UNITED NATIONS

WORLD BANK

EUROPEAN UNION

UNDP

Grenada

Hurricane Beryl

Post Disaster Needs Assessment

08 November 2024

Grenada

Hurricane Beryl

PDNA REPORT

08 November 2024

Table of Content

List of Tables

List of Figures

Acronyms

AMI	Advanced Metering Infrastructure
AGL	Airfield Ground Lighting
BESS	Battery Energy Storage System
BBB	Building Back Better
BNTF	Basic Needs Trust Fund
CARICOM	The Caribbean Community
CBI	Citizenship by Investment
CCCCC	Caribbean Community Climate Change Centre
CDB	Caribbean Development Bank
CDEMA	The Caribbean Disaster Emergency Management Agency
CDPG	Caribbean Development Partners Group
CDRU	Caricom Disaster Relief Unit
CCA	Climate Change Adaptation
CERF	United Nations Central Emergency Response Fund
CET	Common External Tariff
CIT	Corporation Income Tax
CSO	Central Statistical Office
CCI	Cultural and Creative Industries
CDRU	Caricom Disaster Relief Unit
COST	Caricom Operational Support Team
CREWS	Climate Risk Early Warning Systems
CSC	Customs Service Charge
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EBA	Ecosystem Based Adaptation
ECCB	Eastern Caribbean Central Bank
ECLAC	Economic Commission for Latin America and the Caribbean
EOC	Emergency Operations Center
EU	European Union
EWS	Early Warning System
FAO	The United Nations Food and Agricultural Organization
FHH	Female-headed households
GAA	Grenada Airports Authority
GBV	Gender-based Violence
GCF	Green Climate Fund

GDP	Gross Domestic Product
GGIA	Global Gateway Investment Agenda
GOG	Government of Grenada
GRENLEC	Grenada Electricity Services Limited
GSWMA	Grenada Solid Waste Management Authority
GVA	Gross Value Added
ICH	Intangible Cultural Heritage
IMA	Investment Migration Agency
MoE	Ministry of Education
MoH	Ministry of Health
MoID	Ministry of Infrastructure Development
MHEWS	Multi-hazard Early Warning Systems
NaDMA	The National Disaster Management Agency
NAWASA	National Water and Sewerage Authority
NBS	Nature Based Solutions
NCCC	National Climate Change Committee
NEOC	National Emergency Operations Center
NHI	National Health Insurance
NGOs	Non-governmental Organization
NSDP	Grenada's National Sustainable Development Plan 2020-2035
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
PAHO	Pan American Health Organization
PDNA	Post-disaster Needs Assessment
PRA	Prospective Risk Assessments
PURC	Public Utilities Regulatory Commission
SEED	Education, Empowerment, and Development Programme
SOFF	Systematic Observations Financing Facility
T&D	Transmission and Distribution network
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UNRCO	United Nations Resident Coordinator Office
VAT	Value-added Tax
WASH	Water, Sanitation and Hygiene
WB	The World Bank
WFP	The United Nations World Food Programm

Foreword by Prime Minister, Hon. Dickon Mitchell

PDNA Report

We live on the frontlines of the climate battle. Hurricane Beryl made landfall on the shores of our tri-island State of Grenada, Carriacou and Petite Martinique on Monday 1st July 2024 as a Category 4 hurricane. The post-hurricane reality indicated that the northern part of mainland Grenada and the sister isles of Carriacou and Petite Martinique were heavily impacted.

The Government of Grenada swiftly requested assistance from the UN Development System, the World Bank and the European Union to conduct a post disaster needs assessment. The multi-donor approach was agreed to as the most suitable approach to avoid duplication of efforts.

This PDNA estimated the total damage at **XCD468M (USD173M)** and the loss at **XCD127M (USD47M)**. The PDNA methodology defines damages as the total or partial destruction of infrastructure and physical assets. Its cost is estimated at the replacing or repairing market price prevailing just before the disaster. The economic loss represents the changes in economic flows arising from the disaster, e.g. foregone income, additional costs and extraordinary costs.

The recovery needs is reported as **XCD570M (USD211M). The sectoral impact is as follows:** Housing – 74%; Agriculture – 10%; Energy – 6%; Education – 4%; WASH – 3%; Health – 1%; and Culture – 1%.

The assistance received from our friends and partners, thus far, is deeply appreciated and we are truly indebted and grateful to them, however, the resources required to rebuild our tri-island state as indicated by this PDNA is simply not available.

The post-hurricane reality is that we need funds with a quick disbursement period to facilitate immediate response. One lesson learned is that we also need funds for immediate disbursement, pre-the making of landfall by the hurricanes, to ensure better preparation by our citizens and state agencies, if we are to mitigate the risks, post the making of landfall.

Our government has institutionalized fiscal resilience in our financial legislation, by ensuring that reserves are available to target disaster preparation and response and by maintaining parametric

insurance policies for natural hazards through the Caribbean Catastrophe Risk Insurance Facility (CCRIF). These are some of the measures adopted and maintained to build and sustain our resilience to the impacts of climate disasters. These measures will remain a crucial part of our Recovery Strategy and Action Plan that will emanate from this report. Though tried and tested, we are not daunted by the challenges and we remain grateful for the assistance of our partners and friends as we, together, embark upon the rebuilding process mindful of the need to preserve and enhance our tri-island state, part of heaven on earth, for present and future generations.

I extend my deepest gratitude to all those who contributed to this assessment, including our international partners, government ministries, other agencies, and community members. Your dedication and hard work have been instrumental in shaping a path forward for our beloved nation.

Hon. Dickon Mitchell, Prime Minister

Acknowledgments

The Hurricane Beryl Grenada PDNA report has been prepared under the leadership of the Ministry of Economic Development, Planning, Agriculture and Lands, Forestry, Marine Resources and Cooperatives; through its Economic Development, Planning and Cooperatives Permanent Secretariat.

This PDNA was supported by the Caribbean Disaster Emergency Management Agency (CDEMA), United Nations Agencies – UNRCO, ECLAC, FAO, PAHO, UNDRR, UNESCO, UNICEF, UN Women, UNDP, WFP –, and the European Union; with the facilitation from the United Nations Development Programme, UNDP. It also benefited from the valuable inputs of bilateral and multilateral partners, such as the World Bank, Caribbean Development Bank (CDB), and the Caribbean Catastrophe Recovery Insurance Facility (CCRIF).

Essential guidance and inputs were provided by many government agencies and departments including the Ministry of Housing and Community Development, Ministry of Education, the National Security, Home Affairs, Information, and Disaster Management, Ministry of Social Development, the Ministry of Economic Planning, among others. A complete list of institutions and representatives is included as an annex in this report. Field visits by the members of the PDNA team to Carriacou and the mainland helped verify in situ the level of disruption.

The team gratefully acknowledges the hard work of everyone who contributed to produce this document, which will guide the efforts of all those involved in responding to the impact of the 2024 Hurricane Beryl. Photographs used in this publication were taken by development agencies and partners unless stated otherwise. The team would like to express their deepest thanks and appreciation to all the contributors.

EXECUTIVE SUMMARY

Introduction

Hurricane Beryl struck Grenada on July 1, 2024, as a Category 4 storm with maximum sustained winds of 150 miles (240 kilometers) per hour. The Government of Grenada declared the parishes of Saint Patrick, Carriacou and Petite Martinique disaster zones from 1 July to 30 September 2024. The National Emergency Operations Center (NEOC) was activated, with operational support provided by the Caribbean Disaster Emergency Management Agency (CDEMA).

At regional level, the CDEMA convened a preparedness meeting with the Caribbean Development Partners Group (CDPG) on 30 June 2024 with over 166 national, regional, and international partners. The CDPG was attended by the Prime Minister of Grenada, and co-chaired by the CDEMA's Executive Director and the UN Resident Coordinator for Barbados and the Eastern Caribbean. The Caricom Disaster Relief Unit (CDRU) was also mobilized to provide support.

The United Nations Secretary-General, Mr. Antonio Guterres, allocated $4 million from the United Nations Central Emergency Response Fund (CERF) to start the response to Hurricane Beryl, including US$1.5 million for Grenada and Saint Vincent and the Grenadines. In addition, the United Nations launched a regional response plan for Hurricane Beryl, allocating US$7.8 million and targeting 40,600 people in Grenada for humanitarian assistance and early recovery between July and December 2024.

In parallel, on the 16th of July 2024, the Government of Grenada (GOG) through the Ministry of Economic Development et al submitted a request for a Post-disaster Needs Assessment (PDNA) to the United Nations Resident Coordinator Office (UNRCO) in Barbados and the Easter Caribbean. On the 31st of July 2024, a coordination meeting was held between the GOG and the UNRCO, United Nations Development Programme (UNDP), European Union, Economic Commission for Latin America and the Caribbean (ECLAC) and the World Bank, to discuss the scope of the PDNA assessment.

The Ministry of Economic Development, Planning, Agriculture and Lands, Forestry, Marine Resources and Cooperatives was designated as the focal point of the GOG for the PDNA. The GOG was supported in this PDNA by a technical team coordinated by the United Nations Development Programme, with expertise from the European Union, ECLAC, and the wider UN System. The present report presents the findings of the PDNA.

The Effects of Hurricane Beryl Across Sectors

Hurricane Beryl significantly affected the islands of Carriacou and Petite Martinique with an almost complete destruction of their infrastructure. The impact was less severe on the mainland of Grenada but still considerable in some areas. The hurricane damaged or destroyed crops, businesses, homes, schools, and health facilities and disrupted electricity, water, and telecommunications services. Below is a summary of the key PDNA findings in each sector.

HOUSING: The housing stock was severely impacted in Carriacou and Petite Martinique as well as in the parishes in the northern mainland. A total of 3,736 dwellings were affected by Beryl, with 2,754 located in Carriacou, 264 in Petit Martinique and 718 in mainland Grenada. The total damage to housing sector infrastructure and contents is estimated at US$$134.8 million or XCD$363.95 million. Losses and additional costs incurred by the housing sector amount to US$7.11 million or XCD$19.21 million.

HEALTH: A total of 11 health facilities in Carriacou and Petit Martinique, including the Princess Royal Hospital—one of the three main hospitals in Grenada—and the Petit Martinique Medical Station, were severely affected. The Petit Martinique Medical Station is the sole healthcare provider for the island. On the mainland, Grenada saw minor damage to four medical facilities, including the Princess Alice Hospital and Mt. Gay Psychiatric Hospital. Damages in the health sector came to US$1.54 million or XCD$4.16 million, while losses amounted to US$0.25 million or XCD$0.66 million.

EDUCATION: Hurricane Beryl impacted a total of 15 schools, out of which 13 are in Carriacou and Petite Martinique, and 2 in Saint Patrick on the mainland, affecting a total of 1,984 students and 281 staff members. Damage to school buildings, furniture and learning materials has been estimated at US$6.72 million or XCD$ 18.14 million. Losses amount to US$ 1.43 million or XCD$3.87 million.

CULTURE: Hurricane Beryl affected the Carriacou Museum with destruction to artefacts, office space and equipment, historic documents, and books. Churches such as the St. Patrick Catholic Church in Hillsborough dating to 1874, and the Christ the King Anglican Church sustained significant wind and water damage. Other damage includes the plantation ruins such as the Dumfries Plantation ruins, and erosion of archaeological sites and historic cemeteries such as the one at Tibeau. In terms of intangible heritage and the creative economy, cultural practitioners such the Shakespeare Mas, Big Drum and String Band community center experienced destroyed cultural spaces, costumes, and equipment resulting in disruptions in the practice of their heritage. The informal cultural industries sub-sector also experienced loss of markets and disruptions of value chains. Total damage was XCD $1.33 million or USD $0.49 million, and losses to XCD $0.67 million or USD $0.25 million.[1]

1 This estimate is a late revision of damage and loss in the culture sector, not reflected in the consolidated table of damage and loss.

AGRICULTURE: The Crops Sub-sector experienced the greatest level of damage and loss in the northern part of the main island. Losses were mostly related to cocoa, bananas, and fruit trees. Most of the damage were on government infrastructure including germplasm. Livestock was mostly affected In Carriacou and Petit Martinique with significant deaths amongst poultry and pigs but also on the apiculture industry and damage to poultry and pigs' infrastructure. Significant fishery production and private physical assets and infrastructure were also affected in Carriacou and Petite Martinique. The forestry sector was also affected on Carriacou and Petite Martinique, but no cost estimation was made due to the lack of baseline information. The total damage to the agriculture sector amounts to US$19.6 million or XCD$52.95 million, and the losses were US$29 million or XCD$78.5 million.

TOURISM: The hurricane damaged tourism businesses such as accommodation (hotels and guest houses), restaurants, tour operators, attractions, dive shops, and other small tourism enterprises.
The overwhelming bulk of the damage was in Carriacou and Petite Martinique. The cost of the damage was highest in the accommodation and restaurant subsectors. The tourism losses reflect lost business due to the significant damage to tourism infrastructure, which has led to sharply reduced room capacity. The total damage in the tourism sector in Grenada amounted to US$4.11 million or XCD$ 11.11 million. Total sector losses amounted to US$2.37 million or XCD$6.99 million.

WASH: Hurricane Beryl damaged the desalination plants and associated infrastructure in Carriacou and Petite Martinique, as well as 66% of surface water systems on mainland Grenada. The most significant effect was to residential WASH facilities. There was serious disruption to water supply in Carriacou and Petite Martinique, with over 60% of roofs and individual rainwater catchments destroyed or severally damaged. Many residents rely solely on rainwater for their water supply and won't be able to collect enough rainwater before the next dry season. The risk of a water crisis during the next dry season is extremely high and water supply for Carriacou is unsecure! Also, contamination of residential cisterns and tanks increases the risk of water borne diseases. Damage in the sector amounts to US$0.65 million or XCD$1.75 million and losses were US$3.3 million or XCD$8.92 million.

ENERGY: On mainland Grenada, the most northern parts of the island had severe structural damages whilst in Carriacou and Petite Martinique there were catastrophic damages to power generating facilities and the electricity supply transmission and distribution (T&D) system infrastructure. Damages to T&D prevented the Grenada Electricity Services Limited (Grenlec) from supplying electricity to the affected regions. To date over 40% of the customers in Carriacou and Petite Martinique are without power. The damages on the sector amounted to US$4.77 million or XCD 12.88 million and losses to US$2.56 million or XCD 6.91 million.

TRANSPORT: airports and ports were disrupted by Beryl, which play critical roles in tourism, trade, and regional connectivity. The Maurice Bishop International Airport suffered minor structural and electrical damage, while Lauriston Airport in Carriacou experienced more destruction, including

the loss of its terminal roof and extensive water damage to essential equipment. Ports in Grenada and Carriacou, especially the passenger terminal at Tyrell Bay, were heavily affected. Total damage was estimated at US$0.73 million or XCD$1.96 million, and losses at US$0.19 million or XCD$0.51 million.

ENVIRONMENT: Hurricane Beryl caused extensive environmental damage in Grenada, particularly affecting coastal ecosystems, mangroves, and fisheries. The storm worsened coastal erosion, degraded water quality, and damaged critical habitats, including mangroves that protect shorelines. The debris left by the hurricane disrupted wildlife habitats, accelerated land degradation, and hindered recovery efforts, impacting livelihoods and local economies. These environmental effects highlight the need for urgent ecological restoration, especially in vulnerable areas like Carriacou and Petite Martinique.

DISASTER RISK REDUCTION: Hurricane Beryl caused some damages to the Disaster Risk Reduction (DRR) sector in Grenada, particularly in Carriacou. The perimeter fence at the Emergency Operations Center in Carriacou sustained notable damage. Similarly, the warehouse in Carriacou experienced minor damage. In addition, the Early Warning System for the Kick'em Jenny station, located in Carriacou also sustained damage, compromising the station's ability to function optimally. Total damage is estimated at US$0.01 million or XCD$ 0.04 million, and losses US$0.66 million or XCD$1.77 million.

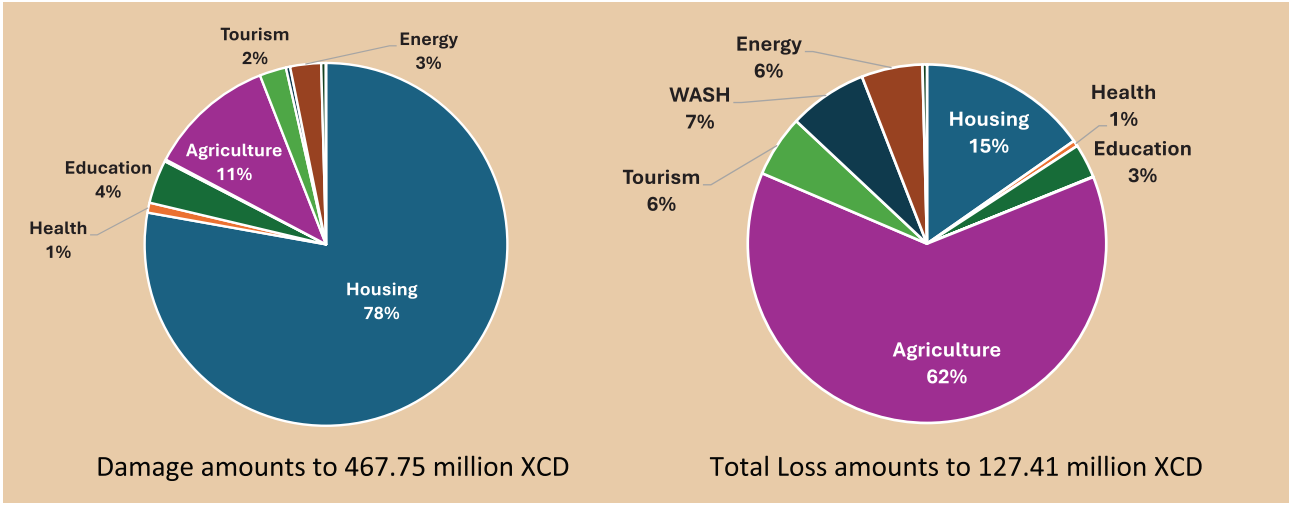
Damage and Losses

The total damage caused by Hurricane Beryl across all sectors amounted to an estimated XCD$467.75 million or US$173.24 million. Most of this damage was in the social sector, specifically housing with XCD$363.95 million or US$134.8 million in damages (about 78% of all damages). Damage in the agriculture sector was the second highest (11% of total) with XCD$52.95 million or US$19.6 million. The third highest damage fell on the education sector (4% of total) with XCD$18.14 million or US$6.72 million. Within the infrastructure sector, most damages fell on the energy sub-sector which suffered a total of XCD$12.88 million or US$4.77 million in damages (3% of total).

Table 1: Damage and Loss by Sector[2]

Sector	million XCD Damage	Income Loss	Additional Costs	Total Loss	Effects
Social	**387.07**	**1.10**	**22.70**	**23.79**	**410.87**
Housing	363.95	1.040	18.17	19.21	383.15
Health	4.16	0.003	0.66	0.66	4.82
Education	18.14		3.87	3.87	22.01
Culture	0.83	0.05		0.05	0.88
Productive	**64.06**	**84.57**	**0.93**	**85.50**	**149.56**
Agriculture	52.95	78.183	0.33	78.51	131.46
Tourism	11.11	6.390	0.60	6.99	18.10
Infrastructure	**16.58**	**3.86**	**12.48**	**16.35**	**32.93**
WASH	1.75	0.127	8.80	8.92	10.67
Energy	12.88	3.608	3.31	6.91	19.79
Transport	1.96	0.129	0.38	0.51	2.47
Cross-Cutting	**0.04**	**-**	**1.77**	**1.77**	**1.81**
Environment				-	-
DRR	0.04		1.77	1.77	1.81
Total	**467.75**	**89.534**	**37.876**	**127.410**	**595.16**
Total USD	**173.24**	**33.161**	**14.03**	**47.19**	**220.43**
*Exchange rate 2.7 XCD per 1 USD					

Figure 1: Damage and Total Loss by Sector as a Percentage of Total



Damage amounts to 467.75 million XCD

Total Loss amounts to 127.41 million XCD

2 *Exchange rate 2.7 XCD per 1 USD. NOTE: In the culture sector total damage was revised to XCD $1.33 million or USD $0.49 million, and losses to XCD $0.67 million or USD $0.25 million.

Losses were most significant in the productive sectors, specifically agriculture, which had XCD$78.5 million in losses or US$29 million, about 62% of all losses. Housing had XCD$19.21 million in losses or US$7.11 million (15% of total losses). The WASH sector had the third highest losses with XCD$8.9 million or US$3.3 million (7% of total). The tourism sector had an estimated XCD$6.99 million in losses or US$2.59 million (6% of total). Total losses across all sectors amounted to XCD$127.41 million or US$47.19 million.

Total Effects (damage plus total loss) of the impact of Hurricane Beryl in Grenada, amounts to 595.16 million XCD which represents the 16.74% of 2023 GDP of the country.

The Human Impact

Estimates indicate that a total of 40,600 people were affected by Hurricane Beryl[3], which represents 39% of a total population of 112,579.[4] The population living on the islands of Carriacou and Petite Martinique were disproportionately affected.

LIVELIHOODS: Income losses caused by Hurricane Beryl on the tourism and agriculture sectors risks increasing poverty and food insecurity in Grenada. Many livelihoods dependent on tourism-related activities were affected due to extensive damage to hotels, guest houses, restaurants, bars, dive shops and other businesses, especially in Carriacou and Petite Martinique. This also had implications for cultural industry practitioners who exist in a highly informal economy and lost access to markets and opportunities related to the hosting of cultural events such as the Carriacou Regatta. In addition, Beryl's impact on agriculture affected the livelihoods of crop farmers, fishers, and livestock owners. The impact on livelihoods was especially high in Carriacou and Petite Martinique. The livelihoods of women and men will be impacted differently. Men will be more affected by job losses in agriculture and fishing since 16.4% of them are employed in this sector, compared to 4% of women.[5] This is especially the case in Carriacou and Petite Martinique where fishing, agriculture and boat building are the mainstays of the local economy. Women in Grenada tend to work in tourism and related jobs, with 17.4% of them employed in wholesale / retail trade, and 12.3% in accommodation and food services.[6] Another consideration is the pre-existing unemployment rate in Grenada, reported at 16.4%.[7] Of special concern are youth and women, given they have the highest unemployment rate at 23% and 16% respectively, compared to men with 7.2%.[8]

POVERTY: In Grenada, the proportion of the population living in poverty and therefore vulnerable

3 OCHA, 2024, Regional Overview and Planned Response to Hurricane Beryl
4 World Bank, 2021, Living Conditions in Grenada: Poverty and Equity Update
5 Central Statistical Office, 2023 Q4 National Labour Force Survey Result
6 Central Statistical Office, 2023 Q4 National Labour Force Survey Results
7 Central Statistical Office, 2023 Q4 National Labour Force Survey Results
8 Central Statistical Office, 2023 Q4 National Labour Force Survey Results

was already significant at 25%.[9] Based on this data, it is estimated that 23,459 people are poor in the parishes affected by Hurricane Beryl.[10] They were disadvantaged already and have borne the brunt of Beryl's impact due to the disproportionate loss of income and food production. This group should be targeted for priority recovery assistance and social protection to prevent them from falling into extreme poverty. People already living in extreme poverty in Grenada represent 3.5% of the population[11], equivalent to about 3,284 people in the affected parishes.[12] They risk falling into destitution and will need urgent support. There are specific population groups who need special attention during the recovery process, such as female headed households who represent 48% of all poor households in Grenada, and children who account for 53% of the poor.[13]

FOOD INSECURITY: The prevalence of severe food insecurity in Grenada is 5.8%, while the prevalence of moderate or severe food insecurity is 20%.[14] Based on this data, it is estimated that 18,767 people (20% of population) are moderately or severely food insecure in the areas affected by Beryl, and 5,442 people (5.8%) are severely food insecure, with St. George and St. Andrew being home to the majority. Income losses due to damages in the tourism and agriculture sectors may increase food insecurity in the country without social protection. Before Beryl, 21% of the population was already unable to afford a healthy diet.[15] Potential gaps in current assistance to food insecure households should be covered through safety nets measures in recovery.

DEPRIVATIONS IN LIVING CONDITIONS: Households affected by Beryl suffered multiple deprivations in their living conditions with negative consequences for multidimensional poverty and human development in Grenada. An estimated 6,353 people in total had their homes damaged or destroyed as a result of Hurricane Beryl, including those not sheltered -most are in Carriacou and Petite Martinique; An estimated 1,984 children are deprived of their education, with the potential loss of one academic semester or year; an estimated 2,848 people are water insecure in Carriacou, and the situation can worsen in the next dry season unless damaged roofs are repaired to enable rainwater collection; and about 4,747 people had their access to healthcare limited by Beryl in Carriacou and Petite Martinique, although today an estimated 529 people continue without access to healthcare in Petite Martinique, with health risks for infants and children under 5 years, pregnant and lactating women, and people with health conditions; lastly, over 40% of customers in Carriacou and Petite Martinique are without power to date. These multiple deprivations will likely increase multidimensional poverty in Grenada (above the current 34%[16]) unless poor and food insecure households receive social protection.

9 World Bank, 2021, Living conditions in Grenada: Poverty and Equity Update
10 Estimate of 25% of a total population of 93,836 living in parishes affected, based on 2021 population data
11 World Bank, 2021, Living conditions in Grenada: Poverty and Equity Update
12 Estimate of 3.5% of a total population of 93,836 living in parishes affected, based on 2021 population data
13 Grenada's Growth and Poverty Reduction Strategy 2014-2018; Caribbean Development Bank, 2016, The Changing Nature of Poverty and Inequality in the Caribbean; UNICEF, 2017, Situation Analysis of Children in Grenada
14 FAO, WFP, UNICEF, IFAD, WHO, 2024, The State of Food Security and Nutrition in the World
15 FAO, WFP, UNICEF, IFAD, WHO, 2024, The State of Food Security and Nutrition in the Worl
16 World Bank, 2021, Living Conditions in Grenada: Poverty and Equity Update

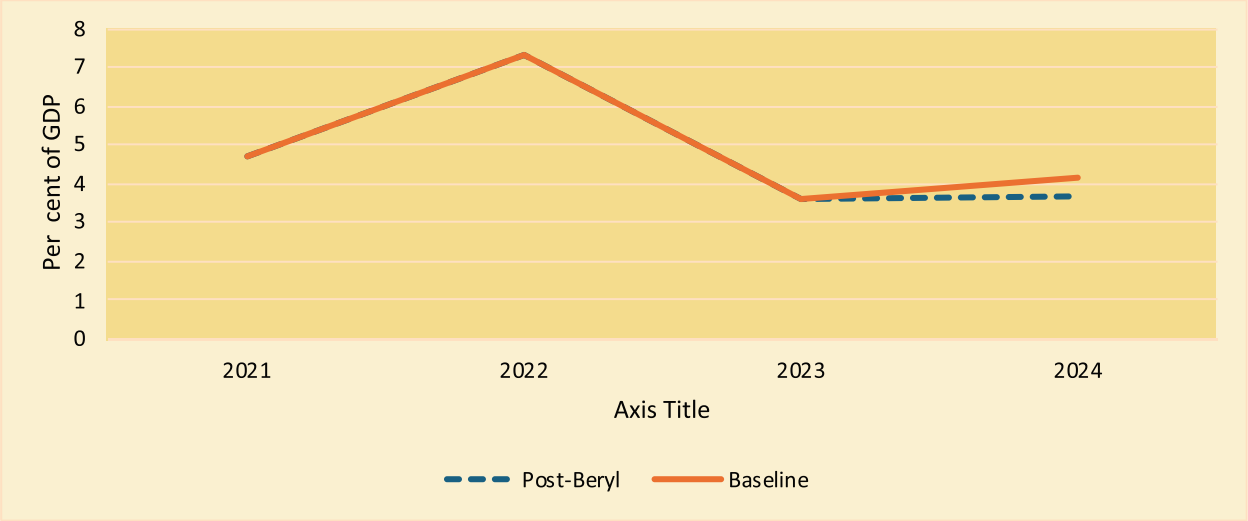
GENDER AND SOCIAL INCLUSION (vulnerable population groups): Female-headed households are highly vulnerable and at risk -they represent nearly half of all households in the country, and a high proportion of poor households.[17] The job and income losses experienced by women could increase poverty among FHH and the impact will be extended to their children as 42% of children live in poor FHH.[18] Children experienced multiple impacts from Beryl -the loss of home and their access to education and healthcare. Child poverty in Grenada may increase without adequate social protection during recovery. One in every two Grenadian children already lives in poverty.[19] The elderly and people with disabilities typically face barriers in their access to health care, housing, employment, education, and transport. They may have special needs such as for medical equipment, medications, or special housing. In Grenada, 20% of poor households have members with some disability.[20] Recovery planning should identify the elderly and people with disabilities in the areas affected by Hurricane Beryl, and mechanisms put in place to assess their recovery needs and ensure their participation in recovery planning. Without targeted recovery assistance, there is a risk that the disadvantages faced by children, FHH, the elderly and people with disabilities will be further entrenched.

The Macroeconomic Impact

THE GROSS DOMESTIC PRODUCT: Hurricane Beryl is estimated to lead to a 0.54 percentage points decline in economic growth in 2024. Therefore, instead of a projected growth of 4.2%, the economy is now expected to grow by 3.64%. Given the substantial loss of income, it is expected that there will be a relatively large fall in value added in the electricity and water sectors, leading to a fall of 6.6% in real output in the sector. The tourism sector is projected to contract by 1.2%, reflecting the relatively small size of the sector in Carriacou and Petite Martinique. However, the fallout in tourism GDP in these islands by themselves has been very significant. This has disrupted real incomes and livelihoods for many workers and businesses in the sector of these islands.

17 World Bank, 2021, Living Conditions in Grenada: Poverty and Equity Update
18 UNICEF, 2017, Situation Analysis of Children in Grenada
19 UNICEF, 2017, Situation Analysis of Children in Grenada
20 World Bank, 2021, Living Conditions in Grenada: Poverty and Equity Update

Figure 2: Real GDP Growth Before and After Hurricane Beryl



THE FISCAL IMPACT: the government made significant allocations for cleanup, rehabilitation, and rebuilding since Hurricane Beryl. This allocation, combined with a package of fiscal incentives, which included a 100 per cent waiver on some duties and taxes to facilitate economic recovery and reconstruction, will widen the fiscal deficit in 2024. The overall deficit is projected to expand from a negligible budgeted surplus to a deficit of 3.8% of GDP. This is the magnitude expected for a disaster based on the scale of impacts suffered by the country. Total revenues and grants are projected to increase by 6.3% to XCD$1,404 million (37% of GDP) as the substantial growth in the first half of the year helped to offset the lost revenue from the tax incentive programme after the hurricane.

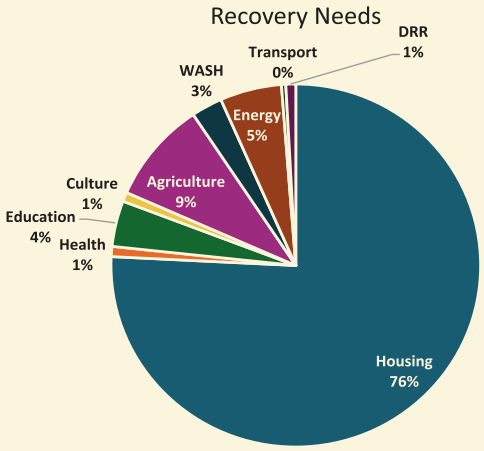
PUBLIC DEBT TO GDP is projected to decline marginally by 1.7 percentage points to 73.3 % of GDP despite the effects of the hurricane. This stems from strong GDP growth in the first half of the year prior to the hurricane, the activation of the disaster deferral clauses, which provide a moratorium on debt service payments for some time, the use of inflows from the CCRIF SPC and the drawdown of existing loans and resources from the consolidation fund to finance recovery and reconstruction rather than new debt. Moreover, the government plans to secure concessional financing to facilitate recovery in 2025.

Recovery Needs

It is estimated that the recovery from Hurricane Beryl will require US$210.94 million or XCD$569.53 million. Most of these needs (76%) are in the housing sector with US$156.78 million or XCD$423.3 million. The second highest recovery needs are in the agriculture sector with US$20.23 million or XCD$54.63 million (9% of total needs), while the third highest recovery needs are in the energy sector with US$12 million or XCD$32.6 million (5% of total).

Figure 3: Recovery Needs by Sector (XCD and USD millions) and as a Percentage of Total[21]

Sector	Millions XCD	Millions USD
Social	458.34	169.76
Housing	423.30	156.78
Health	5.44	2.02
Education	24.64	9.13
Culture	4.95	1.84
Productive	54.63	20.23
Agriculture	54.63	20.23
Tourism		-
Infrastructure	51.33	19.01
WASH	16.45	6.09
Energy	32.60	12.07
Transport	2.28	0.85
Cross-Cutting	5.23	1.94
Environment		-
DRR	5.23	1.94
Total	**569.53**	**210.94**



The Recovery Strategy

The Government of Grenada has defined the recovery vision, guiding principles and strategic priorities for national recovery from Hurricane Beryl. **The recovery vision** is "Stronger together, with resilient sectors and empowered communities for a sustainable Grenada".

In line with the national core values and goals of Grenada's National Sustainable Development Plan 2020-2035, **the following are the guiding principles of recovery:**

1. Social justice, fairness, equality, and equity.
2. Commitment to the disadvantaged, poor, and vulnerable in society
3. Respect for the environment.
4. Accountability, transparency, and good governance.

The Government's **Strategic priorities** for recovery will focus on 1) The restoration of infrastructure and basic services, 2) Livelihoods and economic recovery, 3) Housing and human settlements, and 4) Disaster risk reduction and climate resilience. These are indicated below together with the recovery strategy proposed by each of the sectors.

21 Exchange rate 2.7 XCD per 1 USD. NOTE: The recovery needs in the culture sector were revised to XCD $3.8 million or USD $1.4 million.

1) **Restoration of Infrastructure and Basic Services**

The education sector recovery strategy will adopt an evidence-based child-centered approach to risk reduction, putting children's safety and wellbeing at the center.

The health sector recovery strategy will be anchored to ongoing programs aimed at enhancing the nation's healthcare infrastructure, including medical equipment, capacity-building for healthcare workers, and healthcare facilities. It will also increase resilience for future health emergencies.

In the WASH sector, the aim of the National Water and Sewerage Authority is to provide safe and reliable water to residents and all sectors in Grenada. This includes additional investments in resilience.

The approach for recovery in the culture sector include conducting a multi-hazard risk mapping of the culture sector, the reconstruction of Carriacou Museum, the restoration of built heritage, an assessment and conservation of cultural objects at Carriacou Museum, the replacement of traditional boats, cultural costumes and equipment, and an assessment of archaeological and built heritage, to include completion of important inventories. Overall, the sector could benefit from having a well-defined heritage tourism strategy to support the promotion of historic sites, cultural spaces and events to support revenue earning in the sector. A central and critical component of recovery is the development and implementation of disaster risk management planning.

In Carriacou and Petite Martinique, energy security is a priority such as rebuilding the solar farms. Technical assistance is being considered from the EU-TAF in the re-design of a grid for Carriacou which will build-in resilience and determine the best way to incorporate RE sources to the grid.

In transport, a robust strategy for rebuilding Grenada's ports and airports and mitigating future disaster risks should involve both structural improvements and policy reforms. This approach includes Building Back Better, Investing in Climate-Resilient Technologies, Strengthening Governance and Emergency Preparedness, and Comprehensive Risk Assessments.

2) **Livelihoods and Economic Recovery**

In the agriculture sector, the aim of recovery is to revive economic activities and to strengthen farmers' capacity to be more resilient to similar future shocks in line with the principles of Building Back Better. The strategy will be based on inclusive and participatory community-based approaches, with special focus on the poor and other vulnerable groups.

In tourism, the Government of Grenada will design a creative strategy for resuscitating and developing a more resilient and competitive tourism sector, in concert with the private sector and civil society.

3) Housing and Human Settlements

The housing sector's recovery strategy will be aligned with the National Housing Strategy and the National Adaptation Plan. These initiatives prioritize climate resilience, infrastructure development, community-based recovery, and disaster-resilient building techniques and materials.

4) Disaster Risk Reduction and Climate Resilience

For environmental recovery, recommendations include conducting post-hurricane ecological assessments and pollution reduction campaigns, and involving local communities. In the medium term, the focus is on developing coastal zone management plans, integrating ecosystem-based approaches, and prioritizing sustainable, community-driven environmental practices.

The recovery strategy for Grenada's Disaster Risk Reduction sector will address critical needs for strengthening disaster preparedness and response capabilities through the National Disaster Management Agency of Grenada.

BACKGROUND AND INTRODUCTION

Hurricane Beryl and the Response

Hurricane Beryl struck Grenada on July 1, 2024, as a Category 4 storm with maximum sustained winds of 150 miles (240 kilometers) per hour. The islands of Carriacou and Petite Martinique were especially affected with an almost complete destruction of their infrastructure. The impact was less severe in Northern Grenada. The hurricane damaged or destroyed homes, schools, and health facilities and disrupted electricity, water, and telecommunications services.

The Government of Grenada declared the parishes of Saint Patrick, Carriacou and Petite Martinique disaster zones from 1 July to 30 September 2024. The National Emergency Operations Center (NEOC) was activated, with operational support provided by the Caribbean Disaster Emergency Management Agency (CDEMA), and a rapid assessment team was mobilized to assess the damage from Hurricane Beryl in Carriacou and Petite Martinique.

At regional level, the CDEMA convened a Caribbean Development Partners Group (CDPG) preparedness meeting on 30 June 2024 with over 166 national, regional, and international partners. The CDPG was co-chaired by the CDEMA's Executive Director and the UN Resident Coordinator for Barbados and the Eastern Caribbean and was attended by the Prime Minister of Grenada. The CDEMA also initiated relief coordination efforts in the sub-region and deployed Rapid Needs Assessment Teams. The Caribbean Catastrophe Risk Insurance facility (CCRIF) provided USD 44 million to support relief efforts in Grenada. Regional coordination efforts are ongoing with the Caribbean Development Partners Group.

The Caricom Disaster Relief Unit (CDRU) was mobilized to provide support, and a Caricom Operational Support Team (COST) was stationed across mainland Grenada, Carriacou, and Petite Martinique, managing the activities of the Emergency Operations Center.

The United Nations Secretary-General, Mr. Antonio Guterres, allocated $4 million from the United Nations Central Emergency Response Fund (CERF) to start the response to Hurricane Beryl, including US$1.5 million for Grenada and Saint Vincent and the Grenadines.

In addition, the United Nations launched a regional response plan for Hurricane Beryl, allocating US$7.8 million and targeting 40,600 people in Grenada for the period July-December 2024, with priority given to humanitarian assistance and early recovery.

The Post Disaster Needs Assessment

On the 16th of July 2024, the Government of Grenada (GOG) through the Ministry of Economic Development *et al* submitted a request for a Post-disaster Needs Assessment (PDNA) to the United Nations Resident Coordinator Office (UNRCO) in Barbados and the Easter Caribbean. On the 31st of July 2024, a coordination meeting was held between the GOG and the UNRCO, United Nations Development Programme (UNDP), European Union, Economic Commission for Latin America and the Caribbean (ECLAC) and the World Bank, to discuss the scope of the PDNA assessment. Information from Government reports in priority sectors was shared, providing an indication of the level of data already acquired.

The Ministry of Economic Development, Planning, Agriculture and Lands, Forestry, Marine Resources and Cooperatives was designated as the focal point of the GOG for the PDNA. The GOG was supported in this PDNA by a technical team coordinated by the United Nations Development Programme (UNDP), with expertise from the European Union, ECLAC, and the wider UN System.

