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PROJECT PERFORMANCE ASSESSMENT REPORT

ST. LUCIA

**WATERSHED AND ENVIRONMENTAL MANAGEMENT PROJECT
(CREDIT 2768-SLU AND LOAN 3925-SLU)**

AND

**EMERGENCY RECOVERY AND DISASTER MANAGEMENT PROGRAM
(CREDIT 3151-SLU AND LOAN 4419-SLU)**

July 15, 2005

*Sector, Thematic, and Global Evaluation Group
Operations Evaluation Department*

Currency Equivalents (annual averages)
Currency Unit = East Caribbean dollar (XCD)

1995	US\$1.00	XCD 2.700	1998	US\$1.00	XCD 2.699
1997	US\$1.00	XCD 2.699	2004	US\$1.00	XCD 2.670

Abbreviations and Acronyms

CARICOM	Caribbean Community
CDB	Caribbean Development Bank
CDERA	Caribbean Disaster Emergency Relief Agency
CDMP	Caribbean Disaster Mitigation Project
CMU	Crisis Management Unit
DDC	District Disaster Committee
EOC	Emergency Operations Center
ERDMP	Emergency Recovery and Disaster Management Project
ERL	Emergency Recovery Loan
GDP	Gross Domestic Product
IDA	International Development Association
ICR	Implementation Completion Report
MOCWT	Ministry of Communication, Works and Transport
MOP	Memorandum and Recommendation of the President
NEMAC	National Emergency Management Advisory Committee
NEMO	National Emergency Management Office
NEOC	National Emergency Operations Centre
NMS	National Meteorological Service
OAS	Organization of American States
OD	Operation Directive
ODP	Office of Disaster Preparedness
OECS	Organization of Eastern Caribbean States
OED	Operations Evaluation Department
OFDA	Office of US Foreign Disaster Assistance
SIDS	Small Island Developing States
PCDPP	Pan Caribbean Disaster Preparedness and Prevention Project
PCU	Project Coordination Unit
PPAR	Project Performance Assessment Report
SAP	Systems, Application, Products
SDR	Special Drawing Rights
USAID	United States Agency for International Development
WEMP	Watershed and Environmental Management Project

Fiscal Year

Government: January 1 – December 1

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OED Mission: Enhancing development effectiveness through excellence and independence in evaluation.

About this Report

The Operations Evaluation Department assesses the programs and activities of the World Bank for two purposes: first, to ensure the integrity of the Bank's self-evaluation process and to verify that the Bank's work is producing the expected results, and second, to help develop improved directions, policies, and procedures through the dissemination of lessons drawn from experience. As part of this work, OED annually assesses about 25 percent of the Bank's lending operations. In selecting operations for assessment, preference is given to those that are innovative, large, or complex; those that are relevant to upcoming studies or country evaluations; those for which Executive Directors or Bank management have requested assessments; and those that are likely to generate important lessons. The projects, topics, and analytical approaches selected for assessment support larger evaluation studies.

A Project Performance Assessment Report (PPAR) is based on a review of the Implementation Completion Report (a self-evaluation by the responsible Bank department) and fieldwork conducted by OED. To prepare PPARs, OED staff examine project files and other documents, interview operational staff, and in most cases visit the borrowing country for onsite discussions with project staff and beneficiaries. The PPAR thereby seeks to validate and augment the information provided in the ICR, as well as examine issues of special interest to broader OED studies.

Each PPAR is subject to a peer review process and OED management approval. Once cleared internally, the PPAR is reviewed by the responsible Bank department and amended as necessary. The completed PPAR is then sent to the borrower for review; the borrowers' comments are attached to the document that is sent to the Bank's Board of Executive Directors. After an assessment report has been sent to the Board, it is disclosed to the public.

About the OED Rating System

The time-tested evaluation methods used by OED are suited to the broad range of the World Bank's work. The methods offer both rigor and a necessary level of flexibility to adapt to lending instrument, project design, or sectoral approach. OED evaluators all apply the same basic method to arrive at their project ratings. Following is the definition and rating scale used for each evaluation criterion (more information is available on the OED website: <http://worldbank.org/oed/eta-mainpage.html>).

Relevance of Objectives: The extent to which the project's objectives are consistent with the country's current development priorities and with current Bank country and sectoral assistance strategies and corporate goals (expressed in Poverty Reduction Strategy Papers, Country Assistance Strategies, Sector Strategy Papers, Operational Policies). *Possible ratings:* High, Substantial, Modest, Negligible.

Efficacy: The extent to which the project's objectives were achieved, or expected to be achieved, taking into account their relative importance. *Possible ratings:* High, Substantial, Modest, Negligible.

Efficiency: The extent to which the project achieved, or is expected to achieve, a return higher than the opportunity cost of capital and benefits at least cost compared to alternatives. *Possible ratings:* High, Substantial, Modest, Negligible. This rating is not generally applied to adjustment operations.

Sustainability: The resilience to risk of net benefits flows over time. *Possible ratings:* Highly Likely, Likely, Unlikely, Highly Unlikely, Not Evaluable.

Institutional Development Impact: The extent to which a project improves the ability of a country or region to make more efficient, equitable and sustainable use of its human, financial, and natural resources through: (a) better definition, stability, transparency, enforceability, and predictability of institutional arrangements and/or (b) better alignment of the mission and capacity of an organization with its mandate, which derives from these institutional arrangements. Institutional Development Impact includes both intended and unintended effects of a project. *Possible ratings:* High, Substantial, Modest, Negligible.

Outcome: The extent to which the project's major relevant objectives were achieved, or are expected to be achieved, efficiently. *Possible ratings:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

Bank Performance: The extent to which services provided by the Bank ensured quality at entry and supported implementation through appropriate supervision (including ensuring adequate transition arrangements for regular operation of the project). *Possible ratings:* Highly Satisfactory, Satisfactory, Unsatisfactory, Highly Unsatisfactory.

Borrower Performance: The extent to which the borrower assumed ownership and responsibility to ensure quality of preparation and implementation, and complied with covenants and agreements, towards the achievement of development objectives and sustainability. *Possible ratings:* Highly Satisfactory, Satisfactory, Unsatisfactory, Highly Unsatisfactory.

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Principal Ratings

	<i>ICR*</i>	<i>ES*</i>	<i>PPPAR</i>
Watershed and Environmental Management Project (Credit 2768-SLU and Loan 3925-SLU)			
Outcome	Satisfactory	Satisfactory	Moderately Unsatisfactory
Sustainability	Uncertain	Uncertain	Unlikely
Institutional Development Impact	Substantial	Substantial	Substantial
Bank Performance	Highly Satisfactory	Highly Satisfactory	Satisfactory
Borrower Performance	Satisfactory	Satisfactory	Satisfactory
Emergency Recovery and Disaster Management Program (Credit 3151-SLU and Loan 4419-SLU)			
Outcome	Satisfactory	Satisfactory	Satisfactory
Sustainability	Likely	Likely	Likely
Institutional Development Impact	Substantial	Substantial	Substantial
Bank Performance	Satisfactory	Satisfactory	Satisfactory
Borrower Performance	Satisfactory	Satisfactory	Satisfactory

* The Implementation Completion Report (ICR) is a self-evaluation by the responsible operational division of the Bank. The ICR Review is an intermediate Operations Evaluation Department (OED) product that seeks to independently verify the findings of the ICR.

Key Staff Responsible

<i>Project</i>	<i>Task Manager/Leader</i>	<i>Division Chief/ Sector Director</i>	<i>Country Director</i>
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Emergency Recovery and Disaster Management Program (Credit 3151-SLU and Loan 4419-SLU)			
Appraisal	Eugene McCarthy	Daniel M. Leipziger	Orsalia Kalantzopoulos
Completion	Francis Ghesquiere	Daniel M. Leipziger	Caroline D. Anstey

Preface

This is a Project Performance Assessment Report (PPAR) on the Watershed and Environmental Management Project (WEMP, Credit 2768-Slu and Loan 3925-Slu) and the Emergency Recovery Disaster Management Project (ERDMP, Credit 3151-Slu and Loan 4419-Slu). For the WEMP project the World Bank approved a loan in the amount of \$2.65 million and a credit for SDR 1.7 million, equivalent to the same amount on July 14, 1995. The effectiveness date was October 10, 1995, and the operation was closed on December 31, 1997. For the ERDMP project the World Bank approved two credits and three loans in the amount of SDR 4 million and \$14.07 million respectively on December 10, 1998. Originally, ERDMP was packaged as a multi-country program for the Organization of Eastern Caribbean States. During post-approval negotiations, a credit of SDR 2.2 million and a loan of \$3.04 million were earmarked as being specifically for St. Lucia. The loans and credits were made effective on August 13, 1999. The original closing date was January 31, 2002, and it was actually closed on October 31, 2003.

This assessment covers an uninterrupted involvement of the Bank in support of the Government of St. Lucia as it confronted a series of storm disasters and the country's overall disaster vulnerability. The report is based upon reviews of the Implementation Completion Reports (ICRs), the Memoranda and Recommendations of the President (MOPs), legal documents, project files, and discussions with Bank staff involved with the project. OED fielded a mission to St. Lucia in May of 2004 to review the project results. This PPAR will inform a forthcoming OED evaluation of Bank assistance in the context of natural disasters.

Because St. Lucia is a relatively small island, it was possible for the PPAR mission to visit most of the infrastructure constructed under the two assessed projects, including, *inter alia*, the bulk of the river training, and erosion control works for road and river stabilization (see Annex F for a list of site visits). The mission appreciates the courtesies and attention given by interlocutors and it also gratefully acknowledges the logistical support provided.

Following standard OED procedures, copies of the draft PPAR was sent to government officials and agencies for their review and comments. Comments have been attached as Annex B.

Summary

Tropical Storm Debbie was one of the worst storms to hit St. Lucia in living memory. The storm, which happened in September 1994, devastated the environs of Dennery, Anse La Raye, and Soufriere. Extensive damage to the island's limited agricultural land and to its coral reefs led to the widespread realization that the way the St. Lucia was being environmentally managed was seriously flawed.

The Watershed and Environmental Management Project (WEMP) and the Emergency Recovery Disaster Management Project (ERDMP) both focused on tropical storms. Both encompassed forward and backward-looking activities: reducing the destructive potential of the next storm by planning and other preventive activities; and repairing damage already suffered. Institutional capacity to confront disasters in small island developing states is often limited and St. Lucia was a textbook example: as late as 1994 its Office of Disaster Preparedness consisted of only one professional.

The WEMP supported three main objectives: 1) to initiate the immediate rehabilitation of priority watersheds; 2) to prepare a Watershed Management Plan which would serve as the basis for more conservation-minded development; and 3) to strengthen the government's capacities in environmental management and flood preparedness.

Under the WEMP project, works undertaken to protect urban areas and urban infrastructure were generally effective, but works undertaken in rural areas were often inadequately conceived and executed. Little progress has been made with watershed rehabilitation because agriculture on the hillsides is not yet environmentally sustainable, and most informants believe that deforestation is worsening. Much of the project-built infrastructure has already succumbed to shocks associated with extreme weather events, and the rest is generally not being maintained. There are no adequate arrangements to help avoid known operational risks or to mitigate their impact. The outcome of the WEMP Project is rated **moderately unsatisfactory**. The institutional development impact rating is **substantial**. Sustainability is rated **unlikely**. Bank performance is rated **satisfactory**. The borrower's performance is rated **satisfactory**.

