergencies, and provide general advice and information on water conservation techniques.</p> <p>Water Supply Development Development of water supply systems is the responsibility of WASCO.</p>
<p>Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters</p>	
<p>DRM POLICY ELEMENT</p>	

Risk Identification	<p>ASSUMPTIONS</p> <ol style="list-style-type: none"> 1. That WASCO is the lead responder to Drought situations. 2. A large scale Drought emergency will result in increased demands for/on personnel at WASCO 3. That the Government of Saint Lucia shall respond to a National Disaster. 4. That Emergencies in Saint Lucia may be categorised in two ways: <ul style="list-style-type: none"> • Those that are preceded by a build-up [slow onset] period, which can provide WASCO and NEMO with advance warnings, which is used to facilitate timely and effective activation of national arrangements. • Other emergencies occur with little or no advance warning thus requiring mobilization and almost instant commitment of resources, with prompt support from the Government of Saint Lucia just prior to or after the onset of such emergencies. <p>Drought Susceptibility Map: The map was produced under the Government of Saint Lucia Disaster Management Project II. The elaboration of the drought susceptibility map is based on:</p> <ul style="list-style-type: none"> • Annual water balance • Flow accumulation • Mean annual temperature • Soil drainage and • Moisture supply capacity <p>It is recommended that the drought susceptibility map be used for land use planning.</p>
Risk reduction	
Financial protection and risk transfer	
Preparedness	<p>Saint Lucia is viewed as a water rich island; the drought conditions in 2001 reminded us that Saint Lucia is susceptible to drought. The fact that drought conditions will reoccur in Saint Lucia is the reason for the Water Management Plan for Drought Conditions. This plan provides a framework for preparing for and responding to future droughts to minimize conflicts and negative impacts on Saint Lucia's natural resources and economy.</p> <p>This Emergency Response Plan is a guide for Member Agencies of NEMO into the way a Drought shall be handled.</p> <p>Every Agency Member is to be aware of the existence of this plan and is to be fully knowledgeable of their roles and responsibilities in any disaster as set out in the Standing Operating Procedures [SOP]. This plan shall be stored in an area where every Agency Member has easy access to. Should a disaster occur during the absence of the Head, Staff should have easy recourse to the plan.</p>

The plan is to be renewed annually by the Task Force with a revised copy being submitted to the Director NEMO no later than March 31st of that year.

It is recognized that to achieve the capacity and competency that will allow staff to function smoothly during a response, training must be an ongoing component of professional development. The following subjects shall be presented, but by no means is limited to:

1. Introduction to Disaster Management [IDM]
2. Emergency Operations Centre Management
3. Incident Command System [ICS]
4. Telecommunications

Initial Damage Assessment [IDA] First Aid / CPR Fire Preparedness
In pursuit of its key objective of integrating CDM into its development planning process, WASCO intends to weave CDM practices into its corporate life through the effective realization of the recommended Intermediate Results

Ongoing Management Activities

WASCO has primary responsibility for the provision of water supply services, which includes the abstraction, treatment and distribution.

Monitoring of Hydrologic Conditions undertaken by the Saint Lucia Met Serves and the Hydrological Department of the Ministry of Agriculture. Under the new Act, the Water Resource Management Agency has overall responsibility to manage the water resources. It is expected that once this agency is fully functional these activities will fall under their purview as they are responsible for issue water abstraction licenses and permits.

Regulation of Water Abstraction

To ensure the availability of this source for future generations the Ministry of Agriculture through the Water Resource Management Agency is expected to manage water use to avoid over- abstraction.

Emergency and Conservation Planning

Public water consumers, serving more than 1,000 people should have an emergency and conservation plan.

These plans will address procedures to be taken during periods of limited water supplies. WASCO is willing to work with agencies to develop guidelines for plan development.

Information and Technical Assistance

In addition to the Saint Lucia Met Services, the Hydrological Department of the Ministry of Agriculture is also a source of data on precipitation, stream flow and ground water levels.

WASCO will also provide general advice and technical assistance to individuals and communities facing water supply emergencies, and provide general advice and information on water conservation

	<p>techniques.</p> <p>Water Supply Development Development of water supply systems is the responsibility of WASCO.</p>
Response	<p>DROUGHT RESPONSE ACTIONS</p> <p>The Agency Drought Coordination Matrix shown on the last page identifies specific actions to be taken by various agencies in a staged response to decreasing water supply in Saint Lucia.</p> <p>1. Convening the Drought Task Force The Drought Task Force will be convened by the Managing Director of WASCO when the Country enters a drought watch (as defined in the Drought Matrix) to provide coordination and communication between agencies and institutions affected by drought and to provide a central information source for the news media.</p> <p>2. Intensification of Monitoring and Assistance In drought periods the Managing Director WASCO will shift Division priorities and reassign staff as needed to support Drought Task Force activities, intensify monitoring efforts, provide for increased communication with water appropriators, and effectively respond to increased water use conflicts and requests for advice and technical assistance. This may involve conducting</p> <p>3. Dissemination of Information to the Public WASCO will take the lead role in communicating the extent and intensity of drought conditions to the public. WASCO staff will prepare summary data and public service announcements to convey accurate and timely information on drought conditions across Saint Lucia.</p> <p>4. Implementation of Mandatory Restrictions Water & Sewage Act No. 14 of 2005 Division 3 Emergencies Section 10-1 Where on the advice of the agency the Minister is satisfied that by reason of an exceptional shortage of rain, or contamination of water, a serious deficiency of supplies of water exists or is threatened, the Minister shall forthwith, by Order published in the Gazette, in at least two newspapers in the general weekly circulation in Saint Lucia and by any other media declare a water-related emergency ...</p> <p>5. Activation of the National Emergency Response Mechanism A major situation, which threatens population centres, will require that WASCO receives support for its control and management. This will be coordinated by the National Emergency Operations Centre (NEOC). The decision to advise the NEMO Secretariat of the need for additional support will be made by the Chairman of the Drought Task Force in consultation with the Permanent Secretary – Ministry</p>

	<p>of Public Utilities.</p> <p>6. Declaration of a Water Deficiency Disaster The Prime Minister is empowered to declare an Emergency/Disaster by executive order. If ordered, WASCO may adopt and enforce emergency water conservation restrictions that limit lawn sprinkling, vehicle washing, golf course and park irrigation, and other nonessential uses.</p>
Rehabilitation and reconstruction	N/A

OECS DRM : Protocol			
Name of Project:	St. Lucia Emergency Recovery and Disaster Management Project		
Executing Agency	Govt. of St. Lucia	Funding Institution:	World Bank
Other Institutional Partners		Government Depts. Involved	Min. Finance and Planning Min Works
		Implementation Period:	1998 - 2003
Total External Budget	\$6 .04M WB Loan and Credit (3.04 M loan and 2.2 M credit)	Government Inputs	Not available
Location (s) of Project	St. Lucia		
Project Objective (s)	This project was part of the first phase of an Adaptable Program Lending (APL) operation in St. Kitts and Nevis, St. Lucia, Dominica, Grenada and St. Vincent and the Grenadines. Aimed to support the physical and institutional efforts of five member countries of the OECS to strengthen disaster recovery capacity and emergency preparedness management		
Project Goals	<p>② The first phase of the program (APL1) was to support the immediate reconstruction and rehabilitation of infrastructure in St. Kitts and Nevis and disaster mitigation works and institutional strengthening in St. Kitts and Nevis, St. Lucia and Dominica.</p> <p>② The second phase (APL2) was to support these same activities</p>		

	<p>in Grenada and St. Vincent and the Grenadines.</p> <p>☐ APL3 was to focus on additional physical investments identified through hazard mapping analysis and was to provide further long term institutional strengthening. Funding for this phase was eventually allocated to APL2. As a result APL3 did not materialized as originally expected.</p> <p>☐ APL4 was to provide contingency funding for any eligible OECS member in case of a severe natural disaster during the six year program period.</p> <p>The development objectives of the project in St. Lucia were:</p> <p>☐ To strengthen key economic and social infrastructure and facilities with the aim of minimizing damage caused by future natural disasters and reducing the disruption of economic activity in the event of disaster emergencies (pre-disaster works);</p> <p>☐ To reconstruct and rehabilitate key social and economic infrastructure following disasters to allow quick recovery and minimize disruption of economic activity (post-disaster works); and</p> <p>☐ To strengthen the country's institutional capacities to prepare for and respond to disaster emergencies in an efficient and effective manner.</p> <p>The project financed structural and non-structural measures to protect people, infrastructure and property from future hurricane damage. In addition, it sought to build institutional capacity at the national and local levels, including the public and private sectors, in order to confront natural disasters more effectively in the future.</p>
Brief Project Description	<p>The program aimed to support the physical and institutional efforts of the five member countries of the Organization of Eastern Caribbean States (OECS) to strengthen disaster recovery capacity and emergency preparedness management. The nations' low level of preparedness, lack of mitigating measures and limited disaster response capability had been evidenced by the devastating impact of Hurricane Georges on St. Kitts and Nevis in September 1998.</p>
Target Groups	<p>Five Member countries of the OECS</p>
Inputs	<p>Physical Prevention and Mitigation Works. Strengthen public infrastructure and retrofit public buildings to be used as shelters (US\$ 5.94 million)</p> <p>Strengthening the Office of Disaster Preparedness (ODP) (US\$ 0.86 million)</p> <p>Strengthening the Early Warning System (US\$ 0.44 million)</p> <p>Community Based Disaster Management (US\$ 0.11 million)</p> <p>Institution Building (US\$ 0.24 million)</p>