This PDNA process provided an opportunity to use and strengthen previous capacity building efforts in recovery preparedness, wherein, on March 2023, technical staff from CDEMA and the GOG (3 representatives) participated in a PDNA Regional Workshop. This PDNA exercise is an opportunity to use and strengthen those capacities.

The goal of the PDNA was to estimate the effects and impacts of Hurricane Beryl in the country including the financial costs for restoring basic services, reconstructing infrastructure and assets while ensuring improved resilience to similar events, and for the recovery of the most affected population in terms of their living conditions, livelihoods, gender equality, food security and social inclusion.

The PDNA assessed the macroeconomic and human impact of Hurricane Beryl, as well as the effects on the following 11 sectors:

Social: Housing, Health, Education and Culture
Infrastructure: Transport, Energy; Water, Sanitation, and Hygiene (WASH)
Productive: Agriculture and Tourism
Cross-cutting issues: the Environment and Disaster Risk Reduction.

This report presents the findings of the PDNA in Grenada.

The Country's Socio-Economic Context

Grenada is a tri-island state consisting of the islands of Grenada, Carriacou, and Petit Martinique, with a population of 112,579[22], and an area of 34,000 hectares and 121 km of coastline.

The nation's Human Development Index of 0.793 places it in the high development category. However, Grenada still faces development challenges. About 25 percent of the population is living in poverty and 3.5 percent is living in extreme poverty.[23]

The economy of Grenada is based on agriculture and tourism. Its GDP comprised of 81.3 percent from services (including tourism), 12.7 percent from industry, and 6.1 percent from agriculture and fishing. More than half of the population are directly involved in some kind of agricultural activity.[24]

Prior to Hurricane Beryl, the prospects for Grenada's economy were positive, driven by a resurgence of the tourism sector after a significant downturn following the Covid-19 crisis. A key positive outcome of the economy's expansion has been the recovery of jobs across critical sectors such as tourism and wholesale and retail trade. As such, the unemployment rate in Grenada improved and is now at 16.4%.[25]

When Hurricane Beryl landed in Grenada the country was facing a drought that led to critically low water levels in reservoirs and caused severe water shortages. Communities across the southern and eastern parts of the island (St. Andrew, St. David, and St. George) were the most affected. The Government of Grenada officially declared a water crisis on May 10, 2024, leading to significant water rationing, with restrictions on water usage for non-essential activities. The water company began using water from its back up source (Grand Etang Lake), however, over time this source also depleted since the water was not being replenished. A series of heat waves and bush fires were seen as well throughout the country. Water shortages affected livelihoods, particularly crop production leading to shortages in some fruits and vegetables.[26]

The global Covid-19 crisis had a devastating impact on Grenada's economy. Although the health impact of Covid-19 was well contained, global border closures devastated Grenada's tourism lifeline. As a result, there was a massive implosion of tourism in 2020, with ripple effects on the broader economy and the fiscal position.[27] The unemployment rate peaked at 18.5 per cent in 2020, and GDP

22 World Bank, 2021, Living Conditions in Grenada: Poverty and Equity Update
23 World Bank, 2021, Living Conditions in Grenada: Poverty and Equity Update
24 USAID, 2021, Grenada Resilience Profile
25 Central Statistical Office, 2023 Q4 National Labor Force Survey Results
26 OCHA, Latin America & The Caribbean Weekly Situation Update as of 14 June 2024; IFRC, June 2024, Hot and dry: The small Caribbean Island nation of Grenada struggles with drought, heatwaves, and fire.
27 IMF 2022, Grenada Disaster Resilience Strategy (IMF Country Report No. 22/80)

declined by 13.9% in 2020. Since then, Grenada has faced macroeconomic instability from a loss in government revenue, jobs, increased inflation, and supply chain disruptions.[28]

Overall, Grenada is at risk of sea level rise, storm surge, coastal erosion, sargassum seaweed, drought, extreme temperatures, flash flooding from heavy rainfall, and seismic events associated with the undersea volcano Kick 'Em Jenny. The risks of devastating disasters in Grenada are highly elevated. Of the 182 countries in the Climate Risk Index, Grenada was in the top 2 percent for losses to climate- related natural disasters as a percent of GDP during 1997–2017, and in the top 5 percent of climate-related disaster fatalities.[29]

28 US Department of State, 2023 Investment Climate Statements: Grenada
29 IMF 2022, Grenada Disaster Resilience Strategy (IMF Country Report No. 22/80)

THE MACRO ECONOMIC IMPACT

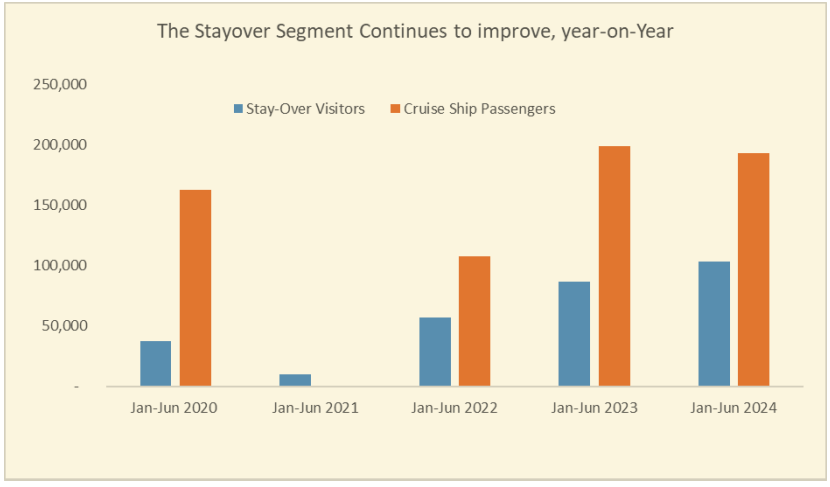
Pre-disaster Context

REAL SECTOR DEVELOPMENTS

Grenada's economy expanded during the first half of 2024, driven by growth in the tourism industry and its knock-on effects on ancillary sectors. Construction activity supported growth, underpinned by the completion of major private sector projects such as Six Senses La Sagesse and continued work on other tourism projects. The ongoing renovation of the National Cricket Stadium and continued work on the Molinere Land Slip project bolstered construction activity.

On the tourism front, targeted marketing and rebranding efforts, coupled with the ongoing 50th anniversary of independence celebrations, resulted in a 3.4 per cent (10,309) increase in total visitor arrivals to 309,138 relative to the same period one year earlier. Stayover arrivals were the standout segment, growing by 18.9 per cent (16,386) to 103,027. Moderating the increase in total visitor arrivals was a 2.8 per cent contraction (5,502) in the number of cruise ship passengers, coupled with a 4.3 per cent decline (575) in the number of yacht passengers.

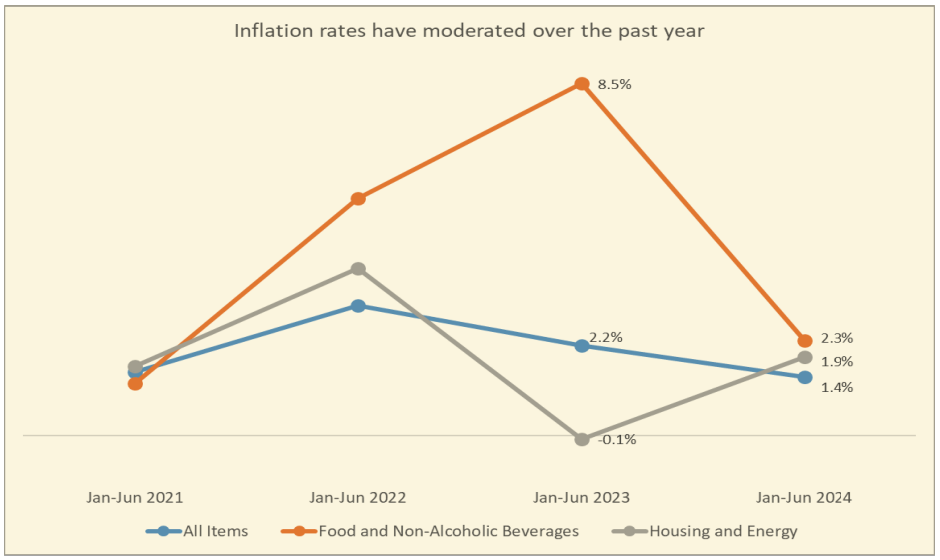
Figure 4: Visitor Arrivals in Selected Categories



Source: ECCB

Inflationary pressures as of June 2024 were broadly contained, with the CPI index rising by 1.4 per cent, compared with 2.2 per cent, one year earlier. Driving prices higher were increased costs for household furnishings, supplies and materials (7.5 per cent); health (3.5 per cent); food and non-alcoholic beverages (2.3 per cent); and housing, utilities, gas, and other fuels (1.9 per cent). Marginal declines in costs associated with the hotels and restaurants, clothing and footwear, and transport sub-categories, moderated the overall price increase.

Figure 5: Selected Categories of Inflation



Source: ECCB

FISCAL DEVELOPMENTS

Consistent with an improving economy, the government of Grenada generated both primary and overall surpluses (after grants) in the first half of 2024. The data at the end of June reflected an overall surplus of $186.8 million, up from a surplus of $170.6 over the comparable period in 2023. Likewise, the primary surplus rose to $212.3 million from $195.4 million a year earlier.

Table 2: Central Government Fiscal Operations (ECSM)

Item	2020HI	2021HI	2022HI	2023HI	2024HI
Current Revenue	349.0	357.5	430.7	624.4	727.5
Tax Revenue	324.7	320.0	359.8	437.7	458.2
Non Tax-Revenue	24.3	37.5	70.9	185.7	269.4
Current Expenditure	322.8	318.9	310.6	345.7	435.1
Current Account Balance (after Grants)	37.3	57.9	201.1	278.5	292.5
Capital Revenue	0.0	0.0	0.0	0.0	0.0
Grants	37.3	71.6	151.4	9.1	9.7
Capital Expenditure and Net Lending	32.3	86.3	169.9	116.2	115.4
Primary Balance (after Grants)	56.8	49.2	126.3	195.4	212.3
Overall Balance (after Grants)	31.2	23.9	106.9	170.6	189.8

Source: The ECCB and National Statistics Office

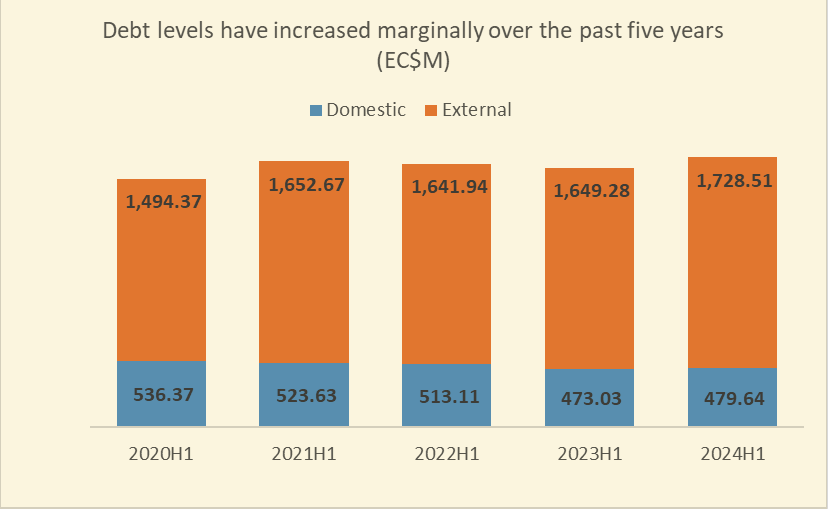
The fiscal outturn was driven by an increase in current revenue relative to current expenditure, with the former growing by $103.1 million to $727.5 million, while the latter rose by $88.4 million to $435.1 million. Consequently, the government recorded a current account surplus of $292.5 million relative to $278.5 million in the previous year. Non-tax revenue provided the primary impetus to the increase in current revenue, buoyed by a 44.3 per cent increase to $269.4 million, mainly because of the Citizenship by Investment (CBI) receipts.

Increased outlays for goods and services, wages and salaries (consistent with the ongoing regularization of public sector workers and transfers and subsidies, accounted for the increase in current expenditure. Capital expenditure fell marginally over the first half of 2024 ($0.8 million) to $115.4 as work on major projects, including the Moliniere Landslip Rehabilitation Project and the St. John's River Flood Mitigation project, continued.

PUBLIC SECTOR DEBT

Public sector debt rose by 4.0 per cent ($85.8 million) to $2,208.2 million compared with $2,122.3 million one year earlier. Central government debt increased by $67.5 million, while public corporations' debt rose by $18.4 million. Most of the new debt was sourced externally, with that component expanding by $79.2 million. Domestic debt saw a $6.6m increase year-on-year.

Figure 6: Public Sector Debt



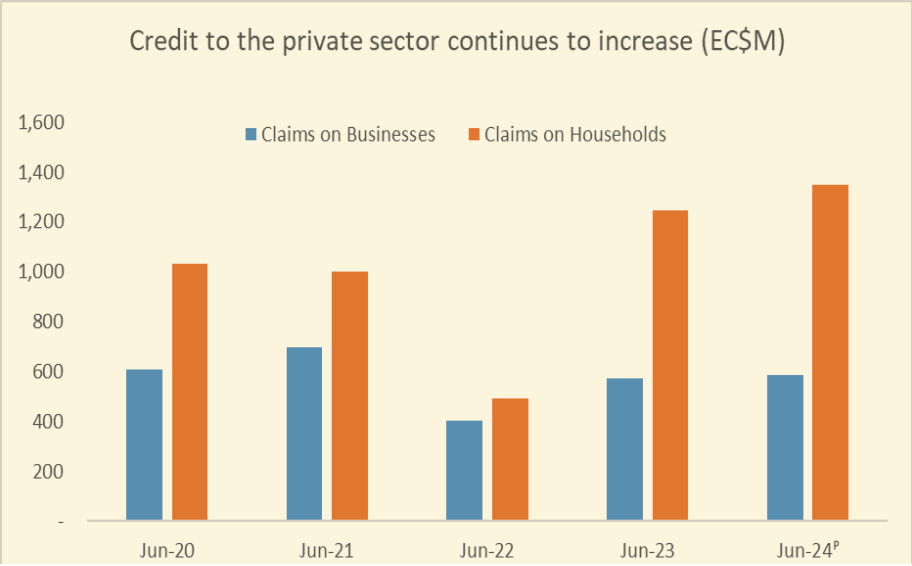
Source: ECCB

MONETARY SECTOR DEVELOPMENTS

Consistent with real sector activity, claims on the private sector (credit) rose by 6.2 per cent ($113.2 million) to $1,933.0 million in the first half of 2024 (Figure 4). Of this amount, claims to households

expanded by 8.2 per cent, while business claims grew marginally by 1.9 per cent. Credit allocated for construction and land development recorded the strongest gains, growing by $70.5 million year-on-year. Meanwhile, the net deposit position of the central government rose by 50.5 per cent to $816.9 million, associated with increased flows from the Citizenship by Investment Programme.

Figure 7: Claims (Credit) to Selected Sectors



Source: The ECCB

Broad money liabilities (M2) also increased, year-on-year, expanding by 5.8 per cent to $3,216.7 million, primarily driven by growth in deposits in the banking system. Specifically, transferable deposits in national currency and other deposits in national currency grew by 9.4 per cent and 4.4 per cent, respectively. However, a 2.7 per cent contraction in foreign currency deposits moderated the increase in broad money.

The asset quality of commercial banks improved over the first half of the year. Non-performing loans as a percentage of gross loans fell by 89 basis points to 3.1 per cent, compared with 4.0 per cent one year earlier. Further, the liquidity position of commercial banks strengthened, bolstered by an increase in the ratio of liquid assets to short-term liabilities of 48 basis points to 56.4 per cent, relative to 55.9 per cent one year ago.

EXTERNAL SECTOR DEVELOPMENTS

Grenada's merchandise trade deficit narrowed in the first half of the year by 5.3 per cent to $660.8 million. Influencing this development was a 5.8 per cent ($43.5 million) contraction in import payments, while export receipts fell by 12.8 per cent ($6.4 million). Exports of manufactured and agricultural products declined, including paper products, animal feed, nutmegs, cocoa, fish, and flour. For services, total visitor expenditure expanded by 22.1 per cent to $513.6 million, primarily

attributable to the stayover segment.

The Macro-economic Impact

The outlook for Grenada is broadly positive despite the devastation caused by hurricane Beryl on the sister isles of Carriacou and Petite Martinique and the northern parts of mainland Grenada. While the agricultural sector was compromised, key tourism assets were unaffected, and activity in the industry will continue to expand. Tourism will be boosted by more targeted marketing, improved airlifts, and new tourism properties on the mainland, such as Six Senses La Sagesse and Silversands Beach House.

Further, activity in the construction sector will accelerate as the rebuilding of homes and businesses affected by the passage of Hurricane Beryl begins in earnest and accelerates into 2025. Moreover, ongoing work on the 150-room Intercontinental Hotel and Villas and the Port Louis Expansion Project should support broader economic activity, with positive spillovers to ancillary sectors. Downside risks to the growth outlook include geopolitical tensions in the Middle East that could lead to higher oil prices, the impact of more hurricanes this year and a slowdown in major markets that affects Grenada's exports.

The fiscal position is expected to worsen, owing to forgone revenue and additional expenditure associated with Hurricane Beryl relief and support measures.

IMPACT OF HURRICANE BERYL ON GRENADA'S GDP

Hurricane Beryl is estimated to lead to a 0.56 percentage points decline in economic growth in 2024. Therefore, instead of a projected growth of 4.2%, the economy is now expected to grow by 3.62% (see figure xx below). Given the substantial loss of income, it is expected that there will be a relatively large fall in value added in the electricity and water sector, leading to a fall of 6.6% in real output in the sector (see table xx below). The tourism sector is projected to contract by 1.2%, reflecting the relatively small size of the sector in Carriacou and Petite Martinique, the two badly affected islands in the overall tourism sector. However, the fallout in tourism GDP in these islands by themselves has been very significant. This has disrupted real incomes and livelihoods for many workers and businesses in the sector of these islands. Real value added in the housing sector was estimated to decline by almost 1.0%. Although the housing stock in Carriacou and Petite Martinique was severely impacted, this resulted primarily in damage to the housing plant rather than losses, thereby limiting the impact on GDP. Nevertheless, rebuilding the housing stock, particularly with upgrades to enhance resilience, will be costly.

Figure 8: Real GDP Growth Before and After Hurricane Beryl

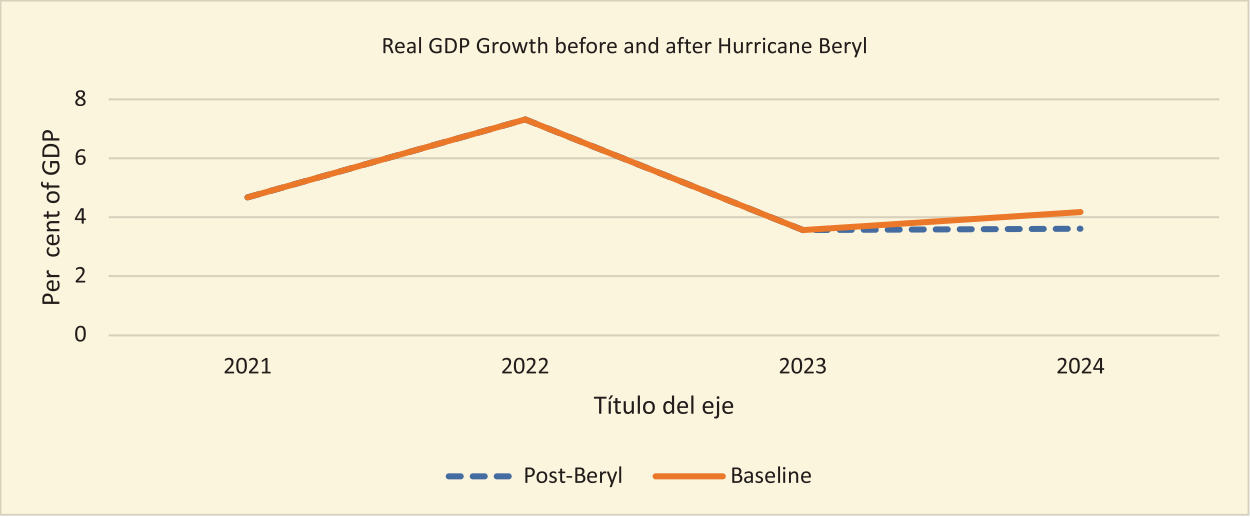


Table 3: Losses, Additional Costs and Changes in Value Added by Impacted Sector (XCD Millions)

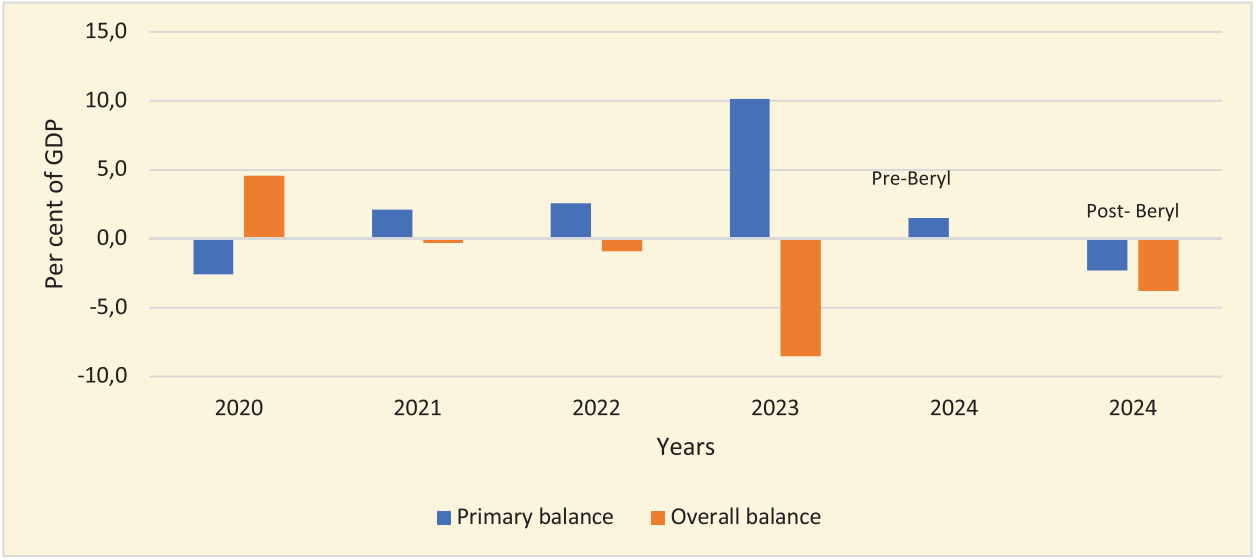
Sector	Losses	Additional costs	Value added coefficient	Intermediate consumption coefficient	Losses	Additional cost	Additional production
	gross terms				value added	intermediate consumption	value added
Social	1.25	26.13					
Housing	1.040	19.07	0.92	0.08	0.96	1.53	
Health	0.003	0.66	0.79	0.21	0.00	0.14	
Education		3.87	0.75	0.25	-	0.96	
Productive	78.61	3.65					
Agriculture	28.735	3.05	0.69	0.31	19.93	0.93	
Tourism	6.390	0.60	0.49	0.51	3.11	0.31	
Infrastructure	4.01	12.11					
WASH	0.127	8.80	0.58	0.42	0.07	3.68	
Energy	3.608	3.31	0.41	0.59	1.49	1.94	
Transport-airports	0.129	0.38	0.25	0.75	0.03	0.29	
Construction		39.73	0.45	0.55			17.88

THE FISCAL IMPACT OF HURRICANE BERYL

Grenada was on course to meet its fiscal targets in 2024 before Hurricane Beryl. The fiscal outturn was buoyed by strong growth in tax revenues. This stemmed partly from firm growth in economic activity, the implementation of compliance measures by the Inland Revenue Department (IRD) and dynamic receipts from the Investment Migration Agency (IMA) Programme. Therefore, during the first half of 2024, the primary balance increased by 10.6% to XCD$216.2 million, relative to the similar period of 2023; similarly, the overall balance expanded by 12.1% to XCD$191.4 million.

The government of Grenada has made significant allocations for cleanup, rehabilitation, and rebuilding since Hurricane Beryl. This allocation, combined with a package of fiscal incentives, which included a 100 per cent waiver on some duties and taxes to facilitate economic recovery and reconstruction, will lead to a substantial widening of the fiscal deficit in 2024. The overall deficit is projected to expand substantially from a negligible budgeted surplus to a deficit of 3.8% of GDP (see figure xx below). This is in the range of the order of magnitude expected for a disaster based on the scale of impacts suffered by the country. Total revenues and grants are projected to increase by 6.3% to XCD$1,404 million (37.0% of GDP) as the substantial growth in the first half of the year helped to offset the lost revenue from the tax incentive programme after the hurricane. Tax revenue is projected to grow by 1.3% to 35% of GDP, while non-tax revenue should expand substantially by over 28% to XCD$466.6 million or 12.3% of GDP.

Figure 9: Primary and Overall Fiscal Balances as a Percent of GDP, Pre- and Post-Beryl



Source: Assessment team based on official data

Given the substantial rebuilding costs, especially as the government is focused on building back better, the fiscal outturn will be strongly influenced by growth in spending. Total expenditure is projected to expand by 17.2% from the budgeted figure to XCD$1,548 million, representing 40.7% of GDP, relative to 34.8% of GDP for the budgeted amount. Current expenditure will increase by over 4.0% to XCD$ 940 million (24.7% of GDP). Meanwhile, capital spending will expand by almost 45% to XCD$608.0 million, rising from a budgeted 11.0% of GDP to 16.0% of GDP. This will be driven by spending on rehabilitation and reconstruction, including housing and public infrastructure after the hurricane.

Public debt to GDP is projected to decline marginally by 1.7 percentage points to 73.3 % of GDP despite the effects of the hurricane. This stems from strong GDP growth in the first half of the year prior to the hurricane, the activation of the disaster deferral clauses, which provide a moratorium on debt service payments for some time, the use of inflows from the CCRIF SPC and the drawdown of existing loans and resources from the consolidation fund to finance the recovery and reconstruction rather than new debt. Moreover, the government plans to secure concessional financing to facilitate the recovery and rebuilding in 2025.

THE HUMAN IMPACT

Introduction

The following core indicators were used to measure the human impact of Hurricane Beryl in Grenada:[30]

1. Living conditions: based on the Multidimensional Poverty Index, this indicator measured deprivations in people's access to water, sanitation, housing, health, education, and electricity.
2. Livelihoods: Measured the impact on people's access to livelihoods collectively (tourism and agriculture)
3. Food security: Measured the impact on household food insecurity including reduced food availability due to damage to crops, livestock, and fisheries, as well as people's reduced access to food (e.g., income, inflation)
4. Poverty: Measured the potential impact on people living in poverty and extreme poverty.
5. Gender equality: Measured the impact on women and girls.
6. Social inclusion: Measured the impact on disadvantaged groups, such as children, female-headed households, the elderly, and people living with disabilities.

The human impact assessment was based on government statistics as well as on existing situation reports from the government, CDEMA, UN agencies and other partners. For the analysis, the assessment considered the pre-disaster context to determine the pre-existing level of vulnerability of the population living in affected areas and compared these results with the extent of damage to basic services and livelihoods as per the results of sector assessments in the PDNA.

Deprivations in Living Conditions

Estimates indicate that a total of 40,600 people were affected by Hurricane Beryl[31], which represents 39% of a total population of 112,579.[32] The population living on the islands of Carriacou and Petite Martinique were disproportionately affected. Those affected face multiple deprivations in their living conditions including homelessness, limited access to water, sanitation, health care and education.

Deprivations in Housing: An estimated 6,353 people had their homes damaged or destroyed in Carriacou, Petit Martinique, and mainland Grenada because of Hurricane Beryl, including those not sheltered. Most are in Carriacou and Petite Martinique.

Deprivations in Water and Sanitation: It is estimated that 2,848 people are water insecure in

30 In line with the Guidelines for Assessing the Human Impact of Disasters (UNDP, WB, EU, 2019)
31 OCHA, 2024, Regional Overview and Planned Response to Hurricane Beryl
32 World Bank, 2021, Living Conditions in Grenada: Poverty and Equity Update

Carriacou. They will face severe shortages in the next dry season unless damaged roofs are repaired/ replaced to enable rainwater collection. The risk of disease outbreaks remains high for the local population.[33]

Deprivations in Health: about 4,747 people had their access to healthcare limited by Beryl in Carriacou and Petite Martinique. Today, it is estimated that 529 people remain without access to healthcare in Petite Martinique. The most vulnerable are infants and children under 5 years of age, pregnant and lactating women, and people with health conditions. According to PAHO, cases of dengue in Grenada increased, as well as cases of undifferentiated fever, the majority in St Andrew district.[34] It is worth noting that vector-borne diseases such as dengue and chikungunya were responsible for epidemics in the country from 2010 to 2016.[35] Young children are most at risk from health deprivations given the marked increase in mortality rates for infants and children under five in the country.[36]

Deprivations In Education: An estimated 1,984 children were deprived of their education due to the damage to primary and secondary schools.[37] Also 281 school staff were affected. Some schools are still operating as shelter for the displaced and will delay children's return to school with the potential risk of school dropout. The Government announced the reopening of schools in September. However, the reopening of schools depends on the relocation of shelters which are housed in schools, sourcing supplies and building materials, ensuring access to the internet, among other.[38] Until schools are repaired and reopen, the risk is high of school dropouts, which may result in a higher proportion of children and youth not completing their education.

Deprivations in Electricity: Given the severe damage to power generating facilities and the electricity supply system in Carriacou and Petite Martinique, over 40% of customers in these two islands are without power to date.

Deprivations in transport due to damaged infrastructure such as ports and airports, limited the availability of critical supplies, including food, medicine, and shelter materials.

33 PAHO Hurricane Beryl Situation Report No 12 (12 August 2024)
34 PAHO Hurricane Beryl Situation Report No 12 (12 August 2024)
35 World Bank, 2021, Living Conditions in Grenada: Poverty and Equity Update
36 World Bank, 2021, Living Conditions in Grenada: Poverty and Equity Update
37 Estimate of a total of 1239 children in preschool, 10,253 in primary school and 8354 in secondary school, based on Grenada National Population and Housing Census 2011
38 UNICEF, Hurricane Beryl Situation Report No 5 and 6

Livelihoods

Hurricane's Beryl's impact on the tourism and agriculture sectors will have significant consequences for local livelihoods, especially in Carriacou and Petite Martinique. The impact will affect women and men differently based on their participation in these sectors.

Tourism provides 42.9% of the country's employment directly and indirectly, which corresponds to 9,700 jobs in tourism and 24,300 jobs in all tourism-related sectors, hotels, restaurants, transportation, and retail.[39] Carriacou and Petite Martinique had extensive damage to businesses related to tourism such as hotels, guest houses, restaurants, bars, dive shops among others. Unemployment in tourism and tourism-related activities will affect all, but more women since they are more active in this sector. About 17.4% of women are employed in wholesale and retail trade, and 12.3% in accommodation and food service activities.[40]

Culture is recognized as an important enabler of economic development, and in Grenada cultural events contribute to tourism especially in Carriacou and Petit Martinique, such as the Maroon and Stringband Music Festival, the Carriacou Regatta, the African Nation Dance among others. These cultural events are significant contributors to the local economy. Hurricane Beryl destroyed tourism-related supply services and decreased tourist spending at various heritage sites, affecting revenue and income for those connected to these livelihoods. Beryl also impacted the hosting of the Carriacou Regatta, which is a large source of revenue for the islands. In relation to value chains, the hurricane disrupted local and imported supply chains, leading to shortages of essential raw materials like flowers and decor items, which increased costs and delayed delivery times. Cultural industries, which are largely in the informal economy, lost access to markets, faced disruptions in the value chain, and lost economic opportunities related to the hosting of cultural events.

Beryl also impacted rural livelihoods, causing extensive damage to crops, livestock, and small ruminants, as well as to fisheries, especially in Carriacou and Petite Martinique. Losses in food production and income will have a direct impact on poverty and food security in Grenada (see sections below).

Job losses in agriculture and fishing will affect more men since 16.4% of them are employed in this sector, compared to 4% of women.[41] This is especially the case in Carriacou and Petite Martinique where fishing, agriculture and the boat building industry are the mainstays of the local economy.[42] Recovery support to farmers and fishers is necessary to prevent food insecurity. It is worth highlighting that farmers were already coping with crop failures prior to Hurricane Beryl due to drought conditions and high temperatures. On May 10, 2024, the government declared a water crisis because of unprecedented low water levels in reservoirs.[43]

39 World Bank, 2021, Living Conditions in Grenada: Poverty and Equity Update
40 Central Statistical Office, 2023 Q4 National Labour Force Survey Results
41 Central Statistical Office, 2023 Q4 National Labour Force Survey Results
42 UNDP, 2022, Tourism Diagnostic Report Grenada
43 WB, Food Security Update June 2024

Another consideration is the pre-existing unemployment rate in Grenada, reported at 16.4%.[44] Hurricane Beryl will increase unemployment in the tourism and agriculture sectors. Of special concern are youth and women, given they have the highest unemployment rate with youth at 23% and women at 16%, compared to men with 7.2%.[45] Higher unemployment among FHH could have serious consequences for poverty and food insecurity, as they represent almost half of all households in the country and a high proportion of the poor.

Construction during the recovery process is likely to create new job opportunities that will benefit men. During recovery it will be important to create job opportunities for women in tourism-related activities, especially FHH.

Food Security

The prevalence of severe food insecurity in Grenada's total population is 5.8% (lower than the 28.6% in the Caribbean), while the prevalence of moderate or severe food insecurity is 20% (compared to 58.8% in the Caribbean). It is also estimated that 21% of the population is unable to afford a healthy diet.[46]

Table 4: Population with food insecurity in parishes affected by Beryl

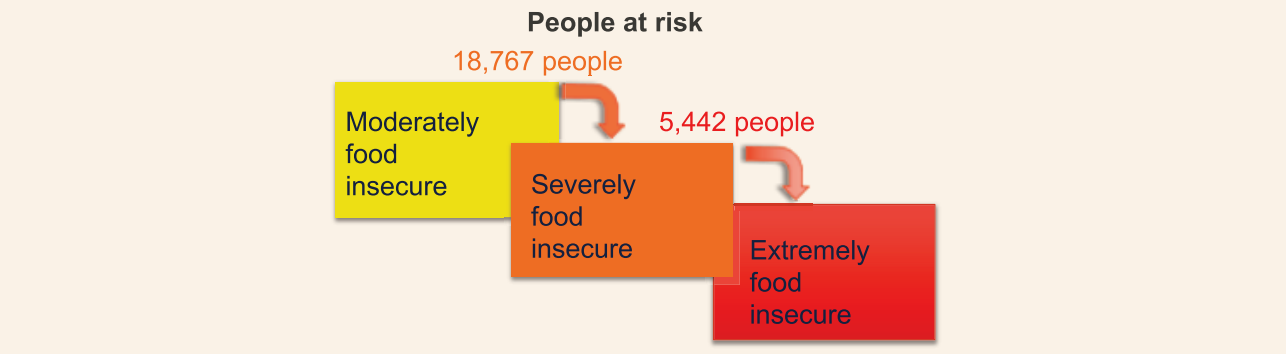
Parishes affected by Beryl	Total population	Pop with severe food insecurity (5.8%)	Pop with moderate or severe food insecurity (20%)
Carriacou & PM	4,747	275	949
St. Patrick	7,846	455	1,569
St George & town	44,777	2,597	8,955
St John	7,773	451	1,555
St Andrew	24,755	1,436	4,951
St Mark	3,938	228	788
TOTAL	**93,836**	**5,442**	**18,767**

To arrive at an estimate of the number of people who are food insecure in the parishes affected by Hurricane Beryl, the above national rates were used for each parish adjusted with the most recent census population data.[47] The results show that 5,442 people are severely food insecure in

44 Central Statistical Office, 2023 Q4 National Labour Force Survey Results
45 Central Statistical Office, 2021 2nd Quarter National Labour Force Survey Results
46 FAO, WFP, UNICEF, IFAD, WHO, 2024, The State of Food Security and Nutrition in the World
47 Based on population numbers in Grenada's Population and Housing Census 2011

the parishes affected by Hurricane Beryl, with St. George and St. Andrew being home to the majority (74%). A person is severely food insecure when they have run out of food and gone a day or more without eating, which is to say that they have most likely experienced hunger. Hurricane Beryl's impact on jobs, income, and food production will push them beyond the tipping point. As such they are the most in need of assistance, especially through cash transfers and other social protection measures, as well as priority recovery assistance across critical sectors such as health, agriculture, tourism, and housing.

An estimated 18,767 people (20%) are moderately or severely food insecure in the same parishes affected by Beryl, which means that their access to food is uncertain, and they may have to sacrifice other basic needs just to eat. Targeted recovery assistance for this group is essential to prevent them from falling into severe food insecurity.



Although no in-depth food security analysis is available for Grenada specifically, WFP reports that food insecurity is 78 percent higher than at the start of the pandemic in 2020 in the English-speaking Caribbean (which includes Grenada). The cost-of-living crisis has been depleting people's coping capacities, with a concerning number of people using savings to buy food, resorting to secondary sources of income, eating less, substituting less preferred foods, buying smaller quantities, spending less on health and education, and even selling assets.[48] This suggests a high level of vulnerability requiring safety nets and social protection.

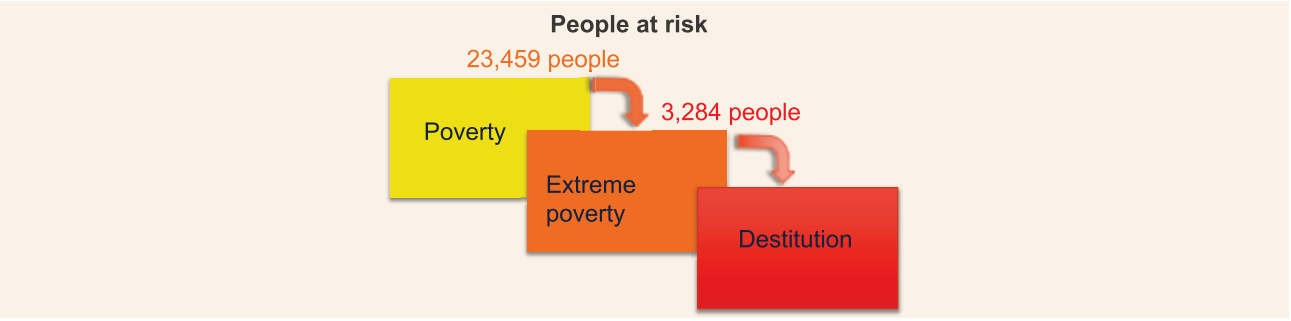
In response to Beryl, the WFP provided food assistance and began the first phase of cash assistance on Carriacou Island. Efforts are underway to design a longer-term cash assistance program led by the Government, following the activation of Grenada's Caribbean Catastrophe Risk Insurance Facility.[49]

48 WFP, CARICOM, CDEMA, April 2024, Caribbean Food Security and Livelihoods Survey
49 OCHA Hurricane Beryl Situation Report #6

Poverty

Poverty is a significant risk driver of disaster vulnerability, and the rate and depth of poverty and vulnerability in Grenada determines the human impact of a disaster such as Hurricane Beryl. The poor live in fragile housing and work in sectors susceptible to disasters such as farming and tourism. Although the poor suffer a small share of the economic losses, they are impacted disproportionately. They tend to lose the few assets they own, their businesses, jobs and income, which further lead to well-being losses related to their living conditions, health, and children's education. They have limited capacity to cope with the multiple impacts and are often forced to take measures with irreversible consequences such as selling their land. If not targeted for assistance, they can be left behind, ultimately pushing them deeper into poverty and destitution.