The ERDMP objectives were: 1) to strengthen key infrastructure before the next disaster (pre-disaster works); 2) to rehabilitate social and economic infrastructure (post-disaster works); and 3) to strengthen the institutional capacity for managing disaster emergencies.

The ERDMP achieved all of its highly relevant disaster mitigation objectives with only minor shortcomings. The project was successful in constructing lasting riverbank and slope stabilization works and increasing institutional disaster preparedness. The hospital now has a disaster-resistant water system. Two bridges have been rebuilt, the airport is protected against storms with a 20-year return period, and drainage around the facility has been greatly improved. A very large number of soil retention works have been undertaken, they are of good quality, and they are likely to withstand future disasters. A number of badly deteriorated schools have been rehabilitated. The project outcome is rated **satisfactory**. The result of the work begun under the Bank loan, and the added stimulus of repeated buffeting of the Region by subsequent disasters has been the creation of permanent public institutions to manage risks, monitor hazards, and predict

disasters. Nationwide, disaster-relevant skills have been upgraded, satellite warehouses have been constructed, and they are equipped with the bulk of the emergency supplies purchased for them. Emergency communication systems have been set up. The institutional development impact rating is **substantial**. Scores of communities have had their vulnerability to unexpected storms and flood significantly reduced. The structures constructed have resisted the forces of several extreme weather events suffering almost no damage. Sustainability is rated **likely**. The Bank did not allot enough time to preparation, and it is hard to justify processing this loan as an emergency operation given that there was no emergency at the time, but supervision missions were frequent, capably staffed, and effective. On balance, Bank performance is rated **satisfactory**. The borrower was slow to appoint key staff and to release them from other duties so that they could deal with the tight implementation schedule. When the Project Coordination Unit was able to turn its full attention to implementation, it proved highly capable, and most components were fully implemented. The borrower's performance is rated **satisfactory** overall.

The following lessons are suggested by the experience of the two projects:

- The Bank needs to be more involved in the immediate post-emergency period, and it needs to be able to quickly fund activities that do not require detailed preparation, but it needs to take the necessary time to prepare infrastructure rehabilitation components that require careful attention to design.
- In the absence of borrower staff experienced in Bank procurement practices, early training and support needs to be provided, especially under the time pressures that are normal for emergency operations.
- When intervening in the natural behavior of a river, it should be realized that there is a danger of triggering unexpected and negative effects.
- In order to work out a feasible action plan for watershed and environmental management it is imperative to identify the main constraints.
- With adequate preparation, infrastructure can be rebuilt in three years, but creating viable institutions at the national, district, and community level takes much longer. Grappling with well entrenched environmental bad practice is even more challenging and time-consuming.

Ajay Chhibber
Acting Director-General
Operations Evaluation

1. Natural Hazards and Small Island States

Land Suitability and Actual Use: An Environmental Mismatch

1. St. Lucia has a rugged topography with steep mountains and narrow river valleys. Rainfall commonly exceeds 150 inches yearly, but peak downpours are short in duration. The rivers and gullies fill rapidly after heavy rains, and a devastating flood can be over in a few hours. But during that period, large amounts of topsoil are washed from fields to gullies to streams. The rivers move the silt to the sea, where it damages the fragile coral reefs that protect the island's periphery. Often enormous social and economic losses result, as flash floods destroy settlements and croplands.

2. Both of the Bank projects evaluated in this performance assessment focused on damage from tropical storms. They included both forward-looking and backward-looking activities: reducing the destructive potential of the next storm by planning (the improved management of watersheds) and other preventive activities together with restoration, repair, and reconstruction of damages already suffered. The accomplishments of the two projects, the Watershed and Environmental Management Project (WEMP, Credit 2768-Slu as well as Loan 3925-Slu) and the Emergency Recovery Disaster Management Project (ERDMP, Credit 3151-Slu and Loan 4419-Slu), need to be understood within the context of how often and in what manner disasters affect St. Lucia.

3. Only about 6 percent of all available land is considered prime for agriculture. Increasingly, farmers have been clearing forests to bring more land under cultivation, moving in the process to steeper, higher land. The government has constructed feeder roads to service these remote areas. This in turn encouraged further cultivation in adjacent areas and removed the vegetative cover from the country's most steeply sloping areas. Poor farmers have every incentive to continue degrading the hillside environment that puts the more productive lowlands at risk, while they have no incentives to invest resources or efforts in environmental protections. The degradation of the environment is a gradual process, but hurricanes and tropical storms hasten the process temporarily and highlight the degree of deterioration.

4. In addition to its vulnerability to flash flooding, St. Lucia is also vulnerable to slower onset floods, landslides, earthquakes, and tidal surges. It also has to confront the technological disasters that regularly strike all countries, such as plane crashes, oil spills, and disrupted telecommunications (see Annex C).

Tropical Storm Debbie Hits St. Lucia

5. Tropical Storm Debbie in September 1994 was one of the worst storms to hit St. Lucia in living memory. Massive landslides began to occur in quick succession. Ultimately, over 400 took place in the immediate vicinity of inhabited areas. Trees and debris choked gullies, creating flimsy dams that trapped enormous quantities of water before giving way, washing away bridges and flooding adjoining farmland. Six bridges were completely washed away and four more were heavily damaged. Damage to feeder roads paralyzed the shipping of agricultural produce. Studies of coral reefs following

Debbie (with sampling points 250-1,250 meters from three river mouths) found coral mortality as high as 50 percent.¹

6. Heavy rain in the preceding weeks had already saturated the soil. The storm damage was concentrated around the cities of Dennery, Anse La Raye, and Soufriere. Official estimates of losses varied between 13 and 15 percent of the 1993 GDP. There were four deaths, and 600 people were moved to emergency shelters. The entire country lost access to fresh potable water. Electricity and telephone service were disrupted.

7. The unprecedented devastation led to the widespread realization that the way St. Lucia was being environmentally managed was seriously wrong. During Debbie even protected riverbanks eroded, culverts were washed away, and river channels rerouted. Afterwards, riverbeds lay dry and productive farmlands turned into watercourses. As much as 10 percent of the productive land was lost due to storm damage and river relocation.² All river stabilization and drainage works needed urgent maintenance and/or repair before the next rainy season. Estimates of the return period for a similar event were made. Results varied greatly according to community and district, but some areas could expect to face similar rainfall within the next two years—underscoring the need to immediately improve watershed management.

8. Following Debbie, the Government of St. Lucia asked for World Bank assistance to repair the damage and to increase its readiness to respond to future disasters.

National and Regional Institutional Capacity for Disaster Management

9. In the early 1990s, Eastern Caribbean nations generally had limited levels of preparedness, lacked erosion control measures, and had only rudimentary disaster response capability. St. Lucia was no exception: as late as 1994 its Office of Disaster Preparedness (ODP) consisted of only one professional (see Box 1). Furthermore, the office had so little credibility that when it issued emergency warnings, they were ignored.

10. The Organization of Eastern Caribbean States (OECS) was established by the Treaty of Basseterre on June 18, 1981. The OECS was created to foster cost-saving, cross-country agreements, and to cope with the high per capita cost of administrative services in the small islands. Most of the OECS' nine member states have worked with the World Bank on projects focusing on disaster management, airport security, education, solid waste management, and other issues. They have often used the OECS as an administrative body when regional and national governments' interests overlap. Steps which the OECS countries have taken to reduce their vulnerability to natural disasters include: stimulating preparedness and coordinating relief operations; undertaking disaster-related training; drafting laws and regulations to strengthen national and community disaster awareness; and engaging business and industry resources to support preparedness. The Caribbean Community (CARICOM) countries formed the Caribbean

1. Study by Sladek, Nowlis, Roberts, Smith and Siirila cited in Government of St. Lucia Ministry of Planning and Development, WEMP Phase II Final Report, November 1997.

2. Government of St. Lucia Ministry of Planning and Development, WEMP Phase II Final Report, November 1997.

Disaster Emergency Relief Agency (CDERA) which initially focused on relief coordination but has now launched a program aimed at evaluating the economic impact of hurricanes in the short, medium, and long term.

Box 1. Evolution and Functioning of the Institutional Framework for Disaster Preparedness and Response in St. Lucia

Exactly when St. Lucia established an office to deal with disasters is not clear, but by 1990 there was such an office being run by a National Disaster Coordinator. The first regional disaster prevention effort, the Pan Caribbean Disaster Preparedness and Prevention Project (PCDPP), ran from 1980 to 1991. A year later, in 1991, St. Lucia and 15 other Caribbean States signed the Articles that created the CDERA. In February 1995, St. Lucia's Office of Disaster Preparedness increased its staff from two to three, adding the post of Deputy Disaster Coordinator. Then in March 2000 the Office of Disaster Preparedness was renamed the National Emergency Management Office (NEMO). NEMO is responsible for having St. Lucia in a state of preparedness for a disaster, as well as for responding to the needs of the country after a disaster occurs and coordinating that response at local, regional, and international levels. While a crisis is underway, NEMO is part of a larger network that includes various ministries that are essential to a response as well as 18 District Committees consisting of representatives of various ministries and social groups. During a disaster NEMO becomes the National Emergency Operations Centre (NEOC) and its personnel contact local counterparts and together they execute the required action. The NEOC is the center from which all commands are issued and to which all demands are made.

Adapted from http://www.geocities.com/slunemo/about_us/This.is.NEMO.pdf. See Annex D for NEMO mission statement.

2. Bank-Financed Disaster Projects

11. Following Debbie, the Bank approved three successive disaster-related projects, leading to a continuous involvement in disaster prevention and response that is scheduled to cover a period of about 15 years (see Figure 1).³

Watershed and Environmental Management Project

12. In October 1994, a month after Debbie, the Bank fielded an identification mission. A timely Bank presence facilitated aid coordination with bilateral and regional organizations. An IDA Project Preparation Facility grant helped accelerate repair works.

3. The ongoing disaster-related work covered by the third loan is scheduled for completion in 2009, and consequently was not ready for evaluation when OED visited in May 2004.

Figure 1. Sequence of St. Lucia Disaster-Related Operations

13. The WEMP focused on restoring and protecting priority river basins and drainage areas, often with labor intensive works that provided disaster-stricken families with badly needed incomes. Because of the number of sites that required attention and their dispersion and inaccessibility, only preliminary engineering sketches were prepared, with the understanding that adjustments would be made on the job. The objectives and components of the project are shown in Box 2.

Box 2. Watershed and Environmental Management Project Objectives and Components

Objectives

- To initiate the immediate rehabilitation of the hydraulic infrastructure of priority watersheds from the damage caused by the flooding and landslides;
- To address the medium and long term requirements for sustainable watershed development by preparing a Watershed Management Plan for key watersheds that would serve as the basis for more integrated, conservation-minded development; and
- To strengthen the government's capacities in environmental management and flood preparedness.