	Project Management (US\$ 0.61 million)
Outcomes	<p>A Disaster Coordinator was appointed at the beginning of the project, and a Project Coordination Unit (PCU) was set up in the Ministry of Finance to implement the project. However, the PCU had never managed World Bank loans. Although the loan also provided for expert assistance in line ministries, implementation capacity remained a problem during the first two years of the project period (see Section 5.3) and led to long delays in implementation. Therefore this ICR rates quality at entry as unsatisfactory.</p> <p>Key economic and social infrastructure and facilities were strengthened to minimize damage and economic disruption from future natural disasters (pre-disaster works). There were important flood control, bridge strengthening and flood mitigation works, and schools were retrofitted as emergency shelters. A large amount of emergency equipment is now available for use in future disasters.</p> <p>The National Hazard Mitigation Council (NHMC) was established prior to effectiveness, and government enacted the Disaster Preparedness and Response Act #13 in 2000. These have provided the institutional underpinnings disaster preparedness. NEMO was established when the National Office of Disaster Preparedness was transformed into NEMO in February 2000. It has undertaken revision of the National Disaster Management Plan and the creation of a liaison with the private sector and a private sector disaster emergency plan. New procedures have been established in the Meteorological Department. A Hazard Analysis Vulnerability Technical Group has been formed within NHMC, and new procedures have been implemented within the National Meteorological Service (NMS - see Section 4.5). NEMO is expected to continue as the nodal agency for disaster preparedness. Plans are moving forward to construct an Emergency Operations Center (EOC) for NEMO which will be the focal point for disaster preparedness and mitigation. The main issues in its sustainability are its lack of adequate staff, especially after the technical assistance provided under the project ends this year.</p> <p>The National Meteorological Service (NMS) has procured communications and meteorological equipment, and its employees were trained in equipment maintenance. New procedures were implemented (e.g. weather information voice mail, dedicated phone lines). Its activities are expected to be sustainable.</p> <p>Where funding for disaster management and emergency related projects are required, the World Bank has proven to be one of the best sources in light of the quick disbursement mechanism. In responding quickly to the immediate concerns of a disaster project, governments should not neglect the opportunity to build</p>

	<p>capacity for a longer-term disaster management capacity.</p> <p>After an emergency has passed, reconstruction works, particularly those involving large capital investments and operation and maintenance requirements, should be carefully appraised. They should be subject to similar technical, economical, financial and institutional analysis as would be other similar investments. When implementing similar projects, Government should avoid shifting assigning responsibilities for project implementation to employees who cannot devote the required time to the project. Moreover, clear agreement on responsibilities of implementing agencies for project implementation at inception would both facilitate the likelihood for follow-up and sustainability after the project is completed.</p> <p>Prevention measures can have a substantial impact on the reduction of social and economic losses.</p> <p>Government should demonstrate commitment to projects to ensure that project objectives are achieved. Project Management requires a team of fully committed staff with the relevant qualification and experience, and with opportunities for appropriate training. Involvement of the community in the decisions of project identification and management significantly helps ensuring the successful implementation of such project.</p>
Impacts	<p>Emergency shelters and equipment storage facilities have been built, and managers have been trained to maintain them and use them in emergencies.</p> <p>Safeguards are in place to ensure that the equipment will not be misused.</p> <p>A building code has been developed, aired publicly and training programs have been held for inspectors. The introduction of the code should over time improve the sustainability of structures in the country. Sustainability is rated likely.</p>
Was Project Evaluated? If so, Key Evaluation Findings	<p>Yes: Implementation Completion Report</p> <p>The Government of Saint Lucia secured a loan from the International Bank for Reconstruction and Development (IBRD) in the amount of US\$3.04 million and a credit from the International Development Association (IDA) in the amount of US\$3 million equivalent, towards the cost of the Saint Lucia Emergency Recovery & Disaster Management Project. This Project became effective in July 1998 and should have been completed in January 2002. However, two extensions were granted, the first for eighteen months and the other for three months, to ensure the successful completion of Project activities.</p>

Insufficient preparatory work was undertaken which delayed project implementation, for example the PAD and Loan Agreements did not correspond, adequate staffing was not identified at the outset of the project, the project implementation was not prepared before effectiveness, and training and institutional capacity building which is integral for effective project implementation and management was not included as a component of the project. In addition, the Project was referred to as "Emergency Recovery" and this was not the case as with normal emergency types projects as disasters referred to had occurred long before the project design. The Project was a normal infrastructural one.

Despite this, there was significant achievement upon completion of the project. The original objectives of the project were met. All of the equipment and the supplies were acquired and delivered to the various agencies, as well as, all of the civil works of varying degrees of complexity were completed. Although the Institutional Capacity Component was not completed the preparatory work has been done to ensure that this component can be undertaken in the near future.

Of major concern is the extent of borrowing by the Government of Saint Lucia (GOSL) therefore adequate maintenance and security must be provided for the newly acquired facilities, infrastructure, equipment and resources that have been provided to ensure future utilization. The GOSL must ensure that resources, both human and financial, are available to sustain the facilities well into the future. The possibility insurance must also be considered to ensure that the objective and benefits of the project are achieved.

The GOSL must express gratitude to the World Bank involved in supervision (Becq, Guinard, Solo, Liauataud, Ghesquiere, Agwu, Daoud, Malfere) for the dedicated support and assistance given to the PCU throughout the implementation of this multifaceted project. Overall the World Bank's performance in this regard was highly satisfactory.

Finally, the GOSL must ensure that projects are well prepared both from the Borrower's end and the World Bank for successful implementation. For effectiveness of loans the system should avoid replicating existing structures but rather measures should be effected to strengthen the existing capabilities and structures, for example the creation of the National Hazard Mitigation Council when an advisory body, the National Emergency Management Advisory Council (NEMAC).

In addition Project implementation manuals and operation manuals feedback from all agencies should be prepared before

	implementation for effective and efficient implementation of projects.
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	<p>The country's institutional capacities to prepare for and respond to disaster emergencies were strengthened. A seven member National Hazard Mitigation Council (NHMC) was established and a Disaster Preparedness and Response Act was passed in 2000. Other initiatives included: (i) revision of the National Disaster Emergency Management Plan; (ii) strengthening the liaison with the private sector to implement the Plan; (iii) proposing a National Building Code and preparing an action plan and legislation for implementation; (iv) strengthening a hazard analysis and vulnerability mapping group; (v) implementing new procedures at the National Meteorological Service; (vi) and strengthening the preparedness of communities through NEMO-sponsored training.</p> <p>☐ Vulnerability Reduction of Public Buildings: An inventory of public buildings was completed by MCWTPU providing a basis for the analysis of government assets and identification of vulnerabilities which could be incorporated in a possible follow-up project.</p> <p>☐ Hazard Analysis: The NHMC Hazard Analysis and Vulnerability Mapping technical working group undertook an assessment. Consultants produced a series of hazard maps for use at the national level by disaster management and government agencies.</p> <p>☐ Vulnerability Mapping: A GIS plan was promised by the Ministry of Planning but not submitted. Some training was done, but no work was produced.</p> <p>☐ Building Codes: Codes have been developed and public consultations held. A regulation was ratified and issued in September 2002 to become effective in 2004. Printing of the building code is completed, and initial training for public officials and contractors has been completed.</p>
Effective mechanism for management of CDM knowledge established	N/A
DRM mainstreamed at national levels and incorporated into key sectors of national economies	<p>Building Codes: Codes have been developed and public consultations held. A regulation was ratified and issued in September 2002 became effective 2004</p> <p>Vulnerability assessments of public completed</p>

Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters	<p>The Community Based Disaster Management Component (IV) was bolstered with a Training and Capacity Building component. It included five types of training, including community based disaster management, training for shelter managers, media training, and training for the PCU and NEMO, and institution building. The equipment procurement and training activities of Community Based Disaster Management were integrated into the component for providing disaster equipment and loss reduction materials.</p> <p>Community Based Disaster Management: NEMO contracted the Red Cross to provide training modules for District Disaster Committees (DDCs). Some 330 people were trained in 148 districts.</p>
DRM POLICY ELEMENT	
Risk Identification	<p>To strengthen key economic and social infrastructure and facilities with the aim of minimizing damage caused by future natural disasters and reducing the disruption of economic activity in the event of disaster emergencies (pre-disaster works);</p>
Risk reduction	<p>Physical Prevention and Mitigation Works. Strengthen public infrastructure and retrofit public buildings to be used as shelters (US\$ 5.94 million)</p> <ul style="list-style-type: none"> ☑ Hewanorra Airport Flood Protection Works: Flood protection works, including a hydrological assessment of a river and, detailed engineering for sea defenses of the airport and a ring road and an assessment of nearby beach movement. (Ministry of Communications, Works, Transport and Public Utilities - MCWTPU together with St. Lucia Air and Sea Ports Authority - SLASPA). ☑ Bridges and River Training: Bridges and river training works at Marc Floissac and Caico, including the acquisition of a stock of Bailey-type bridges. Studies of floods. Strengthening capacity at MCWTPU by providing Bailey-type components and replenishing the stock of gabions (heavy wire baskets used to build small-scale drainage works when filled with rocks). ☑ Cul de Sac Valley flood prevention works: Bridge construction, drainage, embankment works and raising the West Coast Road (MCWTPU). ☑ Supplementary reservoir for Victoria Hospital (MCWTPU). ☑ Disaster Management (Shelter) Program: Retrofitting schools as emergency facilities and installing sanitary facilities. Capacity building, emergency equipment and improved security (Ministry of Education, Human Resources Development, Youth and Sports – MEHRDYS) <p>V. Institution Building (US\$ 0.24 million)</p>