In Grenada, the proportion of the population living in poverty and therefore vulnerable was already significant at 25%.[50] Based on this data, it is estimated that 23,459 people are poor in the parishes affected by Hurricane Beryl.[51] They were disadvantaged already and have borne the brunt of Beryl's impact due to the disproportionate loss of income and food production. This group should be targeted for priority recovery assistance and social protection to prevent them from falling into extreme poverty.



People already living in extreme poverty in Grenada represent 3.5% of the population[52], equivalent to about 3,284 people in the affected parishes.[53] They risk falling into destitution and will need urgent support. There are specific population groups who need special attention during the recovery process, such as female headed households who represent 48% of all poor households in Grenada, and children (one in every two Grenadian children lives in poverty).[54]

50 World Bank, 2021, Living conditions in Grenada: Poverty and Equity Update
51 Estimate of 25% of a total population of 93,836 living in parishes affected, based on 2021 population data
52 World Bank, 2021, Living conditions in Grenada: Poverty and Equity Update
53 Estimate of 3.5% of a total population of 93,836 living in parishes affected, based on 2021 population data
54 UNICEF, 2017, Situation Analysis of Children in Grenada

In terms of non-monetary poverty, it is estimated that 34.3 percent of the country's population lives in households that are multidimensionally poor, which reflects forms of deprivation experienced by the poor such as education, health, living standards, and employment.[55] As indicated earlier in this report, Hurricane Beryl had a direct impact on people's living conditions by increasing deprivations. It is therefore expected that multidimensional poverty will increase in Grenada unless poor households receive the recovery support they need.

Gender and Social Inclusion

Female-headed households (FHH) in Grenada are significantly disadvantaged and likely to have been hard hit by Hurricane Beryl. They represent nearly half of all households in the country, and a higher proportion of poor households.[56] Poverty among FHH extends to a significant proportion of children in Grenada, considering that 42.2% of children live in poor households headed by women (compared to 34.8% among male-headed poor households).[57] As women support larger households (with three or more children in addition to one or two extended family members), they are more at risk of becoming or remaining poor without targeted priority assistance.[58]

Women who work in tourism-related businesses will be disproportionately affected by Hurricane Beryl because they tend to work in this sector, with 17.4% of them employed in wholesale and retail trade, and 12.3% in accommodation and food service activities. An additional 16% of women work in education, and 11.7% in health and social work activities.[59] They are therefore likely to be affected by the closure of schools and health facilities. The unemployment rate among women will increase without recovery support in the form of employment opportunities and social protection, potentially driving them into deeper poverty, especially female-headed households.

Although there is no data on gender-based violence (GBV) in Grenada post-Hurricane Beryl, experience worldwide shows that the incidence of GBV tends to increase in post-disaster situations. Physical and/ or sexual violence in normal times is already of concern in Grenada -one in every four women has suffered physical violence at some point in her life and close to one in every ten women experienced sexual violence over her lifetime. Recovery should support the GBV Work Plan for Grenada, which was developed by the Ministry of Social Development, UNFPA, UN Women

Children: Child poverty in Grenada may increase without adequate social protection during recovery. As noted earlier, one in every two Grenadian children lives in poverty.[60] Special attention

55 World Bank, 2021, Living Conditions in Grenada: Poverty and Equity Update
56 World Bank, 2021, Living Conditions in Grenada: Poverty and Equity Update
57 UNICEF, 2017, Situation Analysis of Children in Grenada
58 UNICEF, 2017, Situation Analysis of Children in Grenada
59 Central Statistical Office, 2023 Q4 National Labour Force Survey Results
60 UNICEF, 2017, Situation Analysis of Children in Grenada

during recovery should be given to poor female-headed households where 42.2% of children live.[61] Children also suffered deprivations in education due to the hurricane's damage to schools, leaving an estimated 1,984 children without school. If schools are unable to re-open in the autumn, the risk of school dropouts will likely increase. This may result in a higher proportion of children and youth not completing their education. Deprivations in health will affect children living in Carriacou where access to healthcare is still limited. As noted earlier, young children are most at risk from health deprivations given the rise in mortality rates in recent years for infants and children under five in the country.[62] As of 2022, the under-five mortality rate for males is 11.6 per 1,000, for females 10.2, and in total it is 21.8, while the neonatal mortality rate for males is 8.8, for females 7.5, and in total 16.3.[63]

The Elderly and People with Disabilities face barriers that affect them disproportionately compared to the rest of the population, such as in their access to transport, health care, shelter and affordable housing, employment, education, or access to information. They face social exclusion and stigma and may have special needs such as for medical or life-sustaining equipment, medications, or special housing. In Grenada, it is estimated that 20.3% of poor households have members with some disability, compared to 17.5% of nonpoor households (for example, 6.3% of the population report having some sort of difficulty walking, 4.3% report having some difficulty with their vision, and 3% report having difficulty with self-care, among other challenges).[64]

Recommendations for Recovery

The following recommendations will ensure that the human impacts of Hurricane Beryl are addressed in the national recovery plan across all sectors:

Ensure that the recovery plan is in line with and supports Goal No. 1: High Human and Social Development, in Grenada's National Sustainable Development Plan 2020-2035 (NSDP); and that it embraces the core values embedded in the NSDP, such as 1) Social justice, fairness, equality, and equity and 2) Commitment to the disadvantaged, poor, and vulnerable in society.

Expand social protection programs to cover all affected households living in poverty and extreme poverty. This may require increasing the number of beneficiaries to ensure no one is left behind and increasing monthly payments in line with the cost of living. Recovery resources may be needed to support the Social Protection Expansion Plan of the Ministry of Social Development, to fill any funding gaps. Recovery assistance can also be channeled through Grenada's other social protection programs, such as the Education, Empowerment, and Development (SEED) Programme, the government's flagship

61 Grenada's Growth and Poverty Reduction Strategy 2014-2018; Caribbean Development Bank, 2016, The Changing Nature of Poverty and Inequality in the Caribbean; UNICEF, 2017, Situation Analysis of Children in Grenada
62 World Bank, 2021, Living Conditions in Grenada: Poverty and Equity Update
63 Data provided by the Government of Grenada
64 World Bank, 2021, Living Conditions in Grenada: Poverty and Equity Update

social safety net programme and The Basic Needs Trust Fund (BNTF) Programme, the government's poverty reduction programme.

For households with severe and moderate food insecurity extend safety nets and cash programs (in addition to food assistance).

Sector recovery plans should give priority to the poor and food insecure, especially in the housing, health tourism and agriculture sectors.

Health sector to prioritize children U5 and infants, to prevent a further increase in morbidity and mortality rates in Grenada.

Target employment creation opportunities for women and men based on their participation in tourism-related businesses and in the agriculture sector, with priority to FHH and youth.

Prioritize the most vulnerable and make sure they are not left behind in recovery: children and youth, female-headed households, the elderly, and people with disabilities.

Support the scale-up efforts on GBV prevention and response through the GBV Work Plan for Grenada, which was developed by the Ministry of Social Development, UNFPA, UN Women.

SECTOR REPORTS

HOUSING

HOUSING

Pre-Disaster Sector Context

Prior to Hurricane Beryl, based on the 2021 National Population and Housing Census, Grenada had a population of 109,021, of which 54,542 were males and 54,479 were females with the majority residing on the mainland, Grenada. The recorded population in Carriacou was 4,218 and 529 was recorded in Petite Martinique. There was an even sex composition in the population.

Table 5: Population and Housing Census by Category of the Respondents, 2021

RESPONDENT CATEGORY	NUMBER		TOTAL	PERCENTAGE	
	MALES	FEMALES		MALES	FEMALES
Non-Institutional Population in Private Dwelling	53,993	54,286	108,279	49.5	49.8
Institutional Population	501	189	690	0.5	0.2
Homeless Population	48	4	52	0	0
TOTAL POPULATION	**54,542**	**54,479**	**109,021**	**50**	**50**

Table 6: Non-institutional Population by Sex and Parish 2021 and 2011

PARISH	2021			2011		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
REST OF ST. GEORGE	20,482	21,614	42,096	17,551	17,527	35,078
TOWN OF ST. GEORGE	1,325	1,356	2,681	1,573	1,598	3,171
ST. JOHN	3,988	3,785	7,773	4,358	4,111	8,469
ST. MARK	2,084	1,854	3,938	2,304	2,104	4,408
ST. PATRICK	3,947	3,899	7,846	5,316	5,188	10,504
ST. ANDREW	12,535	12,220	24,755	13,465	13,036	26,501
ST. DAVID	7,265	7,178	14,443	6,465	6,412	12,877
CARRIACOU AND PETITE MARTINQUE	2,367	2,380	4,747	2,866	2,795	5,661
TOTAL	**53,993**	**54,286**	**108,279**	**53,898**	**52,771**	**106,669**

The housing sector, closely tied to the distribution of this population, was characterized by a mix of traditional and modern construction methods. The parish of St. George, the most populous, had 44,777 residents, placing significant housing demand on this area. This was followed by St. Andrew

with a population of 24,755, St. David with a population of 14,443, followed by St. Patrick with a population of 7,846. St. John, Carriacou and Petite Martinique and St. Mark recorded a population of 7,773, 4,747 and 3,938 respectively.

Prior to hurricane Beryl there was major activity in the construction sector which contributed extensively to GDP. In the year 2022 and 2023 construction had an estimated contribution of 12.35 percent and 10.69 percent in constant prices to GDP.

In each of the parishes, including Carriacou and Petite Martinique, there were modern and traditional buildings being constructed prior to hurricane Beryl. Additionally, there was ongoing refurbishment and expansion of buildings throughout the islands. In 2023 there were 97 commercial building permits granted with 24 granted for expansions, 1 for renovations and 72 for new construction. Residential permits granted in 2023 were 453, with 25 granted for expansion, 13 for renovations and 415 for new construction.

Table 7: Type of Building by Parish Census 2021

TYPE OF BUILDINGS	PARISH							
	St.George	Town of St.George	St.John	St.Mark	St.Patrick	St.Andrew	St.David	TOTAL
Residential	34,705	2,189	7,701	3,866	7,518	24,348	13,491	93,818
Residential/Professional (Office-Service Providers)	257	25	9	1	4	28	15	339
Residential/Commercial	2,000	177	247	151	214	707	221	3,717
Residential/Professional/ Commercial	55	11	2	10	3	19	8	108
Commercial	1,586	377	240	109		811	265	3,624
Professional (Office-Service Providers)	82	54	18	5	22	28	15	224
Professional/Commercial	74	41	4	2	1	18	6	146
Other (specify)								
Don't Know	161	100	59	3	32	121	30	506
Not Stated	300	27	32	19	50	151	214	793
TOTAL	39,556	3,103	8,604	4,201	8,262	26,544	14,336	104,606

Based on the 2021 Population and Housing Census most of the buildings on mainland Grenada were residential buildings, which was followed by buildings that operates with dual functionalities as both residential and commercial, followed by buildings that operated strictly for commercial purposes as shown in Table 3. A similar pattern was observed in both Carriacou and Petite Martinique where most

of the buildings were residential followed by those functioning as both residential and commercial, followed by those operating as commercial.

The estimated number of buildings on the Islands of Grenada, Carriacou and Petite Martinique prior to the passage of hurricane Beryl are as follows. **Petite Martinique**: 299 buildings, of which 258 were residential buildings which represents 86% of total buildings. **Carriacou**: 3,522 buildings. According to the 2021 census, there were a total of 104,696 buildings on **Mainland Grenada**, of which 89.7% correspond to residential buildings.

An analysis of the structure of the material used for outer walls revealed that most buildings on mainland Grenada, and on the islands of Carriacou and Petite Martinique utilized concrete, which was followed by wood and concrete followed by wood. Most of the buildings had galvanized sheet metal as their roofing material, followed by concrete roofing, and shingles. Many of the modern structures utilize concrete for their roofing materials.

Disaster Effects (Damage and Loss)

DAMAGE

The aftermath of Hurricane Beryl has been devastating, resulting in damage and destruction to homes. The housing stock was severely impacted in Carriacou and Petite Martinique as well as in the parishes to the north on the mainland.
The damage assessment was carried out based on a personnel deployment on the field at Carriacou, Petit Martinique and Mailand Grenada. Details of the assessment methodology can be found in the last section of this report. The qualitative levels of damage used for the field assessment were defined based on DANA methodology (CDEMA) as follows: ***level 1***: damage minimal and easily repaired, ***level 2***: the structure can be repaired, ***level 3***: the structure sustained significant damage and ***level 4***: the structure is destroyed.

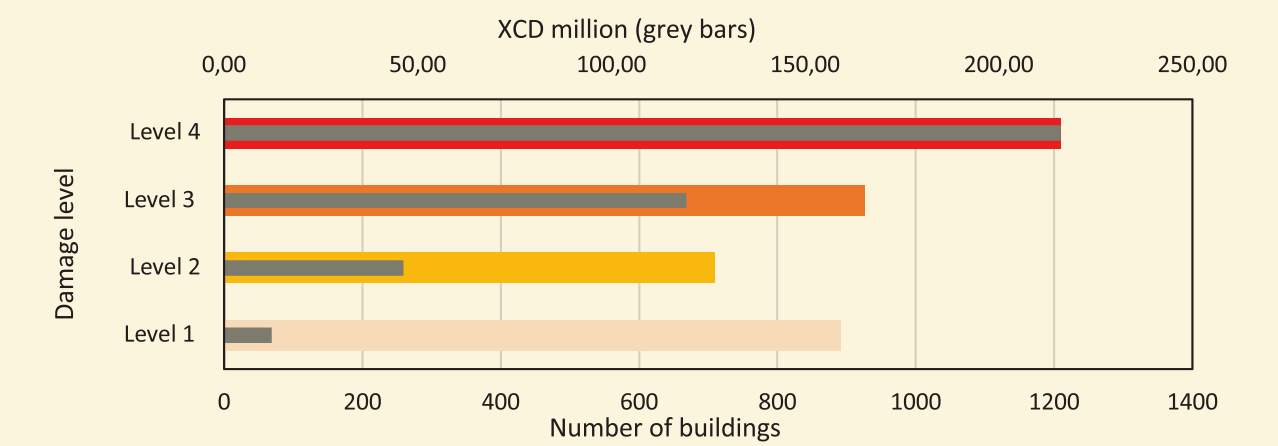
A total of 3,736 dwellings were affected by Hurricane Beryl, being 2,754 located in Carriacou, 264 in Petit Martinique and 718 in mainland Grenada. From the total damage estimate, XCD 290.98 million corresponds to Carriacou dwellings, XCD 35.00 million to Petit Martinique and the remaining XCD 37.97 million to mainland Grenada dwellings. Damage costing includes both damage to the structure and damage to the contents.

In terms of the damage levels, Figure 1 shows the distribution of the number of housing buildings by damage levels. It is clearly observed that a large part of the buildings suffered significant levels of damage, where 1,210 structures suffered level 4 damage, 926 suffered level 3 damage and the remaining 1,600 damage level 1 and level 2. Damage level 4, structures considered destroyed,

concentrates XCD 202, 43 million of damage, level 3, structure sustained significant damage, XCD 109.39 million of damage and buildings with minimal affectation or those that can be repaired (level 1 and level 2) concentrates XCD 52.13 million of the damage.

In terms of the damage levels, Figure 12 shows the distribution of the number of housing buildings by damage levels. It is clearly observed that a large part of the buildings suffered significant levels of damage, where 1,210 structures suffered level 4 damage, 926 suffered level 3 damage and the remaining 1,600 damage level 1 and level 2.

Figure 10: Distribution of Dwellings Damaged by Hurricane Beryl by Damage Level.



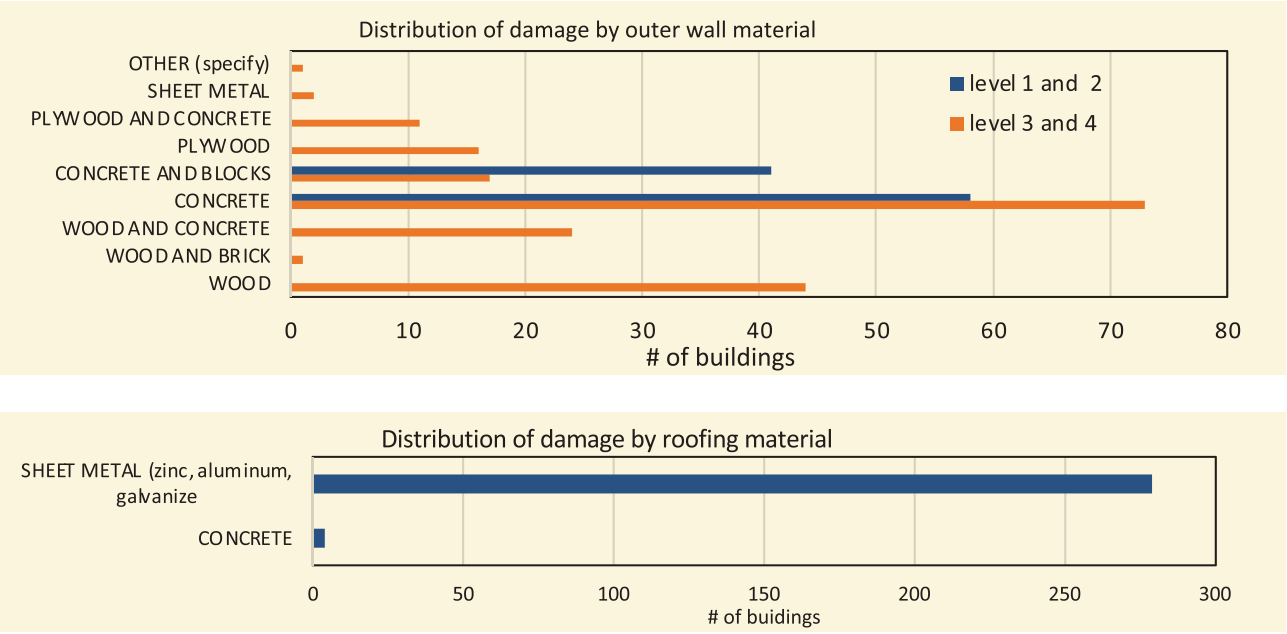
Petite Martinique

Most of the dwellings in Petite Martinique sustained level 3 and level 4 damage, it is 189 of 299 buildings, levels that imply that the structure of the building suffered significant damage or was destroyed respectively. In addition, 99 buildings sustained damages levels 1 and 2, which implies damage that can be repaired. Thus, it can be observed that almost the total building stock in this Island, 96%, was affected by Hurricane Beryl, with a very high degree of devastation. As expected, the buildings that had utilized sheet metal which includes zinc, aluminum, and galvanize as roofing material sustained the most damage at all levels. The buildings that had concrete roofing sustained less damage to their roofs.

The intensity of the hurricane caused extensive damage to all buildings notwithstanding the material that was used for outer walls. The buildings that had wood, wood and brick, wood and concrete, plywood, sheet metal and other as their outer walls sustained level three and four damages, in other works, all these types of buildings in Petite Martinique sustained significant damage or were destroyed. (See Figure 13). In the case of buildings with concrete and concrete and blocks as the material for outer walls, they sustained damage at all levels. Thirty-four percent (34%) of these types

of buildings (blue bars in Figure 13 - top) had an acceptable performance against hurricane Beryl (category 4) forces with minor or damage that can be repaired (level 1 and 2). However, as shown in Figure 13, a large part of the building stock of concrete and blocks outer walls also sustained damage level 3 and 4, which highlights the fact that the connections of the walls with the roof as well as with the foundation are very important for good structural performance against wind forces from the hurricane.

Figure 11: Distribution of Damage in Petit Martinique Dwellings by Outer wall (top) & Roofing material (bottom)



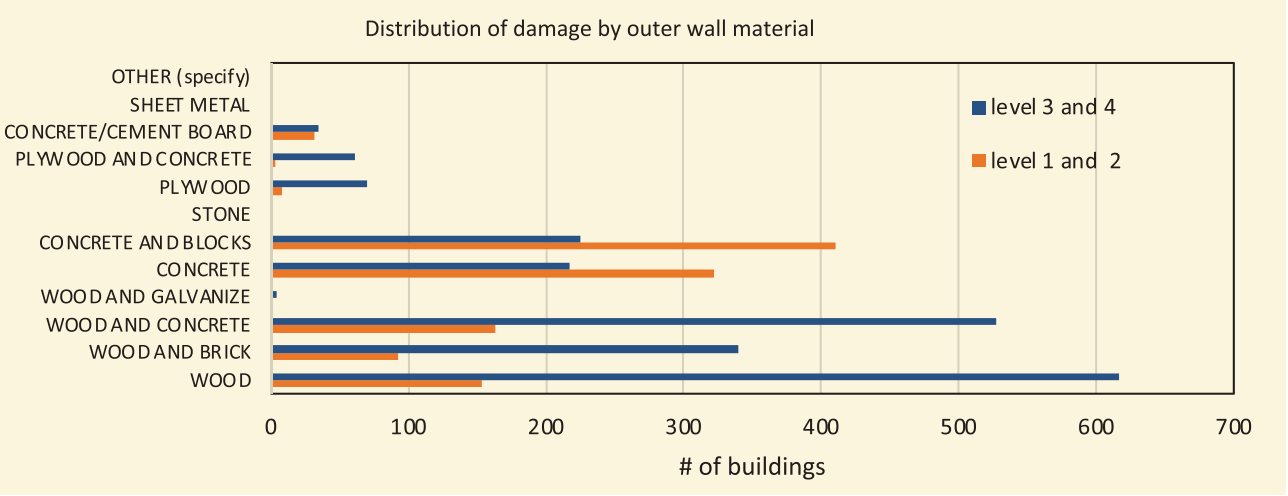
Carriacou

The housing sector in Carriacou was extremely affected by Hurricane Beryl including residential and residential/commercial buildings. Most of the residential buildings sustained level three (3) and level four (4) damage, which is 991 and 717 respectively. This signifies that major reconstruction, and rebuilding must be undertaken to restore those houses on the Island. In addition, five hundred and eighty-seven (587) buildings sustained level two damage and four hundred and fifty-nine (459) with level one damage.

The damage to buildings was across all levels despite the materials that were used for the outer walls, however, buildings that had materials that contained wood, wood and brick and wood and concrete sustained higher levels three and four damages, it is, significant damage or destroyed, whilst those with concrete and concrete-bricks sustained in average lower levels of damage. In this regard, 62% of the total buildings with concrete and concrete-bricks outer walls sustained minor or damage that can be repaired (level 1 and 2), whilst the reminder 38% sustained damage level 3 and 4 damage as shown in Figure 14.

As expected, concrete and concrete-bricks outer walls had a better capacity to withstand category 4 storm wind forces, however, as mentioned in Petite Martinique, wall-roof / beams-columns connection, wall/columns - foundation connections and in general the load transmission system of the entire building to the foundation is crucial for an adequate structural performance against hurricane forces. In the roofing, most of the roofs in Carriacou sustained level three (3) and level four (4) damage given the high predominance of buildings with sheet metal (zinc, aluminum, galvanize), characteristic that, in general, also contribute to a lower performance of structure to withstand the wind forces given the poor connection of walls and roof. Figure 14 illustrates those findings.

Figure 12: Distribution of Damage in Carriacou Dwellings by Outer wall (top) and Roofing Material (bottom)



Mainland Grenada

On mainland Grenada an estimated seven hundred and eighteen (718) residential, residential/ commercial buildings reported to have sustained some form of damage from hurricane Beryl. The parish of St. Patrick sustained the most impact with three hundred and twenty-two (322) residential buildings sustaining damages, which is equivalent to 44.0% of all residential stock in mainland that sustained damage. This was followed by the parish of St. Andrew with two hundred and fifty-seven (257) accounting to 36.0%. Ta

Totally destroyed housed reported by parish indicate that St. Patrick had a total of eighty-five (85) houses that were destroyed, St. Mark's had a total of eleven (11), St. Andrew had a total of ten (10), St. John thirteen (1) and St. David three (3). A total of three hundred and eighty-two residential buildings, 53% of total damaged structures, sustained damage that is minimal (level 1) and eighty-two buildings, 11%, sustained level two damage meaning that they can be repaired.

Residential buildings whose outer material were of wood, wood and concrete, plywood, wood and concrete, and wood and brick recorded the most damage. Those whose outer were of concrete and blocks recorded damage at all levels, however, most of them were relatively low. Table 24 summarizes all the described data.

Table 8: # of affected houses by level of damage and Parish and Damage cost including building & content

Parish	Level 1	Level 2	Level 3	Level 4	Total affected	Public XCD	Private XDC
Carriacou	459	587	717	991	2,754	0	290,975,000
Petite Martinique	50	40	66	108	264	0	35,004,100
St. Andrew's	177	29	41	10	257	0	5,369,500
St. David	34	7	2	3	46	0	935,000
St. George	14	1	13	1	29	0	1,309,500
St. John's	2	0	1	1	4	0	4,763,500
St. Mark's	28	7	14	11	60	0	2,594,800
St. Patrick's	127	38	72	85	322	0	22,995,750
TOTAL	**891**	**709**	**926**	**1,210**	**3736**	**0**	**363,947,150**

LOSSES

Loss estimates in the housing sector fall on the following main categories: a) costs for debris removal and cleaning, b) costs associated with the provision of temporary housing therefore installation, operation and maintenance of shelters, c) governance costs and d) foregone income from rental housing.

Total losses in housing amount to XCD $19.21 million, of which XCD $1.04 million corresponds to foregone incomes by reduction in rental housing and XCD $18.17 million corresponds to additional costs. In additional costs, XCD $12.08 million corresponds to demolition and debris removal, XCD $6.03 million to the provision of temporary housing therefore installation, operation and maintenance of shelters and XCD $56,000 to governance cost associated with the cost of personnel deployment for the field assessment. As part of the debris removal, in addition to cleaning tasks within the

affected islands, debris needed to be transported to places or deposits outside the islands by means of ships or boats.

In the case of shelter, based on NaDMA data, it was used an average daily cost by sheltered of XDC $151 for Mainland Grenada, and XCD $171 for Carriacou and Petit Martinique. Of the total losses, XCD $18.17 million corresponds to the public sector while only XCD $1.25 million corresponds to the private sector.

Table 9: Summary of Loss and Additional Costs incurred in the Housing sector

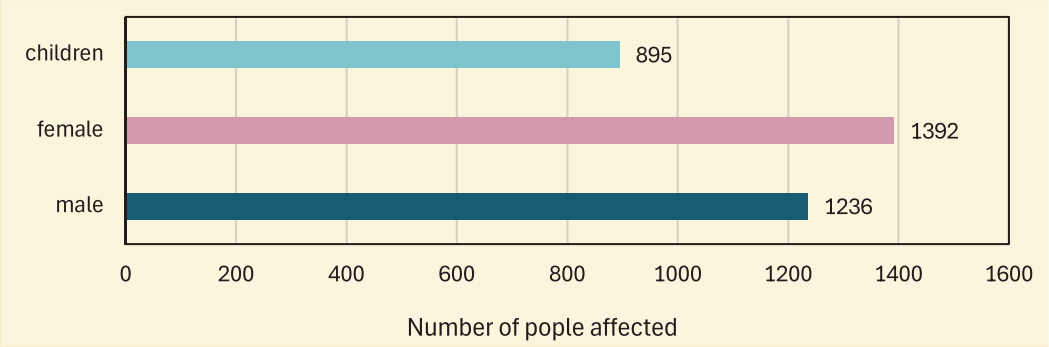
Losses	Total (XCD)	Public	Private
Losses - forgone incomes	1,040,256		
Reduction in rental housing (min six months)	1,040,256	0	1,040,256
Additional cost	18,165,271		
Demolition and debris removal	12,076,178	12,076,178	0
Installation and operation of shelters	6,033,093	6,033,093	0
Governance costs (field assessment)	56,000	56,000	0
Cost for disaster risk reduction	0	0	0
TOTAL LOSSES	**19,205,527**	**18,165,271**	**1,040,256**

The Sector Human Impact

The displacement of the population following a disaster is a critical factor to consider in the assessment of human impacts. As a result of Beryl, a total of 90 official shelters and 11 additional facilities operating as pop-up shelters were opened on June 24th to accommodate displaced residents. These shelters were spread across the country, with 1 located in Petite Martinique, 17 in Carriacou (6 official shelters and 11 pop-up facilities), and 83 on the mainland, primarily in schools, churches, and community centers.

Most shelters were operational for less than five days, offering short-term relief for displaced individuals. However, a few remained open for an extended period in certain areas. Specifically, one shelter in Petite Martinique, three in Carriacou, and one in St. Patrick's West remained open for more than 50 days. As of the latest update on October 4th, 2024, two shelters in Carriacou—Dover School and Hillsborough Government School—are still in operation, providing ongoing support to those affected.

Figure 13: Distribution of Population Sheltered in Grenada after Hurricane Beryl.



In total, 3,523 people were displaced and sought refuge in shelters because of Hurricane Beryl. This included 1,236 males (35%), 1,392 females (40%), and 895 children (25%).

The total population affected by any level of damage to their homes in Carriacou, Petit Martinique, and mainland Grenada was estimated at 6,353, including those not sheltered.

The reconstruction process is expected to take considerable time, and as a result, many families will continue to face challenges in returning to normalcy. The displaced population has had to adapt to new living conditions in both government-run and privately managed shelters, forcing them to make significant adjustments to their daily routines and activities. This disruption has added to the overall impact of the disaster, affecting not only their physical environment but also their social and economic well-being.

Regrettably, four lives were lost on Carriacou, emphasizing the profound impact the disaster had on the island's community.

Recovery Needs and Strategy

RECOVERY NEEDS

The assessment of damage and loss is the base to estimate the recovery needs. As a key component of the recovery process, the concept of building back better (BBB) was applied to counteract not only the damage caused by the hurricane Beryl but also any future hurricane and other catastrophic events including floods, volcanic eruptions, etc., by means of applying a premium to replacement values. In this regard, a differentiated strategy was applied for the increase in costs by BBB, which ranges from 3% for level 1 to 15% for level 4.

The total needs in housing amount to XCD $423.30 millions of which, XCD $405 million corresponds to recovery needs associated with the reconstruction/repair of building damage, and XCD $18.30 million for expenses associated with additional cost. The expenses incurred such as the debris removal and cleaning and the operation and maintenance of shelters are included within the recovery needs, however, it is important to mention that these expenses have already been covered in a high percentage by the government. Damage from household goods and private losses from rental housing have not been included within the needs, as there are no government programs exclusively to address this type of costs. An additional cost for capacity building and training to ensure resilient recovery and a review of codes and standards has been included as part of needs.

Table 10: Summary of Recovery Needs for the Housing Sector

Damage to infrastructure + BBB Parish	Total XCD
Carriacou	323,942,937
Petite Martinique	39,210,868
St. Andrew's	5,749,663
St. David	1,000,888
St. George	1,419,818
St. John's	5,228,558
St. Mark's	2,849,988
St. Patrick's	25,602,010
Subtotal needs for infrastructure	**405,004,728**
Loss and additional cost	**Total XCD**
Demolition and debris removal	12,076,178
Installation and operation of shelters	6,033,093
Governance costs	56,000
Capacity building and training to ensure resilient recovery + review of codes and standards	135,000
Subtotal additional costs	**18,300,271**
TOTAL XCD	**423,304,998**
TOTAL USD	**156,779,629**

RECOVERY STRATEGY

The housing recovery strategy could be aligned with Grenada's current governmental plans, particularly the National Housing Strategy and the National Adaptation Plan (NAP). These initiatives

prioritize climate resilience, infrastructure development, and community-based recovery, echoing the PDNA's focus on sustainable reconstruction. By integrating disaster-resilient building techniques and materials, the recovery efforts aim to reduce vulnerability in high-risk areas, ensuring that the housing sector is prepared not only for immediate rebuilding but for long-term risk reduction and preparedness.

This recovery plan reflects a forward-looking vision for Grenada, where enhancing structural integrity and resilience is essential to safeguarding livelihoods and minimizing the future socioeconomic impact of disasters.

Short- and Medium-Term Activities: In the immediate aftermath of Hurricane Beryl, short- and medium-term activities for housing recovery in Grenada can be focused on addressing urgent housing needs. Temporary repair materials, such as tarpaulins and plywood, should be distributed to allow for quick fixes, ensuring that families have basic shelter while awaiting more permanent solutions. Additionally, long-term temporary housing solutions need to be provided, giving displaced families the stability to plan and initiate the reconstruction of their homes without relying on overcrowded shelters. Reconstruction efforts will prioritize Carriacou and Petit Martinique, where over 90% of homes were damaged, to ensure that the hardest-hit areas recover quickly and safely.

Long-Term Activities: The long-term recovery strategy can be focused on strengthening the resilience of housing through a series of measures aimed at preventing future damage. A key priority will be training builders, engineers, and the general population on improved construction techniques, including better wall-to-roof connections and enhanced designs and constructions for adequate transmission of wind forces through the structure up to its foundation. In parallel, there will be a review and update of Grenada's building codes, incorporating the latest disaster-resilient practices and materials, particularly for roofs and outer walls. Public awareness campaigns will be launched to ensure adherence to these standards, while the government integrates disaster resilience into housing policy, reinforcing Grenada's overall preparedness for future events.

Given that governments normally do not have the financial capacity to cover the entire rebuild of damage of housing buildings, for the most vulnerable communities, a progressive housing could be designed, where the government could help finance the first stage and then provide access to soft credit to complete the housing.

Sector Methodology and Limitations

The damage assessment was carried out based in the field. A structured interview questionnaire was designed in survey solutions (World Bank developed survey application) and was administered digitally using tablets and computers. Information was collected on damage levels to buildings which include residential homes, businesses, institutions, and public units across all parishes and constituencies

including the severely impacted Carriacou and Petite Martinique. To use that data base in the PDNA housing sector, the data base was cleaned up to limit the evaluation to the housing sector only.

Enumerators were given LIDAR imagery maps of Petite Martinique, Carriacou and Grenada on their devices to collect all building information which includes the GPS coordinates points. The statistic office was able to verify the data collection through validation checks. The qualitative levels of damage used for the field assessment were defined based on DANA methodology as follows: *level 1*: damage minimal and easily repaired, *level 2*: the structure can be repaired, *level 3*: the structure sustained significant damage and *level 4*: the structure is destroyed.

Field visits by the members of the PDNA team to Carriacou and the mainland helped verify in situ the level of disruption suffered in a sample of housing buildings. In addition, a second validation of damage levels and associated replacement cost was done by the PDNA team using Google Earth images.

To estimate the value of the houses, the information from the baseline and the local reference was used according to the type of construction and the average housing area by division. These values were suggested by members of the ministry of housing and the statistic office, and they were double checked with local experience builders and by comparisons with prices in similar island/countries.

HEALTH

HEALTH

Pre-Disaster Sector Context

Grenada's health system is primarily public but supplemented by private clinics, and it continues to undergo significant development, particularly with efforts to introduce universal health coverage through the National Health Insurance (NHI). The public sector includes three main hospitals: the General Hospital, Princess Alice, and Princess Royal, which provide a range of services for common health issues, and a mental health facility (Mt Gay Mental Hospital), six health centers, and 30 medical stations scattered across the country offering general care. However, for highly specialized treatment or complex procedures, patients might still need to seek care abroad.

Carriacou and Petite Martinique have a limited number of healthcare facilities, reflecting their small populations. The Princess Royal Hospital, which offers primary healthcare services, and some specialized treatments is in Carriacou. In addition to the hospital, there are several health clinics providing outpatient and emergency services. Petite Martinique, being much smaller, is served by one health clinic that covers basic medical needs. These facilities are part of the broader healthcare system that is being enhanced through national health projects to improve capacity and access.

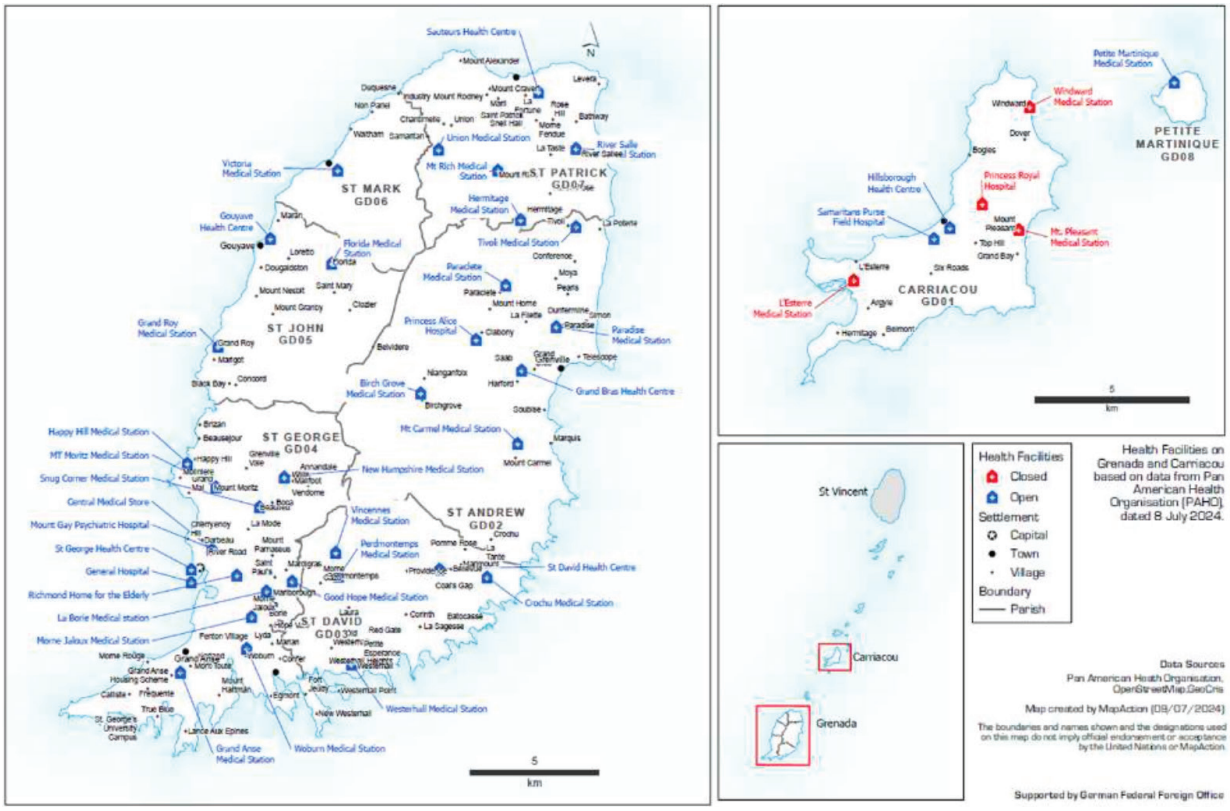
As for the budget, in 2024, $3.5 million has been allocated to restart the National Health Insurance (NHI) project, aimed at providing universal healthcare coverage by 2025. Additionally, $2 million is dedicated to mental wellness projects to address post-pandemic mental health issues. Despite these efforts, there are still challenges, such as staff shortages (around 63 vacancies currently noted within the MoH).

Grenada's health sector is undergoing significant reforms, driven by both local and international initiatives. The Caribbean Development Bank (CDB) and the European Investment Bank (EIB) have launched a US$9.97 million Health Sector Strengthening Project aimed at enhancing the nation's healthcare infrastructure. This initiative will finance medical equipment, capacity-building for healthcare workers, and improvements to healthcare facilities across Grenada. It also focuses on increasing resilience for future health emergencies such as pandemics or those from natural hazards.