Components

- Execution of priority river and drainage rehabilitation works, together with supervisory engineering services for their implementation. Hazard mapping, experimentation with methods for stopping soil movements, surveys to develop design criteria for improved river works; and the installation of modernized equipment and related training for improved hydrological data collection and analysis (\$4.98 million);
- Preparation of plans for (i) integrated watershed development, (ii) pilot watershed management projects, and (iii) an institutional development program consistent with the National Environmental Action Plan; and the design of measures for advancing national environmental protection and disaster preparedness (\$1.1 million).
- Retroactive financing for civil works-related expenditures already incurred (\$0.79 million).

The direct participation of the population in the project's activities and improved disaster management generally were to be encouraged.

Emergency Recovery and Disaster Management Program

14. More than four years after Debbie, ERDMP, the second Bank-financed disaster-related project to be implemented in St. Lucia, was approved. Although it did do work related to that storm, it was originally conceived as a means to promote disaster recovery and emergency preparedness in the member countries of the OECS. National emergency management agencies were to be brought to a level where they would be able to perform effectively.

15. Individual lending operations were supposed to take place in five member states eligible to borrow from the Bank. Thus the program consisted of individual lending operations, phased over a period of approximately six years, supporting a comprehensive set of activities:

- Physical investments: Where necessary infrastructure would be rehabilitated or reconstructed. Additionally, vulnerable infrastructure was to be protected and strengthened *before* the next disaster could strike.
- Capacity building: The capacity of national emergency management agencies was to be strengthened to enable them to perform more effectively.
- Institutional strengthening: Steps were to be taken to increase the ability and interest of the private insurance industry to share disaster-related risks; and the enforcement of building codes and land-use planning would be promoted.
- Community preparedness: Community-level disaster committees were to be organized, trained and equipped to enhance their role in disaster preparedness, mitigation and recovery.

16. The OECS program was divided into phases, with the first focusing on St. Lucia, Dominica, and St. Kitts and Nevis (the last of these recovering from major damage due to Hurricane Georges on September 21, 1998). In addition to infrastructure, in St. Lucia mitigation investments were intended to strengthen emergency preparedness and response systems. Analytical studies were to be undertaken to formulate a strategy for developing insurance and re-insurance schemes for public buildings. And building codes were to be improved in conjunction with proper land use planning. The stated development objectives and components for St. Lucia are shown in Box 3 (also see Annex E).

Box 3. Emergency Recovery and Disaster Management Project Objectives and Components

Objectives

- To physically strengthen key economic and social infrastructure 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)
- To reconstruct and rehabilitate key social and economic infrastructure following disasters to allow quick recovery and minimize disruption of economic activity (post-disaster works)
- To strengthen the countries' institutional capacities to prepare for and respond to disaster emergencies in an efficient and effective manner

Components

- Retrofitting public buildings for use as storm shelters (US\$5.94 million).
- Strengthening the National Office of Disaster Preparedness (US\$0.86 million)
- Strengthening the Early Warning System (US\$0.44 million)
- Community Based Disaster Management (US\$0.11 million)
- Institution Building (US\$0.24 million)
- Project Management (US\$0.61 million) consisting of technical assistance, equipment, workshops and audits.

17. There was a third Bank-funded disaster project in St. Lucia, Disaster Management II, which was not far enough delivered to evaluate. The objectives of this third project in the series aim at further reducing the country's vulnerability to adverse natural events (hurricane, floods, etc.) through investment in risk management activities. Although it is only about a year into implementation, and not the subject of this assessment, the project's activities and objectives (see Annex E) indicate that, although many ERDMP activities are continued, the direction of current work has shifted considerably toward prevention.

3. Implementation: Intended Outcomes and Unexpected Results

Watershed and Environmental Management Project

18. The planning for the management of critical watersheds under the WEMP was time-consuming and slow to start up. As a result, civil works, intended to reduce the danger to livelihoods and property from future flooding, commenced before the watershed planning that was supposed to guide it. Activities such as deepening channels in riverbeds, and river bank stabilization were completed before the environmental management plans were prepared. Predictably, under the circumstances the quality and sustainability of what was done in the rural areas varied widely.

19. In the urban areas project financed works consisted largely of the construction and repair of stormwater drainage canals and the construction of retaining walls along rivers. These works were generally of good quality. The Ministry of Communication, Works and Transport's (MOCWT) "River Management Unit" created under the project carried out minor maintenance programs for urban areas as well. These took place under the "River Desilting/Flood Alleviation and Bank Protection Program". Under this program, the agency maintained water channels within the city limits of Castries and several other urban neighborhoods.

20. The implementation of (all three of) the Bank-financed projects was overseen by a project coordinating unit (PCU) that made the many administrative, strategic, and procurement decisions required for day-to-day operations.⁴ The PPAR mission found a broad consensus regarding the conscientious performance of the unit. Many informants stated that the WEMP project had nearly foundered – but that once the PCU was well led, fully staffed, and functional it had done a very competent job of managing the reconstruction process under difficult circumstances and time pressure. It may well be that had the unit been functioning from the start as well as it did in its latter days, WEMP works might have been better planned. After credit closing, the PCU continued to function with much the same management, supporting other Bank loans including the

4. While the PCU was only so designated in the ERDMP and DMP II projects, key positions in the River Management Unit of the WEMP project were staffed by individuals who later took charge of what became the PCU. Bank documents for the WEMP project (including the SAR and ICR) refer to this unit as a PCU.

ongoing second Disaster Management project. It continues to be widely credited for committed leadership, attention to detail, sensitivity to local requirements, and speedy decision making. Discussions were underway about moving the unit to the Ministry of Finance, and the question that many observers asked was – what problems would that solve?

21. Trials of methods for arresting soil movements consisted largely of encouraging the use of banana trash as a ground cover and to build terraces. Pilot efforts in watershed management and agro-ecological mapping were of a much smaller scale than had been anticipated during appraisal.

Retraining Rivers

22. The rehabilitation works component commenced during the 1995 dry season with the removal of river debris and obstructions (deposited there by Debbie in September of 1994). Objects which were removed most quickly were those seen as representing the greatest danger to agriculture, infrastructure, and livelihoods. The arrival of the next wet season was a serious concern.

23. The vulnerability of floodplain areas to flash floods increased after Debbie due to the destabilization of slopes and the silting up of river beds. Under the project, first actions were directed to sites where channels were blocked by boulders or choked with silt and debris. Unless these were removed, any heavy new rains would cause the rivers to overflow their banks, flooding adjacent agricultural land and urban areas.

Box 4. What is River Training?

The volume of soil and debris which the storm washed into the rivers reduced channel capacity greatly increasing the risk of flooding. River training, the only solution to the problem, consists of a series of works that modify or constrain the behavior of rivers, typically including the creation of new embankments and the upgrading of existing ones, the planting of certain varieties of trees and grasses to hold soil in place, stabilizing the outer edge of river bends using stones or other inorganic material to lessen erosion and to keep the river to its course. Once rivers leave their channels due to flooding, they can abandon them for good – river training returns waterways to alignments from which they have departed. River training, by the creation of guide bunds (sometimes referred to as hard points) protects bridges, drainage infrastructure and roads.

24. Project documents note that in realigned rivers meanders will be reintroduced to increase water carrying ability and to slow their (potentially destructive) velocity during torrential rains. However, the mission noted that in about half of the sites visited, all the remaining meanders were cut so the river flows straight as an arrow, just the opposite of what was intended. The end result is decreased water retention capacity and increased water speed following heavy rainfalls – the source of so many problems following tropical storm Debbie.

25. Many areas, where silt was removed, need further desilting. Some stabilized banks have collapsed. Even though trees and vertical grasses may have been planted on them, they have long since been overtaken by weeds and scrub. One official reported the

same process with drainage ditches, noting that because farmers do not understand their function, all 34 of the ditches that he had visited were out of action due to lack of maintenance. Because of storm damage in some watersheds (a major storm occurred during project implementation) it is nearly impossible to see traces of project debris removal and river management efforts.

26. The Watershed Management Plan prepared toward the end of the project lays out an approach to sustainable watershed development. But while it notes the types of actions that will be required, it does not systematically identify projects for future development that could be undertaken with external finance. Nor does it prioritize works in one watershed over another.

27. As a result of the deepening of river channels (see Table 1), the failure to plant bankside trees and appropriate stabilizing grasses,⁵ and the incidence of heavy rains and tropical storms, there has been extensive erosion of bank and destruction of defenses built under the project. The ICR, which is based on a mission that took place in August 1997, notes that in 11 priority watersheds, after damage⁶ to the works from storms during the first year of reconstruction, the rehabilitated infrastructure effectively withstood the impact of subsequent storms.

28. The OED mission in May 2004 found many of the project sites in poor condition. Minor infrastructure maintenance was carried out by the Ministry of Communication, Works and Transport during 1995, 1996, and 1997, but the PPAR mission concludes that the works were insufficient to the actual needs. Moreover, by 2004, at the many rural sites where rivers and drainage had been stabilized, the mission initially found it difficult to believe that any repairs had ever been undertaken. It is only through consulting detailed photographic evidence of the “before” and “after” project situation at a large number of points along the rivers (documented by the consulting engineers) that the mission could be sure that works had been done at all: sites were clearly identifiable, but the works that were shown in the pictures were no longer distinguishable.

29. Pressure to start reconstruction too soon after disaster⁷ led to inadequately analyzed designs and works implemented in a way that did not systematically reduce vulnerability to the next storm. Admittedly, the coming of the next rainy season presented risks to those rivers with reduced flow capacity. But while removing debris quickly made sense, desilting without stabilizing the denuded hillsides in the surrounding watershed

5. Vetiver, a short grass with extremely low maintenance that is not palatable to animals and highly suited to slope stabilization.

6. About 18 percent of the total cost of the works was lost when infrastructure proved to have insufficient disaster resistance. Causes of failure included: deficient alignment of river defenses, insufficient channel profile control, insufficient height of embankments and gabions, poorly designed in-stream bridge approaches, weak junctions of adjacent structures, and overly shallow foundations. Selected corrective works were undertaken with project funds.

7. The ICR attributes infrastructure failures due to a perceived need for speed: “Two strong storms hit St. Lucia later in 1996, a tropical wave on October 26, and the tail of tropical storm Marco on November 21 caused severe damage...where storm damage rehabilitation had been carried out...the damages inflicted to the works executed [under the project] were mainly the consequence of minor design and construction errors induced by the need to take quick corrective actions after Debbie.”

(beginning at the top) soon led to re-silting. The thorough report produced by the project's consulting engineers substantiates the mission's observations on the effectiveness of the works carried out. The effectiveness of the various actions are described and evaluated in the table below.

