JAMAICA

NATIONAL DISASTER PREPAREDNESS BASELINE ASSESSMENT

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The Pacific Disaster Center and the authors of this report would like to acknowledge the partnership and many insightful inputs and guidance provided by representatives of the various agencies and organizations that participated in the Jamaica NDPBA workshops, surveys, interviews, and data validation and analysis process including:

- Combined Disabilities Commission
- Disaster Risk Reduction Center, University of the West Indies
- Jamaica Constabulary Force
- Jamaica Defence Force
- Jamaica Fire Brigade
- Jamaica Red Cross
- Meteorological Service
- Ministry of Education, Youth, and Information
- Ministry of Health
- Ministry of Labour and Social Security
- Ministry of Local Government and Community Development
- Ministry of Entertainment and Tourism
- Ministry of Transport, Works, and Housing
- Municipal Council of Portmore
- Mona School of Business and Management
- National Environment and Planning Agency
- National Spatial Data Management Division
- National Water Commission
- National Weather Commission
- National Works Agency
- Office of Disaster Preparedness and Emergency Management
- Pan American Health Organization
- Parish Councils: Clarendon, KSAC, Manchester, Saint Ann, Saint Catherine, Saint Mary, Saint James, Saint Thomas
- Planning Institute of Jamaica
- Population Media Center
- United Nations Children's Fund
- United Nations Development Programme
- United Nations Environment Programme
- United Nations Population Fund
- United States Agency for International Development/Office of U.S. Foreign Disaster Assistance
- United States Embassy
- Water Resources Authority

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Acronyms

ACC	Area Coordination Center
ADRA	Adventist Development and Relief Agency
CC	Coping Capacity
CCC	Constabulary Coordination Center
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CDEMA	Caribbean Disaster Management Agency
CDM	Comprehensive Disaster Management
DG	Director General
DM	Disaster Management
DRM	Disaster Risk Management
DRMA	Disaster Risk Management Act
DRR	Disaster Risk Reduction
EOC	Emergency Operations Center
FCC	Fire Coordination Center
GDP	Gross Domestic Product
GOJ	Government of Jamaica
INGO	International Non-Governmental Organization
JCF	Jamaica Constabulary Force
JDF	Jamaica Defence Force
JFB	Jamaica Fire Brigade
JICA	Japan International Cooperation Agency
MCC	Ministry Coordination Center
MHE	Multi-Hazard Exposure
MHR	Multi-Hazard Risk
MLGCD	Minister of Local Government and Community Development
MLSS	Ministry of Labour and Social Security
MOE	Ministry of Education
MOH	Ministry of Health
MOU	Memorandum of Understanding
NDAP	National Disaster Action Plan
NDF	National Disaster Fund
NDMO	National Disaster Management Organization
NDPBA	National Disaster Preparedness Baseline Assessment
NDRCP	National Disaster Response Coordination Plan
NEOC	National Emergency Operations Center
NGO	Non-governmental Organization
NGO	Non-governmental Organization
NSDMD	National Spatial Data Management Division
NSTEP	National Simulation Training Exercise Program
ODPEM	Office of Disaster Preparedness and Emergency Management
PDC	Pacific Disaster Center
PIOJ	Planning Institute of Jamaica
SOP	Standard Operating Procedure
STATIN	Statistical Institute of Jamaica
V	Vulnerability

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Executive Summary

This report details the final results of the National Disaster Preparedness Baseline Assessment (NDPBA) Project conducted in coordination with, and in support of, stakeholders in Jamaica. The goal of this project was to assess disaster risk at the subnational level and place it in the context of disaster risk reduction (DRR) efforts currently underway in Jamaica. The NDPBA provides a baseline for evidence-based DRR decision making while simultaneously supporting the enhancement of data holdings to establish future trends in the drivers of disaster risk.

The NDPBA is a stakeholder facilitated assessment with four key components: 1) focused stakeholder engagements in the form of facilitated knowledge exchanges; 2) a risk and vulnerability assessment (RVA) conducted at the regional level; 3) a comprehensive disaster management (CDM) assessment conducted at national and subnational levels; and 4) the creation and promotion of a common foundation for data gathering and sharing. Key findings from both the RVA and CDM analyses identify relative strengths in the existing disaster management structure, as well as areas where improvements in process, structure, and resources would enhance Jamaica's DRR efforts.

RVA Findings

The results of this analysis determined that Clarendon, Saint Catherine, Saint Thomas, Saint Mary, and Saint Ann have the highest risk in Jamaica (see Table 1). Risk is composed of Multi-Hazard Exposure (MHE), Vulnerability (V), and Coping Capacity (CC). An examination of these risk components helps to build a more comprehensive understanding of the drivers of risk in each parish. Risk in Clarendon is driven primarily by Multi-Hazard Exposure and Vulnerability. In contrast, risk in Saint Catherine is driven almost entirely by hazard exposure. Risk in Saint Thomas and Saint Mary is a combination of all three components: higher exposure, higher vulnerability, and lower coping capacity. Finally, a very low level of coping capacity contributes to risk in Saint Ann.