Figure 16 shows location of most health facilities in Grenada based on data from FAO.[65]

65 PAHO damage assessment report of healthcare facilities following the impact of hurricane Beryl, 31st July 2024

Figure 14: Location of Health Facilities in Grenada, Carriacou and Petite Martinique



Disaster Effects (Damage and Loss)

Immediately after the passing of Hurricane Beryl, PAHO commissioned an assessment for ten healthcare facilities in Carriacou, Petit Martinique and Grenada (mainland) during the period 23rd to 31st July 2024. This report has been used as reference to identify the effects on infrastructure and content of affected health facilities, along with the detailed information provided by the Ministry of Health in Grenada.

Table 11: Effects in 10 Assessed Health Facilities after Hurricane Beryl – Ref. PAHO 2024

Location	Facility	Operational Status	Building structure	Roof structure	Roofing	Windows	Doors	Shutters	Flooring	Plumbing (visible)	Roof gutter	Water tank	Electrical (visible)	Generator	Air Condition	Solar Water Heater	PV System
Petit Martinique	Petit Martinique Medical Station	F															
Carriacou	Windward Medical Station	NF															
	Mount Pleasant Medical Station	NF															
	Lesterre Health Centre	NF															
	Hillsborough Smart Health Centre	F															
	Princess Royal Hospital	NF										**					
Grenada	Central Medical Stores (Smart)	F															
	*Richmond Home (Smart)	F			*												
	Princess Alice Smart Hospital	F															
	§Mt. Gay Psychiatric Hospital	F															
	River Sallee Medical Station	F															

Legend: Minimal; Moderate; Severe; Not applicable; Unknown

Most of the damage observed in the health facilities is related to the capacity of its roof structure and roofing sheeting to withstand strong winds like the ones generated by Hurricane Beryl. The continued rain entering the buildings also affected some of the equipment and furniture, the lack of generators or electrical systems, water provision and other medical supplies prevented its functionality.

According to the Ministry of Health and based on the direct assessment they carried out on the ground, a total of 11 health facilities of different capacities and services were severely affected in Carriacou and Petit Martinique. These include the Windward Medical Station, the Mt. Pleasant Medical Station, the Lesterre Health Center and the Princess Royal Hospital, all of them equally reported by PAHO. Added to this list are complementary facilities that are critical to ensure full provision of health services, among them, the Doctors and Pharmacist quarters, the Administrative Building (Nurses Hostel), part of the Princess Royal Hospital. In addition to the Environmental Health Office and the Births and Deaths Office, both in Hillsborough.

Important to mention that the Prince Royal Hospital, with complexity and capacity to treat the entire population of both islands, and the Petit Martinique Medical Station, represents an important loose of capacity in the health sector. In Petite Martinique, the effects on its Medical Station was also classified as severely damaged due to the complete destruction of its roofing. In mainland Grenada, four medical facilities reported minor damage, including the Princes Alice Hospital and Mt. Gay Psychiatric Hospital.

The cost estimates for the damage were derived from detailed information provided by the Ministry of Health, based on direct observations and actual cost calculations for repairing and rebuilding infrastructure and other physical assets. The total damage to infrastructure and equipment amounts to XCD $4.16 million (USD$1.54 million). Of this, XCD $3.75 million (USD$1.39 million) pertains to the public sector, while the remaining XCD $0.4 million (USD$0.15 million) affects the private sector, specifically linked to the Pharmacist's quarters.

Table 12: Cost Estimates to Repair Infrastructure and its Content in Terms of Damage

Parish	Damage level	Damage to Infrastructure (XCD)	Damage to Equipment (XCD)	Total	Total (Public) XCD	Total (Private) XCD
Carriacou						
Windward Medical Station	Severe	245,880	54,185	300,065	300,065	
Mount Pleasant Medical Station	Severe	245,880	62,250	308,130	308,130	
Lesterre Health Centre	Severe	286,475	23,685	310,160	310,160	
Hillsborough Smart Health Centre	Severe	48,600	52,685	101,285	101,285	
Princess Royal Hospital	Severe	134,584	911,240	1,045,824	1,045,824	
Doctors' quarters	Severe	400,000		400,000	400,000	
Pharmacist quarters	Severe	400,000	2,757	402,757		402,757
Administrative Building (Nurses Hostel)	Severe	400,000		400,000	400,000	
Environmental Health Office (Hillsborough)	Severe	100,000		100,000	100,000	
Births and Deaths Office (Hillsborough)	Severe	100,000		100,000	100,000	
Petite Martinique						
Petite Martinique Medical Station	Severe	420,841	33,500	454,341	454,341	

Parish	Damage level	Damage to Infrastructure (XCD)	Damage to Equipment (XCD)	Total	Total (Public) XCD	Total (Private) XCD
Grenada						
*Richmond Home (smart)	Low	1,000		1,000	1,000	
Princess Alice Smart Hospital	Low	5,000		5,000.00	5,000	
* Mt. Gay Psychiatric Hospital	Low	30,000		30,000.00	30,000	
River Sallee Medical Station	Low	10,000		10,000.00	10,000	
Grenada whole - miscellaneous (office supply and material)			189,019	189,019.10	189,019	
TOTAL XCD		**2,828,262**	**1,329,321**	**4,157,583.85**	**3,754,826**	**402,757**
TOTAL USD		**1,047,504**	**492,341**	**1,539,845.87**	**1,390,676**	**149,169**

In terms of losses and additional costs incurred by the Health Sector, various emergency-related expenses have been documented. These include the hiring of additional personnel, the mobilization of staff, procurement of medical supplies, water, and other essential items for the affected areas, and preventive campaigns to control dengue and COVID outbreaks.

The total loss and additional costs to the Health Sector amount to XCD $664.70 million (USD$246,19 million). Of this, XCD $646.01 million (USD$239.26 million) pertains to the public sector, while XCD $6.69 million (USD$2.48 million) belongs to the private sector.

Effects in selected health facilities in Carriacou, Petit Martinique and mainland Grenada

Complete loss of its roof structure in the **Petit Martinique Medical Station**, the only one serving the island (600-800 persons). Healthcare services were restored with the support of trucked water and small generators. **Photo PAHO 2024**

Princess Royal Hospital the only one serving Carriacou and Petite Martinique (8,000 people) lost 70% of its roof sheeting, the incoming rains left the facility non-functional. Severe damage to the nurses' and doctors' housing impacted operations. **Photo PDNA team**

Nurses' housing at the Princess Royal Hospital severely affected in its roofing structure. **Photo PDNA team.**

Princess Alice Hospital in mainland Grenada suffered minor damage. **Photo PAHO 2024**

Table 13: Summary of Loss and Additional Costs incurred in the Health Sector

Loss and additional costs	Total cost (XCD)	Public (XCD)	Private (XCD)
Losses by interruption or reduction of the services			
- Forgone income due to closure of pharmacies	1,695	0.00	1,695
Cost of birth and death certificates.	1,000	0.00	1,000
Losses by additional cost to maintenance of the services			
- debris removal and cleaning	118,071	118,071	0.00
- Patient transfer	4,000	4,000	4,000
- Field Water Quality Monitoring Kit	810	810	0.00
- Health Promotion Kit	11,000	0.00	0.00
- Educational Materials	5,000	0.00	0.00
- Food	100,000	100,000	0.00
- Transport to Carriacou (Sea and air)	100,000	100,000	0.00
- Transport within Carriacou (land)	15,000	15,000	0.00
- Energy/Fuel	50,000	50,000	0.00
- Security	6,000	6,000	0.00
Governance costs			
- Hiring of temporary staff	3,329	3,329	0.00
volunteers (structural support)	10,000	10,000	0.00
volunteers (health services)	35,000	35,000	0.00
Rental (accommodation)	7,500	7,500	0.00
Risk reduction costs			
- Mosquito fogging	100,000	100,000	0.00
- Vector control campaigns	14,000	14,000	0.00
Preventive measures (mental health)	50,000	50,000	0.00
- Prevention campaigns	8,300	8,300	0.00
- Health promotion campaigns	15,000	15,000	0.00
Psychosocial support	9,000	9,000	0.00
TOTAL XCD	**664,705**	**646,010**	**6,695**
TOTAL USD	**246,187**	**239,263**	**2,479**

The Sector Human Impact

The Petit Martinique Medical Station, the only healthcare facility serving approximately 529 residents on the island, sustained severe damage, resulting in a temporary disruption of services. In Carriacou, around 4,218 people were left without access to healthcare for at least three months due to significant damage to the Princess Royal Hospital. This hospital, the main healthcare provider for both Carriacou and Petit Martinique, experienced 70% damage to its roof. Further compounding the situation was severe damage to the accommodations for nurses and doctors, which rendered the facility non-operational in the immediate aftermath of the hurricane. The Hillsborough Health Centre, which remained functional, provided health services to the patients of the Princess Royal Hospitals thus providing a temporary solution while repairs were completed in the Princes Royal Hospital.

According to the Pan American Health Organization (PAHO) assessment of Grenada's health sector, facilities retrofitted under the SMART programme in the Caribbean showed considerably better resilience. It's worth highlighting that the smart health facilities were retrofitted for Category 3 hurricane and Beryl was Category 4 when it hit Grenada. Retrofitted facilities withstood the impact of Hurricane Beryl much more effectively, underscoring the critical importance of proactive measures to strengthen the capacity of key infrastructure to endure various natural hazards, including hurricanes, earthquakes, and volcanic eruptions. By enhancing the resilience of such facilities, the health sector can maintain its operability during emergency situations, to this end, revising the building codes following Beryl, and specifically provisions for essential infrastructure such as hospitals, schools, and similar, is a must in a country like Grenada that may be subjected to similar or larger events in the future..

Recovery Needs and Strategy

Recovery needs were estimated in terms of costs to put back the infrastructure that was affected, in improved conditions so that future similar events won't have the level of destruction observed after Hurricane Beryl. To this end, a premium of 15% was added to the cost of damage to buildings. All additional costs incurred to manage the emergency and undertake cleaning and debris removal were costed. Total recovery needs for the sector amount to XCD $5.44 million (USD$2.02 million).

Table 14: Summary of Recovery Needs for the Health Sector

Item	Total (XCD)
Damage to infrastructure + 15% BBB	
Carriacou	4,178,422
Petite Martinique	547,378
Grenada	55,419
Subtotal needs for infrastructure	4,781,221
Loss and additional cost	**Total**
- debris removal and cleaning	118,071
- Other additional cost	291,810
- Governance costs	55,829
- Risk reduction costs	196,300
Subtotal additional costs	**662,010**
TOTAL XCD	**5,443,232**
TOTAL USD	**2,016,011**

Important to note that retrofitting of building facilities to withstand Category 4 or higher hurricanes or the combination of any other hazards is not included in this recovery needs estimates and should be part of a detailed cost estimates under a specific retrofitting program for the Health Sector that will require detailed structural studies.

The Health Sector recovery strategy should be anchored to the ongoing discussions and programs aimed at enhancing the nation's healthcare infrastructure, including medical equipment, capacity-building for healthcare workers, and improvements to healthcare facilities across Grenada, Petit Martinique, and Carriacou.

Reviewing building codes, construction standards and its enforcement mechanisms in the light of even larger events that may happen in the future is a must, especially for critical infrastructure that must remain functional after a disaster. This revision should be done based on solid risk assessment studies that will inform design loads for hurricanes and other natural hazards. In addition, regular maintenance of health facilities needs to be budgeted and done on regular basis, including critical equipment which tend to be costly, requiring proper checkups and maintenance, to protect the value of investment.

Sector Methodology and Limitations

The sector assessment used the inventory of damaged infrastructure collected by the Ministry of Health including cost estimates for repairs and to rebuild using market prices. Complementary information related to the effects and levels of damage to health facilities was gathered through the detailed assessment of health facilities undertaken by PAHO between the 23rd and 31st July in Carriacou, Petit Martinique and mainland Grenada. Field visits by the members of the PDNA team to Carriacou and the mainland helped to verify in situ the level of disruption suffered in some health facilities.

EDUCATION

EDUCATION

Pre-Disaster Sector Context

The national education system in Grenada is delivered in five stages: pre-schools (2 years of education), primary schools (7 years), secondary school (5 years), college (2 years), and/or vocational training (2 years).

Figure 15 Education Facilities in Carriacou

The Grenadian education system is composed of 63 pre-primary, 56 primary and 21 secondary schools, located in mainland, while in Carriacou and Petite Martinique, there are 6 pre-primary (2 unattached and 4 attached), 6 primary, 3 secondary, out of them 1 private school, and one belonging to the tertiary level, the Marryshow Community College.

Grenada's education system reflects a commitment to improving access and quality for its citizens. As of 2022[66], the government allocated about 9.87% of its total public spending to education, slightly below its historical average of 11.77%. This is lower than the global average of 14% but demonstrates a sustained investment in the sector.

66 The Global Economy accessed 8 October 2024

The literacy rate in Grenada is very high, with estimates showing over 98% of adults aged 15 and older being literate. The youth literacy rate (ages 15-24) reaches almost 99%, indicating a well-educated younger population. Enrollment rates are also robust, with primary school enrollment at around 83% in 2021, while secondary school enrollment is higher at nearly 99%.

Additionally, the student-teacher ratio in primary schools is favorable at about 16 students per teacher, contributing to more individualized attention in classrooms. Completion rates at the primary level are impressive, exceeding 100%, which suggests that a significant number of students complete their education on time or even earlier. These indicators point to a relatively well-functioning education system, though further improvements in resource allocation and reducing disparities in access could still be enhanced. Students from Carriacou and Petite Martinique have less access to energy and internet, that could facilitate virtual education, in comparison to students from Grenada's mainland.

Disaster Effects (Damage and Loss)

Figure 16: Dover Government School After Hurricane Beryl

Source: Aerophotography from Google Maps accessed 23rd Sept.

Due to heavy winds and flooding, a total of 10 schools were moderately affected in Carriacou, with one more fully destroyed. Figure 18 shows an aerial photography of Dover Government school and the debris that it produced during its collapse. One hundred and three students attended this school and 14 teachers and staff members.

In Petite Martinique and mainland's St. Patrick parish, one school was lightly affected while a second one suffered moderate damage, two such type in each location. A total of 15 schools were affected by hurricane Beryl in Grenada.

A total of 1,984 students and 281 staff members were part of the schools that were affected by hurricane Beryl. About 87 shelters were opened to accommodate 3,523 displaced persons -1 in Petite Martinique, 6 in Carriacou, and 80 in the mainland. Most of the shelters were opened for less than 5 days, and there are still 2 shelters in Carriacou functioning.

Those schools categorized under light damage show minor effects to roofing and ceilings. The moderate damage was assigned to those schools where the roofing structure was affected. Severe damage relates to damage to the entire structure of the school facility, with no possibility of further use. In this category, learning materials and furniture used by students, teachers and officers are also considered as destroyed, including equipment such as computer labs, mostly due to leakage from affected roofs.

Table 15: List of Schools Affected by Hurricane Beryl in Grenada

Name of the School Facility	Damage level
Carriacou	
Dover Gov't	Destroyed
Harvey Vale Gov't	Moderate
Hillsborough Gov't	Moderate
Mt. Pleasant Gov't	Moderate
Our Lady of the Rosary (Primary and Pre-Primary)	Moderate
Harvey Vale Pre-Primary	Moderate
Hillsboruogh Pre-Primary	Moderate
Mt. Pleasant Pre-Primary	Moderate
Windward Pre-Primary	Moderate
Bishop's College	Moderate
Hillsborough Secondary	Moderate
Petite Martinique	
St. Thomas Aquinas	Light
St. Thomas Aquinas Pre-Primary	Moderate
St. Patrick	
Mc Donald College	Moderate
Grenada SDA	Light

The net value of damage to the infrastructure and assets of the Education Sector due to the impact of Hurricane Beryl has been estimated at XCD $18.14 million (USD$6.72 million), at pre-disaster market prices.

Table 16: Damage to Infrastructure and Assets

Name of the School	Damage Infra structure XCD	Damage to furniture, equipment, and others XCD	TOTAL XCD
Carriacou			
Dover Gov't	8,806,000	94,329	8,900,329
Harvey Vale Gov't	389,620	14,920	404,540
Hillsborough Gov't	644,838	34,498	679,336
Mt. Pleasant Gov't	636,229	60,382	696,611
Our Lady of the Rosary (Primary and Pre-Primary)	227,366	28,838	256,205
Harvey Vale Pre-Primary	3,200,000	13,500	3,213,500
Hillsboruogh Pre-Primary	855,089	17,920	873,009
Mt. Pleasant Pre-Primary	324,192	10,780	334,972
Windward Pre-Primary	140,000	8,258	148,258
Bishop's College	362,627	116,754	479,381
Hillsborough Secondary	Cost required	83,349	83,349
Petite Martinique			
St. Thomas Aquinas	125,000	15,633	140,633
St. Thomas Aquinas Pre-Primary	930,272	10,440	940,712
St. Patrick			
Mc Donald College	879,176	81,375	960,551
Grenada SDA	28,212	0.00	28,212
TOTAL XCD	**17,548,624**	**590,977**	**18,139,602**
Total USD	**6,499,490**	**218,880**	**6,718,371**

Hurricane Beryl made landfall at the end of the 2023-24 school year when students were just starting their holidays season. However, teachers and administrative staff who were still on duty could not perform their responsibilities on a regular basis.

The school year 2024-25 in Grenada was scheduled to start on the 2nd of September. However, at the time of writing this report, schools have not initiated the new session in Carriacou and Petite Martinique, as the affected schools have not been rehabilitated yet, or those that were not affected are being used as temporary shelters. On the other hand, utility services have not been fully reinstalled in those islands yet, even if the energy sector has reported that electricity is now available in the entire island of Carriacou, WASH facilities need to be quickly addressed.

The seven schools in Carriacou and Petite Martinique that were used as temporary shelters will require repairs and equipment to make them operational. At the time of writing this report, there are no clear indications about the deactivation of the shelters.

All schools have undertaken clean-up and debris removal from the premises, at different levels. These activities were made by the Ministry of Carriacou Affairs with the support of teachers, admin staff, students, and parents.

As school buildings and their contents have been affected, the Ministry of Education expects an increase in the number of beneficiaries under the MoE programme that provides uniforms and books to students in Carriacou and Petite Martinique, as well as in the school feeding programme. No damage was reported to Education District offices. However, the personnel of the MoE and District Offices have dedicated some time to monitor the situation and to participate in disaster response coordination meetings.

The Government of Grenada has also put in place a temporary program to ensure students from the affected islands of Carriacou and Petite Martinique can continue their education in mainland Grenada. Support from the MoE includes transportation, accommodation, and food. This initiative may require permanent monitoring and psychosocial support to students and families. On the other hand, it is important to monitor the situation of students who do not participate in this programme and have abandoned their education.

The losses and additional costs incurred to undertake all the above-described activities amount to XCD $3.87 million (USD$ 1.43 million). Income not collected has not been estimated at the time of submission of this report.

Table 17: Losses and Additional Costs Incurred in the Education Sector

ITEM	TOTAL (XCD)	Comments
Debris removal	719,254	
Student relocation *	295,095	To be reviewed for the team
Increase on Uniform student program		
- Pre-primary	172,200	
- Primary	212,400	
- Secondary	386,360	
Care Package for students	2,061,900	1200 one-off for books; 500 one-off for clothing; 2000 for rent, transportation, food; 1 laptop; 2000 per month for 10 months
Deep Cleaning & Sanitizing	21,500	
TOTAL XCD	**3,868,709**	
TOTAL USD	**1,432,855**	

The Sector Human Impact

The following summarizes the main human impacts in the education sector:

- **1924** students were affected in the 3 islands Carriacou, Petite Martinique and mainland's St. Patrick Parrish, additionally 281 school staff.
- **103** students attended Dover Government School destroyed by Beryl
- **7** schools that suffered damage served as shelters
- **191** students need to be or have been relocated to other schools.
- The student relocation program has several challenges as it is addressed to teen-agers, and security and supervision concerns have been raised.
- Psychosocial support for the education community should be given to any person willing to receive this service as well as students and teachers.
- Delays in the initiation of the education year seem to be able to be accommodated.
- WASH facilities in schools: bathrooms, access to clean water, and water storage tanks, need to be attended to quickly, as well as school appliances such as stoves, and refrigerators.

Recovery Needs and Strategy

Total recovery needs for the Education Sector are estimated at XCD $24.64 million (USD$9.13 million). This amount includes repairing and rebuilding infrastructure and assets with an added premium of 15% to include improvements related to stronger roofing systems to withstand strong winds and heavy rains like those produced by Beryl.

Recovery needs also include the costs of the temporary education programs for students from Carriacou and Petite Martinique moving to the mainland, and the care packages for students including the uniform programme. Other costs are related to cleaning and debris removal.

Table 18: Recovery Needs in Education Sector

Damage to infrastructure + 15% BBB	TOTAL XDC
Carriacou	18,407,388
Petite Martinique	1,239,635
St. Patrick	1,124,872
Subtotal infrastructure + BBB	20,771,895
Loss & additional costs	TOTAL XDC
Debris removal	719,254
Student relocation *	295,095
Increase on Uniform student program	770,960
Care Package for students	2,061,900
Deep Cleaning & Sanitizing	21,500
Subtotal loss and additional costs	3,868,709
TOTAL XDC	**24,640,605**
TOTAL USD	**9,126,150**

Recommendations for recovery implementation

- **Policy and regulatory framework.** The Ministry of Education has an updated Education Sector Plan. This was done by Global Partnership for Education, which provides significant funding for priority areas. The Grenada Education sector has defined five policy priorities for the period of implementation of the ESP, until 2030:

    - Equitable participation: To ensure free and universal participation in education, from ECE to secondary, with attention to at-risk and excluded children, and to provide free access to TAMCC, within the context of gender parity.

- Quality and learning: To improve the quality of teaching and learning that includes but is not limited to literacy, oral expression, numeracy, problem solving, soft skills and digital literacy skills
- Education and the world of work: To provide youth and adults with a relevant and diversified skill set, including creativity and innovation, to become productive citizens
- Management and governance: To improve the delivery of education services through a better managed, better resourced and resilient education system
- Values: To transmit values that contribute to the development of the attributes of the ideal Grenadian citizen

This Education Policy may need to address disaster risk management more comprehensively. The MoE should adopt an evidence-based child-centered approach to the education sector risk reduction, putting children's safety and wellbeing at the centre of national, sub-national and local levels efforts. For instance, it is recommended:

- Students; integration into curriculum and co-curricular activities; Disaster Risk Reduction, Emergency Preparedness and Climate Change
- teachers and Administrators; education in emergencies, infrastructure assessment/ maintenance, new school standards
- parents and community; based on vulnerability identified, community engagement and training.

- **Alignment to global frameworks and initiatives.** The GoG needs to sign on to the Worldwide Initiative for Safe Schools (in support of the implementation of the Sendai Framework for Disaster Risk Reduction), and to adopt and implement the Caribbean Safe School Initiative (CSSI). The latter intends to create safe, secure/protective, and green educational institutions from pre-primary to tertiary levels, including private and public institutions through the development of simple, applicable and adaptable tools. The larger education framework for the region on emergency, DRR and school safety is the Caribbean Safe School Initiative (https://www.cdema.org/safe-school-caribbean/contenido-home-principal.html). However, there are several, all of which go back to Caribbean Safe School Initiative (CSSI). Grenada is due to be in the next implementation cohort in 2025.

- **Knowledge management.** The GoG, development agencies and regional bodies must prioritize, fund, and focus on understanding the impacts of disasters on education, risk reduction, preparedness and response. Such studies can identify gaps in policies, implementation, data and knowledge that will provide an evidence base to inform program and advocacy strategies.

- **Institutional capacity building**. it includes building capacities to increase disaster risk management of educational communities through the assessment of risks and vulnerability conditions of all schools (to multi-hazards), the preparation of disaster risk management

plans and safety plans, training of teachers, admin staff, students, and all school community, as well as strengthening MoE and Education District Offices in disaster risk management.

- **Partnerships**. strengthening partnerships with other Central Government institutions, municipalities, UN agencies and specialized NGOs.

- **Financing.** Increase resource mobilization to support the implementation of the recovery plan and building resilience strategy with Government, donors and other multilateral agencies

Global Partnership for Education, GPE, OECS grants

The Climate Smart Education Systems strategic capability initiative is a GPE funded initiative that seeks to enhance countries' capacities to mainstream climate change adaptation and environmental sustainability into education sector plans, budgets and strategies as well as to enhance education ministry capacity for cross-sectoral coordination on climate and environment-related policy and programming. Grenada can express interest in benefitting from activities within this initiative, as several are clearly related to the Compact, for instance the integration of climate change and environmental sustainability in curricula and teacher education.

- **Intersectoral Linkages.** Articulate the education sector recovery interventions with other sectors, such as WASH, energy, the human impact, and Infrastructure. Emphasis should be placed on the construction of proper evacuation centers to avoid using schools for that purpose.

- **Monitoring and evaluation**. Closely monitoring the implementation of the strategy, monitor standards and regulations for Build Back better and comply environmental and social safeguards, accountability of affected populations. It is recommended to outline a small working group responsible for this based on the structure of the Ministry of Education and the Disaster Management Agency. Perhaps a deputy chief education officer, maintenance focal point, PTA member, public works representative and Disaster Management representative. This group can monitor indicators, recommend training and advance the general agenda.

- **Emergency response and recovery preparedness mechanism.** This should be developed at the MoE along with a national database to track vital data on the impact of disasters on students, on damage, loss, and recovery needs.

Implementation Strategy

The Ministry of Education will lead the planned activities using its own resources in collaboration with other line ministries, UN agencies, NGOs, and Community Organizations. The MoE will monitor the recovery process to ensure the use of BBB principles and to identify and address potential

gaps along the process. The recovery strategy will build on the efforts already made by the school communities and Central Government.

In the recovery strategy, special attention will have to be paid to assisting children with disabilities and learning difficulties, who have been affected by the disaster. In all construction-related work, focus should be on the fact that they need to be made disabled friendly.

It is important that the recovery strategy also looks at the human capacity development specifically in recovery including education in emergency training, simulation training with school management and ministry staff to better understand what could happen and planning, cross training with child protection & social protection in an emergency.

The MoE will continue to collaborate with organizations such as UNDP and UNICEF, and other agencies in implementing activities focusing on school safety and child centered DRR in schools. UNICEF had been supporting the MoE and relevant stakeholders during the past decade in promoting participatory school self-assessment and planning processes with emphasis on the Child-Friendly Approach, including DRR and Social Cohesion.

Schools in Grenada generally have emergency and evacuation plans but are less structured when it comes to disaster risk reduction and resilience building. School safety planning empowers the school community, particularly the students, to be actively engaged in discussions around disaster risks and mitigation measures, as well as how to stay safe, in their school, as well as in their homes.

Sector Methodology and Limitations

Baseline information was provided by the MoE, or taken from the Grenada Education Sector Plan 2022-2025, and the Education Statistics. Primary data was collected by the MoE through school wise damage assessments. Cost estimates were based on direct observation and actual costs needed to repair moderate damage to most of the schools and the replacement costs of the fully destroyed facility in Carriacou.

In terms of level of damage, light damage corresponds to minor effects to roofing and ceilings. Moderate damage was assigned to those schools where the roofing structure was affected in addition to the sheeting. Severe damage relates to damage to the entire structure of the school facility, with no possibility of further use.

The recovery needs proposed in this document include BBB costs for infrastructure and additional costs incurred by the government for the emergency response and support to the affected education community.

CULTURE

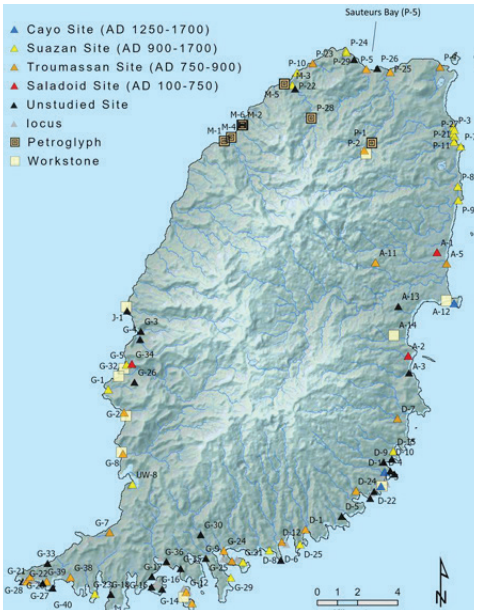
CULTURE

Pre-Disaster Sector Context

Grenada exhibits a rich and diverse heritage, as evidenced by its tangible and intangible heritage, cultural expressions, landscapes, and natural heritage. The country has one element inscribed on the Representative List for the intangible heritage of humanity – Traditional wooden boatbuilding in Carriacou and Petit Martinique, and one element – Shakespeare Mas, a traditional component of Carriacou's annual carnival, pending a decision for inscription.

The Grenadines Island Group has also been placed on the tentative list for world heritage listing as a transboundary nomination for Grenada and Saint Vincent and the Grenadines for their extraordinary heritage representing seascapes, marine habitat and biodiversity, terrestrial heritage, and their geology. In terms of their cultural heritage, the diversity that exists also includes Indigenous People's culture and history, such as the site where the Black Caribs were exiled before shipment to Central America, Big Drum Nation Dancing related to African traditions that have been well preserved in Carriacou from the days of slavery, boat building, and sailing. The Grenadines are renowned for their indigenous boatbuilding skills and seafaring traditions. There is also the rich historical aspect of shipwrecks in the area.

Figure 17: Pre-Columbian Sites in Grenada[67]



67 Archaeological Background of Sauteurs Bay, Grenada (Site # GREN-P-5): Settlement, Burial, and Disaster in the Shadow of Leapers' Hill. Source: Hanna, 2022

There are pre-Columbian settlement sites throughout the islands that have the potential for research and heritage tourism. The Pre-Columbian history of the Grenadines is very rich. This history has been well documented and is still present in the names of the Grenadines (i.e., Bequia – the land of clouds; Carriacou – the land of reefs). Many indigenous artefacts have been found throughout the islands.

Other celebrations include rites of passage events for weddings, tombstone feasts, and wakes), maroon festivals, carnivals and masquerades, and music and dance events. Built heritage is demonstrated through Caribbean vernacular architecture, religious structures, fortifications, and industrial heritage from the plantation past of these islands.

Cultural heritage holds great importance for communities in Grenada and plays a critical role in their economic growth, poverty reduction, and sustainable development. In post-disaster situations, it is acknowledged that cultural heritage also plays a role in strengthening the resilience of affected communities through traditional practices around social cohesion and response and recovery to natural hazards. Many people earn their livelihoods by participating in the sector. So, the capacity of the sector to rebuild post-disaster has implications for the socio-economic conditions of many Grenadians.

In Grenada, the sector falls under the Ministry of Economic Development, Planning, Tourism, Creative Economy, Culture, Agriculture and Lands, Forestry, Marine Resources and Cooperatives, and its management is specifically under the Ministry for Tourism, Creative Economy and Culture.

Inventories exist to include tangible heritage, such as 23 National Heritage Landmarks/Monuments. Actions to preserve built heritage are, however, limited and poorly coordinated. Built heritage is also accorded little priority, in fact buildings damaged by Hurricane Ivan have still not been restored. The Ministry of Tourism is now responsible for sites and culture, but these two themes have shifted around different Ministries. In terms of intangible cultural heritage, the Grenada National Trust also maintains an inventory of practitioners and Grenadian elements.

Disaster Effects (Damage and Loss)

At the time of assessment, it was not possible to obtain all the figures related to damage and loss as some of these were still being compiled. In this case, to be confirmed (TBC) is indicated. As for losses, these were calculated by adding revenue and other damage losses and the costs for emergency interventions where these have been done. This assessment primarily concerns Carriacou and, to some extent, Petit Martinique, which was the centre of impact.

Hurricane Beryl's impact on the culture sector of these identified islands had far-reaching effects at many sites and on individuals, communities, practices, cultural associations, and institutions. The degree of damage was mostly moderate to severe, largely from wind damage. Historic structures

experienced partial or complete collapse or lost their roofs, while archaeological sites were inundated or badly eroded. Cultural practitioners lost their costumes, equipment, and spaces for practice and performances, and artisans lost access to resources and markets.

Both private and public cultural heritage were assessed. Overall, built and archaeological heritage experienced the most damage from Hurricane Beryl. The destruction of the Carriacou Museum was perhaps one of the most visual representations of the destruction caused by Beryl.

Following the hurricane and at the time of the assessment, heritage sites, museums, and other cultural spaces remained closed and were unable to function. Across the board, revenue was impacted either by fewer international and local visitors or the diminished spending power of Grenadians within the context of increased food prices, costs associated with recovery efforts, and loss of income from reduced livelihoods activity.

New risks and vulnerabilities emerged due largely to the lack of disaster planning, to collections being in a poor state with limited environmental controls, pre-existing risks, the emergence of pests, poor maintenance of historic structures and sites, and insufficient human and financial resources required to implement priority actions. There are also risks related to the demolition or insensitive restoration efforts of historic structures due to limited capacity and resources.

Table 19: Summary of Damage and Level of Damage to Cultural Heritage on the Affected Islands

Level of Damage	Grenada, Carriacou and Petit Martinique Cultural Heritage
Minor	Carriacou Botanical Gardens; Mt. Caramel Waterfall; Renegade Rum Distillery; River Antoine; Mt. Rich Petroglyph; Underwater Sculpture Park
Moderate	Belmont Estate
Severe/Extreme	St. Patrick Roman Catholic and Christ the King Anglican Churches; Dumfries Plantation Ruins; Belair Estate Ruins; Carriacou Museum; Grand Bay and Sabazan archaeological sites; Tibeau Cemetery; Bathway Beach; Levera Park and Beach.

BUILT HERITAGE, SITES AND MONUMENTS

Archaeological research on Carriacou indicates that despite its small size, the island was inhabited prehistorically for at least a thousand years.[68] The island's archaeological and built heritage comprises pre-Columbian archaeological sites, remnants of its past plantation economy, historic churches, fortifications, historic cemeteries, and vernacular houses.

In terms of specific damage to historic buildings, all the historic churches lost their roof. They sustained

68 Fitzpatrick et al., A Decade of Archaeological Research on Carriacou, Grenadine Islands, West Indies

significant wind and water damage, such as the St. Patrick Catholic Church in Hillsborough, dating to 1874, and the Christ the King Anglican Church, the oldest Anglican Church dating to 1840, which lost their roof and had substantial damage to their interior. At the time of the assessment, these buildings remained without a roof, and attempts were being made to undertake structural assessments and valuations in relation to restoration. Losses would be directly related to the cost of restoring these structures and identifying alternate spaces for worship.

Plantation ruins experienced a partial or complete collapse, such as the Dumfries Plantation ruins, which experienced a collapse of the chimney of the lime factory and a further collapse of existing structures at the site. The Dumfries Plantation was known as a cotton, sugar cane, and lime plantation dating to the mid to late 1700s. It retained several ruins dating to the late 18th and early 19th centuries that illustrate the plantation landscape. Hurricane Beryl destroyed these ruins.[69]

The Belair plantation was one of the largest on the island and one of the few to produce sugar cane. It had two windmill towers, with the larger, upper one used to grind sugar cane and surrounded by ruins of buildings that catered to the production of sugar. Its great house was used as the 'Doctor's House' for many years before it was abandoned, finally succumbing to Hurricane Beryl. The Belair Park was used as a cultural space where events like the Carriacou Maroon and Stringband Music Festival were held until recently.[70]

In terms of archaeological heritage, secondary but unverified data suggests that the pre-Columbian archaeological coastal village settlement sites of Grand Bay and Sabazan were exposed to further erosion from wave action. These pre-Columbian archaeological sites are recorded as the largest and most prominent sites and are extremely significant to the heritage of Carriacou and Grenada. These sites have previously yielded human burials, and a further loss of these sites is a loss to Grenada. Likely, other lesser-known coastal archaeological sites have also experienced coastal inundation and erosion.

The historic Tibeau cemetery is one of the oldest cemeteries on Carriacou, which is believed to be from the 1700s. The cemetery is now closer to the sea, with some historic tombs already submerged in the water due to previous erosion and further erosion caused by Hurricane Beryl. It was not possible to access the graves due to fallen trees and other debris blocking access. Reports suggest that three-quarters of the cemetery is already underwater.

At the time of the assessment, it was not possible to obtain costs associated with damages experienced by these sites or even if they would be restored. In terms of loss, these archaeological and built heritage sites did not receive revenue in relation to visitors, and no emergency actions commenced.

69 Brief Assessment of the Impact of Hurricane Beryl on Carriacou and Petit Martinique's Cultural Heritage prepared by John Angus Martin

70 Brief Assessment of the Impact of Hurricane Beryl on Carriacou and Petit Martinique's Cultural Heritage prepared by John Angus Martin

Post assessment, no confirmation was received regarding the restoration of structures, and organizations sought to identify resources for structural integrity assessments. Other sites, such as the botanical garden, which was used for public events, also experienced damage.

On mainland Grenada, damage was mostly minor to moderate and confined to the north of the island. Here, the Grenada Tourism Authority reported that Bathway Beach, Levera Park and Beach, and Belmont Estate experienced moderate to severe damage, and the Renegade Rum Distillery, River Antoine, Mt. Rich Petroglyph, and the Underwater Sculpture Park had low damage. No employees were affected, and no statistics were received regarding visitor numbers and impacted revenue.

In the case of sites that experienced severe impact, it was a bit more challenging to assess loss, as these structures need more detailed assessments, particularly in determining structural integrity. So, in these cases, losses focused on what was required to stabilize these spaces to create access.

The total damage in the archaeological and built heritage sub-sector was estimated at XCD $503,000, and losses are yet to be confirmed.

MOVEABLE HERITAGE, REPOSITORIES, AND INSTITUTIONS

The assessment focused on the Carriacou Museum and Historical Society. The Carriacou Museum was opened in 1976 and is in Hillsborough. It is the most prominent museum repository and heritage institution for Carriacou and Petit Martinique. Since 2022, the museum has received a subvention from the Government of Grenada. The museum displays occupied the lower floor, although some Amerindian artefacts were in boxes on the top floor, which were destroyed.[71] As a result of this destruction, office space and equipment, as well as historical documents and books, were destroyed. There is also a serious mold issue, and the space is not environmentally safe for staff. Leaking also continues when there is rain. Technical assessments are required for cultural objects to ascertain their status. In terms of losses related to the restoration of the structure, there is a need to replace office equipment lost. The museum has been closed since the passage of the hurricane, so there are no fees for visits to the museum, gift office sales, or membership subscriptions.

There is no disaster emergency management plan in place for the Carriacou Museum, and there is limited digitization of records due to insufficient resources. This is the same across all similar spaces. No jobs were lost at the museum, and staff are involved in recovery efforts. However, research, visitor, membership subscription, and gift shop revenue have not resumed as the museum is no longer functional and open.

Total damage to moveable heritage is estimated at XCD $50,000 and losses XCD $10,000.

71 Brief Assessment of the Impact of Hurricane Beryl in the Carriacou Museum by John Angus Martin

INTANGIBLE CULTURAL HERITAGE

Carriacou and Petit Martinique are home to various intangible cultural heritage (ICH) elements that are still being practiced today and are central to life on the islands. These include Traditional boat building, Shakespeare Mas, Big Drum Music, Dance Performances, and String Band Music. In 2023, the Wooden Boatbuilding of Carriacou and Petite Martinique was inscribed on the UNESCO Representative List of the Intangible Cultural Heritage of Humanity. Shakespeare Mas' has also been put forward for nomination and is pending a decision. From consultations with practitioners, specific damages and losses were recorded to include:

- **Shakespeare Mas**: Loss of uniforms, equipment, and props, the roof of the community centre used for some activities destroyed, and loss of secondary income
- **Big Drum:** Loss of uniforms; however, drums were not damaged
- **Boatbuilding**: loss of traditional boats with approximately 50% badly damaged and the remaining destroyed. This has resulted in the loss of fishing livelihoods and significant expenses to build boats. It also takes several months to build a traditional boat
- **String Band Music**: uniforms, musical instruments, and equipment. At the time of the assessment, performers had not played on Carriacou since the passage of Hurricane Beryl. The rented office space for the cultural band was also destroyed.