Table 1. The Effectiveness of the Rehabilitation Works Undertaken

Operation Undertaken	Impact	Comments
Organic debris and rubbish cleared from 10 rivers, sediment removal from 9 rivers	<ul style="list-style-type: none"> • Blockage removed • Decreased floodplain flooding • Increased flow rate • Lessened eutrophication and health hazards 	Non-controversial activity: debris removed to dump, organic material used as compost and mulch. Special attention (burial) was required for dead animals.
Widening river channels (major work on 5 rivers)	<ul style="list-style-type: none"> • Decreased floodplain flooding • Immediate loss of agricultural land • Loss of riverbank habitat 	Overall beneficial but some problems were noted including need for urgent soil stabilization and tree planting. Consultation and compensation essential.
Five river channels deepened	<ul style="list-style-type: none"> • Increased erosion of existing channel and in tributaries. • Undercutting of banks 	Creates more river channel and bank instability problems than it solves.
Rock protection (rip-rap, done on 10 rivers)	<ul style="list-style-type: none"> • Helps prevent riverbank erosion 	Too expensive for the protection of agricultural land. Should only be done to protect infrastructure. Not as effective as using gabion baskets.
Gabion baskets on eroding (outside) bank (done in four geographic areas, number of rivers not clearly specified).	<ul style="list-style-type: none"> • Effective at protecting against river bank erosion. • Looks good. 	Not recommendable just to protect agricultural land. High cost was not justified in most cases.
Meander (loop) cutting (major work on 3 rivers, minor work on another).	<ul style="list-style-type: none"> • Increases speed of drainage • Increased erosion • Loss of trees and protective vegetation • Loss of agricultural land • Loss of access to agricultural areas • Large volume of spoil 	Highly problematic. Not recommended for any future work in St. Lucia except where current meander threatens major infrastructure over a wide area. Leads to land disputes and compensation claims. Increased flow rates aggravate future floods and contribute to rapid erosion
Filling old meanders (major work on 3 rivers, minor work on another)	<ul style="list-style-type: none"> • Creation of new land 	Any benefits from this expensive new land creation have been small, legal status (ownership) of new lands is uncertain due to absence of boundary markers, and fertility/texture of new land is poor. Filled areas serve as a reserve flood channel, and are highly subject to flood hazard.

30. The assessment mission substantiated the ICR finding that works were too rushed to be of satisfactory quality. In many cases the perceived need to hurry was mistaken. What is the point of hurrying to build things that wash away? Field observations confirmed that subsequent tropical storms and heavy rains (and in this case several weather events that happened before the project had even closed) conspired with

inadequately conceived restoration plans and a lack of watershed level planning, to destroy a significant amount of the supposedly disaster-resistant project-built infrastructure.

The Emergency Recovery and Disaster Management Program

31. While the OECS program was being appraised it was thought that grouping projects for all five OECS countries into one adaptable program loan would lead to efficiencies (as a ratio of administrative budget over dollars lent). In practice the opposite was true: nine loans/credits in total eventually had to be unbundled and turned back into separate projects.⁸ Therefore, although an innovative approach was used to develop a regional program, it had little effect.⁹

32. The PPAR mission visited a number of ERDMP sites, including retrofitted schools, gabions (for landslide prevention, drainage, and river training), the emergency water supply for the hospital, storage facilities for emergency supplies, and the flood prevention works at the airport.

33. The gabion works were extensive and first rate. Sites were well chosen. Execution was good. The infrastructure and settlements being protected generally warranted the scale and cost of what was being done to protect them. Although in a few sites, it seemed that a small additional investment in extending what was done would greatly increase sustainability, project staff indicated that such extensions were contemplated in the follow-on project. Following the midterm review in January 2002, an amendment to the loan/credit agreement dropped flood prevention works in the Cul-de-Sac Valley (bridge construction, drainage, embankment works). These were not undertaken after an in-depth feasibility study showed the cost was much higher than anticipated.

34. While the project documents describe a concerted effort to create emergency shelter in public buildings and to increase public awareness of locations designated for use as public shelters (refer to Box 3 for objective and component descriptions), most of the buildings designated for project-financed repairs were schools that were badly in need of refurbishment before tropical storm Debbie hit. The quality of the works was uneven: at one school officials complained bitterly that the project-supplied roof was leaking to a degree that was causing ongoing interior damage and that in spite of repeated complaints, no efforts had been made to correct the situation. Similar complaints were made about improvements to school bathrooms, which were still not usable. In several schools, the new aluminum louvers installed (glass windows would have been inappropriate given the climate) were too thin for use in public buildings, much less classrooms for playful and energetic children. They were made of easily buckled and flimsy material, much more fragile than the louvers the classrooms had before. The majority of the new louvers had already been either destroyed, seriously damaged, or bent by the students just in normal

8. The ICR notes that different purchase order numbers were required for SAP to monitor each project separately.

9 The comments on this report submitted by the Borrower note that the regional approach facilitated information exchange and helped to strengthen a “culture of prevention” in participating countries.

use. The classrooms that still had the old windows were much better off, in terms of the percentage of louvers in each classroom that could be made to close to keep the rain out.

Shelters

35. The government originally selected 23 schools to be retrofitted as hurricane shelters. Schools in St. Lucia tend to be two stories high, accommodating three to six classrooms on each level under a large gable roof. Often there are multiple buildings. Under the project, roofs and windows had to be made sufficiently hurricane-resistant to offer dry accommodation to families sheltering there. Kitchens and sanitary facilities had to be added where absent, or upgraded to handle large groups living in the buildings for extended periods of time. Generators and water tanks also had to be installed.

36. Repairs were intended to make schools more disaster-resistant and ready to provide shelter in an emergency. Yet, while other buildings on the island were designated as disaster shelters (primarily community centers and some churches), and clearly marked with signage to that effect, the schools the mission visited were not so designated, perhaps because of the experience of St. Kitts (see Box 4). True, the repairs under the project (except for the louvers) addressed the immediate needs of St. Lucia's schools. But, while the repairs may be contributing significantly to their continued use as schools, they are not significantly increasing their disaster resistance.

37. Water tanks (intended to increase the capacity of public buildings to function as emergency shelters) were not installed and are the subject of litigation between the government and the supplier. They were constructed out of a glass fiber commonly used for water tanks in Europe, and after they were delivered, local officials mistook the glass for asbestos fiber and refused to accept them.

38. During implementation, replacing roofs in schools proved more expensive than anticipated. Only 11 of the planned 23 schools were actually repaired. The PPAR mission found the following:

- Roofs were not pitched steeply enough to counteract the uplifting force of high winds.
- The lightweight roof sheeting was not always hurricane-proof. It was not always attached to roof trusses with special fasteners, nor were the trusses connected to the masonry with an unbroken band of metal (commercially available "cyclone straps" are a common solution).
- Since the louvers installed under the project are not capable of keeping torrential rains out, storm shutters will be needed for emergencies.
- While the kitchens observed by the mission seemed to have the capacity to handle long-term large-scale feeding operations, sanitary facilities are borderline inadequate for the current school population. They do not have the capacity to house a large number of adults in addition to children.

Box 4. A Better Approach to Emergency Shelter: The St. Kitts Experience

Under ERDMP, five countries (St. Lucia, Dominica, St. Kitts, St. Vincent, and Grenada) were to construct hurricane shelters. When the 1998 Hurricane George damaged 85 percent of the houses in **St. Kitts**, people used schools as shelters for up to three months, until their homes were fixed. This, however, posed a problem for schools, which were not able to operate. Children already traumatized by the loss of their home had to suffer the disruption of their schooling, keeping parents busy with childcare. Therefore, under ERDMP St. Kitts developed a new strategy for its shelter construction. The Government of St. Kitts and Nevis decided against retrofitting schools, and instead built smaller shelters that could be used as community centers year-round. Five of eight community centers were built with concrete roofs and reinforced windows in the island's most populated areas. Their interiors are designed to be turned into separate dormitories for men and women. Shelter managers were trained and a national shelter policy developed and discussed with all stakeholders.

Disaster Institutions and Resources

39. District Disaster Committees (DDCs) report twice a year directly to the Prime Minister. The PPAR mission was present the opening day of the hurricane season. There was a high awareness of possible hurricane threats, and meetings to coordinate disaster relief between different donor agencies, as well as a planning session with the Prime Minister and NEMO to prepare for the next hurricane. Disaster management has become an integral part of the country's planning processes. School principals and District Disaster Committees (DDCs) received training in how to operate shelters, and in how to communicate with the radio equipment that was purchased under the project. Training was also provided to the media to use clearer language when announcing hurricane threats.

40. The storage facilities for emergency supplies were built as intended. They are completely new structures but they have not yet been handed over to the local communities. Both NEMO staff and the District Disaster Committees have keys, but no community leaders or village committees have been entrusted with that responsibility.

41. The stockpiles of disaster equipment and loss reduction materials included generators, water purification equipment, plastic sheeting, chain saws, lanterns, and first aid supplies. Much of the equipment was pilfered before it could be transferred to the satellite warehouses. This loss largely cancels out the capacity the equipment was intended to create, and communities were doubtless disappointed not to receive all they expected. According to data provided to the mission by NEMO, losses include 60 percent of portable generators (3 out of 5), 40 percent of chain saws (4 out of 10), 30 percent of emergency water pumps (3 out of 10), about 16 percent of the total number of folding cots (17 out of 104), 33 percent of shovels (30 out of 90), 10 percent of hard hats (9 out of 90), and a significant quantity of tarpaulin and plastic sheeting.

42. The Early Warning System for storms and hurricanes is now operating, thanks to investments in equipment for the National Meteorological Service. There is now an enhanced satellite receiving station with high-resolution imaging, and an upgraded Area Forecast System. New computers and a dedicated phone system were provided, along

with training in their use. Equipment was purchased for a Flood Warning System and the system is operational in the larger rivers. Emergency plans for the full range of hazards to which the country is exposed were prepared, though they are awaiting official approval (see Annex C).

43. Because of the high complexity of the project in St. Lucia – seven different agencies involved, multi-sectoral activities scattered all over the country – the following components were only partly achieved or had to be cancelled. Most of them concerned institutional strengthening:

- Little was done to increase the government’s access to insurance under the project, other than the preparation of an inventory of public buildings.
- Government buildings were not assessed for hazard vulnerability.
- No training was provided in emergency equipment management.
- Vulnerability maps were not produced. Coordination with CDERA and Caribbean Development Bank (CDB) regarding map preparation took place, but no action followed and the component was cancelled.
- A national building code had been prepared under the Caribbean Disaster Mitigation Project (CDMP), funded by USAID/OFDA and OAS, but it is still awaiting enforcement.
- A seven-member National Hazard Management Council was organized to advise NEMO but did not meet regularly: it duplicated the National Emergency Management Advisory Committee (NEMAC), which under law has to meet regularly, and which enjoys wide representation by community organizations, professional associations, and business/industry representatives.

44. The PPAR mission contacted CARICOM and CDERA to learn their perspectives on the two evaluated projects and the regional approach taken in ERDMP. Officials from OECS complained that they were only involved in the loan negotiations. Once the loan was approved, member countries did not consult OECS further.

Impact of Bank Disaster Lending is Significant

45. During the early 1990s, no disaster legislation existed for St. Lucia, no emergency communication equipment was available, hurricane announcements were made in a way that only educated people could understand, and District Disaster Committees (DDCs) were not trained in operating shelters and evacuating people living in flood-prone areas. The following incident illustrates changes to which the World Bank project contributed.