Table 1. Summary of Risk Scores for Parishes with the highest risk scores in Jamaica

Parish	MHR		MHE		V		CC	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Clarendon	0.665	1	0.728	2	0.678	1	0.411	7
Saint Catherine	0.651	2	0.989	1	0.430	12	0.467	5
Saint Thomas	0.623	3	0.656	4	0.616	4	0.402	9
Saint Mary	0.605	4	0.595	5	0.622	3	0.403	8
Saint Ann	0.566	5	0.550	7	0.512	9	0.364	12

CDM Findings

Results from the CDM analysis highlight key areas where disaster management capacity and capabilities could be strengthened in Jamaica:

1. Jamaica has not established minimum training requirements for disaster management personnel at the national and parish levels, which may result in potential knowledge gaps, and impact the availability of qualified staff.
2. A centralized repository for tracking training achievements does not exist, preventing the validation of credentials to ensure adequately trained staff.

3. No national exercise program with participation requirements for organizations and agencies at all levels is in place, which would minimize capacity gaps, particularly at the subnational level.
4. ODPEM's budget allocations are insufficient, limiting ODPEM's capacity for DRR initiatives and reducing the effectiveness of the comprehensive disaster management system in Jamaica.
5. DRR efforts being undertaken by the GOJ lack visibility. Poor communication about these activities could result in potential duplication of effort.
6. Inadequate disaster management funding and few personnel at the parish level limits the capacity of subnational disaster management. Consequently, tactical disaster response and relief operations are centralized at the national level.
7. Insufficient NDF funds reduces the effectiveness of disaster response operations in Jamaica.
8. Strategies to complete the implementing regulations outlined by DRMA 2015 have not been formalized, resulting in many aspects of the law not being applied.
9. There is a lack of ministry and sector-specific comprehensive disaster management plans.
10. Parish disaster plans are largely unavailable and incomplete.
    a. A standard format is not in place for parish disaster plans.
    b. No central repository is available to store and provide access to disaster plans.
11. Because parish disaster plans are largely incomplete or unavailable, parishes rely on national disaster plans during disaster response operations.
12. There is currently no strategy in place to complete the NDRCP.
13. National standards for updating plans and SOPs have not yet been established, resulting in generally incomplete and outdated plans.
14. Because parish governments generally do not have the capacity to conduct local tactical disaster response and relief activities these actions are directed by national-level actors. This results in overly-centralized and less efficient disaster response operations.
15. Ministries applying for international support for DRR projects and NGOs conducting DRR projects within Jamaica are not required to coordinate with ODPEM.
16. The absence of a sole-purpose national EOC could result in critical delays in response efforts, particularly during quick-onset events.
17. An operational nation-wide emergency communications system has not been established to address critical communication needs when land and cellular telephone networks are unavailable.
18. Personnel from national ministries sometimes report to their organizational EOCs rather than local parish EOCs, resulting in a lack of advocacy and support at the Parish level during disaster response and relief operations.
19. The absence of an inventory of disaster relief supplies maintained by and shared among national and parish governments and NGOs, inhibits efficient provision of relief supplies.
20. ODPEM has no database or inventory of institutional resources and equipment in each jurisdiction that may be used to support disaster response operations.

Jamaica NDPBA Consolidated Recommendations

A suggested five-year timeline to implement programmatic recommendations and strategies to reduce disaster risk and strengthen comprehensive disaster management in Jamaica are presented in Figure 1 and Figure 2.