ICH practitioners indicated that not having costumes impacted their participation in some events, and in some traditional social events such as Tomb Feasts and Dancing of the Flag and Cake, persons are not necessarily having a full celebration due to the cost of hosting activities.

Although known and specific elements on Grenada's ICH inventory were not disrupted significantly, the day-to-day living heritage of persons was impacted by their ways of being, knowing, and doing. These could also have implications in the long-term for elements that had declining numbers of practitioners or knowledge bearers. An example of this is traditional boatbuilding, where practitioners highlighted that due to the time and cost related to building a new boat, boats were mostly being made on-demand, mostly by overseas persons. Fishermen were also gravitating to more cost-effective boats.

Regarding quantifying disaster effects on intangible cultural heritage, estimations are relevant to the destruction of places, objects, and materials, as well as the loss of income related to performance events that supported the transmission of ICH. Damage to intangible cultural heritage is estimated to be XCD $730,000 and losses XCD $10,000.

CULTURAL AND CREATIVE INDUSTRIES

Carriacou is known for a variety of festivals and social events, such as the Maroon and Stringband Music Festival, the Carriacou Regatta, African Nation Dance, Dancing of the Flags and Cake at wedding ceremonies, and the annual carnival. These cultural events are significant contributors to the economy of Carriacou and Petit Martinique. The passage of Hurricane Beryl impacted the hosting of the Carriacou Regatta, which was a large source of revenue (up to XCD $650,000) for the islands and the participants of the Regatta, many of whom lost their traditional boats during the hurricane. Other festivals are slated for April 2025, and events are likely to continue unaffected.

Due to the limited time for the field assessment and data collection, a Google survey was used to obtain wider data for the CCIs. It received 20 responses representing fashion design, craft, spoken word and creative writing, creative design, Carnival, and fashion. More than 50% indicated they were part of a creative association, such as the Grenada Association of Creative Arts. Recorded effects include being unable to get financing for the purchase of damaged equipment, damage to most materials and equipment, flooding of workspaces, and impact on persons they depend on for work. Some persons indicated that their relationship with the Maroon Festival, Petite Martinique Regatta, and even Carriacou Carnival remains uncertain to a degree.

In relation to value chains, the hurricane disrupted local and imported supply chains, leading to shortages of essential raw materials like flowers and decor items, which increased costs and delayed delivery times. In terms of cultural spaces or spaces used for cultural activities, some were damaged, resulting in cancellations and the need for repairs before resuming operations. Tools and equipment were damaged or inaccessible due to the hurricane, which greatly reduced productivity during the recovery period. Stocks of perishable materials were lost due to power outages and damage to storage facilities. Some raw materials were damaged and cannot be reused. As expected, there is also lower spending power for customers/consumers. Some persons indicated that the Grenada Cultural Foundation usually hired them as stagehands and for event management for festivals in Carriacou, and that, again, may not be necessary. Income, in some instances, was reduced by up to 80%.

At the time of the assessment, no figures were forthcoming from the CCIs in terms of disaster effects. The Carriacou Regatta, however, reported a loss of XCD $650,000 in relation to not being able to host the event. Overall, the total damage to the culture sector is estimated to be XCD $1.33 million and losses XCD $670,000.

Table 20: Total Disaster Effects (Damage and Loss) on Grenada's Culture Sector

Sub-sector	Total Effects (XCD)		Total Value of Damage and Loss
	Damages	Losses	
Built heritage, sites, and monuments	503,000	TBC	503,000
Moveable heritage, Collections, Institutions	50,000[72]	10,000	60,000
Intangible Cultural Heritage	730,000	10,000	740,000
Cultural and Creative Industries	TBC	650,000	650,000
Cultural Administration	50,000	TBC	50,000
SECTOR TOTAL (XCD)	**1,333,000**	**670,000**	**2,003,000**
SECTOR TOTAL (USD)	**493,704**	**248,148**	**741,852**

NOTES
- Disaster effect estimates were provided by the institutions, organizations, and practitioners, as well as eye estimations of damages.
- CCI practitioners did not provide figures. The cost indicated was provided by officials for the Carriacou Regatta.

The Sector Human Impact

Hurricane Beryl disrupted culture's role in promoting social cohesion and post-disaster recovery. Although it is not possible to quantify this disruption to cultural and community life, this is nevertheless a key component to consider in relation to human impacts. For example, being able to host and participate in important cultural events and celebrations is a key component of the social and cultural well-being of Grenadians, particularly from the affected islands, who retained many traditions from their ancestors. It is not possible to quantify an impact such as this. Nevertheless, its value to the recovery of Grenadians is critical.

Culture is recognized as an important enabler of economic development globally. Although cultural heritage contributes to Grenadian tourism, this contribution has not been mapped or sufficiently quantified. Non-economic losses also present a challenge in a framework that focuses on economic values. Hurricane Beryl destroyed tourism-related supply services and decreased tourist spending at various heritage sites, affecting revenue and income for those connected to these livelihoods. This has a significant impact on a key sector of a country where livelihoods are closely linked to Grenada's cultural heritage, although not sufficiently documented.

72 Based on figures provided by the Carriacou Museum

Recovery Needs and Strategy

RECOVERY NEEDS

Central to this recovery effort is a strategy that promotes and facilitates the enhanced coordination of efforts and cross-cutting partnerships to streamline better the management and maintenance of the diversified cultural sector. In the short to medium term, the priority should be the stabilization, rehabilitation, and restoration of sites and monuments, securing cultural objects, mapping risks, and ensuring that heritage spaces become revenue earners once more if they were prior. In the long-term, the recovery of the sector should be guided by the need to develop frameworks – through planning, policy, programming, and partnerships - that will support the attainment of and sustainability of resilience. The Recovery Framework recognizes that for the sector to become resilient, it cannot only rely on its internal partnerships. Critical partnerships will be needed across the board in disaster management, the environment, industry and trade, housing, and lands, among other key areas.

The Hurricane Beryl assessment identified priority recovery actions for the culture sector, that can guide the sector on some of the partnerships and programmes that are needed and where opportunities lie. The total recovery needs for culture are assessed at XCD$ 3.78 million or USD $1.4 million. Further details on recovery needs can be found in Annex 1.

Table 21: Recovery Needs for the Culture Sector

Culture Subsector	Recovery Needs (USD)			
	Short-term	Medium-term	Long-term	Total
Built heritage, sites, and monuments	100,000	100,000	50,000	250,000
Moveable heritage, Repositories, and Institutions	10,000	222,000	10,000	242,000
Intangible Cultural Heritage	250,000	390,000	0	640,000
Cultural and Creative Industries	25,000	15,000	0	40,000
Cultural Administration	20,000	210,000	0	230,000
TOTAL	**405,000**	**937,000**	**60,000**	**1,402,000**
NOTES: 1. Short-term: 28.89% , 2. Medium-term: 66.83%, 3. Long-term: 4.28%				

RECOVERY STRATEGY

The recommendations below are in relation to disaster risk reduction (DRR), climate change, and building resilience in the Grenadines' culture sector. These actions include developing or finalizing inventories, prioritizing the maintenance, restoration, and conservation assessments of heritage,

capacity-building for those working in the sector, partnerships, identification and mapping of risks, and developing the appropriate framework to manage these risks and the actions to be taken in heritage in emergencies contexts. It is also critical to establish protocols for safeguarding heritage when threats are imminent.

The Grenada culture sector has multiple actors, including intersections with tourism. Considering that the culture sector often does not have the human or financial resources to deal with emergencies on its own, a strategy should be developed amongst all actors to determine the actions and protocols to be established to deal effectively with emergencies. A collaborative approach ensures that all components of the culture sector are included, and critical partnerships are established to support resilience building.

Recovery should consider mapping the culture sector to understand its economic contribution to the Grenadian economy. This data will be critical to emergency contexts when priorities are being established, which often exclude culture.

Urgently address the mapping of disaster risk across culture sector. The sector is currently operating blindly and without the required data to develop data-informed strategies to address risk. *Action: Multi-hazard mapping and vulnerability assessment of disaster risk focussing on the Grenadines and developing a risk map of cultural assets that will function as the main reference tool. Also, enhance the capacity of heritage managers and other actors for identification and monitoring of risks, risk reduction and disaster response, and recovery and restoration efforts of cultural heritage. This mapping exercise should also include heritage in the private sector.*

Ensure that a disaster emergency management strategy is in place for the culture sector. Cultural actors often state that resources are not available to address managing emergencies. However, the development of a costed strategy that prioritizes preparedness planning will greatly assist the sector and result in a more efficient recovery process. Action: *Development of a costed Disaster Emergency Management Strategy for the sector in partnership with national disaster emergency management partners. In the case of Carriacou and Petit Martinique, smaller, more targeted disaster risk management plans can be developed with the support of the Grenada Tourism Authority Office on Carriacou.*

Partnerships are needed for the safeguarding and management of heritage and to provide innovative ways of addressing issues, uncovering additional resources, and preventing duplication of efforts. *Action: There are many opportunities for partnerships to be developed in the culture sector, such as with the Ministry of Industry and Trade for work in the cultural industries.*

Finally, a coordinated heritage tourism strategy will prove beneficial to the Grenadines, encourage the growth of tourism, support the interpretation of sites, and help the rehabilitation of sites that have deteriorated.

Specific to archaeological and built heritage

- Complete inventories using technologies such as GIS to create more informed systems that encourage partnerships for the management and maintenance of heritage
- Prioritize the maintenance of built heritage and monuments to ensure that historic structures are better able to withstand cyclone impacts. This action may require a partnership between the tourism and culture divisions and the various NGOs working with built heritage.

Moveable heritage and repositories:

The only repository assessed was the Carriacou Museum, which lost most of its documentary heritage, and its collections were exposed to the elements and mold. To build resilient collections and repositories, the following should be addressed:

- Digitization of collections should be undertaken as a priority.
- Capacity-building on paper conservation
- Capacity-building on archaeological conservation (first aid for cultural objects)
- Awareness and capacity building on risk mitigation is important for museum staff.
- Identify alternate secure storage spaces.

Intangible Cultural Heritage:

- ICH groups, practitioners, and knowledge-bearers should examine ways to develop resilience that is aligned with their context in times of emergencies. The Grenada National Trust can facilitate such activity in collaboration with other key actors and partners.
- Develop activities that seek to safeguard the intangible cultural heritage in affected areas, such as those that relate to disaster mitigation and resilience, as well as those that promote livelihoods and social cohesion and seek to support the transmission of ICH. The Grenada National Trust has supported ICH-related activities in the past and can be called on to assist ICH groups and practitioners.
- Capacity-building in safeguarding and documentation of ICH during emergencies

Cultural Industries:

- Resilience is needed in terms of support to create alternate platforms for market access, registers of artisans, etc., as well as more secure storage areas.
- Encourage cultural industry associations to initiate discussions regarding disaster emergency management standard operating procedures for their wider membership and to collect data that is necessary to inform risk reduction interventions and recovery efforts.
- The CCIs also tend to have informal structures, so it is important to develop a system that allows them to contribute and provide support (such as insurance schemes) in times of emergencies.

Sector Methodology and Limitations

The culture sector's assessment was facilitated by the Grenada National Commission for UNESCO. The sector assessment used a variety of methods for data collection, including field assessments. In areas where a field assessment was not possible, secondary data sources were utilized, such as reports, photographs, damage summaries from validated sources, and virtual surveys. Primary and secondary data were then compiled and integrated to ensure a comprehensive coverage of the effects of Hurricane Beryl on the sector.

The team collaborated with government agencies, non-government agencies and organisations, civil and community organisations, local communities, artists and artisans, and individual practitioners and knowledge bearers, who are all a part of Grenada's culture ecosystem at country level and specifically on the islands mentioned.

The assessment reviewed existing documents relevant to the impact of Hurricane Beryl, the administration of culture in Grenada, relevant policies, legislation, and strategies, and a desk-review of reports documenting prior effects of other natural hazards on the sector. An assessment mission was undertaken during September 2024 to verify secondary data, to collect data on the impacts, and to do consultations with affected individuals and groups.

For disaster effects, the areas assessed are based on UNESCO's description of the culture sector, including archaeological and built heritage, intangible cultural heritage, moveable heritage and repositories, cultural and creative industries, and cultural administration.

All activities involved *analyzing* the pre-disaster context; *identifying* the effects of the disaster on Grenada's culture sector; *comparing* pre-disaster with the disaster effect; *identifying* priority recovery needs, including resilience measures; and *formulating* a recovery strategy to mitigate the effects of the impacts and return the affected culture sector to normalcy to include both policy recommendations and a strategy for implementation.

During the field assessment, it was not possible to visit all affected areas as the situation on the ground was still very much in an active disaster recovery zone. It was also a challenge to obtain figures regarding damage and losses. As such, this report presents data where it was made available. The assessment, however, presents a snapshot of the disaster effects on Grenada's culture sector.

AGRICULTURE

AGRICULTURE

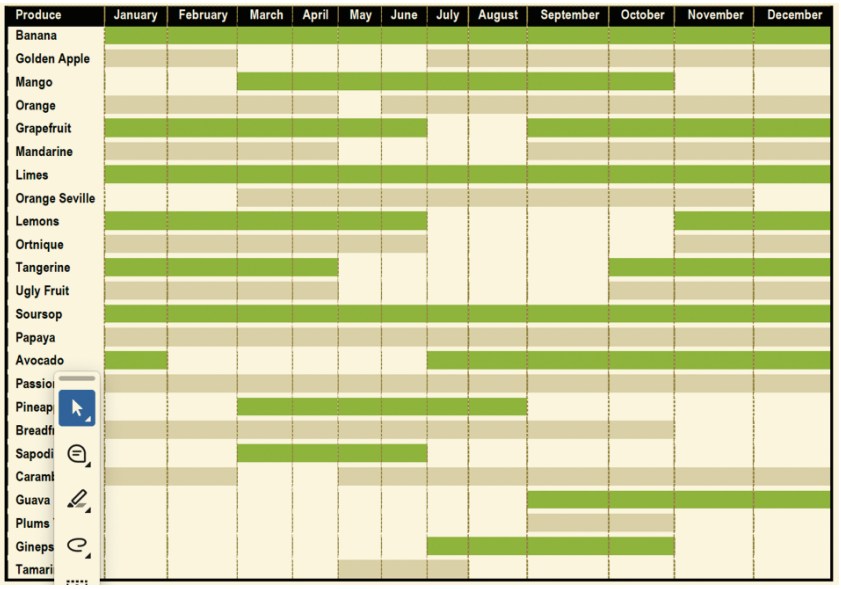
Pre-Disaster Sector Context

The agriculture sector, represented by the crop, livestock, fisheries, and forestry subsectors, accounts for 4,56% [73] of the total country's Gross Value Added (GVA). Grenada's agricultural sector employs around 5,727 people and this represents just over 11% of the total employment generated in the islands.[74] The agricultural sector is the second economic activity with the largest employment generation after the Wholesale and Retail sector (16.6%). About 85% of agricultural employment is carried out by men and 15% by women. The country is the second world's largest producer of nutmeg[75] and fish are one of the most important export commodities, with exports accounting for USD $5.41 million in revenue.[76]

The crops sub-sector shares 45% of the agriculture GVA and 2% of the overall country's GVA.[77] The agriculture sector is mostly concentrated in the mainland with very little production on the Islands. Major cash crops are nutmeg/mace and cocoa but the Island also produces cinnamon, ginger, cloves, vegetables. During the period 2010 to 2014, nutmeg, mace and cocoa accounted for 47% of agricultural exports with nutmeg accounting for 32%, mace 3%, and cocoa 12%[78]. Major fruits are bananas, plantain, vines, soursop, breadfruit and mango.

73 Basic Prices, Central Statistical Office 2014 – 2023
74 Ministry of Finance, National Labour Force Survey, 2023: 4th quarter
75 *Ibid*
76 Grenada national ecosystem report: 2023, https://canari.org/grenada-national-ecosystem-report/
77 Basic Prices, Central Statistical Office 2014 – 2023
78 Grenada National Agriculture Plan 2015-2030

Figure 18 Seasonal Fruit Calendar



Source: Grenada National Agriculture plan 2015

The livestock sub-sector represents 13.9% of the agriculture's contribution to GVA and 0.6% of the overall country GVA.[79] The total population of livestock was estimated at over 118,618 animals.[80] Local poultry production occupies 14.5% of the market demand. The sector suffers from limited access to nutritious forage, it is a financial burden on farmers to provide housing, and it faces serious challenges with pest and diseases, and low productivity.

Table 22: Livestock Population in Grenada

Parish Grenada	Cattle	Sheep	Goats	Pigs	chicken	Total
St. Andrew	684	3.184	4.068	1.482	24.694	34.112
St. David	232	1.400	2.008	1.176	15.174	19.990
St. George	273	1.993	2.456	792	17.687	23.201
St. John	93	338	1.297	364	13.428	15.520
St. Mark	52	215	345	54	627	1.293
St. Patrick	285	1.456	1.706	464	9.551	13.462
Carriacou	325	3.212	1.601	513	3.939	9.590
Petite Martinique	6	767	404	19	254	1.450
Total	1.950	12.565	13.885	4.864	85.354	118.618

79 Basic Prices, Central Statistical Office 2014 – 2023
80 Agriculture census 2012

The fisheries sub-sector in Grenada accounts for 1.67% of the Total Gross Value Added.[81] The fisheries sector represented around 36.7% of the latest Agriculture's GVA.[82] This sector has evolved from artisanal to commercial fishery and harvesting tropical multispecies stock (pelagics, demersal species and high value vulnerable fisheries) in the last decade. Local fisheries authorities estimate overall investments in infrastructure and services for around XCD $450 million in the fishing industry.

The Food and Agricultural Organization (FAO) estimates that the fisheries sector provides direct - indirect employment to 3500 - 4000 persons and around 83 - 86% are full time. The Ministry of Agriculture with its Fisheries Department registers around 2610 vessels in its system; but only 970 vessels are estimated to be operational.[83] The vessels registered in the system (2160) have the following distribution or structure: Pirogue (79.2%), Launch (11%), Beach Seine (1.4%), Sport Fisher (1%), Deck Sloope (0.4%) and undetermined (7.1%). The distribution of operational vessels (970) is currently structured as follows: Open Vessels with oars: 12 - 16 feet (16.5%), Open Vessels with outboard motor: 12 -26 feet (46.4%); Pirogues with cabin and motor: 20 – 31 feet (14.4%); Open Vessels with or without engine: 26 -32 (4.1%); Launch with engine: 32 – 54 feet (16.5%); and launch with engine: 55 – 80 feet (2.1%).

The FAO's Fisheries and Aquaculture Department[84] has reported 45 fish landing sites around Grenada's islands. Seven are considered primary landing sites with port facilities - fish market; thirty-seven are classified as secondary landing sites without infrastructure; and one is denominated tertiary landing site. The primary landing sites in Grenada are Grenville, Melville Street, Gouyave, Victoria, Duquesne, Sauteurs and Hillsborough. The most notable landing sites based on the quantity landed are Grenville (25%), Gouyave (22%), Carriacou and Petite Martinique (18%), Grand Mal (12%), Melville Street (11%), other secondary sites (8%), Victoria (2%), Duquesne (1%) and Sauteurs (1%).

The sector is a multi-gear fishing and complex multi-species fishery sector with no closed season. Fisheries is based on a mix of large and small pelagics, wide spread of demersal species (reef fish and deep-water snapper) and some high value vulnerable fisheries (lobster, conch and turtle). Ninety-one percent of the total fish catch (tons) is concentrated in 10 species: Yellow fin tuna (63%), Great Barracuda (5%), Common Dolphinfish (5%), Atlantic Sailfish (5%), Blackfin Tuna (3%), Snapper (2%), Parrot Fish (2%), Blue Marlin (2%), Red Hind (2%), Cavali - Jack (1%). The other 9.9% of the total fish catch (tons) is distributed among the following eighteen species: Wahoo (1.4%), Skip Jack Tuna (1.3%), Lobster (1.1%), Conch (1.1%), Coney (0.9%), Rainbow Runner (0.8%), Sword Fish (0.4%), White Marlin (0.3%), Bigeye Tuna (0.3%), Bigege Scad (0.3%), Shark (0.3%), Albacore (0.3%), Sandtile Fish (0.2%), Grunt (0.1%), Grouper (0.1%), King Mackerel (0.1%), Doctor Fish (0.1%) and Atlantic Bonito (0.05%). Grenada's Fisheries Division monitors catches of around 59 species; but in most cases, production is recorded in around 40 species.

81 Basic Prices, Central Statistical Office 2014 – 2023
82 Includes Crops, Livestock, Forestry and Fisheries
83 Fisheries Division, 2023
84 FAO Fisheries and Aquaculture Department, 2017

Historically, Grenada's annual fishing production has ranged from 2,500 to 3,340[85] metric tons over the last seven years. The latest data on fishery production reported by the Grenada Fisheries Division is 3,334 tons, which amounts to a production value of XCD $68 million (2023). The fish catch in Grenada is mainly marketed fresh, fresh on ice and minimally frozen; but Grenada's fish imports are mainly processed. Grenada imported around XCD $32 million the last year. Seventy six per cent of total fish imports are distributed in the following products: a) Fish dried, salted, smoked, cooked or not, smoked or not (34%); Alaska Pollock, dried, fish offal, salter or not, smoked or not (7%); Mackerel (11%), Sardines (5%), Frozen Fish (5%); Tunas (4%); Cod (6%), Fresh Fish Fillets (2%) and Frozen Tunas (2%).

The forestry sub-sector represents approximately 23% of the main Island of Grenada, composed of cloud, rain, lower mountain, evergreen and semi-evergreen forests. Deciduous and littoral forests are founded around coastal areas. Carriacou and Petite Martinique is characterised by deciduous and thorn scrub types.[86]

According to the Biodiversity Strategy & Action Plan Grenada, July 2000, Littoral Woodlands occur along the coast in small stretches in Grenada, Carriacou and Petit Martinique. Grenada contains 21 patches of mangrove along the eastern coastline from Levera to Telescope, and along the southeastern coastline from Requin to True Blue, and on the north and south coasts of Carriacou.

Disaster Effects (Damage and Loss)

The crop sector was mostly affected in the northern part of the main Island, particularly in Saint Andrews, Saint John, Saint Mark, and Saint Patrick. The most affected crops were cocoa followed by banana, breadfruit, soursop, and nutmeg. The fishery sector was mostly affected on the Islands, particularly Carriacou. The livestock sector was affected mostly in Carriacou, Petite Martinique and Saint Patrick. Additionally, heavy rainfall and flooding caused severe soil erosion and land degradation, particularly in St. Patrick and St. Andrew, heightening landslide risks and affecting future agricultural productivity. Heavy damage was also registered on the forestry sector, particularly in Carriacou, St Andrews and St David.

Damage to the agriculture sector as a whole amounted to XCD $52.95 million or USD $19.61 million.

85 Grenada' s Fisheries Division, Annual Fish Production, 2023
86 Revised forest policy for Grenada, Carriacou and Petite Martinique, 2018. https://faolex.fao.org/docs/pdf/grn219361.pdf

Table 23: Damage by Sub-sector

Sub-sector	damage XCD		
	Public	Private	Total
Crop	4.000.000,00	31.224.670,17	35.224.670,17
Livestock	-	9.147.758,75	9.147.758,75
Fishery	2.815.428,00	5.758.705,00	8.574.133,00
Total	6.815.428,00	46.131.133,92	52.946.561,92

Crops: The total value of damage to crops was estimated at over XCD $35.22 million. Most of the damage recorded in this sub-sector are related to damaged trees (cacao, bananas, nutmeg, soursop, breadfruits, and vines), uprooted by strong winds, followed by damage to private and government owned infrastructure (including Government owned germplasm). The most affected Parish was St Andrews, followed by St Patrick.

Table 24: Damage to Crops

Parish Grenada	damage XCD		
	Public	Private	Total
St. Andrew	1.000.000,00	14.944.152,50	15.944.152,50
St. David			
St. George		16.240,00	16.240,00
St. John		2.639.347,50	2.639.347,50
St. Mark		2.919.330,00	2.919.330,00
St. Patrick	3.000.000,00	10.705.600,17	13.705.600,17
Carriacou			
Petite Martinique			
Total	4.000.000,00	31.224.670,17	35.224.670,17

Livestock: The total value of damage in the livestock sub-sector was estimated at XCD $9.14 million. Most of the damage are related to the death of animals, particularly pigs, poultry and beehives, and damage to livestock infrastructure (sheds and pens). Hurricane Beryl's effect on Grenada's mainland was low but affected apiculture activities (35% of hives destroyed) and poultry (200-500 birds lost). Carriacou and Petite Martinique were more affected, with over 65% of ruminants, 75% of pigs and poultry, and 100% of beehives affected, alongside substantial infrastructure damage estimated at XCD $5-10 million.

Table 25: Damage to Livestock

Parish Grenada	damage XCD		
	Public	Private	Total
St. Andrew			-
St. David			
St. George			-
St. John			-
St. Mark			-
St. Patrick		415.070,00	415.070,00
Carriacou		6.820.583,49	6.820.583,49
Petite Martinique		1.912.105,26	1.912.105,26
Total	0	9.147.758,75	9.147.758,75

Fisheries: The total value of damage in the fisheries and aquaculture sector was estimated at XCD $8.57 million. Damages are related to destroyed or damaged boats and fish processors, seamoss assets, jetties, ice machines cold rooms, solar panels (fish market), fish market buildings, the shorelines, communication network towers, coral nurseries assets, and processing plants (solar drying units).

Table 26: Number of Boats Damaged (Total and Partial)

Parish Grenada	# boats damaged								level of damage	
	Launch	Pirogue	Beach Seine	Deck Sloope	Sport Fisher	trawler	longline	Unknow	partial	total
St. Andrew		2						1	1	
St. David		1							3	
St. George	37	17	2		1		3	18	13	5
St. John	2	8						1	12	1
St. Mark	6	8			3			1	18	3
St. Patrick		5	1						4	2
Carriacou	27	62	2	5	1	1		1	82	17
Petite Martiique		20	1						65	11
Total	72	123	6	5	5	1	3	22	198	39

Table 27: Damage to Fisheries

Parish Grenada	Damage		Grand total
	Private	Public	
St. Andrew	99.500	104.000	203.500
St. David	83.200	-	83.200
St. George	511.602	-	511.602
St. John	163.206	191.464	354.670
St. Mark	140.872	94.000	234.872
St. Patrick	126.000	191.464	317.464
Carriacou	3.078.350	2.078.500	5.156.850
Petite Martinique	1.555.975	156.000	1.711.975
Total	5.758.705	2.815.428	8.574.133

Forestry: Carriacou's forest and coastal ecosystems sustained significant damage, with varying levels of impact across different areas. The Belair Forest Plantation, a mid-aged forest with economically valuable hardwoods, saw 20% of its trees uprooted and 80% with broken tops. The Dover Mangrove and Beach Ecosystem and Lauriston Mangrove and Associated Coastal Ecosystems, dominated by various mangrove species and other coastal trees, had similar damage with approximately 20% uprooted and over 80% with broken tops. Harvey Vale Mangrove Ecosystem, featuring dense, mixed-aged trees, experienced over 80% defoliation and 15% broken tops, with 75% of beach trees losing their tops. Island-wide, forest resources saw 70-85% broken tops and 15-30% uprooted, with hardwood species playing a crucial role in environmental and ecological functions. Wildlife presence was noted across all areas. Damage to forestry was also quite significant in St Andrew, St Patrick, S George, and St David.

Table 28: Damage in Forestry

Parish Grenada	Forest area name	% Uprooted and fallen Trees	% Defoliated and Broken Trees
St. Andrew	"Grand E'tang Forest Reserve Including Mt. Qua Qua, Grand E'tang Lake area, Black Forest Area, St. Marguerites Area"	50	85
St. David	Morne Gazo Forest Reserve	30	50
	Petit Etang Watershed Area	60	80
St. George	Annandale Forest Reserve	30	50
	Mt. Hartman national Park and Dove Sanctuary		5
	Woburn mangrove conservation area		2
St. John			
St. Mark			
St. Patrick	Ramsar Site: Mangrove and Woodland Surrounding mangroves	15	50
		10	45
	Bathway Beach	25	30
	Forest Vegetation Throughout St. Patrick	15	50
Carriacou	Belair Forest Plantation	20	80
	Dover Mangrove and Beach Ecosystem	20	80
	Lauriston Mangrove and Associated Coastal Ecosystems	15	85
	Harvey Vale Mangrove Ecosystem	15-20	75-80
	Island-Wide Forest Resources Other Than Plantation, Mangrove and Beach	15-30	70-85
Petite Martinique			

Losses or aggregate change in economic flows in the agriculture sector is estimated at XCD $78.51 million or USD $29.08 million. Most of the losses were recorded in the crop sub-sector.

Table 29: Total Losses by Subsector

Sub-sector	loss XCD		
	Public	Private	Total
Crop	-	72.223.790,12	72.223.790,12
Livestock	-	1.783.452,13	1.783.452,13
Fishery	269.200,00	4.230.588,67	4.499.788,67
Total	269.200,00	78.237.830,92	78.507.030,92

Crops: Estimated production losses in the crop subsector was XCD $72.22 million. Cocoa was the most affected, followed by bananas. Fruit production (breadfruit, mango, sour soap, vine) was also badly affected. St Andrew, followed by St Patrick were the most affected Parishes.

Table 30: Losses in the Crop Sub-sector

Parish Grenada	loss XCD		
	Public	Private	Total
St. Andrew		50,945,629.76	50,945,629.76
St. David			
St. George		974,400.00	974,400.00
St. John		4,255,676.76	4,255,676.76
St. Mark		2,710,287.96	2,710,287.96
St. Patrick		10,097,705.40	10,097,705.40
Carriacou			
Petite Martinique			
Total	-	68,983,699.88	68,983,699.88

Livestock: Estimated production losses in the livestock subsector was XCD $1.78 million, related to loss of honey and eggs production, with 300 poultry perished on the main Island, and 75% of the stock for Carriacou and Petite Martinique. The share between layers and broilers were considered equal. About 35% of beehives were affected on the mainland and 100% in Carriacou and Petite Martinique.

Table 31: Losses in Livestock

Parish Grenada	loss XCD		
	Public	Private	Total
St. Andrew			-
St. David			
St. George			-
St. John			-
St. Mark			-
St. Patrick		1.591.380,00	1.591.380,00
Carriacou		191.701,28	191.701,28
Petite Martinique		370,85	370,85
Total	-	1.783.452,13	1.783.452,13

Fisheries: Loss is estimated at XCD $4.49 million and are related to loss of income due to destroyed or damaged boats, or aquaculture materials and fish processing structures, as well as costs for debris removal. Most of the losses refer to loss of income from fishing activities with Carriacou being the most affected.

Table 32: Losses in Fisheries

LOSSES						
	Fisheries	Aqua - Culturist	Fish Processing	Debris removal	Total	
Parish	Private	Private	Private	Public	Public	Private
St. Andrew	30.000,00	305.408,18			-	335.408,18
St. David	18.200,00	222.371,19			-	240.571,19
St. George	479.218,60	119.305,60			-	598.524,20
St. John	146.287,00			23.400,00	23.400,00	146.287,00
St. Mark	290.950,00		18.000,00	23.400,00	23.400,00	308.950,00
St. Patrick	90.100,00	75.000,00		23.400,00	23.400,00	165.100,00
Carriacou	1.670.558,40	27.000,00		117.000,00	117.000,00	1.697.558,40
Petite Martinque	738.189,70			82.000,00	82.000,00	738.189,70
Sub total	3.463.503,70	749.084,97	18.000,00	269.200,00	269.200,00	4.230.588,67

Note: loss of income information provided by fishermen. Assumptions: Recovery time between 2 – 6 months based on the level of damage (more 70 % = total damage - 6 months) / less 70% = partial damage – between 2 to 6 months)

The Sector Human Impact

The effects of Hurricane Beryl on agriculture resulted in overall impact on food security, reduction of export of products such as nutmeg, cocoa and eggs. It has also a direct impact on livelihoods, with loss of income for fishermen, livestock herders, beekeepers, egg, and crops producers.

Recovery Needs and Strategy

Total recovery needs for the agriculture sector amount to XCD $54.63 million or USD $20.21 million.

Table 33: Total Recovery Needs for the Agriculture Sector

Intervention/Activity	Short-term* (up to 12 months)	Intermediate* (up to 3 years)	Long-term * (up to 5 years)	Cost in XCD	Cost in USD
Assistance to clear debris, fallen trees and crops. Prune or cut broken tree branches with jagged edges, as clean cuts encourage better healing and faster regrowth.	300.000,00			300.000,00	111,000.00
Cocoa and nutmeg planting materials required for replanting.	30.382.345,00			30.382.345,00	11,241,467.65
Introduction of Wind-break tree species to increase resiliency to strong winds.		300.000,00		300.000,00	111,000.00
Develop planting system with fast-growing grass species such as the vetiver grass as a green bioengineering tool for controlling erosion and slope stabilization		300.000,00		300.000,00	111,000.00
Scale up provision of feed, fooder, veterinariy services and restocking	1.627.758,75			1.627.758,75	602,270.74
Enforce livestock sheds and pens building standards to be able to withstand natural disasters	7.520.000,00			7.520.000,00	2,782,400.00
Sea-moss farmers will require planting material.	208.200,00			208.200,00	77,034.00
Provision of Business Interruption Benefit for basic needs coverage	2.800.000			2.800.000,00	1,036,000.00
Reestablishment of the Fisheries Communication Network		2.210.000		2.210.000,00	817,700.00
Clearing debris at fish landing and market sites	269.000			269.000,00	99,530.00

Repair of affected landing sites around the island)		1.200.000		1.200.000,00	444,000.00
Repair of fish market sites		1.400.000		1.400.000,00	518,000.00
Credit lines with special conditions for the rapid restoration of the fishing fleet		5.400.000		5.400.000,00	1,998,000,00
Credit lines with special conditions for the rapid restoration of seamoss farms		208.000		208.000,00	76,960.00
Develop policies and capacity-building initiatives for resilient agriculture practices, environmental best practices			200.000,00	200.000,00	74,000.00
Conduct in depth ecosystem-based assessment and restoration of ecosystem (mangrove, plantation, beach etc..)			300.000,00	300.000,00	111,000.00
Total	43.107.303,75	11.018.000,00	500.000,00	54.625.303,75	20,211,362.39

In the crop subsector, short-term activities will address immediate needs such as cleaning of debris and providing seedlings, and restoring nutmeg, cocoa, and fruit tree plantations with shorter cultivars (e.g., for breadfruits cultivar Ma'afala and Meinpadahk that can be easily sourced from neighboring islands like St.Vincent and Trinidad). In the medium term, the introduction of wind-break tree species is recommended to increase resilience to strong winds. An integrated planting system with fast-growing grass species such as the vetiver grass is recommended as a green bioengineering tool for controlling erosion and slope stabilization. Long term interventions include policy development and capacity-building initiatives to adopt disaster resilient agroforestry practices.

In the livestock subsector: short-term activities will support the continued rehabilitation of livestock production through scaled-up provision of feed, fodder, veterinary drugs, as well as restocking. Restoration of destroyed animal shelters using BBB principles should also be prioritized. In the medium to long term, further resources would be required for restoring the livestock economy, promoting traditional breeds in select zones due to their inherent resistance, developing area specific action plans for natural calamities including assembly points, rescue, and development of low carbon / climate resilient animal shelter models. Capacity building for field veterinarians and livestock keepers on climate smart practices for livestock rearing shall be also implemented together with awareness creation and development of standardized weather/holistic hazards index-based livestock insurance systems targeting small holders and the landless. Reconstruction needs shall include restoration of assets at the individual / community level, as well as support to the private sector (i.e., poultry / apiculture industry).

In the fishery sub-sector: In the short term, interventions should focus on supporting basic Needs Coverage for Fishermen and Sea moss farmers, and on the restoration of fishing capacity, both Infrastructure and vessels (Short – Medium Term).

In the Forestry sub-sector: Interventions that speak to environmental best practices are needed, including ecosystem restoration (mangrove, plantations, beach and other forests).

The recovery needs and strategy were developed and prioritized according to the severity of damages and losses identified in the agriculture sector analysis. The agriculture strategy will be based on inclusive and participatory community-based approaches, with special focus on the poor and other vulnerable groups. Given the negative impact of natural disasters, particularly on the agriculture sector, further ecosystems assessments are needed to identify sustainable means to reduce impacts from future storms and hurricanes and promote resilience including use of Ecosystem Based Adaptation (EBA) and Nature Based Solutions (NBS). The aim of the recovery and reconstruction effort in agriculture is to revive economic activities across the sector and to strengthen farmers' capacity to be more resilient to similar future shocks in accordance with the principles of Building Back Better.

6. Sector Methodology, Limitations and Recommendations

Limitations

- Lack of accurate baseline data for agriculture (latest census done in 2012)
- Limited detailed, parish level information on effect of hurricane Beryl on the sector
- Several assumptions were made to estimate the overall loss and damage figures, resulting in a rough estimation of the effects, particularly regarding crop and livestock.

Recommendations

- **Strengthen** the collection, management, and dissemination of pre-disaster sectoral baseline data to improve risk assessments, disaster needs evaluations, beneficiary targeting, procurement, and emergency response planning.
- **Improve** accessibility of data and specifications for fishing vessels, farming inputs, and tools to enhance disaster effects analysis and expedite recovery procurement and repairs.
- **Promote** geospatial tools like satellite imagery, Lidar, and drone imagery to support production monitoring and disaster damage assessments.
- **Build** capacity in preparing, disseminating, and interpreting agriculture-specific early warning advisories for crops, livestock, and fisheries.
- **Integrate** ecosystems-based approaches and adopt lower-impact fishing gear where applicable.
- **Conduct** lesson-learning exercises on Hurricane Beryl's preparedness and response to inform future disaster preparedness and simulation planning.
- **Enhance** dissemination of the CARICOM Emergency Response Strategy for the Agriculture Sector, linking it to national agriculture and multi-sectoral preparedness efforts in collaboration with CDEMA, NaDMA, and relevant ministries.

TOURISM

TOURISM

Pre-Disaster Sector Context

During the decade from 2014 to 2023, tourism in Grenada performed quite well. Visitor arrivals posted annual average growth of 33.4%. High-spending stayover visitor arrivals registered an average yearly growth of 20.7%, while sea arrivals grew by 16.6%. Meanwhile, cruise ship passenger arrivals posted dynamic average growth of 62.9% per year. In line with the robust growth in arrivals, visitor expenditure averaged 35.1% per year over the decade.

Beyond the strict numbers, tourism has had many beneficial spillovers in the economy and society. The sector is an important source of employment and livelihood for many people, especially women. In addition, it is an important source of earnings for farmers, fisherfolk, taxi and tour operators, craft vendors, and people in the cultural and entertainment industry.

Prior to Hurricane Beryl, total visitor arrivals, including students, grew by 3.4% to 313,851 visitors. Higher spending stayover visitors expanded by 15.8% to 115,744 visitors, on the backs of the continued recovery after the pandemic. Cruise ship passenger arrivals declined by 2.8% to 193,394. Meanwhile, yachting passengers contracted by 4.3% to 12,717. Hotels and resorts and private homes were the main types of visitor accommodation, accounting for 51% and 32% of arrivals, respectively.

