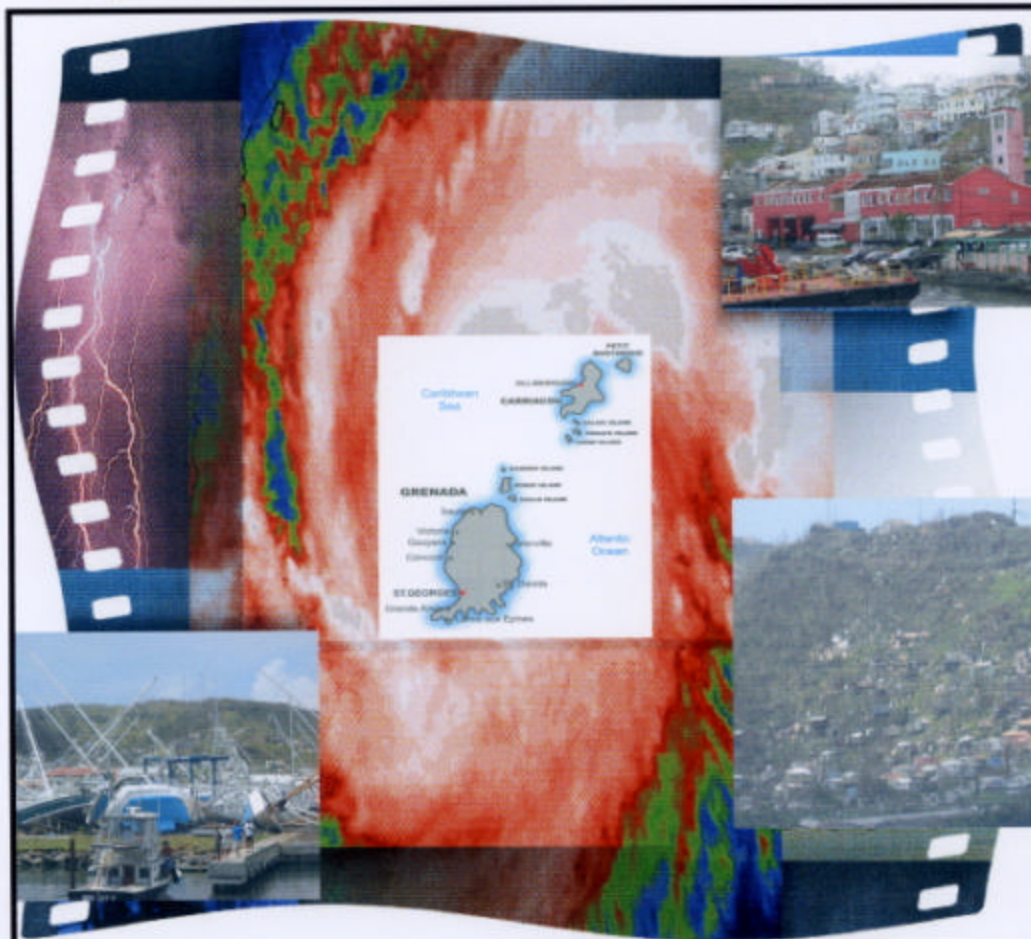




# ORGANISATION OF EASTERN CARIBBEAN STATES



***GRENADA: MACRO-SOCIO-ECONOMIC ASSESSMENT  
OF THE DAMAGES CAUSED BY HURRICANE IVAN  
September 7th, 2004***

## **ACKNOWLEDGEMENT**

The Secretariat of the Organisation of Eastern Caribbean States wishes to acknowledge the significant assistance provided by Dr. Estaban Perez and Ms. Asha Kambon of the United Nations Economic Commission for Latin America and the Caribbean, Ms. Laurel Bain of the Eastern Caribbean Central Bank, Mr. Anthony Payne of USAID, and Dr. David Smith of Smith Warner International, all of whom participated as members of the ten person OECS Team.

Financial assistance was provided by the United States Agency for International Development, through the CARANA Corporation, and the United Nations Development Programme for the Eastern Caribbean. The speed with which this assistance was provided to the OECS Secretariat is recognised with much appreciation.

The support provided by the Permanent Secretaries and staff in the various ministries in Grenada, especially during this period of great personal trauma and loss, is acknowledged with deep gratitude, as is the assistance provided by various other private sector agencies and individuals. Special mention is made of the tremendous assistance provided by Mr. Timothy Antoine, Permanent Secretary in the Ministry of Finance and Planning who went out of his way to ensure that the work of the OECS Team was made easy.

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# Executive Summary

## The Process

This study to undertake a Macro-economic and Social Assessment of the effects of Hurricane Ivan on the performance of the Grenadian economy, in the short, medium and long term, was initiated as a result of a visit by the Director General of the Organization of Eastern Caribbean States, to the Prime Minister Dr. the Hon. Keith Mitchell, on 10 September - Day Three of the post event period.

It was clear from the scope and scale of the damages sustained, that while significant efforts needed to be deployed urgently to deal with the immediate emergency effects of the event, **critical** thinking also needed to be applied rather quickly, to the types of interventions **critical** to the process of rebuilding the economy. Tourism and agriculture – among the main drivers of the economy - had all suffered tremendous damages. Damages to infrastructure and other essential services at both the national and community levels were also significant.

Another type of initiative - one that would document, analyze and compute the indirect and direct effects of Ivan on the economy, allowing for an overall assessment of the damages and their impact on the economy, was also **critical**. Most important was the need to project the impact of these damages on overall macro economic performance in the short, medium and **long terms**, as the basis to guide discussion of rehabilitation and recovery requirements, establish guidelines for these efforts and identify a range of policy, programmatic and project interventions best suited to the long process of economic, social and environmental recovery. This is what this report seeks to do.

This type of comprehensive assessment of macro-economic impacts is based on a methodological approach formulated by UN-ECLAC and refined to suit the needs of Small Island Developing States by the Organization's regional Headquarters for the Caribbean. Reports of this type have formed the basis for targeted efforts, at recovery and rehabilitation, on the part of development partners in response to similar types of crisis in other Caribbean countries. What sets this particular event apart however, is the sheer intensity of the damages incurred, and their scope. It is this fact that has resulted in the blurring of the previously more rigid interpretation of the emergency response, and recovery and rehabilitation phases of natural disasters such as this, and has resulted in a reduction of the time between the event and the deployment of the assessment team.

The need for such an intervention and the facilitation of the same was discussed with the Prime Minister on 10 September, during the first visit of the OECS Director General, and immediately endorsed.

The Director General led the OECS Assessment Team; the Technical Coordinator of the Team was a member from the UN-ECLAC regional Headquarters for the Caribbean. The

ten person Team which was fielded comprised of five persons from the OECS Secretariat, two from the UN-ECLAC regional Headquarters for the Caribbean, one each from the Eastern Caribbean Central Bank and USAID, and one specialist consultant. The assessment took place in Grenada over the period 19 – 24 September. The report was presented to the Prime Minister and Cabinet colleagues on 24 September, and will form the basis for a meeting of Development Partners convened by the World Bank on behalf of the Government of Grenada on 4 October in Washington DC.

## **The Report**

The report undertakes a sector by sector analysis of the impact of Hurricane Ivan; an assessment of overall damages is then computed. Sectors are grouped into four categories: Social, Productive, Infrastructural and Environment. The first includes the housing, health and education sectors. The second comprises agriculture, manufacturing, wholesale and retail, and tourism. The third includes electricity, water and sewerage, telecommunications, roads and drainage, coastal infrastructure, sea and airports. The environmental assessment includes, among other things, the impact of damages to watersheds on water quality and coastal resources; ecosystem and habitat damages, and implications for solid waste management - an important factor, given the tremendous amount of debris which must now be collected and dumped.

In each of the sectors, a distinction is made between direct and indirect damages. Direct damage refers to losses to assets and stocks at the time of the disaster. Indirect damage is defined as losses in flows (income and production flows following the occurrence of the disaster). Estimates of direct and indirect damages for the economy as a whole are then presented in summarized format. Their magnitude is evaluated in relation to macroeconomic aggregates. The overall computation of the damage also includes a detailed macroeconomic assessment of the situation prior to the disaster, the projected macroeconomic performance without the disaster, and estimated economic performance of the economy as a result of both the direct and indirect costs and effects associated with Hurricane Ivan.

The report concludes with a presentation of guidelines for a rehabilitation and reconstruction strategy and program. Of critical importance is the need to reduce vulnerability over time and increase resilience at both the community and national levels to events of this type. As a result reconstruction must be married with strategic policy interventions aimed at managing risks. A portfolio of projects aimed at facilitating reconstruction and recovery, is also included in this report.

## **The Effects**

An event such as Hurricane Ivan serves to give stark reality to the inherent vulnerability of Small Island Developing States. Prior to hurricane Ivan, the economy was projected to

grow by 4.7 per cent in 2004 and at an average rate of 5.0 percent between 2005 and 2007. The growth was fuelled by developments in the agriculture and construction sectors and in the tourism industry for 2004. The fiscal operations of Central Government were estimated to result in a current account surplus of \$17m or 1.3 per cent of GDP, with an overall balance (after grants) of \$60m or 4.8 per cent of GDP. On the external account, the current account deficit was estimated to contract as a result of the projected slower growth in imports and the improved performance of the tourism industry.

With the passage of hurricane Ivan, economic activity is projected to decline by approximately -1.4 percent in 2004 (resulting in an overall impact of six percentage points of GDP growth) reflecting a contraction in tourism and the halt in production of traditional crops. In the following year, the economy is projected to remain stagnant as the tourism industry continues to be weak and agriculture feels the full impact of Ivan. Thereafter, economic growth is projected to average 4.0 per cent mainly on account of the strong growth in construction, and a halt in the decline of tourism and agriculture.

In 2004, following Ivan, the fiscal position of Central Government deteriorates from a surplus of \$17m to a deficit of \$54m or 4.5 per cent of GDP reflecting the fall off in revenue, particularly from taxes on international trade and transactions. The growth in capital expenditure, including the outlays for rehabilitation and reconstruction, is projected to widen the overall fiscal deficit (after grants) to approximately 12 per cent of GDP. The external account will experience a widening of the current account deficit due to the strong growth in imports and the contraction in earnings from tourism, despite the growth in current transfers. The capital and financial account will benefit from higher official capital grants and insurance inflows.

## **The Future**

The assessment presented in this report should form the basis for the government and international community to identify and set national priorities in the recovery and rehabilitation phase. It should be utilized as a basis for introducing disaster preparedness, planning and mitigation into the development planning apparatus of the country and into the consciousness of the people of the country. The last major event of this type to affect Grenada was Hurricane Janet, in 1953. There are two generations of Grenadians who have therefore not experienced an event of this type, and the trauma to the national physic has been severe. The 2004 hurricane season so far has resulted in an unprecedented wave of destructive tropical storms and hurricanes, with half of the season still to follow.

The passage of Ivan, terrible as it has been, should also be viewed as an opportunity, through the process of rebuilding, to put systems in place to assist in reducing overall impacts of such an event when they do occur. The following are some of the recommendations and projects resulting from the discussion of macro economic and social effects:

- The process of rebuilding will be enormous. There is need for the development of a statutory or other body to coordinate and direct this process.
- Systems should be put in place to ensure the management of disasters in their fullest sense; from security planning and deployment, to coordinating, receiving and distributing aid, to coordinating the efforts aimed at utility recovery.
- Land use and urban planning, the review of building codes and standards, the regularization of informal settlements that have been flattened, should also be given priority. Technical assistance with respect to introducing hurricane safety provisions in the rebuilding process is an immediate need, as is assistance relative to retrofitting for this purpose.
- A major campaign of public awareness with respect to disaster preparedness is indicated as is a systematic approach to providing counseling to the thousands who are suffering post traumatic stress disorder.
- Of critical importance is the need to identify series of projects with the potential to generate income and foreign exchange, and provide employment quickly. The agro forestry sector, agriculture and fisheries, eco-tourism, are among some of the sectors with the potential to provide immediate benefits. The high levels of unemployment in all sectors and particularly among Grenadian youth must be dealt with, urgently.

What must be cautioned against, even in the face of the real need to clear debris and start the process of rebuilding as quickly as possible, is the need to ensure that rebuilding does not take place at a lower standard, thereby increasing the vulnerability of the country to future events, and that the remarkable gains in solid waster and environmental management in which this country has taken a leadership role are not lost in the bid to find appropriate sites for the mountains of debris which must be cleared. Most importantly, in all of this, is the trauma and dislocation endured by the people of Grenada. The effects of post trauma stress disorder must also be dealt with, as speedily as possible.



## **Limitations of the Report**

This report was undertaken over a four day period, twelve days after Hurricane Ivan swept through the island. The level of effort represented here is in keeping with both the amount of time available to the OECS led Assessment Team, and the conditions operating in the country at the time of Mission.

Although one of the Team members did visit Carriacou with her national counterpart, the data presented in this report, in the main covers only the island of Grenada which was the worst hit of the tri-island State.

The primary objective of the Mission was to undertake a critical assessment of the impact of damages, both direct and indirect, as well as their secondary causes and effects, on the macro-economic performance of the country in the short, and medium term. The assessment does not provide, for example, a quantitative analysis of the impacts on those in the informal sector and their linkages to the formal sector; neither has the report been able to quantify the damage caused to environmental assets. Benchmark numbers with respect to those operating in the informal sector are not available, and as a result, their linkages, while described, have not been quantified. It is important however to understand that they exist.

Similarly, the methodological approach utilized to compute macro effects does not permit for a comprehensive analysis of effects in an all encompassing way. A report such as this should not replace the need to undertake detailed socio-economic assessments of social safety nets that will be required, for example, to provide shelter and livelihoods for those whose losses are complete. In any event, such an analysis is not the objective of this report.

The report provides an overall estimate of the magnitude of the damage and states the reconstruction requirements. It quantifies the losses and projects macro performance soon after the event in an effort to ensure that the critical discussions required, relative to rebuilding the Grenadian economy, can start. It sets the basis for critical next step actions at both the international and national levels.

## Preface

Hurricane Ivan, a category 3 system with sustained winds of 115mph, impacted Grenada and its dependencies on Tuesday, September 7<sup>th</sup> 2004, leaving a trail of damage. According to initial reports, eighty per cent (80%) of the country was reported to have been demolished with at least eighty- nine per cent (89%) of the housing stock being destroyed. In addition unconfirmed reports placed the number of persons dead at twenty-eight.

Pursuant to discussions on the 10<sup>th</sup> of September 2004, between the Prime Minister of Grenada and the Director General of the OECS, the OECS Secretariat fielded a multi-disciplinary team to assist the Government of Grenada undertake a macro-socio-economic assessment of the damage caused by Hurricane Ivan. This Inter-Agency Team was made up of four persons from the OECS Secretariat, two persons from UNECLAC, and one person from ECCB. In addition, two consultants supplemented the Team. The OECS Team worked with local counterparts who had been assembled for coverage of each of the main sectors. Funding for the assessment was provided by USAID and UNDP. This assessment, which was undertaken from the 19<sup>th</sup> to the 24<sup>th</sup> of September 2004, complements the compilation of damage and needs assessments prepared by numerous other agencies.

The assessment presented in this Report includes estimates of direct and indirect damage to the economy as a whole: their magnitude was evaluated in relation to macroeconomic aggregates. The overall assessment of the damage also includes a detailed macro-economic assessment of the situation prior to the disaster, the expected situation without the disaster, and the estimated performance of the economy with the passage of the hurricane. The information presented is based on data that was available and on evidence collected through field visits and interviews.

The assessment employed was in accordance with the methodology that has been developed by UNECLAC<sup>1</sup> and the OECS<sup>2</sup>. The focus of this methodology is on the valuation of the damage on the society, economy and environment of the affected country so that appropriate mitigation strategies can be formulated during the reconstruction phase. The recommendations for the reconstruction phase take into account an assessment of the worst affected social, economic, infrastructure and environmental sectors.

It is estimated that the magnitude of the loss exceeds the country's ability to address reconstruction needs on its own, particularly if the aim is also to reduce the impact of similar events in the future. International cooperation is therefore considered essential.

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<sup>1</sup> See, ECLAC/IDNDR (1999), *Manual for Estimating the Socio-Economic Effects of Natural Disasters*. ECLAC (2003) *Handbook for Estimating the Socio-Economic and Environmental Effects of Disasters*. LC/MEX/G.5.LC/L.1874  
ECLAC (2004) *Disaster Assessment Training Manual for SIDS*. LC/CAR/L.12.

<sup>2</sup> See, OECS (2004), *post Disaster Rapid Environmental Assessment – Manual with Guidelines*.

Consequently, outputs of the assessment include guidelines for a rehabilitation and reconstruction programme, and a tentative list of project outlines. Questions of improved land use planning, watershed and coastal management, early warning, emergency response, and structural preparedness for evacuation and sheltering potentially affected populations, are seen as important considerations for the reconstruction process. Additionally, the reconstruction strategy should pay special attention and priority on including sustainability and increased governance criteria in making social and productive investments, and on allocating resources to the reinforcement and retrofitting of vulnerable infrastructure, basic lifelines and services.

The Grenadian society and government now face the opportunity of undertaking the reconstruction with renewed values and criteria, and on embarking on institutional, policy, legal and structural reforms that will strengthen the country's resilience to economic, social and ecological vulnerability.



# **I. Background**

## **1. The Mission**

The OECS Mission was deployed on September 19<sup>th</sup> 2004. Mr. Timothy Antoine, Permanent Secretary in the Ministry of Finance was appointed as the focal point responsible for coordinating all logistical and technical support to the Mission Team. The Members of the Mission are identified below:

Dr. Len Ishmael	OECS, Director General
Dr. Estaban Perez	ECLAC, Regional Headquarters for the Caribbean (Technical Team Leader) Macro-Economist
Ms. Asha Kambon	ECLAC, Regional Headquarters for the Caribbean Social Scientist
Ms. Rosalyn Hazelle	OECS, Social Scientist
Dr. Vasantha Chase	OECS, Environmental Specialist
Mr. Francis Burnette	OECS, Public Health Specialist
Mr. George Alcee	OECS, Agricultural Specialist
Ms. Laurel Bain	ECCB, Macro-economist
Mr. Anthony Payne	USAID, Civil Engineer
Dr. David Smith	Smith Warner International, Coastal Engineer

Local counterparts provided continuous support to this effort. The full list of these colleagues is contained in Annex 1 of this Report.

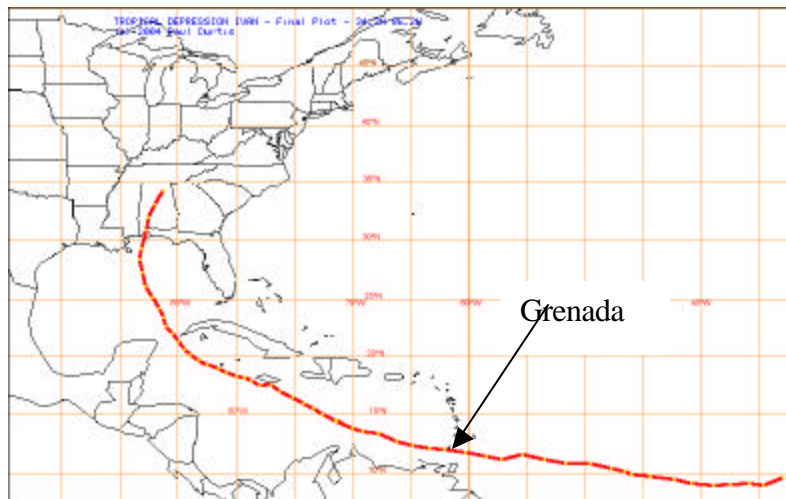
## **2. Description of the Phenomenon and its Effects**

The State of Grenada, which includes the islands of Carriacou and Petit Martinique, is located in the Caribbean Sea between latitudes 11°59' and 12°20' North and longitudes 61°36' and 61°48' West. Grenada is the largest and main island, being 18 km (11 miles) wide, 34 km (21 miles) long, and with a coastline of about 121 km (75 miles). It has an area of 312 km<sup>2</sup> (121 sq. miles) (Figure 1).



**Figure 1 Map of Grenada**

On Monday 6<sup>th</sup> September 2004, at 11:00AM, as Tropical Storm Ivan approached the Windward Islands from the Atlantic Ocean (Figure 2), tropical storm warnings for Grenada were upgraded to Hurricane warnings. As Hurricane Ivan came closer to Grenada, however, winds remained relatively light, less than 10 mph. At 1:00PM on the 7<sup>th</sup>, the eye of the storm was approximately 35 miles to the ESE of Grenada. Winds measured at the airport were gusting to 40 mph, while the maximum sustained wind speeds recorded by the National Hurricane Centre were of the order of 120 mph.

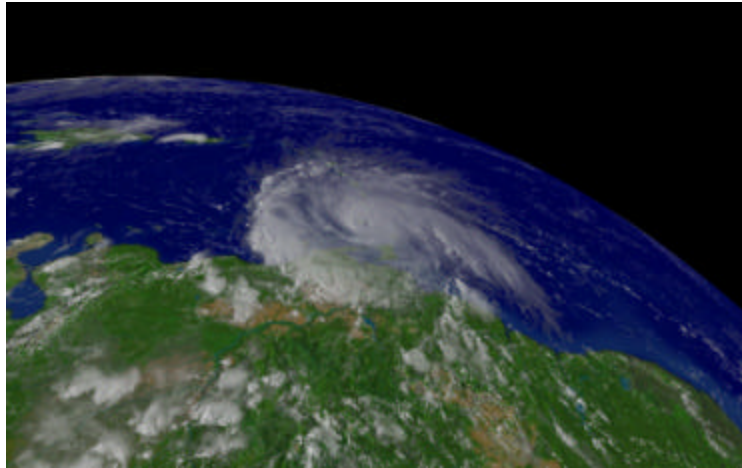


**Figure 2 Track of Hurricane Ivan**

Conditions in Grenada depreciated rapidly after this, with measured central pressures dropping from 998 mb at 1:00PM down to 955 mb at 4:30PM. Concurrently, wind speeds increased to over 120 mph at the Point Salines Airport, with gusts of over 145 mph occurring between 4:05PM and

4:10PM. By midnight of the 7<sup>th</sup>, recorded atmospheric pressures had risen to 1000 mb, and winds had dropped to between 40 and 60 mph. Over the following day, wind speeds slowly decreased and atmospheric pressures climbed to 1010 mb.

A satellite image of Hurricane Ivan is presented in Figure 3. This image was taken as the eye of the hurricane was almost directly over Grenada.



**Figure 3 Satellite Image of Hurricane Ivan over Grenada**

Damage caused by the storm was extensive, with the worst observed being in the parishes of St. George's, St. David's, St. John's and St. Andrew's. Significant damage to the housing stock was recorded, in the form of wooden houses being totally destroyed, roofing being blown off houses (both concrete and wood), and with concrete walls being knocked down. In addition, electrical poles were downed in many areas of the country, thereby affecting power distribution and telecommunications. Reservoirs and intake structures were adversely affected (fallen trees, silt and general debris). In addition, distribution lines were damaged. This resulted in island-wide disruption of water supply services.



**Photo 1 Damaged Housing in St. Georges**

As a result of electric poles coming down, telecommunications island-wide were disrupted. This also extended to the cellular network, where antennae were moved out of alignment.

Damage to housing infrastructure was also accompanied by widespread deforestation throughout the island (Photo 2). Anecdotal reports indicate that during the hurricane's passage over Grenada, several small but powerful whirlwinds were noted. These had the effect of exacerbating significantly, the damage that occurred.



**Photo 2**Downed Trees in the Central Areas of the Island

Hurricane advisory data taken from the National Hurricane Center (NHC) database, gave information on central pressures during the storm's approach to Grenada. Using this data, along with observed forward speed and maximum wind data, a very preliminary estimate was done of the waves that would have been generated by Hurricane Ivan. This procedure<sup>3</sup> gave waves in deep water approximately 14m in height, with directions to the NW. Once the hurricane passed west of Grenada, wave directions would have shifted to the north. Even though these large waves were generated offshore, they would have been reduced as they traveled inshore, as a result of the large offshore bank that trends in a NE-SW direction off the south and east coasts of Grenada. These banks would have resulted in a significant amount of wave energy loss occurring before the arrival of the storm waves onshore, therefore reducing the amount of damage caused by this phenomenon. This was evidenced by the fact that only limited areas were seriously affected by wave action.

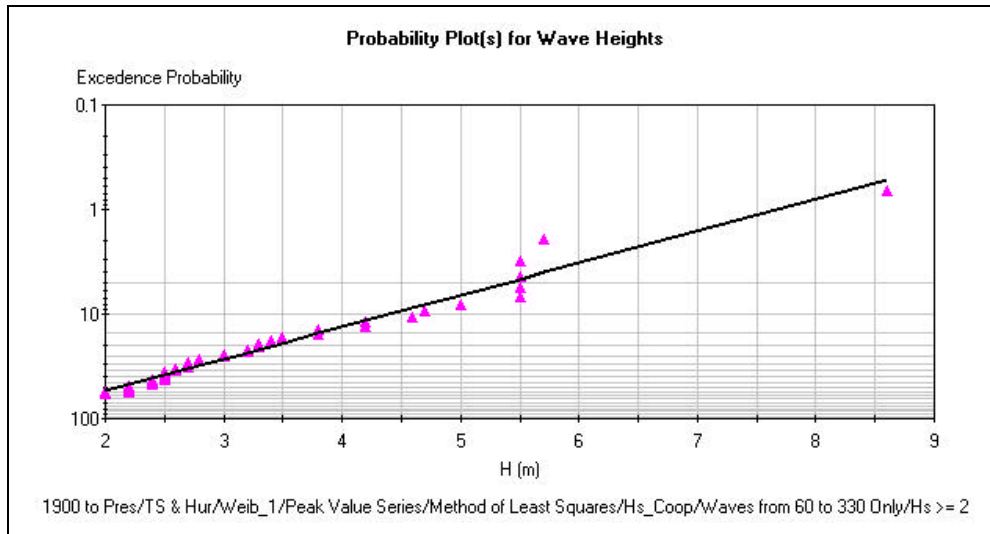
To put the intensity of hurricane generated waves into perspective, the estimated wave heights from Hurricane Ivan can be compared with a wave analysis carried out recently for Grenada<sup>4</sup>. That analysis also involved the use of parametric wave models to derive a data series of wave heights from hurricanes (HURWave). The NOAA database of hurricane records, which dates back to 1900, was used. All hurricanes passing within a 400 km radius of Grenada were selected from the larger database, and wave heights in deep water (greater than 150m deep) computed for those selected occurrences. A statistical analysis was carried out on the data series of wave heights. The following plot ( Figure4) shows the fit of the distribution used to the data series of wave heights.

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<sup>3</sup> Young, I.R. 1988. "Parametric Hurricane Wave Prediction Model"

<sup>4</sup> Smith Warner International Ltd. 2004. "Marine Component of EIA for Prickly Bay, Grenada"





**Figure 4 Hurricane Wave Extremal Analysis**

Coming out of this analysis, a number of return period events were identified. The results of this hurricane analysis are shown below in Table 1. The probability that a particular wave height would be exceeded within the next 50 years, is also shown in the table below.

Return Period (years)	Significant Wave Height $H_s$ (m)	Wave Period, $T_p$ (s)	Exceedance Probability (%) for 50 yrs
2	1.74	4.68	100.0
5	3.04	6.65	100.0
10	4.02	7.93	99.5
20	5.01	9.10	92.3
25	5.32	9.46	87.0
50	6.30	10.53	63.6
100	7.29	11.53	39.5

**Table 1 Results of Statistical Hurricane Analysis**

The comparison of the estimate of wave heights, generated under Hurricane Ivan, with those previously obtained for the larger database, indicates that Ivan may have been a more than 100 year event.

Three areas in particular suffered damage from storm surge and wave action. These were the areas of Soubise to Marquis, Rive Antoine and Waltham. At Soubise for example, local eyewitness accounts indicate that the storm surge and wave run-up was in excess of +3.0m above Mean Sea Level. The result of this was that the sea pushed all of the houses along that strip of roadway from the seaward side of the road over to the landward side. Residents subsequently relocated their homes back to their original places after the storm.

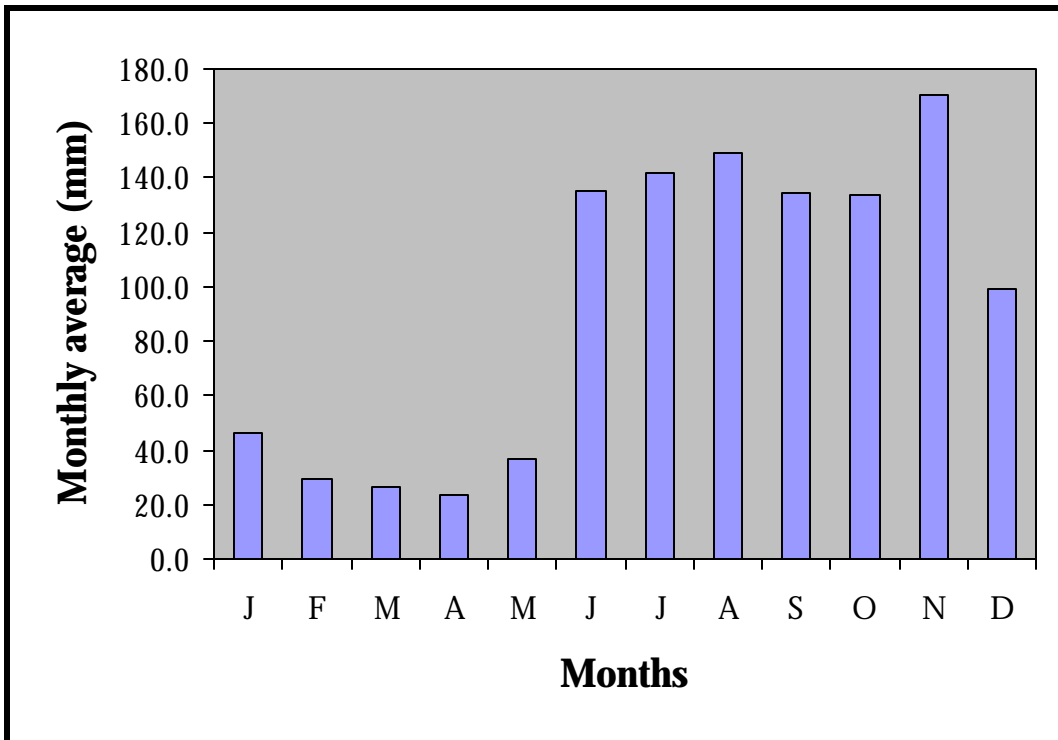


**Photo 3 Damage to Soubise Area (Note boat washed onto landward side of road)**

Rainfall measured at the Point Salines International Airport (PSIA) indicated a total amount of 256.0 mm between the hours of 11:00AM and 5:00PM. This translates to an average rainfall rate of 42.7 mm/hour during that six-hour period. To put this into context, the following data is presented summarizing rainfall patterns for Grenada.