	<p>☑ Vulnerability Reduction of Public Buildings: An assessment of public buildings to develop optimal vulnerability reduction measures through mitigation/retrofitting and/or an insurance strategy to minimize risk at a reasonable cost. Review existing building codes and land use planning and recommend improvements. Recommend improvements in the insurance sector.</p> <p>☑ Hazard Analysis/Vulnerability Mapping: Support for the preparation of a hazard and vulnerability map for St. Lucia to identify hazards and use the information to plan for disaster preparedness and mitigation.</p> <p>☑ Building Codes: Pursue adoption of a national building code and its effective enforcement (St Lucia had been reviewing its code with help from the Caribbean Disaster Mitigation Project - CDMP).</p>
Financial protection and risk transfer	N/A
Preparedness	<p>Strengthening the Office of Disaster Preparedness (ODP) (US\$ 0.86 million)</p> <p>☑ Technical assistance to the National Office of Disaster Preparedness: Capacity building in disaster preparedness and management, technical assistance for mobilizing support from businesses and industries and emergency planning and mitigation activities.</p> <p>☑ Emergency communications system: A system to communicate among all national and local levels, including base station radios, repeaters, and mobile radios for District Committees.</p> <p>☑ Disaster equipment and loss reduction materials: Provision of stocks of emergency supplies and “loss reduction materials” such as generators, water purification equipment, plastic sheeting, chain saws, lanterns, and first aid supplies (managed by ODP; stored locally).</p> <p>Strengthening the Early Warning System (US\$ 0.44 million)</p> <p>☑ Support for the National Meteorological Service (NMS): provision of an enhanced satellite receiving station with high-resolution imaging. Upgrading a Star IV computer terminal, a component of the World Area Forecast System. Providing Computer equipment to acquire and distributing meteorological and phone equipment.</p> <p>☑ Development of a Ham Weather Radio Observation Network: Providing Ham radio operators with radio equipment, weather monitoring equipment and training.</p> <p>☑ Development of a Local Flood Warning System: Establishment of an ALERT system to detect weather events, transmit data and receive the information at a base station.</p> <p>☑ Technical Assistance and Training: Training in meteorology and related subjects and assistance with equipment maintenance.</p>

	<p>Local disaster committees existed but needed to be strengthened. Disaster Committees were to be provided training in organization and functions of the committee and in “Surviving the Next Disaster,” and other skills such as search and rescue and donations management. External sources of assistance were to be sought. Disaster committees would be provided with emergency equipment and disaster supplies to be stored in a safe place.</p>
Response	<p>Disaster Committees were to be provided training in organization and functions of the committee and in “Surviving the Next Disaster,” and other skills such as search and rescue and donations management.</p>
Rehabilitation and reconstruction	<p>To reconstruct and rehabilitate key social and economic infrastructure following disasters to allow quick recovery and minimize disruption of economic activity (post-disaster works); and</p>

OECS DRM : Protocol			
Name of Project:	MoSSaiC – Utilizing Community-Based Approaches in Mitigating Landslide Hazard		
Executing Agency	STUDY	Funding Institution:	OECS
Other Institutional Partners	N/A	Government Depts. Involved	NOT AVAILABLE
		Implementation Period:	2005-2007
Total External Budget	NOT AVAILABLE	Government Inputs	Not available
Location (s) of Project	ST LUCIA		

Project Objective (s)	To look within those at risk communities to examine and model the instability triggers that actually cause landslides in order that appropriate mitigation can be undertaken.
Project Goals	Community based approaches implemented for landslide risk reduction
Brief Project Description	<p>The Caribbean region is subject to rainfall events that act to trigger landslides on the steep slopes which 75ocalized75ze a significant percentage of the area of many islands states. Current climate change predictions point to the increased hurricane activity in the near future and suggest that the region is likely to see an increase in extreme rainfall events and hence an increase in landslides (Mann and Kerry, 2006). A second major element creating landslide hazard in the region is that in many areas there is a significant amount of unplanned housing (approximately 60% in Saint Lucia, for example) located on slopes that are at risk of landslides. It is this combination of triggering rainfall and unplanned housing on steep slopes that affects what are already the most vulnerable groups in society.</p> <p>There have of course been a number of initiatives and programmes that have sought to map hazards in the Caribbean region (Caribbean Development Bank, 2004). The scale of the mapping in relation to the scale of the triggering mechanisms remains a critical issue as far as practical remediation is concerned. Figure 1 shows the two landslide prone, vulnerable communities of Skate Town and Lower Bagatelle in the Castries Basin, Saint Lucia. These communities would be identified as hazard prone areas in a conventional mapping programme. However, as this paper will demonstrate, we need to look within those communities to examine and model the instability triggers that actually cause landslides in order that appropriate mitigation can be undertaken.</p> <p>The scale at which such communities most frequently experience landslides is illustrated in Figure 2. As is the case here, processes such as highly 75 localized soil water convergence can be very important landslide triggers – physical processes which are operating at scales orders of magnitude smaller than hazard mapping can be resolved to.</p>
Target Groups	Vulnerable communities in St Lucia
Inputs	In the Saint Lucia pilot, MoSSaiC has developed three approaches to encourage individual home owners to be aware of these issues and to take steps to connect to newly provided drains. First, a 'show home' was selected by the community – an existing house within the community – and the necessary features of 'good drainage practice' installed with the involvement of members of the community. Second, a poster was designed which illustrated all the features of the show home as an example of 'good practice' for

	<p>improving slope stability through better drainage. Finally, we participated in media coverage of the project, with particular emphasis on the STARTM drain design, since this is a low-cost intervention that individuals can implement themselves.</p> <p>Noteworthy is that fact that some 93% of budget was spent either on salary costs for community members or material costs, and that the intervention made resulted in the slopes being stable against 1 in 4 year storms, whereas previously such slopes had failed at lower rainfall levels.</p>
Outcomes	<p>496 persons-weeks employment for community members</p> <p>Resident share with Government in terms of design and construction</p> <p>450 gallon water tanks supplied to most deserving residence</p> <p>Stable against 1: 1-1-4 yr storm and hurricane Dean rainfall</p> <p>Roof guttering and drain connections yield > 20% reduction in rainfall infiltration slope</p>
Impacts	<p>The approach developed and implemented by MoSSaiC has two overarching elements as illustrated in Figure 5: i) Teams and people – government expertise incorporated in a MoSSaiC Management team to reflect the multi-disciplinary approach; and community expertise and involvement (MoSSaiC Certification for key project members). ii) Methods and a technical ‘Toolbox’ – including CHASM software, research, mapping (Design); and low-cost approaches, training, and implementation (Construction).</p> <p>Was reported on by the Dominica representative at the 2006 Annual MoSSaiC workshop in Saint Lucia. This is a significant element of regional-capacity build in that with Community members and contractors from the local community present and participating, they could profitably exchange implementation issues and identify common themes for further attention such as longer term drain maintenance.</p> <p>Anderson <i>et al.</i> (2007b) have made clear that defining ‘the community’ on the one hand, and identifying the relational elements that would be catalytic for the intervention, on the other, is of critical importance to the success of the implementation. For example, the requirement of a community to configure a Community Project Committee (CPC) for such projects is a key element of community mobilisation and sensitisation. Different Island States in the region have different existing and potential structures at the community level; the OECS programme provides an important vehicle for testing the implementation of the MoSSaiC methodology in differing environments.</p> <p>MOSSAIC OUTCOMES</p> <p>Measuring the Benefits of the Landslide Mitigation Measures in Saint Lucia</p> <p>Having secured acceptance of a ‘preventative measures’ policy,</p>

	delivered an appropriate management structure, and implemented an 'on the ground' programme, it is important that project impact is assessed. Here-in lies a serious methodological problem for hazard mitigation projects: that of knowing what would have happened in the absence of the intervention (Bird, 2004). Assessing the effectiveness of a mitigation project rests less on proving impacts than on showing improvement in practice (Mayoux and Mosedale, 2005; Hulme, 2000).
Was Project Evaluated? If so, Key Evaluation Findings	Not available
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	<p>The success of the Saint Lucia implementation and MoSSaiC methodology has allowed the pilot to be extended elsewhere within the region (Anderson and Holcombe 2006a, 2006b). MoSSaiC was incorporated into the OECS-USAID Sub-Regional Disaster Response and Risk Reduction Programme 2005-06. This allowed a pilot to be established in the Fond Cole Community, near Roseau, Dominica (Figure 7) in 2006, whilst the 2006-09 OECS-UNDP programme has facilitated commencement of a pilot in Saint Vincent and a further one in Bequia in the Grenadines in 2007. In both Dominica and Saint Vincent and the Grenadines a MoSSaiC interdisciplinary team was established and a training programme delivered to the team both at the respective Government Agency offices and on site.</p> <p>A central outcome of the pilot programme reported here is the need for that recognition to be based on a 5 year plus time horizon. This is needed in order to deliver sustainability within communities with regard to both the physical interventions (individual owners making provision for surface water management themselves) and behavioural changes that are needed (maintenance of drains within communities). A regional framework platform with that scope and timeline we believe can deliver a significant landslide risk reduction programme</p>
Effective mechanism for management of CDM knowledge established	N/A
DRM mainstreamed at national levels and incorporated into key sectors of national economies	Specifically, the Saint Lucia Government has formally recognised the MoSSaiC Management Team as a Committee reporting to Cabinet, and extended the initial Skate Town pilot to 5 additional communities in 2005/06; OECS endorsed a programme of regional roll-out; and members of the Skate Town community in Saint Lucia have been active in promoting the transfer of knowledge and advocacy of benefits in another vulnerable community at the annual MoSSaiC workshop and more widely.

Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters

Improving slope drainage can often be an effective way of reducing landslide hazard and the identification of drainage locations and other appropriate measures begins with learning from communities. The knowledge of community members is vital in gaining an understanding of these highly localised slope processes leading to landslides.

Understandably, householders are concerned that they will benefit from landslide mitigation measures and will need reassurance, for instance, that a drain built up-slope of their house will actually be of benefit to them, even if it is not on their property. A critical component of the MoSSaiC programme is to discuss with residents how and why slope stability processes vary over short distances and therefore that landslide mitigation intervention methods should be expected to differ over similarly short distances. The fact that decisions, such as the design of a community drainage system are not an imposed solution, but that the community has taken ownership of the process from the beginning, is important here. Engineers against Poverty (www) comment:

"Poor people are too often the subjects of development rather than active participants in the process. For improvements to be sustainable, poor people must become empowered through the development process."

Community leaders can have a catalytic part to play in hazard mitigation projects: conveying the project vision to other residents, and helping in selecting workers for construction. In some cases an individual with particular skills and a grasp of the technical aspects of the project can act as a catalyst and raise awareness of slope management issues in their own and other communities.

The community is thus a central focus of the MoSSaiC programme outlined in this paper.

For example, the requirement of a community to configure a Community Project Committee (CPC) for such projects is a key element of community mobilisation and sensitisation. Different Island States in the region have different existing and potential structures at the community level; the OECS programme provides an important vehicle for testing the implementation of the MoSSaiC methodology in differing environments.

On the other hand it also illustrates the potential vulnerability of such a pilot to funding regimes and political changes which if not managed appropriately with the vision constantly reasserted can have detrimental and long lasting impact on the very communities one is seeking to assist. This is a real issue in terms of programme delivery, where community acceptance is key; the expectation of individual community making contributions to surface water management is one of changing behaviour in many cases which means a sustained and visible programme over years, not months.

	<p>The challenge is to be able to demonstrate that low-cost, community- based, risk reduction programmes have real impact and in so doing seek to influence donor agency funding approaches. This paper we believe adds additional weight to the need for donor agencies to recognise the benefits of the MoSSaiC low-cost, high impact programme for landslide risk reduction.</p>
DRM POLICY ELEMENT	
Risk Identification	<p>The Caribbean region is subject to rainfall events that act to trigger landslides on the steep slopes which characterise a significant percentage of the area of many islands states. Current climate change predictions point to the increased hurricane activity in the near future and suggest that the region is likely to see an increase in extreme rainfall events and hence an increase in landslides (Mann and Kerry, 2006). A second major element creating landslide hazard in the region is that in many areas there is a significant amount of unplanned housing (approximately 60% in Saint Lucia, for example) located on slopes that are at risk of landslides. It is this combination of triggering rainfall and unplanned housing on steep slopes that affects what are already the most vulnerable groups in society. There have of course been a number of initiatives and programmes that have sought to map hazards in the Caribbean region (Caribbean Development Bank, 2004). The scale of the mapping in relation to the scale of the triggering mechanisms remains a critical issue as far as practical remediation is concerned. Figure 1 shows the two landslide prone, vulnerable communities of Skate Town and Lower Bagatelle in the Castries Basin, Saint Lucia. These communities would be identified as hazard prone areas in a conventional mapping programme. However, as this paper will demonstrate, we need to look within those communities to examine and model the instability triggers that actually cause landslides in order that appropriate mitigation can be undertaken.</p> <p>The scale at which such communities most frequently experience landslides is illustrated in Figure 2. As is the case here, processes such as highly localised soil water convergence can be very important landslide triggers – physical processes which are operating at scales orders of magnitude smaller than hazard mapping can be resolved to.</p> <p>Rainfall has been identified as the main landslide trigger in the Tropics (Lumb, 1975), and preliminary evidence suggests that climate change could result in increasingly intense precipitation events in regions such as the Caribbean (CRU, 1999; Charveriat, 2000) thus increasing the probability of landslides. However, even without climate change, anthropogenic activities are increasing landslide risk in some of the most vulnerable communities in the Caribbean. These activities include altering slope geometry with earthworks (cuts and fills), and loading slopes with buildings and</p>

	<p>infrastructure. Associated with this are variations in the surface-water and groundwater regimes, and changes in vegetation. The pressure of development on land from population growth typically means that the poorer, most vulnerable sections of society are living on the most 'marginal', landslide-prone hillsides.</p>
Risk reduction	<p>Over the last three decades policy statements by all major agencies have included risk reduction as a pre-condition and an integrated aspect of sustainable development (UN-ISDR, 2000). However, Wamsler (2006) observes that when it comes to practical implementation of mitigation strategies in communities there has been comparatively less activity, even when money is available.</p> <p>LANDSLIDE RISK REDUCTION</p> <p>In the physical environment 'risk' comprises two components: the probability of a hazard occurring; and the consequence of the occurrence of that hazard – to people, property or the economy, for example (Crozier and Glade, 2005; Hardingham <i>et al.</i>, 1998; Ho <i>et al.</i>, 2000). This is expressed by equation 1.</p> <p>Landslide Risk = Landslide Hazard Probability x Consequence (1) (Australian Geomechanics Society, 2000)</p> <p>Therefore, to reduce landslide risk in communities we must either reduce landslide hazard; or reduce the vulnerability of communities to landslides; or do both.</p> <p>This paper is primarily concerned with reducing landslide hazard – the probability that a landslide will occur. However, the approach taken by MoSSaiC in order to achieve this has the effect of improving community and government awareness of landslide risk. A resultant benefit is that 'risk aware' communities and governments can also take steps to improve their resilience to the consequences of landslides in the future.</p> <p>Improving slope drainage can often be an effective way of reducing landslide hazard and the identification of drainage locations and other appropriate measures begins with learning from communities. The knowledge of community members is vital in gaining an understanding of these highly localised slope processes leading to landslides.</p> <p>Understandably, householders are concerned that they will benefit from landslide mitigation measures and will need reassurance, for instance, that a drain built up-slope of their house will actually be of benefit to them, even if it is not on their property. A critical component of the MoSSaiC programme is to discuss with residents how and why slope stability processes vary over short distances and therefore that landslide mitigation intervention methods should be expected to differ over similarly short distances. The fact that decisions, such as the design of a community drainage system are not an imposed solution, but that the community has taken ownership of the process from the beginning, is important here.</p> <p>Engineers against Poverty (www) comment:</p>

	<p><i>"Poor people are too often the subjects of development rather than active participants in the process. For improvements to be sustainable, poor people must become empowered through the development process."</i></p> <p>Community leaders can have a catalytic part to play in hazard mitigation projects: conveying the project vision to other residents, and helping in selecting workers for construction. In some cases an individual with particular skills and a grasp of the technical aspects of the project can act as a catalyst and raise awareness of slope management issues in their own and other communities. The community is thus a central focus of the MoSSaiC programme outlined in this paper.</p> <p>For example, the requirement of a community to configure a Community Project Committee (CPC) for such projects is a key element of community mobilisation and sensitisation. Different Island States in the region have different existing and potential structures at the community level; the OECS programme provides an important vehicle for testing the implementation of the MoSSaiC methodology in differing environments.</p>
Financial protection and risk transfer	N/A
Preparedness	<p>The success of the Saint Lucia implementation and MoSSaiC methodology has allowed the pilot to be extended elsewhere within the region (Anderson and Holcombe 2006a, 2006b). MoSSaiC was incorporated into the OECS-USAID Sub-Regional Disaster Response and Risk Reduction Programme 2005-06. This allowed a pilot to be established in the Fond Cole Community, near Roseau, Dominica (Figure 7) in 2006, whilst the 2006-09 OECS-UNDP programme has facilitated commencement of a pilot in Saint Vincent and a further one in Bequia in the Grenadines in 2007. In both Dominica and Saint Vincent and the Grenadines a MoSSaiC interdisciplinary team was established and a training programme delivered to the team both at the respective Government Agency offices and on site.</p>
Response	N/A
Rehabilitation and reconstruction	N/A

OECS DRM : Protocol	
Name of Project:	Talvern Water Rapid Riverbank Stabilization- Talvern Water

	Catchment Group		
Executing Agency	OECS	Funding Institution:	OECS
Other Institutional Partners	TALVERN WATER CATCHMENT GROUP	Government Depts. Involved	NRMU
		Implementation Period:	July 1999
Total External Budget	NOT AVAILABLE	Government Inputs	
Location (s) of Project	TALVERN-ST LUCIA		
Project Objective (s)	<p>The major problems to be addressed by this project can be summarized as follows:</p> <ol style="list-style-type: none"> 1. <u>Acute riverbank erosion</u> 2. <u>Siltation of the river bed</u> 3. <u>Improper farming practices</u> 4. <u>Agro-chemical pollution</u> 5. <u>Livestock rearing along river banks</u> 6. <u>Sewage and solid waste disposal</u> <p>The project purpose is defined within the following specific objectives:</p> <ul style="list-style-type: none"> ■ Soil conservation through stabilization of riverbanks within the Talvern catchment through implementation of short- and long-term bio-engineering strategies; ■ Reduction in the level of pollutants (agro-chemicals, human and animal effluent) entering the watercourse through establishment of vegetative filters along riverbanks; ■ Elimination of livestock grazing along river banks; ■ Creation of the mechanisms to empower and facilitate community/farmer management of water resources within the Talvern catchment; ■ Development of effective methodologies for rapid riverbank rehabilitation that can be replicated within other catchment areas on St. Lucia. 		
Project Goals	Improvement of drinking water quality obtained from the Talvern water catchment.		