46. In early 2002, 17 disaster management officials from St. Lucia participated in a simulation exercise in Tegucigalpa, Honduras.¹⁰ During this exercise St. Lucia’s National Emergency Response Management Plan was tested. It had been prepared under ERDMP by a consultant to NEMO. On September 23, 2002, Hurricane Lili hit St. Lucia. The disaster preparedness and response was tested by a real event and the procedures

10. Humanitarian Allied Forces Command Post Exercise is an exercise conducted every two years and sponsored by the US Southern Command with the intention of testing EOCs and improving response between national, regional and international agencies.

developed in the Hurricane Plan workshop were followed. The day before the event people in St. Lucia were told about the hurricane threat in plain English and in Creole. Officials responsible for disaster management opened shelters, organized the evacuation of people living in endangered areas, and closed schools and commerce the following day. When the storm hit the following night, the Emergency Operations Center (EOC) was staffed by volunteers, and communications with DDCs worked at all times. Storm damage was estimated at US\$7.6 million, most of which came from crop losses. No one was reported injured or dead. A debriefing session took place, and NEMO is now updating its National Emergency Response Management Plan based on the experience gained under the project.¹¹ Without ERDMP, this level of preparedness would not have been reached.

47. The appropriateness of processing the loan using the expedited procedures allowed for emergency recovery lending was not justified, however.¹² There had been no immediate emergency situation in St. Lucia at the time of preparation. The perceived need to move quickly during the design phase, led to (many) components being so poorly defined during preparation that they had to be reappraised during implementation.

4. Achievement of Objectives and Ratings

WEMP

Objective 1. To initiate the immediate rehabilitation of the hydraulic infrastructure of priority watersheds from the damage caused by the flooding and landslides (achieved but with major shortcomings).

48. Drain rehabilitation works were conducted covering six towns. In Dennery, however, the project created a significant environmental nuisance. The storm water drainage canal, intended to flow into the sea was constructed at the wrong height and slope. Thus contaminated rainwater accumulates a few hundred meters from the outlet of the canal, resulting in a garbage trap that produces bad smells and encourages mosquitoes a few steps from the main street.

49. Execution of river rehabilitation works took place in the 11 priority watersheds. The removal of silt, boulders, and organic material temporarily increased the capacity of water courses, but the lack of upstream measures to control erosion and stabilize steep slopes will make these improvements short-lived. Restored banks were not properly stabilized, and stone (rip rap and gabions) was used at sites where it was not economically justified. The unevenness of project civil works was partially the result of using many small contractors, who were difficult to supervise. Engineering review of project work led to the identification of valuable lessons which (hopefully) will be

11. Retrieved on 08/22/04 from:

<http://www.reliefweb.int/w/rwb.nsf/6686f45896f15dbc852567ae00530132/d571ffbe0d71a7da85256c45007519ce?OpenDocument>.

12. The PPAR and ICR are in agreement regarding the inadvisability of using ERLs when there is no emergency.

reflected in ongoing and future river works aimed at increasing carrying capacity. Contractors' experience with the type of works used under this project will benefit St. Lucia in the years to come.

Objective 2. To address the medium- and long-term requirements for sustainable watershed development by preparing a Watershed Management Plan which would serve as the basis for more integrated, conservation-minded development of key watersheds (achieved but with significant shortcomings).

50. The Watershed Management Plan was prepared, and it did develop clear criteria and guidelines for watershed management generally. But beyond that it failed to identify concrete steps to take. Studies conducted to inform the plan preparation process contributed to knowledge on watershed development. The participation of large numbers of families in labor intensive rehabilitation works contributed to increased public awareness of the nation's environmental problems.

Objective 3. To strengthen the government's capacities in environmental management and flood preparedness (fully achieved).

51. The individuals in the several agencies involved with project and financial management acquired invaluable experience with the design and implementation of hydraulic works. This has made the PCU a more effective implementer of the two disaster projects which followed WEMP. The project provided on the job training to numerous small contractors, and it strengthened the capacity of participating ministries and agencies in flood preparedness and civil works.

Ratings for the WEMP Project

52. *Outcome.* The project achieved highly relevant physical and institutional objectives but with a series of major shortcomings. Much of the infrastructure constructed has already been degraded. Adequate arrangements are not in place to help avoid known operational risks or to mitigate their impact. The infrastructure constructed and services generated labor-intensive employment at a time when that was of critical importance to many families, however. Overall the project outcome is rated **moderately unsatisfactory**.

53. *Institutional Development Impact.* The Office of Disaster Prevention (known later as NEMO) began to develop a measure of implementation capacity, and blossomed more fully under the ERDMP project rated below. The River Management Unit evolved into the PCU which has become a semi-permanent institution; capable staff have been recruited and retained, information systems have been established, and hazard-related planning processes have been carried out in an unprecedented manner—albeit a great deal more remains to be done. Under the labor-intensive works undertaken, local skills have been upgraded, which may affect families capacity to earn over the longer term. Disaster risk management and efficacious response to emergency situations are now central in the government planning process. Institutional development impact is rated **substantial**.

54. *Sustainability.* Project-built public infrastructure is in use. But they are generally not being maintained under the budgets and oversight of the relevant ministries. Sustainability of the works depends on two things: 1) the regular provision of human and

financial resources for their maintenance and 2) upstream environmental management and sensible land use practices which should have been part of the project but were not. There was a three-year period where some systematic effort (though not at the scale necessary) was exerted for hydraulic infrastructure maintenance. Since then, maintenance efforts have occurred but they have not been systematic and they often come too late – interventions tend to be triggered by damage to bridges, cutting of road beds, and failure of urban drainage systems. Little progress has been made with environmentally sustainable agriculture on the hillsides, because most of the pilots envisioned at appraisal did not happen. Most informants believe that deforestation is worsening. At the time of this review, the resilience to risks of future net benefits flows is poor. Although the project continues to produce net benefits, there is little likelihood that they will be maintained. Sustainability is rated **unlikely**.

55. *Bank Performance.* The Bank responded quickly after Debbie, and Bank staff helped to design a project that addressed the problems caused by the storm in a comprehensive way. Early Bank involvement mobilized funding from other sources that complemented project activities in important ways. Bank performance is rated **satisfactory**.

56. *Borrower Performance.* Although the PCU was slow to become effective, staff flexibility and determination to succeed helped overcome a number of obstacles. Ministries that had never worked together before coordinated effectively during implementation. Key staff members that participated in the effort have become important disaster experts in the country. Less positively, monitoring and evaluation was never undertaken, so that an opportunity was missed to identify aspects of the protection works that were not cost-effective (e.g. protecting fields). The studies and the Environmental Management Plan were completed and used effectively. The borrower's performance is rated **satisfactory** overall.

ERDMP

Objective 1. 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 (fully achieved with minor shortcomings).

57. The PPAR mission visited Hewanorra Airport, the most valuable of the infrastructures protected, and reviewed the measures provided for the facility with the team in charge. Drainage has been provided so that the waters from major storms flow directly to the sea. Dikes protect the runways from the waters of a river which passes near the airport; and an access road has been constructed to facilitate the maintenance of the system. At Victoria Hospital, the mission noted that the water tower built with project funds was of good quality and filled to capacity. Its location on stabilized ground on a nearby hill ensures a continuing supply of water to the hospital in the event that water service is cut off by storms, as happened following tropical storm Debbie.

58. The Emergency Shelter Program, which retrofitted schools for use following emergencies contributed to the creation of a reserve shelter capacity, even though the retrofitted schools visited are not currently designated as shelters. Kitchen facilities are

up to the task of feeding a large temporarily displaced population, though the sanitary facilities are not yet adequate to such use.

59. The vulnerability assessment of public buildings did not take place, although an inventory of these buildings had been prepared—an important first step. A related issue that remains to be addressed is the protection of historic cultural property, which because of tourist interest has economic importance. Fort Rodney on Pigeon Island is a major tourist attraction, but public officials say it is hard to justify measure to protect the complex from extreme weather events when the government finds it hard to finance the reconstruction of public office buildings providing services to the entire country.

Objective 2. To reconstruct and rehabilitate key social and economic infrastructure following disasters to allow quick recovery and minimize disruption of economic activity (fully achieved).

60. No disaster occurred during the project but there was much left to put together after Debbie. Bailey bridges were bought, two bridges were rebuilt using the acquired modules and sufficient stock remains to construct one (small) additional bridge when that should become necessary. The bridges acquired were of exceptionally good quality. Unfortunately they were not compatible with the existing stock of Bailey-type bridges so that the modules cannot be combined, and any new works cannot be supplemented from existing stock. Numerous flood prevention and drainage works have been done using gabions. Slope stabilization and landslide prevention works were also generally well executed and likely to last the 50-year projected life span of gabions. The project replenished the government's stock of the steel baskets which are used to make gabions, which will facilitate quick recovery and infrastructure protection in the future.

Objective 3. To strengthen the countries' institutional capacities to prepare for and respond to disaster emergencies in an efficient and effective manner (fully achieved).

61. The National Meteorological Service has equipment that will enable it to better monitor storm development and trajectory, and it has the telephone equipment (procured under the project) to deliver warnings. The emergency communications system enables the national authorities to stay in closer contact with local officials and community committees. In many districts the system is tested weekly to ensure its continued functioning and to keep up participants' skills and morale. Strengthening NEMO through technical assistance and capacity building in disaster preparedness has contributed to a significant improvement in functionality, which it has demonstrated in crises. Its ability to transform into the NEOC is an important power. The development and subsequent revision of the National Emergency Response Plan and the various hazard-specific plans prepared under the project are a major step forward. The creation of its relationship with the 18 partner district committees is moving it toward community-based disaster management.

62. Local disaster committees have been strengthened. The motivation of the committees has been enhanced enormously by the personal attention given to their functioning by the head of state, who meets with all the committees once a year to discuss preparations and plans of action for the next hurricane season. District disaster committees have been given a secure storage place where they can store emergency equipment and supplies. Stockpiles of disaster equipment and loss-reduction materials have been established, but they have not yet been turned over to the local committees as anticipated.

Ratings for the ERDMP Project

63. *Outcome.* The project achieved all of its highly relevant disaster mitigation objectives with only minor shortcomings. The hospital now has a disaster-resistant water system. Two bridges have been rebuilt, and there are parts enough to make one more whenever that should be necessary. The airport is protected against storms with a 20-year return period, and drainage around the facility has been greatly improved. A very large number of gabion works have been undertaken, they are of excellent quality, and they are likely to resist bad weather. A number of badly deteriorated schools have been rehabilitated, and they have marginally increased their capacity to serve as shelters in some future emergency. Overall the project outcome is rated **satisfactory**.

64. *Institutional Development Impact.* The Project Implementation Unit worked exceptionally well in the ERDMP projects, and continues to play a key role in all ongoing Bank work. During the ERDMP, the staff of the NEMO was doubled,¹³ and a National Hazard Mitigation Council was added to advise and support it. DDCs were created, and they have continued to receive support and encouragement from the highest levels. The result of the work begun under the Bank loan, and the added stimulus of repeated buffeting of the Region by subsequent disasters has been the creation of permanent public institutions to manage risks, monitor hazards, and predict disasters. Hundreds of members of local committees have been trained in disaster management by the Red Cross. Fourteen flood warning stations are constantly monitoring river levels and flows. The PCU was transformed into an auxiliary disaster management institution increasing human welfare over the long term. A Disaster Preparedness and Response Bill was passed. New procedures are in effect at the National Meteorological Service (NMS) that provide increased safety to air travelers. Nationwide, disaster-relevant skills have been upgraded, satellite warehouses have been constructed, and they are equipped with the bulk of the emergency supplies purchased for them. Emergency communication systems exist where none did before. The institutional development impact rating is **substantial**.