1. Rain is distributed into a rainy season from June to December – which receives about 77 percent of the annual rainfall – and a dry season from January to May.
2. Grenada experiences wide variations in annual precipitation at different locations, with, for example, the Grand Etang Forest receiving an average annual rainfall of about 3,880 mm (153 in).
3. Rainfall intensities are often greater than 50 mm/hr, and intensities up to 132 mm/hr have been reported (CCA, 1991).
4. Average annual rainfall recorded at the Point Salines International Airport (PSIA) for the period 1986-2003 was 1,125.6 mm (44 in), with monthly variations shown in Figure following.

The comparison of rainfall received during the hurricane, with seasonal rates, indicates that relatively little rainfall fell during this event. This was very beneficial, as had there been heavy rains, combined with the deforestation that occurred, significant landslides and further loss of life would almost certainly have occurred.



**Figure 5 Monthly Average Rainfall – PSIA (1986-2003)**

Finally, it should be noted that although Grenada is considered to be located just south of the hurricane belt, Hurricane Ivan has confirmed that the country is vulnerable to tropical storms, hurricanes and storm surges during the hurricane season, which runs from June to November. The last hurricane to directly hit Grenada, Hurricane Janet, in 1955, resulted in extensive damage and the loss of over 100 lives. More recently, in 1999, storm surges and high waves (no wind or rain) caused by Hurricane Lenny in the northern Caribbean resulted in severe infrastructural damage to Grenada’s west coast. Hurricane Ivan, even though coming 49 years after Janet, reinforces the need for all Caribbean countries to be adequately prepared for hurricane attack.

### **3. Affected Population**

#### **3.1 Description of Affected Population**

Grenada is comprised of seven parishes, which include the island of Carriacou and Petit Martinique; together they have a population of 102,632 persons<sup>5</sup>. Of the six parishes on the island of Grenada, which were impacted by hurricane Ivan, four: St. George, St. David, St. Andrew and St. John, were most severely affected.

The four affected parishes consist of a total population of some 81,883 persons or 80% of the total population. In the other three parishes St. Mark, St. Patrick and Carriacou, on average, some 20% of the persons in those parishes were severely affected. Table 2

<sup>5</sup> Government of Grenada Population and Housing Census 2001

details the affected population by Parish. Worst hit were persons in St. George, St. Andrew and St. David.

Parish	Total population <sup>b</sup>	Population		Population Affected
		Male	Female	
St. George's	37,057	17893	19164	35575 <sup>a</sup>
St. John's	8591	4314	4277	7732 <sup>c</sup>
St. Mark's	3994	1965	2029	799 <sup>d</sup>
St. Patrick	10,674	5256	5418	2135 <sup>d</sup>
St. Andrew's	24,749	12311	12438	23,759 <sup>a</sup>
St. David's	11,486	5770	5716	10337 <sup>a</sup>
Carriacou	6081	2972	3109	1216 <sup>d</sup>
<b>Totals</b>	<b>102,632</b>	<b>50481</b>	<b>52151</b>	<b>81,553</b>

**Table 2. Grenada: Estimated Affected Population due to Hurricane Ivan<sup>6</sup>**

Hurricane Ivan took the lives of twenty-eight persons, of which 30 % were due to trauma to the head and chest, attributed directly to the hurricane. The majority or 69 % of the victims were males, and 70 % of all deceased were over 60 years old. Consistent with the destructive path of the hurricane, 50% of deaths occurred in St. Georges, followed by 25 % in St. David's. Seven persons died indirectly as a consequence of the hurricane. Within two weeks after the passage of Hurricane Ivan, the accident and emergency departments of the two largest hospitals reported that 680 persons had been treated for various injuries. Cases of gastro enteritis in children were beginning to surface as the shortage of potable water became acute. In response, the Ministry of Health had begun the distribution of rehydration kits.

A Poverty Assessment Study conducted in 1999 indicated that some 32% of the population of Grenada were living in poverty. Of those who were defined as poor, 32% could be found in the parish of St. George's, 27% in St. Andrew's, 10% in St John's and 10% in St. David's. Table 3 below presents the data for poverty estimates by parish in Grenada. The poor who lived in the most affected parishes by hurricane Ivan, accounted for approximately 75% of the all those persons who were poor across the nation. The annual expenditure of the poor was estimated to be less than EC\$3,262.00 which was considered to be the cost of meeting minimal food and other basic requirements. Approximately 13% of all individuals in the country were found to be extremely poor or indigent.

Disasters associated with natural events are fundamentally an issue of development and there are close links between poverty, low-income populations, and communities being disproportionately affected by natural hazards. The effect of the disaster on the parishes with the significant proportions of the poor exacerbated an already difficult situation.

<sup>6</sup> Source:<sup>b</sup> Population Census 2001; <sup>a</sup> as estimated by 96% of those living in the hardest hit parishes; <sup>c</sup> as estimated by 90% of those affected parishes that were also hard hit; <sup>d</sup> as estimated by 20% of those living in parishes which were not as severely affected

This became evident, in the aftermath of the hurricane, when bands of persons who had lost their homes, took to the streets and looted.

Parish	Total population <sup>b</sup>	% of population	As a % of the poor population <sup>a</sup>
St. George's	37,057	36.1	31.7
St. John's	8591	8.4	10.0
St. Mark's	3994	3.9	4.8
St. Patrick	10,674	10.4	14.0
St. Andrew's	24,749	24.1	26.6
St. David's	11,486	11.1	9.8
Carriacou	6081	6.0	3.1
Totals	102,632	100	100

**Table 3 Poverty Estimates by Parish – Grenada<sup>7</sup>**

St. George's has suffered the fate of modern-day towns and cities, which became magnets for persons from the country-side seeking employment and livelihoods. These persons are part of the continuous internal migration streams which flow from the country side to town. They often find themselves cut off from family ties, living in precarious circumstances and in overcrowded squatter communities. In Grenada, many such persons work mainly in the informal sector<sup>8</sup> providing support services -such as meals to workers in the manufacturing sector at the estate in Frequente. To the tourist sector on the south coast of St. Georges's, informal sector workers provide hand crafted beads, craft produced from forestry products, and hair braiding services. Many women, as well, in this sector are involved in the trafficking of fruits and ground vegetables. The Poverty Assessment Report concluded that the informal sector has been important to the growth of Grenada. In the parish of St. Georges, they can be found living in the Grand Anse Valley, and in St. Andrew's in Soubise, both of which suffered immense destruction from the hurricane.

In the wake of Ivan, many persons found themselves without shelter, food, belongings or a social network to provide immediate support. It was reported that 18,000 persons were without homes and required relocation to approximately 160 formal and informal shelters.<sup>9</sup> Unfortunately many locations designated as shelters had their roofs torn off by hurricane Ivan forcing persons to seek alternate places of refuge. However, two weeks after the event, the numbers residing in shelters had been reduced to approximately 5,700 persons, or approximately 7% of the affected population, distributed in just over 140 shelters. The details of known formal and informal shelters are presented in table 3. Reports indicated that in some instances, as many as five families could be found crowded into single-family dwellings, which still had roofs or partial roofs, following the

<sup>7</sup> Source: <sup>a</sup> Grenada Poverty Assessment Report 1999; <sup>b</sup>Population Census 2001

<sup>8</sup> Government sources indicate that the informal sector may contain some 30% of the working age population (15-49) with a female participation rate that may be higher than that of the male rate.

<sup>9</sup> A peculiar situation arose following hurricane Ivan, where in some cases, designated shelters were destroyed by the hurricane, and in other cases, where persons were either without access to or knowledge of the location of the designated shelters, they moved into unoccupied buildings that appeared to be able to withstand the hurricane winds. In those situations the living conditions were precarious.

hurricane. In one instance, where some 540 persons took refuge in an informal shelter, they were found to be without basic sanitation facilities. Immediate installation of portable toilets occurred to avoid a serious health crisis.

Number of Shelters	Persons in Official Shelters	Persons in Unofficial Shelters	Total Number of persons in Shelters
10(official) 27(unofficial)	124	949	1073
20(official) 38(unofficial)	774	1803	2577
2(official) 6(unofficial)	0	149	149
8(official) 4(unofficial)	145	49	194
4(official) 22(unofficial)	341	1277	1618
3(official)	101	-	101
144	1485	4227	5712

**Table 4 Summary of persons in shelters by Parish<sup>10</sup>**

Fallen trees, landslides and debris (galvanize sheetings, boards, parts of household furnishings) strewn on the roads and broken poles and downed telephone lines resulted in the isolation of a number of communities. This hampered the distribution of food and other relief supplies. Almost the entire population was without access to potable water in the immediate aftermath of hurricane Ivan. After two weeks, water was gradually being restored. In the parish of St. George's, access to water had been increased from 30% to 75%.<sup>11</sup> The entire population was without access to electricity, immediately after the event, barring the few who had personal generators. Electricity has been restored to a small section of the country through the assistance of local and regional crews provided by CARICOM member states through CARILEC. After two weeks, approximately 50% of those persons with usual access to telecommunications services were without. Services to sections of St. Georges have been restored.

### 3.2. Vulnerability of Women and Children

Male headed households account for some 52% of the households in Grenada and females 48%, but among the poor the situation is reversed, female headship accounts for 52% of the households. The living conditions and capacities of the head of household is important as it affects issues of intergenerational poverty, the life chances of children and the other dependents, such as the youth and elderly who live in the household. The difficult situation of poor female headed households in the aftermath of hurricane Ivan was evident in the larger numbers of females in shelters than males and the larger number of children than adults. In one shelter in Bollicau, two women had between them some 22 children, which supports the findings of the poverty assessment regarding the extremely large size of poor families. UNDAC reported that the food distribution situation was slow and tedious, not often reaching the people who needed it most.

<sup>10</sup> Source: OECS on the basis of official information and consultations with Government officials

<sup>11</sup> CDERA Situation Report #8.

There were anecdotal reports of young women, seeking to procure transactional sex in order to secure needed supplies. Reports were also received of instances of gender based violence occurring in informal shelters.

Women are very often left with the responsibility for elderly relatives. Grenada has one of the highest total dependency ratios in the OECS region 94.8% and a relatively high elderly dependency ratio of 31.8%<sup>12</sup>. Persons over 65 years of age account for 16.3% of the population. It was not surprising therefore, that many of the deaths due to hurricane Ivan occurred among the aged, nor among elderly men, as there has been noticed a phenomenon in the OECS countries of the single headed male household living in somewhat lonely and precarious circumstances in old age.<sup>13</sup>

The employment situation is precarious in the best of times. The rate for male unemployment is 15% and 13% for females. Labour force participation rate of women is significantly lower in Grenada than other OECS countries. Approximately 68% of males and 38% of females participate in the labour force. This may not represent those working in the informal sector however, as many persons who eke out a living, to maintain themselves, through activities in that sector often do not consider themselves to be part of the labour force. The reported damage to day care centres, caused by hurricane Ivan which left some 480 children, in the parish of St. George's alone, without the care to which their parent or guardian have been accustomed, could make the participation in the labour force of women all the more precarious. This has become particularly clear, as the data on the parent of children of the day care centres, point to a significant proportion, 70%, of the parents being single female heads of households. With the expected negative fallout on the productive sectors of the economy, due to hurricane Ivan, larger numbers of women and men can be expected to seek their livelihoods in the informal sector. Provision of support services to female heads of households, in the form of day care for their children, will become necessary, not only to allow the mother time to secure a livelihood, but to ensure the safety and reduced vulnerability of the children who would have to be left without supervision and care in her absence.

### **3.3. Psycho Social Trauma**

Eighty per cent<sup>14</sup> of persons alive today in Grenada would never have experienced a hurricane, as the last major event, Janet, occurred in 1955, some 49 years ago. Disasters affect people in different ways. However, the shock at the devastation caused by hurricane Ivan and the resulting psycho social trauma to the entire population although acknowledged, has not been able to receive the attention of the health system that it requires. The health services have been burdened treating with the physical needs of the population following the crisis and trying to ensure that no outbreaks of infectious diseases occur. It is therefore not surprising that evidence of trauma rehabilitation has not been strong. UNICEF had begun to provide support to the government in the

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<sup>12</sup> Poverty Assessment Report, Grenada, 1999

<sup>13</sup> Social Audit of the Sugar Industry of St. Kitts and Nevis (2002)

<sup>14</sup> Grenada Population Census 2001 indicates that 80% of the population are aged 0-49

organization of community level peer counseling for children in shelters. Efforts were being made to secure the services of child psychologists and counselors, from off island, to support the needs of children and women.

## **4. Emergency Actions**

### **4.1 Government Actions**

Based on reports received originating from the Hurricane Centre in Miami, Grenada's Hurricane Tracking commenced as early as Saturday September 4, 2004. On Sunday September 5, the Government issued a Storm Watch. This was upgraded to a Hurricane Watch by 11:00 am on September 6. This action was taken as the centre of Hurricane Ivan was said to be located near the Island. The Government of Grenada took a decision to close all schools and governments offices to allow for citizens to prepare themselves for the Hurricane.

Government received information that suggested that if Ivan continued on its path it would have been likely to reach Grenada within 22 hours. In response, the National Emergency Relief Organization (NERO) called on citizens to take the storm warning seriously and to start their preparations. NERO continued to issue regular updates to citizens including information on basic supplies, the location of shelters and a call to listen to their radios for information. Persons living in low-lying areas, or areas prone to flooding were encouraged to evacuate, as well as those whose homes may have been vulnerable to high winds. At 5:00 pm the Hurricane Watch was upgraded to a Hurricane Warning.

The Prime Minister of Grenada, Dr. the Rt. Hon. Keith Mitchell, on September 7, called on all citizens to brace themselves for the worst eventualities. He advised persons to seek shelter at the venues announced by the Disaster Preparedness Office, and also urged persons not to become complacent.

Food was distributed to shelters starting on September 8, meats held in cold storage was also widely distributed. All seven parishes received food shipments on Saturday and Sunday following the passage of Ivan. There was also the distribution of water to shelters. Water bladders with a capacity of approximately 10,000 gallons were deployed within the first seventy-two hours after the storm.

The Public Health Department struggled to set up community water tanks. Water crews worked on restoring some water capacity in all areas, St. Patrick had 75% of its water restored by September 11, while St. Andrews had 50% of its water by the same date. However, water shortages were being addressed through bladders, tanks, water trucks and bottled water.



The Carriacou Disaster Preparedness Committee meanwhile had alerted chairpersons of the district committees to revisit vulnerable persons and prepare them for relocation; Shelters were opened; senior citizen's homes were prepared.

## **4.2 International Cooperation**

On Wednesday at approximately 9:00 am the Eastern Caribbean Donor Group met at the CDERA Headquarters, to receive a preliminary damage report. The information emanating from that meeting was to inform the group's emergency response. The Caribbean Disaster Response Unit scheduled for deployment on Wednesday to Grenada. While CDERA's sub-regional focal point for Grenada in Trinidad and Tobago was actively mobilizing to get supplies to Grenada, CARILEC assembled its restoration crews to be sent to Grenada. The Emergency Assistance Funds which is operated by CDERA and Caribbean Development Bank were activated. CARICOM Secretariat was apprised of the situation.

The British Naval Ship HMS Richmond also offered immediate support and assisted the Grenada Broadcasting Network in establishing a transmitter to allow for communication to the people. They also provided medical supplies to the General Hospital and restored their power.

The Regional and International Community have responded with the deployment of its multi-discipline Rapid Needs Assessment Team (RNAT) comprising of CIDA, USAID/OFDA, UNICEF, UNIFEM, UNDAC, PAHO, Red Cross, Environment and Sustainable Development Unit of the OECS and CARILEC. There has also been a major clean up effort with the support of the Venezuelan contingent. The government of Trinidad and Tobago has deployed a military contingent to assist with the recovery relief and rehabilitation efforts, in addition to providing material assistance. The details are presented in table 5.

Internal security has been provided by security personnel from the Regional Security System. A high level mission consisting of the Secretary General of CARICOM, the Director General of the OECS and the President of the CDB arrived in Grenada on September 10 to undertake a first hand assessment.

Agency	Type	Cost
T&T Regiment (Contingent of 250 soldiers)	Security; School repairs; contribution of 1,276 tons food, water, and generators; food distribution, restoration of water and sewage systems; restoration of electrical cable and poles and telecommunications,; medics, engineers; and 638 tons of construction material.	USD 1.3 Million
Venezuelan Regiment (Contingent of 146 soldiers)	Repairing schools and prison; debris removal; 8 tons water ; 25.5 tons food; 2 tons medicines, 8 tons construction material.	...
UNICEF	Rehabilitation of schools; medical and psycho-social support in the form of a doctor and an psychosocial expert; 200 collapsible water containers; trauma kits; 5,000 health kits and 5000 doses of oral rehydration packets .	...
PAHO/WHO	Cash grant	USD 500,000.
PAHO/WHO &OXFAM	Technical assistance in water restoration, water management and quality.	...
IFRC	Distribution of food water purification tablets, hygiene kits and plastic sheeting; Water bladders and 10,000 jerry cans, 3,500 tarpaulins, 10,000 bags rice, 9,600 cans corned beef, 10,000 bags red beans	...
Telecommunication without Borders	Provided free international communication, including internet connection	...
UNDP	Emergency relief, including supplies and logistics	USD 100,000.
CIDA	Assessment and relief efforts, technical assistance in areas of water and airport, supplies and ground transportation and other associated costs.	CAN\$550,000.
WRB Enterprises Inc	Appeal funds to CDERA	USD250,000
UNOCHA	Cash Grant	USD100,000

**Table 5 Summary of Relief Assistance<sup>15</sup>**

<sup>15</sup> Source: OECS estimates based on official information and consultation with Government officials

## **II. Assessment of the Damage**

This chapter contains an assessment of the damage caused by Hurricane Ivan to the social sector (housing, education and health), infrastructure and telecommunications, and production sectors (agriculture, including fisheries; manufacturing; retail and wholesale trade; and tourism), and to the environment, including water and sanitation. The assessment was carried out on the basis of information available during the mission. Direct damages or effects were assessed, that is, damage to physical infrastructure and the country's capital reserves, and indirect damages or effects, such as lower production of goods and services and emergency outlays.

The costs of rebuilding damaged assets have also been calculated where relevant. If the aim were to return to the situation prior to the hurricane, the value would be the same as the direct cost according to this methodology. However, for the purpose of a reconstruction programme, the assessment should also take into account the value of improved replacement, including disaster prevention and mitigation criteria, such as better technology and quality and more resistant structures. Natural disasters provide a country with an opportunity to rebuild, taking into account the approaches to economic, social and environmental development, which could simultaneously reduce its vulnerability to natural disasters.

The OECS mission interviewed representatives of the government, the private sector, and international organizations, who frequently provided information and valuable suggestions for the preparation of this document.

The figures used in this chapter were calculated in local currency.

### **1. Social Sectors**

#### **1.1 Housing**

Just under 28,000 houses or 89% of the country's housing stock of 31,122 houses have been damaged by Hurricane Ivan. Near 10,000 houses, or 30%, have been so badly damaged that they require complete replacement. Approximately 22,000 or 70% require repair. Table 6 presents an estimation of the proportion of houses requiring repair and reconstruction based on the population census data. The cost of damage to the housing sector has been estimated at \$EC1,380 million dollars, as detailed in table 7. Of that, 36% represents costs of repair and 64% reconstruction costs.

Parish	Total Number of Households	Proportion requiring Repair		<sup>c</sup> Proportion requiring reconstruction	Proportion Suffering No damage	Total Number of Houses damaged
		Minor <sup>a</sup>	Major <sup>b</sup>			
St. George's	11367	15	70	15	0	11367
St. John's	2739	60	20	0	20	2191
St. Mark's	1210	55	15	0	30	847
St. Patrick	3210	50	20	0	30	2247
St. Andrew's	7140	35	50	10	5	6783
St. David's	3530	15	70	15	0	3530
Carriacou	1926	35	5	0	60	770
Totals	31,122					27,735

**Table 6 Households affected by Hurricane Ivan by type of repair required by Parish<sup>16</sup>**

<sup>a</sup> Minor damage includes windows , doors destroyed or damaged and damage to partial roof covering;

<sup>b</sup> Major damage includes roof structure destroyed or damaged;

<sup>c</sup> Requiring reconstruction due to significant damage to structural frame

Note those parishes where houses were not damaged

In a number of parishes, the entire housing stock of a particular village was destroyed. In the parish of St. David the village of Après Toute was moved from the hillside, with only a pile of wood and sheets of zinc as an indication of its previous location. In St Georges, Darbeau, Vendome and Grande Anse Valley had been swept away and in St. Andrew, Soubise which was by the sea, took the brunt of the winds and sea surges from the hurricane, leaving a small number of houses standing.

Although a vast number of houses were still without roof and in a state of collapse, many houses were being made livable through the efforts of a custom called “marooning”<sup>17</sup> which involves villagers coming together in groups to help each other construct a house without payment. The housing stock of Grenada was a fairly sturdy one, with at least 40% having been built before 1980. At least 48% of the houses were constructed of wood and concrete and 30% of wood alone. In regard to roofing, some 79% the houses had their roofs covered with galvanize or alu-zinc sheeting.

Hurricane force winds of 115 miles per hour tore off roofs belonging to persons in the low and high income houses without distinction. The Prime Minister’s Official residence, personal house and the official house of the Governor General were extensively damaged, good illustrations of the more substantial houses being damaged along with houses put together by members of the squatter community. Although the

<sup>16</sup> Source: OECS estimates based on official sources and consultation with government officials

<sup>17</sup> Marooning comes from the notion of ‘maroonage’ found among Africans brought to the new world, who having escaped slavery, built independent societies. It is a custom rooted in the notions of independence and self-help.

Governor General's house was over 100 years old, making it a peculiar case. In the example, however, where houses were totally destroyed or severely damaged, in many instances they could be identified as having been constructed of light wood and precariously built. Poorly constructed housing, built without adherence to the building codes, or to land use guidelines, makes persons more vulnerable to hurricanes. Many housing settlements of this nature were built upon steep hillsides increasing their vulnerability to the wind force of hurricane Ivan.

<b>Thousands of EC Dollars</b>	
<b>Total</b>	<b><u>1,380,851,015.00</u></b>
<u>Direct effects</u>	
i. Reparation of damaged houses	495,229,840.00
ii. Replace of lost houses	877,095,175.00
Imported component <sup>a</sup>	1,097,860,012.00
<u>Indirect effects</u>	
i. loss income from rent <sup>b</sup>	8,526,000.00

**Table 7 Summary effects on the Housing sector<sup>18</sup>**

a/ imported component calculated at 80% of direct effects

b/ based on the cost of an average two bedroom flat – rate EC\$1,000.00 for a period one year.

The repairs and replacement to similar conditions have a value of EC\$1,380 million as presented in table 7. Reconstruction with some required improvements to reduce vulnerability is a larger figure, and amounts to some EC\$1,945 million dollars as can be seen in Table 8.

<b>Thousands of EC Dollars</b>	
<b>Total</b>	<b><u>1,945,827,517.00</u></b>
<u>Direct effects</u>	
i. Reparation of damaged houses	544,752,824.00
ii. Replace of lost houses	1,064,804,693.00
iii. Cost of furnishings	336,270,000.00
Imported component <sup>a</sup>	1,556,662,014.00

**Table 8 Estimated Reconstruction costs<sup>19</sup>**

a/imported component calculated at 80%

## 1.2 Education

<sup>18</sup> Source: OECS estimates based on official sources and consultation with government officials

<sup>19</sup> Source: OECS estimate based on official sources and consultations with Government officials

Damage to the education sector was second only to the housing sector in its severity. The estimated cost to the sector is \$EC196 million dollars, as detailed below. A more correct figure however, would be approximately \$EC215 million<sup>20</sup>. This figure would accurately reflect the damage to the entire network of schools and skills training institutions in the country.

The destruction to the education sector is a particularly hard blow to the Grenadian society as much emphasis and hope had been placed on education in order to transform the economy and the society. Some, 30,481 students have been affected, in the aftermath of hurricane Ivan. The Government of Grenada's medium Term Economic Strategy paper 2000-2002, notes that the development of the human resources constitutes the single most important element of Grenada's national development. The most recent poverty Assessment Report for Grenada concluded that at the base of poverty reduction in Grenada must be a radical human resource strategy that embraces the entire nation and excites it to acquire knowledge and skills.

The government recently concluded a Strategic Plan for the Educational Enhancement and Development 2002-2010, SPEED, with significant support from the international donor community. The first three objectives of the plan: to provide universal access to education; to improve radically the quality of education; and provide learners with relevant knowledge attitudes and skills, is going to be seriously challenged by the effects of the disaster on the education sector.

Parish	Schools										
	Pre-primary			Primary			Secondary			Tertiary	
	No	Repair	Recon	No	Repair	Recon	No	Repair	Recon	No	Repair
St. George's	18	1,806,984	84,150	19	11568850	2772350	7	8429250	2662400	1	45,000,000
St. Andrew's				8	3415900	0					
Carriacou					24,000		2	10,000			
				22							
Totals	18	1,806,984.	84,150.	49	15,008,750.	2,772,350.	9	8,439,250	2,662,400	1	45,000,000

**Table 9 Number Public Schools affected by Hurricane Ivan: Cost of repair and reconstruction by selected Parishes<sup>21</sup>**

Table 9 above shows the details of the costs of repair and reconstruction to the public schools by selected parishes. The main tertiary level institution in the country the T.A. Marryshaw Community College has been severely damaged and requires repair costs of \$EC4.5 million dollars. The main boys secondary school, Grenada Boys Secondary School, suffered damage to the tune of \$EC 2.6 million dollars. Particularly hard hit

<sup>20</sup> This information was based on discussions with government officials and verified by the independent information collected..

<sup>21</sup> Source: OECS estimate based on official sources and consultations with Government officials

were other secondary and primary schools that suffered damage to their roofs and to their structures due to the high winds of the hurricane. Many of the schools can be found in the St. Georges parish but the network of primary and secondary schools spread throughout the length and breadth of the country. Those located in St. David's and St. Andrew and St. John, also suffered loss of their roofs.

Parishes	Schools			
	Special Education		Day Care Centres	
	No	Repair	No	Repair
St. George's	2	222,750.00	14	314,306.00
Totals	2		14	314,306.00

**Table 10 Number Public, Special Education Schools and Day Care Centres affected by Hurricane Ivan: Cost of repair and Reconstruction for the Parish of St. George's<sup>22</sup>**

Table 10 above details the number of special education schools and day care centres in the parish of St. George's requiring repair as a result of hurricane Ivan. The loss of school facilities at the start of the school term for children with special needs could be a critical setback to their development.

The cost of damages to sporting facilities, which received a severe battering from Hurricane Ivan, amounted to over \$EC 83 million dollars. Pavilions were broken, hard courts damaged and bleachers turned into rubble. Table 11 details the number of facilities and costs by parish. Of particular significance was the damage sustained by the premier sporting facility of the country the Grenada National Stadium, in St. George's, which accounted for the lion's share of the cost at \$EC80 million.

Parishes	No.	Extent of Damage	Cost of damages
St. George's	4	Structural damage to roof, pavilion and perimeter fence and clearing of debris	1,165,000.00
St. David's	2	Structural damage and clearing of debris	350,000.00
St. Andrew's	2	Structural damage and clearing of debris	430,000.00
St. Marks's	1	Structural and Clearing	100,000.00
St. John's	1	Structural damage and clearing of debris	600,000.00
St. Patrick's	3	Structural damage and clearing of debris	410,000.00
Grenada National Stadium in St. Georges	1	Roof and supporting structure of all pavilions destroyed; private press boxes destroyed; Electronic score boards destroyed; Mondo Track damaged; Office Equipment destroyed	80,100,000.00
Totals	14		83,155,000.00

**Table 11 Number of sporting facilities affected and cost of damage by Parish<sup>23</sup>**

<sup>22</sup> Source: OECS estimates based on official sources and consultations with government officials

<sup>23</sup> Source: OECS estimates based on official sources and consultations with government officials

Damage to historical sites due to hurricane Ivan, in the town of St. George, the capital of Grenada, is of considerable concern. St. George's unique characteristic of fish scale roof, Georgian Architecture and system of fortifications has been a source of pride and a unique tourism attraction. The damage to the historic sites in the city has been estimated at approximately EC\$8 million dollars. The details are presented in table 12. The sites include Government House – Governor General's Residence, the Roman Catholic Cathedral and Presbytery, the Presbyterian Kirk and a number of historic Forts, and the Tourist Shopping Centre on the Carenage. This cost does not include cost of materials and training which would be necessary to enable skilled workers to undertake the repair and refurbishment that is necessary.