Brief Project Description	<p>The Talvern water catchment is one the most important drinking water sources in the north of the island, supplying water to several communities around Babonneau and Forestiere, and communities as far away as Bocage and Bagatelle.</p> <p>Inappropriate agricultural land management within the catchment is the primary contributor to poor water quality that is extracted at the intake. During heavy rains large volumes of sediment originating from eroded gullies, land slips and unprotected riverbanks are transported by the river to the intake, resulting in problems in extraction and distribution of water. Agro-chemicals applied to crops cultivated along the edge of the river often wash into the river contributing to deterioration of water quality. In a few locations upstream of the intake, human and animal effluent and solid waste are discharged into the river.</p> <p>A management strategy for this catchment is urgently required to curb the rate of environmental degradation. Of primary concern is rehabilitation of the riverbanks in terms of reducing erosion along riverbanks through the stabilization measures and reforestation. Establishment of an effective vegetative filter along riverbanks will also assist in filtering agro-chemicals before entering the watercourse.</p>
Target Groups	FARMERS AND WASA
Inputs	<ol style="list-style-type: none"> 1. Database of land parcel owners within the catchment area 2. Reconnaissance survey of river banks 3. Community / Farmer sensitization and consultation 4. Workshops 5. Installation of rehabilitation measures. Recommended rehabilitative measures of will be based on the severity of degradation on the riverbank and acceptability by the farmer. Treatments will therefore be modified accordingly depending on location on the stream bank. 6. Stabilization of farm outflow drains 7. Control of direct effluent discharge into main channels 8. Monitoring and evaluation
Outcomes	Water resource management
Impacts	Improvement of drinking water from Talvern catchment
Was Project Evaluated? If so, Key Evaluation	Not available

Findings	
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	N/A
Effective mechanism for management of CDM knowledge established	N/A
DRM mainstreamed at national levels and incorporated into key sectors of national economies	<p>Much work has been carried out under the post-Tropical Storm Debbie Watershed and Environment Project (WEMP) in identifying appropriate technologies in soil stabilization along riverbanks and landslide areas. However, beyond the pilot sites established to test these technologies, there has been little application beyond. It is felt that proposed recommendations made in the WEMP can be applied to riverbank rehabilitation in Talvern with the hope of extending the methodology to other catchment areas around the island.</p>
Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters	<p>The lands within the Talvern catchment are predominantly privately owned and it is not realistic to consider government acquisition of the lands above the intake. Hence all interventions must be based on acceptance of farmers. Community/farmer participation is therefore essential in the entire process and is strongly emphasized in this project. The Talvern Water Catchment Group will therefore take on the lead role as the implementers of the project with technical support from institutions such as the Forestry Department, Agriculture Extension, the Environmental Health Department, etc.</p> <p>The project will be executed with the involvement of several stakeholders. The lead group in this initiative will be the Talvern Water Catchment Group, a collective of farmers from the Fond Assor area who occupy lands in the vicinity of the intake. Several of the group members have recently benefited from training workshops and seminars in soil and water conservation, and water resources policy and legislation. This group is somewhat loose and will need to work closely and be supported by agencies from the Ministries of Agriculture, Health and Community Development.</p>
DRM POLICY ELEMENT	

Risk Identification	Poor water quality
Risk reduction	A management strategy for this catchment is urgently required to curb the rate of environmental degradation. Of primary concern is rehabilitation of the riverbanks in terms of reducing erosion along riverbanks through the stabilization measures and reforestation.
Financial protection and risk transfer	N/A
Preparedness	N/A
Response	N/A
Rehabilitation and reconstruction	N/A

OECS DRM : Protocol			
Name of Project:	Implementing low-cost landslide risk reduction: A pilot study in 3 unplanned housing areas of the Caribbean		
Executing Agency		Funding	N/A

	STUDY	Institution:	
Other Institutional Partners	Not available	Government Depts. Involved	N/A
		Implementation Period:	2007-2008
Total External Budget	Not available	Government Inputs	N/A
Location (s) of Project	Castries Basin St Lucia		
Project Objective (s)	This article is concerned with the latter-developing an approach to landslide risk reduction in a vulnerable community comprising unplanned housing development. Major slides have already occurred and a neighboring community has had to be relocated at significant cost to Government.		
Project Goals	Implementation of low-cost community-based approach to landslide risk reduction		
Brief Project Description	<p>Landslides pose a serious physical and environmental threat to vulnerable communities living in areas of unplanned housing on steep slopes in the Caribbean. Some of these communities have, in the past, had to be relocated, at costs of millions of dollars, because of major slides triggered by tropical storm rainfall. Even so, evidence shows that: (1) risk reduction is a marginal activity; (2) there has been minimal uptake of hazard maps and vulnerability assessments and (3) there is little on-the-ground delivery of construction for risk reduction. This article directly addresses these issues by developing a low-cost approach to the identification of the potential pore pressure changes that trigger such slides we seek to address these three commentaries directly.</p> <p>This article outlines a low-cost community-based approach to landslide risk reduction implemented in two unplanned communities on Parkers Hill in Castries, St Lucia, West Indies. A third neighboring community of Black Mallet had experienced a recent major landslide which resulted in the relocation of numerous residents and a cost to Government of US\$8 million funded in the form of a loan from the regional banking system (Anthony 2001). St Lucia, like other states in the Caribbean suffers from major slides occasioned by tropical storms and has a substantial housing stock that comprises unplanned wooden structures.</p> <p>Study site—Castries Basin, St Lucia, West Indies Parker's Hill, St Lucia, is a hillside prone to major instability: There are three scales of landslides evident on this hillside; (1) currently active rotational slides of approximately 50-m upslope extent (2) minor slides (10-m upslope extent) threatening individual properties; and (3) a zone of a major slide (2.2 ha) which occurred in 1999 and resulted in the relocation of some 50 families.</p>		

	<p>Identifying the causes of slope instability to facilitate appropriate risk reduction.</p> <p>Zone 1: active rotational slides.</p> <p>Zone 2: minor local slides. This zone comprises evidence of a number of relatively small slides, triggered by surface water concentration. These slides are sufficient to cause movement to, and damage of, small wooden housing structures. Detailed community discussions with residents confirmed the location, timing and triggering sequence of such slides. It was evident that the appropriate strategy to minimise such slides lay with the effective capture and management of surface water through the extended provision of slope drainage and associated household water management on that slope area.</p> <p>Zone 3: progressive slide. In October 1999 a major slide occurred in the Black Mallet area. This slide necessitated “the removal and relocation of persons from Black Mallet has cost this Government EC\$16.7 million. Most of that expenditure has been incurred in providing alternative housing, surveying lots, and constructing roads and drainage ... to receive the relocated residents. The lessons are hard, but we must draw and learn from them. Unquestionably, the communities which are most vulnerable to landslides and land slip- pages are the unplanned communities habituated by the poor and the dispossessed”.</p>
Target Groups	Vulnerable communities
Inputs	Technical assistance and data from community members
Outcomes	The model outcome for zone 3 provides further consistent and robust evidence that controlling surface water (limiting infiltration) on the hill slope is an appropriate landslide risk reduction strategy; although as we have noted, in this slope zone, such an intervention would be a future initiative for government given the evident stability of the slope and current lack of housing.
Impacts	Post-construction evidence indicates the methodology to be sound, in that the site was stable in subsequent 1-in-1 to 1-in-4 year rainfall events. A critical feature of the approach is that it is community-based from data acquisition through to community members participating in construction.
Was Project Evaluated? If so, Key Evaluation Findings	NOT AVAILABLE
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM	

programme implementation at national and regional levels	Certain major projects have developed from a combination of Government and community funds
Effective mechanism for management of CDM knowledge established	Methods used adopted into OECS Policy Documents
DRM mainstreamed at national levels and incorporated into key sectors of national economies	The holistic, community based, low cost approach to landslide risk reduction outlined in this article has now been mainstreamed in the OECS 2005-2008 Disaster Response and Mitigation Programme(OECS) 2006
Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters	<p>Post-construction evidence indicates the methodology to be sound, in that the site was stable in subsequent 1-in-1 to 1-in-4 year rainfall events. A critical feature of the approach is that it is community-based from data acquisition through to community members participating in construction.</p> <p>Nevertheless, there is increasing recognition of the need for change. Whilst there is widespread agreement that the ‘softer’ approaches to risk reduction, such as training and awareness raising, have limited impact (Warmser 2006), there is a clear emerging of the key role that communities might have in the process.</p> <p>There is also a broadening consensus that it is cost-effective to train and educate communities about risks they face, provide them access to resources and knowledge, and to develop community-based preparedness and mitigation programs. This approach has emerged as a complement to structural mitigation (dams, dykes, levees, etc.) and even certain types of non-structural mitigation programs (land use, building codes, development regulations, etc.often either nonexistent or fragmentary”.</p> <p>In many developing countries, an appropriate way to approach landslide risk reduction is through a programme of preventative measures developed in partnership with local communities and cross-ministry initiatives specifically designed to build capacity within vulnerable communities (Anderson and Holcombe 2004, 2006a, 2006b). Whilst governments, supported by other actors—international agencies, academia, and non-governmental organisations—play a key role in organizing and funding disaster management programmes, the content and implementation of these initiatives now include communities as prime actors. Interventions must therefore aim at reducing vulnerability at the community level.</p> <p>Within the context of the available resource environment, this hillside arguably represents one of the most challenging problems that can be faced for landslide risk reduction. The additional</p>