65. *Sustainability.* Scores of communities have had their vulnerability to unexpected storms and flood significantly reduced. Preliminary work on a relevant building code, plus code-related training for the construction industry has been undertaken. If enforced, this will increase the sustainability of public and private investments. The gabion structures constructed have resisted the forces of several extreme weather events, suffering almost no damage, and it can be predicted that they will continue to resist disaster risks, adding to the substantial benefits delivered. Project-built public infrastructure (bridges, drains, warehouses, and the upgraded schools) are in use. With the exception of rural works, they are generally being well maintained. Technical and financial resilience is high, as is social support. Sustainability is rated **likely**.

66. *Bank Performance.* The Bank did not allot enough time to preparation, and it is hard to justify processing this loan as an emergency operation given that there was no emergency at the time, and the complex implementation arrangement and the institution building envisaged under the project would have benefited from a longer implementation

13. As of the mission it consisted of three professional staff, a secretary, and an inventory officer.

period. However, supervision missions were frequent, capably staffed, and effective. On balance, Bank performance is rated **satisfactory**.

67. *Borrower Performance.* The borrower was slow to appoint key staff and to release them from other duties so that they could deal with the tight implementation schedule. Preparation was inadequate. In the latter stages, however, the PCU was able to turn its full attention to implementation, and most components were fully implemented. The borrower's performance is rated **satisfactory** overall.

5. Conclusions and Lessons

68. For the WEMP project, after the 1996 storm Debbie, the Bank chose a Sector Investment and Maintenance Loan. In contrast, three years later, the ERDMP project was processed as an Emergency Recovery Loan without there being any disaster as a trigger event. In the first project, adequate time was given to project preparation (though the sequencing was wrong and the watershed management plans were not followed) and to a thorough analysis of the country's needs relative to the long-term restoration of degraded watersheds. The second project, in part because it was prepared on a fast-track, failed to address the medium- and long-term needs of the watershed problem. Fast-tracking when there was not even an emergency proved counterproductive.

69. Under the WEMP project, works undertaken to protect urban areas and urban infrastructure were generally effective. This can be contrasted with works undertaken in rural areas which often were inadequately conceived and executed. The ICR noted that preparation of the watershed management plan was delayed because execution of the civil works was the immediate priority. This argument makes little sense and fails to explain why they could not have been conducted in parallel from the outset.

70. In the absence of sound environmental management, each event makes the next one more probable. Management of rivers in order to reduce storm-related floods requires the knowledge of the root causes of flooding in each locality, and the identification of site-specific steps to minimize flood impacts. The WEMP project had it right in the sense that watersheds need to be dealt with as the basic unit. Runoff from hillsides needs to be reduced, and, on agricultural land, organic and inorganic barriers put in the path of runoff so that most of the water not absorbed where it lands gets absorbed way before it gets to the valleys. Restorative measures are needed to protect the productive valleys downstream of severely degraded areas on the hillsides.

71. While the WEMP project *taken as a whole* took a comprehensive and forward-looking approach, including planning for the next disaster, it did so only after the reconstruction works were inappropriately completed, with many subsequently destroyed or damaged (because they were not adequately disaster-resistant *and* because maintenance was not systematically undertaken).

72. The ERDMP project was more successful in constructing lasting riverbank and slope stabilization works and in improving institutional disaster preparedness. Yet

because it was prepared on a fast-track basis, some drainage systems did not work as designed, and protection measures failed to tackle the (up-stream, hilltop) roots of environmental degradation, which had already been thoroughly identified during the first project. Instead of capitalizing on the insights developed by the WEMP Watershed Management Plan, it responded to some immediate repair needs without having a long-term disaster prevention approach. The rivers have never returned to the stability which characterized them before Debbie because: some river training works were not done properly; the watershed was never managed as a whole, needed upstream measures were never really taken, and little piloting work was ever done.

73. Several vulnerability reduction works necessary to protect several large population centers have been left to the second Disaster Management follow-on project. For example, a new seawall and artificial islands will be constructed in Dennery harbor. Recent thinking in the Region indicates that some thought should be given in the follow-on project to moving housing back from the beach, rather than to constructing works that require high maintenance where maintenance is typically neglected. Several government officials suggested lower-cost alternatives to the problems of Dennery, including breakwaters, and moving all the homes back from the beach while preserving their positions relative to each other (as land availability does not present much problem).

74. The recent Caribbean 2004 Regional Disaster Conference: “Managing Hazards in a Changing Environment” reviewed the progress made in disaster management and mitigation since the 1984 Ocho Rios Conference and concluded that governments should back away from large-scale investments in structural measures to reduce disaster vulnerability. Various discussants had noted that since 1984, Caribbean countries have built expensive infrastructure (often with donor support) without having the funds to maintain it. Regional experience over the last decade led the participants to conclude that Caribbean states ought to change to more sustainable and cost-effective non-structural mitigation investments – measures such as relocating low-lying settlements away from the coast.

An Evolving Bank Strategy in the Caribbean

75. It is important when the Bank is working with disaster-stricken small island developing states (SIDS) to arrive at the scene quickly, to be present throughout the period the government and donors prepare their response, and to provide financing for urgently needed works. But many works are not so urgent to justify over hasty preparation. Quickly prepared plans for reconstruction have resulted in significant wastage. More attention to design is needed. More importantly, the Bank should wait for a borrower-owned response to environmental degradation. An emergency creates pressure to opt for speed at the expense of detail, yet it is the details that determine whether or not efforts will succeed. Taking the time to develop a better design based on sound principles of environmental management could have lessened a number of problems.

76. The Bank needs to develop a clearer understanding of which aspects of emergency response can be rushed, and which cannot. Bank strategies to reduce the vulnerability of SIDS have evolved considerably over the past two decades. Projects

during the 1980s¹⁴ rebuilt roads and wharves and invested in coastal protection. A closer look at the islands' infrastructure makes it clear that a lack of maintenance and environmental degradation increased the damage caused by tropical storms.

77. Beginning in 1989, disaster rehabilitation projects became more multi-faceted.¹⁵ Vulnerability was reduced not only through coastal protection infrastructure, but through a multitude of measures such as higher design standards during rebuilding, balance of payment loans to ease cash-flow, promotion of building codes, national disaster legislation, hazard mapping, and land use planning. The largest change was the investment in disaster management to make governments and communities better prepared. Beginning with the creation of the regional Caribbean Disaster Emergency Response Agency (CDERA), disaster management offices were set up in all the Caribbean SIDS; the Bank's strategy was to strengthen them through staff increases, disaster management training, national emergency plans for different hazards, and emergency equipment.

78. The change in practice observed reflects the evolution of the Bank's operational policies. In 1984, operational policy note 10.07, "Guidelines for Bank Participation in Reconstruction Projects after Disasters," states that projects should not focus on institutional change. By 1989, the main emphasis in the Operation Directive (OD 8.50), had shifted to disaster management, reflected in the recommendation to develop a national strategy and establish an adequate institutional and regulatory framework. The 1995 WEMP project was prepared under the provisions of this directive. Beginning in 1989, disaster recovery projects involve components to make national institutions better prepared to cope with future disasters. This emphasis on disaster management remains important in the (1995) OP 8.50. Four years later, the ERDMP, approved in FY 1999 for five Caribbean countries, exemplifies this shift to disaster management.

79. The Bank's focus on institutions for disaster needs to bear in mind that regional organizations and national governments' interests do not always overlap. CDERA, CDB, and OECS feel the need to be more involved by the World Bank in country-level activities in order to raise their quality and improve sustainability. However, judging by the St. Lucian officials met during the evaluation, individual countries do not wish to have their projects managed by external institutions. They value the learning experience of going it alone and are reluctant to involve regional entities (feeling that local institutions gain little when the regionals are involved).

Lessons

- ***The Bank needs to be more involved in the immediate post-emergency period, and it needs to be able to quickly fund activities that do not require detailed preparation, but it needs to take the necessary time to prepare infrastructure rehabilitation components that require careful attention to design.*** If the Bank is

14. In Vanuatu, Samoa, Comoros, and the Dominican Republic to give a few examples.

15. For example, the Jamaica Emergency Reconstruction Import Loan which promoted higher design standards, disaster insurance, improved building codes, training in disaster management, and the establishment of an emergency communication system.

eventually going to be involved in reconstruction, it needs to sit down at the table with the early responders. The Bank should be present in the immediate aftermath of a natural disaster when decisions are made which influence future reconstruction activities. Bank staff with disaster knowledge need to advise governments on reconstruction and mitigation, and other players need to have an understanding of what the Bank will ultimately do. Since SIDS tend not to have large reserves available for disaster reconstruction, small-scale but nearly instant funding is crucial in the immediate aftermath of a disaster. The experience of these two projects illustrates the perils of inadequate attention to design, including taking into account the motivation and perceptions of key stakeholders.

- ***In the absence of borrower staff experienced in Bank procurement practices, early training and support needs to be provided, especially under the time pressures that are normal for emergency operations.*** During WEMP it took a long time for the involved government staff to learn Bank procedures. In the context of SIDS, it is important to take into account the capabilities of the country. A small country with limited human resources needs assistance if it is to produce the same amount of documentation as a large country. Targeted procurement support needs to be tailored to the capacity of individual SIDS.
- ***When intervening in the natural behavior of a river, it should be realized that there is a danger of triggering unexpected and negative effects.*** For this reason it is sometime preferable to keep land adjoining rivers free of construction and to allow the river to have some freedom of movement.
- ***In order to work out a feasible action plan for watershed and environmental management it is imperative to identify the main constraints hampering sound management.*** In St. Lucia constraints have included turf issues between relevant public institutions, the movement of farming to the hillsides, the nature of local crops, and local perceptions of hazards (causes and remedies).
- ***With adequate preparation, infrastructure can be rebuilt in three years, but creating viable institutions at the national, district, and community level takes much longer.*** Grappling with well entrenched environmental bad practice is even more challenging and time-consuming.

Annex A. Basic Data Sheet

ST. LUCIA WATERSHED AND ENVIRONMENTAL MANAGEMENT PROJECT (CREDIT 2768-SLU AND LOAN 3925-SLU)

Key Project Data (amounts in US\$ million)

	<i>Appraisal estimate</i>	<i>Actual or current estimate</i>
Total project costs	7.10	7.31
Loan amount	5.30	5.13

Cumulative Estimated and Actual Disbursements (amounts in US\$ million)

	<i>1996</i>	<i>1997</i>	<i>1998</i>
Appraisal estimate (US\$M)	2.0	3.3	na
Actual (US\$M)	3.8	0.6	.9*
Actual as % of appraisal	190	18	na

Date of final disbursement: May 30, 1998

Note: Most of the project was completed by the end of 1996 and during 1997 and 1998.

*Priority was given to the execution of the civil works (financed by the loan), therefore most works were completed by the end of 1996. During 1997 and 1998, implementation focused on preparation of the Watershed Management Plan and only minor works remain to be completed.