The tourism sector in Carriacou and Petite Martinique is relatively small compared with Grenada. The sector consists of a range of establishments and activities, including small hotels, guest houses and apartments, restaurants, tour operators and taxis, dive shops and attractions. The yachting subsector is more important in Carriacou and Petite Martinique than the traditional stayover component. Yacht passenger arrivals were 13,615 in 2019 but fell off during the pandemic. In 2023, the total number of yacht passenger arrivals was 10,811. International stayover arrivals are relatively small, with domestic tourists from Grenada an important contributor to stayover arrivals.

Disaster Effects (Damage and Loss)

To assess the damage in the tourism sector, the baseline listing of tourism properties in the accommodation sector and other activities, including dive tourism were examined. The listing from the Grenada Tourism Authority provided a listing of 213 tourism businesses that were evaluated for impacts after Hurricane Beryl. These included accommodations, sites and attractions and marinas. The accommodations in Carriacou and Petite Martinique consisted mainly of small hotels, guest houses, Airbnb, apartments, and villas.

The damage in tourism was estimated based on the methodology outlined in the ECLAC's Handbook for Disaster Assessment. The estimates of damage to tourism infrastructure, including hotel plants and guest houses, were based on the value of the asset before the hurricane, the extent of its degradation after the event and the cost of replacing or restoring it to its prior condition. The replacement cost is based on the average price per square foot for buildings in the affected islands. The average minimum cost for private buildings is around XCD$250 per square foot and ranges from XCD$550-600 for commercial properties.

The damage to the tourism sector in the islands ranged from slight to severe. Slight damage means there were some non-structural impacts to the plant and equipment, but the property's structural integrity remained unaffected. Meanwhile, the severe damage category applied to those properties that suffered significant non-structural impacts alongside some structural impacts. Given the differentiated wind and rainfall intensity in Carriacou and Petite Martinique versus Grenada, the most severe impacts were in the two former islands, as Grenada was spared the brunt of the hurricane. Damage stemmed mainly from wind and water impacts, with most properties suffering significant roof damage in Carriacou and Petite Martinique. This was compounded by damage to windows, equipment and furnishings, the common areas and landscaping.

Table 34: Damage in the Tourism Sector

	Tourism Properties and Facilities (XCD Millions)		
Categories	**Public**	**Private**	**Total**
Hotels	-	5.58	5.6
Guest houses/villas	-	3.50	3.5
Restaurants	-	1.32	1.3
Tour operators, taxis & vehicle rentals		0.11	0.1
Attractions	-	0.50	0.5
Other tourism businesses	-	0.10	0.1
Total	-	11.11	11.1

The total estimated damage in the tourism sector in Grenada, Carriacou and Petite Martinique amounted to XCD $11.11 million or USD $4.11 million. The overwhelming bulk of the damage was in Carriacou and Petite Martinique, which bore the brunt of the hurricane. Damage in these islands was estimated at XCD$10.49 million, while for Grenada it was XCD $0.62 million. The cost of the damage was highest in the accommodation and restaurant subsectors. The damage to the hotel subsector was estimated to be XCD $5.58 million, representing just over 50% of the total damage. Hotels in Carriacou and Petite Martinique consisted of small properties that suffered significant damage to the roof, windows, walls, equipment, and furniture. Guest houses were also severely affected, with damage estimated at XCD $3.5 million, or almost 31.5% of the total. Restaurants had

a similar profile of damage to hotels and guest houses, accounting for nearly 12% of the damage, amounting to XCD $1.3 million. Tour operators, attractions, dive shops, and other small tourism businesses were also affected by the hurricane, but their damage costs were much smaller than those of accommodation and restaurants. Nevertheless, the adverse ripple effects on the livelihoods of the affected small businesses and households have been significant.

The tourism losses reflect lost business due to the significant damage to tourism infrastructure, which has led to sharply reduced room capacity. In addition, the appeal of the destination has been affected by reduced dining options, the closure of attractions and fewer amenities. The islands are also expected to face reduced tourist demand as some visitors shift to competing destinations. Some visitors have cancelled their bookings in the wake of the hurricane. Further, these factors, compounded by significant environmental damage, are expected to reduce the demand for the destination in the short term, especially for stayover visitors. Total losses amounted to XCD $6.4 million or USD $2.37 million (not including additional costs). This represented 35% of the total impact of the hurricane. As with the damage, the bulk of the losses were in Carriacou and Petite Martinique, amounting to just under XCD $6 million, accounting for 93.5% of the total.

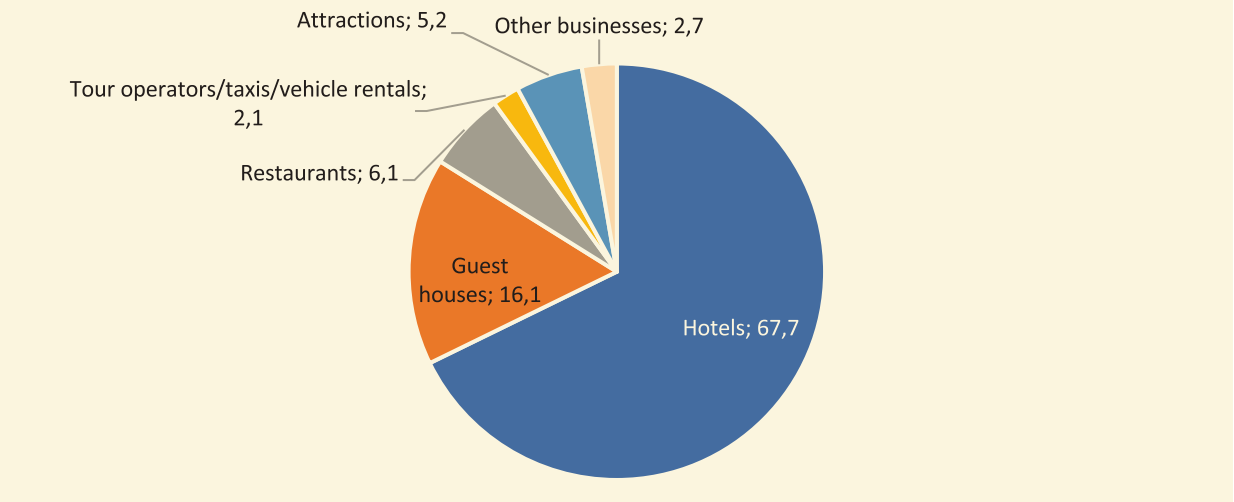
Like the damage, losses were concentrated in the accommodation and restaurant subsectors. Losses in accommodation were estimated at XCD $4.3 million and XCD $1.0 million in hotels and guest houses, accounting for 68% and 16% of the total losses (see figure xx below). Although not substantial on a national scale, losses in accommodation were significant for Carriacou and Petite Martinique, particularly given the relatively small size of the subsector. Moreover, losses are expected to run into the tourist high season that runs from mid-December to mid-April.

Meanwhile, losses were relatively lower in tour operations, attractions, and other businesses, given their smaller share of the sector. The estimated losses for tour operators and taxis amounted to XCD $0.14 million, or 2.1% of the total losses. However, like the loss of income for other small businesses, it represented a significant livelihood shock for affected operators, affecting their living standards in the short term.

Table 35: Losses in the Tourism Sector (excluding additional costs)

Type of business	Losses (XCD Millions)	% of total
Hotels	4.3	67.7
Guest houses	1.0	16.1
Restaurants	0.4	6.1
Tour operators/taxis/vehicle rentals	0.1	2.1
Attractions	0.3	5.2
Other businesses	0.2	2.7
Total	**6.4**	

Figure 19: Tourism Sector Losses by Type of Expenditure in Percentages



Additional costs amounting to XCD $0.59 million resulted from the hurricane. Most of these costs stemmed from clean-up costs following the damage to tourism properties and amenities. The hurricane's damage led to substantial debris, which had to be cleared to restore business operations. Therefore, cleanup, including debris removal accounted for more than 70% of the total additional costs. The remainder of the extra expenses related to the acquisition of alternative power sources from the use of generators, hiring extra workers and the costs of information bulletins and advertising by the Grenada Tourism Authority to inform tourists and operators in major markets that Grenada, the mainland, was not badly damaged and was open for business.

Table 36: Additional Costs in the Tourism Sector

Island	Additional costs (XCD Millions)
Grenada	0.43
Carriacou & Petite Martinique	0.16

Recovery Needs and Strategy

RECOVERY NEEDS

In the short term (6 to 12 months), a strong focus of recovery will need to be placed on rehabilitation and business recovery to limit the economic and social fallout from the hurricane. Given the severe impact on Carriacou and Petite Martinique, tourism businesses in these islands need an urgent liquidity injection. A business grant should be considered to provide short-term assistance for

businesses to undertake immediate repairs needed to restart operations. This will enable them to secure some income from yacht and dive tourists who might still visit the islands.

In the short to medium term, the government's Business Reactivation Fund, which has been capitalized at XCD $25 million at the Grenada Development Bank, should be fully implemented. This will enable several businesses to build back better so they can better withstand future hurricanes. However, most businesses interviewed noted that they were underinsured. Therefore, the authorities should undertake and awareness campaign to encourage tourism and other businesses to ensure that they are adequately insured, including against flooding. In addition, businesses must be encouraged to revise their insurance plans when they upgrade and modernize their properties so that coverage matches the higher property values.

In the medium to longer term, tourism construction must focus on resilience. Some severely damaged properties in Carriacou and Petite Martinique were built from a mixture of wood and concrete. Given that the Caribbean is expected to be affected by more frequent and intense hurricanes due to climate change, property owners should consider rebuilding fully concrete structures where they can afford them. In addition, properties will need to consider safety measures relating to improved roof design and the use of hurricane straps.

Table 37: Damage and Loss in Tourism

	Tourism impact in XCD millions				Tourism impact in USD millions			
	Damage	Losses	Additional costs	Total	Damage	Losses	Additional costs	Total
Hotels	5.58	4.32	0.19	10.09	2.07	1.60	0.07	3.74
Guest Houses	3.50	1.03	0.14	4.67	1.30	0.38	0.05	1.73
Restaurants	1.32	0.39	0.08	1.79	0.49	0.14	0.03	0.66
Tour operators, taxis, vehicle rentals	0.11	0.14	0.05	0.30	0.04	0.05	0.02	0.11
Attractions	0.50	0.33	0.13	0.96	0.19	0.12	0.05	0.36
Other businesses	0.10	0.18	0.01	0.30	0.04	0.06	0.002	0.10
Total	11.11	6.39	0.60	18.11	4.13	2.35	0.22	6.70

RECOVERY STRATEGY

In concert with the private sector and civil society, the Government of Grenada will need to design a creative strategy for resuscitating and developing a more resilient and competitive tourism sector in the aftermath of Hurricane Beryl. This strategy should include short, medium, and long-term measures.

The government has provided a package of incentives to assist affected households and businesses. These include a waiver of value-added tax (VAT), common external tariff (CET), and customs service charge (CSC) on building materials, household furnishings, equipment, and replacement parts. This will help tourist businesses restore their operations so that some of them can benefit from the high season, which runs from mid-December to mid-April. The package also includes support for business activation, including a waiver on taxes on machinery and equipment, a waiver of property taxes for affected residential and commercial properties for 2025 and a waiver of corporation income tax (CIT) for affected businesses for the period June 1 to December 31, 2024.

Alongside the above-mentioned measures, Grenada needs to upgrade the tourism product in Carriacou and Petite Martinique to make it more competitive and attract more high-spending international stayover visitors. The upgrading strategy can be built around adventure, eco, heritage, and cultural tourism. The zip line in Petite Martinique needs to be repaired and better marketed as an attraction. In addition, cultural tourism should be better integrated around the indigenous Maroon Festival, Stringband music and Big Drum Nation Dance. There is also scope for branding the islands as novel, unspoilt gems to attract more high-net wealth tourists.

WATER, SANITATION AND HYGIENE

WATER, SANITATION AND HYGIENE

Pre-Disaster Sector Context

Water and Sewerage

The National Water and Sewerage Authority (NAWASA) is mandated to provide potable water supply and offsite sanitation services throughout Grenada. Approximately 90% of the water produced by NAWASA comes from surface water sources, with the remaining 10% sourced from boreholes, springs, and desalination on Carriacou and Petite Martinique.

NAWASA is responsible for operating and maintaining over 30 water and wastewater systems. These systems include intake structures (dams, boreholes, and springs), raw water transmission pipelines, treatment plants (including two reverse osmosis desalination plants in Carriacou and Petite Martinique), treated water transmission pipelines, storage reservoirs, pump stations (water and wastewater), distribution pipelines, and several buildings.

Status of water supply services prior to the hurricane:

The Grenada Core Welfare Indicators Survey report of the Joint Monitoring Programme (JMP) for the WASH Report 2023 states that 99% of the population in urban areas and 95.3% of the population in rural areas had access to improved water facilities on their premises. This includes piped, non-piped and surface water. In terms of service level estimate it was reported that in urban areas, 95.8% of the population received water supply service, while in rural areas this was 88.1%.[87]

Table 38: Percentage of the Population with Access to Water Supply Facility Type

Facility Type	Sub-Facility	Urban	Rural	National
Improved water supply facility	Overall	99.0	95.3	95.4
	All piped	99.0	92.7	92.9
	Non-piped	0.0	2.6	2.5
	Surface water	0.0	0.3	0.3

Source: Grenada Core Welfare Indicators Survey report

Status of sanitation services prior to the hurricane:

87 JMP (washdata.org)

In terms of sanitation, 97.5% of people in urban areas and 98.3% of people in rural areas had access to improved sanitation facilities, whilst there is a low prevalence of open defecation of 1.7% in urban areas and 0.6% in rural areas.[88]

Table 39: Percentage of the Population Using Sanitation Facilities

Facility Type	Sub-Facility	Urban	Rural	National
Improved toilet connection	Overall	97.5	98.3	98.3
	Sewer connection	50.7	3.3	5.4
	Septic tank connection	37.6	55.2	54.4
	Others	9.2	39.8	38.5
Open defecation	N/A	1.7	0.7	0.7

Source: Grenada Core Welfare Indicators Survey report

Hurricane Beryl highlighted the following pre-existing WASH sector development challenges and risks:

Vulnerability of Water Infrastructure: The water supply system's dependence on fragile surface water infrastructure makes it highly susceptible to damage from natural disasters. The nine most vulnerable treatment plants, producing a combined average of 4.24 million gallons per day account for 60.6% of the island's total daily water production. The failure of key treatment plants and pipelines during Hurricane Beryl exposed the sector's vulnerability;

Limited Institutional Capacity: NAWASA's lack of comprehensive disaster risk management training for its staff impedes the Authority's effectiveness in managing the risks associated with natural hazards and hindered effective response and recovery efforts;

Aging Infrastructure: Many parts of the water supply network, particularly raw water transmission pipelines, are outdated and made of less durable materials (e.g., PVC replacing cast iron), which are prone to damage and disruption during extreme weather events from falling trees, landslips, river erosion and structural failures;

Inadequate Investment in Resilience: There is insufficient funding and investment in upgrading the water infrastructure to withstand climate-related hazards, putting long-term water security at risk.

Solid Waste Management

88 JMP (washdata.org)

The Grenada Solid Waste Management Authority (GSWMA) is charged with the duty of developing the solid waste management (SWM) facilities and improving the coverage and effectiveness of solid waste storage, collection, and disposal facilities of Grenada. The Ministry of Health provides overall policy guidance and carries out enforcement. Solid waste collection coverage is 98%, spanning towns, suburbs, and rural areas. Waste contractors collect co-mingled waste, transport it to the dumpsites and dispose it. Recycling is not mainstreamed as waste pickers collect and return breweries bottles, copper wires, aluminum, and scrap iron. Key challenges for solid waste management include illegal dumping of waste at abandoned properties, behind bridges, byways, and sea walls.

Disaster Effects (Damage and Loss)

Damage in the WASH sector amounts to XCD $1.75 million (USD $0.65 million) and losses XCD $8.92 million (USD $3.3 million). Hurricane Beryl severely damaged the reverse osmosis (RO) desalination system in Petite Martinique disrupting water supply production and dissemination for about 3-4 weeks and caused some modest damages to the RO system in Carriacou, disrupting water production for about 3-4 days. The hurricane damaged the intake pipes and pumps, treatment plants, storage tanks, distribution pipes and pump, plant and office buildings. In addition, in particular the heavy rainfalls associated with the passage of Hurricane Beryl caused significant damages to water supply infrastructure and surface water catchments on the mainland Grenada. Landslips, fallen trees and increased debris loads in creeks caused damages to dams and intake structures, disrupting water mains, distribution lines and filled reservoirs with debris and dead wood in the North and East of Grenada, parishes of St Andrew, St Patrick, and St David. The surface water catchment at Mt. Horne is rendered unsafe now and will need to be relocated.

Table 40: Estimation of Damages in the WASH Sector

DAMAGE	Carriacou	Petite Martinique	St Andrew	St David	St Patrick	TOTAL	
						(XCD)	(USD)
Tanks	308,000	124,500		240,000		**672,500**	**249,074**
Pipes:							
- Raw main			185,000	4,500	75,000	**264,500**	**97,963**
- Intake pipes/supports	15,000	88,000				**103,000**	**38,148**
- Distribution pipes	23,000	9,000	25,000			**57,000**	**21,111**
Dams			210,000	5,000		**215,000**	**79,630**
Plant Buildings	45,000	85,000	2,000			**132,000**	**48,889**
Pumps	85,000	38,000				**123,000**	**45,556**
Pump Buildings	10,000	45,000				**55,000**	**20,370**
Office Buildings	14,750	4,100				**18,850**	**6,981**
Waste Management Facilities						**105,000**	**38,889**
SUBTOTAL	500,750	393,600	422,000	249,500	75,000	1,745,850	646,611

Municipal sewerage systems were unaffected and there was little to no damage reported to individual septic tanks. However, superstructures of pit latrines were destroyed by the high winds on Carriacou and Petite Martinique.

Domestic garbage collection resumed shortly after Beryl and there was only some modest damage to waste management equipment and facilities. However, the massive destruction of buildings, infrastructure and vegetation and associated hurricane waste required the purchase of substantial additional equipment (incl. waste collection trucks) for the management and disposal of the additional demolition (and construction) waste. With nearly XCD $8.4 million in costs, this comprises the highest single loss within the WASH sector. The decline in water supply revenues, clean-up and debris removal, temporary provision of water and higher costs for collection /disposal of demolition waste are the other major losses in the sector with approximately XCD $0.13 million, XCD $0.11 million, XCD $0.09 million, and XCD $0.09 million, respectively.

Table 41: Estimation of Losses in the WASH Sector

LOSS	Carria-cou	PM	St Andrew	St David	St George	St John	St Mark	St Patrick	TOTAL	
									(XCD)	(USD)
Higher Operation Costs										
Cost of temporary provision of water	68,000	4,400	16,000						**88,400**	**32,741**
Support to operational staff	21,500	4,400							**25,900**	**9,593**
Use of alternative sources of water supply	10,080	34,875							**44,955**	**16,650**
Cost of clean-up/ debris removal			44,000	3,000	4,300	28,000		33,000	**112,300**	**41,593**
Restoration of water services (staff overtime and employment of temp. workers etc.)	21,500	17,400	9,400	1,900	1,750	1,500	500	10,150	**64,100**	**23,741**
Additional equipment to process and dispose Hurricane waste									**8,370,000**	**3,100,000**
Higher operating costs for collection/disposal of demolition waste									**90,000**	**33,333**
Loss in Revenue										
Decline in operational revenues (water supply)	11,786	5,238	45,697	4,892	14,522	8,701	1,027	35,249	**127,111**	**47,078**
SUBTOTAL	132,866	66,313	115,097	9,792	20,572	38,201	1,527	78,399	8,922,766	3,304,728

Whilst Hurricane Beryl caused significant damage and loss to the water and sanitation sector utilities,

the most significant effect in the sector is to residential WASH systems. Based on a sample survey 75 households in the nearby Southern Grenadines damages in the order of XCD 6.65 million (US$ 2,46 million) are estimated to individual domestic WASH facilities on Carriacou and Petite Martinique. Only 10% of households in Carriacou are connected to the NAWASA RO system and residents predominantly rely on individual rainwater catchment systems for their water supply. However, with 63.9-65.6% of roofs and individual rainwater catchments destroyed or severally damaged on Carriacou and PM, respectively, many residents won't be able to collect sufficient rainwater before the next dry season. **The risk of a continued water crisis during the next dry season is extremely high!**

The Sector Human Impact

Hurricane Beryl caused a serious disruption of water supply on the islands of Carriacou and Petite Martinique. Many water cisterns and tanks are contaminated following the passage of Hurricane Beryl rendering them unsafe for use. Further, there is now the practice of extracting water from the cisterns and tanks with buckets due to the disruption of household electricity supply and subsequent operation of electrical pumps, which causes (further) contamination of cisterns and tanks.

As a survey of the Environmental Health Department on Petit Martinique shows there is an increased risk of water borne disease among the residents as more persons use water from cisterns for drinking, and the fact that more than half of the premises do not treat the water in the cisterns. However, only a very small percentage reported any symptoms of water borne disease so far. 7% (4) persons reported having diarrhea and 6% (3) reported vomiting. Most other persons (89% or 48) showed no symptoms of water borne diseases.

The future of water supply in Carriacou is unsecure given the upcoming dry season. This can only be remedied if there is substantial and rapid reconstruction and repairs of roofs and/or creation of additional desalination capacity by NAWASA. Most residents are very concerned about the water supply situation during the upcoming dry season as evidenced by a household survey of nearby Southern Grenadines, which face similar water supply challenges post Beryl.

In addition, Hurricane Beryl caused a serious degradation of several surface water catchments, with one reservoir being now in urgent need of relocation. The massive destruction of buildings, infrastructure and vegetation caused considerable strain on waste management and disposal capacities.

Recovery Needs and Strategy

Recovery and reconstruction needs in the WASH sector total XCD $16.45 million or USD $6.09 million.

Table 42: Recovery and Resilience Needs for the WASH Sector

Intervention/Activity	Short-term (up to 6 months)	Med -term (up to 18 months)	Long-term (up to 3 years)	Notes/ Priority
Repair and replacement of damaged water supply infrastructure (tanks, pipes, treatment plants, dams, pumps, and buildings), and waste management facilities	1,689,435			2 (partially completed)
Provision of second RO plant for Carriacou	1,620,000	1,620,000		1, co-financing EU/CCCCC
2 additional 100,000 gallons storage tanks and dissemination pipes		500,000		2, G-CREWS
Temporary provision of water (bottles/truck)	88,400			completed
Use of alternative water sources	44,955			completed
Clean-up and debris removal (tanks, plants, reservoirs, offices)	112,300			completed
Restoration of water supply	64,100			completed
Needs to keep staff on Carriacou and PM	25,900			completed
Relocation of Mt Horne dam and reservoir		1,100,000		2, no co-financing secured yet
Strengthen environmental resilience of Grenada's water supply		605,000	605,000	3, no co-financing secured yet
Additional equipment needed to collect, process, and dispose additional construction and demolition waste	8,370,000			1(66% completed, GoG Beryl funds)
Extra costs of managing additional waste	90,000			GoG Beryl funds
TOTAL (XCD)	**12,105,090**	**3,825,000**	**605,000**	**16,445,090**
TOTAL (USD)	4,483,367	1,416,667	224,074	6,090,000

RECOVERY STRATEGY

The GSWMA received funds from the Beryl Recovery Funds of the Ministry of Infrastructure Development (MoID) to purchase additional equipment, including additional rubbish collection trucks. Thereof, about 2/3 have been procured and the remaining 1/3 is expected to be procured by the end of October 2024.

NAWASA's aim is to provide safe and reliable water to residents and all sectors in Grenada. This will require in addition to the repair and replacement of damaged water facilities the following urgent additional investments in resilience:

- XCD $3.7 million for installation of a second reverse osmosis treatment plant on Carriacou, with additional water storage capacity and dissemination network. The European Commission through its implementing partner, the Caribbean Community Climate Change Centre (CCCCC), will provide € 490,000 in co-financing for the plant. In addition, water storage and dissemination lines approximately valued at XCD $500,000 will be provided through the Climate Resilient Water Sector in Grenada (G-CREWS) project supported by the Green Climate Fund, the German Federal Ministry for Economic Cooperation and Development and the Government of Grenada.[89]
- XCD $1.1 million for relocation of Mt. Horne dam and surface water reservoir. NAWASA is exploring co-financing from CDB and others.
- XCD $1.2 million to enhance environmental resilience of Grenada's water supply, including network vulnerability assessment, replacement of vulnerable PVC pipes, improved maintenance schedules, reconstruction of pump house in Petite Martinique, and DRM capacity building. NAWASA is exploring grant co-financing from CDB and others.

Demonstrating its commitment to address climate and disaster resilience, NAWASA was one of the first water utilities in the Caribbean to join the newly established Caribbean Water Utility Insurance Collective providing financial and technical support following major disasters in the region. NAWASA received the first ever payout under this newly established facility of XCD $5.9 million (within just 14 days) to support the recovery of water supply in Grenada, including its islands of Carriacou and Petite Martinique, following Hurricane Beryl. In a report from the General Manager of NAWASA, it was stated that the funding would be complemented with other resources from CDB et. al., to strengthening the resilience of the intake of the Petite Martinique desalination plant within the next 4-6 months as well as conduct further assessments of vulnerabilities of the overall supply network in Carriacou and Petit Martinique.

Sector Methodology and Limitations

The estimation of damage, loss and needs is based on data and information received from NAWASA and GSWMA. The estimation of effects and impacts of Hurricane Beryl on domestic WASH facilities on the islands of Carriacou and Petite Martinique is inferred from a sample survey of the nearby Grenadines.

89 The increased water production, storage and dissemination capacity will address the immediate temporary threat of a drinking water shortage due to the need to rebuild roofs and individual rainwater harvesting facilities. In addition, it will meet the increased water demand from residents during dry seasons due to lesser and more variable rainfalls and will create more resilience in the water supply sub-sector due to increased redundancy and robustness and thus better preparedness to future shocks.


ENERGY

ENERGY

Pre-Disaster Sector Context

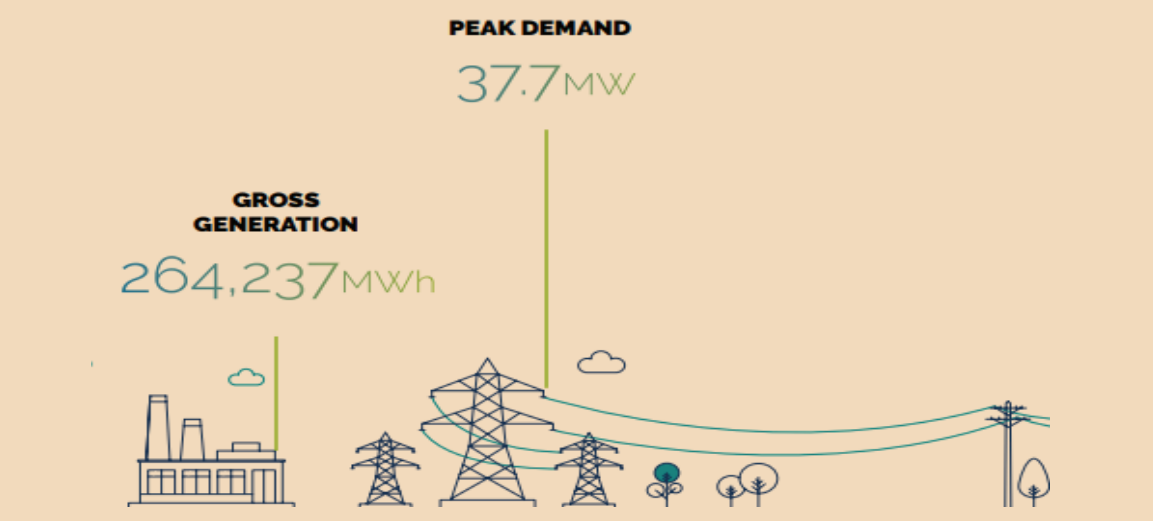
The Grenada Electricity Services Limited (GRENLEC) is a state-owned public utility. GRENLEC, as the Network Licensee, is responsible for transmission, distribution and supply, and for most of the electricity generation on the island. Since the enactment of the Electricity Supply Act (ESA) in 2016 and the establishment of the Public Utilities Regulatory Commission (PURC), there has been a greater emphasis on regulatory oversight and the emergence of Independent Power Producers (IPPs), aiming to enhance the sector's sustainability and resilience. Prior to Hurricane Beryl, the sector was in a relatively stable condition, with ongoing projects aimed at enhancing infrastructure resilience and expanding access to electricity. About 99.7% of the country's population has access to electricity. GRENLEC serves a diverse customer base, including residential, commercial, and industrial users with over 58,000 customers, of which around 4,100 are in Carriacou and Petite Martinique. The electricity network is dependable, although there are some challenges in consistent access to power due to the occasional unplanned outage or voltage drop, outside of those caused by weather conditions.

Infrastructure and Capacity: On grid generation

Grenada's electrical Grid [51.36MW of centralized diesel generation] is shared between the Queens Park Power plant and the SGU power station (4.68MW strategically located at the University principally as backup units), and 12 distribution feeders of varying lengths with a minor mix of distributed renewable energy sources (5 MW, primarily solar PV). The sole power station in Carriacou has a generation capacity of 1.8 MW with a peak demand of 1.5MW while on Petite Martinique, there is 0.37 MW of diesel capacity to the island along with a 30kW solar PV plant. A recently constructed Solar PV (856kWp), and Battery Energy Storage (BESS) (768kWh, 400kW) in Limlair, Carriacou was being commissioned at the time of hurricane Beryl. Multiple planned solar projects facilitated through the regulator, PURC are part of ongoing efforts to increase renewable energy usage and reduce dependence on fossil fuels. In 2023, Grenlec commissioned 72 new RE interconnections under the PURC Self-Generator program, adding 1.17 MW to the total installed capacity.

The electrical network is principally a distribution network at 11KVA's, except for two 33KVA transmission line lengths totaling 16.91km, from the Queens Park Power Plant to Grand Anse. The transmission and distribution (T&D) network consist of mainly overhead (99%) and a small percentage of underground electrical network across Grenada and the lines are categorized into primary and secondary lines. For Grenada, the total length of primary lines is 461.10 km, while secondary lines total 1,845.14 km. In Carriacou, the primary lines measure 44.73 km, while secondary lines total 182.63 km. Petite Martinique has a total of 2.99 km of primary lines and 512 km of secondary lines. The following figure illustrates key generating characteristics of the electrical system.

Figure 20: Summary of Electricity Supply and Demand Characteristics



Source: Grenlec. Annual report 2023

Sector developmental challenges

Economic Impact: The electricity sector plays a crucial role in Grenada's economy, supporting various industries and contributing to overall development. The sector is grappling with aging infrastructure and financial constraints, impacting service reliability and modernization efforts. Investment in renewable energy projects is ongoing but has faced delays due to limited resources and planning challenges. Recently, there has been focus on improving efficiency and mostly driven by the private sector, individuals have sought costs reductions, leading to a growth in investing in renewable energy projects to enhance sustainability.

Challenges and Opportunities: While the electricity sector in Grenada was performing satisfactorily pre-Beryl, challenges such as aging infrastructure, the need for modernization, and the potential impacts of climate change were recognized. Opportunities for growth included the expansion of renewable energy projects, improvements in energy efficiency measures and enhancement of resilience in the grid infrastructure. Due to its pre-dominantly overhead configuration the existing T&D network remains vulnerable to high-winds and related catastrophic impacts of hurricanes and related natural disasters.

Disaster Effects (Damage and Loss) DAMAGE AND LOSS

Damages in the energy sector amounted to XCD $12.88 million or USD $4.77 million. The electricity sector effect was not evenly spread across all three islands of the state of Grenada. Varying degrees of damage to power plants, solar PV farms, and transmission and distribution systems across

Grenada, Carriacou, and Petite Martinique was assessed. In Grenada, the Queen's Park Power Plant and St. George's University suffered negligible damage with no damage to the fuel tanks or fuel supply system. The Plain's Solar PV Farm and Grand Anse Solar PV Farm owned by the utility had minor to no damage. The distribution system damages were mainly in the northern parishes, with regional organization Carilec assistance requested for the northern part of the island. Severe damage to electrical T&D infrastructure in the northeast of the island occurred. These affected areas are connected to the ends of the Gouyave feeder, Grenville feeder and Industrial feeder. The transmission system in St. Georges remained undamaged. Most of the damages can be attributed to treefalls and vegetative debris, compounded in other areas by landslides. This meant that while the recovery plan was implemented in a relatively quick and efficient manner, many areas on secondary lines were cut off as there was first a need for clearing up efforts before secondary customer connection lines could be assessed.

Table 43: Estimation of Damages in the Electricity Sector

Damages	Grenada	Carriacou & PM	Total (XCD)	Total (USD)
Transmission and Distribution				
Line Materials	256,797	735,431	1,580,573	585,398
Cables	30,164	286,516	361,926	134,046
Poles	14,307	424,391	460,158	170,429
Transformers	79,188	836,492	1,034,461	383,134
			-	-
Carriacou Offices			-	-
Administrative Building		338,245	338,245	125,276
Storage Building		8,421	8,421	3,119
Garage		36,714	36,714	13,598
Engine Hall		114,120	114,120	42,267
Petite Martinique Plant & Office				
Petite Martinique Solar Plant		254,501	254,501	94,260
Customer Offices				
UPS Grenville Office	15,000		15,000	5,556
Grenville Office Building	31,000		31,000	11,481
Other Generation Assets			-	-
Solar PV and BESS - Limlair		8,640,000	8,640,000	3,200,000
Total	**426,455**	**11,674,829**	**12,875,117**	**4,768,562**

The utility company buildings in Carriacou suffered infrastructure damages including the Beausejour Power Plant building, Control Room/Switchgear, Garage Building, Office, Storeroom, and Staff area which lost their roofs. No damage to diesel generators, the fuel tanks or fuel supply system. The Petite Martinique's power plant experienced heavy structural damage and the Petite Martinique's Solar PV Farm was completely destroyed. There was catastrophic damage to the electrical T&D infrastructure for both islands with over 150 fallen poles accompanying most of the lines and over 75 transformers destroyed. Most of these damages can be attributed to treefalls and vegetative debris. Both the primary and secondary feeder lines remained completely disconnected after the hurricane as there was first a need for clearing up efforts before customer connection lines could be assessed. Initially, all generators remained offline whilst the plant building was repaired, and initial customers assessed. To date most connections are temporary connections as over 50% of customer premises are not yet qualified for electrical connections.

The newly built, grant funded, solar plant and Battery Energy Storage System (BESS) which was designated to offset 30% of the energy consumption in Carriacou was destroyed, with over 80% of the PV array being damaged. 15-20% of the PV modules could potentially be reused. The inverters and batteries show no visual damage and may still be functional. There were flaws in the plant layout, the racking design, and drainage systems etc. which led to the system being significantly compromised. This renewable energy system was being commissioned when the hurricane occurred rendering the project unusable and needing to be replaced.

The damage estimate for the transmission and distribution systems, Solar PV farms and other assets is approximately 53% of the pre-Hurricane asset inventory in Carriacou and Petite Martinique and around 0.4% for Grenada with an aggregate impact of around 10% of the pre-Beryl infrastructure assets of the utility in all three islands.

Total sector losses were estimated to be XCD $6.91 million or USD $2.56 million.

Table 44: Estimation of Losses in the Electricity Sector

Losses	Grenada	Carriacou & PM	Total (XCD)	Total (USD)
Wages Distribution - Hurricane	710,092	-	923,119	341,896
Wages Dist C'cou - Hurricane	-	516,610	929,897	344,406
Employee Assistance Program - Hurricane expense	-	94,734	123,154	45,612
Production Expenses Hurricane	-	11,773	15,305	5,668
Repairs & Mtc - Hurricane Expense	2,327	20,940	30,247	11,202
Outside Purchases - Hurricane Expense	8,086	72,771	105,114	38,931
Overseas Labor - Hurricane	-	1,298	151,298	56,036
Tree Trimming - Hurricane Restoration	61,500	-	70,725	26,194
Vehicle Rental - Hurricane expense	-	1,800	9,000	3,333
Transportation- Hurricane expense	-	99,965	179,936	66,643
Meals - Hurricane Expense	28,655	257,896	372,516	137,969
Crew Accommodation - Hurricane expense	26,326	236,934	394,890	146,255
Foregone Income				
Loss revenue for electricity supply			3,361,387	
Loss revenue from waived reconnection		246,660	246,660	91,356
Total	**836,985**	**1,561,379**	**6,913,247**	**2,560,462**

The utility provided financial assistance to its employees in Carriacou and Petite Martinique through an employee assistance program and covered the expenses of Carilec members doing recovery and restoration work on the islands. From the total losses assessed the utility had foregone incomes from reduced electricity sales to the 4100 customers in Carriacou and Petite Martinique spread over a 12-month period if over 12% of customers regain an electricity connection per month after the passage of the hurricane.

The Sector Human Impact

Hurricane Beryl had catastrophic effects on the supply of electricity in Carriacou and Petite Martinique. Initially, all generators remained offline whilst the plant building was repaired, and initial customers being assessed.

To date most connections are temporary connections as over 50% of customer premises are not yet qualified for electrical connections. This poses an economic and household challenge to execute daily activities due to the lack of a suitable electrical connection. This lingering effect of inadequate electricity usage due to no connection or temporary connections is two-fold as in the absence of electricity supply most households in Carriacou and Petite Martinique would not be able to effectively access any harvested rainwater from their cisterns as they are not able to operate an electrical pump.

In addition, access to frozen and perishable goods was reduced as most businesses and supermarkets did not have an electrical connection to run refrigerators. This poses a food security and health risk for the population.

The destruction of the Limlair solar farm have prevented the residents from experiencing lower cost electricity in the short run unless this solar farm or similar grant-funded systems are re/constructed.

Recovery Needs and Strategy

RECOVERY NEEDS

In total, the energy sector's recovery needs are XCD $32.6 million or USD $12.07 million. The key recovery and reconstruction need are for the immediate repair of the T&D systems which was executed with the assistance of regional utilities through Carilec. Over 50% of the needs is for the upgrades of the metering systems to AMI to ensure that it is more responsive and resilient in the face of natural disasters. Also planned is the assessment of the grid infrastructure to ensure investment in resilient and sustainable energy infrastructure which includes the rebuild of underground networks for a key economic corridor on the island of Carriacou. After Beryl, there have also been on-going discussions with the implementers/investors of the Solar PV system to assess how insurance can assist in terms of recovery. The goal is for Petit Martinique (200 kW peak) and Carriacou (1.5 MW peak) to be 100% RE.

Table 45: Recovery and Resilience Needs for the Electricity Sector

Intervention/Activity	Short-term* (up to 12 months)	Med-term* (up to 3 years)	Long-term * (up to 5 years)	Priority (rank 1-5)	Cost (XCD)
T&D System Repairs					**6,979,943**
Materials (Poles, Cables, Transformers)	X			1	3,674,743
Labour (Salaries & Wages)	X			1	1,853,016
Overseas Labour	X			1	151,298
Employee Assistance Program	X			1	123,154
Plant expenses	X			1	15,305
Repairs & Maintenance	X			1	30,247
Transportation & vehicle rental	X			1	188,936
Crew Accommodation & Meals	X			1	767,405
Outside Purchases & Supplies	X			1	105,114
Tree Trimming - Hurricane Restoration	X			1	70,725
PV Plant Repairs					**253,048**
PV Solar Plant Petite Martinique	X				253,048
Office Repairs					**543,499**
Carriacou Offices	X			1	497,499
Petite Martinique Plant & Office	X			1	
UPS Grenville Office replacement	X			1	15,000
Grenville Office Building repairs	X			1	31,000
Resiliency Infrastructure	X				**16,183,510**
AMI Infrastructure Implementation (Carriacou & PM)		X		1	10,183,510
Underground Network - 2.63 miles from Plant to NAWASA desalination plant. Est. (EC$4M-6M)		X		1	6,000,000
****Limilar Solar PV system replacement**	X			**1**	**8,640,000**
Total					**32,600,000**

The T&D network in Grenada was 100% restored within 1 month with the focus then shifting to Carriacou and Petite Martinique. In Carriacou and Petite Martinique the utility is providing temporary connections to residents to ensure early access to electricity supply. Energy Security is a priority so the solar farms at Limlair and Petite Martinique are a priority for reconstruction.