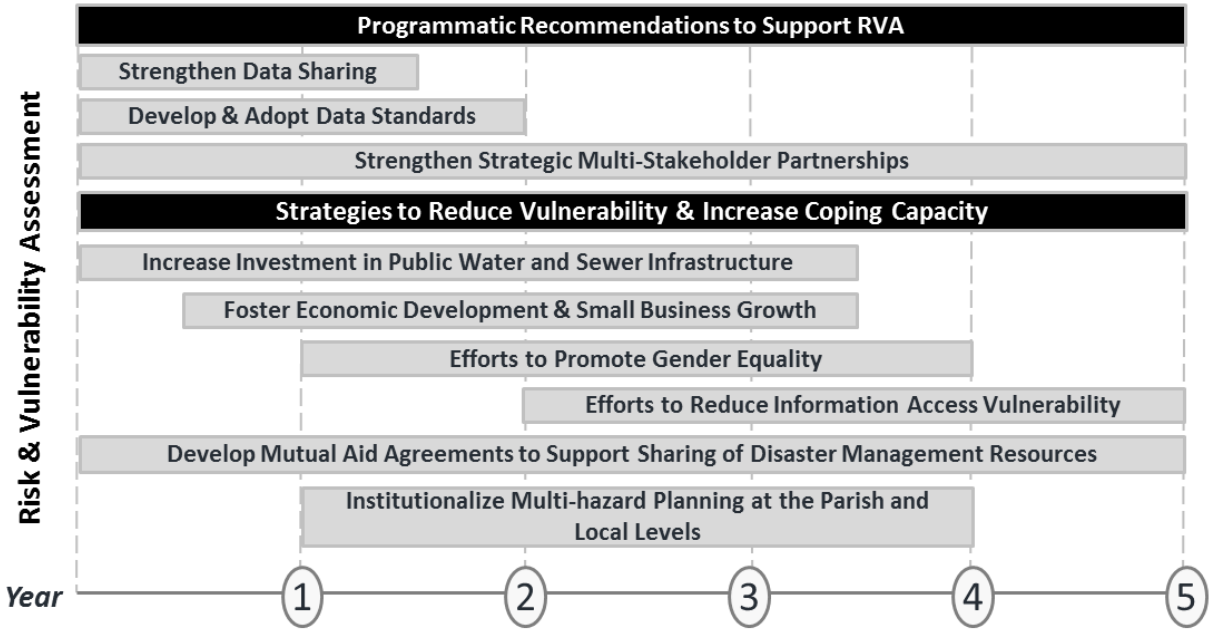

Figure 1. Suggested Five-year Implementation Plan to reduce disaster risk in Jamaica based on RVA results

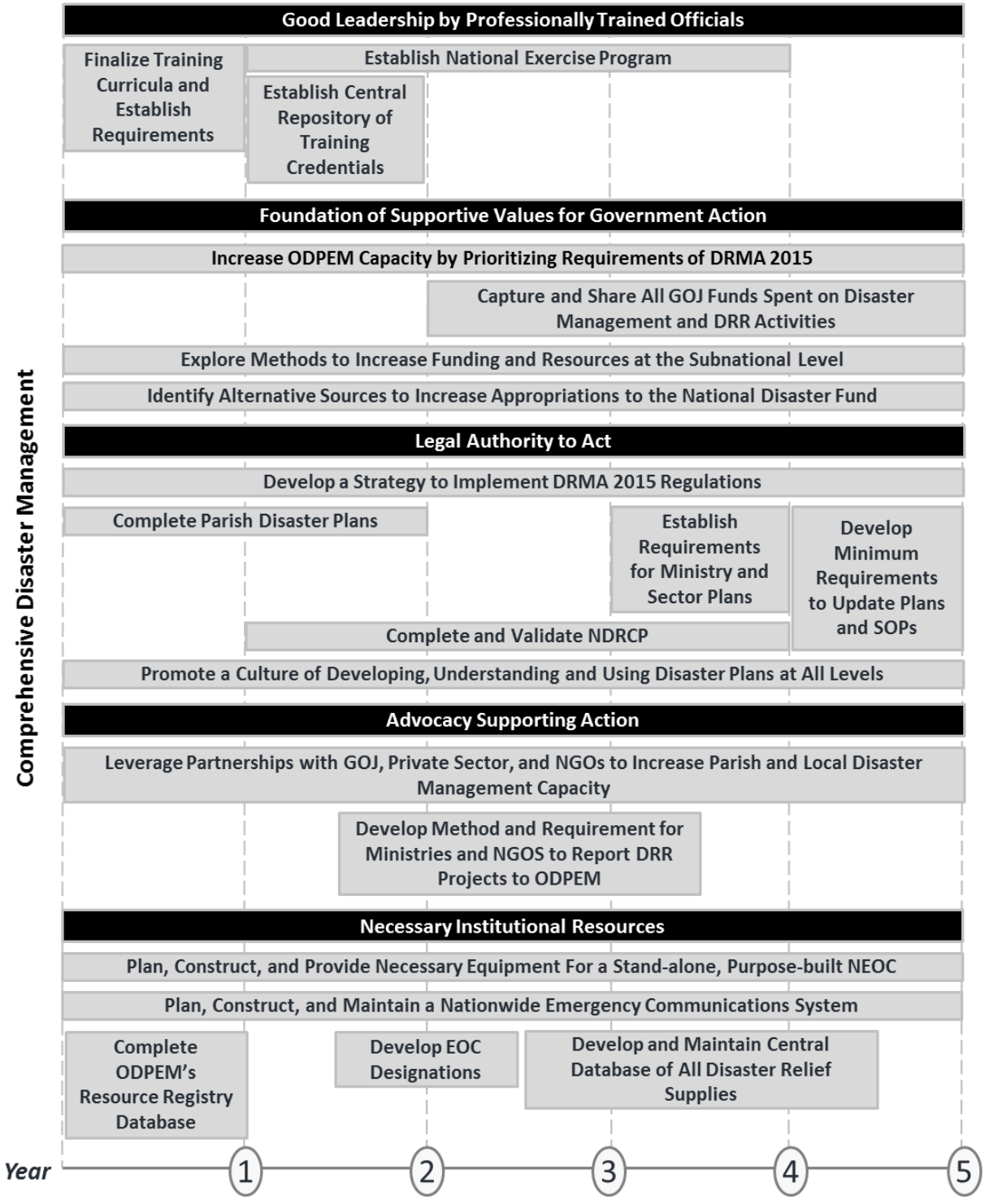

Figure 2. Suggested Five-year Implementation Plan to strengthen CDM in Jamaica based on assessment results

Contents

Introduction

This report summarizes the results of the National Disaster Preparedness Baseline Assessment (NDPBA) project conducted by the Pacific Disaster Center (PDC) in partnership with, and in support of Jamaica.