Project Dates

	<i>Original</i>	<i>Actual</i>
Departure of Appraisal Mission	December 1994	December 1994
Board approval	July 1995	July 1995
Effectiveness	October 1995	October 1995
Closing date		

Staff Inputs (staff weeks)

<i>Stage of Project Cycle</i>	<i>Planned</i>		<i>Revised</i>		<i>Actual</i>	
	<i>Weeks</i>	<i>US\$('000)</i>	<i>Weeks</i>	<i>US\$('000)</i>	<i>Weeks</i>	<i>US\$('000)</i>
Preparation to Appraisal					62.3	219.7
Appraisal					9.5	26.1
Negotiations through Board Approval	4	11.5	2.2	5.3	4.2	27.2
Supervision	13	70.2	17	61	11.2	45
Completion	5	17.			7	28
Total					94.2	346

Mission Data

Stage of Project Cycle	Date (month/year)	No. of persons	Staff days in field	Specializations represented	Performance rating	
					Implementation Status	Devel. Objectives
Through appraisal	10/94	3	4	Economist, Engineer		
	11/94	1	8	Environmentalism		
	12/94	1	8	Environmentalism		
	1/95	1	9	Social Scientist		
Appraisal through Board Approval	No Appraisal Mission					
Supervision	7/95	1	5	Engineer	S	S
	3/96	1	5	Environmentalism	S	S
	10/96	2	6	Natural Resources Management, Engineer	S	S
	3/97	1	2	Natural Resources Management	S	S
Completion	8/97	2	10, 7	Natural Resources Management, Engineer	S	S

ST. LUCIA EMERGENCY RECOVERY AND DISASTER MANAGEMENT PROJECT (LOAN 4419)

Key Project Data (amounts in US\$ million)

	Appraisal estimate	Actual or current estimate	Actual as % of appraisal estimate
Total project cost	7.65	7.65	100

Project Dates

	Original	Actual
Departure of Appraisal Mission		12/1994
Board approval		12/10/1998
Effectiveness	3/11/1999	8/13/1999
Closing date	1/31/2002	10/31/2003

Staff Inputs (staff weeks)

	Actual/Latest Estimate	
	N° Staff weeks	US\$US\$('000)
Identification/Preparation	17.3	90.8
Appraisal/Negotiation	2.7	13.5
Supervision	31.3	165.9
ICR	2.0	21.8
Total	53.3	292.0

Mission Data

	<i>Date (month/year)</i>	<i>No. of persons</i>	<i>Specializations represented Performance rating</i>	<i>Performance Rating</i>	
				<i>Implementation Progress</i>	<i>Development Objectives</i>
Identification/ Preparation	9/98	1	Engineer		
Appraisal/Negotiation	10/98	8	Engineers (2), Environment Specialist Community Dev. And Loss Reduction Specialist, Disaster Management Specialist Disbursement Officer, Lawyer, Early Warning Specialist		
Supervision	1/99	5	Engineer, Environment Specialist, Urban Planner Weather Service Expert, Disaster Forecasting Specialist	S	S
Supervision	3/99	1	Financial Management Specialist	S	S
Supervision	6/99	1	Engineer	S	S
Supervision	11/99	2	Financial Management Specialist, Disaster Management Specialist	S	S
Supervision	12/99	1	Urban Planner	S	S
Supervision	3/00	2	Engineer, Disaster Management Specialist	S	S
Supervision	10/00	1	Engineer	S	S
Supervision	12/00	3	Engineer, Disaster Management Specialist, Financial	U	S
Supervision	3/01	2	Engineer, Finance Officer	S	S
Supervision	11/01	2	Urban Specialist, Disaster Management Specialist	S	S
Supervision	4/02	2	Urban Specialist, Disaster Management Specialist	S	S
Supervision	5/02	1	Financial Specialist	S	S
Supervision	7/02	1	Engineer/Procurement Specialist	S	S
Supervision	10/02	5	Urban Specialist (3), Engineer, Disaster Management Specialist,	S	S
Supervision	11/02		Urban Specialist	S	S
Supervision	2/03		Urban Specialist	S	S
Completion	11/13/2003	2	TTL, Program Officer, Procurement Specialist		S

Other Project Data

Borrower/Executing Agency:

FOLLOW-ON OPERATIONS

<i>Operation</i>	<i>Credit no.</i>	<i>Amount (US\$ million)</i>	<i>Board date</i>
Disaster Management Project II		3.7	

Annex B. Borrower Comments

July 8, 2005

Mr Alain Barbu
 Manager
 Sector, Thematic and Global Evaluation Group
 Operations Evaluation Department
 The World Bank
 1818 H. Street N.W.
 Washington D.C. 20433
UNITED STATES

Dear Sir

**Reference: Comments on Draft Project Performance Assessment Report
 Saint Lucia - Watershed and Environmental Management Project
 (Credit 2768-SLU and Loan 3925-SLU),
 Emergency Recovery and Disaster Management Program
 (Credit 3151 - SLU and Loan 4419 -SLU)**

Thank you for forwarding to the Government of Saint Lucia (GOSL) the draft Project Performance and Assessment Report (PPAR) to enable the submission of comments before the final report can be finalized. The report is well detailed and certainly will be useful to the GOSL in preparing projects. However, there are only a few points needs clarification and have been listed below.

Watershed and Environmental Management Project

The Ministry of Agriculture (MOA) and the Ministry of Communications and Works (MCW) were responsible for implementation Project. I worked on the Project in a financial management capacity on the components relating to the MCW and as a result would have no choice but to concur with the report. However, Mr Martin Satney, Permanent Secretary of the MOA worked on the Project in a technical capacity on the components relating to the MOA and would have better knowledge and be more capable to provide comments.

However please permit me to raise the following comments.

Page 6 paragraph 20 - A Project Coordination Unit (PCU) did not exist for the WEMP. This MCW component was coordinated by the engineering firm assigned to the Projects and payments made through the Accounting Unit of the MCW. The lack of a PCU may have given risen to the problems encountered. It was the Emergency Recovery and Disaster Management Project (ERDMP) and not the WWMP that "nearly foundered". Therefore, that entire paragraph relates to the ERDMP and not the WEMP. Further, only two Bank-financed projects were overseen by a PCU. They are the completed ERDMP and the ongoing Disaster Management II.

Emergency Recovery and Disaster Management Project

Preface - The Saint Lucia ERDMP was financed through one credit in the amount of SDR 2.2m and one loan of 3.04m from the World Bank. There is some confusion in the preface between the Saint Lucia project and the entire first phase of the OECS ERDMP Program, which also included Saint Kitts & Nevis and Dominica.

Page 5 Box 3 - The same confusion seems to occur in Box 3 page 5 that lists components and amounts allocated for the ERDMP. However the Saint Lucia ERDMP did not have a component for Retrofitting of public buildings for use as storm shelters. The component was stated on the Box 3 is the Physical Prevention and Mitigation Works component. The amount allocated was US\$5.94. The Retrofitting of public buildings for use as storm shelters component stated in Box 3 may be related to the first phase of the APL.

Page 6 Para 17 - The Disaster Management Project II is a follow up project on the Saint Lucia ERDMP but not part of the original ERDMP APL. The Project became effective in October 1004. Phase three of the APL was cancelled in 2002 as all of the funds were absorbed by Phase two of the APL.

Page 10 Paragraph 31 - It is important to note that the regional approach used by the World bank had significant benefits, including the fact that it facilitated exchanges of information between executing agencies in the region (the Bank organized several PCU coordination/training meeting in Washington and Saint Kitts (training Financial Management), that greatly facilitated these exchanges); and further contributed to strengthen a culture of prevention among the agencies involved, as members from each PCU was able to compare with what the other island was doing.

Page 10 Paragraph 34 and Page 11 Paragraph 38 - The original project ERDMP did not seek to "create emergency shelters in public buildings" rather the Project focused on retrofitting of schools. Under the project design 23 schools identified by the Ministry of Education. However, after project inception, the PCU and personnel of the Ministry of Education realized that only 9 schools did fit the condition set by the World Bank for retrofitting (i.e. that the works should bring the facilities to Hurricane resistant levels and could be used as shelter in case of needs). Notwithstanding this additional schools were subsequently intervened using project savings. As well as additional works were done to some of the schools already retrofitted for example Bexon. Due the reduced resources available works were more limited to the original nine schools that were planned for.

I take this opportunity to thank you for bringing to our attention the quality of work at certain schools as it relates to installation of windows etc. Considering that the PCU has not received a formal complaint from the Ministry of Education the issues raised will be

communicated to the Ministry so that this can be resolved. Considering that retrofitting of schools is a component of the follow on Disaster Management Project 11 the PCU may be able to use some funds under the Project to execute the necessary repairs.

Page 10 Paragraph 36 - The PCU will draw this concern to the Ministry of Education and NEMO to ensure that that clear markings are placed on schools to indicate that these schools can be used as shelters.

The final sentence relates to Grenada and not Saint Lucia.

Page 10 Paragraph 41 - Under the Disaster Management Project ten additional warehouses to enable empowerment of disaster committees will be constructed. In light of this the PCU will discuss the issues of safety, maintenance, adequate storage and sustainability with NEMO to see how the current system can be improved. This activity, including training will probably be financed under the DMP11.

Pages 12-13 Paragraph 43

- *Little was done to increase the government's access to insurance under the project, other than the preparation of an inventory of public buildings—This component will be done under the DMP11.*
- *Vulnerability maps were not produced. Coordination with CDERA and Caribbean Development Bank (CDB) regarding map preparation took place, but no action followed and the component was cancelled - This component will be done under the DMP11.*

Page 13 Paragraph 44- Officials of the OECS were not involved in the loan negotiation for the ERDMP. Officials of the OCES were involved with negotiations for the Emergency Recovery Project, which has a regional component and relates to security at airports and seaports. The loans / lending for the ERDMP was individual and each country attended its loan negotiations separately.

Page 15 Paragraph 51 - Mention should not be made of a PCU as one did not exist for the WEMP.

Page 15 Paragraph 53 - This paragraph refers to the ERDMP and should not be under the WEMP

Page 20 Paragraph 73 - The works at Dennery actually includes the construction of three off shore breakwaters and does not include artificial islands. This option was chosen, as it was both the preferred option of the local population following extensive community consultations conducted by the PCU. In addition, it is the optimal option coming out of the cost benefit analysis. Further, residents have exhibited great resistance to relocation.

Page 22 Paragraph 73 - The Paragraph below refers to the ERDMP and not the WEMP.

- ***In the absence of borrower staff experienced in Bank procurement practices, early training and support needs to be provided, especially under the time pressures that are normal for emergency operations.*** During WEMP it took a long time for the PCU to learn Bank procedures. In the context of SIDS, it is important to take into account the capabilities of the country. A small country with limited human resources needs assistance if it is to produce the same amount of documentation as a large country. Targeted procurement support needs to be tailored to the capacity of individual SIDS.

Annex C. Disasters Causing Significant Damage in St. Lucia (25-year period)

1980 Hurricane Allen with estimated damage of \$100 million.

1981 Cargo transport airplane crash.

1986 Tropical storm Danielle.

1989 Swarming locusts.

1990 A series of earthquakes from February to November.

1990 Landslide at Morne du Don.

1992 Bocage landslide.

1993 Civil unrest caused by banana industry workers

1994 Tropical Storm Debby.

1995 Oil spill in Cul de Sac Bay spreads oil along the coastline at the northern end of the island (where most hotels are located).