RECOVERY STRATEGY

The recovery needs and strategy were developed and prioritized according to the severity of damages and losses identified in the energy sector analysis. Several discussions were also held with the key national authorities. This approach enabled the solutions to ensure a proper alignment and

coordination with the already on-going recovery and reconstruction efforts, undertaken both by the government and other humanitarian and development actors, thus avoid duplication of efforts.

Technical assistance from the EU-TAF in the re-design of a grid for Carriacou which will build-in resilience and determine the best way to incorporate RE sources to the grid is being considered. Once the re-design of the grid is completed, the EU will try to attract investors from Europe through the Global Gateway Investment Agenda (GGIA). While the EU will not be able to cover all the cost, there might be some possibilities through blending to contribute to some investments in the future.

GRENLEC received an XCD $25.1 million payout from the CCRIF-SPC to support repairs to the electricity transmission and distribution systems.

Sector Methodology and Limitations

The estimation of damage, loss and recovery needs is based on data and information received from the utility, GRENLEC. There is an overall lack of capacity by the utility to efficiently execute the required assessment and this resulted in noisy data which needed some time and effort to scrub for applicability.

TRANSPORT

TRANSPORT

Pre-Disaster Sector Context

The transport sector comprises two subsectors, airports, and ports. Other subsectors such as roads, were not included in the analysis as reports have indicated that they did not suffer major damage or have been already rehabilitated.

Airports

Grenada's aviation sector is managed by the Grenada Airports Authority (GAA), a statutory corporation established by the Parliament Act, CAP 12, Airports Authority Act, Revised Laws of Grenada of 1990. The GAA is responsible for overseeing the management, control, and supervision of the country's airports. At the heart of the sector is Maurice Bishop International Airport (MBIA), located at Point Salines on the southern tip of Grenada. MBIA is the primary hub for international flights, its 9,000-foot runway can accommodate large commercial aircraft. MBIA plays a critical role in Grenada's tourism industry by connecting the island to major destinations in the Caribbean, North America, and Europe.

Lauriston Airport in Carriacou provides an essential link for the smaller islands. Serving mainly domestic flights, Lauriston connects Carriacou to Grenada's MBIA and nearby islands such as St. Vincent and the Grenadines. It is a public airport with an asphalt surface and is operated by the Grenada Airport Authority. Its runway is suitable for smaller aircraft and handles around 10,000 passengers annually. Lauriston is crucial for Carriacou's residents, supporting inter-island travel and medical evacuations while contributing to the island's tourism development. Though its facilities are more limited compared to MBIA, with basic passenger services and a small terminal building, the airport is an important part of the local transportation network, ensuring that Carriacou remains connected to both the main island and the broader region.

These airports handle over 200,000 passengers annually, over 9 airlines, over 350 employees and have been serving over 38 years to Grenadian inhabitants

Photo: Carriacou's Laurrison Airport

Ports

Grenada's port sector is crucial for both trade and tourism, serving as the gateway for goods and passengers to and from the island. The main port, St. George's Deep Water Harbor, located in the capital city of St. George, is the island's primary commercial port. It handles most of Grenada's cargo, including container shipments, bulk goods, and general merchandise, supporting the island's economy. This port plays a vital role in the importation of essential goods, such as fuel, construction materials, and food products, as well as in the export of local agricultural products like nutmeg, cocoa, and bananas. Additionally, Melville Street Cruise Terminal, located near the Deep Water Harbor, is key to Grenada's booming cruise tourism sector, welcoming thousands of visitors annually. This port infrastructure serves the island's population of about 108,279 (census 2021) people, providing vital links to regional and international markets. The nearby islands of Carriacou and Petite Martinique, with a combined population of about 4,747, are served by smaller port facilities that are essential for connecting these communities to Grenada and the wider Caribbean.

Photo: New Tyrell Bay Port
Source: Carriacou marine

The Grenada Ports Authority manages two key facilities in Carriacou: the older port at Hillsborough and the newer facility at Tyrell Bay. While Hillsborough Port had traditionally been the island's main hub for cargo and passenger activities, it recently underwent refurbishment to improve its structure and functionality. However, the newer Tyrell Bay Port now serves as Carriacou's primary port, offering more modern infrastructure to handle growing demands.

This facility is equipped with a cargo warehouse and a passenger reception building that accommodates both ferry services and cruise passengers. The Tyrell Bay Port is strategically important, not only for managing the flow of goods and passengers between Carriacou, Grenada, and neighboring islands, but also for boosting the island's tourism sector. Together, these ports are vital for ensuring the smooth flow of resources and trade to Carriacou's population, while also supporting the local fishing industry and the island's economic development. Together, these ports are vital for ensuring the smooth flow of resources and trade to Carriacou's population, while also supporting the local fishing industry and the island's economic development.

Disaster Effects (Damage and Loss)

After Hurricane Beryl impacted Grenada, Carriacou, and Petite Martinique, the road system experienced moderate damage. The storm disrupted infrastructure, particularly in coastal and low-lying areas, resulting in blocked and eroded roads due to heavy rains and localized flooding. Carriacou and Petite Martinique saw reduced accessibility in some sections due to debris accumulation and minor landslides. In Grenada, several roads and culverts required immediate clearing and repairs to restore full functionality, especially in rural areas where storm runoff caused damage to retaining walls and embankments.

The response to these disruptions included rapid deployment of assessment teams to identify priority repairs and ensure critical routes were reopened for relief efforts. Regional support coordinated through CDEMA, and CARICOM also facilitated early recovery efforts by providing logistics and supplies to stabilize transportation networks and other essential services in the affected areas.

Airports

Maurice Bishop International Airport (MBIA):

Structural Damage:

- General water damage noted.
- Damaged in areas on the south-west side of the runway of the perimeter fence.

Equipment Damage:

- Three A/C units' electronic boards in the condensers were damaged due to excessive moisture from severe weather.
- Electrical systems at the Airfield Ground Lighting (AGL) service station were affected by excessive moisture.
- One broken antenna stayed wire at the Grand Etang Hi-site.

Lauriston Airport, Carriacou

Structural Damage

- Air Terminal Building:
    - Roof blown off.
    - Windows severely damaged.
    - Roofing sheeting blown off.
- Parking Bay for Rescue Appliances:
    - Roof blown off.
    - Support structure severely damaged.
    - Storage racks damaged.
- CFR Living Quarters:
    - Roof blown off.
    - Windows glass was severely damaged.
- Water Storage Tank: A plastic water storage tank for the bathroom facility at the sewer lagoon facility was blown off the concrete roof.

Equipment Damage

- Security Equipment:
    - X-ray machine and Walk-Through Metal Detector (WTMD) were exposed to elements and water damaged.
    - Two handheld security wands were damaged by water.
- Computer Systems:
    - PC system with printer at the OIC Lauriston Airport damaged by water.
    - One PC system in the Immigration Office was water damaged.
    - The TV set in the departure hall was damaged.
- Air Conditioning Units:
    - Two 4T units were damaged by flying debris and water.
    - One 2T unit was damaged by flying debris and water.
- Electrical Distribution System: Damaged by flying debris and water.
- Doors:
    - Doors in the departure and arrival in the landside, and airside were damaged by flying debris and water.
- Airfield Lighting System:
    - Compromised by flying debris, breaking protective sheds, and causing water penetration in fixtures. Some were blown away.
- Airfield Windsock: Damaged.
- Perimeter Fence: 60% severely damaged.
- ATC Communication Antennas: Damaged by flying debris and strong winds.
- Plumbing Lines: Damaged by flying debris.
- Rescue Truck: Damaged by flying debris.
- Meteorological Automatic Weather Station (AWS): Tower and solar panel damaged.

Ports

There was no reported structural damage to the cargo terminal at St. George's, the facility was fully operational. The Cruise Pier at St. Georges had some light cosmetic damage to the rails and walkways which Grenada Ports Authority will rectify without central assistance. The passenger terminal at the port of Tyrrel Bay Carriacou suffered catastrophic failure. The building must be demolished and rebuilt according to the General Manager. The cargo terminal at the port of Tyrrrel Bay Carriacou suffered minor damage to the roof and significant damage to its access/ egress doors. According to the Manager, there were plans already in place to rectify this issue. The quay/pier suffered no damage due to the hurricane, however an ongoing issue of sink holes (engineering assessments have already been triggered) seems to have exacerbated.

The Port of Tyrrel Bay was fully operational, presently there is full berthing, however, the port has not resumed taking regular cargo due to door and roof damage. Power, communications, and water supply remain a challenge/limited. All Grenada Ports Authority's facilities are fully insured, and the insurance adjusters have already conducted their assessments with a view towards early settlement.

Table 46: Airport Damage

LAURISTON AIRPORT CARRIACOU			
Damage	**Total XCD**	**Private**	**Public**
Terminal building	**309,720.14**		**309,720.14**
Tower	18,980.20		18,980.20
Arrivals	86,864.28		86,864.28
Departure	98,242.28		98,242.28
Check in / Airline office	100,933.38		100,933.38
Lunchroom	4,700.00		4,700.00
Other affected areas	**794,189.22**		**794,189.22**
CRF Quarters	5,285.74		5,285.74
Parking bay for rescue boat & recue appliance	40,571.24		40,571.24
Runway	155,010.00		155,010.00
Perimeter fence	538,330.00		538,330.00
Miscellaneous / contingency	54,992.24		54,992.24
Key equipment	**371,060.11**		**371,060.11**
X-RAY Machine wet and exposed to the elements	353,223.28		353,223.28
WTMD wet and exposed to the elements	17,836.83		17,836.83
Total damage airports	**1,474,969.47**		**1,474,969.47**

Table 47: Airports Loss and Additional Costs (XCD)

Loss & Additional Costs	Total XCD	Private	Public
Loss of income			
Income forgone from Airport Closure (July & August 2024)	14,750.60		14,750.60
Additional Costs			
Additional Staff Costs	207,988.37		207,988.37
Support to Staff			
Mitigation measures			
Setback on Night Service implementation			
Delayed Plan for Night Services (night landing was projected commence November 2024. Project delayed by approx. 6 months	48,000.00		48,000.00
Total loss and additional costs airports	**270,738.97**		**270,738.97**

Table 48: Ports Damage, Loss and Additional Costs

CARRIACOU PORTS				
DAMAGE				
Port at the Tyrell Bay				
Item	**Damage level**	**Total XCD**	**Private**	**Public**
structures		**380,000.00**		
Buildings	30%	80,000.00		80,000.00
Passenger terminal	80%	285,000.00		285,000.00
Perimeter fence	30%	15,000.00		15,000.00
Equipments/Machinery		**41,000.00**		**41,000.00**
Computers	10%	8,000.00		8,000.00
Furniture	5%	5,000.00		5,000.00
Solar PV	100%	28,000.00		28,000.00
Port at Hillsborough				
Structure		65,000.00		65,000.00
Building	75%	65,000.00		65,000.00
Total Damage Ports		**486,000.00**		**486,000.00**

LOSS & ADDITIONAL COSTS	**Total XCD**	**Private**	**Public**
Loss of income			
Reduction in revenue from the use of ports	114,000.00		114,000.00
Additional Costs			
Debris Cleanup & Removal	15,000.00		15,000.00
Increase in the operational costs of ports, shipping lines, etc.	50,000.00		50,000.00
Staff accommodation/cargo, coms	60,000.00		60,000.00
Total loss and additional costs ports	**239,000.00**		**239,000.00**

Total damages in the transport sector are estimated to be XCD $1.96 million, and losses XCD $0.13 million.

Table 49: Summary Damage, Loss, Additional Costs and Recovery Needs for Transport Sector

Damage (XCD)	Loss (XCD)	Add. Cost (XCD)	CEF* Loss+AdC (XCD)	Recovery Needs (XCD)
1,960,969	128,750	380,988	509,738	2,282,884

The Sector Human Impact

The damage to Grenada's ports and airports following Hurricane Beryl had a significant impact on the local population, especially vulnerable groups such as women, children, and the elderly. With transport infrastructure crippled, the availability of critical supplies, including food, medicine, and shelter materials, became limited. The disruption affected humanitarian logistics, delaying both immediate assistance and the delivery of essential goods to affected communities.

In Carriacou and Petite Martinique, which were hit hardest, access to external aid was further constrained by the limited functionality of airports and seaports. Many families were displaced, with shelters becoming overcrowded and operating under substandard conditions. This situation placed additional burdens on children, elderly residents, and women, especially those caring for dependents.

The restricted movement of relief efforts also complicated healthcare responses. Health facilities across the islands sustained significant damage, leading to shortages in medical supplies and disruptions

in services. This had ripple effects on public health, exacerbating risks for vulnerable populations already struggling with gastroenteritis and dengue outbreaks in the region. Access to clean water was particularly affected, heightening concerns over waterborne diseases for those with limited means to relocate or access safe drinking water.

Recovery Needs and Strategy

RECOVERY NEEDS

Total recovery needs for the transport sector amount to XCD $2.28 million (USD $0.85 million) in terms of costs to put back the infrastructure that was affected, in improved conditions so that future similar events won't have the level of destruction observed after Hurricane Beryl landing in the country. To this end, a premium of 15% was added to the cost of damage to buildings. All additional costs incurred to manage the emergency and undertake cleaning and debris removal were costed.

Table 50: Recovery Needs for Airports and Ports in Grenada

AIRPORTS RECOVERY NEEDS	TOTAL XCD
Damage Infrastructure	
Terminal building	356,178
Other affected areas	913,317
Subtotal infrastructure + BBB	**1,269,495**
Loss & Additional Cost	
Additional Costs	207,988
Cos of Building Resilience	TBC
Setback on Night Service implementation	48,000
Subtotal for additional cost	**255,988**
TOTAL XCD	**1,525,484**
TOTAL USD	**564,994**

PORTS RECOVERY NEEDS	TOTAL XCD
Damage Infrastructure	
Port at the Tyrell Bay	554,400
Port at Hillsborough	78,000
Subtotal infrastructure + BBB	**632,400**
Additional Cost	
Additional Costs	125,000
Subtotal for additional cost	**125,000**
TOTAL XCD	**757,400**
TOTAL USD	**280,518**

RECOVERY STRATEGY

A robust strategy for rebuilding Grenada's ports and airports after Hurricane Beryl and mitigating future disaster risks should involve both structural improvements and policy reforms. This comprehensive approach could include the following key elements:[90] [91]

1. **Building Back Better (BBB) Framework**: Infrastructure should be rebuilt with enhanced resilience against extreme weather events. This involves reinforcing airport terminals and port facilities, installing storm-resistant roofing and windows, and elevating critical equipment above flood levels. Tyrell Bay's passenger terminal, which needs to be demolished and rebuilt, offers an opportunity to incorporate these standards.

.

2. **Investment in Climate-Resilient Technologies**: Integrating solar panels, as previously installed in some facilities, along with backup generators and rainwater harvesting systems would ensure continuous operations during emergencies. Upgraded drainage systems can reduce the risk of flooding, particularly at the airports and ports that are in low-lying areas vulnerable to storm surges.

.

3. **Strengthening Governance and Emergency Preparedness**: Clear protocols for rapid evacuation, emergency operations, and communication systems need to be established to minimize disruption during future crises. This includes training port and airport staff in disaster management and coordinating with regional emergency entities like CDEMA for swift response and recovery actions. Linking this activity with international initiatives such as the one promoted by UNDP through the GARD (Get Airports Ready for Disasters) program could be a good opportunity for this sector.

90 The United Nations in the Caribbean
91 ACAPS Hurricane Beryl impact in Grenada

.

4. **Comprehensive Risk Assessments**: Regular vulnerability assessments should be conducted to identify areas most susceptible to damage. The discovery of sinkholes at Tyrell Bay prior to the hurricane indicates the need for continuous monitoring and proactive repairs to address underlying risks.

5. **Insurance and Financial Preparedness**: Ensuring that all facilities are insured, as is the case with Grenada Ports Authority properties, allows for faster recovery. Contingency funds for unexpected repairs and operational disruptions should also be incorporated into planning efforts.

6. **Promoting Regional Collaboration**: Given the reliance on regional connectivity for trade and tourism, Grenada can benefit from joint initiatives with CARICOM and neighboring countries to share best practices in resilient infrastructure development and emergency logistics management

By combining these strategies, Grenada can not only restore its transport infrastructure but also safeguard its future operations from the increasing frequency and intensity of tropical storms and hurricanes.

Sector Methodology and Limitations

The national teams from airports and ports in Grenada provided detailed information on the effects caused by Hurricane Beryl. Cost estimates to repair and rebuild infrastructure were discussed and agreed based on actual cost estimates undertaken locally.

THE ENVIRONMENT

THE ENVIRONMENT

Pre-Disaster Sector Context

Grenada faces a variety of environmental challenges, including climate change, coastal erosion, pollution, and waste management. Various institutions and legal frameworks have been established to address these issues and promote sustainable development and disaster resilience.

Key Institutions:

- The Ministry of Climate Resilience, the Environment, Forestry, Fisheries, and Disaster Management oversees the development and implementation of policies related to climate resilience and environmental protection. It is essential in integrating sustainable practices into national development strategies, focusing on protecting Grenada's rich biodiversity while enhancing the resilience of communities against climate-related threats.
- The National Climate Change Committee (NCCC) coordinates national efforts in addressing climate change. It steers the implementation of the National Climate Change Policy and ensures alignment with regional and international climate commitments. The committee focuses on enhancing the adaptive capacity of vulnerable sectors, including agriculture and tourism.
- The Solid Waste Management Authority (SWMA) is responsible for managing waste collection, disposal, and recycling across Grenada. It plays a vital role in minimizing the environmental impact of waste, particularly from urban centers and tourist activities, and works towards improving waste management practices throughout the country.

Legal Frameworks and Institutional Arrangements:

- National Climate Change Policy (NCCP) 2017-2021: This policy outlines Grenada's approach to climate resilience, emphasizing adaptation and mitigation strategies across sectors. It aims to integrate climate considerations into national development planning while addressing issues such as gender equity and the protection of vulnerable communities.
- Environmental Management Act (2018): This act establishes the legal framework for environmental protection and sustainable management of natural resources. It empowers the Environmental Division to oversee environmental impact assessments and ensure compliance with environmental standards across various sectors.
- National Biodiversity Strategy and Action Plan (2016-2020) is a strategic document geared to facilitate the integration of biodiversity conservation and sustainable use into national decision making.
- Solid Waste Management Act (2010): This act governs the management of solid waste in

Grenada. It establishes guidelines for waste disposal and promotes recycling initiatives, aiming to reduce the environmental footprint of waste generated by both local communities and the tourism industry.

Environmental challenges faced by parishes:

- Saint George: As the capital parish, Saint George is under pressure from urbanization and development. Key concerns include pollution from industrial activities, improper waste disposal, and the loss of natural habitats due to infrastructural expansion.
- Carriacou and Petite Martinique: These smaller islands face significant challenges related to marine pollution, particularly from plastic waste and debris associated with tourism. Protecting fragile marine ecosystems, including mangroves, is a priority.
- Other parishes, such as Saint David and Saint Mark: These parishes are primarily agricultural but are affected by soil erosion, deforestation, and the degradation of land due to unsustainable farming practices. The impacts of climate change, such as increased rainfall and drought, threaten food security and livelihoods in these rural communities.

Disaster Effects (Damage and Loss)

In Grenada, hurricane Beryl caused widespread destruction, not only to public infrastructure but also to ecosystems and natural vegetation. The storm intensified coastal erosion, stripping away topsoil and depositing large amounts of sediment into the nearshore waters, negatively impacting fisheries and marine ecosystems. For this assessment, the real or potential effects of the hurricane have been broken down into coastal ecosystems and mangroves.

Photo: Coastal ecosystems and mangroves

Satellite imagery from NASA's Earth Observatory showed pre-storm healthy green mangroves, which turned dark and waterlogged after the storm, indicating widespread harm. This waterlogging reduced oxygen in the soil, inhibiting processes like photosynthesis essential for the mangroves' recovery.

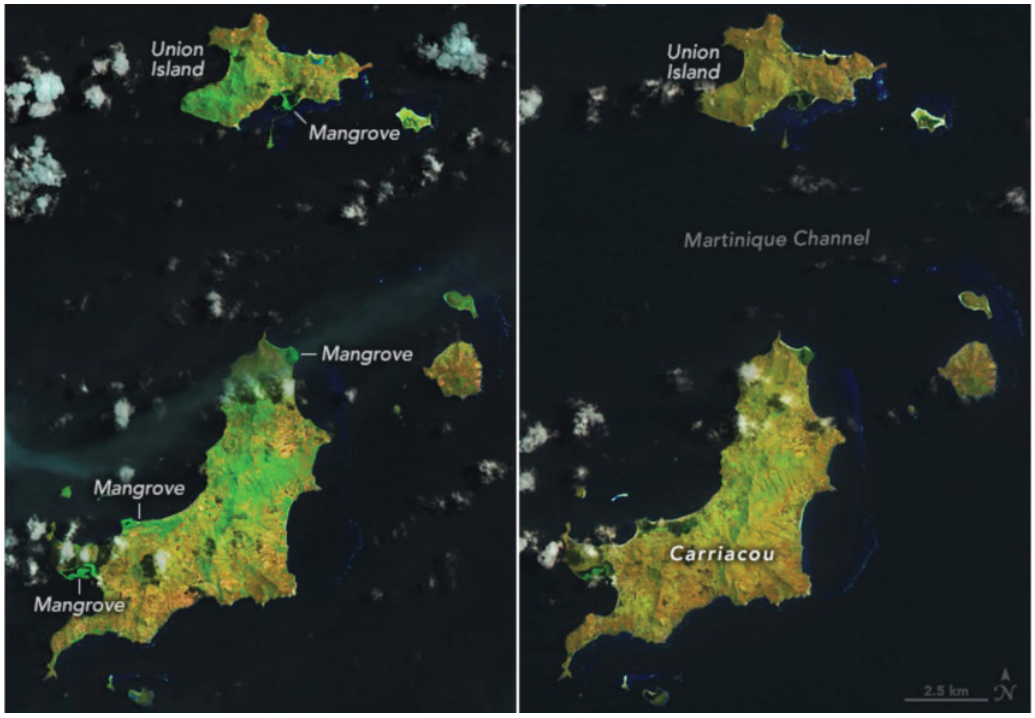


PHOTO: SATELLITE IMAGERY OF PRE-STORM HEALTHY GREEN MANGROVES
June 20 - July 6, 2024 comparison
source: NASA Earth Observatory, https://earthobservatory.nasa.gov/images/153039/carriacou-after-beryl

Hurricane Beryl significantly impacted Grenada's mangrove ecosystems, which are essential for coastal protection and biodiversity. In Carriacou areas (more specifically Paradise, Tyrrell Bay, and Lauriston), extensive damage was recorded, including the loss of mangroves, undercutting of prop roots, and mangroves buried by sediment. The storm surge and heavy rainfall exacerbated these conditions, leading to debris trapped in branches and extensive breaking of mangrove branches. Such damage reduces the buffering capacity of mangroves, weakening their role in protecting shorelines from erosion and storm impacts. Mangroves are vital for stabilizing coastal zones, and the observed degradation indicates a pressing need for focused restoration efforts.[92]

The interconnectedness of coastal ecosystems in Grenada means that damage to mangroves has a ripple effect on other critical habitats such as beaches, wetlands, and rocky shores. The flooding caused by Hurricane Beryl washed sediments and land-based pollutants into the marine environment, harming water quality and potentially triggering algal blooms, which threaten fish populations and local fisheries. The role of mangroves in filtering such pollutants is crucial, but their diminished state from the hurricane weakens this natural defense. This degradation is compounded by ongoing

92 Preliminary Ecosystem Impact Assessment of Damage Caused by Hurricane Beryl, Government of Grenada, 10 July 2024

challenges such as pollution and sediment runoff, further straining the ecological balance in these fragile ecosystems.[93]

Given the high vulnerability of small island states like Grenada to climate change and tropical storms, the observed damage from Hurricane Beryl underscores the importance of integrated coastal zone management. The restoration and conservation of mangroves should be prioritized as part of ecosystem-based solutions for resilience building. These natural buffers not only help reduce the direct impact of hurricanes but also contribute to the long-term sustainability of coastal communities by supporting fisheries, protecting infrastructure, and enhancing biodiversity.[94]

The accumulation of debris across Grenada, particularly in areas like Carriacou and St. Patrick following the hurricane has had significant environmental, economic, and ecological consequences. Large quantities of fallen trees, broken branches, and other plant material expose the soil to erosion, which, when combined with heavy rainfall, accelerates land degradation. Wildlife habitats have been destroyed, leaving many species vulnerable due to the loss of food and shelter. Furthermore, unmanaged debris impedes recovery efforts, posing hazards to human settlements and limiting access to crucial areas. Effective debris management is critical for ecosystem restoration and preventing further damage to both natural resources and local livelihoods.[95]

The Sector Human Impact

The environmental damage caused by Beryl could profoundly affect the population, its livelihoods, living conditions, and gender dynamics. The storm affected coastal ecosystems, particularly mangroves, which are essential for shoreline protection and fisheries. This ecological disruption could reduce income for communities reliant on fishing and tourism, threatening food security and economic stability.

Debris from the hurricane can worsen land degradation, affect wildlife habitats, and obstruct recovery efforts, leaving many settlements vulnerable. Women, often engaged in agriculture, fisheries, and tourism, could be disproportionately impacted by the loss of livelihoods, underscoring the need for gender-sensitive recovery efforts.

Recovery efforts should prioritize ecosystem restoration, appropriate debris management, and community involvement to enhance resilience. Integrating women and other affected groups in decision-making will be crucial to ensuring an inclusive and sustainable recovery.

93 Preliminary Ecosystem Impact Assessment of Damage Caused by Hurricane Beryl, Government of Grenada, 10 July 2024
94 Preliminary Ecosystem Impact Assessment of Damage Caused by Hurricane Beryl, Government of Grenada, 10 July 2024
95 CLIMATE RESILIENT AGRICULTURE FOR INTEGRATED LANDSCAPE MANAGEMENT PROJECT (CRA). SUPPORT TO UN TEAM/CDEMA FOR CONDUCTING RAPID FOREST RESOURCE ASSESSMENT IN CARRIACOU & ST. PATRICK, IN THE AFTERMATH OF HURRICANE BERYL (July 7& 10, 2024).

Recovery Needs and Strategy

The following short- and medium-term recommendation are proposed:[96] [97]

Short-Term:

- Conduct a comprehensive ecological assessment post-Hurricane Beryl, focusing on tracking vegetation damage to inform immediate coastal restoration efforts.
- Launch environmental awareness campaigns to educate locals and visitors about reducing pollution, promoting alternatives to single-use plastics, and smart waste management.
- Involve local communities in ecological assessments and decision-making processes to ensure sustainable management practices are implemented quickly.
- Distribute machinery such as shredders and chainsaws to farmers, along with establishing mechanisms for ensuring the sustainable use of these resources. This will help in converting biodegradable debris into useful products to support biodiversity conservation.

Medium-Term:

- Develop and implement the coastal zone management plans (ICZM) with active participation from local communities and establish the Grenada coastal zone management unit under the Integrated Coastal Zone Act.
- Integrate ecosystem-based approaches and nature-based solutions into all government plans to enhance coastal stability and resilience against future storms and erosion.
- Ensure that long-term environmental policies prioritize sustainability and resilience, including ongoing community involvement in ecological management strategies.

96 Preliminary Ecosystem Impact Assessment of Damage Caused by Hurricane Beryl, Government of Grenada, 10 July 2024

97 CLIMATE RESILIENT AGRICULTURE FOR INTEGRATED LANDSCAPE MANAGEMENT PROJECT (CRA). SUPPORT TO UN TEAM/CDEMA FOR CONDUCTING RAPID FOREST RESOURCE ASSESSMENT IN CARRIACOU & ST. PATRICK, IN THE AFTERMATH OF HURRICANE BERYL (July 7& 10, 2024).

DISASTER RISK REDUCTION

DISASTER RISK REDUCTION

Pre-Disaster Sector Context

Grenada, a Caribbean nation of 345 square kilometers, is characterized by its rugged volcanic terrain and limited flat land, primarily along its coastal areas. The island experiences a tropical marine climate with distinct wet and dry seasons, coinciding with the Atlantic Hurricane season, thus increasing its vulnerability to tropical cyclones. The average temperatures range from 22.5°C to 32.4°C, with climate change projections indicating rising temperatures and intensified storms. Grenada's mountainous geography makes it highly susceptible to landslides, particularly in urban and suburban areas built on slopes, which amplifies the potential impact of heavy rainfall events.

Priority 1 of the Sendai Framework emphasizes the importance of understanding disaster risk. Despite ranking relatively low on the Inform Risk Index at 161 out of 191 countries, Grenada faces significant vulnerabilities, as evidenced by the devastating impact of Hurricane Ivan in 2004. The country's hazard profile includes various risks, especially hydrometeorological hazards such as hurricanes, floods, and droughts. Additionally, Grenada is situated in the Atlantic Hurricane Belt, making it prone to frequent storms that have historically caused substantial damage. Geological risks such as volcanic activity and earthquakes also pose threats, with Kick 'em Jenny being the more active volcano. Environmental hazards driven by human activities further endanger biodiversity and freshwater supply. Social vulnerabilities, influenced by poverty, gender inequality, and age, hinder disaster preparedness and recovery efforts.

Physical vulnerability in Grenada is heightened by rapid urbanization and inadequate infrastructure, especially in densely populated areas like St. George's. The demand for housing and land has led to overcrowding and informal settlements, which are often ill-equipped to withstand hazards. Recommendations from the 2013 Land Policy Issues Paper emphasize the need for improved land-use planning and enforcement of building codes to mitigate these risks. Approximately 52.1% of Grenada's population is exposed to multiple hazards, with coastal communities particularly at risk from storm surges and sea-level rise. The National Adaptation Plan predicts significant economic losses and damage to infrastructure due to climate-related events, placing immense pressure on the country's service-based economy, especially tourism and agriculture. In 2023, the Physical Planning Unit was restructured as the Planning and Development Authority, now a statutory agency responsible for national development planning, including zoning, building control, and development approvals. The Authority develops frameworks for sustainable land development, monitors building compliance, and grants development permissions. Its efforts to modernize and build capacity align directly with DRR priorities, especially in building code enforcement and hazard zoning.

Priority 2 of the Sendai Framework emphasizes strengthening disaster risk governance through the integration of disaster risk reduction (DRR) into policy frameworks and enhancing institutional structures. Grenada's key policy instruments include the National Sustainable Development Plan (2020-2035), the National Climate Change Policy (2017-2021), and the National Adaptation Plan (2017-2021). However, gaps in financial, institutional, and monitoring coherence hinder the effectiveness of these policies. DRR in Grenada involves both governmental and non-governmental institutions, with the National Disaster Management Agency (NaDMA) playing a central role in coordinating disaster preparedness and response, which is expected to become a statutory agency. Grenada currently lacks a formal Recovery Strategy. However, the Model National Recovery Framework (MNRF), recently updated by CDEMA under the EnGenDER Project, could be adapted and implemented in Grenada to guide both pre- and post-disaster policy and strategy. This MNRF, or a tailored version of the National Recovery Framework (NRF), outlines policies for Disaster Risk Reduction (DRR) and establishes the institutional framework for disaster recovery planning and post-disaster management.

The recently adopted Disaster Management Bill (December 2023) establishes a comprehensive framework for disaster management, outlining the responsibilities of various entities, including the National Emergency Advisory Council and District Disaster Management Committees. It emphasizes gender-responsive approaches in disaster management, but community-level coordination remains largely voluntary and unsupported by legislation. The private sector's involvement, such as that of the Grenada Chamber of Commerce, is also crucial for disaster resilience. Despite efforts to mainstream DRR, there are still notable gaps in sector-specific policies and strategies that need addressing.

Priority 3 of the Sendai Framework focuses on investing in disaster risk reduction for resilience, involving resources aimed at enhancing resilience against disasters. Funding for NaDMA primarily comes from the Prime Minister's budget, yet overall funding for DRR initiatives remains low, with external agencies providing much of the support. Grenada has been part of the Caribbean Catastrophe Risk Insurance Facility, which aids post-disaster funding. However, challenges persist in integrating disaster risk management into development plans.

Priority 4 of the Sendai Framework highlights the importance of enhancing disaster preparedness for effective response. Grenada's National Disaster Plan (2011) coordinates disaster response, but comprehensive recovery policies are lacking, creating challenges for long-term recovery. Community disaster plans need updates to incorporate recovery strategies, while training for disaster response remains inconsistent. Effective multi-hazard early warning systems (MHEWS) are crucial for timely hazard responses, but while national systems exist, community-level capabilities require strengthening.

Disaster Effects (Damage and Loss)

The immediate effects of Hurricane Beryl on Grenada's Disaster Risk Management system were limited, with Carriacou being the most affected. The perimeter fence of the Emergency Operations Center was destroyed, which not only compromised the security of the facility but also impaired

its capacity to function as a crucial coordination hub during the emergency response. Similarly, the Early Warning System (EWS) at the Kick'em Jenny station suffered damage to its perimeter fencing and roof, severely impacting its ability to effectively monitor and provide timely alerts. These damages exposed the vulnerabilities in Grenada's DRM infrastructure and highlighted the need for reinforcement measures to prevent future disruptions in disaster preparedness.
In response to the crisis, logistical hubs were swiftly established with the support of the World Food Programme (WFP) and CARICOM to ensure the efficient distribution of emergency supplies and relief aid to affected areas.[98] This rapid response played a crucial role in mitigating further impacts on the community.

The government of Grenada, in collaboration with the Caribbean Disaster Emergency Management Agency, promptly undertook the production of Rapid Assessment Reports. These were essential in evaluating the extent of the damage and helped to restore critical DRM infrastructure but also emphasized the importance of resilient systems that can better withstand future disasters.

Hurricane Beryl caused significant damages in Grenada, particularly in Carriacou. The perimeter fence at the Emergency Operations Center (EOC) in Carriacou sustained notable damage, leading to the need for repairs to ensure the facility's continued functionality and security. Similarly, the warehouse in Carriacou experienced minor damage, particularly to its garage door, though repairs were promptly completed, minimizing any further disruption to operations.

In addition to these structural damages, the Early Warning System for the Kick'em Jenny station, located in Carriacou, was also affected by the storm. The station's perimeter fencing and roof sustained damage, compromising the station's ability to function optimally. These damages highlight the vulnerability of critical DRR infrastructure to extreme weather events, emphasizing the need for stronger resilience measures to safeguard such essential systems in future disaster events.

Table 51: Damage Incurred by the DRR Sector

Category	Cost XCD
Perimeter fence at EOC Carriacou (chain link fence)	20,000
Garage door to warehouse (minor damage) in Carriacou- repair completed	5,400
EWS for Kick'em Jenny – station at Carriacou that sustained some damage. Perimeter fencing, roof.	10,000
Total XCD	**35,400**
Total USD	**13,111**

Total damages in the DRR sector amount to XCD $0.035 million or USD $0.01 million. The sector's losses are XCD $1.77 million or USD $0.66 million, which reflects the financial burden associated with emergency response efforts following the crisis.

The funding allocated for the overtime of emergency response personnel highlights the importance

98 Partners of the Caribbean: WFP, collective action and the response to Hurricane Beryl | World Food Programme

of compensating dedicated staff who worked tirelessly to manage the immediate aftermath of the disaster. In addition, the costs associated with feeding coordination teams and volunteers underscore the necessity of sustaining those on the front lines of recovery, ensuring they remain healthy and focused on their critical roles. Moreover, the travel expenses for volunteers engaged in cleanup operations further illustrate the community's reliance on dedicated individuals who contribute their time and effort to restore the affected areas. These efforts demonstrate a collective commitment to rebuilding and improving the resilience of the islands.

Shipping relief supply items from Grenada to Carriacou and Petite Martinique represents another crucial component of the overall response strategy. The logistical challenges of transporting resources to these islands necessitate a consistent and well-coordinated approach, as the needs of the affected populations are time-sensitive and require immediate action. Additionally, the costs associated with using trucks to move relief supplies within Carriacou and Petite Martinique highlight the need for efficient transportation methods to reach remote areas. Fuel expenses for vehicles operating in Grenada further compound the financial challenges faced by the DRR sector. Collectively, these losses illustrate the critical role that logistical support, volunteer engagement, and personnel dedication play in effectively responding to disasters and enhancing community resilience in the face of adversity.

Table 52: Losses and Additional Costs incurred in the DRR Sector

Category	Number	Unit Cost XCD	duration	Total (XCD)
Overtime of emergency response personnel	17	15.63	300	79,687
Feeding for coordination team and volunteers in Mainland and Carriacou	100	80.00	90	720,000
Travel for 220 volunteers to clean up the islands (2 days over 6 weekends)	220	160.00	12	422,400
Shipping of relief supply items from Grenada to Carriacou and petite Martinique	12	10,000.00	2	240,000
Trucks to move relief supplies on Carriacou and Petite Martinique	4	350.00	60	84,000
Fuel costs – 25 vehicles in Grenada.	25	100.00	90	225,000
Total XCD				**1,771,087**
Total USD				**655,958**

Recovery Needs and Strategy

RECOVERY NEEDS

Total recovery needs for the sector amount to XCD $5.23 million or USD $1.94 million. The recovery strategy for Grenada's Disaster Risk Reduction sector following Hurricane Beryl can be organized into three distinct phases: short-term, medium-term, and long-term. Each phase addresses critical needs for strengthening disaster preparedness and response capabilities. These strategies will be implemented by NaDMA, the National Disaster Management Agency of Grenada, in collaboration with other relevant departments and ministries and should align with already existing National Frameworks to ensure consistency with nationally agreed resilience priorities.

Table 53: Summary of Recovery Needs

Total Damage	35,400
Total Additional Costs	1,771,087
Strengthening DRM System	3,421,000
Total Recovery Needs XCD	**5,227,487**
Total Recovery Needs USD	**1,936,106**

Short-Term Recovery Measures (up to 6 months)

- The immediate priority is implementing the Disaster Risk Management Act 2023. This will establish a strong legislative framework for disaster preparedness, response, and recovery.
- Another critical short-term action is to review and update DRM plans for multiple hazards, including oil spills, volcanoes, hurricanes, and Emergency Operations Centers (EOCs). These updated plans will provide clear guidelines for decision-makers and responders in various disaster scenarios.
- The purchase of 100 handheld radios for disaster communication is an essential need to be addressed in the short term. These radios will improve on-ground communication during disaster events.

