



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 ••••• 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.

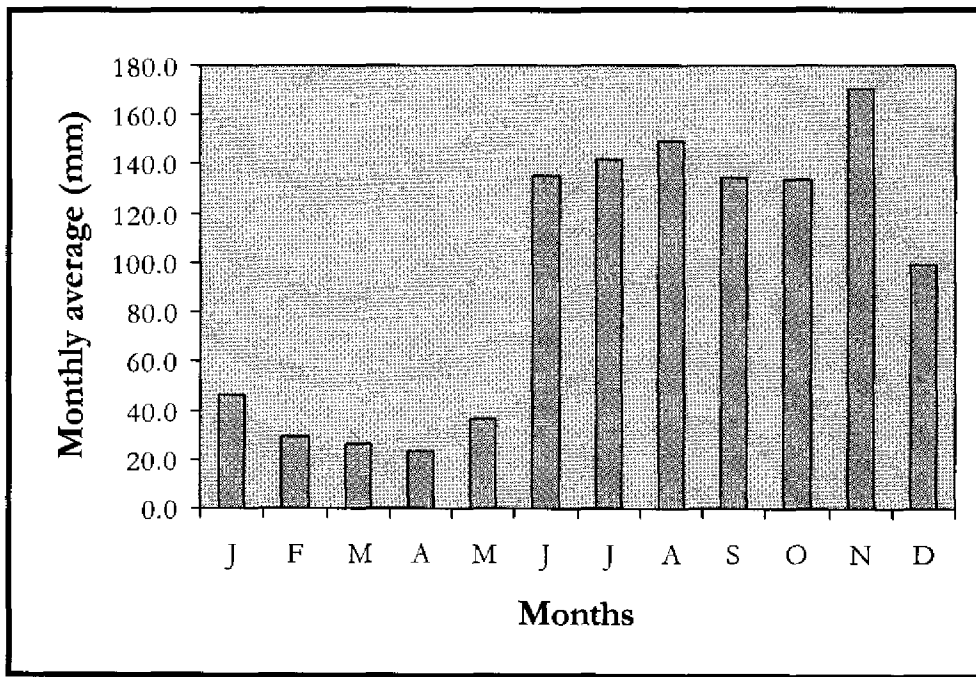


Figure 5 Monthly Average Rainfall – PSIA (1986-2003)

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 persons⁵. 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

⁵ 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 ^b	Population		Population Affected
		Male	Female	
St. George's	37,057	17893	19164	35575 ^a
St. John's	8591	4314	4277	7732 ^c
St Mark's	3994	1965	2029	799 ^d
St Patrick	10,674	5256	5418	2135 ^d
St. Andrew's	24,749	12311	12438	23,759 ^a
St David's	11,486	5770	5716	10337 ^a
Carriacou	6081	2972	3109	1216 ^d
Totals	102,632	50481	52151	81,553

Table 2.Grenada: Estimated Affected Population due to Hurricane Ivan⁶

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.

^a Source: ^b Population Census 2001; ^a as estimated by 96% of those living in the hardest hit parishes; ^c as estimated by 90% of those affected parishes that were also hard hit; ^d 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 ^b	% of population	As a % of the poor population ^a
St. George's	37,057	36.1	31.7
St. John's	8,591	8.4	10.0
St. Mark's	3,994	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	6,081	6.0	3.1
Totals	102,632	100	100

Table 3 Poverty Estimates by Parish – Grenada⁷

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 sector⁸ 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.⁹ 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

⁷ Source ^a Grenada Poverty Assessment Report 1999, ^bPopulation Census 2001

⁸ 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.

⁹ 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 Parish¹⁰

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%.¹¹ 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 Bollibeau, 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.

¹⁰ Source OECS on the basis of official information and consultations with Government officials

¹¹ 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%¹². 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.¹³

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 cent¹⁴ 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

¹² Poverty Assessment Report, Grenada, 1999

¹³ Social Audit of the Sugar Industry of St. Kitts and Nevis (2002)

¹⁴ 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 Assistance¹⁵

¹⁵ Source: OECS estimates based on official information and consultation with Government officials