<b>Historic Sites</b>	<b>Cost</b>
House of parliament	790,000
Supreme Court Registry	450,000
Roman Catholic Cathedral and Presbytery	1,500,000
Equity House/ Methodist manse	60,000
Fletcher's Residence	75,000
Leroy Robinson residence	575,000
Grenada Cooperative Bank Building	50,000
Grenada Building and loan Offices	50,000
Fort George	400,000
Forth Matthew	100,000
Fort Federick	50,000
Grenada National Museum	120,000
Grenada Public Library	60,000
Presbyterian kirk	1,600,000
Knox House	40,000
Julien's Building	60,000
Huggins Buildings	
Hubbards main Office Building Young Street	50,000
Hubbards lumber Yard	150,000
La Chappelle	50,000
Technical and Allied Workers Union Bldg.	350,000
Government House – Governor General's Residence	1,850,000
Tourist Shopping on the Carenage	50,000
1810 Building and three other on Melville Street	125,000
Hassan Building Melville Street	35,000
<b>Total</b>	<b>7,940,000.00</b>

**Table12 Historical Sites damaged by hurricane Ivan in the town of St. George's and the cost of repair<sup>24</sup>**

<sup>24</sup> Source: OECS estimates based on official sources and consultations with government officials



Parish	Name of facility	Nature of damage	Cost of damages	
St. George's	River Road multi-purpose centre (pre school and library)	Roof blown off, flooding and structural damage	50,000.00	
	Brizan Multi-purpose Centre	Partial roof damage , windows and flooding	40,000	
	Mt. Moritz multi-purpose centre	Roof blown off	40,000	
	Happy Hill Community Centre	Roof blown off	10,000	
	Vendome Multi purpose centre	Roof blown off	40,000	
	Mt. Gabon/Mt. Toute Community Centre	Roof blown off, windows lost	30,000	
	Calliste Community Centre	Roof blown off	20000	
	Waburn Community Centre	Roof blown off windows and doors lost	25,000	
	St. Paul's Multi purpose centre	Roof , windows, doors	70,000	
	Belmont Community Centre	Roof blown off, windows and structural damage	40,000	
	St. David's	Bellevue Community Centre	Roof blown off, windows and toilet facilities destroyed	40,000
		Wisden Forest Comm. Centre	Roof damage, structural damage	35,000
		Corinth Comm. Centre	Roof blown off	20000
		Westerhall Comm. Centre	Roof blown off	20000
Berrotte Comm. Centre		Roof blown off	15,000	
Beaton Comm. Centre		Partial roof destroyed	7,000	
Belle isle Cmm. Centre		Roof blown off	10,000	
Après Toute Comm. Centre	Total destruction	30,000		
Totals	18 community centers		542,000	

**Table 13 Number of Community Centres affected and cost of damage by Parish<sup>25</sup>**

Community centres play a central role in the community. Many serve as community libraries, day care centres during the day, adult skills training centres and adult literacy centres in the evening and as a location for community meetings. The loss of these centres may negatively impact the strength of social capital in Grenada and reduce the support services which the government and civil society, can make available to members of the various communities. Because Grenada does not have local government institutions, the community centres can perform a vital link in the people's participation in the governance process. Sturdy community centres may be able to replace schools as a shelter in the event of a natural hazard, thus reducing the wear and tear of the school buildings in the event of a natural disaster.

<sup>25</sup> Source: OECS estimates based on official sources and consultations with government officials

	<b>Thousands of EC Dollars</b>
<b>Total</b>	<b><u>195,820,884.00</u></b>
<u>Direct Effects</u>	194,560,884.00
i. Reparation of Schools (without improvement)	99,773,884.00
ii. Replacement of school materials and furnishings	3,150,000.00
iii. Damage to libraries, national archives and historic sites	7,940,000.00
iv. Damage to Community Centres	542,000.00
v. Damages to sport facilities	83155000.00
<u>Indirect effects</u>	
i. Damages from use as shelters	1,260,000.00

**Table 14 Summary of Effects on the Education System<sup>26</sup>**

Table 14 presents the direct and indirect costs of damage to the education sector which stands at \$EC 195 million dollars. Reconstruction and reinforcement of existing structures in order to reduce vulnerability will increase the cost of repair and reconstruction to some \$EC215 million, as presented in table 15.

	<b>Thousands of EC Dollars</b>
<b>Total</b>	<b><u>215,402,972.00</u></b>
<u>Direct effects</u>	<u>214,016,972.00</u>
i. Reparation of damaged schools	109,751,272.00
ii. Replacement of lost schools	3,465,000.00
iii. Repair to libraries , national archives and historic sites	8,734,000.00
iii. Repair of Damage Communities centres	596,200.00
iv. Repair to sport facilities	91,470,500.00
<u>Indirect effects</u>	<u>1,386,000.00</u>
Imported component <sup>a</sup>	171,213,577.00

**Table 15 Estimated Reconstruction Costs for the Education Sector<sup>27</sup>**

a/ imported component calculated at 80%

### 1.3 Health

The damage to the major public hospitals, health centers and other health care institutions has been estimated at \$EC 11 million dollars following the aftermath of hurricane Ivan. The damage to various aspects of the Government's health system, will

<sup>26</sup> Source: OECS on the basis of official information and consultations with Government officials

<sup>27</sup> Source: OECS estimate based on official sources and consultations with Government officials

cause hardship to the users of the system and to the care givers seeking to provide the services to which the public is accustomed, while maintaining optimum quality.

The medical laboratory at the two hundred bed St. George's General hospital suffered the worst damage within the hospital compound; the laboratory lost approximately 40 % of its roof, 25 % windows, and all reagents. Due to the continued power outage at the laboratory following the hurricane, estimating the extent of damage caused by the disaster, was not feasible, though it was expected to be extensive. The physical structure of the laboratory was already dilapidated prior to the catastrophic event, and was due to be incorporated in the second phase of the General hospital renovation project. Hurricane Ivan has exacerbated already deteriorating circumstances and accelerated the urgent need to construct a new medical laboratory. The roofs of several ancillary buildings within the General hospital's complex have also been destroyed. The ophthalmic ward suffered extensive damage. Total damage to the general hospital is estimated to be \$EC 4.5 million dollars. Table 16 presents the cost of damage by health institutions.

<b>Institutions</b>	<b>Cost EC \$</b>
Carlton Drug Rehabilitation Centre	2,625,000.00
Central Medical stores	1,750,000.00
Community health Centres	590,500.00
Princess Alice Hospital	3,550,000.00
Princess Royal hospital (Carricaou)	60,000.00
Richmond home for the elderly and indigent	525,000.00
St. Georges General Hospital	4,500,000.00
School of nursing	70,000.00
Vector Control building	109,000.00
Project Office building for General hospital	75,000.00
Pharmaceuticals in Health Centres	70,000.00
<b>Total</b>	<b>10,599,500.00</b>

**Table 16 Summary of damage to Public Health Institutions<sup>28</sup>**

The 30 bed Princess Alice hospital in St. Andrew suffered major damage and is mostly dysfunctional. It lost 90 % of its roof, and most of its equipment, furniture, and supplies were looted. Within this complex, the roofs of the nurse's hostel and a doctor's quarters were completely lost, while the other doctor's residence was destroyed. The cost of damage to the complex is estimated at \$ 3.5 million. The remaining two hospitals in Grenada, the psychiatric and Princess Royal, were spared. Carriacou's 35 bed hospital,

<sup>28</sup> Source: OECS estimated based on official sources and consultations with Government officials.

Princess Royal, sustained roof damage, and its cistern water supply was contaminated, at total replacement cost of \$ 60,000.

The complete galvanize sheeting, and 30 % of the ceiling of Central Medical Stores (CMS) was destroyed, at a cost estimated at \$ EC1.7 million dollars. The pharmaceuticals section of CMS was unscathed, but 30,000 examination gloves, 65,000 needles, and related medical supplies valued at approximately \$EC 60,000 had deteriorated. Fortunately, prior to the hurricane, refrigerated items were relocated to another safe building. CMS lacks electrical power to store vital pharmaceuticals, such as vaccines and insulin. Pharmaceuticals valued at \$ 70,0000 in the health centres were reported destroyed.

The roof of the Richmond home for the elderly, which cares for 110 aged and underprivileged citizens, was completely destroyed and the Carlton Drug Rehabilitation Centre suffered a similar fate resulting in an estimated cost of \$ 2.6 million

The damage to the community health institutions is of concern to the health sector as primary health care is a critical component of the health service. Of the country's total listing of thirty six health facilities, eight or 22 %, completely lost their roofs, and are dysfunctional. There was varying damage to the remaining peripheral clinics, ranging from partially destroyed roofs, broken doors and windows, and disrupted electricity lines.

The following buildings sustained heavy damage, mainly from damaged roofs : school of nursing , books and equipment; Vector control building , equipment and vaccines; and the project office building for the reconstruction of the general hospital

The ministry also incurred a variety of indirect cost consequent to the hurricane. In seeking to maintain optimal health service operations, care givers worked round the clock and ambulances and health vehicles were commandeered into rescue and relief efforts. An aggregate of the direct and indirect costs to the Ministry of Health was estimated at \$EC 10.7million dollars as presented in table 17.

	<u>Thousands EC Dollars</u>
<b><u>Total</u></b>	<b><u>10,782,150.00</u></b>
<b><u>Total Direct</u></b>	<b><u>10,599,500.00</u></b>
i. Damages to Hospitals	8,110,000.00
ii. Damage to Community Health Centres	590,500.00
iii. Health Care Institutions	1,899,000.00
<b><u>Indirect Cost</u></b>	
i. Increased cost of Communications	60,000.00
ii. Increased work hours of health care professionals	68,400.00
iii. Increased use of health vehicles in rescue and relief efforts	54,250.00
<b><u>Total indirect cost</u></b>	<b><u>182,650.00</u></b>
<b><u>Imported component</u></b>	<b><u>8,479,600.00</u></b>

**Table 17 Summary Effects on Health Sector<sup>29</sup>**

<sup>29</sup> Source OECS Estimates based on official sources and consultations with Government officials.

In order to maintain the health status of the Grenadian population, the Government will find it necessary to reconstruct the damaged health institutions. Table 18, depicts the reconstruction costs for the various health institutions, which amounts to \$EC11.6 million dollars, representing an increase for mitigation and reduced vulnerability.

Thousands of EC Dollars	
Total	11,658,900
<u>Total Direct cost</u>	<u>11,658,900.00</u>
Reparation of damaged hospitals	8,921,000.00
Reparation of damaged community Health centres	649,000.00
Repair to Health care institutions	2,088,900.00
Imported component	9,327,120.00

**Table 18 Estimated Reconstructed costs for the Health Sector<sup>30</sup>**

## 2. Productive Sectors

### 2.1 Agriculture, Livestock and Fisheries Sector

#### 2.1.1 Overview

The agriculture sector in Grenada is critical in maintaining an environment of social and economic stability. The sector plays a vital multi-functional role in generating foreign exchange, providing employment and contributing to food security.

Since 1997, the performance of the sector can be described as mixed. With a negative growth of 0.89 percent in 1997 followed by a negative 1.20 percent in 1998, the sector grew by 10.02 percent in 1999. The ensuing two years 2000 and 2001 registered negative growth of 2.15 and 2.85 percent respectively. In 2002, the sector again registered positive growth of 19.0 percent. These changes in the growth of the sector are closely related to the output of the principal crops cocoa, nutmeg and banana. This is exemplified in the 2.4 percent negative decline in 2003, which was attributed to a 7.9 percent fall in output in the main crops cocoa, nutmeg and banana. The production of nutmeg declined by 20.8 percent to 5.4m pounds. A 12 percent decline in mace output naturally accompanied the fall in nutmeg production. Cocoa continued its downward trend in 2003 to register a 29.4 percent fall in output. Banana output declined by 21.7 percent as very little is now produced for the export market.

<sup>30</sup> Source OECS Estimates based on official sources and consultations with Government officials

Prior to the disaster growth in the sector was projected to register positive growth in, at least the medium run. In 2004, the sector was expected to expand by 4% , by 12% in 2005 mainly due to the production cycle of traditional crops (and in particular of nutmeg) and stabilize around 4% for 2006 and 2007. . Livestock and forestry has been fairly steady since 1997, registering only positive growth. Fish output has been steadily increasing since 2000. The sector grew by 13.1 percent in 2003. The sector provides direct employment for 2200 fishermen and many more along the commodity chain as the product moves to the consumer. A wide range of non traditional are grown in Grenada. These range from roots and tubers, vegetables, brassicas, and cucurbits among others. The non traditional play a significant role in ensuring food security.

### **2.1.2 Description, analysis and estimation of the damage**

The impact of hurricane Ivan was widespread throughout the island inflicting severe damage to the agriculture sector. The damage was most intense in the parish of St. Andrew accounting for 60 percent of total damage, followed by St. David with 20 percent, St. Johns 10 percent, St. Georges 5 percent with St. Mark, and St. Patrick sharing the remaining 5 percent. As a result of the high velocity winds experienced with hurricane Ivan, extensive losses were recorded in the crop sub sector, livestock, fisheries and in the seventy two (72) water catchments.

Table 19 provides a summary of the direct, indirect, and total damage to crops, livestock, fisheries, propagation units and nurseries, irrigation and drainage, and farm roads by parish. The total direct and indirect damages were estimated at 55 and 46 million EC\$ respectively.

#### Crops

The principal export crop nutmeg, which was concentrated in the north eastern parishes of St. Patrick and St Andrew, was severely damaged as well as other crops ready for harvesting at the time of the disaster. The nature of the damage ranged from toppling to uprooting, snapping, defoliation and scorching.

The effects on the nutmeg sub-sector, which employs approximately 30,720 persons either directly or indirectly will deny the dependents of their livelihoods and may draw some closer or beyond the indigence curve. This situation will worsen unless steps are taken in the short run to replant and rehabilitate the production base which has declined by approximately 10 percent of the pre-disaster level. The new plantings must be encouraged in solid stands as this will allow for optimal use of the cultivable resource and the opportunity for diversifying the sector.

Direct damage	Crops	Livestock	Fisheries	Propagation units and private nurseries	Irrigation and drainage	Farm roads	Total
St. John	1,304,493	359,832	545,000	2,030,000.00	17,242	3,062,480	7,319,047
St. George	1,455,336	1,863,137	1,535,000	727,115.00	25,763	3,758,540	9,364,891
St. David	2,320,840	1,335,064	137,000	858,530.00	71,563	4,680,790,	9,403,787
St. Patrick	1,505,934	995,218	280,000	70,000.00	142,938	2,259,130	5,253,220
St. Mark	895,073	118,067	191,000	10,000.00	14,313	2,099,400	3,327,853
St. Andrew			468,000		114,500	10,170,460	20,009,933
Carriacou and Petite Martinique	5,044,351	1,949,862	20,000	2,262,760			20,000
Total	12,526,027	6,621,180	3,176,000	59,958,405	386,319	26,030,800	54,698,731
Indirect damage							
St. John	4,372,267	430,680	738,000	203,000	3485	306,248	6,053,680
St. George	1,806,600	1,695,720	645,000	72,712	5153	375,584	4,600,769
St. David	4,842,740	2,329,216	120,000	85,853	14,313	468,079	7,860,201
St. Patrick	3,708,334	565,770	248,000	7,000	28,588	225,913	4,783,605
St. Mark	2,694,494	114,142	247,500	1,000	2,863	209,940	3,269,939
St. Andrew			378,000		22,900	1,017,046	19,035,916
Carriacou and Petite Martinique	15,048,011	2,343,683	180,000	226,276			180,000
Total	32,472,446	7,479,211	2,556,500	595,841	77,302	2,602,810	45,784,100
Total damage							
St. John	5,676,760	790,512	1,283,000	2,233,000	20,727	3,368,728	13,372,727
St. George	3,261,936	3,558,857	2,180,000	799,827	30,916	4,134,124	13,965,660
St. David	7,163,580	3,664,280	257,000	944,383	85,876	5,148,869	17,263,988
St. Patrick	5,214,268	1,560,988	528,000	77,000	171,526	2,485,043	10,036,825
St. Mark	3,589,567	232,209	438,500	11,000	17,176	2,309,340	6,597,792
St. Andrew	20,092,362	4,293,545	846,000		137,400	11,187,506	
Carriacou and Petite Martinique	0	0	200,000	0	0	0	200,000
Total	44,998,473	14,100,391	5,732,500	6,554,246	463,621	28,633,610	100,482,841

**Table 19 Summary of Direct and Indirect Damage by Parish in Eastern Caribbean Dollars**

Other negative implications of the disaster include a reduction in nutmeg production over the next five years and a concomitant reduction in foreign exchange earnings, which will decrease to about 8 percent once current stocks are exhausted.

Plant and building infrastructure also suffered from the onslaught of Ivan. Eleven on the nineteen stations sustained considerable damage at an estimated cost of EC \$5.7 million.

The distillation plant at Marli suffered significant damages and will require approximately EC\$150,000 to secure and repair the factory shell and another EC\$500,000 to return the plant to a desired level of operation. The reconditioning plant also suffered damages that will require repairs costing EC\$100,000. The organic plant, because of the extensive damages will have to be replaced. The replacement cost is estimated to be EC\$750,000.

Cocoa, another major contributor to the economy is grown on approximately 8000 acres of land. The sub-sector employs approximately 7,500 active farmers spread throughout the parishes. According to information sourced from the Grenada Cocoa Association, production in 2004 prior to the hurricane reached 1,800,000 lbs valued at EC\$5,580, 000.

The extensive cocoa building infrastructure used for buying, propagation and servicing the industry suffered substantial damage. The estimated value of the damage, which includes the private operators, such as Belmont, which is also a tourist attraction is approximately EC\$1.8 million. The effect on employment is expected to be drastic on all dependents of the industry along the commodity chain.

The banana industry, which has some level of importance both for local consumption and export was demolished. The 350 acres grown throughout the parishes suffered 100 percent damage. The total estimated damage to the industry is estimated to be EC\$1,440,134.

The minor fruits which include sapodilla, papaya, passion fruit, golden apple and others were demolished. They were either uprooted, toppled or scorched beyond regeneration. The damage to minor fruits is estimated at EC\$2,792,000.

Citrus also suffered similar type damage to the other tree crops. Of the 120 acres planted island-wide, 18.50 acres were destroyed. The estimate of direct and indirect cost for citrus is EC\$2,610,623.

The 114.5 acres of vegetables being cultivated at the time of the hurricane was completely wiped out. Tomatoes, cucurbits, brassicas, okra, sweet pepper, pigeon pigeons and corn were among the range of vegetables lost. The irrigation systems used in vegetable production was also badly damaged. The total estimated cost of the loss in vegetables is EC\$2,792,000

The category roots and tubers which comprise sweet potato, yams, dasheen and tannia also suffered damages. Of the 282 acres planted before the disaster, 66.47 acres was damaged. The estimated cost of the damages to roots and tubers is EC\$837,125.

The 41 propagation stations in the country have been severely damaged. These stations including the central propagation station and private stations have been severely destroyed and are non functional. The estimated cost of the damage to all these stations is EC\$6,554,246



### Forestry

Ninety one percent of the forest lands and watershed now lay bare and stripped of the vegetation, which once supported an ecosystem where much fauna and flora benefited directly or indirectly. The 72 watersheds on the island have been devastated. A major concern remains over the level of water which the aquifers can now support and for how long. Urgent action needs to be taken in the very short run to ensure regeneration and growth of vegetation in the forest and watershed areas. This may mean introducing some fast growing species while the indigenous plants slowly emerge.

### Livestock

The livestock sub-sector suffered damages to housing infrastructure of poultry and small ruminants and loss of stock of same. Losses linked to secondary effects resulting from stress and trauma were also recorded in livestock. The damage was most severe in poultry, pigs and sheep and goats.

### Fisheries

The fisheries sub-sector suffered major damage to its fleet boat and equipment. The 2,200 fishermen in the sub-sector suffered loss to engines, hulls, gear, safety equipment, communicating facilities, seines and housing facilities. The damage to the fisheries sector is estimated to be EC\$5,732,500.

### Farm roads

150 miles of farm roads was damaged during hurricane Ivan. The damage resulted from blockage of trees, clogged drains and culverts, destruction of the road base and surface. The estimated value of reconstruction is EC\$28,633,610

## **2.2 Tourism**

### **2.2.1 General Overview**

Tourism is jointly with agriculture the major economic sector of Grenada. The sector has been an important contributor to the diversification of the economy which has taken place in recent years. It has also a significant source of foreign exchange and labor employment. Finally as pointed out in WTO (2002) the development of tourism has “helped cushion the effects of the decline in its exports, particularly bananas and cocoa.

Within CARICOM Grenada’s market share has increased over time and currently represents 5% of the total. Contrarily within the OECS, Grenada’s share has exhibited a declining trend (19% and 12% of the total in 1990 and 2003).

During the 1990’s decade and until 2003, the year prior to the disaster, Grenadian tourism developed significantly. The contribution of tourism to the economy grew from 5.8% in 1990 to 9% in 2000 and has remained roughly at that level. The contribution of tourism

to the overall economy is even greater when measured through the tourism satellite accounts (28% in 2003). In the same vein, the number of visitor arrivals increased from 265,167 in 1990 to 316,158 in 2000. The evolution of arrivals from 2001 to 2003 reflects the September 11th effects and the consequent recovery of the tourism sector.

In terms of its components cruiseship arrivals, which represented 63% of the total on average between 1990 and 2004, has expanded at an uneven pace. However, stayover arrivals saw a steady increase in its numbers from 76,447 to 133,724 for the same period. This translated in an increase in the contribution of stayovers visitors to the total (29% and 45% in 1990 and 2003). The rise in stayovers responded in part to the expansion of the country's hotel capacity and the upgrading of its tourist facilities during the 1990's decade. The number of rooms in tourist accommodation establishments rose from 1,115 in 1990 to 1,758 in 2003 (See table 20 below).

Revenues have risen as well. Available data for the hotel sector representing half of the saleable room stock shows that profit margins more than doubled between 1991 and 2003.

The growing number of stayover arrivals and the positive response of the Hotel Sector to satisfy the increasing demand has also had significant effects in the economy. Stay over arrivals account for 88% of total visitor expenditure (cruiseship and yacht tourist expenditure represent 8% and 3% of total expenditure respectively). In addition the sub Hotel Sector represents an important source of domestic employment (8% of the total if only direct employment is taken into account) and of domestic demand as most of its services are sourced from local products and sources.

	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b>Total visitors</b>	300,602	317,315	369,346	386,013	368,417	391,680	378,952	316,528	277,000
Day-over visitors	31	34	29	28	30	30	33	41	30
United States	93,919	108,957	108,007	108,231	110,748	115,794	125,289	128,864	123,000
Canada	30,364	30,476	30,033	30,380	29,320	29,381	34,694	32,543	32,000
Europe	4,214	4,987	3,920	5,748	4,977	5,290	6,136	4,829	5,000
United Kingdom	...	...	...	...	...	...	...	43,862	40,000
Germany	11,217	17,740	18,480	16,780	21,350	23,311	26,234	32,236	28,000
Caribbean	...	...	...	...	...	...	...	4,586	3,000
Other Countries	13,692	14,729	14,615	14,357	16,407	18,636	22,204	24,112	27,000
Excursionists	34,432	41,025	40,959	40,966	38,694	...	36,021	23,518	17,000
Cruise ship passengers	6,622	7,880	11,450	10,800	11,057	10,011	8,202	7,359	6,000
<b>Total visitor expenditure (EC\$ m)</b>	200,061	200,478	249,889	266,982	246,612	265,875	245,461	180,305	147,000
Day over visitors	130	158	156	160	399	415	458	481	...
Cruise ship passengers	120	148	143	147	379	394	438	466	...
<b>Number of cruiseship calls</b>	10	10	12	13	20	21	20	14	...
<b>Number of yacht calls</b>	382	420	448	392	323	328	369	360	...
<b>Total number of tourist accommodations</b>	4,267	5,413	5,314	5,355	5,292	4,583	5,354	5,361	5,000
Hotels	70	73	78	78	80	87	86	94	...
Apartments cottages and villages	28	27	27	27	27	28	27	30	...
Guest Houses	19	21	26	26	29	30	34	34	...
<b>Total number of hotel rooms by tourist accommodation</b>	23	25	25	25	24	29	25	30	...
Hotels	1,428	1,428	1,652	1,669	1,775	1,802	1,800	1,822	1,000
Apartments cottages and villages	1,027	1,012	1,064	1,066	1,136	1,146	1,200	1,197	1,000
Guest Houses	236	245	371	384	418	404	389	393	...
<b>Total number of beds by tourist accommodations</b>	165	171	217	219	221	252	211	232	...
Hotels	2,710	2,718	2,936	2,964	318	2,995	3,274	3,091	3,000
Apartments cottages and villages	1,975	1,960	1,961	1,964	2,047	1,925	2,240	1,998	2,000
Guest Houses	474	490	636	659	720	669	709	722	...
<b>Employment</b>	261	268	339	341	351	401	325	371	...
Number of employees in tourism establishments	1,528	1,528	1,768	1,786	1,899	1,928	1,926	1,950	1,000
Age bill as percentage of total revenue	...	...	...	...	...	...	31	30	...
<b>Average occupancy rate</b>	67.3	70.1	67.2	61.1	62.1	62.3	64.8	71.0	...
Per day night	...	...	...	...	...	...	...	...	...
Per room night	...	...	...	...	...	...	...	...	...
<b>Travel and tourism account (Satellite accounts)</b>	...	...	...	...	...	...	21	21	...
Capital investment in tourism as % of total	...	...	...	...	...	...	30.2	29.36	30.00
Tourism exports as % of the total	...	...	...	...	...	...	...	...	...

Source: ECLAC, on the basis of official information and the Tourism Board of Grenada  
a/ Preliminary figures.

Table 20 Tourism Statistics

In 2004, the tourism sector noted a clear recovery from the effects of September 11th. As captured by national accounts the tourism industry (constituting namely the category of Hotels and Restaurants) was expected to grow by 8%. Stay over arrivals and cruiseship passengers grew by 11% and 79% in July 2004 in relation to the previous year.

On an annual basis tourist arrivals were projected to increase to 370 972 by 2004 and to 478 000 in 2006. Tourist expenditures had grown by 28% in the first semester of the year (45 and 58 million in January and July 2004 respectively) and were expected to increase by 8% for the whole year. At the broader level, if direct and indirect employment creation and the sectorial linkages between the tourism industry and the rest of the economy are considered, the travel and tourism industry was projected to account for 26% of total employment, 21% of total investment and 29% of total exports (See table above).

Hurricane Ivan severely affected the performance of the tourism industry. The sector suffered both direct and indirect damages. The former refer to damages suffered by productive assets, equipment, inventory and soft furnishings at the time of the disaster.

Indirect damages refer to damages that are a result of the interruption to the flows of goods and services and income. It is defined as the sum of income foregone and increases in costs and expenditures. More to the point indirect effects are a combination of supply side and demand side effects.

In the case of the Hotel subsector the former refers mainly to the contraction in the supply of tourist services by the host country due to the closure of hotels, the loss in room capacity, extra-costs incurred for the payment of utilities (water, electricity), making the hotel functional (i.e., the picking up of debris), security costs incurred due to the initial effects of the natural disaster on crime, and refunds for bookings that were made (whether for hotel services, tourism packages or Marina services prior to the disaster). The analogue of the loss in room capacity in the case of the yachting sector is the closure of Marinas and Harbours, and the loss in the number of slips in Marinas or the reduction of the number of stored yachts for repairs.

The main factor accounting for the demand side of the story is the change in the number of visitor arrivals due to the occurrence of the event.

Due to the importance of the tourism sector described above, the negative effects of the Hurricane on the sector are bound to be felt through out the economy in terms of: (i) loss of aggregate income and employment; (ii) its lower contribution and negative effect to the overall rate of growth of the economy, (iii) increase in imports due to the need to purchase intermediate goods and raw materials for repairs, (iv) increase in insurance flows, and (v) lower contribution to government revenue. These aggregate effects are termed secondary effects.

## 2.2.2 The Tourist Accommodation Subsector

### a) Direct damages

By far the majority of the tourist accommodations have sustained significant direct damages. The damage is geographically concentrated in Grenada, and more specifically, in the capital St. Georges. Insignificant or no damage at all was registered in Carriacou and Petite Martinique. Within St. Georges, the damage is concentrated in the area of Grand Anse (The Hotel Belt). Damages were also reported in the area of Carenage which is located near the center of St. George. At the more detailed level direct damages have been reported in:

- Roofs and ceilings.

Damages to roofs and ceiling include the removal of roofs and the peeling of the aluminium steel sheeting that covers the roofs and also protects the furniture and equipment in the room from weather conditions

- Electrical wiring and installations.

The damage to roofs has had an immediate implication for the functioning of the wiring of the infrastructure affected. The wiring has been damaged in all of these cases. As a result the electrical power has been shut down and tourist accommodations have been forced to rely on generators to provide minimum electrical power.

This has important implications for the computations of indirect cost as it forces the management to rely on an existing or newly bought electrical generator, purchase additional fuel, and in some cases reduce the number of hours during which electricity is available in order to recoup part of the additional costs incurred as a result of the damage of the Hurricane.

- Room appliances and accommodation equipment .

The damage and loss of part or whole roofs left the room equipment (air conditioning, televisions, lamps) and furniture vulnerable to the weather pattern of the hurricane. Besides equipment and furniture protruding from the wall, some equipment (fans and air conditioning) that was in rooms located near the sea were tarnished with salt particles causing rusting. In some cases the equipment was damaged by missile parts (including aluminium pile and wood) that were flown in by the high speed of the wind. As rain was not an accompanying feature of Hurricane Ivan most of the rooms and equipment damaged did not register damages related exclusively to rain fall.

In some more dramatic cases small cottages, apartments and small restaurants that were located in separate locations from the main tourist accommodation were literally wiped out.

As a result the damages have severely limited the supply capacity of tourist accommodations. A sample of the extent of the damage is provided in table 33 below. The table lists a sample of tourist accommodations, their geographical location, room capacity of the accommodation and the number of rooms that were reported damaged. The sample of hotels accounts for more than 60% of total saleable room capacity in Grenada. The information here presented was obtained through field work of the mission with direct interviews of owners or managers and is meant to provide an overall representative of an overall view of the damage to hotel capacity.

Name	Category	Geographical location	Capacity	Number of rooms damaged
Allamanda Beach Resort	Hotel	Grand Anse	50 Rooms	4 damaged.
Blue Horizon Siesta Hotel	Hotel Siesta	Grand Anse Grand Anse	32 Rooms 37 Rooms	All 11 damaged 6 destroyed
Mariposa Beach Resort	Hotel	Morne Rouge	31 Rooms 15 Appartments	21 damaged 2 damaged
Gem Holiday Beach	Appartments, cottages and villas	Morne Rouge Bay	20 Rooms	19 damaged
Grenada Grand Resort	Hotel	Grand Anse	212 Rooms	130 damaged
Coyaba Beach Resort	Hotel	Grans Anse	70 Rooms	
Grand View Inn	Appartments, cottages and villas	Mone Rouge	69 Rooms	51 rooms damaged 10 destroyed
La Luna	Hotel	Morne Rouge	16 Cottages	All damaged 5 cottages seriously damaged 1 cottage destroyed
True Blue Bay Resort	Hotel	True Blue	38 Rooms	28 Rooms damaged 12 badly damaged 3 cottages destroyed
Rex Grenadian Resort	Hotel	Point Salines	212 Rooms	Most rooms damaged. 127 badly damaged
La Source Resort	Hotels	Pink gin beach	100 Rooms	All rooms damaged 23 rooms not significantly damaged. 73 rooms with varying degrees of damage. 4 rooms destroyed.
Lance aux epines cottage	Appartments, cottages and villas	L'Anse aux Epines	11 Rooms	All badly damaged
Calabash Hotel	Hotel	L'Anse aux Epines	30 Rooms	All damaged 1 badly damaged.
Wave Crest Holiday Apartments	Appartments, cottages and villas	Grand Anse	22 Rooms	17 badly damaged
Roydon's	Appartments, cottages and villas	Grand Anse	6 Rooms 6 Appartments	3 rooms destroyed
St Ann's Guest house	Guest Houses	Paddock	12 Rooms	5 non-functional

**Table 21 Sample of room damage by tourist accommodation**

Name	Category	Geographical location	Capacity	Number of rooms damaged
Mamma's Lodge	Guest Houses		10 Rooms	All damaged and non-functional
Lexus Inn	Appartments, cottages and villas	Belmont	18 Rooms	All badly damaged and non-functional
Lazy Lagoon	Guest House	Lagoon Road	12 Rooms	All completely destroyed
Villamar Holiday Resort	Hotel	L'Anse aux Epinnes	20 Rooms	All badly damaged and non-functional
South Winds	Appartments, cottages and villas	Grand Anse	19 Rooms	Damage in most of the rooms

Source: On the basis of field interviews with owners/managers of the corresponding tourist accommodations.