Table 54: Recovery Needs to Build Resilience

Activity	Short (Up to 6 months)	Medium (Up to 18 months)	Long Term (up to 36 months)	Total (XCD)
Governance – implementation of the DRM Act 2023	50,000			50,000
Review of the DRM plans for different hazards – oil spill, volcano, EOC, hurricane etc. (8 plans at 30,000 EC each)		240,000		240,000
Strengthen the NaDMA office, with 7 additional recruitments – technical and administrative personnel, average yearly salary 96,000 XCD	336,000	672,000	1,008,000	2,016,000
Equipment - 100 handheld radios at 3,000 XCD each	150,000	150,000		300,000
Equipment - 25 Starlink for Grenada and Carriacou at 5,000XCD each	125,000			125,000
Capacity building and operative trainings for NaDMA staff and volunteers (with the support of CDEMA at 30,000 XCD/training))	90,000	180,000	180,000	450,000
Vehicles - 2 at 120,000 XCD each	120,000	120,000		240,000
Total XCD	**871,000**	**1,362,000**	**1,188,000**	**3,421,000**
Total USD	**322,592**	**504,444**	**440,000**	**1,267,037**

Medium-Term Recovery Measures (up to 18 months)

- To improve institutional resilience, the medium-term focus is on strengthening NaDMA by recruiting seven additional staff, including both technical and administrative personnel. This expansion will enhance the agency's ability to manage disaster events more effectively.
- A critical medium-term priority is capacity-building for NaDMA staff and volunteers, in partnership with the Caribbean Disaster Emergency Management Agency. These training programs will ensure that personnel are well-prepared to execute disaster response protocols.
- Continued equipment acquisition is needed, including an additional 100 handheld radios and 25 Starlink satellite systems for Grenada and Carriacou, to further strengthen communication and coordination capabilities during emergencies.

Long-Term Recovery Measures (up to 36 months)

- In the long term, NaDMA's capacity will be reinforced through sustained recruitment efforts and ongoing professional development for staff, ensuring that the agency remains equipped to meet growing disaster response demands.
- Two vehicles will be acquired to enhance NaDMA's mobility during disaster response operations. This logistical support is crucial for effective on-the-ground operations and timely responses.

- Continued investments in capacity-building and training will ensure that disaster management teams are consistently prepared to handle emerging threats and evolving disaster scenarios.
- Evaluate the legislative framework for development planning, permits, and building regulation enforcement. This includes providing guidelines and enhancing laws and regulations for the long term.

RECOVERY STRATEGY

Thinking beyond the long term – Recommendations for building long-term resilient in Grenada

The recommendations are based on the main conclusions drawn from information gathered during field visits and data collected from official sources. For each of the priorities for action, the measures suggested by sector specialists will be detailed. These recommendations provide a framework for building long-term resilience in Grenada, considering the most relevant findings from each sector. The prioritization of actions, allocation of resources, and timing of implementation will ultimately depend on the Government of Grenada, based on its internal human and financial resources, ongoing initiatives, anticipated developments, and overarching priorities. Similarly, the results of the CDEMA Comprehensive Disaster Management Audit for Grenada in 2022 highlighted the strengths, weaknesses, opportunities, and threats to the Grenada National Disaster Management Framework.

Considering that a disaster usually brings disaster risk management and disaster risk reduction to the forefront of the public agenda, it is imperative to adopt efficient and timely measures across all levels of government. This section includes a set of recommendations, grouped into the Four Priorities of the Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework), that aim for setting the conceptual bases for a resilient recovery and reconstruction process in Grenada.

Priority 1. Understanding disaster risk.

The disaster risk management process, encompassing all its components—risk assessment, prevention, mitigation, preparedness, and response—must be grounded in a comprehensive understanding of disaster risk. This understanding should consider all dimensions, including vulnerability, capacity, the exposure of people and assets, hazard characteristics, and the environment. Recognizing these dimensions requires acknowledging a wide range of issues and demands a coordinated effort, which is the responsibility of national and local authorities across all socioeconomic sectors.

1. Addressing Systemic Risk

The COVID-19 pandemic and the negative impacts produced by Hurricane Beryl have highlighted the need for systemic risk planning across sectors. This is further stressed by climate change, which presents cascading effects across various sectors and systems. Grenada, in its recovery efforts, is urged to advance systemic risk planning by improving data management and sharing mechanisms, in line with global frameworks like the Global Risk Assessment Framework and the Sendai Framework. A critical aspect of systemic risk planning is fostering interdisciplinary, cross-sectoral, and multi-stakeholder involvement in disaster risk reduction. This requires strengthening institutional mechanisms to

facilitate cooperation among diverse stakeholders, including government, civil society, private sector, academia, and media. The shift involves moving from viewing national disaster offices as the primary risk reduction entities to embedding risk management across all stakeholder activities.

Moreover, integrating disaster risk reduction into development planning is vital for systemic risk planning. This means embedding risk-informed policies into various sectors such as health, tourism, education, and agriculture to build resilience.

2. **Development of a National Disaster Risk Information Management System that includes information on past events (damage and losses), current hazard, vulnerability, and exposure data for developing risk knowledge and the use geospatial information to support disaster DRM**

One of the key components of risk assessment is data and information management related to potential hazards, as well as data concerning exposure and vulnerability, to have an estimate for affected populations and assets. According to the 2022 CDM Audit, a national repository for hazard knowledge does not exist, though there is some information in silos for instance, statistical information is available at the Meteorological Office and the Ministry of Agriculture. Therefore, it is strongly recommended that the Government of Grenada initiate a process to develop, establish and sustain a National Disaster Risk Information Management System by collating information for all sectors of past and current events, as well as of current latent hazards, exposure, and vulnerabilities, and developing a spatial data infrastructure for the country.

Disaster databases provide essential data and information for the development of disaster risk management policy and planning. The key characteristic of national disaster databases is that they represent disaster impacts as a manifestation of locally specific patterns of hazard, exposure, and vulnerability, in other words realized risk. Historical disaster data, however, can provide a unique window to observe and monitor patterns and trends of risk generation and accumulation.

Historical disaster data is essential for guiding preparedness planning, enabling NaDMA to prioritize actions in regions frequently affected by hazards and setting corrective risk management priorities before disasters occur. This data supports community-based risk assessments, reinforcing local knowledge, and helps refine risk assessments by comparing projected impacts with actual outcomes, thus improving hazard maps and vulnerability models. Mapping of hazard occurrences is often not assigned to any agency, but it is a critical input into hazard maps. Hazard mapping models are probabilistic, and without occurrence data, hazard maps can be too general to be useful. Additionally, as past risk patterns may not predict future risks due to changing conditions, these databases provide real-time insights into how risks are generated and accumulated. A special emphasis needs to be made for the accounting of small and medium disasters, which uncover in many cases hazards and vulnerabilities that could be hidden otherwise.

In addition to this, it is also recommended that the Government initiate a process to establish legislation regarding geo-information management which would define responsibilities and competencies for the production, management, and dissemination of geo-information at various territorial levels. In parallel with this process, it is recommended to establish multi-sectoral baseline assessments for disaster evaluation in the short term. Developing these baselines and establishing multi-hazard early

warning protocols for their regular updates will provide essential tools for maintaining an up-to-date and accurate risk profile of the country.

Strengthening local oceanographic, climatological, geospatial, and statistical information systems is therefore essential for achieving this objective. Timely access to information is recommended for effectively managing and mitigating the risks associated with these weather events. Real-time data on oceanographic and climatic variables during such events can significantly reduce damage to fishing assets and economic flows in the sector. Establishing a network of monitoring stations at strategic fishing sites for oceanographic and climatic information is vital for tracking and forecasting.

Finally, another recommendation is to foster the interaction of the Central Statistical Office (CSO) with the NaDMA, so that better assessments and monitoring of the costs of each disaster, from preparation to recovery, is properly estimated and recorded in the database.

3. Develop a natural capital exposure model for Grenada.

It is advisable for Grenada to consistently invest in appraisals of marine natural capital and ecosystem services by conducting locally tailored studies using appropriate methodologies that reflect the unique characteristics of local habitats. These studies would create a robust baseline for evaluating the overall contributions of the country's natural capital to society and the Grenadian economy, while also enhancing the understanding of risks to these resources.

Priority 2. Strengthening disaster risk governance to manage disaster risk

Disaster risk governance involves mainstreaming disaster risk reduction within and across all sectors; implementing disaster risk reduction strategies; providing incentives for disaster risk reduction activities (such as compliance with building codes requirements); establishing and strengthening coordination mechanisms; and instituting legislation and policies in support of disaster risk management. Risk governance emphasizes the importance of establishing clear objectives, plans, competencies, guidelines, and coordination within and across sectors to foster collaboration and partnerships in prevention, mitigation, preparedness, response, recovery, and rehabilitation.

1. Integrating DRR into Development Planning

Disaster Risk Reduction should be regarded as a model for sustainable development rather than just a discipline. By integrating DRR into development planning across essential sectors, stakeholders can enhance risk-informed policies and actions, thereby reinforcing resilience. This proactive approach addresses the root causes of disaster risk, preventing systemic failures during adverse events and protecting vulnerable populations disproportionately affected by disasters.

To further strengthen this integration, it is crucial to align DRR with the Sustainable Development Goals (SDGs) and Climate Change Adaptation (CCA) within Grenada's national development plan, coordinated by a dedicated institution. The establishment of the Ministry of Climate Resilience, the Environment, Forestry, Fisheries, and Disaster Management marks a significant advancement in this effort.

2. Data Access and Sharing Protocols Across Key Sectors

In Grenada, there is a need for improved protocols to manage geo-information related to hazards, exposure, vulnerability, and risk. Effective disaster risk management depends on sharing this data at a national level. To address this, it's recommended to develop a centralized, open platform that includes hazard and vulnerability analyses and risk profiles, utilizing Geographic Information Systems.

Establishing these platforms will encourage collaboration among government agencies, local authorities, academic institutions, and the private sector. Formal agreements should guide data-sharing responsibilities and protocols, specifying what data is shared, who can access it, and how it can be used. The goal is to integrate disaster risk information into national policies and decision-making processes, promoting data-driven policy development for better disaster preparedness and resilience.

3. Revise, Finance, and Enforce a Multi-Hazard National Building Code

Grenada's housing sector faces vulnerabilities due to poorly maintained structures, particularly during hurricanes. Older buildings are susceptible to damage from strong winds and heavy rainfall, with roof supports and the quality of openings being critical factors. Homeowners often delay maintenance, leading to costly repairs during disasters. While Grenada has the capacity to improve building code enforcement, it lacks the financial and human resources needed for effective compliance. National building codes, based on risk assessments, require clear roles for monitoring and enforcing compliance, including technical inspections. The maintenance of critical infrastructure requires a dedicated budget, and retrofitting programs enhance resilience for older facilities. The government is encouraged to strengthen housing legislation by enforcing regular maintenance and updating the National Building Code for long-term disaster risk reduction. This includes adopting the CARICOM Regional Standard CRS 10: 2023 and developing an institutional framework for enforcement.

Priority 3. Investing in disaster risk reduction for resilience

Priority 3 of the Sendai Framework emphasizes the significance of public and private investments in disaster risk prevention and reduction through structural and non-structural measures. The goal is to enhance economic, social, health, and cultural resilience.

1. Retrofitting and Construction of Shelters

Many multi-purpose facilities, such as schools, community centers, churches, and guest houses, were impacted by Hurricane Beryl. These buildings were often not originally designed as shelters. Improving their resilience can enhance Grenada's preparedness and response capabilities, ensuring the safety and well-being of its population. The Government of Grenada should consider retrofitting existing shelters to withstand Category 4 and 5 hurricanes by upgrading their structural integrity according to national building codes. CDEMA's Model Emergency Collective Shelter Management Policy can serve as a guideline but needs adaptation to integrate within the national emergency management system.

To support shelter recovery, the transition from institutional shelters to permanent housing solutions should be a priority. The International Organization for Migration (IOM) is actively engaged in this

process, to help people repair and return to their homes with technical guidance and other support. The post-Beryl joint shelter and settlements response strategy, prepared by the IOM in 2024, could potentially form the basis of a Housing Strategy Plan for Grenada, aimed at reducing dependency on institutional shelters and promoting home repairs and resilience building.

2. Risk Transfer Instruments

Grenada is a member of the Caribbean Catastrophe Risk Insurance Facility but lacks a national disaster contingency fund for quick emergency financing. Although there have been attempts to establish recovery financing mechanisms, they remain insufficient. The government has engaged with the World Bank for contingency credit and partially developed procurement and financial management systems. The National Sustainable Development Plan emphasizes the need for risk transfer mechanisms and insurance but lacks a dedicated budget and mobilization strategy. Risk transfer instruments like parametric insurance can offer quicker recovery options by shifting financial burdens from governments to private entities.

Grenada is working to secure disaster contingency funds through international mechanisms, but these should be complemented by internal budgets. Developing disaster risk reduction financing involves creating strategies to enhance resilience and ensure timely support for vulnerable populations. Integrating risk reduction financing with social protection systems can improve assistance efficiency, as demonstrated by topping up insurance premiums to disburse cash to vulnerable households.

3. Utilizing prospective risk assessments (PRA) Results for Investment Decisions

Quantitative and prospective risk assessments can guide investment processes by quantifying risks and providing insights into future scenarios. These assessments help identify actions that yield significant benefits in disaster risk reduction. A key output, the loss exceedance curve, helps determine effective actions across different impact levels. While these assessments apply to all assets and populations, starting with critical infrastructure is pragmatic, as data is often readily available, and its functionality post-disaster is crucial for reducing secondary losses.

4. Investing in Redundancy of Key Networks

Redundancy in networks like transportation, telecommunications, and energy is crucial for disaster resilience. It ensures systems remain operational despite disruptions, enabling quicker recovery and safeguarding critical services. Backup routes or components in redundant systems allow continued functionality when primary systems fail. For instance, if a government facility loses primary communication or power, redundant systems ensure seamless transitions, maintaining essential functions. This redundancy minimizes downtime, crucial for disaster response and recovery.

Priority 4. Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation, and reconstruction.

There is an urgent need for disaster preparedness mechanisms that implement proactive measures before events occur, integrate disaster risk reduction into strategies, and ensure adequate capacity for effective response and recovery. Empowering vulnerable populations, such as women, youth, the elderly, and people with disabilities, is essential. They should be enabled to lead and advocate for

approaches centered on gender equality and universal access in recovery, and reconstruction. Effective recovery practices should include actionable plans that guide and organize resources, avoiding the reconstruction of existing vulnerabilities while addressing the specific needs of the population and their means of production.

1. Integrate Build Back Better Principles

By integrating BBB principles into recovery and reconstruction, communities can enhance their resilience to disasters, promote sustainability, and support long-term development. Recovery efforts must restore and improve the resilience and sustainability of affected communities, infrastructure, and systems.

Integrating BBB principles allows for incorporating sustainable development aspects into recovery activities, including risk-informed investment and design for critical infrastructure. It also provides the opportunity to integrate nature-based solutions as part of DRR actions, particularly in countries like Grenada, which have valuable natural capital. This approach also enables sharing best practices, such as reviewing successful recovery efforts from the Caribbean region to inform local plans.

2. Integrate Resilient Infrastructure Principles such as those promoted by UNDRR

By integrating the UNDRR's resilient infrastructure principles, communities and governments can develop systems that withstand disasters and contribute to development, sustainability, and quality of life. This proactive approach fosters a culture of resilience benefiting current and future generations. The principles advocate a multi-hazard approach to infrastructure development, considering various risks and vulnerabilities to ensure adaptability to a range of potential disasters. Resilient infrastructure is designed, constructed, and maintained to withstand disaster impacts, reducing vulnerability, and enhancing resilience. It supports sustainable development through environmentally friendly practices and long-term planning, helping communities adapt to climate change and other risks while contributing to economic and social sustainability. Moreover, resilient infrastructure minimizes economic losses.

3. Strengthen National Capacities for Damage and Loss Assessments

Target E of the Sendai Framework focuses on estimating disaster-related damage and losses. There is a need to enhance institutional capacity to conduct national assessments using available methodologies (e.g., DaLA or PDNAs) for future disasters. UN agencies, programs, or funds can assist by providing training sessions to key government agencies, mainstreaming the use of these methodologies. Facilitating knowledge transfer ensures that information is readily available in the wake of a disaster and that the government can accurately calculate costs. This supports timely responses and appeals to international financial institutions for disaster relief and recovery efforts.

An additional proposed approach to strengthen this capacity includes training local or community-level responders in the technical collection of disaster data using tools like handheld devices and open-source software such as KOBO. For example, in flood events, training could focus on mapping the physical extent, depth, and damage. In the case of landslides, it would include collecting data on typology, descriptions, scars, deposits, and flows. Photos of damage can be linked to these records, enhancing the descriptive data. This geospatial and descriptive data could be integrated into an overarching data management system, as suggested in the PDNA framework.

Additionally, the following initiatives can further support these efforts:

- **PDNA training for Recovery Teams (RNAT)**: Extending training to universities could engage graduates as volunteers, integrating them into the CRRF (Comprehensive Disaster Risk Management Framework) Roster at CDEMA.
- **Training for Local Disaster Committees** to benefit from targeted PDNA training to strengthen local capacity for disaster assessment and response.
- **Development of PDNA Manuals**, tailored to national contexts can be created, ensuring that assessment methodologies align with each country's specific needs and circumstances.

4. Integrating Gender Analysis in Grenada's Post-Disaster Recovery Strategies

It is recommended that the Government of Grenada develop procedures to ensure that gender analysis is included in post-disaster recovery plans and strategies. This involves incorporating gender considerations to address the specific needs and vulnerabilities of different groups. Additionally, providing training in gender analysis for disaster response teams is crucial. This training will equip responders with the skills to evaluate gender-specific impacts and ensure that recovery efforts are equitable and inclusive.

5. Setting up a Grenada's Resettlement Plan

It is suggested that the government of Grenada should focus on developing a comprehensive Resettlement Strategy to effectively meet the needs of displaced and homeless individuals. This approach should include detailed assessments of the affected populations to understand their specific needs and vulnerabilities. It is essential to identify and secure safe, sustainable land for resettlement. The strategy must encompass plans for infrastructure development, including housing, sanitation, and access to essential services such as healthcare. Engaging local communities and stakeholders is crucial to ensure the process is inclusive and facilitates the social and economic integration of displaced people. Additionally, setting a timeline and allocating sufficient resources will be key to success.

6. Promote and ensure the design, development, implementation, sustainability, and monitoring of Multi-Hazard Early Warning Systems (MHEWS).

Despite the severity of Hurricane Beryl, the number of fatalities was lower compared to past hurricanes like Maria in 2017 and Ivan in 2004. This improvement results from years of investment in strengthening early warning systems by Caribbean nations, supported by organizations like the Caribbean Disaster Emergency Management Agency. To continue this progress, it's essential to enhance multi-hazard early warning systems in Grenada. It is recommended that, within the framework of the Early Warnings for All initiative, Grenada collaborates closely with UNDRR, WMO, and CDEMA to develop a comprehensive MHEWS Gap Analysis and Implementation Plan. This plan could be financed by mechanisms supporting the initiative, such as the Green Climate Fund (GCF), the Climate Risk Early Warning Systems (CREWS), and the Systematic Observations Financing Facility (SOFF), among others.

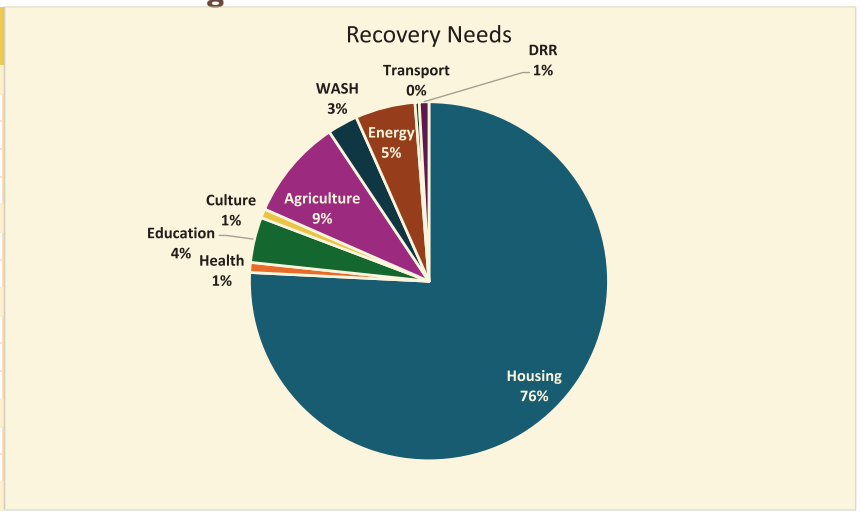
NATIONAL RECOVERY NEEDS & STRATEGY

RECOVERY NEEDS

It is estimated that the recovery from Hurricane Beryl will require US$210.94 million or XCD$569.53 million. Most of these needs (76%) are in the housing sector with US$156.78 million or XCD$423.3 million. The second highest recovery needs are in the agriculture sector with US$20.23 million or XCD$54.63 million (9% of total needs), while the third highest recovery needs are in the energy sector with US$12 million or XCD$32.6 million (5% of total).

Figure 21: Recovery Needs by Sector (XCD and USD millions) and as a Percentage of Total[99]

Sector	Millions XCD	Millions USD
Social	458.34	169.76
Housing	423.30	156.78
Health	5.44	2.02
Education	24.64	9.13
Culture	4.95	1.84
Productive	54.63	20.23
Agriculture	54.63	20.23
Tourism		-
Infrastructure	51.33	19.01
WASH	16.45	6.09
Energy	32.60	12.07
Transport	2.28	0.85
Cross-Cutting	5.23	1.94
Environment		-
DRR	5.23	1.94
Total	**569.53**	**210.94**



The recovery needs identified by each sector are summarized below:

TOURISM short term recovery measures include rehabilitation and business recovery to limit the economic and social fallout from the hurricane. Given the severe impact on Carriacou and Petite Martinique, tourism businesses in these islands need an urgent liquidity injection. A business grant can provide short-term assistance for businesses to repair and restart operations. In the short to medium term, the government's Business Reactivation Fund needs to be fully implemented to enable businesses to build back better. In the medium to longer term, tourism reconstruction needs to focus on resilience.

AGRICULTURE: short-term needs in the crop subsector include cleaning debris, providing seedlings, and restoring nutmeg, cocoa, and fruit tree plantations. In the medium term, wind-break tree species are needed to increase resilience and an integrated planting system to control erosion. Long term interventions include policy development and capacity-building on resilient agroforestry practices. In

99 Exchange rate 2.7 XCD per 1 USD. NOTE: The recovery needs in the culture sector were revised to XCD $3.8 million or USD $1.4 million.

the Livestock sub sector, short-term activities will support the rehabilitation of livestock production through scaled-up provision of feed, fodder, veterinary drugs, as well as restocking, and the restoration of destroyed animal shelters. In the medium to long term, the need is to restore the livestock economy; capacity-building on climate smart practices for livestock rearing and development of weather index-based livestock insurance. Reconstruction needs is for restoring assets and supporting the private sector (poultry / apiculture industry). In the fishery sub-sector short term needs cover the basic needs of fishermen and sea moss farmers and restore fishing capacity such as infrastructure and vessels.

HOUSING: The sector's recovery needs are associated with the reconstruction/repair of damaged buildings as well as with additional costs for enhancing the resilience of buildings to withstand future disasters. Other needs include debris removal and cleaning, the operation and maintenance of shelters (although these expenses have already been covered by the government), and capacity building and training to ensure resilient recovery. Damage from household goods and private losses from rental housing were not included as there are no government programs to address this type of costs.

HEALTH: Recovery needs include repairing the health infrastructure that was affected, with improved conditions so that future similar events won't have the level of destruction observed after Hurricane Beryl. To this end, a premium of 15% was added to the cost of damage to buildings. Needs also include managing the emergency and undertaking cleaning and debris removal.

EDUCATION: The recovery needs include repairing and rebuilding infrastructure and assets with an added premium of 15% to include improvements specially related to stronger roofing systems to withstand strong winds and heavy rains. The recovery needs also include the operation of the temporary education programs for students from Carriacou and Petite Martinique who are moving to the mainland, and the delivery of care packages for students including the uniform programme.

CULTURE: Recovery needs include conducting a multi-hazard risk mapping of the culture sector, the reconstruction of Carriacou Museum, the restoration of built heritage, an assessment and conservation of cultural objects at Carriacou Museum, the replacement of traditional boats and musical equipment, and an assessment of archaeological and built heritage including the completion of inventories. Overall the sector could benefit from having a well defined heritage tourism strategy to promote historic sites, cultural spaces and events to increase revenues. A critical component of recovery is the development and implementation of disaster risk management planning.[100]

WASH: Recovery needs in the sector include equipment to manage and dispose of extra solid waste, increasing the resilience of water supply systems, the repair and replacement of damaged water supply infrastructure and solid waste management facilities, and the restoration of water supply and solid waste management services. The repair and replacement of damaged water facilities need urgent investments in resilience, such as the installation of a second reverse osmosis treatment plant

100 The recovery needs in the culture sector were revised to XCD $3.8 million or USD $1.4 million.

on Carriacou, with additional water storage capacity and dissemination network, the relocation of Mt. Horne dam and surface water reservoir, and strengthening the resilience of Grenada's water supply.

ENERGY: Recovery needs in the energy sector covers the costs to overcome the identified damage and loss generated by Beryl. In the short-term the solar farm at Limlair and in Petite Martinique is a priority with the introduction of the Advanced Metering Infrastructure (AMI) for a more responsive grid network in the face of disasters. Medium-term recovery is for the AMI as well and to add resiliency to the T&D infrastructure by placing power lines underground for a key section of the grid network.

TRANSPORT: Recovery needs cover the costs to put back the infrastructure that was affected, in improved conditions so that future similar events won't have the level of destruction observed with Beryl. To this end, a premium was added to the cost of damage to buildings. All additional costs incurred to manage the emergency and undertake cleaning and debris removal were also included.

ENVIRONMENT: sector recovery needs include conducting an ecological assessment post-Hurricane Beryl, launching environmental awareness campaigns, involving local communities in ecological assessments, and establishing mechanisms for the sustainable use of resources. Over the medium-term, coastal zone management plans are implemented, and the Grenada coastal zone management unit is established, integrating ecosystem-based approaches and nature-based solutions into all government plans, and ensuring that environmental policies prioritize sustainability and resilience.

Disaster Risk Reduction: The immediate priority is to implement the Disaster Risk Management Act 2023, to review and update DRM plans for multiple hazards, and to purchase handheld radios for disaster communication. Medium-term needs include strengthening the NaDMA by recruiting staff and delivering capacity-building training.

THE RECOVERY STRATEGY

The Government of Grenada has defined the recovery vision, guiding principles and strategic priorities for national recovery from Hurricane Beryl. **The recovery vision** is "Stronger together, with resilient sectors and empowered communities for a sustainable Grenada".

In line with the national core values and goals of Grenada's National Sustainable Development Plan 2020-2035, **the following are the guiding principles of recovery:**

5. Social justice, fairness, equality, and equity.
6. Commitment to the disadvantaged, poor, and vulnerable in society

7. Respect for the environment.
8. Accountability, transparency, and good governance.

The Government's **Strategic priorities** for recovery will focus on 1) The restoration of infrastructure and basic services, 2) Livelihoods and economic recovery, 3) Housing and human settlements, and 4) Disaster risk reduction and climate resilience. These are indicated below together with the recovery strategy proposed by each of the sectors.

5) Restoration of Infrastructure and Basic Services

The education sector recovery strategy will adopt an evidence-based child-centered approach to risk reduction in the sector, putting children's safety and wellbeing at the center of national, sub-national and local levels efforts. Sector specific risk assessments, strategic and operational planning, institutional commitment, partnerships, and continued financing is required to that end.

The health sector recovery strategy will be anchored to the ongoing discussions and programs aimed at enhancing the nation's healthcare infrastructure, including medical equipment, capacity-building for healthcare workers, and improvements to healthcare facilities across Grenada, Petit Martinique, and Carriacou. It will also focus on increasing resilience for future health emergencies such as pandemics or those from natural hazards like Hurricane Beryl.

In the WASH sector, the aim of the National Water and Sewerage Authority (NAWASA) is to provide safe and reliable water to residents and all sectors in Grenada. This will include the repair and replacement of damaged water facilities as well as additional investments in resilience.

The approach for the recovery of the culture sector focuses on meaningful resilience, and specifically Carriacou and Petit Martinique's culture sector. It prioritizes the maintenance, restoration and conservation assessments of heritage, capacity-building for those working in the sector, partnerships, the mapping of risks, and developing the appropriate framework to manage these risks.

In Carriacou and Petite Martinique, energy security is a priority so the solar farms at Limlair and Petite Martinique are a priority for reconstruction. Meanwhile the utility is providing temporary connections to residents to ensure access to electricity supply. Technical assistance is being considered from the EU-TAF in the re-design of a grid for Carriacou which will build-in resilience and determine the best way to incorporate RE sources to the grid. Once the re-design of the grid is completed, the EU will try to attract investors from Europe through the Global Gateway Investment Agenda.

In transport, a robust strategy for rebuilding Grenada's ports and airports after Hurricane Beryl and mitigating future disaster risks should involve both structural improvements and policy reforms. This comprehensive approach could include the following key elements: Building Back Better, Investment

in Climate-Resilient Technologies, Strengthening Governance and Emergency Preparedness, and Comprehensive Risk Assessments.

6) Livelihoods and Economic Recovery

In the agriculture sector, the aim of the recovery and reconstruction efforts is to revive economic activities and to strengthen farmers' capacity to be more resilient to similar future shocks in accordance with the principles of Building Back Better (BBB). The agriculture strategy will be based on inclusive and participatory community-based approaches, with special focus on the poor and other vulnerable groups.

In tourism, the Government of Grenada will design a creative strategy for resuscitating and developing a more resilient and competitive tourism sector in the aftermath of Hurricane Beryl, in concert with the private sector and civil society. This strategy includes short, medium, and long-term measures.

7) Housing and Human Settlements

The housing sector's recovery strategy will be aligned with Grenada's current governmental plans, particularly the National Housing Strategy and the National Adaptation Plan. These initiatives prioritize climate resilience, infrastructure development, and community-based recovery, echoing the PDNA's focus on sustainable reconstruction. By integrating disaster-resilient building techniques and materials, the recovery efforts aim to reduce vulnerability in high-risk areas, ensuring that the housing sector is prepared not only for immediate rebuilding but for long-term risk reduction and preparedness.

8) Disaster Risk Reduction and Climate Resilience

For environmental recovery, key recommendations include conducting post-hurricane ecological assessments, launching pollution reduction campaigns, and involving local communities in decision-making. In the medium term, the focus is on developing coastal zone management plans, integrating ecosystem-based approaches into government policies, and prioritizing sustainable, community-driven environmental practices for building long-term resilience.

The recovery strategy for Grenada's Disaster Risk Reduction sector following Hurricane Beryl will be organized into three distinct phases: short-term, medium-term, and long-term. Each phase addresses critical needs for strengthening disaster preparedness and response capabilities. The strategies will be implemented by the National Disaster Management Agency of Grenada, in collaboration with other relevant departments and ministries.

Annex 1: References

ACAPS, (2024) Grenada Impact of Hurricane Beryl 18 July 2024

Caribbean Development Bank (2016). The Changing Nature of Poverty and Inequality in the Caribbean

Caribbean Tourism Organization and Grenada Tourism Authority (2024), Rapid Needs Assessment-

CDEMA (2024). Grenada: Hurricane Beryl Provisional Rapid Needs Assessment Team Report, July 2024

Central Statistical Office, (2023). Q4 National Labour Force Survey Results

Central Statistical Office, (2021). Q2 National Labour Force Survey Results

FAO, WFP, UNICEF, IFAD, WHO, (2024) The State of Food Security and Nutrition in the World 2024

Fitzpatrick et al., A Decade of Archaeological Research on Carriacou, Grenadine Islands, West Indies

Government of Grenada (2024), Grenada Medium-term Fiscal Framework 2025-2027.

Government of Grenada (2024). Post Hurricane Beryl Incentives Package Phase II

Government of Grenada (2024). Provisional Sectoral Report on Hurricane Beryl 2024.

Government of Grenada (2023). Grenada National Ecosystem Report

Government of Grenada (2015). Grenada National Agriculture Plan 2015-2030

Government of Grenada (2014). Grenada's Growth and Poverty Reduction Strategy 2014-2018

Government of Grenada (2012). Agriculture Census 2012

Grenada Ministry of Finance (2023). National Labour Force Survey, 2023: 4th quarter

Grenada Tourism Authority (July 2024). Rapid Damage Assessment: Tourism Sector Analysis

IFRC (2024), Hot and dry: The small Caribbean Island nation of Grenada struggles with drought, heatwaves, and fire.

IMF (2022). Grenada Disaster Resilience Strategy (IMF Country Report No. 22/80)

NAWASA (2024). Report: Initial Assessment of NAWASA's assets in Carriacou

NAWASA (2024). NAWASA's Post Beryl Restoration Efforts at Carriacou and Petit Martinique

NAWASA (2024). Concept Note: Improving the Environmental Resilience of Grenada's Water Supply

OCHA (2024). Regional Overview and Planned Response to Hurricane Beryl

OCHA (2024). Latin America & The Caribbean Weekly Situation Update as of 14 June 2024.

OCHA (2024). Hurricane Beryl Situation Report #6

PAHO (2024). Hurricane Beryl Situation Report No 12 (12 August 2024)

UNDP (2022). Tourism Diagnostic Report Grenada

UNICEF (2017). Situation Analysis of Children in Grenada

UNICEF (2024). Hurricane Beryl Situation Report No 5 and 6

USAID (2021). Grenada Resilience Profile

US Department of State (2023). Investment Climate Statements: Grenada

WFP (2024). Partners of the Caribbean: WFP, collective action and the response to Hurricane Beryl

WFP, CARICOM, CDEMA (2024). Caribbean Food Security and Livelihoods Survey

World Bank (2021). Living conditions in Grenada: Poverty and Equity Update

World Bank (2024). Food Security Update June 2024

World Travel and Tourism Council (2023). Travel & Tourism: Economic Impact 2023: Grenada.

Annex 2: Detailed Recovery Needs for the Culture Sector

Activity	Short term (1-YR)	Med-term (3-YR)	Long term (5-YR)	Total
Consultation with disaster management agencies and partners to discuss disaster management planning and coordination for the culture sector		10,000.00		10,000.00
Multi-hazard risk mapping of the culture sector in the Grenadines (Grenada)		50,000.00		50,000.00
Reconstruction of Carriacou Museum		112,000.00		112,000.00[101]
Replacement of damaged and destroyed ICH costumes	10,000.00			10,000.00
Replacement of musical and other equipment for practitioners		100,000.00		100,000.00
Replacement of destroyed traditional boats (constructing new boats)		480,000.00		480,000.00
Training on providing First Aid to cultural heritage in times of crisis	20,000.00			20,000.00
Develop heritage tourism marketing strategy and programme for Grenada and the Grenadines.		100,000		100,000
Update existing inventory of sites and undertake periodic state-of-conservation assessments	25,000	25,000		50,000
Develop actions to ensure business continuity in Cultural Industries.	15,000	15,000		30,000
Culture integrated into national framework for management of risks and recovery; Ensure the development of needed governance frameworks such as updating and finalizing of the Grenada Culture Policy to include climate change and DRM considerations to reflect better relationships and partnerships that are required between cultural organizations and other partners to build disaster resilience in the culture sector.		50,000		50,000
Implement a digitization programme for relevant documentary heritage and other collections.		100,000		100,000

101 Based on Valuation of 298, 303.14 XCD prepared for the restoration of the Carriacou Museum, Jules Consulteam (JCT (September 2024)

Training on documenting and safeguarding ICH in Emergencies and pilot activity in documenting ICH knowledge and practices relevant to natural hazards		50,000		50,000
Assessment of archaeological and built heritage (to include structural assessments) and establish access	50,000			50,000
Based on individual site needs, develop, and implement programme to clean, rehabilitate, restore, or stabilize historic structures	150,000			150,000
Assessment and conservation of cultural objects at Carriacou Museum	30,000.00			30,000.00
Consultations with all actors, the Grenada Office of Creative Affairs, the relevant ministry of industry and trade, and umbrella bodies regarding the replacement of equipment for artisans and workspaces to facilitate the resumption of cultural activities and earning	5,000.00			5,000.00
Consultation with umbrella bodies regarding attaining resilience in the cultural and creative industries sub-sector and establishing an emergency fund or insurance	5,000.00			5,000.00

Annex 3: PDNA Team Composition

Government Team Composition

Sector	Government Institution	Name	Position
Housing	Ministry of Housing	Gary Walker	Housing Officer
	Ministry of Social Development	Mr. Samuel St. Bernard	Senior Planner
	Ministry of Trade	Jillian St. Bernard-James	Trade Officer
	Ministry of Housing and Community Development	Misty Garrett	Community Development Officer
	Economic Development, Planning, and Cooperatives	Ms. Kenita Paul	Director (Ag.) for Statistics
		Tiffany Charles	Statistics
Education	Ministry of Education	Alana Felix-Roberts	Senior Administrative Officer
		Ruth Charles	Project Officer
		Denton Forteau	Maintenance Officer
	Cabinet Office	David Hopkin	Policy Development Officer
	National Security, Home Affairs, Information, and Disaster Management	Ms. Petal Rush	Senior Planning Officer
	Economic Development, Planning, and Cooperatives	Monique Noel	Project Manager BNTF
	Department of Public Administration	Leanwall Perotte	Head of Reform Management
Health	Mental Health, Wellness, and Religious Affairs	Mr. Josh Hector	Directyor of Mental Health and Substance Use
		Mrs. Meryl Roberts-Marryshow	Psychiatric Social Worker
		Mrs. Doris Keen-Douglas	Registrar
	Economic Development, Planning, and Cooperatives	Danessa Joseph	Technical Coordinator SAEP
WASH	Ministry of Social Development	Miss Rhonda Penny	Liason Officer
	Macroeconomic Policy Unit	Tonia Adams	

Other infrastructure: Power, energy, Transport	Economic Development, Planning, and Cooperatives	Dr. Stephen Fletcher	Project Manager SAEP
	Ministry of Mobilization, Implementation, and Transportation	Wayne Finlay	Senior Technical Officer
	Cabinet Officer	Tyrone Francis	Monistoring and Foundatino Officer
	National Security, Home Affairs, Information, and Disaster Management	Ms. Keisha Alexander	Planning Officer
	Ministry of Finance	Cassandra Ettienne	Policy Analyst
Agriculture, Fisheries, Livestock, Forestry	Agriculture, Lands, Forestry, and Marine Resources	Mr. Michael Church	Planning Officer II
		Mr. Denis Baptiste	Assistant District Agricultural Instructor I
		Andrea Thomas	Resource Officer
		Ms. Kimberly Lewis	Data Clerk
	Economic Development, Planning, and Cooperatives	Junior Alexis	Environmental Statistician
Tourism		Kim Julien	Technical Officer Tourism
	National Security, Home Affairs, Information, and Disaster Management	Dr. Terrence Walters	NADMA Director
	RDU-SAEP, BNTF	Michelle John	M&E Specialist
	BNTF	Devon Brilton	Assistant Community Officer
	Ministry of Economic Planning	Kendall Alexander	_
	Division of Culture	Celina Edwards	Representative for Chief Cultural Officer
	Ministry of Foreign Affairs	Tamera Courtney	FSO
		Garth Walters	FSO
		Sabrina Dumont	750
	Ministry of Tourism, Aviation, and Culture	Susan Jones Benjamin	

UN Agencies and Partners

Partner	Name
UNDP	Jeannette Fernandez (Consultant Coordinator)
	Jose Antonio Leon
	Elizabeth Soomer
	Luis Gamarra
	Sarah Faber
	Monica Trujillo
	Karima Degia
	Lucy Beauchamp
IOM	Peter Cawley
UNICEF	Lyston Evred Skerritt
EU	Dominique Blariaux
	Michael Bonte
	George Matthiew
PAHO	Lealou Reballos
FAO	Roberto Sandoval
ECLAC	Omar Bello
	Santiago Salvador
	Michael Hendrickson
UNDRR	Jair Torres
	Mario Salgado
UNESCO	Yuri Peshkov