The objective of the Jamaica NDPBA was to identify the conditions within the country that assess its preparedness for and capabilities in effectively responding to and recovering from disasters. Designed to provide a comprehensive understanding of Jamaica's risk and disaster management capabilities, the findings support evidence-based decision making to enhance disaster risk reduction (DRR) through focused capacity and capability building. Using a stakeholder-driven approach, the NDPBA project facilitated the integration of national DRR goals into the Risk and Vulnerability Assessment (RVA) and Comprehensive Disaster Management (CDM) methodologies.

The goal of the project was to enhance disaster resilience within Jamaica by:

- Scientifically capturing disaster risk within the environmental, social, and economic context of Jamaica.
- Documenting and assessing disaster risk governance with the goal of providing actionable information that can be used to strengthen disaster management and manage disaster risk.
- Better understanding the disaster management capabilities in Jamaica to manage, prepare for, and respond to disaster events.
- Analyzing multi-hazard risk to provide actionable information to guide investments in an effort to strengthen resilience.
- Providing a forum for all vested stakeholders to share and communicate successes and challenges encountered in the understanding and management of disaster risk.

The NDPBA project provided a repeatable and measurable approach to examining key elements of disaster risk reduction (DRR). The NDPBA approach consists of four distinct yet complimentary components, including: 1) focused stakeholder engagements in the form of facilitated knowledge exchanges; 2) a risk and vulnerability assessment (RVA) conducted at the Parish level; 3) a comprehensive disaster management (CDM) assessment carried out at national and subnational levels; and 4) the creation and promotion of a common foundation for data gathering and sharing.

NDPBA components were uniformly undertaken to provide the foundation for short- and long-term preparedness activities through the development of:

- A detailed subnational risk and vulnerability assessment that included the following elements: multi-hazard exposure, vulnerability, coping capacity, lack of resilience, and multi-hazard risk in Jamaica;
- A review of national and subnational CDM capabilities to identify challenges and provide recommendations for strengthening preparedness and response;
- A proposed five-year plan including recommendations to build capacity and capability; and
- Data integration and information sharing.

The data and final analysis provided in this report are integrated into the Pacific Disaster Center's (PDC) decision-support system known as DisasterAWARE™ allowing for open and free access to critical DRR data and information. Access to the system may be requested through ndpba@pdc.org.

Methods

This section of the report summarizes the NDPBA methodology implemented in Jamaica, to include stakeholder engagement, data gathering procedures, data processing, and analysis.

Facilitated Knowledge Exchanges

Facilitated stakeholder engagements acknowledge the Guiding Principles of the Sendai Framework for Disaster Risk Reduction and serve as a key component of the NDBPA. Over the duration of the project, stakeholders in Jamaica were invited to attend three Knowledge Exchanges (*Initial, Midterm, and Final*) as well as participate in data reviews, interviews, and standardized surveys. Knowledge Exchanges provided opportunities for stakeholders to present on disaster management topics of interest and highlight the important work each organization is undertaking to support DRR. Leveraging a participatory approach, a diverse group of traditional and non-traditional disaster management stakeholders were engaged. This encouraged active participation and promoted diversity among participants and partners.

Prior to the first Knowledge Exchange, in-depth archival research was conducted to gain insight into the national disaster management system and identify disaster management stakeholders who were subsequently invited to the Initial Knowledge Exchange. Presentations provided by the project team and by in-country stakeholders during this event and two subsequent Knowledge Exchanges provided opportunities to discuss the NDPBA methodology, explore available data sources and gaps, administer surveys, discuss disaster management challenges and successes, and review preliminary assessment results for Jamaica. Following the exchange, meetings with stakeholders were scheduled to conduct detailed interviews and share data and information. Additional stakeholder engagements provided opportunities to share data, conduct interviews, provide training on PDC's DisasterAWARE™ decision support system, and exchange professional insights, experience and best practices.

This participatory approach was coordinated with the national disaster management agency, the Office of Disaster Preparedness and Emergency Management (ODPEM). Working closely with ODPEM, the project team collaborated with a broad range of project stakeholders at national and subnational levels including the National Spatial Data Management Division (NSDMD), Planning Institute of Jamaica, Ministry of Health, Jamaican Red Cross, Parish Disaster Coordinators and other government agencies; as well as the United Nations Country Team; and national and international NGOs. A full list of participating agencies and organizations is included in the acknowledgements section of this report.