**Table 22 Sample of Room Damage by Tourist Accomodation**

As a result of the damage many hotels have for all functional purposes shut down. At the current stage twenty-two tourist accommodations have functionally closed down their operations as a result of the phenomena. These represent 55% of the stock of saleable room capacity prior to Hurricane Ivan (See table 23 below).

Tourist accommodation	Percentage of total room capacity	Percentage of total bed capacity
Spice Island Beach Resort	4.3	2.1
Blue Horizons Cottage Hotel	2.1	1.7
Grand View Inn	4.5	2.0
Flamboyant Hotel	4.0	3.3
La Luna	1.0	0.4
Wave Crest Holiday Appartment	1.4	0.8
Palm C3urt Appartments	0.8	0.6
South Winds	1.2	1.0
Gem Holiday Beach Resort	1.0	1.2
Rex Granadian Resort	13.8	7.0
La Source Resort	6.5	5.2
Mariposa Beach Resort	2.7	1.6
Siesta Hotel	2.4	1.7
Lance Aux Epines Cottage	0.7	1.1
Roydon's Appartments	0.4	0.4
Villas of Grenada	1.0	2.1
Blue Orchid Hotel	1.0	0.8
Lazy Lagoon	0.4	0.2
Palm Grove Guest House	0.7	0.5
Coyaba Beach Resort	4.6	3.3
Winward Sands Inn	0.7	0.4
Villamar Holiday Resort	4.3	1.04
Percentage of the total	55.4	42

Source: Own estimations based on field interviews with owners and managers of tourist accommodations and on information provided by the Grenada Board of Tourism.

**Table 23 Tourist accommodation functionally closed and number of room and beds**



When valued in monetary terms tourist accommodations reported through their respective assessor's evaluations varying degrees of damages. A quick sample of a subset of tourist accommodations representing 38% of the saleable room capacity indicated that the extent of the damage ranged from 650,000 to 40 million EC\$. It was estimated by the mission that the direct losses born by tourist establishments to their buildings and infrastructure amount to 167 million EC\$ (See table 24 below). The figure was obtained on the basis on information provided by the bigger tourist accommodations (those with room capacity exceeding 50) on estimated losses to buildings and infrastructure, taking into account that the Hurricane affected close to 90% of the tourist accommodations; using, and assumptions, based on field work, that the damages to establishments with less than 30 bore losses on average of 300,000 EC\$ per establishment. Losses to restaurants and gift shops were estimated at 30 million EC\$.

Category	Millions of Eastern Caribbean Dollars
Total	196.7
Roofing and building structures (includes electricity repairs and plumbing)	166.7
Equipment and furniture	....
Restaurants	20
Gift shops	10

Source: Estimates based on field work, and meetings with the Grenada Board of Tourism and the Ministry of Finance.

**Table 24 Tourist accommodation Subsector Direct damage by category**

**b) Indirect damages.**

All hotel accommodations suffered and will continue to register indirect damages. Indirect damages are presented here under supply induced indirect damages and demand induced indirect damages.

The supply induced indirect damage refers mainly to the interruption of income flows or income foregone due to the loss in capacity (i.e., occupancy) resulting from the natural disasters. This follows from the type of information presented in table 24 above and considers in addition the rate of room occupancy, the realised room rate, and time during the year in which the disaster occurred. In the case of Grenada, Hurricane Ivan impacted one to two months before the high tourist season.

Finally the estimations also take into account the period for which the rooms and in this case many hotels will not be functional. Thus it was necessary to include not only the period for which the rooms that were damaged will not be functional but also, when the tourist establishment had shut operations, the entire revenue obtained from the occupancy of all the establishment's rooms. The calculations ultimately depended on the period during which the establishment in question would remain closed.

The survey conducted by the mission on this particular issue yielded different answers. While forty percent of the establishments interviewed thought that they would be fully back in operations by December 15th, thirty percent was of the opinion that they would be back in operations in six months and the rest stated that their time frame was eight to twelve months. The full hotel infrastructure is expected to be operational in a year's time.

In addition supply induced indirect damages consider the higher rates of utility costs as a result of the interruption of electricity, drinking water and higher transportation costs. It also factors in security costs and the expenses associated with picking-up the debris which in some cases, namely in the case of the bigger hotels, has been substantial.

The interruption of electricity has forced many establishments to buy or rent a generator plant and incur into fuel, diesel fuel expenses. According to ground interviews and official sources of information, the indirect costs for diesel fuel were estimated on average at 1,625 EC\$ per day.

The absence of drinking water has also led establishments to pay for transportation costs to provide drinking water. When this was the case, the cost of water was factored into the calculations at 900 EC\$ per day.

The cost of operations associated with the picking-up of the debris varied according to the establishment in question. The mission found that in some cases the transactions associated with the picking up of debris were non-market transactions. In one case, the establishment owner/manager provided shelter for a group of workers of the hotel that had as a result of the hurricane lost their shelter in exchange for picking up the debris. In others hotel workers were re-hired at the wage of a laborer for cleaning up operations. The establishments at the higher end of the income strata contracted private firms to do the work.

The demand induced damages relate to income losses derived from the decline in tourist arrivals (in this particular case stayover) as a result of the passage of the Hurricane. The information here was obtained through tourist expenditure surveys (which provide level and composition by category of the expenditure) and airline and tour operator interviews.

The number of tourist stayover arrivals dropped to almost nil in September (the month in which the disaster took place). It is expected to remain close to that level for October and November. Some increase in stayover arrivals is expected in the month of December. In fact the pick up in stay-over arrivals will depend on the extent to which the tourist infrastructure has been repaired and is functional.

Contrarily at the time this report was drafted few cancellations were registered in the cruiseship industry. During the month of September two of the scheduled cruiseship calls were diverted to Dominica. In the month of October only one cruiseship liner will anchor in Dominica rather than in Grenada as scheduled (accounting for 2758 passengers). After the month of November a 10% o 15% drop in cruise-passengers is expected (See Figure 6). It has also been reported that one company, which accounts for 8% of the Cruiseship

industry is pulling its operations out of Grenada and will relocate to the neighbouring island of St. Vincent.

The disaster and the consequent drop in tourist arrivals has had devastating effects on tour operators. The larger tour operators have reported losses of 75,000 EC\$ on average per month starting in September and have projected that level of losses until November. The smaller tour operators have reported losses of 10,000 EC\$ on average per the months of September, October and November.

Table 25 provides estimates of the indirect damages sustained by the tourist accommodation sector. These are estimated at 68 million EC\$ for the three months following the natural disaster.

The estimate combines both supply and demand induced effects. It was based on: (i) gross hotel revenues used in national accounts for the computation of the subsector contribution to GDP; (ii) interviews with tour operators, (iii) estimations of the decline in stay over arrivals; (vi) computations of the average gross revenue per room; (vii) the number of saleable rooms, (viii) energy costs (mainly diesel fuel) equivalent to 3,250 EC\$ per two-three days; (ix) water costs equivalent to 900 EC\$ per day; (x) a laborer's wage of 70 EC\$ per day; (xi) on the assumption that the disaster affected 90% of the tourist accommodations.<sup>31</sup>

	September-December
Total	67,580,285
Loss of gross revenue from occupancy of tourist accommodations	50,000,000
Loss of income of tour operators	2,475,000
Utilities	11,657,925
Electricity	7,502,625
Water	4,155,300
Security	600,000
Clean –up operations	3,447,360
Source: Estimated based on field interviews and information provided by the Grenada Hotel & Tourism Association and the Grenada Board of Tourism.	

**Table 25 Indirect damage for the last quarter of the year in Eastern Caribbean Dollars**

After December it is expected that hotel accommodations will not incur in any additional utility costs or clean-up operations and that the hotel room capacity will be restored gradually. On the basis of an average revenue per room derived from national accounts statistics and considering that from December onwards 40% of the hotel capacity

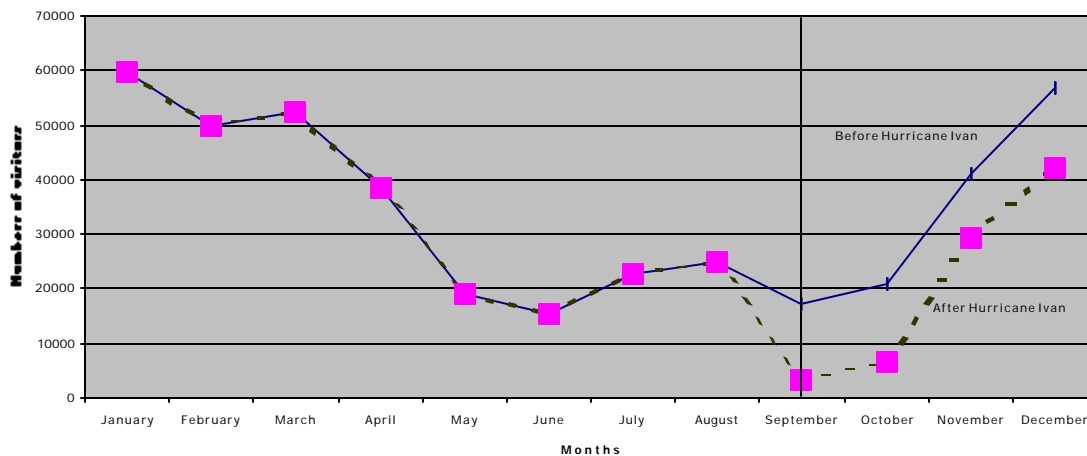
<sup>31</sup> An alternative method to calculate indirect costs at least for tourist accommodations consists in estimating the number of stay over visitors that will not be arriving due to the disaster. On this basis the loss of revenue from these non-arrivals can be obtained using the breakdown by type of tourist accommodation, the daily average expenditure and the weight of accommodation expenditures in total expenditures by type of accommodation. The result equaled 32.5 million for the months of September-December which is below the one obtained in Table 36 above which was arrived by analyzing hotel revenues. The available information however considers a sample representing less than 2% of stay over arrivals. See, The Grenada Board of Tourism, Grenada's Visitor, Expenditure and Motivation Survey (Winter 2003).

damaged by the hurricane would be restored and thereafter the room capacity would be restored at a rate of 10%, the indirect costs for the year 2005 sum up to 28, 937, 948 million EC\$ (not taking into account tour operators income losses).<sup>32</sup>

### 2.2.3 The yachting subsector

The yachting subsector suffered significant damages mainly as a result of the impact of the wind on yachts. By far the majority of the damage was reported in the Island of Grenada. Carriacou did not incur in any losses and Petite Martinique reported only two yachts lost. The information here provided was obtained on the basis of interviews and surveys with the manager/owners of Grenada’s Yacht Club, True blue Resort and Marina, Prickley Bay Marina, Martin’s Marina, Grenada Marine and the Spice Island Marina. The last two establishments perform full service boatyards.

Figure 6  
Estimated number of total visitor arrivals with and without the natural disaster  
January - December  
2004



Note: Includes yachts, stay over and cruiseship arrivals.  
Source: On the basis of official information and informatioden provided by .....

#### a) Direct damages

At the time of the Hurricane, Grenada hosted 800 yachts. Of these fifteen sank, six disappeared and fifty were found stranded on land. The number of boats damaged is estimated at roughly 400. At present the yachting rescue operation is in the process of salvage. The repair phase will begin once the contractors have fully estimated the extent of the damage.

<sup>32</sup> These are however small compared to the loss of income of tourist accomodations.

Boats were damaged while at sea and also in boatyards. The extent of the damage was varied according to the marina and boatyards. Most boats however had a common pattern of damage. The direct damage refers mainly to:

- lost rings
- mast damages
- stainless steel framework
- hull damages.

Direct damage was also sustained by the yachting installations. These include (i) repairs to fence, car-park, electricity; (ii) electricity and plumbing; (iii) roof and infrastructure; (iv) wall repairs; (v) refueling. According to interviews these categories represent 8%, 22%, 35%, 17% and 9% of the total respectively.

Taking into account that there were 800 yachts in Grenada at the time of disaster and that half have been damaged, 15 have been reported destroyed, the total direct damage is estimated to be of the order of 108 millions EC\$. The figure was obtained through interviews with cruisers and yacht surveyors. It was also considered that the costing of yacht repairs can easily vary between 162,000 and 540,000 EC\$.

## **b) Indirect damage**

As in the case of tourist accommodations Indirect damage estimates comprise both supply and demand induced damages. Supply induced damages refer to the decline in income due in turn to reduction in harboring capacity due to the effects of the Hurricane.

At least three yachting installations in Grenada are closing and others have also considered moving their base of operations to safer locations. As a result the harboring capacity of the island will be at least temporarily reduced.

Demand induced damages refer mainly to the income loss due to the decline in the number of yacht arrivals due to the disaster. This will be determined in the short run by the Hurricane itself but also by a loss in the level of trust placed on Grenada as a Hurricane haven. The predicted number of yacht calls for 2004 without the Hurricane was 4,900, the projected number of yacht calls with the Hurricane is 4,380. Taking into account both the supply and demand induced factors in the yachting sector, the mission estimated the indirect losses to be 4.7 million EC\$ (See table 26 below).

	Eastern Caribbean dollars Millions
<u>Direct costs</u>	
Yachting repairs and losses	108.7
<u>Indirect costs</u>	
Loss of direct expenditure	4.7
<b>Total</b>	<b>113.4</b>

Note: Indirect losses refer to the last three months of the year 2004.

Source: On the basis of field interviews and information provided by the Grenada Board of Tourism and the Marine and Yachting Association.

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### **Table 37 Direct and Indirect damages : The yachting sub-sector**

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It is difficult at this point to estimate the indirect losses for the yachting sector for 2005 as there is no forecast on the expected number of yachts passengers for 2005 and little information regarding to what extent the passage of Hurricane Ivan will affect yachts' intentions of harboring in Grenada. If the assumptions are made that: (i) the number of yacht calls in 2005 would have increased in line with the expected average rate of growth of visitor arrivals (14%); (ii) the average length of stay for visiting yachts is 21 days; (iii) daily expenditure is 150 EC\$; (iv) in 2005 that the effects of Ivan is the contraction in yacht calls by 40%, and that (v) the industry would recover by 2006, indirect costs for 2005 would sum up to 21.4 million EC\$.

At the same time the disaster will have short run expansionary effects in activities related to repair and maintenance. These follow from the main areas that were damaged. These are rigging, stainless steel activities and fiber glass repair. The increase in demand for the services and goods of these sectors will generate additional income. Notwithstanding due to the absence of these skills in the labor force, some boats are being repaired in other locations (Trinidad and Tobago, Antigua and Barbuda, St. Maarten). Thus far the number of boats that have left represent 10% of the pre-Hurricane yachting float.

#### **2.2.4 Secondary effects**

Hurricane losses in the tourism sector will spill over the balance of payments, growth and income, expenditure effects and the level of indirect taxes (See table 27 below).

Balance of payment effects include increasing imports mostly for reconstruction phase of the tourist accommodation sector and yacht repairs. It also includes the decline in travel earnings due to the drop in stay-over arrivals. However, it is to be noted that the travel account will also register inflows as a consequence of travel associated mainly with family issues (family visits and also family members flying to other Caribbean countries due to loss of home or to continue their education studies). It is projected that the travel account of the balance of payments will contract by 45 millions EC\$.

The economy is also likely to register insurance flows but only a part will flow into Grenada. In the particular case of the yachting sector, insurance flows will not find their way into Grenada since most yachts are owned by non-residents.

Effects on growth and income will include the change in the contribution of tourism to GDP as a result of the Hurricane. Taking into account the effects of the natural disaster the tourist sector will contract by 25%.

Secondary effects	Millions of Eastern Caribbean Dollars (unless stated otherwise)
Loss of expenditure	45.0
Loss in sectoral GDP (Constant 1990 dollars)	20.3
Loss of indirect tax revenue	2.7
Employment losses (direct and indirect)	
Number of unemployed	8,000
Note: On the basis on projected tourist expenditure The secondary effects are for 2004.	

**Table 27 Secondary effects of the tourism sector**

This also comprises the disposable income which is actually spent by the accommodation sector. Taking into account the major's hotels gross revenue, their tax payments and the variation in tourist arrivals, it is expected that net profits may decline in some cases by more than 50%.

The damages felt in the tourism sector also will spill over to indirect tax revenues. The estimate is that in terms of indirect tax revenues, the economy would lose close to 3 million EC\$.

Finally and most important, the effects on the tourism sector will have a negative impact on employment. The impact on employment refers not only to direct employment but also indirect employment. The estimate of job losses ranges from 2,860 if the impact of the Hurricane touches only the 'direct jobs' component of employment in the tourism industry. If the direct and indirect components are taken into account the number of jobs lost can be of the order of at least 8,000.

### **2.3 The Manufacturing Sector**

The manufacturing sector in Grenada is relatively small, accounting for approximately 6.0 per cent of GDP. The sector is dominated by the production of beverage and tobacco; garments; grain mill products and bakery products; and chemicals and paints.

Since 2001, the sector registered declines in each year, which averaged 4.5 per cent over the period, and activity in the sector was projected to remain stagnant in 2004. This was

influenced by the fluctuations in output of the major industrial products, particularly chemicals and paints and grain mill products and bakery products. Over the period 2005 and 2007, growth in manufacturing is projected to be marginal at an average rate of 1.0 per cent.

With the passage of hurricane Ivan, the sector experienced significant damage of approximately 75 per cent of buildings and stocks. The level of employment in the sector was also significantly reduced, particularly in the industries related to the production of garments and furniture as some of these entities are not expected to recommence operations in 2004.

Consequently, the sector is projected to decline by 10.0 percent in 2004, by 5.0 percent in 2005 and remain stagnant in the subsequent years.

Table 28 below summarises the direct and indirect effects of hurricane Ivan on some of the major industrial enterprises. The data is based on a survey response of twenty five (25) enterprises in the manufacturing sector. The survey questionnaire, which was prepared and distributed by the OECS mission while carrying out the assessment of the damage, requested data on the level of employment before and after the hurricane; the status of the operations of the enterprise; value of sales; the value of buildings, equipment and machinery, and inventories; and the estimated loss as a result of the hurricane. Based on the data received, both direct and indirect damage was calculated.

The direct damage is related to the destruction of assets at the time of the hurricane namely, buildings, equipment and machinery, and inventories. The indirect costs are related mainly to the loss in flows of income and additional cost as a result of the hurricane.

As indicated in the table, the direct damage is much higher than the indirect damage, and this is associated with the high cost of buildings and equipment. The direct damage to the sector was estimated at \$17 million EC\$ and the indirect cost at \$4 million EC\$.

Among the manufacturing industries, the rum, furniture and garment industries suffered the most significant damage. In the case of the production of rum, buildings were most severely affected while for the furniture and garment industries both buildings and inventories were damaged. The beverage sub-sector, which dominates the industry, was affected by damage to buildings but operations were not halted for a lengthy period. A number of light manufacturing industries lost substantial portions of inventories and suffered from damage to buildings. The period for the commencement of their operations is uncertain.



Type of Establishment-:	Direct Damage	Indirect Damage	Total
Production of Beverages	2.6	0.1	2.7
Furniture	2.4	0.4	2.8
Rum	4.0	0.9	4.9
Garments and Bags	4.6	1.7	6.3
Food	0.8	0.2	1.0
Other	3.4	1.0	4.4
Total	17.8	4.3	22.9

Source: On the basis of field interviews and information provided by the manufacturer's association and the ministry of finance and planning.

**Table 31 The manufacturing sector Direct and indirect damage in Millions of Eastern Caribbean Dollars**

## 2.4 The Wholesale and Retail Sector

The wholesale and retail trade which accounts for approximately 10 per cent of GDP, comprises a large variety of traders in foodstuff, clothing and accessories, and books and stationary. Development in the sector is generally influenced by the performance of the other economic sectors and, except in 2001 when overall economic activity declined, the wholesale and retail trade sector has been recording growth. In 2004, the sector was estimated to grow by 8.0 per cent and at an average rate of 7.0 per cent between 2005 and 2007.

Following hurricane Ivan, the sector is projected to record zero growth in 2004. Despite the projected growth on construction, the wholesale and retail sector will be adversely affected by the reduction in income from the other major economic sectors namely tourism and agriculture. In addition, the sector suffered both direct and indirect damage from the hurricane, which interrupted normal business activities.

The direct damage is related to that of physical assets and stocks. The sector was seriously affected by the loss of inventories due mainly to the looting that occurred immediately after the hurricane. This contributed to indirect damage as entities did not immediately reopen because of the general impact of the devastation; the loss of stocks from the hurricane and the subsequent looting; and the need to secure available stocks. A period of restricted trading in supermarkets was manifested in limited opening hours and restrictions on the number of shoppers in the supermarket.

At this stage as the sector had not been able to complete the run on their inventory stocks following the disaster. The mission was nonetheless able to provide an estimate of indirect damage based on national accounts and in site interviews. The value of the indirect damage was estimated at 11 million EC \$.

### 3. Infrastructure

#### 3.1 Public Utilities

##### Electricity

Grenada's electricity is provided by the privately owned Grenada Electricity Services Ltd. (GRENLEC), from its power station located in Queen's Park, St. George's. GRENLEC's present generating capacity is 40 megawatts, and was scheduled to be upgraded to 43 megawatts by the end of 2004, with a peak load of 25 megawatts. As a result of the hurricane<sup>33</sup>, it is estimated that 80% of GRENLEC's distribution system was damaged, while the main generating system was left essentially intact (some water induced damage to panels occurred).



**Photo 4** Typical Damage to Electric Poles

A damage assessment subsequent to the hurricane was carried out by USAID and by CARILEC. These assessments confirmed that the majority of the damage occurred in the parishes of St. George and St. David, while in the north of the island, the damage was not as extensive.

One of the key rehabilitation strategies adopted by GRENLEC has been the assignment of priority areas for the restoration of power. These are described following.

1. The **health sector**, specifically power was restored within 3-4 days to the main general hospital in St. George and to the Mt. Gay Mental Hospital. This was achieved through the restoration of a feeder supply from the main generating plant. For hospitals such as the Princess Alice Hospital in Grenville, where it was not possible to restore the feeder supply, a standby plant was installed.
2. Priority was then assigned to the **security forces**, where either feeder supply or standby plants were used.
3. **Water supply systems** were also assigned secondary priority, which proved to be a relatively difficult objective given the remote nature of some of these systems. Portable generators have now been installed at the two most critical sites, Baillie's

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<sup>33</sup> Information obtained through discussion with Mr. Vernon Lawrence, CEO of GRENLEC

Bacolet and Chemin Valley. Six other portable plants have been sourced from the United States and are to be flown in to be installed at six sites which are to be designated by NAWASA. It is estimated that by the end of September, 2004, all water supply stations should be powered and in operation.

4. The *commercial sectors* were then targeted for start up (tertiary priority). These areas are contained primarily in downtown St. George's, where substantial restoration of power has already taken place north to Tanteen and south to the Carenage. It is estimated that by the end of September 2004, all of St. George's (town) will be powered. Grenville is to receive a generator, with full power to be back in that town by the first week of October. From Grenville, the feed will go westward to Gouyave.
5. The next area also targeted for restoration (tertiary priority) was the *main tourism area* of Grand Anse. GRENLEC anticipates restoration of power to this area towards the end of September 2004.

An additional plant was placed at the *St. George's University* and the main feeder supply is presently being restored back to True Blue. Line crews are working their way from True Blue back to Grand Anse. The efforts for these areas are being helped with the emplacement of a 1.5 MW unit that has been located in Lance Aux Epines.



**Photo 5 1.5 MW Unit in Lance Aux Epines**

The long-term restoration strategy for GRENLEC includes the importation of 1000 electricity poles, which are due to arrive by end September, 2004 from the United States. Following this, it is expected that the main load centres will be restored by mid-October, while for general distribution, all power should be back within a period of six (6) months.

Assistance has been received from electricity generating companies out of Trinidad, St. Lucia, St. Vincent, Montserrat, Antigua and Dominica. In addition, the Trinidad and Tobago Electricity Corporation (T&TEC) has brought in pole diggers (digger derricks) and bucket trucks, while VINLEC out of St. Vincent also sent in some equipment. These have greatly assisted the restoration efforts. Notwithstanding this assistance, additional pole diggers are sorely needed in order to bring the entire country back on stream. A long term mitigation strategy for the reduction of vulnerability within this sector may be to lay underground cables. In order to optimize economies for such an undertaking, however, this would likely have to be coordinated with Cable & Wireless, and be concentrated within specific population centres such as St. George's and Grenville.

The damage assessment carried out for this utility estimates a restoration cost of EC\$70 million (direct costs). In terms of resultant losses of revenue, the following is noted:

- Monthly revenues are approximately EC\$8.5 million
- No revenues are expected to be collected for the month of September
- 50% of the revenues for this utility come from St. George's, Grand Anse and Grenville, where power will be restored within the first month.
- Over the remaining five (5) month period, it is assumed that power will be restored to rural areas at a rate of 10% per month.
- Using these facts and assumptions it is estimated that the total loss of revenue to this utility as a result of Hurricane Ivan (indirect costs) would be EC\$21.3 million.

## **Water Supply and Sewerage**

NAWASA, a government owned Statutory body, is responsible for water supply in Grenada. In all, there are twenty-five (25) dams/intake structures in the NAWASA system. The Authority plans in 2004, to commission a new desalination plant with a design capacity of 1,820 m<sup>3</sup>/day (0.4 mgd). This desalination plant is intended to supply the Woburn storage tank during the dry season.

NAWASA operates the Grand Anse sewerage system which serves the residential, tourism and industrial areas from Falege, Grand Anse to Point Salines, with collection, screening and pumping to a sea outfall at Point Salines.

As a result of the storm<sup>34</sup>, it was assessed that the dams suffered damage through siltation and the introduction of debris and trees. In addition, several distribution lines (from the dams to the treatment plants) were damaged, as they are supported overland on elevated columns and thrust blocks (Photo 3). These structures were in turn damaged by falling trees.

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<sup>34</sup> Telephone interview with Mr. Neptune, Acting Manager of Production and Quality



**Photo 6 Damaged Water Supply Infrastructure at Beausejour**

Damage was spread across the island, but was worse in the southern and eastern parishes.

Rehabilitation strategies include:

1. An initial temporary cleaning of all dams (already completed)
2. Proper cleaning of dams on a systematic basis. Three dams have already been properly cleaned, Concorde, Vendham and Radix. Annandale is to be cleaned by excavator by the end of September, 2004. It should be noted that restoration activities have been hampered by the relatively remote locations of many dams and consequent lack of access.
3. Temporary repairs to the trunk main on the Beausejour Bridge were made, however, these have to be redone and made permanent.
4. The distribution system at the Les Avocats site also needs to be repaired.

It is estimated that close to 90% capacity would be available by the end of September, 2004, however, water supply is still intermittent up to the time of writing of this report. This has prompted an advisory for the public to boil all water prior to consumption.

A damage assessment carried out by NAWASA revealed the following capital cost estimate breakdown for rehabilitation of services.

Pipeline Repairs	EC\$2.5 million
Repairs to Buildings	EC\$2.5 million
Repairs to plant (pumping stations, reservoirs, etc.)	EC\$1.5 million

This results in a total estimate of direct replacement costs of EC\$6.5 million. It should be noted that no damages were reported for the Grand Anse sewerage system and outfall.

In terms of indirect costs as a result of loss of revenue, the following can be noted:

- Total daily revenues equal EC\$46,000/day
- Based on the above assumption table 19 lists indirect costs by geographical location.

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<b>Parish/Region</b>	<b>% of Revenue</b>
Carriacou	0.5
St. George	70
St. David	9
St. Andrew	14
St. Patrick	3
St. Mark	1.5
St. John	2

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**Table 32 Indirect costs in water supply and sewerage by parish**

- It has been assumed that there has been a 70% loss of revenue overall in the month of September.
- Based on the referenced interview, it has been assumed that only 10% loss of revenue will occur in the month of October.
- No loss of income is expected to be incurred in November.
- Based on these facts and assumptions, it is computed that the total expected loss of revenues for this utility (indirect losses) will be EC\$1.1 million.

## **Telecommunications and Broadcasting**

Cable & Wireless Grenada is currently the sole telecommunications company offering direct exchange lines service to customers in Grenada. The company, 70% owned by Cable & Wireless plc, has in place an 18 optic fiber cable ring around Grenada (part of the Eastern Caribbean Fiber System) and has over 30,000 lines installed. A wide range of modern telecommunications services is provided through this company.

The telecoms industry has been deregulated in Grenada, and there are now several mobile and internet service providers established in the country. These include Digicel, AT&T and GNP.

Following the storm, a detailed damage assessment was carried out by Cable & Wireless, with assistance from both regional and extra-regional resources of the parent company. The assessment revealed the following information<sup>35</sup>.

- Both cellular and land line networks remain largely in operation.
- The lines on the east coast were installed underground, whereas those on the west coast were largely above ground. As a result, significant damage was sustained to poles on the west coast.

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<sup>35</sup> Interview with Mr. Aaron Moses, Head of Human Resources, Cable & Wireless



**Photo 7          Downed Poles Carrying Communication Cables**

- All cell sites were installed with generators.
- Significant damage was sustained to overhead fibres and to distribution lines, for which it is estimated that there was a 60% loss island-wide.
- Damage was also caused post-storm by people driving over lines and accidentally chopping cables as part of clean-up efforts.
- After the hurricane, it was discovered that the antennae (i.e. sectors) at several cell site locations had been blown off alignment by the wind. These all had to be realigned.