	<p>complexity is the existence of a range of complex slope- failure mechanisms within short distances. A key element in the delivery of the risk reduction has been the recognition of the importance of the detailed scale of investigation required to be effective and to deliver on-the-ground solutions; this is as much in modelling terms as it is in the planning of remediation measures. This is not an area for which GIS hazard mapping can add value.</p> <p>This article has shown that cost-effective solutions can be found; much of the basis for the emergent solutions lies at the community level in terms of the provision of community information on hazard, through to implementation using community contractors and harnessing community awareness to ensure good drainage practice is followed in such vulnerable communities. The interventions outlined have been completed with St. Lucia Government funding. This initiative reflects the Government's recognition that taking the novel approach outlined above could potentially achieve significant risk reduction at a cost which is less than 2% of community relocation costs should a major slide occur at the scale equivalent to the 1999 Black Mallet slide.</p> <p>The holistic, community-based, low-cost approach to landslide risk reduction outlined in this article has now been mainstreamed in the Organisation of East Caribbean States 2005–2008 Disaster Response and Mitigation Programme (OECS 2006). This programme, and the focus of UNDP support, has at its core the improvement of disaster management at the community level which Anderson and Holcombe (2004, 2006a, 2006b, 2007) have shown is an important focus if real, substantive and sustainable on-the-ground risk reduction in the most vulnerable of communities is to be realised. Tompkins (2005) reinforces this approach in the context of Caribbean storm risk, finding that 'self-efficacy, strong local and international support networks, combined with a willingness to act collectively' appear to have increased the resilience of the Cayman Islands' Government to tropical storm risk. The research we have reported demonstrates that a practical and effective methodology with a community focus, seeking to achieve low-cost landslide risk reduction measures, can be delivered on the ground to the most vulnerable of communities. Welcome though this is, there is the fundamental question of developing a sustainable funding structure.</p>
DRM POLICY ELEMENT	
Risk Identification	<p>The implication to be drawn from such post-failure analyses is that there are limits to the spatial utility of GIS-based mapping methodologies.</p> <p>Notwithstanding the spatial scale (and ultimate utility) of GIS-based mapping approaches, Governments and donor agencies see value in such a methodology contributing to planning frameworks (Caribbean Development Bank 2006). However, further</p>

	<p>complications can ensue from the socio-political status within certain tropical developing countries where development often outpaces the ability of regulatory frameworks to ensure that ‘best’ practice, derived from risk-mapping exercises, is followed. Unplanned housing developments on steep slopes frequently lack any form of adequate slope drainage and hence makes steeper slopes particularly vulnerable to landslides. The problem, typical of those faced by many of the most vulnerable communities is illustrated in Fig. 1. Of course, the majority of unplanned or squatter type settlements are to be found on just such steep, marginal, slopes and so intrinsically there is already a high risk of slope instability. Such communities are also among the most vulnerable in terms of social needs and housing conditions. Dai et al. (2002, p. 65) argue “that in order to mitigate landslide hazard effectively, new methodologies are required to develop a better understanding of landslide hazard and make rational decisions on the allocation of funds for management of landslide risk”;</p>
<p>Risk reduction</p>	<p>Landslides pose a serious physical and environmental threat to vulnerable communities living in areas of unplanned housing on steep slopes in the Caribbean. Some of these communities have, in the past, had to be relocated, at costs of millions of dollars, because of major slides triggered by tropical storm rainfall. Even so, evidence shows that: (1) risk reduction is a marginal activity; (2) there has been minimal uptake of hazard maps and vulnerability assessments and (3) there is little on-the-ground delivery of construction for risk reduction. This article directly addresses these issues by developing a low-cost approach to the identification of the potential pore pressure changes that trigger such slides we seek to address these three commentaries directly.</p> <p>There are three important commentaries which form the foundation for the research reported in this article: Risk reduction is a marginal activity—Wamsler (2006) exemplifies the fact that risk reduction is a ‘marginal activity within international aid organisations’, and there is an apparent professional discipline incompatibility between those involved in risk reduction and those involved in urban planning. Thus, preventative urban planning is difficult to achieve. Little on-the-ground delivery of tangible risk reduction construction—over the last three decades policy statements by all major agencies have included risk reduction as a precondition and an integrated aspect of sustainable development, but when it comes to practical implementation, very little has been done, even when money is available (UN-ISDR 2002; Wamsler 2006). Minimal uptake of hazard maps and vulnerability assessments—in the Caribbean, a major report on the status of hazard maps and vulnerability assessments concluded that, ‘despite numerous major regional programmes, the uptake of hazard maps has been minimal’ and that insufficient funds had been directed to hazard mitigation (Opadeyi</p>

et al. 2005).

This article tackles these three outcomes directly and outlines the completed delivery of community-based, on-the-ground landslide risk mitigation measures in vulnerable communities in the Caribbean. The question we pose in this article is: can appropriate low-cost interventions be devised and undertaken, to provide significant risk reduction to vulnerable communities? Donor response to risk reduction can be significantly reduced by the very cost effective nature of such interventions. Agencies tend to be under pressure to meet spending targets and this can make it difficult for them to prioritise low budget but relatively long-term mainstreaming activities, such as disaster reduction (DFID 2004). Nevertheless, there is increasing recognition of the need for change. A 55° hillside with known major instability, housing that is unplanned the density of which reaches as much as 75%, the absence of a drainage system, metred water supplied to every property, and with the households being the most vulnerable from every standpoint, represents the severest of contexts in which to design and implement appropriate risk reduction.

The above section outlined three different classes of instability on the hillside. Models were configured to ascertain the likely dominant factors in triggering the observed slope failures. In all cases surface water infiltration on the slope area of interest was determined to be the cause as opposed to larger-scale groundwater responses for example (see Lumb 1975; Koo and Lumb 1981), although the timing and detailed process response was different in each zone. This apparent clear relationship between the rainfall falling on the slope area and the resultant instability is critical in suggesting appropriate remedial measures.

The model outcomes spatially delimited the causative rainfall area and confirmed the appropriateness of surface water management within the slope areas as an effective way of reducing risk. Given this background context a surface drainage plan was developed that encompassed for the entire hillside; it was developed jointly with local residents and implemented by them. The intervention was thus community-focussed throughout. Meetings were held with residents during the entire process—from hazard recognition to community members undertaking construction (Fig. 10).

Community consultation was key in assisting with identifying priority areas and designing the drainage plan. Figure 11 shows the final drainage plan focussing on the two-slope sectors (zones 1 and 2) which have had persistent problems with slope instability over the last 5 years and which are occupied by unplanned housing. The plan comprises key intercept drains across the slope in upslope locations, which were carefully configured to connect with existing drainage provision, and pays due attention to existing known areas of instability. The proposed drainage plan also took account of detailed observations by community residents, themselves fully

	<p>familiar of course with those slope areas with greatest surface water at times of major storm events. Pivotal components included the cross-slope main intercept drain (Fig. 12) and the intercept drain immediately upslope of the rotational failure (Fig. 13). Consistent with the desire to deliver an appropriate risk reduction strategy, a low-cost drainage method was deployed alongside standard block drain construction. This drainage system, outlined by Anderson and Holcombe (2006b) comprises sunlight resistant polythene overlain by a locally available wire mesh to facilitate the provision of a soft engineering approach to surface drainage (the STARTM drainage system). The overall cost is less than 10% of comparable concrete drains and is capable of being constructed by community residents themselves. This system affords a major opportunity to improve drainage at low cost, provides a soft engineering solution, and uses readily available local materials. Importantly, the materials can be readily carried to sites that are inaccessible and would otherwise demand double handling of cement and blocks if conventional blockwork drains were to be built.</p> <p>Within the context of the available resource environment, this hillside arguably represents one of the most challenging problems that can be faced for landslide risk reduction. The additional complexity is the existence of a range of complex slope- failure mechanisms within short distances. A key element in the delivery of the risk reduction has been the recognition of the importance of the detailed scale of investigation required to be effective and to deliver on-the-ground solutions; this is as much in modelling terms as it is in the planning of remediation measures. This is not an area for which GIS hazard mapping can add value.</p>
Financial protection and risk transfer	Wamsler (2007) observes the lack of funding for risk reduction, but suggests that integrating risk and loss- financing into existing housing financing mechanisms (micro credit, subsidies and savings), and then expanding these mechanisms to finance risk reduction is what is required. Certain major projects have developed from a combination of Government and community funds, but these tend to be major, one-off, infrastructural projects for which the community contribution is in any event small (Government of St Lucia 2002).
Preparedness	Use of surface water modeling to effectively reduce landslide risk
Response	N/A
Rehabilitation and reconstruction	N/A

OECS DRM : Protocol			
Name of Project:	PAGET FARM ST VINCENT		
Executing Agency	National Emergency Management Organization, Paget Farm	Funding Institution:	OECS
Other Institutional Partners	UNDP, University of Bristol	Government Depts. Involved	Ministry of Transport and Works
		Implementation Period:	2008-2009
Total External Budget	EC \$255,960.00	Government Inputs	Not available
Location (s) of Project	Paget Farm , St Vincent		
Project Objective (s)	<p>The specific objectives of the project were:</p> <ol style="list-style-type: none"> 1. To establish appropriate interventions for flood and landslide risk reduction; 2. To build capacity to protect Paget Farm from flooding and landslides; 3. To sensitize the residents of the selected community on long term strategies; 4. To develop a participatory management system for risk reduction at the community level. 		
Project Goals	<p>The Paget Farm and a related project at Dark View, were part of a much larger policy¹ and actions to be implemented over a ten year period. Based on the research conducted and inputs from various agencies the vision of the overall policy is: “ to achieve the institutionalization of a disaster management culture in St. Vincent</p>		

¹ The Mitigation Policy was submitted to Cabinet in 2005 for their approval.