Risk and Vulnerability Assessment (RVA)

The purpose of conducting a subnational baseline Risk and Vulnerability Assessment (RVA) was to characterize elements of multi-hazard risk. The subnational NDBPA RVA was adapted from PDC's established Global RVA framework to meet the specific needs of Jamaica. To capture the complex concept of risk, PDC's RVA leverages a composite index approach. Composite indices are constructed by combining data sets that represent general themes that contribute to risk (e.g., access to information, health status, or governance). These individual variables, or *indicators,* are uniform and quantifiable characteristics that reflect the overall concepts required for analysis. Appropriate subnational indicators were identified in partnership with stakeholders. The data were combined to represent the components of hazard exposure, vulnerability, and coping capacity.

The index created represents Multi-Hazard Risk (MHR) as a function of *component indices* representing Multi-Hazard Exposure (MHE), Vulnerability (V), and Coping Capacity (CC).

- *Multi-Hazard Exposure* describes the population present in hazard zones that are thereby subject to potential losses.
- *Vulnerability* describes the characteristics and circumstances of a community, system, or asset that make it susceptible to the damaging effects of a hazard.
- *Coping Capacity* characterizes the ability of people, organizations, and systems, using available skills and resources, to face and manage adverse conditions, emergencies, or disasters.

The assessment considered exposure to the following hazards: tropical cyclone wind, inland flood, coastal flood, landslides, and earthquakes. The basic model for the Multi-Hazard Risk Index is:

$$\textit{Multi-Hazard Risk Index} = (MHE + V + (1 - CC)) / 3$$

The Lack of Resilience (LR) Index represents the combination of Vulnerability (V) and Coping Capacity (CC). This basic model for Lack of Resilience Index is:

$$\textit{Lack of Resilience Index} = (V + (1 - CC)) / 2$$

The methodological process for the NDPBA RVA is illustrated below in Figure 3.

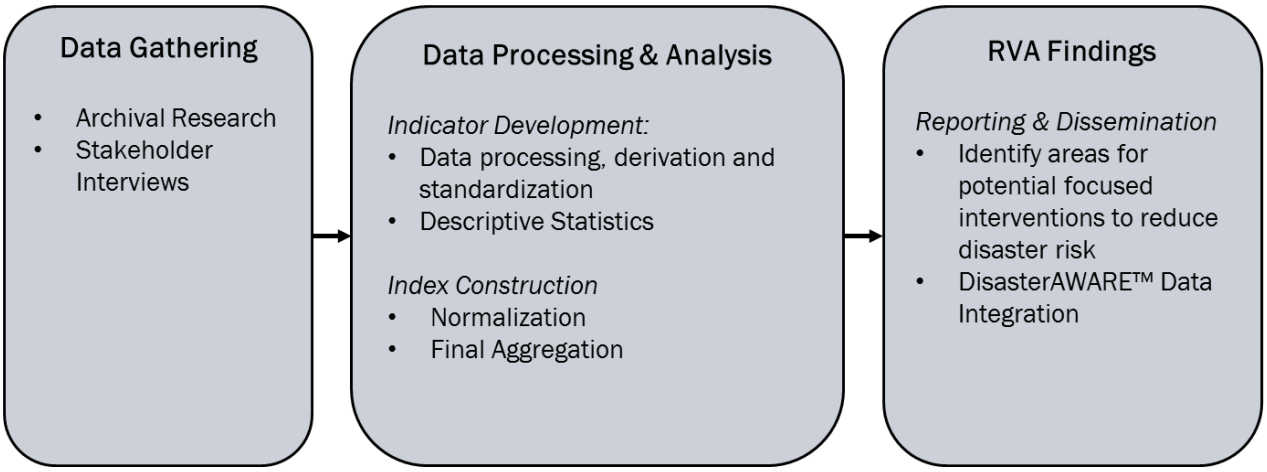

Figure 3. NDPBA Risk and Vulnerability Assessment (RVA) Methodological Process

Data Gathering

In partnership with stakeholders, a review of archival research and stakeholder interviews were conducted to identify potential data to be included in the study. Each indicator was gathered from vetted sources, and evaluated for potential use in the RVA model. Data were scrutinized to identify possible gaps, missing values, and to document any caveats regarding data quality or completeness. In certain cases, missing documentation or lack of data lineage precluded the use of datasets in the analysis. For details on the RVA data sets used in this analysis see **Appendix A: RVA Component Index Hierarchies and Thematic Rationale**.

Data Processing and Analysis

Datasets used in the analysis were standardized for use as indicators in order to make meaningful comparisons. For details on RVA index construction see **Appendix B**: **RVA Index Construction**.

RVA Findings

The results of the analysis helped to identify potential areas in which to focus limited resources in an effort to reduce disaster risk. As part of the final report, programmatic recommendations to support future RVAs and specific strategies to reduce vulnerabilities and increase coping capacities at the subnational level are provided. The analyzed data have been integrated into PDC's DisasterAWARE™.