Restoration efforts have been ongoing since the hurricane, and Cable & Wireless have carried out restoration activities in concert with GRENLEC, with whom it shares the use of poles. At time of writing of this report, the following was the status of the restoration strategy.

- 21 of 24 GSM cellular sites were up and running
- 10 of 12 TDMA cellular sites were now back in operation
- 15 of 21 switches were now working
- The primary problem with the restoration activities will lie with the distribution lines, which are not expected to be fully operational for another six (6) months.
- As a measure of goodwill, Cable & Wireless has given the month of September free to all land line and internet users.
- It should be noted that meter readings indicate that approximately 10,000-15,000 lines are presently working, out of a total of 34,500 residential and commercial

lines. This is believed, however, to reflect an unreal situation, as in some cases the lines may be functional, however the individual house may have been destroyed.

The damage sustained has been estimated at EC\$30 million, with a replacement cost (direct cost) of EC\$42 million. This difference is accounted for by the fact that duties are now payable on the required equipment, whereas previously they were not. Estimates for the damages sustained by the other cellular providers have been made based on a preliminary estimate of the relative market share of these providers. This results in the following:

- |            |                |
|------------|----------------|
| 1. Digicel | EC\$10 million |
| 2. AT&T    | EC\$10 million |
| 3. GNP     | EC\$ 5 million |

In all, this gives a total estimate of direct cost for this utility sector, of EC\$67 million.

In terms of indirect costs as a result of loss of revenue, the following can be noted:

- There have been some losses of revenue from the cellular telephone network. In the first day after the storm, it is assumed that 10-15% of cell sites were working in the two northernmost parishes. Two days after the event, 12 of 24 GSM sites were up and running. Two weeks later, 23 of 24 GSM sites were up and running. This leads to the assumption that on Day 1 following the event, cellular phone revenues would have been reduced by 90%. Between Day 2 and Day 7, cellular phone revenues would have been reduced by 50%. Between Day 7 and Day 14, revenues would have been reduced by 20%. After Day 14, revenue reductions would have been minimal (5%). These assumptions may be tempered by the fact that there has been significant increased cell phone usage since the hurricane. It is not, however, possible to quantify this increased usage at this stage.
- On average, residential customers pay EC\$60/month for land lines. Commercial customers can be expected to pay approximately EC\$105/month per phone. This equates to monthly revenues of EC\$2.4 million.
- Cell phone revenues are approximately 60% of land line revenues, or approximately EC\$33,000 per day.
- Prior to the hurricane, there were 27,500 residential lines and 7,500 business lines.
- No revenues are expected to be collected for the month of September throughout the island.
- It is assumed that by the end of September, 30% of all land lines will be in operation and that revenues may be collected for them.
- It has also been assumed that 50% of land lines will be restored between October and February, at a rate of 10% per month and that revenues may be collected for them.
- Finally, it has been assumed that the remaining 20% of lines, even if repaired within the six month window, will likely require a further six months before housing infrastructure has been upgraded to the point where land line fees may be charged.
- The total loss of revenue (indirect losses) from land lines over the next twelve (12) months will be EC\$57 million.



- The total loss of revenue (indirect losses) from cell phones as a result of the hurricane is estimated to be EC\$280,000. This includes a 40% markup to account for the other cellular operators.

The cable providers in Grenada are Cable Vision and Wee TV. Damage assessments carried out for this sub-sector total EC\$5 million. To replace this damaged equipment, which primarily consists of the lines, will require an estimated EC\$7.5 million. This service is not expected to be restored for another six months. Using a customer base of approximately 15,000 and at a monthly rate of EC\$60, the indirect losses are expected to be EC\$5.4 million. This estimate does not include losses from advertising revenues.

There are approximately eight (8) broadcasting stations in Grenada. All of these were out of service during and immediately after the storm. At the time of writing this report, three stations were partially back on the air. Based on discussions with the main operators, a figure of EC\$2 million can be assumed for the rehabilitation costs.

## **Roads and Drainage**

A detailed field review of the road network throughout the island revealed that in general, with a few exceptions, the main roads were largely intact. This fact was largely due to the limited amount of rainfall that fell during the hurricane. Where damage and/or limitations to access occurred, it was primarily due to: land slippage; erosion; fallen trees and wave effects.

### **Land Slippage**

Land slippage was observed at St. Paul's, where clean-up efforts took approximately three days. Other sites of slippage included River Road and Brizan. In addition, the effects of the storm worsened the effects of a major landslide that had occurred previously on the Western Main Road on the approach to Gouyave (Photo 8). This landslide occurred before the hurricane and urgently needs to be cleared and some slope stabilization works carried out.



**Photo 8 Land Slippage at Gouyave Blocking Western Main Road**

Mitigation strategies for this slide could include either some form of slope stabilization, or relocation of the roadway to a lower level with sea defence works to protect it. It is

estimated that the cost of repairs to this location is approximately EC\$1.2 million. No indirect costs have been assigned to this project, as the length of the diversion roadway is sufficiently short that it does not present a significant difference from the main route.

### **Erosion**

Erosion of road edge was noted particularly at Grand Etang and Westerhaul (Photo 9). This type of road failure is characterised by removal of a section of the road, through the action of a slope failure. Remedial works should include a retaining wall, which would have to be designed on a site specific basis. Estimated costs to repair these two locations will be EC\$500,000.



**Photo 9**            **Erosion of Roadway at Westerhaul**

### **Fallen Trees**

A number of roads were blocked by fallen trees all over the island (Photo 10). This phenomenon is discussed in the Environmental Section, where the prevalence of downed trees in the Grand Etang Forest Reserve was noted. Following the hurricane, the Ministry of Works sent out 15 crews to carry out clearing exercises island-wide. Each crew consists of a front end loader, a dump truck and labourers with chain saws. Estimated costs for this activity will be EC\$1.2 million.



**Photo 10**      **Typical Example of Fallen Trees**

### **Coastal Damage**

The area from Soubise to Marquis was severely impacted by storm surge and wave effects. As a result of this, almost of all the houses and boats on the seaward side of the road were washed over to the landward side of the road, thereby blocking the road. After the passage of the storm, residents of the area cleared the demolished housing. Many of these residents have started to rebuild homes on the same lots that were affected by the hurricane storm surge and wave action (Photo 11). Mitigation action for this low lying area should ideally be relocation/resettlement of this community. Failing this, some form of coastal protection works (e.g. breakwaters) should be implemented, so that widening and increase in height of the beach lands may be achieved. The cost of construction of breakwaters for this area is estimated to be approximately EC\$3.0 million.



**Photo 11** Reconstruction of housing at Soubise/Marquis

## **Airports**

The passage of Hurricane Ivan resulted in damage to the Point Salines International Airport (PSIA). Damage was sustained to:

- Navigational aids (VOR, DME and NDB)
- Precision approach craft indicators (PAPI's). Two of these units are presently functional out of a total of four.
- The tower radio and equipment.
- Automatic flight plan processing system.
- Miscellaneous antennae.
- Approach lights, turning lights and runway lights.
- Air conditioners.

Structural damage was noted in the Tower, Terminal Building, Crash Fire and Rescue Building, Central Generating Station, Aviation Services office, Taxi Association office, Staff House. Of note was the collapse of the Store Equipment Building (Photo 12).



**Photo 12 Total Collapse of Walls of Store Equipment Building for PSIA**

The estimated cost of structural repairs is EC\$1.0 million. This does not include the cost of repairs for specialized equipment, which is presently being assessed. It should be noted that after the passage of the hurricane, all flights, with the exception of emergency and relief flights, were put on hold. Passenger service resumed after a period of approximately one week. During this period, September 6<sup>th</sup> to 13<sup>th</sup>, there was loss of revenue from: landing fees; cargo through-put; navigational Aids; Fuel through-put; aircraft overtime; ground handling; aircraft parking; concessionaires; offices; departure tax; and passenger facilitation charges. Discussions with PSIA management revealed an approximate estimate of lost revenues as a result of the hurricane, of EC\$500,000.

## **Seaports**

Damage to the main port terminal was confined to structural building damage (Photos 13 and 14). No damage was reported as occurring to the container stacking equipment, to the docks or to the fendering system. At the new cruise terminal location, no damage was reported as occurring to the dock, although minor damage occurred to the new Welcome Centre. In particular, a damage assessment commissioned by the Port Authority revealed that damages were recorded to the:

- Storage sheds;
- Caricom shed;
- Administration offices;
- Baggage shed;
- Police Station;
- Yard office.
- Lighthouse;
- Post office

This damage assessment revealed a total damage estimate of EC\$3.4 million. Following the hurricane, operations resumed at the port after a period of approximately one week. This delay resulted from a difficulty in getting staff to return to work within that period, and also was due to the fact that efforts were concentrated on the processing and clearing of relief supplies. It should be noted, however, that resumption of normal commercial activities has taken approximately three weeks. An approximate estimate of lost revenues for the port was obtained by assuming a value equivalent to 75% of the revenues

recorded in September 2003. This gave a value of indirect losses for the Port of EC\$670,000.



**Photo 13 Queen's Warehouse**



**Photo 14 Damaged Geest Warehouse**

## **4. Effects on the Environment**

### **4.1 The Environmental Baseline**

The state of Grenada, which includes the islands of Carriacou and Petit Martinique and several small uninhabited islands mainly off the east coast. The highest point is Mount Saint Catherine, at 840m. Carriacou, located 24km to the northeast of Grenada is much less mountainous and has an area of 34km<sup>2</sup>. Petit Martinique is 2.3km<sup>2</sup> and lies east of the northern section of Carriacou.

Despite centuries of agricultural cultivation and recent tourism activity, Grenada, up to the time of hurricane Ivan, still retained some of its mountaintop forests and coral reefs, over 450 species of flowering plants, 150 species of birds, and mostly undamaged landscape vistas. The nation has also had a diversity of cultural resources: Carib (Amerindian) archeological sites; historical sites spanning over 400 years of human drama and socio-economic activity (including forts, sugar mills, rum distilleries, and estate houses).

Mountain peaks, steep ridges and deep narrow valleys dominate the interior of Grenada. The volcanic geology of the interior is the dominant factor that produced this landscape. The coastal periphery of Grenada presents a landscape which is much more subdued than the interior. The western side of the island displays a more rugged aspect as the central ridge is nearer to the coast on that side; the slopes are gentler on the east, and there are some fairly extensive coastal plains. The topography of the southwestern and northeastern parts of the island consists of low hills.

## 4.1.1 Marine and Coastal Habitats<sup>36</sup>

### Mangroves

With the exception of the harbours at St. George's and Halifax, the west coast consists of a series of shallow bays separated by headlands, as do the north and northeast coasts. The southeast coast, south of Telescope Point and the south coast westerly of Point Salines are deeply indented with many small bays that had previously been backed by mangrove swamps. Mangrove vegetation also existed at Lavera Pond, St. Patrick and at Harvey Vale, Carriacou. Other areas included the Conference/Pearls area and the bays between St. David and Prickly Bay on the south coast off the main island. The main species of mangrove included red mangrove (*Rhizophora mangle*), black mangrove (*Aveennia germinans*), white mangrove (*Laguncularia racemosa*), and button wood (*Conacarpus erectus*). The rest of the coastal area is considered dry woodland and cactus shrub and made up of a mixture of species including *Impomea sp.* In some sandy beaches, sea grape (*Cocoloba uvifera*), coconuts (*Cocos nucifera*), almond (*Terminalia cattapa*) and manchineel (*Hippomane mancinella*).

### Sea Grass Beds

Marine plants included sea grass communities which existed in the Telescope area and within the barrier type reef extending from Grenville Bay to (MAP) Prickly Bay in the South; at Carriacou in the L'Esterre Bay and Machineel Bay and within the reef at North Bay, Isle de Rhonde. The main species are turtle grass, *Thalassia testudinum* and mantee grass, *Syringodium filiforme*. Other marine plants include various species of green, blue green, brown and red algae, some of which are locally used as a food. A variety of seaweeds or sea moss (red marine algae) mainly *Graciliria sp.* was harvested at notable sand-mud locations at Calliste, Conference, Pearls and Telescope as well as locations at Carriacou and Isle de Ronde. The sea moss is harvested primarily for local consumption although some of the dried plants are exported to neighboring islands. Sustainable harvesting of the sea moss has been maintained at Calliste, St. George's.

### Coral Reefs

Most of the reefs around Grenada and the Grenadines, especially along the East and South East are in varying stages of degradation and recuperation. The islands adjacent to the Lavera Bay have reef systems with Sugar Loaf being in the best state of recovery and dominated by elkhorn coral (*Acropora palmate*). There is one barrier type reef stretching from Telescope Point to Marquis Islands with elkhorn coral, finger coral (*Porites porites*) and some boulder coral including mustard, and brain coral. Small fringing reefs mainly of elkhorn coral exist along the southeast and the south coast of Point Salines. These reefs have shown some signs of recovery but most of them remain covered with algae.

On the north west coast of Grenada, the reef at Red Rock, originally dominated by elkhorn coral has suffered much physical damage from strong storm swells that frequently hit the area. Reefs also exist at Beausejour and Molinere. The reefs at

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<sup>36</sup> This section is informed by the Biodiversity Strategy and Action Plan for Grenada. This was prepared in July 2000 and consisted of gathering information on the status of biological resources, benefits, threats to and loss of biodiversity and the causes of these threats and losses.



Mollinere have been steadily degrading as a result of overuse mainly by tourists. The three fathoms reef in Grand Anse is badly degraded; however, the six fathoms reef is still in good shape. Large barrier reefs occur along the east coasts of Carriacou, Petit Martinique and some of the smaller islets of the Grenadines. These are strongly dominated by elkhorn corals in the shallower's waters and boulder coral in the fore reef. Saline and White Islands have an excellent reef system and presently have the best species combination in the area.

### **Forests and Natural Vegetation**

Prior to Hurricane Ivan there was very little documentation on the composition and status of Grenada's forests. However, three (3) endemic species of plants were known: the Grand Etang Fern (*Danaea sp.*), the Cabbage Palm (*Oxeodoxa oleracea*) and one endemic tree species (*Maythenus grenadensis*).

Using the Beard classification, there were six (6) major forest communities:

- Cloud Forest (montane thicket, palm break and elfin woodlands). Generally, these forests were located in the inaccessible upper slopes of Grand Etang and on Mt. St. Catherine. They have suffered little degradation and appear to be under no serious threat.
- Rain Forest and Lower Montane Rain Forest. These forests occurred below the cloud cover and where rainfall exceeds 2500mm per annum. The best remnants were found in the Grand Etang Forest Reserve.
- Evergreen and Semi-evergreen forests. These forests occurred where the rainfall is between 2000 and 2500mm per annum. A 40 to 60ha of this forest type was found at Morne Gazo in the south.
- Deciduous Forest and Cactus Scrub. These occurred at lower elevations where the rainfall is between 1000 – 2000mm per annum, usually falling within a five month period. They were found in the north and south of mainland Grenada, and on Carriacou and Petit Martinique.
- Littoral Woodlands. A small patch remained at the edge of Levera woodland in the northeast of Grenada.
- Mangrove woodlands (this has already been described above).

None timber forest products, primarily screw pine (*Pandanus utilis*) and bamboo (*Bambusa vulgaris*) are harvested and utilized for making baskets and other handicraft. Many naturally occurring herbs are also used to produce herbal medicines, especially in the rural areas.

### **Wildlife**

Records on faunal species numbers, distribution and their current status are extremely limited. The terrestrial wildlife<sup>37</sup> is thought to consist of:

- Four amphibian species
- Eight species of lizards

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<sup>37</sup> Groome, 1970. The list by Groome may be incomplete, and some of species mentioned may no longer exist.

- Five species of snake
- One hundred and fifty species of birds (18 are thought to be threatened)
- Four native species of terrestrial mammals
- Eleven native species of bats
- One endemic specie of weevil (*Diaprepes sp.*)
- Several species of fresh water shrimps and land crabs

The dry forest in the south and north of the island is considered prime habitat for the Grenada Dove (*Leptotila wellsi*) and the Grenadian Hook-billed kite (*Chondrohierax uncinatus*). Grenada is also home to four bird species that are endemic to the Lesser Antilles<sup>38</sup>. These include the Grenada flycatcher (*Myiarchus nugatory*), the Scaly-breasted thrasher (*Margarops fuscus*), the Lesser Antillian bullfinch (*Loxigilla noctis*), and the Lesser Antillian tanager (*Tangara cucullata*).

Hunting, for recreation and a source of food, was a very popular activity in Grenada. The main animals hunted were: maniocou, armadillo, mona monkey, ramier pigeon, and iguana.

### **Fisheries**

The International Centre for Living Aquatic Resource Management (ICLARM) records 233 marine species, 69 marine/brackish water species and 17 species for fresh water.

Records of fish landings classify the range of marine species into pelagic finfish, demersal finfish, crustaceans and shellfish; the unclassified fish are mainly dermesals. The near shore and off shore coral reefs provide the base for dermasal fish such as snappers, groupers, grunts, doctorfish, etc., while the off-shore ocean provides Yellow-fin Tunas, Oceangar, Marlin, Dolphin fish and King fish among others. Beach seines very close to shore harvest jacks and robins when such fish come off the ocean deep on a daily basis. Divers in significant quantities traditionally harvest crustaceans and other shellfish such as lobsters, turtles and conch.

Although a large segment of the national fishery remains semi-subsistence, commercial fisheries has been quite significant. The Yellow-fin Tuna is a highly sough-after species because of its market value; it now accounts for the largest species catch in national landings. Before the hurricane, tuna fishery contributed, on an average, to at least 16% of landed catches.

The environmental profile of each of the parishes in Grenada is presented in Table 20.

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<sup>38</sup> CCA/GOG/USAID 1999

Parish	Population	Natural Resources (Key)
St. George's	31,994	Beaches, coral reef, Grand Etang Rain Forest, rivers, dry scrub forests, waterfalls, lakes, mangrove forests, off shore islands, bays and sheltered harbours
St. John's	8,752	Rivers, waterfalls, beaches, lakes, mangrove forests, bays and sheltered harbours
St. Mark's	3,861	Rain forests, rivers
St. Patrick's	10,118	Forests, rivers, beaches, lakes, mangrove forests, coral reefs, offshore islands, dry scrub forests
St. Andrew's	24,135	Forests, beaches, coral reefs, waterfalls, dry scrub forests, rivers (Great River)
St. David's	11,011	Dry forests, mid-elevation wet forests, beaches, coral reefs, mangrove forests, sheltered bays
Carriacou and Petit Martinique	5,726	Coral reefs and beaches, mangrove forests, oyster beds, sheltered bays, dry scrub forests

**Table 33 Environmental Profile for Parishes in Grenada<sup>39</sup>**



Grande Anse Beach



Concord Falls



Lavera

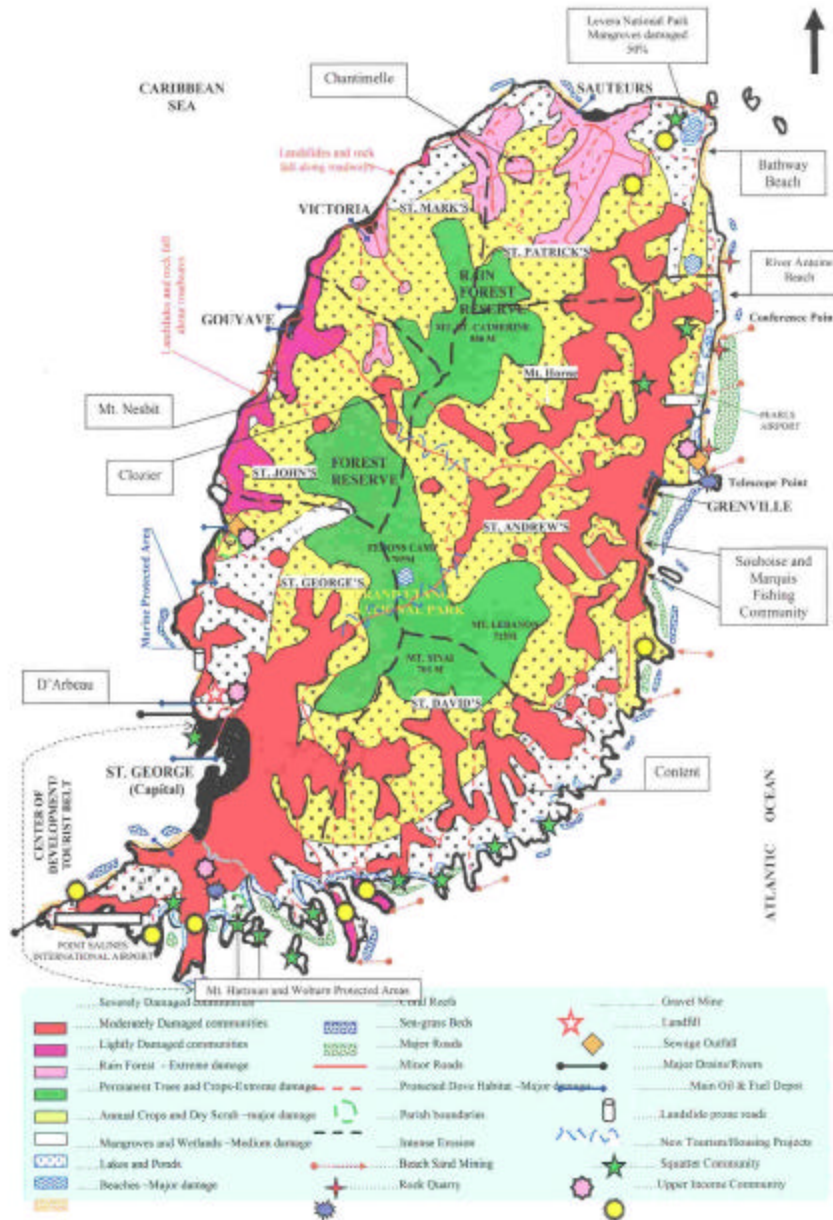
**Photo 15 Some Environmental Assets before Hurricane Ivan**

<sup>39</sup> Jessamy 1999

Figure7 Map showing environmental assets



Figure 8. Map of Grenada showing damage to environmental assets



## 4.2 Description of Environmental Impacts

Environmental Asset	Intensity of Damage	Extent of Damage	Functioning of Asset	Duration of Impact	Recovery of Asset
Mangroves	Medium	70%	Adverse Effect	Short to Medium term	Natural/ requires appropriate environmental protection measures
Sea grass beds	Minor	<10%	No Effect	Short term	Natural
Coral reefs	Minor	<10%	No Effect	Short term	Natural
Beaches	Major	>50% <sup>a</sup>		Short to Medium term	Natural
Forest and natural vegetation	Extreme	100%	Intense impairment of the functioning of the asset	Long term	Irreversible damage. Requires concentrated environmental protection measures.
Wildlife	Extreme	100%	Impairment of the functioning of the asset	Medium to Long term	Requires concentrated environmental protection measures
Fisheries <sup>a</sup>	Minor	<10%	No effect	Potential Medium to long term impact*	Natural

**Table 34 Incremental Damage Intensity Rating of Environmental Assets<sup>40</sup>**

<sup>a</sup> La Sagesse, River Antoine, Bathway, Pearls

<sup>b</sup> The immediate impact of the hurricane has been minor but there may be a potential medium to long-term impact on the fish stock, particularly near shore and reef fisheries which are dependent on other neighbouring ecosystem such as mangroves and watersheds. Fresh water fisheries will also be impacted seriously in the medium term because of a change in water quality and quantity, resulting in a disturbance in the habitat. The impact on the sector is mainly due to damaged boats and equipment.



**Photo 16 Damage to Watersheds and Forests**

<sup>40</sup> Source OECS ground truthing

List of Livelihoods	Intensity	Comments
Hunting	Extreme	The wildlife habitats and source of food have been destroyed
Tour-guiding	Extreme	Access routes to the eco-tourism sites are impassable; it is envisaged that the sites have also sustained some damage
Craft-making	Major	Although the bamboo and screw pine have sustained damaged, material can still be obtained from the damaged stock; unfortunately, preservation and storage of the material may prove problematic
Fruit gatherers	Extreme	All the trees and plants have been severely damaged
Charcoal burners		This has a positive impact because of the abundance of wood from the fallen trees

**Table 35 Damage to Livelihoods Generated from Ecological Assets<sup>41</sup>**

Environmental Assets (Key)	St. George's	St. John's	St. Mark's	St. Patrick's	St. Andrew's	St. David's
Beaches	Minor	Minor	Minor	Major		
Coral reef	Minor	NA	NA	Minor		
Grand Etang Rain Forest	Extreme	Extreme			Extreme	Extreme
Mid-elevation wet forests	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme
Dry scrub forest	Major	-	-	-	-	Major
Watersheds	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme
Waterfalls	Minor	Minor			Minor	
Mangroves	Major			Major		Major
Off shore islands	Minor			Minor		

**Table 36 Effects of Hurricane Ivan to Environmental Assets in each Parish<sup>42</sup>**

One of the other problems associated with environmental assessment of disasters is the difficulties encountered in calculating the population that suffers loss of well being: ecosystems are assets(natural capital) from which goods and services are derived for the general public. Table 5 has therefore been constructed to show how the hurricane has impacted upon the goods and services that are normally derived from the major ecosystems in Grenada.

<sup>41</sup> Source OECS field interviews

<sup>42</sup> Source OECS ground truthing

<b>Ecosystem</b>	<b>Goods</b>	<b>Services</b>
Forest ecosystems	Timber Fuelwood Drinking water Non-timber products (fruit, plant medicines, wildlife) Genetic resources	Maintain array of watershed functions (infiltration, purification, stabilisation) Remove air pollutants, emit oxygen Cycle nutrients Maintain biodiversity Sequester atmospheric carbon Moderate weather extremes and impacts Generate soil Provide aesthetic enjoyment and recreation
Agro-ecosystems	Food crops Crop genetic resources	Maintain limited watershed functions (infiltration, partial soil protection) Provide habitats for birds, pollinators, soil organisms, etc. important to agriculture Build soil organic matter Sequester atmospheric carbon
Freshwater ecosystems	Drinking and irrigation water Fresh water fisheries Genetic resources	Dilute and carry away waste Cycle nutrients Maintain biodiversity Provide aquatic habitat Provide transportation corridor Provide for aesthetic enjoyment and recreation
Coastal ecosystems	Fisheries Seaweeds (sea moss) Wood for charcoal Genetic resources	Moderate storm impacts (mangroves, barrier reefs) Provide wildlife (marine and terrestrial habitat) Maintain biodiversity Dilute waters Provide for aesthetic enjoyment and recreation
Reef Fisheries	Minor	The habitat for reef fisheries received minor damage. There is, however, a reported increase in spear fishing of reef fisheries after the hurricane.

**Table 37 Goods and Services Provided by Ecosystems in Grenada<sup>43</sup>**

## **Solid Waste Management**

The hurricane has created large volumes of wastes. Table 6 below seeks to identify the waste stream, volume of each waste stream and the way in which it is being managed, two weeks after the event.

<sup>43</sup> Adapted from World Resources Institute (2001)



Types of Waste	Estimated volume	Cost of Removal in EC\$	How disposed
Fabric and clothing	NA	NA	Burning Disposed as household waste
Zinc Roofing (residential only)	4,000 tonnes	\$.6mil	Left on the roadside Dumped in unauthorized locations (national stadium, Tanteen, Westerhall)
Bulky waste (mainly wood from destruction to property)	50,000 m <sup>3</sup>	\$1.1mil	Left on the roadside Dumped in unauthorized locations
Demolition waste	800,030 m <sup>3</sup>	\$2.35mil	Left on the roadside Dumped in unauthorized locations
Fallen Trees	130,000m <sup>3</sup>	\$3mil	Left on the roadside Still lying along river banks

**Table 38 Type and Volume of Waste after Hurricane Ivan<sup>44</sup>**

The volumes identified above were calculated on the basis of the waste that still remains to be cleared, two weeks after the passage of the hurricane.

## Valuing the Damage

The purpose of assessing damage is to identify the magnitude of the impact of the environmental resources and services and on the economy of the country. Damage may be valued in different ways, based on the end use to which the information will be put. The two values are full economic loss and remediation cost. The full economic loss is used to gauge the impact of the event on the national economy.

The simplest method of crudely estimating full economic cost on any environmental asset is to multiply the value of the asset by a factor that represents the extent and intensity of the damage. In Grenada, as is true in the rest of the OECS sub-region, national accounts do not include environmental assets.<sup>45</sup> Consequently, as observed from the tables above,

<sup>44</sup> Volumes provided by Ewald Spitaler of OXFAM (personal communication)

<sup>45</sup> Some of the value of environmental services is, however, included in the statistics of such sectors as agriculture and tourism. Some of the value of environmental services is, however, included in the statistics of such sectors as agriculture and tourism.

the damage assessment has not been able to quantify the economic loss of the environmental assets and services as a result of Hurricane Ivan.

In the absence of full economic loss, the most appropriate response to assessing damage to environmental assets is to cost the remediation. These values are particularly useful in determining the estimates for financial assistance. However, remediation costs are based on the nature of the remediation work to be undertaken and must be estimated on a case-by-case basis. Some of the remediation costs are also provided under the chapter dealing with agriculture, forestry and fisheries.

### III MACROECONOMIC EFFECTS

This chapter comprises four sections. The first section presents an estimation of the summary of damages (direct and indirect) and an evaluation and interpretation of the results. The second section describes the macroeconomic trends in the previous year (i.e., the year prior to the disaster). The third section analyses the short run (2004) and medium run (2005-2007) expected performance of the economy without the disaster. The final section provides a macroeconomic assessment of the disaster. The second, third and fourth sections survey the overall economic trends of the economy, fiscal policy, the external sector and the financial system to the extent that is permitted by the availability of data. The last section also gives a detailed analysis of the expected performance of the main economic sectors. In addition the fourth section considers the effect of the disaster on the evolution of prices and the level of employment.

All estimations were carried out on the basis of official data and also on information provided by private sector organisations. They are presented in Eastern Caribbean Dollars.

The effect of the damages are significant. They amount to twice the current value of GDP. By far the most important component of overall damages, losses or costs is the direct damage. In relative terms the overriding damage is concentrated in the housing sector. As well the damage has important implications at the social level since it has affected those sectors that are labour intensive, in particular agriculture and tourism. The effects of the Hurricane are bound to curtail the level of employment.