	<p>and the Grenadines through leadership, public education and legal instruments". The policy aims: "to reduce the vulnerability of St. Vincent and the Grenadines to the impacts of natural and man-made disasters, through the effective administration of land use, environmental protection measures, public education and community participation".</p> <p>The project aimed to address the problem of landslides and flooding in the community of Paget Farm. The targeted area is mainly a low income community and is prone to major landslides with a long history of slope failure.</p>
Brief Project Description	<p>The population is concentrated in several nodes of which Kingstown is the capital. Other major population centres are Georgetown, Mesopotamia, Chateaubelair, Barrouallie, Campden Park and Layou. Due to the danger posed by the possible eruption of the La Soufriere volcano the northern section of the island remains under-populated.</p> <p>The country has a well developed transportation system linking the main island with the outlying cays. These cays can be accessed by boats or commuter airplanes which operate on a regular basis. Internally the road network which consists of 1,040 kilometres is not well developed, as only approximately 320 kilometres of this total are paved. In many areas these are poorly maintained and are frequently affected by landslides and rock falls. To a certain extent, many of the problems being experienced, vis-à-vis, landslides, can be attributed to the practice of clearing embankments of all vegetation thereby increasing their instability, particularly during the rainy season. This triggers frequent landslides, thereby increasing the cost of maintenance, and restricting the ability of the population to move freely, during prolonged periods of inclement weather. Currently, major road improvement works are being carried out on the windward section of the island, and there are plans to continue the construction of the cross-island road with the stated purpose of alleviating some of the commuting problems now being experienced.</p> <p>The community risk reduction component of the OECS Secretariat's Disaster Response and Risk Reduction Programme (DRRP) targeted St. Vincent and the Grenadines as one of its participating Member States. The activities of the programme focused on communities and households that are vulnerable to natural hazards such as landslides and floods. The OECS programme provided technical support to these communities within a participatory framework. As a result of this intervention, the targeted communities were empowered and better able to reduce their risks to natural disaster</p>

	situations.
Target Groups	<p>Paget Farm is located on the Grenadine island of Bequia. It is a small fishing community of about 40 family dwellings. It is probable that these properties are built on previously failed material and recently, there is growing evidence which supports this probability. Additionally, there is also evidence that earlier physical planning processes did not seriously consider drainage systems on hill slopes in the Paget Farm area, especially in terms of construction. This was demonstrated in the construction of roads across major gullies without surface water management. Consequently, in the absence of clearly defined technical interventions supported by the community, there were slope failures with severe impacts on the residents and property.</p> <p>The area consists of a steep slope at the foot of a hill and tapers off into a low-lying area stretching to the coastline. The surface topography indicates the steep terrain at the top of the community generates a significant run off which severely affects the residents lower down slope.</p> <p>An assessment of the problems in Paget Farm, conducted in January 2008 at project commencement revealed that:</p> <ol style="list-style-type: none"> 1. The community is built on previously failed landslide material. 2. The community lies at the foot of a drainage basin and it serves as a conduit to the main drainage channel. 3. The channels running through the community are inadequate to handle the volumes of water they are expected to carry. 4. Some areas lack drainage infrastructure leading to excess surface flooding in the community. 5. The surface profile inside the community is sporadic and is inadequate for draining surface water; and existing drainage get blocked with debris from erosion upstream on hill slopes and ghuts. 6. Areas surrounding Paget Farm has been identified as having high landslide potential due to its surface composition and gradient.
Inputs	<ol style="list-style-type: none"> 1. Provided a set of construction implementation interventions related to drainage; 2. Modeled water flows on slopes and within channels; and 3. Engaged key stakeholders to ensure ownership of the intervention. <p>The interventions toward landslide risk reduction activities used a multi-disciplinary holistic approach. The project adopted the</p>

	<p>MoSSaiC model and its methodological considerations in implementing the technical and community interventions. This model suggests that information needs to be gathered from a variety of sources, integrated in a manner that allows the correct identification of process controls on slope stability, and resultant mitigation measures presented that allow residents in part of a community to understand why one particular measure is adopted in one slope zone and (because of subtle differences in the dominant slope stability control processes), different interventions may be recommended in another (MoSSaiC Report 2007).</p> <p>Identification of the most at-risk communities, largely in unplanned developments, is necessary as a preliminary step to implementing a landslide risk reduction programme. The project under the technical guidance of the National Emergency Management Organisation (NEMO) had initially identified 10 low income communities with slope failures. However, considering budgetary constraints, two communities were selected: Dark View on the North Leeward side of the island and Paget Farm located on the southern coast of Bequia. The project provided technical interventions to Paget Farm in the first phase in 2008 and planned to mobilize additional resources in the second phase.</p> <p>The project recognized that the low-cost, community-focussed slope drainage intervention programme provided a counterbalance to the potentially large government costs that could be encountered if relocation of communities were to be necessary due to landslide occurrence.</p> <p>The activities of the project comprised three components: community consultations; training; and implementation of physical works.</p>
Outputs	<p>The project achieved the following outputs:</p> <ul style="list-style-type: none"> • Increased number of drains • Increased number of roof gutters • Increased cross-community links • Technical/engineering methodology developed • Community and government capacity developed
Outcomes	<ul style="list-style-type: none"> • Significant decrease in flooding and landslide events in Paget Farm. • building local capacity in the broad area of slope stability whilst simultaneously seeking to minimise resource expenditure • achieving the vision by identifying key community based risk reduction projects that can be undertaken by <i>existing</i> Government-based staff and local communities

	<ul style="list-style-type: none"> establishing team structures that are key to delivering the vision; a management team that develops and communicates the vision; field teams that develop project strategies and implement specific project plans.
Impacts	Quality of life in Paget Farm community improved.
Was Project Evaluated? If so, Key Evaluation Findings	No formal evaluation of the project is publicly available.
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	The implementation of the project was coordinated by the National Emergency Management Organisation (NEMO), which collaborated with a number of relevant agencies: Ministry of Transport and Works, Physical Planning, Town and Country Planning, Forestry Department, Ministry of Agriculture, Forestry and Fisheries, Lands and Surveys, Ministry of Rural Transformation, Housing and Land Development Corporation and the Bequia Disaster Committee. The project therefore mobilized a cross section of key stakeholders with keen interests in risk reduction.
Effective mechanism for management of CDM knowledge established	No documentary information.
DRM mainstreamed at national levels and incorporated into key sectors of national economies	The project recognized that the implementation of disaster reduction measures constitutes a central aspect of any sustainable development policy
Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters	Disaster reduction measures can become a positive asset in post-disaster relief situations, especially with regard to the positive impact of targeted policies for community level advocacy, awareness raising and preparedness training. The project team also recognized that longer-term measures that help reduce the vulnerability of community members to hazards are of primary importance for operating an effective transition from relief to development. These relate to basic elements of increasing the resilience of communities through participatory programming with stakeholders, understanding and addressing gender equity, and differences in their capacities, vulnerabilities and needs. In the end the worth of disaster management is determined by its usefulness for empowerment and to save lives and livelihoods. In this respect, the Paget Farm project, which built on a set of community consultations in January and February 2008, facilitated the inputs

	<p>from the targeted households.</p> <p>With technical and financial assistance from the OECS Secretariat, the project team under the leadership of NEMO and in collaboration with local disaster committee in Bequia implemented a series of community consultations. Following site assessments by the MoSSaiC team and NEMO, members of the Paget Farm community were presented with the proposed intercept drainage plan and made recommendations during the community consultations. The recommendations were specifically directed on issues related to drainage routing and potential land-take.</p> <p>The consultations promoted broad based consensus on the drainage plans and the roles and responsibilities of the community. The community participated in implementing the work packages and played a role in maintaining the drains post construction.</p>
DRM POLICY ELEMENT	
Risk Identification	With technical and financial support from the OECS Secretariat, some preliminary training was undertaken in community hazard identification and mapping.
Risk reduction	The project recognized the need to strengthen the capabilities of the community and relevant project partners in order to support the implementation of the physical works and to ensure sustainability at the community level. Moreover, through the training activities, the project also facilitated a better understanding of the linkages between community based risk reduction interventions and physical development planning processes. Drainage systems planning is seldom integrated into national physical plans.
Financial protection and risk transfer	N/A
Preparedness	The project embarked on public awareness campaign commencing with its official launching. Other activities included the preparation and dissemination of leaflets and brochures to the members of the targeted community and surrounding households. In addition, the project promoted public announcements on the mass media aimed at addressing the major issues related to slope failures and emphasizing the importance of adopting sound risk reduction measures for the safety and protection of human life and property. NEMO was responsible for mobilizing the required technical and financial resources for implementing this component of the project.
Response	N/A