Comprehensive Disaster Management (CDM)

Comprehensive Disaster Management (CDM) is the integrated approach of managing hazards through all phases of disaster management. Leveraging the latest academic research, the CDM analysis examines core elements of effective disaster management. The assessment is constructed to provide a systematic understanding of the challenges to operationalizing disaster management techniques in support of diverse community needs. The results of the assessment provide necessary information for policy makers to effectively direct investments in an effort to save lives and reduce losses. The CDM assessment can provide greater context to the RVA by placing the risk of each department into the larger DRR framework of Jamaica.

For the purposes of this assessment, CDM is conceptualized as the function of five components (see Figure 4):

- **Good Leadership by Professionally Trained Officials:** examines the professionalization of the disaster management field.
- **Foundation of Supportive Values for Government Action**: examining the backing, support, and sponsorship of CDM efforts.
- **Legal Authority to Act**: examines the legal framework that governs disaster management.
- **Advocacy Supporting Action**: examining stakeholder support and backing to include the general public, NGOs, and those providing assistance before, during, and after an event.
- **Necessary Institutional Resources**: examines available resources (material and human) that are provided by the jurisdiction or through mutual-aid agreements and partnerships with neighboring jurisdictions.

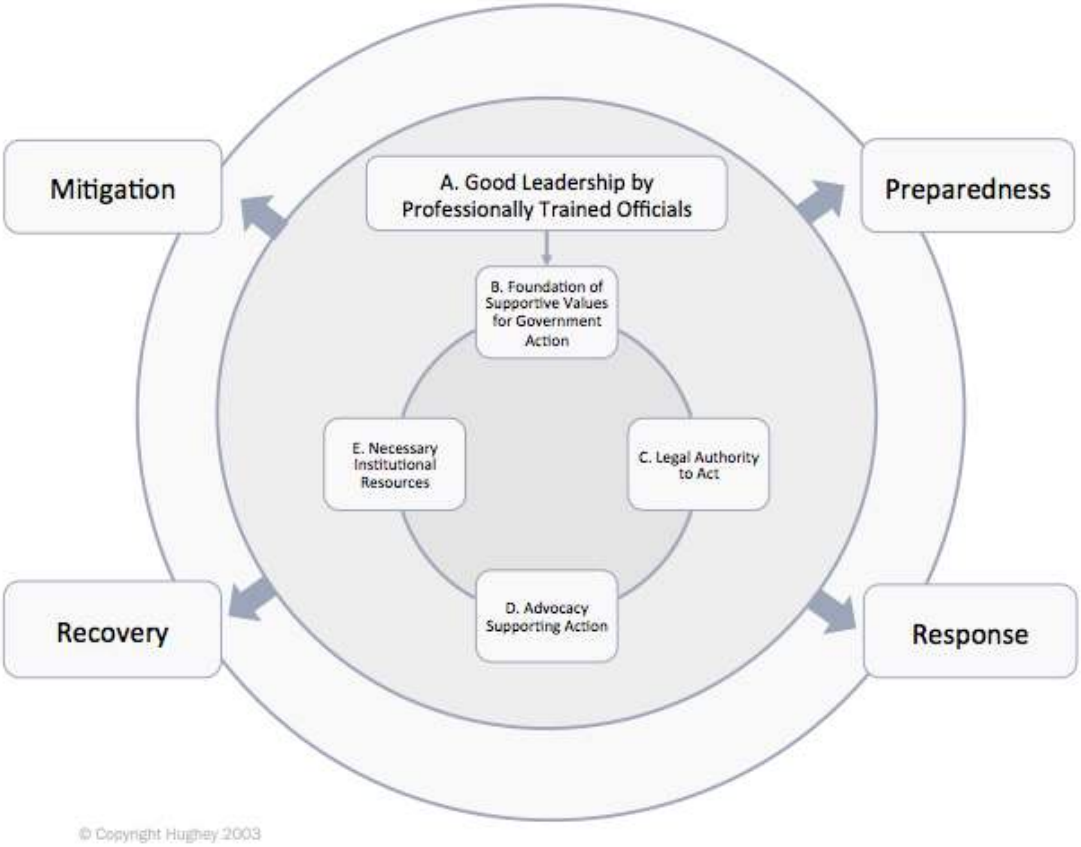

Figure 4. Comprehensive Disaster Management Model (Hughey, 2003)

The methodological process for the NDPBA CDM is illustrated below in Figure 5. CDM data were analyzed using a mixed methods approach. The approach combined both qualitative and quantitative data and methods of analysis, allowing for a more complete assessment of the CDM theoretical framework.