In the year in which the disaster occurred (2004) overall GDP is project to contract by – 1.4. While the tourism sector will most likely register a severe downturn, agriculture is expected to contract by –1%. The above average output of the sector (especially of traditional crops) in the first half of 2004 will partly offset the halt in its ouput in the last three months of the year. The sector will register the full effects of the Hurricane in 2005 (-39%). The manufacturing sector that had registered negative growth rates in past three years and is projected to maintain this trend in 2004. Contrarily the construction sector will expand due to the reconstruction and recovery efforts in the housing and tourism sectors.

Notwithstanding the devastating effects of the disaster there are safety valves which if appropriately identified and managed can act as buffer stocks to the general economic downturn. The development of short term crops in agriculture, the effect on the construction sector on related economic activities, and the cruiseship and yachting industry are but a few examples.

One of the most important challenges that policy makers will face is to match those safety valves with the pressing needs of the population and with the concomitant increase in the supply of labor provoked by the effects of the Hurricane on the productive sectors and in particular on labor intensive activities.

## 1. Summary of damages

The total damage of Hurricane Ivan is estimated to be 2,4 billion EC\$, that is more than twice the current value of GDP. The bulk is concentrated in direct damages. These account for 89% of the damage, 201% of GDP. For its part indirect damage accounts for 11% of the damage (26% of GDP). (See Table 37).

The results highlight the fact that, as described in this report, most of the damage was concentrated in infrastructure and in particular in housing, as 89% of the housing stock registered some or other type of damage caused by the Hurricane.

Sector	Direct damage	Indirect damage	Total
Agriculture	54	46	100
Manufacturing	18	4	22
Wholesale and retail trade	...	11	11
Tourism	305	101.2	406.2
Electricity	70	21	91
Water/sewage	7	1	8
Telecommunications and broadcasting	76.5	62.4	138.9
Cable	8	5	13
Education	195	1	196
Transport	10.3	1.2	11.5
Housing	1,372	9	1381
Health	11	0	11
Total	2,127	263	2389.6

**Table 37 Summary of direct and indirect damages Millions of Eastern Caribbean Dollars**

In accordance with this finding, when seen in relation to nominal GDP, the damage to housing alone is equivalent to 1.4 times the money value of GDP (that is the value of the flow of goods and services produced by Grenada in a year) (See table 38 below).

The agricultural sector recorded a level of damage (10% of GDP) equivalent roughly to its contribution to GDP. In the case of agriculture direct damage was close in magnitude to that of indirect damage. This reflects mainly the fact that the damage not only wiped out traditional crops but also that as a result the source of income of traditional farmers was been destroyed and will not be easily substituted.

In the case of tourism direct damage (41% of GDP) reflects not only the damage to tourist accommodations but also to yachts. The tourism's sector flow of income will be severely affected in the last three months of the year but gradually the sector will witness some recovery. The sector is expected to be close to fully operational at the end of 2005.

Sector	Direct damage	Indirect damage	Total
Agriculture	0.05	0.05	0.10
Manufacturing	0.02	0.00	0.02
Wholesale and retail trade		0.01	0.01
Tourism	0.31	0.10	0.41
Electricity	0.07	0.02	0.09
Water/sewage	0.01	0.00	0.01
Telecommunications and broadcasting	0.08	0.06	0.14
Cable	0.01	0.01	0.01
Education	0.20	0.00	0.20
Transport	0.01	0.00	0.01
Housing	1.37	0.01	1.38
Health	0.01	0.00	0.01
Total	2.13	0.26	2.39

**Table 38 Summary of direct and indirect damages In relation to of GDP**

Damages to electricity, as a result of the impact of the wind on electrical posts and on building structures and the concomitant damages to telecommunications are also significant (9% and 14% of GDP).

Finally the quantification of the loss to the education (20% of GDP) underscores the severe social consequences of the disaster. Indeed, while the economic effects is pressing need to be solved in the short run, the social consequences of Hurricane Ivan, in the long run may mostly concentrated in the social sectors of the economy.

## **2. The pre-disaster situation**

### **2.1 General trends**

Since 1980, Grenada has undergone two phases of economic growth (See Figure 9). The first one lasted from 1980 until 1987. The second one began in 1993 and was interrupted by the effects of the September 11th events. Following two years of negative growth (-4.3% and -0.4% in 2002 and 2003 respectively) the economy clearly recovered in 2003 and expanded at a rate of 5.7% (the highest among the OECS and also among CARICOM economies) (See table 48).

In 2003 growth was mainly propelled by the construction sector and the tourism industry. In that year construction registered the highest rate of growth in at least a decade (29%) and its contribution to GDP reached 9.8%. Construction activity responded mainly to the initiative of the private sector and public capital expenditures.

The robust performance of the tourism industry (6% and 14% in 2002 and 2003 respectively) indicated that the sector was poised for a definitive recovery following the effects of the September 11th events. In 2003, the total number of visitors and tourism expenditure grew 9% and 23% respectively.

For their part the agricultural and manufacturing sectors registered contractions (-2.4% and -2.8%). The behavior of the agricultural sector reflected the reduction in the output of traditional crops (nutmeg, banana and cocoa). The evolution of the manufacturing sector responded to declines in the production of animal feed, technical difficulties in obtaining raw materials for the manufacture of rum, and shifts in the production of flour to other sources.

The increase in aggregate output and in particular the dynamism of the construction sector translated into a higher import demand for goods. This led, in conjunction with the contraction in the production of traditional export crops, to a widening of the merchandise trade deficit (35% and 43% of GDP in 2002 and 2003). The result in the merchandise balance was reinforced by profit repatriation outflows (35% of GDP in 2003), and was partially offset by the surplus in the services sector (11% and 14% of GDP for 2002 and 2003). The overall result was a widening of the current account deficit from -29% of GDP in 2002 to 35% the following year.

At the same time the greater demand for imports expanded tax revenues which jointly with expenditure restraint improved the fiscal position of the authorities.

## **2.2 Fiscal policy**

In 2003 the overall fiscal deficit declined in relation to the previous year (-19% to -4.9% and -21% to -10% with and without grants respectively). This resulted from an increase in current revenues coupled with a decline in capital expenditures.

Current revenue increased significantly by \$31.0m or 10.6% in 2003 when compared with the outturn in 2002. This increase was mainly attributed to higher revenue from taxes particularly from taxes on international trade. This was driven by robust growth in imports particularly construction materials, motor vehicles, telecommunication accessories and consumer goods. As a result the government recorded a current account surplus of \$38.4m, 3.3 per cent of GDP compared with \$9.3m or 0.9 per cent of GDP in 2002.

Recurrent expenditure increased slightly by \$1.9m or 0.7%. Contributing to this slow increase in recurrent expenditure was a moderate growth in salaries and allowances, which reflected a 2.5% increase in salary payments for the year 2002 and interest payments. Capital expenditure declined by 89.0m (36.4%) to \$155.4m and was financed mainly by external loans.

Central Government debt, excluding guaranteed debt, moved from \$909.9 million EC\$ (84.6% of GDP) in 2002 to \$984.0 million EC\$ (83.3% of GDP) in 2003. The domestic debt stock represented 22.9% of the total.

After recording significant growth in 2002 with the contraction of the US \$100.0m bond, at the end of 2003 central government's external debt grew by 6.9 per cent to \$731.7m. External debt service to current revenue also represented 21.8% in 2003 and is estimated to remain at that level during 2004.

### **2.3 The balance of payments**

During 2003 the overall balance of payments position of Grenada was estimated to have deteriorated as a deficit of \$34.6 million EC\$ was recorded in contrast to a surplus of \$84.3 EC\$ in 2002. This outturn reflected primarily activity on the current account as the deficit widened by 17.9% to \$400.9m (33.9% of GDP) due to the increase of the merchandise trade deficit by 33.5% to \$511.2m. The expansion in the merchandise trade deficit over 2003 was influenced by a higher import bill primarily for construction and tourism related purposes.

Net inflows on the services account were estimated to have grown by 36.2 % to \$165.1 million EC\$ in 2003. These developments were largely attributable to an increase in inflow on the travel account and reduced outflows on the other business services account. On the income account the deficit grew by 3.6% to \$152.4 million EC\$ in 2003 due primarily to interest payments.

On the capital and financial account, the surplus improved from \$278.9 million EC\$ in 2002 to \$284.9 million EC\$ in 2003 due to a fall in other liabilities payments. The surplus on the financial account declined due to a fall in the inflow of official bond proceeds.

### **2.4 Developments in the financial system**

Consistent with the growth in the economy, total monetary liabilities of the banking system increased by 8.0% to \$1,260.4 million EC\$ during 2003 compared with growth 7.1% in 2002. The growth in M2 reflected expansions in both the narrow money supply (M1) (13.7 per cent) and quasi money (6.7 per cent). The increase in M1 was influenced by a 14.3% expansion in private sector demand deposits. Of quasi money private sector savings deposits rose by 9.6% while private sector foreign currency deposit increased by 20.8 per cent.

Over 2003 domestic credit grew by 5.4% to \$978.5 million EC\$. Net credit to the central government from the banking system increased by 78.2% (\$55.5m) to \$126.6 million EC\$. This is in contrast to the development in 2002 when net credit fell by 25.0 per cent,

reflecting increased deposits associated with proceeds from a bond floated on the international capital market. Commercial bank credit to the central government rose by 24.5 per cent to \$144.0 million EC\$, well above the 9.7 per cent rate of growth in 2002. This performance was partly attributed to an increase in commercial bank holdings of treasury bills and debentures and the granting of additional loans and advances. The central government's deposits in the banking system fell by 35.5 per cent to \$32.3 million EC\$, following strong growth in 2002. Lending to the private sector grew by 3.1% to \$923.7 million EC\$.

During 2003 the net foreign assets of the banking system rose by 23.9% (\$78.2 million EC\$), consistent with the growth in monetary liabilities and the slower growth in domestic credit. The net foreign assets of the commercial banks doubled to \$181.3 million EC\$. Grenada's imputed share of the reserves held by the Central Bank was down by 5.3% to \$224.7 million EC\$, indicative of the overall deficit on the balance of payments account. Liquidity within the commercial banking system remained high during 2003.

As the economy continues to expand, the total monetary liabilities of the banking system are estimated to increase by 6.5% to \$1,342.2 million EC\$ in 2004. Domestic credit is expected to grow by 8.5% reflecting growth in credit to both the central government and the private sector. The net foreign assets of the banking are expected to increase by 2.3% to \$415.1 million EC\$ in 2004. In line with an average import cover of 4.3 months, Grenada's imputed share of the ECCB reserves are estimated at \$233.8 million EC\$ at the end of 2004.

### **3. The short and medium run expected performance of the economy**

#### **without the disaster 2004-2007**

##### **3.1 Overall trends**

Based on projections prior to the impact of hurricane Ivan, the economy was estimated to grow by 4.7% in 2004 (See table 48). This growth was expected to be fuelled mainly by developments in agriculture, tourism, and banking and insurance. Agriculture was estimated to grow by 3.6% resulting from an improved performance of the traditional crops as well as the continued increase in the non-traditional crops. The hotel and restaurant sector was projected to increase by 8.0%. For the first half of 2004 value added in this sector would have benefited from a 9% growth in stayover arrivals. This growth is expected to have spill over effects in the more service-oriented sectors particularly in communications, transportation and banks and insurance. Among the other sectors, construction was expected to grow by 5.0%.

The preliminary outturn of central government fiscal operations for 2004 showed a current account surplus of \$17.5 million EC\$, which represents 1.4% of GDP and an



overall deficit of \$60.6million EC\$, equivalent to 4.5% of GDP. Current revenue was expected to grow by \$31.8 million EC\$ as a result of the expansion in economic activity. Both capital and recurrent expenditure was projected to increase, resulting in a lower current account balance relative to the outturn in 2003. The growth in capital expenditure will be based on ongoing implementation of the PSIP while recurrent expenditure will increase in part due to higher outlays on personal emoluments.

Over 2004, prior to the occurrence of the disaster, the current account deficit of the balance of payments was estimated to contract albeit marginally by 1.5% to \$395.0 million EC\$. This performance was based upon a narrowing in the merchandise trade deficit as imports were projected to contract as the construction boom slows. As a result of the weak performance of the agriculture and manufacturing sectors on the international market, merchandise exports were estimated to contract by 3.4% to \$102.1 million EC\$ in 2004. On the capital and financial account the surplus is estimated to contract by 9.7% to \$358.8 million EC\$ due to a further reduction in official receipts.

As the economy continued to expand, the total monetary liabilities of the banking system were estimated to increase by 6.5% to \$1,342.2 million EC\$ in 2004. Domestic credit was expected to grow by 8.5% reflecting growth in credit to both the central government and the private sector. The net foreign assets of the banking system were expected to increase by 2.3% to \$415.1 million EC\$ in 2004. In line with an average import cover of 4.3 months, Grenada's imputed share of the ECCB reserves was estimated at \$233.8 million EC\$ at the end of 2004.

Over the medium term (2005 to 2007) prior to the event, the economy was projected to grow at an overall average rate of 5.0%. In 2005 the economy was expected to grow at approximately 5.0% due to growth in agriculture, construction and tourism. The agricultural sector was expected to grow by 12.0%, due to the anticipated peak year for the nutmeg industry, as well as the continued improvement of the non-traditional crops. Construction was projected to grow by 7.0%, due to the preparations to host some of the 2007 World Cup cricket matches. In the hotel and restaurant sector, growth of 6.0% was expected for 2005, due to improved performance of stayover visitor arrivals.

The economy was expected to continue to grow in 2006 by 4.8%, as the construction sector (10.0%) and tourism industry (6.0%) continued to maintain their levels of growth, due to the preparation of the staging to the World Cup and the high increase in tourist arrivals.

A higher level of growth of 5.2% was anticipated in 2007, influenced mainly by the development in the hotel and restaurant sector (12.0%) and other tourism related sectors due to activities associated with hosting the World Cup in 2007. Construction was expected to grow by approximately 6.0%.

### **3.2 Fiscal Accounts**

The preliminary outlook for 2004, without the disaster, showed a current account surplus of \$29 million EC\$, representing 1.3% of GDP and an overall deficit of \$131.8 million EC\$, equivalent to -4.5% of GDP (-9.3% without grants). Current revenue was expected to grow by \$90 million EC\$ as a result of the expansion in economic activity. Both capital and recurrent expenditure were expected to increase resulting in a lower current account balance relative to the outturn in 2003. The growth in capital expenditure was seen to be developing in line with ongoing implementation of the PSIP while recurrent expenditure will increase in part due to higher outlays on personal emoluments.

Over the medium term 2005 to 2007, the surplus on the current account is projected to move from \$22.6m (1.7% of GDP) in 2005 to \$38.5m (2.5% of GDP) in 2007. The improvement in central governments current account position over the medium term will be as a result of the growth in revenue outpacing that of current expenditure. Of the recurrent revenue items, taxes on international trade which represents approximately 50.0% is forecasted to increase on average by 6.5% from \$189.2m in 2005 to \$214.6m in 2007. In line with the forecasted growth in economic activity taxes on domestic goods and services is expected to increase on average by 8.1 per cent to \$64.3m (4.1 per cent of GDP) in 2007.

During the period 2005 to 2007 recurrent expenditure was forecasted to increase on average by 5.1 per cent to \$392.8m in 2007. Personal emoluments, the major component of recurrent expenditure was forecasted to grow on average by 5.5 per cent to \$177.5 million EC\$ in 2007. The growth in personal emoluments would have resulted from incremental salary increases to public officers and the implementation of specific wage increase agreements.

The overall fiscal operations of the central government are forecasted to fluctuate over the medium term. The overall deficit was expected to move from \$111.0 million EC\$ (8.3 per cent of GDP) in 2005 (-10.2% without grants) to \$117.4 million EC\$ (7.5 per cent of GDP and 9.5% without grants) in 2007.

To central government's debt was forecasted to increase by 5.4% in 2004 and over the medium run by 8.8% on average reaching 1,020.2 million EC\$ in 2007. Over 2004 it was also expected that central government external debt grow by 16.2 per cent to \$850.3m.

### **3.3. External Accounts**

Over 2004 the current account deficit was estimated to contract albeit marginally by 1.5% to \$395.0m. This result was influenced by a narrowing in the merchandise trade deficit as imports were projected to contract responding, in turn, to the slowdown in construction activities. As a result of the weak performance of the agriculture and manufacturing

sectors on the international market, merchandise exports were estimated to contract by 3.4% to \$102.1 million EC\$ in 2004. On the capital and financial account the surplus was estimated to contract by 9.7% to \$358.8 million EC\$ due to a further reduction in official receipts.

Over the medium term 2005 to 2007, the current account deficit is forecasted to increase on average by 5.5% to \$434 million EC\$ in 2007. The growth in the deficit was seen to respond to the expected higher import bill associated with the importation of items to facilitate the country's hosting some world cup cricket games in 2007. From 2005 to 2007 merchandise exports were forecasted to grow on average by 5.9% to \$118.7 million EC\$ due in part to some recovery in demand on the international market for the output of traditional crops and manufactured items.

Net inflows on the services account are projected to increase to \$276.6 million EC\$ in 2007. These developments were be associated with strong growth in all categories of visitor arrivals. On the income account, the deficit was expected to widen to \$205.0 million EC\$ in 2007 attributable to interest payments as the debt expands. Net current transfers were expected to grow moderately over the period 2004 to 2007 in line with the growth in industrialized countries.

The surplus on the capital and financial account was expected to grow over the medium term influenced by activity on the financial account. Net inflows on the capital account were expected to increase from \$99.0 million EC\$ in 2005 to \$107.2 million EC\$ in 2007 as a result of a steady increase in capital transfers. On the financial account direct investments were estimated to increases related to construction activities such as a marina on the sister island of Carriacou and the Levera project.

### **3.4 Monetary Accounts**

In line with the expected expansion of the economy, the total monetary liabilities of the banking system were estimated to increase by 6.5% to \$1,342.2 million EC\$ in 2004. Domestic credit was expected to grow by 8.5% reflecting growth in credit to both the central government and the private sector. The net foreign assets of the banking were projected to increase by 2.3% to \$415.1 million EC\$ in 2004. In accordance with an average import cover of 4.3 months, Grenada's imputed share of the ECCB reserves were estimated at \$233.8 million EC\$ at the end of 2004.

Over the medium term 2005 to 2007 monetary liabilities were expected to grow on average by 7.6% to \$1,672.0 million EC\$ in 2007. Domestic credit was expected to increase over the medium term, as the central government utilised the domestic banking system to finance a portion of its overall deficit.

With the anticipated growth in economic activity the expected reliance on the banking system by the private sector would also have contributed to an increase in domestic

credit. The net foreign assets of the banking system are forecasted to increase over the medium term on average by 3.7% to \$459.7 million EC\$ in 2007. Based on an average import cover of 4.3 months, Grenada imputed share of the ECCB reserves was forecasted to increase to \$278.4 million EC\$ by 2007. As well commercial banking liquidity was forecasted to remain high over the medium term.

### **3.5 Assumptions**

The major assumptions underlying the growth projections without the disaster are as follows.

#### **Domestic Exports**

Nominal contraction estimated for 2004.

For the period 2005 to 2007 growth based on resumption of three-year cycle for nutmeg and nutmeg oil from 2005.

#### **Domestic Imports**

Fall off expected in 2004. Over the medium term imports moved in line with the anticipated requirements of the tourism industry and construction sector.

#### **Travel – Visitor Expenditure**

10.1 per cent increase in travel credit expected in 2004 followed by some further increases over the medium term. Based on discussions with Grenada Tourist Board.

#### **Portfolio Investment – Other Profits and Dividends**

Debit in 2004 and over the medium term refers to bi-annual interest payments on US\$100m bond and other official bond payments.

#### **Direct Investment – Other**

In 2003 funds related to investment statistics captured by the GIDC (\$68.7m), St Georges University (\$20.0m) and other investments. Over the medium term financial inflows will be related to the Levera project and several marina projects around the island.

#### **Other Public Sector Long term Loans**

Includes proceeds of two bond issues in 2003 - US\$100m (Bears Sterns) and US\$10m (Unit Trust Corp in T'dad)-only US\$3m disbursed in Nov 2002. Over the medium term external proceeds necessary to assist with the funding of the fiscal deficit.

### **Financing**

In 2003 a significant portion of change in Government Foreign Assets represents US\$7.0m disbursed from UTC Trinidad. Over 2003 Grenada also drew down \$12.5m of its imputed reserves at the Central Bank to finance the deficit on its balance of payments.

Over the medium term financing for the balance of payments represented the change in imputed reserves at an average import cover of 4.3 months.

### **GDP by Sector**

#### Agriculture

Agricultural production is projected to increase from 2005 based on likely developments in the nutmeg, cocoa and banana industries. Nutmeg production should benefit from secondary and tertiary processing; banana production should benefit from the organic project; and cocoa output from a revitalisation programme.

#### Fishing

New fish market to be opened in Grenville in 2003.

#### Manufacturing

Activity in the manufacturing sector is expected to improve in 2005 with the establishment of an agro-processing plant.

#### Electricity and Water

Based on trend.

### Construction

Includes construction work on the Levera project, second phase of the cruise terminal, marine development and other construction activity in preparation for the 2007 cricket world cup.

### Hotels and Restaurants (Tourism)

In 2005 and beyond sector is expected to improve further based on factors such as increased marketing and additional airlift.

### Air Transport

Based on performance in hotels and restaurants.

### Road Transport

Based on performance of hotels and restaurants and construction.

### Sea Transport

Based on cargo landed and loaded of expected projects.

### Communications

Some sectoral growth is anticipated from 2005 and beyond with the establishment of two additional communication providers. Nominal growth is also projected thereafter with recovery in the tourism industry.

### Government Services

Based on natural increase in employment of government sector and future increments.

### Other Services

Growth projected.

Consumer Price Index is expected to increase by 2.5 per cent in 2005 and over the rest of the medium term.

## **3.6 The Fiscal accounts**

The domestic economy is expected to grow in 2005 by 5.0 per cent. Real growth of 4.9 per cent and 5.1 per cent is projected over 2006 and 2007 respectively.

Inflation, which has averaged around 1.0 percent over the last couple of years, is expected to average 2.5 per cent over the medium term.

Monetary Liabilities are projected to grow steadily during the period 2005 – 2007. The anticipated growth in monetary liabilities is expected to result in large part from the projected increase in domestic credit to the Government and the Private Sector.

Imports of goods and services are projected to grow on average at around 6.0 percent during the period 2005 –2007.

Revenue projections under the baseline scenario are based on the assumption that there are no further changes in the tax system during the period 2005 –2007. The systematic relationship between the major tax categories and their respective bases is assumed to be unitary. Expected developments in the proxy bases (Nominal GDP, Imports and Private Consumption) are used to forecast fiscal revenues.

A very conservative approach was taken with respect to recurrent expenditure projections. With the exception of interest payments, the growth in the other categories

was based on: (I) expected inflation rate, (ii) the growth in nominal GDP, and; the annual average growth rate of the particular category. Interest payments were estimated using the projected increase in the stock of external and domestic debt and the average implied interest rate for the respective category.

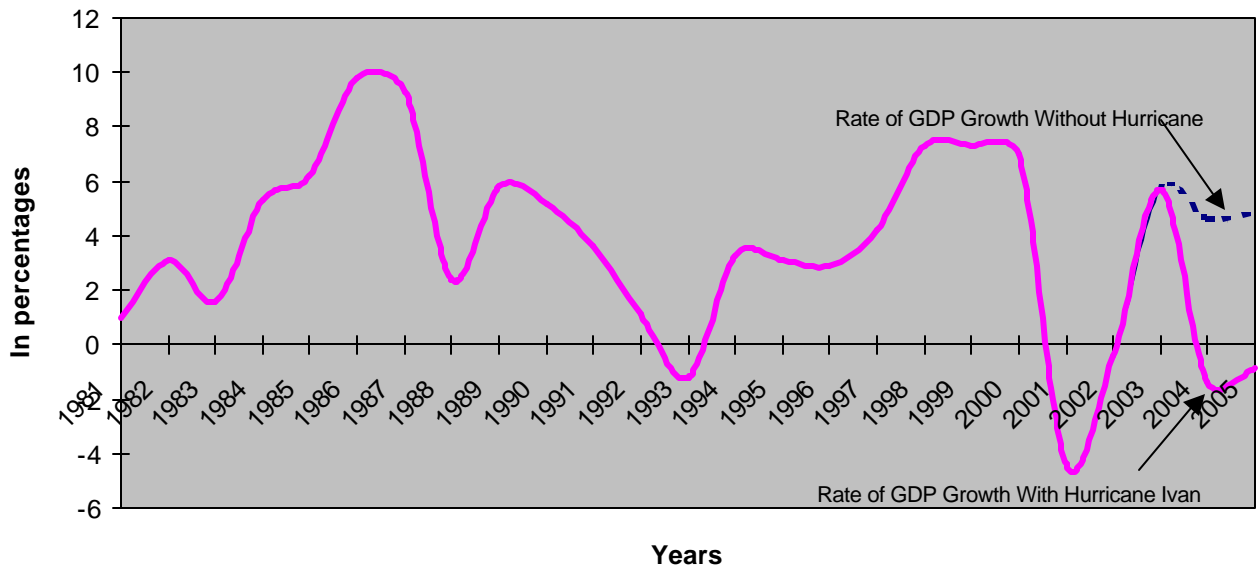
Capital expenditure was projected at 9.5 percent of GDP over the period. Our assumption is that by cutting capital expenditure too thin, there is the risk of unfavourably affecting projects and programmes needed to spur economic growth.

#### 4. The post disaster macroeconomic assessment

##### 4.1. GDP growth

As a result of the Hurricane GDP growth is expected to contract in 2004 by  $-1.4\%$  The contraction in GDP growth will respond mainly to the underperformance of most sectors and in particular due to the devastation caused by the disaster in the agricultural sector and in the tourism industry.

**Figure: 9**  
**Grenada**  
**GDP growth with an without Hurricane Ivan**  
**1981 - 2005**





The agricultural sector (-0.8% taking into account the effects of the disaster) will reflect the full stop in the production of the traditional crops (bananas, cocoa and in particular nutmeg) after the hurricane. Notwithstanding the effects of the overall halt in the production of nutmeg (which represents 35% of the volume output of total crops) in the last quarter of the year growth in agricultural output will be partly or more than fully compensated by the significant growth in nutmeg in the first half of the year (34%). As a result the rate of growth in the volume of nutmeg production will rise in 2004 by 19%. However due the drop in the international price of nutmeg (between January and August, the international unit price of nutmeg declined by 36%) the value sales are projected to decrease by -24%.

A similar outcome can be expected in the case of cocoa. The volume output is forecasted to increase by 17%. The value of production will also rise as the unit prices for the first eight months of the year were higher than those recorded for the same period in the previous year (1.79\$ and 1.94\$ for 2003 and 2004 respectively).

Contrarily mace will register an overall decline in volume and value of -22% and -7% respectively. It should also be taken into account that the production of this crop declined by -29.3% in the first half of the year.

The effects of the hurricane on agricultural production will be fully felt in 2005. Cocoa and nutmeg production will cease altogether and banana output will recover only partially after the first nine months of 2005. Non-traditional crops will decline in 2005 but will register marginal growth in subsequent years.

Tourism is projected to contract by 25% reflecting the damage to the hotel plant and the damages of approximately 90 percent of hotel rooms. As a consequence growth in stay over visitors for the last three months of the year is expected to be minimal. This will translate into a significant loss of income during the said period (and also in 2005), which is the basis for the determination of value added in that sector.

For its part the manufacturing sector is projected to contract by 10%, as most of the enterprises suffered damages to buildings and stocks. In particular, some industries were adversely affected by the complete depletion of stocks in the aftermath of the Hurricane.

The wholesale and retail sector was also adversely affected by the destructive trading activity that took place following the Hurricane and the loss of stocks immediately after the Hurricane. Consequently the sector is not projected to record growth in 2004.

The construction sector is poised to register positive growth in 2004, which is estimated at this time at 15%. This reflects the rehabilitation and recovery efforts following the Hurricane. In the public sector, construction activity will be focused on developing the

social infrastructure and restoring public buildings. This will be financed with grants and loans. Activity in the private sector, dominated by home reconstruction will be finance, only partially, from insurance inflows and migrant transfers.

## **4.2. Fiscal policy**

For 2004, the secondary fiscal effects will include a widening of the fiscal gap. The fiscal deficit, taking into account the effects of the disaster, is projected to increase to –145 EC\$ million dollars (-60.6 EC\$ million in 2003) including grants. This represents 12 per cent of GDP taking into account grants (-18.7% without grants).

The fiscal performance will reflect a decline in revenue due mainly to the contraction in GDP, which will affect negatively the revenues from tax collection. Tax revenues are expected to decline from 303.5 to 246.3 million EC\$ (-19%).

At the same time the decline in GDP will have a negative impact on revenues corresponding to international trade and transactions. This category will witness a decline from 182.2 to 144.7 million EC\$ (-21%). Nonetheless, the economy is bound to witness an increase in import growth reflecting activities related to emergency efforts, which are not subject to taxes and duties.

On the expenditure side, total expenditures will increase (474 and 508 million EC\$ without and with taking into account the effects of the disaster). This result will be influenced by developments on both the capital and current account (318 and 335 million EC\$ without and with the disaster).

The behavior of current expenditures will reflect efforts at containing its growth in the last quarter of the year. This reflects in part the fact that contractors are providing free services to the government for the undertaking of clean-up operations following the natural disaster. The government's involvement comprises the provision of fuel and oil. At the same time the government is planning to reduce its transfers and part of its demand for goods and services. Wages and salaries will not be significantly affected, as they are mainly non-discretionary expenditures.

Capital expenditures are expected to rise from 135 to 173 million EC\$ mainly as a result of rehabilitation of schools, government buildings in need of urgent attention and improvements to the road network.

The fiscal deficit will be financed by a larger inflow of grants (57 and 81 million EC\$ in the pre and post disaster scenarios) and the contract of additional loans. The inflow of grants is mainly bilateral and responds to disaster relief. The additional loans are geared to support capital expenditures.

Over the medium term, the fiscal deficit of the central government will be gradually reduced. The revenue base will be recovering while efforts will be made to control the

level of expenditures, particularly on goods and services. However, as a result of the previous year's fiscal performance interest payments on the debt will rise unless a moratorium on the public debt is granted as a result of the devastation of the disaster. Other categories of current expenditure will continue of pre-disaster projected growth path.

Capital expenditures will register an increase over the medium-term as result of payments associated with the disaster reconstruction and rehabilitation efforts.