Rehabilitation and reconstruction	N/A
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OECS DRM : Protocol			
Name of Project:	Troumaca Dam -Ecotourism Development St Vincent		
Executing Agency	North Leeward Tourism Association	Funding Institution:	OECS-NRMU SMALL PROJECTS FACILITY
Other Institutional Partners	NOT AVAILABLE	Government Depts. Involved	NLTA
		Implementation Period:	2002
Total External Budget	EC 111,690	Government Inputs	NOT AVAILABLE
Location (s) of Project	TROUMACA-NORTH WESTERN ST VINCENT		
Project Objective (s)	<ul style="list-style-type: none"> To create strong and meaningful partnerships between the public and non-governmental sectors in the planning and development of potential nature sites and attractions. These 		

	<p>partnerships reflects the government's commitment to the <i>St. George's Declaration Of Principles For Environmental Sustainability In The OECS</i>.</p> <ul style="list-style-type: none"> • To provide a framework for the development of sustainable tourism on the island. • To improve the quality of life of the people in the North Leeward Area. • To contribute to the goals, objectives and intent of the Biodiversity • Build capacity in areas related to forestry management, protection of river banks, and rehabilitation of degraded areas. • Convention of which St. Vincent and the Grenadines is a signatory.
Project Goals	<p>The Ecotourism Development project at Troumaca was part of the island's development strategy towards economic diversification. Additionally, eco-tourism was intended to assist in strengthening the incorporation of environmental issues into development initiatives both at the national and community level.</p> <p>To ensure efficient and effective utilization and management of the North Leeward Resources for sustainable development.</p>
Brief Project Description	<p>The North Western region of the island (North Leeward) is a scene of pristine beauty, fertile valleys and refreshing waterfalls, set in a tranquil, slow paced environment. As a consequence of the rugged terrain, the settlements like most others on the island are on the coastline, and there are no roads connecting the west coast of the island to the east coast. Two of the most northerly villages on the western side are Coull's Hill and Troumaca. These are agricultural communities and a low-income area on the island. Unemployment is estimated at over 55 percent, most persons practicing subsistent farming, fishing or burning of firewood for coal. Adverse social conditions such as alcoholism, teen pregnancy, overcrowded housing, poor sanitary conditions and illiteracy are prevalent. Low self-esteem exists among many young persons compounded by the lack of opportunities, recreational facilities and opportunities for self-employment.</p>
Target Groups	<p>The beneficiaries of the project were the indigenous people of Coull's Hill and Troumaca, tourist and local visitors who gained access to an additional recreational site and an educational nature trail. The indigenous people also gained employment opportunities in the development, upkeep and maintenance of the site.</p>
Inputs	<ul style="list-style-type: none"> • Conduct inventory of area's flora and fauna, medicinal and historical resources. • Conduct training for tour guides and micro-entrepreneurs. • Physical site improvement of the Dam

	<ul style="list-style-type: none"> • Construction of footpaths. • Stabilization of the riverbanks. • Construct footbridges. • Landscaping of recreational site. • Capacity Building and Awareness. • Documentation of the process • Procurement of equipment. • Production of interpretative Brochures. • Construction of Signage. • Construction of Tourism Information Center and Public convenience.
Outcomes	<p>The preparation and completion of two surveys and reports on Flora and Fauna Medicinal inventory Historical resources inventory Two training seminars completed: one (1) for tour guides and one (1) for ecotourism micro businesses. Physical improvements to the dam and the redevelopment of a recreational park. Footpath and two footbridges constructed Troumaca dam area landscaped and developed as a recreational area. 40 persons trained in capacity building and environmental awareness by January 2003.</p>
Impacts	<p>Lessons learned from this project, which was essentially a pilot project were to be used in the development of other sites in North Leeward, in St. Vincent and the Grenadines and in the wider Caribbean</p>
Was Project Evaluated? If so, Key Evaluation Findings	No publicly available evaluation.
CDM FRAMEWORK OUTCOMES	
Enhanced institutional support for CDM programme implementation at national and regional levels	<p>Lessons learned from this project, which was essentially a pilot project expected be used in the development of other sites in North Leeward, in St. Vincent and the Grenadines and in the wider Caribbean</p>
Effective mechanism for management of CDM knowledge established	N/A
DRM mainstreamed at national levels and	N/A

incorporated into key sectors of national economies	
Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters	<p>The Government's ecotourism initiative also emphasizes the development of co-management approaches, and the linkages between ecotourism resources and sustainable livelihood for the reduction of poverty in marginalized communities.</p> <p>The project aimed to assist in stemming the land degradation as it caters for capacity. Building capacity in areas related to forestry management, protection of river banks, rehabilitation of degraded areas and prevention and control of land degradation by developing sustainable use methods.</p> <p>The project was community driven, participatory and will reduce environmental problems. It will utilize the locally available technical and scientific resources. Above all it will be catalytic in terms of developing other entrepreneurial projects, which will generate income, raise productivity and reduce poverty.</p> <p>The project provided pilot level experience, which can be easily replicated in other parts of St. Vincent and the Caribbean.</p>
DRM POLICY ELEMENT	
Risk Identification	<p>The Ecotourism Development project at Troumaca contributed towards one of the island's development strategies towards economic diversification. Additionally, it is hoped that this type of tourism will assist in strengthening the incorporation of environmental issues into development initiatives both at the national and community level</p>
Risk reduction	<p>This project was also expected to assist in stemming the land degradation, through building capacity in areas related to forestry management, protection of river banks, rehabilitation of degraded areas and prevention and control of land degradation by developing sustainable use methods.</p>
Financial protection and risk transfer	N/A
Preparedness	N/A
Response	N/A
Rehabilitation and reconstruction	N/A

OECS DRM : PROTOCOL			
Name of Project:	COMPREHNSIVE DISASTER MANAGEMENT HARMONIZED IMPLEMENTATION PROGRAMME-(CDM HIP) PHASE 1		
Executing Agency	CDERA/OECS	Funding Institution:	CIDA/DFID/O ECS
Other Institutional Partners	NATIONAL DISASTER MANAGEMENT ORGANIZATIONS	Government Depts. Involved	Not available
		Implementation Period:	
Total External Budget	USD 11,706,192	Government Inputs	USD 300,000
Location (s) of Project	CDERA AND OECS MEMBER STATES		
Project Objective (s)	<p>Enhanced Institutional Support for CDM Programme Implementation at national and regional levels.</p> <p>CDEMA CU is strengthened and restructured for effectively supporting the adoption of CDM in member countries</p>		

Project Goals	To contribute to strengthening community, national and regional level capacity to mitigate, manager and coordinate recovery and rehabilitation to natural and anthropogenic hazards, and the effects of climate variability and change.
Brief Project Description	The Comprehensive Disaster Management Harmonized Implementation Programme (Phase 1) is a five year programme aimed at enhancing institutional support and community resilience to mitigate and respond to and recover from the adverse affects of climate variability and change and disasters. The programme is unique as it promotes a multi-donor harmonized approach for the support of the enhanced Comprehensive Disaster Management (CDM) Strategy.
Target Groups	CDERA MEMBER COUNTRIES AND OECS
Inputs	Technical assistance and funding
Outcomes	<p>Enhanced institutional support for CDM Program implementation at national and regional levels.</p> <p>Enhanced community resilience in CDERA states/territories to mitigate response to and recover from the adverse effects of climate variability and change and disasters.</p> <p>Communities are more aware and knowledgeable on disaster management and related procedures including safer building techniques</p>
Impacts	GOVERNMENTS OF PARTICPATING STATES/TERRITORIES SUPPORT CDM AND AVE INTEGRATED CDM INTO NATIONAL POLICIES AND STARTEGIES
Was Project Evaluated? If so, Key Evaluation Findings	N/A
CDM Framework Outcomes	
Enhanced institutional support for CDM programme implementation at national and regional levels	<p>CDERA CU is strengthened and restructured for effectively supporting the adoption of CDM in member countries</p> <p>Governments of Participating States/Territories support CDM and have integrated CDM into national policies and strategies</p>

	Improved coordination at national and regional levels for disaster management
Effective mechanism for management of CDM knowledge established	System for CDM monitoring, evaluation and reporting is being built
DRM mainstreamed at national levels and incorporated into key sectors of national economies	Disaster Risk Reduction integrated into National Environment Management Strategies (NEMS)
Enhanced community resilience to mitigate and respond to adverse effects of climate change and disasters	Communities are more aware and knowledgeable on disaster management and related procedures including safer building techniques Standardized holistic and gender sensitive Community Methodologies for natural and anthropogenic hazard identification and mapping, Vulnerability and Risk Assessments and Recovery and Rehabilitation procedures developed and applied in selected communities
DRM Policy Element	
Risk Identification	Enhancing institutional support and community resilience to mitigate and respond to and recover from the adverse affects of climate variability and change and disasters
Risk reduction	Disaster Risk Reduction integrated into National Environment Management Strategies (NEMS)
Financial protection and risk transfer	Evidence of reduced losses in Caribbean region Improved disaster risk management coordination at the national and regional levels
Preparedness	To contribute to strengthening community, national and regional level capacity to mitigate, manager and coordinate recovery and rehabilitation to natural and anthropogenic hazards, and the effects of climate variability and change
Response	Enhanced community resilience in CDERA states/territories to mitigate response to and recover from the adverse effects of climate variability and change and disasters.
Rehabilitation and reconstruction	Vulnerability and Risk Assessments and Recovery and Rehabilitation procedures developed and applied in selected communities