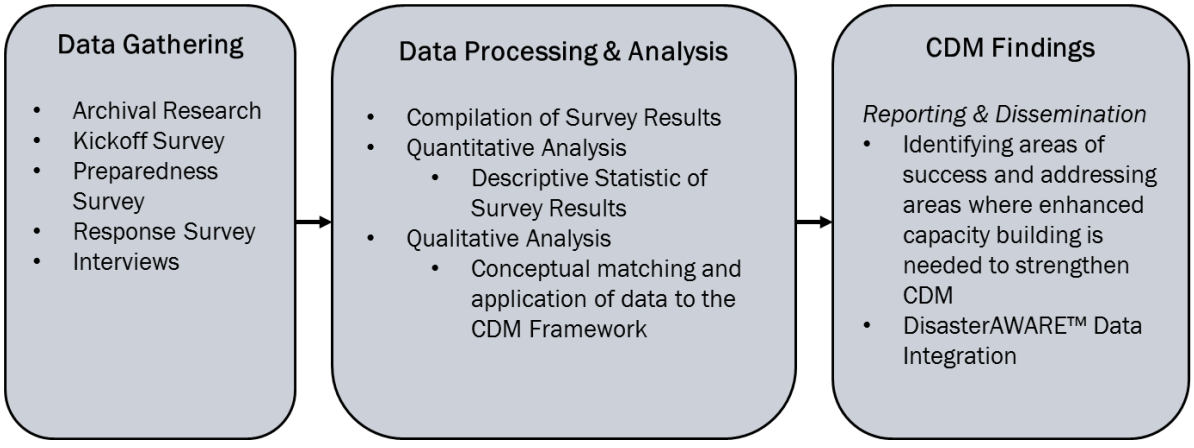

Figure 5. NDPBA Comprehensive Disaster Management (CDM) methodological process.

Data Gathering

Archival research, surveys, and interviews were the primary data gathering methods used to gain insight into existing capabilities of Jamaica's disaster management structure. Interviews with stakeholders corroborated information obtained through online research and from surveys administered during Knowledge Exchange workshops. All information collected was put in context using components of the CDM framework as a guide. Figure 6, below, illustrates the types of information gathered and analyzed for each component of the CDM analysis.

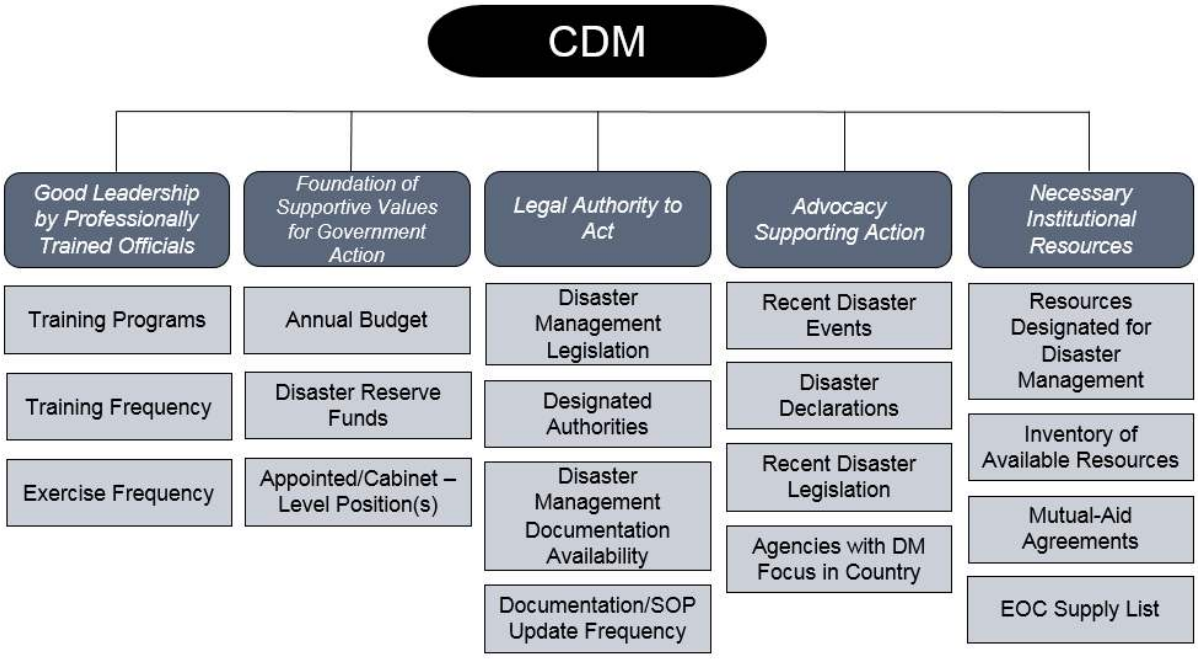

Figure 6. Datasets for CDM Analysis

Data Processing and Analysis

Four CDM-focused surveys were administered over the course of the project, with emphasis on questions related to disaster preparedness and response activities, and DRR priorities. Due to a high rate of non-response, results of the final survey (DRR Prioritization) were not included in the assessment. Responses from the remaining three surveys were analyzed either quantitatively or qualitatively, depending upon the question. Summary statistics and frequencies were generated for ranked-response questions. Open ended questions helped to identify recurring themes that could be further explored during interviews with disaster management stakeholders. For detailed summaries of survey results, refer to **Appendices C, D,** and **E**.