### **4.3. Balance of payments**

Following the disaster the deficit of the current account will increase from 372 (pre-disaster scenario) to 450 million EC\$ (post disaster scenario). This will be due on the one hand to the higher level of merchandise imports as a result of emergency, recovery and reconstruction activities. On the other hand, merchandise exports are expected to decline by 20 percent to \$61 million EC\$.

Also the services balance will witness a reduction in its surplus due to both supply constraints and demand factors. The supply constraints result from the damage sustained to hotel plants, marina bays, and tourist infrastructure. The demand constraints arise from the suspension of visitor arrivals, mainly stay-over, due to the overall effects of the disaster. The net service movement is expected to move from 176 (pre-disaster scenario) to 101 million (post disaster scenario).

The current account will benefit from money flows of unilateral transfers, and grants. More specifically, it is expected that current transfers to the government will increase from 18 to 53 million (pre and post disaster scenarios respectively). Workers remittances will more than double as family members living abroad provide assistance to their relatives.

The capital and financial account will strengthen associated with the increase in capital grants to the government and higher inflows associated with insurance. Capital grants are estimated to rise roughly by 50%. Insurance flows are projected to reach at the time of this report to 75 million EC\$.

In 2005, the current account deficit will widen as the tourism sector continues to struggle with the effects of hurricane Ivan and production of the traditional crops contracts sharply. Nonetheless the economy will continue to benefit from financial flows mainly grants and insurance inflows.

### **4.4 Prices and employment**

Prices are expected to increase in the short run and moderate thereafter. A very recent field survey conducted indicated that there were no apparent signs of price hikes in

established enterprises. However, there have been price increases reported in some of the retail outlets.

The level of employment will be severely affected. In the manufacturing sector unemployment will increase significantly with the temporary halt in operations of some enterprises. Job losses will be particularly visible in the industries related to the production of garments and furniture.

The tourism industry will also register important increases in unemployment. It is estimated that the job losses could amount to more than 60% of the total labor force of that sector. In the tour operator industry only 3% to 4% of the labor force are likely to be retained while the rest will be in the more optimistic scenario temporarily unemployed.

The construction sector, will be the main drive of employment. However, the sector will not be able to absorb all the labour released from the other sectors because of the specialised skill requirements for rehabilitation and reconstruction purposes.

## **IV GUIDELINES FOR REHABILITATION, RECOVERY AND A RECONSTRUCTION PROGRAMME**

### **1. Overall Context**

The devastating consequences of Hurricane Ivan in Grenada, calls for the adoption of rehabilitation and reconstruction approaches that increase the country's resilience to the economic, social and ecological vulnerabilities that exist in very small island states. Caribbean states are more vulnerable than many other developing countries. Their higher level of vulnerability can be traced back to the interaction of a number of socio-economic and natural characteristics. Most notable among them are:

- Environmental/ecological vulnerability, particularly high exposure to natural hazards;
- Limited land resources and difficulties in waste disposal management;
- Limited diversification and very open economies;
- Weak institutional capacity and high costs of basic infrastructure; and
- Special social vulnerabilities, particularly in the area of limited human resource capacity.

Grenada, in the aftermath of hurricane Ivan, evinced many of these vulnerabilities. The small size of the population and the economy of most Caribbean States mean that in the event of a disaster, large proportions of the economy and population are impacted. In the case of Grenada, the assessment indicated that 80% of the population was affected, and the cost of the damage was estimated to be close to twice the annual national GDP. As a result of the damage caused by hurricane Ivan, many victims that were already poor prior to the hurricane were left in conditions of extreme poverty. Government and the international community may wish to focus their support on addressing the problems described in the preceding chapters. Hurricane Ivan has also exposed the country's weaknesses in land use planning, urban planning, building practices, and hazard mitigation policies. The need for hazard mapping, which can inform land use policy and building practices, has also come to the fore.

The main aims of the proposed projects are to attend to victims of the disaster, rebuild and improve destroyed and damaged assets, reestablish productive and export processes, and in general help to reactivate the process of economic and social development. Two broad areas are suggested for action: rehabilitation and reconstruction. Within those areas it is suggested that focus be placed on:

- **Reinvigorating the economy;**
- **Generating employment; and**
- **Reducing social vulnerability.**

## **1. The Rehabilitation stage**

This stage will seek to normalize the living conditions of the victims while also reactivating the economy – by meeting their vital needs and delivering basic services. The food, health care and employment needs of the population will need to be expeditiously met through the following actions:

- a. Provision of food
- b. Potable water
- c. Control and prevention of diseases
- d. Housing repair and reconstruction
- e. Supply of seeds and basic inputs to affected farmers along with financial support and soft loans.

## **3. Reconstruction Stage**

This is the most crucial stage in the economic and social terms, since it will lead to the full reestablishment of normal living conditions and the county's economic and social development momentum prior to hurricane Ivan. The activities involved in this phase involve:

- b. The implementation of specific projects;
- c. Replacing lost support infrastructure (buildings, roads, sea walls, sewerage systems, electricity, transportation and communications networks);
- d. Replacing lost social infrastructure ( schools, housing, hospitals);
- e. Re-establishing agricultural activities;
- f. Generating productive jobs;
- g. Strengthening national emergency committees; and
- h. Reducing the social vulnerability of the affected population.

## **4. Recommendations**

In light of the significance of agriculture both to food security and as a possible source of employment generation, it is recommended that in order to mitigate the current effects and any future disaster of this nature, Government and the donor community may wish to support a number of the following actions, the full listing of which can be found in the annex:

- Focus on food security in the short run ensuring that short term crops and poultry are two immediate interventions.
- Source the necessary inputs to rehabilitate and rebuild the fisheries sector to pre hurricane commercial activity.
- Source early bearing and improved cultivars of crop species for propagation and cultivation.

- Because of the denuded state of the forested and watershed areas, urgent attention should be paid to revegetate the watersheds to allow for some growth and coverage to increase photosynthetic activity and oxygen supply.
- Develop a policy and strategy, which focuses on a commercial led industry approach to agriculture addressing issues of Legal and Institutional Reform; Incentive Regimes and Insurance; and Product Development and marketing.

The yachting industry is an emerging sector of the tourism industry which has the potential for high income earning, generation of employment among the youth, and the possibility for increasing the diversity of the tourism product. At the level of policy, the implementation of standards for the yachting industry is essential. To preserve the integrity of the cruise ship industry, attention has to be paid to increased safety and security of visitors, and improvement in public health. Port infrastructure, including public amenities, will require repair and upgrading.

In the area of infrastructure the following recommendations are made:

- Construction of underground cables for electricity and telecommunications, particularly in the urban towns of St. George's and Grenville;
- Regular maintenance of water supply dam installations;
- Increased usage of building codes in the reconstruction efforts and in building in general;
- Establishment of an agency to exclusively handle the execution of rehabilitation and reconstruction projects;
- Development of a Disaster Management Plan of Action.

In regard to health, the damage to health facilities is of urgent concern. Recommendations for rehabilitation and reconstruction suggest that :

- The government and donors may wish to give urgent attention to the medical laboratory , which is vital for evidence – based medicine ;
- The vast majority of the problems associated with the Health Sector emanated from roof and infrastructural damage to the health institutions.

The following policy measures may minimize damage to buildings in the future:

- Implement and revise where necessary, the existing Building Code,
- Enact a Building Act to boost construction standards for health care institutions;
- Establish a Grenadian Building Authority ( GABA ) to enforce building regulations for Health care institutions.

Additional recommendations are:

- Transfer refrigerated medical products to the most robust institutions with generators prior to an impending storm.
- Place medical equipment or stock on pallets to avoid water damage.

Despite centuries of agricultural cultivation and recent tourism activity, Grenada, up to the time of hurricane Ivan, still retained some of its mountaintop forests and coral reefs, over 450 species of flowering plants, 150 species of birds, and mostly undamaged landscape vistas. The destruction of the natural environment, is evident everywhere. The following are recommendations which may advance the protection of Grenada's rich natural resource:

- Prior to the passage of Hurricane Ivan, Grenada had embarked on the preparation of a National Environmental Policy and National Environmental Management Strategy. The country may wish to expedite the completion of the policy and Strategy. Unlike most other OECS Member States, Grenada may wish to pursue a policy and strategy that will focus on the re-establishment of significant biodiversity assets lost to the hurricane. An additional focus that is recommended is the creation of livelihood opportunities from the sustainable use and management of environmental assets.
- It is strongly recommended that sound and sustainable environmental considerations and standards be incorporated into all aspects of the post Ivan reconstruction of Grenada. This is particularly true for the rapid deployment of low costing shelter which, should not only be constructed according to internationally accepted building codes, but also constructed in locations that meet basic environmental criteria or which provide for environmental mitigation measures.
- A national physical planning policy has already been completed for the country. Incorporated into this instrument is a land use policy. The Government of Grenada may wish to consider reviewing and enhancing the policy, in light of the lessons learned from the passage of Ivan, and seeking Cabinet ratification of such so that it can be implemented as part of a wider reconstruction programme.

The reduction of the social vulnerability of the population has to be of utmost importance as the government of Grenada seeks to rebuild its society. In the measurement of social vulnerability a number of characteristics have been under consideration. Among them are the strengthening of the education of the population, maintaining optimum health, and achieving a secure and safe environment for people to conduct their business of life. The Government has expressed as a priority, the importance of developing its human resources. In that regard:

- A nationwide, all-age literacy and skills training programme that is gender aware and sensitive, should be developed and supported;
- Relief programmes with incentives for study should be considered;
- Support for Family Life Education throughout the school system from primary age should be instituted;



- Community based income generating projects of a cooperative nature should be explored as the people of Grenada have a strong culture of cooperative activity; and
- Food security for families in need, particularly households headed by women should be supported.

## **5. Project Proposals**

The fundamental factor regarding the viability of any reconstruction process is a country's internal capacity to undertake the rehabilitation and reconstruction process without further imposing on its already limited capacities. Grenada knows best the time frame and priority of its actions and will surely seek to strike a balance between the urgent task of replacing what has been lost and re-building its resilience to withstand similar future shocks. Once the emergency phase is over, rehabilitation and reconstruction programmes will need to be established in order to restore the facilities, assets and services damaged by the devastating effects of the hurricane. While the international community offers it support, the content, priorities and scope of such programmes must necessarily be a national, sovereign decision of Grenada which has to respond as much to the magnitude of the damage as to its pre-existing socio-economic conditions and policies. In any event, reconstruction will need to be carried out on the basis of a significant qualitative improvement over previous circumstances. Observance of building codes to withstand hurricanes and other natural hazards is an essential aspect of reconstruction.

Any strategy for rehabilitation and reconstruction must rest on strengthening the basis for sustained resilience and less vulnerable development with growth. Thus, the proposed mixture of components to build resilience to natural disasters must be compatible with sound economic policies and the necessary structural reforms that will allow Grenada more effective integration into the CSME and into a liberalized global market.

Included below is a sample of priority investment projects deemed important for repair and reconstruction of the Grenadian society and economy. This list of project profiles was developed with the input of national authorities and does not run counter to proposals submitted by other regional and international agencies.

The principle objective of the proposed projects is to present a portfolio that can help to reactivate the process of social and economic development, to re-establish productive and export processes, to re-build damaged assets and to reduce social vulnerability. Each project profile provides basic information on aims, scope, expected results, activities and tasks to be carried out, investments to be made, expected financing, and special characteristics.

Each profile should be subsequently analyzed in order to draw up a definitive project that will help improve the living conditions of disaster victims, and recover the physical and economic losses stemming from Ivan's devastating effects.

## **V PROJECT PROFILES**

**PROJECT TITLE: FORMATION OF AN AGENCY TO FACILITATE THE RECONSTRUCTION OF GRENADA**

**Sector: INFRASTRUCTURE**

**Sub-sector**

**Background:**

Given the extent of damages recorded, it is anticipated that there will be a need to comprehensively manage the allocation of major funding expected to flow from donor agencies to the rehabilitation of Grenada. At present all infrastructure works are handled through the Ministry of Works. This Ministry is not expected to have the staffing required to adequately implement the number and scale of projects that will have to be defined in order to rehabilitate Grenada.

In order that such an agency may operate to the best efficiencies, it is recommended that it be set up as a Statutory Body having a CEO and a Board of Directors who will be answerable to the Prime Minister. It is recommended that the members of the Board of Directors be drawn from:

- The Ministry of Works;
- The Ministry of Finance;
- The Ministry of Housing;
- The local Engineering Association;
- The private sector;
- The OECS.

**Project Objectives:**

To facilitate the implementation of an agency created specifically to manage and execute, in as efficient a manner as possible, projects which will be identified for the reconstruction and rehabilitation of Grenada.

**Duration of the project: 60 months**

**Date of initiation: April 2005**

**National Executing Agency: Ministry of Finance and Planning**

**Newly established National Reconstruction Agency**

**Description of activities and tasks:**

- To implement the legislation required to set up a Statutory Agency for the carrying out of reconstruction projects
- The subsequent implementation of projects

**Expected results and products:**

**The efficient and timely execution of projects aimed at the reconstruction and rehabilitation of Government and National infrastructure**

**Total required investments: (EC\$dollars)**

Labour requirements  
(work/months)

National inputs:

Imported inputs:

**Financial requirements (EC\$dollars)**

500,000,00  
0

Local:

10,000,000

**Special Remarks:**

<b>GRENADA</b>	<b>AGRI-2</b>
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**PROJECT TITLE: Enhance food security**

<b>Sector: AGRICULTURE</b>	<b>Sub-sector: Poultry</b>
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**Background:**  
Hurricane Ivan left significant damage to poultry pens and destruction of stock (chicks, feed, pesticides, etc.). Poultry farmers need to reconstruct and repair plants, and purchase stock and supplies to establish the poultry industry and hence their livelihoods.

**Project objectives:**

- To enhance food security and improve livelihoods of poultry farmers.

<b>Duration of the Project: 6 months</b> <b>Date of initiation: October 1, 2004</b>
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<b>National executing agency: Ministry of Agriculture</b>
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**Description of Activities and Tasks:** The project is intended to replace the heavy losses in equipment reconstruct destroyed pens and to procure layers and broilers and the requisite feed and medication for birds for the 200 destroyed units.

<b>Expected results and products:</b>
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<p><b>Total required investments: EC\$2,981,550:</b></p> <ul style="list-style-type: none"> <li>Galvanized sheets EC\$16,000</li> <li>Posts, beams &amp; laths EC\$46,800</li> <li>500 rolls chicken wire EC\$270,000</li> <li>80 shredders EC\$400,000</li> <li>6000 broiler chicks EC\$900,000</li> <li>6000 layer chicks EC\$1,200,00</li> <li>Feed &amp; medication EC\$148,750</li> </ul> <p style="text-align: center;">_____</p> <p><b>Financial requirements (dollars)</b></p> <ul style="list-style-type: none"> <li>Local:</li> <li>External:</li> <li>Donation/grant:</li> </ul> <p style="text-align: center;">_____</p> <p><b>Potential source of financing</b></p> <ul style="list-style-type: none"> <li>External credit:</li> <li>Donor: FAO, CDB, EU, USAID, IADB, World Bank</li> </ul>
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**Special remarks:**

<b>GRENADA</b>	<b>AGRI-3</b>
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**PROJECT TITLE: Strengthening the capacity and capability of production of planting for the revitalization of the crop sub-sector**

<b>Sector: AGRICULTURE</b>	<b>Sub-sector: Crops</b>
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Background:

**Project objectives:**

- To enhance food security and generate employment and incomes by strengthening national capacity to propagate and cultivate select crop commodities.

<b>Duration of the Project: 10 months</b> <b>Date of initiation: November 2004</b>
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<b>National executing agency: Ministry of Agriculture</b>
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**Description of Activities and Tasks:** The project involves the repairs to nursery infrastructure on the island and the procurement of selected seeds and cultivars and the requisite pesticides, fertilizers, peat moss, etc. for propagation and immediate planting of selected commodities island wide.

<b>Expected results and products:</b>
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<p><b>Total required investments: EC\$5,798,405:</b></p> <ul style="list-style-type: none"> <li>• Repair to nurseries &amp; replacement of watering system EC\$5,120,505</li> <li>• Procurement of seed &amp; other planting material, fertilizers, pesticides, peat moss, seedling trays, manure, sprayers <span style="float: right;">EC\$677,900</span></li> </ul> <hr/> <p><b>Financial requirements (dollars)</b></p> <ul style="list-style-type: none"> <li>• Local:</li> <li>• External:</li> <li>• Donation/grant: _____</li> </ul> <p><b>Potential source of financing</b></p> <ul style="list-style-type: none"> <li>• External credit:</li> <li>• Donor: FAO, CDB, EU, USAID, IADB, World Bank</li> </ul>
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**Special remarks:**

**GRENADA**

**No. ENV-1**

**PROJECT TITLE: WATERSHED CONSERVATION AND PROTECTION:**

**Sector: Forestry**

**Subsector: Environment**

**Background:** Ninety one percent of the forest lands and watershed now lay bare and stripped of the vegetation, which once supported an ecosystem where much fauna and flora benefited directly or indirectly. The 72 watersheds on the island have been devastated. A major concern remains over the (i) the level of water which the aquifers can now support and for how long, (ii) habitats for the wildlife, and (iii) serious soil erosion of the unvegetated hill slopes. Urgent action needs to be taken in the very short run to ensure regeneration and growth of vegetation in the forest and watershed areas. It is important to ensure that, in the drive to vegetate the watersheds and hill slopes, as much of the native biodiversity is maintained.

**Project objectives:** To rehabilitate all the watersheds in Grenada in order to:

- a. Prevent soil erosion as a result of the destruction of all canopies of vegetation along the slopes of watersheds;
- b. Improve water quantity and water quality; and
- c. Re-establish biodiversity of forest eco-systems.

**Duration of the project: 5 year(s)**

**Date of initiation: Immediate**

**National executing agency: Forestry Department and the Department of Environment in collaboration with interested voluntary organisations, schools and community groups**

**Description of activities and tasks:**

- a. Collection and propagation of surviving plant material, especially of the endemic species, from the surviving stock;
- b. Capture and recovery of wildlife for release in the wild after habitats have recovered sufficiently;
- c. A forestation of watersheds with fast growing native species;
- d. River bank stabilisation; and
- e. Appropriate policy, legal and institutional frameworks for watershed management, including community based approaches.

**Expected results and products:**

1. At least 80% of all watersheds are fully vegetated, with fast growing species native to the major forest communities in Grenada before the passage of Hurricane Ivan, by the end of the project.
2. At least 80% of Grenada's biodiversity is re-established by the end of the project.
3. Community based river bank stabilisation programmes established in at least 60% of the communities which neighbour major river systems.
4. Improved water quality and quantity in at least 50% of the watersheds.
5. Genetic stock of native plants and wildlife species preserved and propagated for re-establishment of biodiversity.
6. Conduct of an inventory of biodiversity in Grenada, Carriacou and Pettit Martinique.
7. Establishment of a herbarium.
8. Implementation of appropriate institutional, policy and legal frameworks for integrated watershed management.

**Total required investments: US\$1.6mil.**

**Special remarks:**

The project will undertake to create

<b>GRENADA</b>	<b>No. ENV - 2</b>
<b>PROJECT TITLE: CREATING SUSTAINABLE LIVELIHOODS FROM BIODIVERSITY ASSETS</b>	
<b>Sector: Environment</b>	<b>Subsector: Social Development</b>
<b>Background:</b> A number of the communities specialize in handicrafts made from non-timber products. These products have been destroyed in the hurricane and it is anticipated that many women from the target communities will be displaced	
<b>Project objectives:</b> To establish a Small Grants Facility which will enable rural communities to create livelihoods through the sustainable use of biodiversity assets.	
<b>Duration of the project: 3 years</b>	<b>National executing agency: Ministry of Agriculture in collaboration with the Department of Environment and NGOs.</b>
<b>Date of initiation: First Quarter 2005</b>	

**Description of activities and tasks:** Provision of small grants up to US\$20,000 for the creation of livelihood opportunities.

<b>Expected results and products:</b> 1. A total of at least 10 grants are issued annually to undertake catalytic projects that
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<p><b>Total required investments: US\$700,000</b></p> <ul style="list-style-type: none"> <li>• Labour requirements (work/months)</li> <li>• National inputs(in-kind)</li> <li>• Imported inputs: _____</li> </ul> <p><b>Financial requirements (dollars)</b></p> <ul style="list-style-type: none"> <li>• Local: \$150,000</li> <li>• External: \$450,000</li> <li>• Donation/Loan/Funding: _____</li> </ul> <p><b>Potential source of financing</b></p> <ul style="list-style-type: none"> <li>• External credit:</li> <li>• Donor: UNDP, CDB, OAS, EU, Republic Of China</li> </ul>	<p><b>Special remarks:</b></p> <p>The Grants Facility will enable the women to obtain funds to cultivate the necessary plant material and to purchase tools, etc. that may have been destroyed by the hurricane.</p> <p>Other resource based livelihoods may include jewelry production from non timber products and marine resources; crafts from banana waste, etc.</p>
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**GRENADA**

**No. ENV - 3**

**PROJECT TITLE: ENVIRONMENTAL AWARENESS CAMPAIGN**

**Sector: Environment**

**Subsector:**

**Background:** The fragility and vulnerability of island biodiversity has been clearly evidenced by the damage of the hurricane to native species of flora and fauna. This fragility and vulnerability is further exacerbated by the impact of poor management and behavioural practices. Debris from the hurricane has been dumped into a few of the mangroves stands and it is anticipated that as the clean up efforts increase, that there may be indiscriminate dumping in a number of the ecosystems.

**Project objectives:** To ensure that there is no further degradation of the biodiversity assets of Grenada, Carriacou, and Petit Martinique.

**Duration of the project: 4 years**

**Date of initiation: 2<sup>nd</sup> quarter  
2005**

**National executing agency: Department of  
Environment in collaboration with the  
Departments of Forestry and Fisheries, local  
CBOs, NGOs, schools, etc**

**Description of activities and tasks:**

1. Public education and awareness through the use of all available media and social marketing techniques;
2. Provision of small grants (not more than US\$5,000) to undertake catalytic projects on biodiversity conservation and sustainable environmental protection.

**Expected results and products:**

1. Regeneration and protection of biodiversity stock that had been destroyed by the hurricane;
2. Active school and CBO/NGO programmes on ensuring that biodiversity stock is not loss through natural or man-made events;
3. Infusion of environmental curriculum into primary to junior secondary schools.

**Total required investments: US\$250,000**

- Labour requirements  
(work/months)
- National inputs:
- Imported inputs:

**Financial requirements (dollars)**

- Local: \$50,000
- External: \$200,000
- Donation/Loan/Funding:

**Potential source of financing**

- External credit:
- Donor: UNDP, USAID, WWF, RARE

**Special remarks:**

<b>GRENADA</b>	<b>No. ENV - 7</b>
<b>PROJECT TITLE: REMOVAL OF WASTE DEBRIS</b>	

<b>Sector: Environment</b>	<b>Subsector: Solid Waste</b>
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**Project objectives:** To remove, for safe disposal, specific types of waste created during the passage of Hurricane Ivan

<b>Duration of the project: 3 months</b>
<b>Date of initiation: Immediate</b>

<b>National executing agency: Grenada Solid Waste Management Authority</b>
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**Description of activities and tasks:**

1. Preparation of temporary sites to receive specific waste types;
2. Collection and removal of waste to temporary receptacles.

<b>Expected results and products:</b>
1. A clean and safe environment.

<p><b>Total required investments: US\$3.88mil</b></p> <ul style="list-style-type: none"> <li>• Labour requirements (work/months)</li> <li>• National inputs(in-kind)</li> <li>• Imported inputs: equipment and Machinery for waste reduction</li> </ul> <hr/> <p><b>Financial requirements (dollars)</b></p> <ul style="list-style-type: none"> <li>• Local: \$.25mil</li> <li>• External: \$3.63</li> <li>• Donation/Loan/Funding:</li> </ul> <hr/> <p><b>Potential source of financing</b></p> <ul style="list-style-type: none"> <li>• External credit: Donor: CDB, EU, World Bank</li> </ul>
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**Special remarks:**

It is estimated that the following types and volumes of waste need to be disposed :

Galvanised waste	4,000 tonnes
Bulky waste	50,000m <sup>3</sup>
Demolition waste	100,000m <sup>3</sup>
Fallen trees	130,000m <sup>3</sup>

Cost to remove and transport all waste	US\$2.6mil
Equipment & machinery	.5mil
Rental of heavy Equipment	.03mil
Preparation of temporary Sites	.5mil
<b>Total</b>	<b>US\$3.63mil</b>

<b>GRENADA</b>	<b>SOC-1</b>
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**PROJECT TITLE: REHABILITATION OF EDUCATIONAL FACILITIES**

**Sector: SOCIAL** | **Sub-sector: EDUCATION**

**Background:** The education sector suffered considerable damage with the passage of Hurricane Ivan. Damage to the education section was second only to the housing sector in its severity. Schools in all Parishes and at all levels; 74 pre-primary, 57 primary and 19 secondary affecting a total of 150 schools. Some schools also suffered damages as they were used as shelters. Over 30,481 children are being deprived from attending school; at the secondary level 4,032 boys and 5,486 girls are affected. This level of destruction is a particularly hard blow to Grenadian society as much emphasis and hope was placed on education in order to transform the economy and the society overall. The most recent poverty assessment report conclude that human resource strategy which embraces the entire nation and excites it to acquire knowledge and skills was a base for poverty reduction in Grenada.

**Project objectives:**

- Reconstruction and repair of existing structures, including reinforcement, in order to reduce vulnerability to natural disasters.
- To provide children with a means to continue their education.
- Review the government's Strategic Plan for Educational Enhancement and Development in view of the disaster.
- Review the catchment communities of the existing school boundaries.

**Duration of the project: 5 years, done in phases.**

**National executing agency:** Ministry of Education and Ministry of Finance

**Date of initiation: Immediate**

**Description of activities and tasks:** Contracting of services of the required technical experts. Procure school materials, equipment and furnishings damaged by the hurricane.

**Expected results and products:**

- Restoration and construction of Schools at all levels.
  - Replacement of school materials, equipment and furnishings
- Restoration of libraries and computer facilities.

<p><b>Total required investments:</b>  <b>EC\$203,000,000.00</b></p> <ul style="list-style-type: none"> <li>• Labour requirements (work/months)</li> <li>• National inputs:</li> <li>• Imported inputs:</li> </ul> <p><b>Financial requirements (dollars)</b></p> <ul style="list-style-type: none"> <li>• Local:</li> <li>• External:</li> <li>• Donation/Loan/Funding:</li> </ul> <p><b>Potential source of financing</b></p> <ul style="list-style-type: none"> <li>• External credit:</li> <li>• Donor:</li> </ul>	<p><b>Special remarks:</b></p>
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<b>GRENADA</b>	<b>SOC- 10</b>
<b>PROJECT TITLE:</b> Restoration of Important Historical Landmarks in the Town of St. George's	

**Sector: SOCIAL**

**Sub-sector: Heritage Sites**

Background: The project stems from the general efforts of restoring Grenada, in particular the Town of St. George, to its pre-Hurricane Ivan, status. Called "A City on a Hill" the town of St. George Grenada, has been the subject of many studies over many years, due to its unique characteristics such as fish scale roofs, Georgian Architecture and system of fortifications. It has also been described for over a century as the most picturesque town in the entire Caribbean. Not only had the town of St. George received special mention from the Georgian Society during the 1930s and 1950s, but also in 1988, it was nominated as one of the monuments of the Wider Caribbean. As recent as August 2003, studies were carried out on the Town as part of the efforts of getting the Fortified System of St. George's, listed as a potential World Heritage Site.

**Project objectives:** The Project seeks to restore the historical monuments and properties, so that the Town can retain its historical character.

**Duration of the project: 12 months**  
**Date of initiation: Immediate**

**National executing agency:** Ministry of Finance and Planning

**Description of activities and tasks:**

- Training of young artisans to undertake this work.
- Hiring of a consultant to advise on the restoration processes.
- Material for restoration.
- Hiring of a coordinator for management of the project.
- Safeguard and restore the historical archives of Grenada.

**Expected results and products:** Historical sites and buildings within the town of St. Georges restored to maintain the integrity and uniqueness of the town of St. Georges; as part of the Grenada's national pride and its selling point as tourist attractions. A cadre of trained artisans and skilled persons in historical restoration and preservation. The capacity to facilitate the exchange of information between local and regional inventories. Developed material for use as educational tools, tourists and promotional purposes.

<p><b>Total required investments:</b>  <b>ECS 13,590,000.00</b></p> <ul style="list-style-type: none"> <li>• Labour requirements (work/months)</li> <li>• National inputs:</li> <li>• Imported inputs:</li> </ul> <hr style="width: 20%; margin-left: 0;"/> <p><b>Financial requirements (dollars)</b></p>	<p><b>Special remarks:</b></p>
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<b>GRENADA</b>	<b>SOC-6</b>
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**PROJECT TITLE: CONSTRUCTION OF LOW COST HOUSING DEVELOPMENT**

**Sector: SOCIAL** | **Sub-sector: Housing**

Background: Hurricane Ivan demonstrated the vulnerability of low income earners, living in areas and in houses unsuitable for withstanding the natural forces of a storm. In many areas of Grenada there were few buildings suitable to withstand winds of upwards to 115mph. Almost 28,000 houses or 89% of Grenada's housing stock of 31,122 houses have been damaged or destroyed by Ivan. Approximately 22,000 or 70% requires repair. In some areas the entire housing stock was destroyed. In the village of Après Toute all that remained were piles of wood and sheets of zinc to indicate that houses once stood there. The new construction in these areas will provide housing taking into consideration standards that will help in the reduction of vulnerability in cases of tropical storms and hurricanes.

**Project objectives:**

- The intention of this project is to address the very serious housing crisis that has been created due to the destruction of houses with the passage of Hurricane Ivan; through the construction of affordable houses for low and middle income households, which can withstand at least a category 3 hurricane. Safer houses provided to the affected population including the indigent population.

**Duration of the Project: 5 Years**  
**Date of initiation: November 15, 2004 in three phases. Each phase will include (a) reconstruction (b) refurbish (c) construction and (d) financing.**

**National executing agency: National Housing Authority, Ministry of Finance and Planning**

**Description of Activities and Tasks:** In phase one to reconstruct 33% of damaged homes, refurbish 33% of concrete homes which sustained structural damages, construct 33% of homes for low income and 33% of homes for middle income and provide finance to 33% of affected persons to refurbish and construct homes.

**Expected results and products:**

- Houses refurbished and constructed for families who suffered severe housing damage with increased protection to withstand future natural disaster.