1996 Major fires at Victoria Hospital and Patterson's Gap

1996 Tsunami causes extensive damage.

1998 Collapse of the national phone system.

1998 Boguis landslide destroys 12 homes and leaves over 50 homeless.

1999 Oil spill.

1999 Black Mallet and Maynard hill landslip leads to relocation of over 100 families.

1999 Hurricane Lenny causes major damage (described below).

2000 Civil unrest and arson leads to injuries and arrests.

2002 Partial collapse of the national phone system affects all but wireless service.

2002 Tropical Storm Lili causes extensive damage and leads to an evacuation order for Anse la Raye (an order that is ignored by the entire village).

2003 Tropical wave causes extensive damage to banana fields and fruit industry infrastructure.

Data compiled and provided to the OED mission by A. L. Dawn French, National Emergency Management Office, St. Lucia.

Annex D. National Emergency Management Organization: Mission Statement

The role of the NEMO is to develop, test and implement adequate measures to protect the population of St. Lucia from the physical, social, environmental and economic effects of both natural and man-made disasters. Its responsibility is to ensure the efficient functioning of preparedness, prevention, mitigation and response actions.

HAZARDS

Severe weather systems are not the only threat that NEMO must plan and respond to; hazard analysis and experience have confirmed that St. Lucia is at risk from numerous hazards, both natural and technological:

- Natural [rapid onset]: Fire, Seismic, Volcanic, Tsunami, Flooding, Landslide, Storm, Hurricane
- Manmade [rapid onset]: Dam Collapse, Explosion, Oil/Chemical Spill, Mass Casualty, Nuclear spill, Civil Unrest • Natural [slow Onset]: Drought, Famine, Plague

OPERATIONS

During “peacetime” the Office of the NEMO acts as a secretariat assisting the eighteen local communities with various public awareness campaigns as well as training sessions. One area of constant activity is providing advice to companies and service groups on action that can be taken before, during and after a disaster. The Office also takes part in activities that will heighten awareness with the public e.g. Radio and Television programs, summer school talks, production of telephone cards and the creation of an Internet website at <http://www.geocities.com/slunemo> where certain sections of the National Plan are available.

Disaster Management in St. Lucia is executed on a voluntary basis and during an event NEMO is part of a larger network that comes into existence to respond to a disaster. There are various Ministries that are essential to a response action. There are also eighteen (18) District Committees that are composed similarly to the national committees, which are composed of representatives of various Ministries and Social Groups. For a response action the national personnel contact his/her local counterpart and together execute an action.

During an event NEMO transforms into the NEOC. The NEOC is the center from which all commands are issued and to which all demands are made. It is the seat of control for the Prime Minister as Chairman of the NEOC and as Leader of the State. All heads of essential services locate at the NEOC e.g. Commissioner of Police, Chief Fire Officer, Chief Medical Officer, etc. With the permission of the Cabinet of Ministers; NEMO has the responsibility of the majority of government’s resources during a crisis. These resources are coordinated by NEMO/NEOC but are utilized by various agencies. With

the cooperation of the private sector NEMO also has access to the resources of individuals and companies. Finally the **Emergency Powers Act 5 of 1995** provides the office with the ability to commandeer DURING A STATE OF EMERGENCY ONLY. Therefore NEMO/NEOC has access and control of the resources of the Nation when faced with a disaster.

In 2000 the **Disaster Preparedness and Response Act 13 of 2000** was passed thus consolidating and placing in law the actions of NEMO. The NEOC has one final responsibility, and that is to the Tourism Industry. The sector has created the Crisis Management Unit (CMU) which functions out of the Ministry of Tourism. Once the NEOC is activated the CMU is also activated.

REGIONAL LINKS

St. Lucia is a member state of CDERA. The CDERA, which is an intergovernmental regional disaster management organization established in 1991 by an Agreement of Heads of Government of the CARICOM. Its headquarters are located in Barbados. CDERA has three (3) principle organs:

- The Council is the supreme policy making body and is comprised of the Heads of Government of the Participating States or their designated representatives. It meets annually to review the work of the Agency, approve its Work Programme and Administrative Budget and make any other major policy decisions required.
- The Board of Directors is made up of the National Disaster Coordinators of Participating States, with the Coordinator (see below) as Chairman. The Board serves in a technical advisory capacity and makes recommendations to Council on matters such as those mentioned above.
- The Coordinating Unit is the administrative headquarters of the Agency and is located in Barbados. It is responsible for executing the activities of the Agency and conducting its day-to-day business. Source: CDERA 2001

RESPONSE PLANS

Disaster Management is not conducted on an ad hoc manner. There are plans and procedures to be followed and no two hazards are responded to in the same manner. As such in August 1996, the Cabinet of Ministers accepted and authorized the St. Lucia National Emergency Response Plan. In 2002/2003 with the assistance of the OECS Emergency Recovery and Disaster Management Project, NEMO reviewed the 1996 Response Plan and commissioned new plans to address other hazards. Once the Cabinet of Ministers has accepted and authorized the new plan the completed National Emergency Response Plan for St. Lucia will comprise of the following:

- Hurricane Response Plan
- Flood Management Response Plan
- Anse la Raye Evacuation Plan (Appendix to Flood Management Response Plan)

- Debbie Response Plan
- Volcanic Eruption Response Plan
- Oil Spill Plan
- Hazardous Materials Plan
- Stress Management Response Plan
- Hazard Mitigation Plan
- Maritime Search and Rescue Plan
- Land Search and Rescue Plan
- District Model Plan
- Policy on Donations
- Policy on Travel
- Policy on Management Dead Bodies in Disasters
- Policy on Emergency Shelters
- Policy on Emergency Housing

NEMO's partners continue to work on the:

- Health Sector Response Plan
- Ministry of Works Response Plan
- Borderlais Correctional Facility Response Plan
- Cruise Ship Response Plan
- Hospitality Industry Crisis Response Plan

While NEMO works on:

- Policy Guidelines on Mass Crowds Events
- Policy on Hazard Mitigation
- Policy on Displaced Persons
- Emergency Shelter Program.

Annex E. Supplemental Information on Project Objectives and Components

The details on the various components of the ERDMP are as follows:

- **Physical Prevention and Mitigation Works.** Public infrastructure was to be strengthened to make it more storm-resistant and public buildings were to be retrofitted so they could be used as shelters (US\$ 5.94 million). Specific works under this component were:
 - Hewanorra Airport: 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.
 - Bridges and River Training: Works at Marc Floissac and Caico, including the acquisition of a stock of Bailey-type bridges. Replenishing the stock of gabions (heavy wire baskets used to build small-scale works when filled with rocks, stacked, and tied together).
 - Cul de Sac Valley: Flood prevention works, bridge construction, drainage, embankment works and raising the West Coast Road.
 - Supplementary water storage capacity for Victoria Hospital.
 - Disaster Management and Emergency Shelter Program: Retrofitting schools for use as emergency facilities and installing sanitary facilities adequate to such use. Capacity building, emergency equipment and improved security for the Ministry of Education, Human Resources Development, Youth and Sports (MEHRDYS).
- **Strengthening the National Office of Disaster Preparedness (US\$ 0.86 million)**
 - Technical assistance and capacity building in disaster preparedness and management, planning, and mitigation activities.
 - Establishing an emergency communications system at the national and local levels (including base station radios, repeaters, and mobile radios for District Committees).
 - Establishing stockpiles of disaster equipment and loss reduction materials (such as generators, water purification equipment, plastic sheeting, chain saws, lanterns, and first aid supplies).
- **Strengthening the Early Warning System (US\$ 0.44 million)**
 - Support the NMS by providing an enhanced satellite receiving station with high-resolution imaging, upgrading the World Area Forecast System, and providing computer and phone equipment.
 - Development of a Ham Weather Radio Observation Network capable of weather monitoring.
 - Development of a Local Flood Warning System.
 - Technical Assistance and Training in meteorology and related subjects and assistance with equipment maintenance.
- **Community Based Disaster Management (US\$ 0.11 million)**
 - 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.

- Institution Building (US\$ 0.24 million)
 - An assessment of public buildings to develop optimal vulnerability reduction measures and/or an insurance strategy to minimize risk at a reasonable cost. Review existing building codes, land use planning, and the insurance sector.
 - Hazard analysis/vulnerability mapping.
 - Pursue adoption of a national building code and its effective enforcement.
- Project Management (US\$ 0.61 million) consisting of technical assistance, equipment, workshops and audits.

The components of the second disaster management project are as follows:

1. Physical Prevention and Mitigation Work: (a) coastal protection works for Dennery Village; (b) rehabilitation and reconstruction of two bridges; (c) drainage, river walls and slope stabilization. (d) retrofitting of schools; (e) retrofitting of health centers; (f) procurement of additional stock of gabion baskets, mattresses and geotextile; (g) technical audits for the coastal protection works at Dennery Village; (h) training and capacity building for the technical service division.
2. Strengthening Emergency Preparedness and Response: (a) construction of the EOC and central warehouse; (b) additional satellite warehouses; (c) installation of water tanks in shelters; (d) technical assistance and training for the National Emergency Management Office (NEMO); (e) specialized disaster equipment.
3. Institutional Strengthening: (a) building code training and sensitization; (b) technical assistance in territorial planning; (c) vulnerability assessment and hazard mapping; (d) study on vulnerability and risk transfer of government assets.
4. Project Management: (a) technical assistance to the PCU. Project management services, office equipment and supplies are also included. And (b) technical Audits.

Annex F. Mission Site Visits

Castries

- river wall
- drains
- riverside businesses
- Pilot project on the road above Castries on the hillside.

Goodlands:

- gabions on the hillside of the road
- back fill to stabilize road
- drains
- boulders works

Deglos Malc

- gabions (3 layers)

Malc bridge

- gabions
- concrete bridge with steel railing

Bexon

- gabions and backfill to protect road

Cul-de-Sac valley

- bridge

Bassin de Joseph

- large gabion structure with geotextile(5 layers)

Caico bridge

- gabion works on one side (4 layers)
- road works on hillside of the road
- drainage works and culverts

Union

- gabion works, damaged by automobile accident
- masonry wall

Babonneau 1

- gabions (3 layers) to retain hillside wall from sliding ,
- protection for house above

Babonneau 2

- gabion basket walls

Ceye-Meneger

- drainage and gabion structures

Lefeullie

- drainage
- gabion structures

Victoria Hospital

- water tank
- tank access road
- tank protection and soil stabilization works
- piped system for the hospital

Thomazo

- gabions
- drainage system (4 layers)

Barre Florent

- gabions
- drainage

Mabouya Valley, Derniere River

- river training and realignment

Dennery

- warehouse
- sea defense
- drainage

Cacoux Vigier

- flood protection
- gabions

Hewanorra Airport

- fence around the airport
- river training to prevent flooding
- outlet to sea
- accessroad

Darban

- gabion baskets (18 layers)

Soufriere

- gabion works
- bridge

Bexon, RC Infant School:

- windows
- roof
- toilets

Bexon

- warehouse

Micoud

- warehouse
- Micoud Secondary school.
door frames
roof
generator
ceilings
new louvers

Mongouge Combined School

- balcony
- new roof
- 2 water tanks

Canaries

- satellite warehouse

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- Helen Phillip
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