**Total required investments:**  
**USD\$27,000,000.00**

- Labour requirements (work/months)
- National inputs:
- Imported inputs:

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**Special remarks:**

<b>GRENADA</b>	<b>SOC- 5</b>
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**PROJECT TITLE: STRENGTHEN WOMEN'S CAPACITY FOR INCOME GENERATION ACTIVITIES IN THE POST DISASTER PHASE**

**Sector: SOCIAL** | **Sub-sector: Social and Human Development**

Background: The disaster demonstrated not only the vulnerability of people, living in areas and in houses unsuitable for withstanding the natural forces of a tropical storm but the inability of certain agricultural productions to withstand such shocks. Many of the affected households are female headed. Income generation activities are needed to reduce vulnerability and create opportunities allowing the women themselves to improve their situation and quality of life for their families.

**Project objectives:** Reduce economic vulnerability of poor women.

**Duration of the project: 3 years**  
**Date of initiation: Immediate**

**National executing agency:** Ministry of Social Development

**Description of activities and tasks:** Short-term consultant, training and capacity development activities for women. Market surveys to find niche markets in agro-processing, craft, short crop cultivation, horticulture, poultry farming, meat production and orchards.

**Expected results and products:** Increased capacity of women to engage in income generation activities in cottage and small scale manufacturing.

<p><b>Total required investments:</b>  <b>USD\$500,000.00</b></p> <ul style="list-style-type: none"> <li>• Labour requirements (work/months)</li> <li>• National inputs:</li> <li>• Imported inputs:</li> </ul> <p style="text-align: center;">_____</p> <p><b>Financial requirements (dollars)</b></p> <ul style="list-style-type: none"> <li>• Local:</li> <li>• External:</li> <li>• Donation/Loan/Funding:</li> </ul> <p style="text-align: center;">_____</p> <p><b>Potential source of financing</b></p> <ul style="list-style-type: none"> <li>• External credit:</li> <li>• Donor:</li> </ul>	<p><b>Special remarks:</b></p>
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**GRENADA**

**SOC- 9**

**PROJECT TITLE: INSTITUTIONAL STRENGTHENING OF THE NATIONAL EMERGENCY RESPONSE ORGANIZATION (NERO) AND DISASTER DATABASE**

**Sector: SOCIAL**

**Sub-sector: Disaster Preparedness**

Background: The impact of Hurricane Ivan has clearly demonstrated the need for increased capacity at the national and the community levels in emergency preparedness and response. The efficient and effective planning and management of disaster preparedness and response activities requires that the national and community organizations have accurate and reliable data. This data needs to be systematized and easily accessible to those engaged in planning and management efforts.

**Project objectives:**

- Increase disaster preparedness, management and response capacity at all levels.
- Develop and strengthen a Social Indicators Committee.  
Strengthen the capacity of Ministries in the social sector and NERO to gather and analyse data related to disaster preparedness and management.

**Duration of the project: One year**

**Date of initiation:**

**National executing agency: NERO, Ministry of Finance (Technical Corporation Unit & National Statistical Office)**

**Description of activities and tasks:**

- Conduct an evaluation of current capacity to respond to the effects of natural and manmade disasters.
- Make recommendations on how to strengthen management, preparedness and response capacity at all levels.
- Review and strengthen the national disaster plan.
- Examine models of good practices within the region in disaster management and mitigation.
- Develop a public awareness programme in disaster preparedness.
- Provide training in disaster management and response, including distribution, data collection and analysis and shelter selection and shelter management.
- Social mobilization.
- Equipment.

**Expected results and products:**

- Establishment of local emergency management committees.
- Increased participation of civil society.
- Publication of key surveys and studies on disaster preparedness, response and mitigation.
- Increased inter-ministerial coordination.
- Establish and strengthened inter-ministerial database systems.

**Total required investments: EC\$500,000.00**

- Labour requirements  
(work/months)
- National inputs:
- Imported inputs:

**Special remarks:**



**GRENADA**

**SOC- 2**

**PROJECT TITLE: PHYCHO-SOCIAL REHABILITATION**

**Sector: SOCIAL**

**Sub-sector: PSYCHO-SOCIAL**

Background: People's behaviour changes during emergencies, as do the ways in which they express their emotions. There is frustration and anguish which, among other things, fosters acts of violence. Such reactions to stress and crisis provide a basis for the orientation of mental health efforts and services towards the psychosocial mitigation and the prevention of trauma occasioned by natural disasters and other such emergency situations. Capacity building activities directed at community levels serve to foster local leadership and skills. Sensitization of community leaders, health professionals, educators, and families towards the issues of prevention and care for the psychosocial impact of disasters promotes their ability to understand the situation. Increased awareness lends itself to the focus on preparedness, which benefits communities in managing the process of prevention and recovery from disasters. Skill-building and training enable people to meet the demands of dealing with the concerns before, during and after disasters. In addition, such an orientation fosters coping at the level of the individual, the family, the community and beyond.

**Project objectives:**

- To assess the psychological impact of disaster in the general population.
- To advance mental health protection and promotion in the general population.
- To promote protection against and prevention of mental health risks.
- To promote the prevention of gender-based violence.
- To promote the provision of psychological, emotional and social assistance needed for the care of women, children, the elderly, and physically and mentally challenged persons.
- To assist persons to develop better coping skills in dealing with issues of displacements.

**Duration of the project: 24 months**

**Date of initiation: Immediate**

**National executing agency:** Ministry of Social Development

**Description of activities and tasks:**

- Sensitization, awareness-raising, and education of families, educators, health care providers and community and national leaders to the normal reactions of children, youth and adults to crisis conditions.
- Skills-building and training in assessment of post-traumatic stress.
- 'Managing grief and loss' training for families, educators, health care providers, and community leaders.
- Establish a network of community persons trained in crisis management.
- Integrate a psycho-social component in the current disaster management profile by incorporating a Stress-Management in Disasters (SMID) Committee into NERO.
- Develop SMID in conjunction with NERO and other stakeholders.
- Contract the services of a trained professional to coordinate and manage the project.
- Develop the necessary mechanisms and structures to establish a counseling unit.

**Expected results and products:** Situational diagnosis, increased awareness of crisis reactions, increased coping skills, and decreased risk for mental illness and dysfunctional behaviour associated with trauma and the establishment of a counseling unit.

**GRENADA**

**SOC- 3**

**PROJECT TITLE: PSYCHO-SOCIAL REHABILITATION FOR CHILDREN**

**Sector: SOCIAL**

**Sub-sector: PSYCHO-SOCIAL**

Background: Disasters affect children in different ways, yet the psycho-social impact often remains invisible in studies and goes untreated. There is a need to sensitize the community, especially teachers, caregivers and parents on how to identify signs of psycho-social trauma in children. They also need to be sensitized towards issues of prevention and care for the psycho-social impact of disasters and abuse.

**Project objectives:**

- Develop a cadre of trained teachers, caregivers and parents.
- Develop an integrated plan for psycho-social rehabilitation of children who have experienced all forms of trauma.
- Create public awareness on the psycho-social impact of disasters on children.

**Duration of the project: 24 months**

**Date of initiation: Immediately**

**National executing agency:** Ministry of Social Development

**Description of activities and tasks:**

- Develop training materials, train teachers, guidance counselors, parents and caregivers nation-wide to recognize the signs and symptoms of trauma and abuse in children.
- Develop and produce public service announcement on the care and protection of children.
- Train teachers, school administrators and caregivers in psycho-social trauma and rehabilitation.
- Sensitize parents and community leaders.
- Develop a cadre of Peer Counselors to provide support to affected children.

**Expected results and products:**

- Package of training materials for psycho-social rehabilitation aimed at teachers, caregivers, parents and children
- Full electronic and print media campaign.
- Poster competition for children.
- Workshops at national and district levels.

**Total required investments: EC\$400,000.00**

- Labour requirements  
(work/months)

- National inputs:
- Imported inputs:

**Financial requirements (dollars)**

- Local:
- External:
- Donation/Loan/Funding:

**Potential source of financing**

- External credit:
- Donor: UNICEF

**Special remarks:**

<b>GRENADA</b>	<b>SOC- 8</b>
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**PROJECT TITLE: SHELTERS ALSO SERVING AS COMMUNITY CENTERS IN GRENADA**

**Sector: SOCIAL** | **Sub-sector: Ministry of Social Development**

**Project objectives:**

- Create structurally sound building to serve as shelters in time of disasters that will also serve as centres for community development.
- Serve as community libraries, adult skills training centres and adult literacy centres.
- Community computer activity centres.
- Incorporate daycare facilities for low income families.

**Duration of the project: 5 years**  
**Date of initiation: Immediate**

**National executing agency:** Ministry of Finance

**Description of activities and tasks:**

- Identify existing suitable and structurally sound buildings in each community.
- Identify location/land for construction of new shelters/community centres.
- Refurbished and new construction of shelters/community centers.
- Purchasing of basic furniture and equipment.
- Evaluate the infrastructural needs to accommodate the expected number of persons needing shelters.

**Expected results and products:**

- Shelters/community centres constructed and equipped as shelters and for community development activities.
- Development of policy for management and maintainance of shelter/community centres.
- Capacity building and skills training programmes developed and implemented.
- Provision of safe and affordable child care facilities for low in come families.

**Total required investments:**  
**EC\$20,000,000.00**

- Labour requirements  
(work/months)
- National inputs:
- Imported inputs:

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**Financial requirements (dollars)**

- Local:
- External:
- Donation/Loan/Funding:

**Special remarks:**

<b>GRENADA</b>	<b>SOC-4</b>
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**PROJECT TITLE: REHABILITATION OF SOCIAL SERVICE FACILITIES**

**Sector: SOCIAL** | **Sub-sector: Social and Human Development**

Background: The Facilities used to provide safe places for the elderly, children and persons with disabilities and also child care suffered considerable damage; ranging from completely destruction to a range of structural damages including complete and partial roof loss. These homes were located in the parishes of St. Georges, St. Andrews, St. Marks, St Johns and St. Patricks and Carriacou. In the case of the day care centres seventy percent (70%) of the children affected are from single female headed household thus creating an additionally burden for these women.

- Project objectives:**
- Reconstruction and repair of existing structures, including reinforcement, in order to reduce vulnerability to natural disasters.
  - To provide a place of care and protection for persons in need of special assistance.

**Duration of the project: 1 year**  
**Date of initiation: Immediate**

**National executing agency:** Ministry of Social Development

**Description of activities and tasks:** Refurbish and construct damaged facilities and the procurement of material, equipment and furnishings damaged by the hurricane.

- Expected results and products:**
- Reparation of children’s homes, Homes for the elderly and Home for persons with disabilities.
  - Reparation of Day care Facilities.
  - Replacement of materials, equipment and furnishings
- Reparation of libraries and sports facilities.

<p><b>Total required investments:</b>  <b>EC\$4,000,000.00</b></p> <ul style="list-style-type: none"> <li>• Labour requirements (work/months)</li> <li>• National inputs:</li> <li>• Imported inputs:</li> </ul> <hr/> <p><b>Financial requirements (dollars)</b></p> <ul style="list-style-type: none"> <li>• Local:</li> <li>• External:</li> <li>• Donation/Loan/Funding:</li> </ul> <hr/> <p><b>Potential source of financing</b></p> <ul style="list-style-type: none"> <li>• External credit:</li> <li>• Donor:</li> </ul>	<p><b>Special remarks:</b></p>
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<b>GRENADA</b>	<b>SOC-11</b>
<b>PROJECT TITLE: REPLACEMENT OF ROOF AND REFURBISHMENT OF CARLTON HOUSE DRUG REHABILITATION CENTRE</b>	

**Sector: SOCIAL**

**Sub-sector: HEALTH**

Background: Hurricane Ivan completely destroyed the roof, and significantly damaged the walls and internal structures of the Carlton House Drug Rehabilitation Centre.

**Project objectives:**

- The project aims to construct a new roof and repair the internal structures of the Drug Rehabilitation Centre to ensure a safe and comfortable environment of its clients.

**Duration of the Project: 4 months**  
**Date of initiation: 1<sup>st</sup> June 2005**

**National Executing Agency:**  
**Ministry of Health and Ministry of Finance and Planning**

**Description of Activities and Tasks:**

The project, which is estimated to last approximately four months, will involve the reconstruction of a new roof, and the repair of the walls and other internal structures of the drug rehabilitation centre.

**Expected results and products:**

The roof and infrastructure of the Carlton House Drug Rehabilitation Centre (CHDRC) will be reconstructed to allow for resumption of work at the centre.

**Total required investments:**  
 US\$972,000

**Special remarks:**

**Financial requirements (dollars)**

- Local:
- External:
- Donation/grant:

**Potential source of financing**

- External credit:
- Donor:

**GRENADA**

**SOC-12**

**PROJECT TITLE: STRENGTHENING OF COMMUNICABLE DISEASE SURVEILLANCE IN GRENADA, CARRIACOU, AND PETITE MARTINIQUE**

**Sector: SOCIAL**

**Sub-sector: HEALTH**

Background: Following the passage of hurricane Ivan, several cases of communicable diseases was suspected but not confirmed. The country lacked efficient communicable disease surveillance for reporting these conditions on time.

**Project objectives:**

- To prevent and control communicable diseases in Grenada, Carriacou, and Petite Martinique, by establishing an efficient surveillance system that can monitor these conditions, and are sufficiently flexible to respond to changing trends on time.

**Duration of the Project: 1 year**

**Date of initiation: 1<sup>st</sup> October 2004**

**National executing agency: Ministry of Health and Ministry of Finance and Planning**

**Description of Activities and Tasks:**

The surveillance system will be focused in the public hospitals, health centres and medical stations in the tri-island state. Designated nurses will report weekly to the national epidemiologist who will transmit the data weekly to Caribbean Epidemiology Centre (CAREC).

**Expected results and products:**

An efficient and up-to-date surveillance programme for communicable disease.

**Total required investments:**

US\$76,590.

**Special remarks:**

**Financial requirements (dollars)**

- Local:
- External:
- Donation/grant: \_\_\_\_\_

**Potential source of financing**

- External credit:
- Donor: \_\_\_\_\_

**GRENADA**

**SOC-13**

**PROJECT TITLE: REPAIR OF ROOF OF CENTRAL MEDICAL STORES (CMS)**

**Sector: SOCIAL**

**Sub-sector: HEALTH**

Background: Hurricane Ivan completely destroyed the galvanize sheeting, and partially damaged the inner ceiling of the roof of CMS.

**Project objectives:**

- To replace the complete galvanize sheeting, and repair the ceiling of CMS.

**Duration of the Project: 1 month**  
**Date of initiation: 15<sup>th</sup> October**  
**2004**

**National executing agency: Ministry of Health and Ministry of Finance and Planning**

**Description of Activities and Tasks:**

Central Medical Stores is the government's main warehouse for storing pharmaceuticals and related medical supplies. The project seeks to restore the security and integrity of the medical products by repairing the roof over a 1-month period.

**Expected results and products:**

The roof of CMS will be repaired to provide full security, and to maintain the integrity of medical products.

**Total required investments:**

US\$648,148

**Special remarks:**

**Financial requirements (dollars)**

- Local:
- External:
- Donation/grant:

**Potential source of financing**

- External credit:
- Donor:

**GRENADA**

**SOC-14**

**PROJECT TITLE: THE RECONSTRUCTION OF ROOFS ON THE LABORATORY AND OTHER DEPARTMENTS AT THE ST. GEORGE'S GENERAL HOSPITAL.**

**Sector: SOCIAL**

**Sub-sector: HEALTH**

Background: Hurricane Ivan damaged the roof of several departments at the St. George's general hospital, including the laboratory, storeroom, kitchen, laundry, administrative office, and nursing and drivers offices.

**Project objectives:**

- To rebuilding the roof of the laboratory, and affected departments of the general hospital in order to restore critical diagnostic and other services to the population of Grenada.

**Duration of the Project: 3 months**  
**Date of initiation: 15<sup>th</sup> October 2004**

**National executing agency: Ministry of Health and Ministry of Finance and Planning**

**Description of Activities and Tasks:**

The project aims to construct the roof of the medical laboratory as a priority, because it sustained the most damage within the hospital. In addition, the roofs of the surrounding buildings within the hospital compound will be repaired; these structures comprise the store room, generator room, kitchen, laundry, administrative office, and nursing and drivers offices.

**Expected results and products:**

The roof and supporting structures of the medical laboratory and other affected buildings will be repaired.

**Total required investments:**

US\$1,666,666

**Special Remarks:**

**Financial requirements (dollars)**

- Local:
- External:
- Donation/grant: \_\_\_\_\_

**Potential source of financing**

- External credit:
  - Donor:
- \_\_\_\_\_



**GRENADA**

**SOC-15**

**PROJECT TITLE: CONSTRUCTION OF ROOF OF RICHMOND HOME FOR THE ELDERLY**

**Sector: SOCIAL**

**Sub-sector: HEALTH**

Background: The roof of the Richmond Hill Home for the Elderly was destroyed by hurricane Ivan, which caused further deterioration to the beds of the institution.

**Project objectives:**

- To replace the roof and beds which were destroyed by the hurricane, and to maximize the opportunity by purchasing important amenities for the institution.

**Duration of the Project: 4 months**  
**Date of initiation: 1<sup>st</sup> November 2004**

**National executing agency: Ministry of Health and Ministry of Finance**

**Description of Activities and Tasks:**

The project aims to improve the building and infrastructure by replacing the roof and purchasing fifty (50) new beds and ten (10) wheel chairs to enhance the quality of life for the institution's residents. The home has a capacity of one hundred and ten (110) persons and provides care for the elderly and mentally and physically challenged persons.

**Expected results and products:**

The construction of the roof for the Richmond Hill home, equipped with 50 new beds and 10 additional wheel chairs.

**Total required investments:**  
US\$194,444

**Special remarks:**

**Financial requirements (dollars)**

- Local:
- External:
- Donation/grant: \_\_\_\_\_

**Potential source of financing**

- External credit:
- Donor: \_\_\_\_\_

**GRENADA**

**SOC- 16**

**PROJECT TITLE: REPLACEMENT OF ROOF AND REPAIR OF THE WATER CATCHMENT SYSTEM OF PRINCESS ROYAL HOSPITAL**

**Sector: SOCIAL**

**Sub-sector: HEALTH**

Background: Hurricane Ivan damaged the roof and water catchment system of Princess Royal Hospital in Carriacou

**Project objectives:**

- The project aims to repair the roof of the hospital which is situated on the hill top and is therefore particularly vulnerable to strong winds. In addition, the water catchment system will be restored to good working condition to ensure that the hospital and its environs have a reliable supply to good quality water.

**Duration of the Project: 1 month**  
**Date of initiation: 15 October 2004**

**National executing agency: Ministry of Health, Social Security & the Environment**

**Description of Activities and Tasks:**

The hospital roof and the water catchment system will be repair simultaneously.

**Expected results and products:**

The roof of the hospital and the water catchment system will be repaired.

**Total required investments:**

US\$37,037

**Special remarks:**

**Financial requirements (dollars)**

- Local: \_\_\_\_\_
- External:
- Donation/grant:

**Potential source of financing**

- External credit:
- Donor: \_\_\_\_\_

**GRENADA**

**SOC-17**

**PROJECT TITLE: THE CONSTRUCTION OF ROOFS AND SUPPORTING STRUCTURES OF DAMAGED PRIMARY HEALTH CARE CENTRES**

**Sector: SOCIAL**

**Sub-sector: HEALTH**

Background: Hurricane Ivan damaged or destroyed the roofs of several health centres. Important furniture and equipment were also damaged.

**Project objectives:**

- To repair the roofs and supporting structures of primary health care institutions to ensure a resumption of essential health services to catchment areas.

**Duration of the Project: 6 months**  
**Date of initiation: 15 November 2004**

**National executing agency: Ministry of Health and Ministry of Finance and Planning**

**Description of Activities and Tasks:**

Replacement of damaged roof, doors, windows, furniture and equipment.

**Expected results and products:**

The primary health care institution restored to full working conditions by the replacement of roofs, relocated fixtures, and equipment

**Total required investments:**

USD\$218,518

**Special remarks:**

**Financial requirements (dollars)**

- Local:
- External: \_\_\_\_\_
- Donation/grant:
- 

**Potential source of financing**

- External credit:
- Donor: \_\_\_\_\_

**GRENADA**

**SOC- 18**

**PROJECT TITLE: REPLACEMENT OF ROOF, LABORATORY EQUIPMENT AND RABIES VACCINE AT THE VECTOR CONTROL BUILDING**

**Sector: SOCIAL**

**Sub-sector: HEALTH**

Background: The hurricane destroyed the roof and equipment at the Vector Control building. The power outage at the building also destroyed the rabies vaccine.

**Project objectives:**

- The project aims to replace the roof, and purchase equipment to ensure that Vector borne diseases caused by mosquitoes, such as Dengue fever, are controlled. The Vector Control department will reestablish the vaccination programme against Rabies. These vector control programs are important to control the potential increase of the populations of mangoose and mosquitoes which tend to occur after hurricanes.

**Duration of the Project: 3 months**  
**Date of initiation: 1 January 2005**

**National executing agency: Ministry of Health and Ministry of Finance and Planning**

**Description of Activities and Tasks:**

Construction of roof, procurement of equipment and rabies vaccine.

**Expected results and products:**

The roof of the Vector Control building will be repaired, and essential equipment and rabies vaccine procured.

**Total required investments:**  
USD\$40,370

**Special Remarks:**

**Financial requirements (dollars)**

- Local:
- External:
- Donation/grant: \_\_\_\_\_

**Potential source of financing**

- External credit:
- Donor:

<b>GRENADA</b>	<b>No.</b>
<b>PROJECT TITLE: Grenada Economic Recovery Intervention</b>	
<b>Sector:</b> <b>Manufacturing Sector</b>	<b>Subsector(s):</b> <b>Agro-processing, Furniture, Agro-tourism etc</b>

**Project objectives:**

1. To accelerate the restoration process of the manufacturing facilities in Grenada, thus minimizing the loss in sales, export earnings and operating cash flow position of the companies.
2. To bring the companies to an operating efficiency level that is consistent to competitive standard in their respective industry.
3. To minimize the immigration of skilled people and entrepreneurs because of lack of income to maintain family, which could lead to re-training and recruitment of entire new workers. Thus, this could have an adverse impact on operating productivity.

**Duration of the project:** 3 months

**Date of initiation:** Immediate

**National executing agency:**

Organization of Eastern Caribbean States – Export Development Unit (OECS-EDU)

**Description of activities and tasks:**

To provide technical skills required for the refurbishment and restoration work necessary to bring manufacturing facilities in Grenada to a minimum acceptable operating condition. Immediate work is required in the re-instatement of electrical system, plumbing, refrigeration, cleaning, and re-calibration of plant equipment for the re-commissioning of the plants to full productive capacity. In recognizing the constraints in accessing national skills in the short term, this project will facilitate the recruitment of technicians from OECS companies with the necessary skills in fulfilling the project objectives. Companies will be approached to release the required staff as their contribution to the rehabilitation effort being undertaken. The project will provide for a projected 20 man-days per company and will meet the cost of travel, meals, accommodation and other incidental expenses.

**Expected results and products:**

- Restored plants operating efficiently
- Minimization in revenue and operating cash flow losses

**Total required investments: US\$340,000.00**

- **Labour requirements (work/months) :**  
20 man-days per company
- **National inputs:**  
To be Determined
- **Imported inputs:**  
Technicians (as detailed in project)

**Special remarks:**

The estimated cost per company is US\$6,800.00 and this project focuses on 20 manufacturing companies in Grenada, thus a total cost of US\$340,000. This project cost does not include loss of raw and packaging inventory and operating inputs to restart the operations and building structural damages. It is anticipated that these are being attended to under different national programmes.

<b>GRENADA</b>	<b>INFR-3</b>
<b>PROJECT TITLE: SECURITY OF WATER SUPPLIES</b>	

<b>Sector: INFRASTRUCTURE</b>	<b>Sub-sector: WATER</b>
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Background: As a result of Hurricane Ivan water supply across the island was greatly disrupted. This disruption was primarily from three phenomenon:

1. falling trees took down several sections of distribution pipelines, where these pipelines were supported on elevated columns;
2. Because of excessive silt, debris and trees in the dams located across the island, and because of their relatively remote locations, required clean up activities were hampered;
3. Lack of electrical supply to plants.

**Project objectives:**

- To reduce the vulnerability of this sector during natural disasters

<b>Duration of the project: 1 year</b>
<b>Date of initiation: Immediate</b>

<b>National executing agency:</b> Ministry of Works, Ministry of Finance and NAWASA
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**Description of activities and tasks:**

1. Distribution of pipelines and thrust blocks to be placed on or as close to the ground as possible;
2. Treatment plant supplied with stand by power;
3. Clearing of access road to dam and maintenance of shrubbery;

<p><b>Expected results and products:</b></p> <ul style="list-style-type: none"> <li>• Access to roads to dams maintained with a five meter range on each side of road;</li> <li>• Maintenance of shrubbery adjacent to roads leading to dam;</li> <li>• Regularly maintained standby power supply.</li> </ul>
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<p><b>Total required investments: EC\$ 20 million</b></p> <ul style="list-style-type: none"> <li>• Labour requirements (work/months)</li> <li>• National inputs:</li> <li>• Imported inputs:</li> </ul> <p>_____</p> <p><b>Financial requirements (dollars)</b></p> <ul style="list-style-type: none"> <li>• Local:</li> <li>• External:</li> <li>• Donation/Loan/Funding:</li> </ul> <p>_____</p> <p><b>Potential source of financing:</b></p> <ul style="list-style-type: none"> <li>• Donor:</li> </ul>
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**Special remarks:**

<b>GRENADA</b>	<b>INFR-2</b>
<b>PROJECT TITLE: ELECTRICAL SUPPLIES AND TELECOMMUNICATIONS</b>	

**Sector: INFRASTRUCTURE**

**Sub-sector: Electrical and Telecommunication**

**Background:** During Hurricane Ivan several electrical utility poles were brought down across the island. This was perhaps most concentrated in St. Georges where the density of poles is related to the fact that this town is the main population centre for Grenada. As a result of the damage to these poles, telecommunications were also affected, as cable and wireless uses the electrical poles for carrying transmission cables.

**Project objectives:** To reduce the vulnerability of this sector to the effects of hurricane and other storms damage, it is being recommended that an underground system of cables be established in the main centres of St. Georges and Grenville.

**Duration of the project: 24 months**  
**Date of initiation: Immediate**

**National executing agency:** Ministry of Works and Ministry of Finance

**Description of activities and tasks:**

- Develop a secure electricity and telecommunication service in the two main residential and commercial communities in Grenada.
- Ensure the uninterrupted supply of electrical and telecommunications service to government complexes.

**Expected results and products:**

Electrical and telecommunication service with increased protection from disruption in future natural disasters.

<p><b>Total required investments:</b>  <b>ECS\$ 50,000,000.00</b></p> <ul style="list-style-type: none"> <li>• Labour requirements (work/months)</li> <li>• National inputs:</li> <li>• Imported inputs:</li> </ul> <p>_____</p> <p><b>Financial requirements (dollars)</b></p> <ul style="list-style-type: none"> <li>• Local:</li> <li>• External:</li> <li>• Donation/Loan/Funding:</li> </ul> <p>_____</p> <p><b>Potential source of financing</b></p> <ul style="list-style-type: none"> <li>• External credit:</li> <li>• Donor:</li> </ul>
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**Special remarks:**

<b>GRENADA</b>	<b>INFRA-4</b>
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**PROJECT TITLE: SOUBISE- MARQUIS SEA DEFENSE WORKS**

**Sector: INFRASTRUCTURE** | **Sub-sector: SEA DEFENCE**

**Background:** The area of Soubise-Marquis is very prone to flooding from storm surge effects. During Hurricane Ivan, very serious and significant damage occurred to houses in the area as a result of storm surge and wave action.

**Project objectives:** To reduce the vulnerability of the Soubise-Marquis community and to provide enhanced shelter for homes and for berthing of fishing vessels.

**Duration of the project:** 24 months  
**Date of initiation:** Immediate

**National executing agency:** Ministry of Finance and Planning.

**Description of activities and tasks:** Creation of a dyke/revetment. The construction of offshore breakwater to reduce storm wave action and to encourage the build-up of sand on the shoreline in the toe of these structures.

- **Expected results and products:** It is expected that the vulnerability of this community will be reduced following these measures.

<p><b>Total required investments: EC\$5,000,000.00</b></p> <ul style="list-style-type: none"> <li>• Labour requirements (work/months)</li> <li>• National inputs:</li> <li>• Imported inputs:</li> </ul> <p>_____</p> <p><b>Financial requirements (dollars)</b></p> <ul style="list-style-type: none"> <li>• Local:</li> <li>• External:</li> <li>• Donation/Loan/Funding:</li> </ul> <p>_____</p> <p><b>Potential source of financing</b></p> <ul style="list-style-type: none"> <li>• External credit:</li> <li>• Donor:</li> </ul>
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**Special remarks:**



<b>GRENADA</b>	<b>INFRA-5</b>
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**PROJECT TITLE: RE-OPENING OF WESTERN MAIN ROAD AT SOUTHERN APPROACH TO GOUYAVE**

**Sector: INFRASTRUCTURE** | **Sub-sector: ROADS**

Background: Due to a major landslide the western main road at the southern approach to Gouyave has been blocked. The landslide has revealed a potentially dangerous section of this essential roadway, where the likelihood of further slippage is high.

**Project objectives:** To ensure the continued integrity of the western main road during all weather conditions.

**Duration of the project: 6 months**  
**Date of initiation: Immediate**

**National executing agency:**  
 Ministry of Finance, Ministry of Works and the National Water and Sewerage Authority

**Description of activities and tasks:** The project is aimed at investigating the most appropriate method of restoring use of this road. Two possible mitigation methods include:

- Application of the slope stabilization techniques to the face of the slope, clearing the blocked roadway, and anchoring the toe of the slope.
- Relocation of the roadway to a lower level and protecting it by appropriately designed sea defense works.

**Expected results and products:**  
 Enhanced road safety.

**Total required investments: EC\$20,000,000.00**

- Labour requirements  
(work/months)
- National inputs:
- Imported inputs:

\_\_\_\_\_

**Financial requirements (dollars)**

- Local:
- External:
- Donation/Loan/Funding:

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**Potential source of financing**

- External credit:
- Donor:

**Special remarks:**

# ORGANISATION OF EASTERN CARIBBEAN STATES



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