CDM Findings

CDM results helped to identify existing strengths and potential challenges that limit the delivery of effective disaster management. As part of this report, programmatic recommendations are provided to strengthen preparedness and response capacities, and thereby safeguard lives and reduce disaster losses.

Risk and Vulnerability Assessment (RVA) Findings

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Findings: Risk and Vulnerability Assessment (RVA)

The RVA results presented in this section represent the analysis of the 14 parishes in Jamaica. An overview of the national results is provided followed by a detailed review of each parish.

Summary

The RVA results highlight regions of Jamaica that may be in greater need for support due to increased population exposure, higher vulnerability or lower coping capacity. The RVA helps to:

- Identify the level of exposure an area has to multiple hazards.
- Assess the aspects of populations that make them susceptible to hazard impacts.
- Identify aspects of an area that can be improved to support coping strategies following hazard events.
- Place resources in areas that may need additional support following disasters.

Table 2 provides a summary of the component results for Multi-Hazard Risk (MHR), Multi-Hazard Exposure (MHE), Vulnerability (V), Coping Capacity (CC), including index scores, and relative ranking among the 14 Parishes. A rank of 1 corresponds to a high score (e.g., high multi-hazard risk), while a rank of 14 indicates a low score (e.g., low multi-hazard risk).

Table 2. Multi-Hazard Risk (MHR) Index scores, rankings and component indices for Jamaica parishes

Parish	MHR		MHE		V		CC	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Clarendon	0.665	1	0.728	2	0.678	1	0.411	7
Saint Catherine	0.651	2	0.989	1	0.430	12	0.467	5
Saint Thomas	0.623	3	0.656	4	0.616	4	0.402	9
Saint Mary	0.605	4	0.595	5	0.622	3	0.403	8
Saint Ann	0.566	5	0.550	7	0.512	9	0.364	12
Manchester	0.541	6	0.528	9	0.436	10	0.340	14
Portland	0.532	7	0.532	8	0.597	7	0.533	4
Trelawny	0.528	8	0.409	10	0.588	8	0.413	6
Westmoreland	0.500	9	0.249	12	0.609	5	0.359	13
Saint Elizabeth	0.464	10	0.130	14	0.664	2	0.401	10
Hanover	0.454	11	0.145	13	0.599	6	0.383	11
Saint Andrew	0.445	12	0.705	3	0.280	13	0.650	1
Kingston	0.411	13	0.572	6	0.240	14	0.580	2
Saint James	0.410	14	0.354	11	0.435	11	0.560	3

The Multi-Hazard Risk Index (mapped in Figure 7) provides a high-level tool that supports comparison of risk across Jamaica. Though the MHR Index provides a powerful overview of risk conditions, its component indices – Multi-Hazard Exposure, Vulnerability, and Coping Capacity – and their subcomponents provide crucial details on the drivers of risk. These drivers can be used to design focused interventions for overall disaster risk reduction.

Multi-Hazard Exposure

Multi-Hazard Exposure is characterized by the people, property, systems, and other elements present in hazard zones that are thereby subject to potential losses. For this assessment, exposure considers five hazard types: tropical cyclone wind (Category 1 storm and above), seismic activity (MMI VII and above), landslides, inland flood, and coastal flood. For each of the five hazard types, exposure is based on the population residing within the zone.

The Multi-Hazard Exposure Index is a function of both raw and relative population exposure. Raw population exposure provides an indication of how many people are exposed, which can assist in planning and provide a better understanding of the raw scale of potential response activities needed, such as evacuation or sheltering. In contrast, relative population exposure is expressed as a proportion of base population. This provides an indication of how important a hazard is within a region, helping to facilitate prioritization in the decision-making process. Relative exposure helps highlight the relevance of hazards within regions that have relatively small populations.

Examining hazard exposure data for each hazard type provides a cross-section that can be used to identify the specific hazards contributing to exposure in each Parish. Understanding exposure to specific hazards is valuable for determining appropriate mitigation actions. Differences in the type of hazard inherently dictate which mitigation options could be most effective in reducing losses and casualties in Jamaica. For example, while levees may help to control coastal flood waters in Portland, they would be ineffective in preventing losses from seismic activity in Saint Andrew. This assessment demonstrates the importance of understanding hazard exposure not only in terms of the total number of people exposed, but also the hazards that threaten them. Multi-Hazard Exposure in Jamaica is illustrated in Figure 8 below.

Vulnerability

Vulnerability refers to the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. Areas with higher Vulnerability Index scores are more susceptible to harm from hazards, often lacking the resources to adequately prepare for, respond to, and recover from disasters. Recognizing the sensitivities of vulnerable areas, the Vulnerability Index (illustrated in Figure 9 below) is an instrument for decision support in comparing and prioritizing disaster mitigation projects and allocating aid following hazard events.

An examination of the Vulnerability Index subcomponents reveals the drivers of vulnerability within the parishes. In Jamaica, Clarendon (ranked 1 of 14) not only represents the highest overall vulnerability, but also ranks among the highest in Environmental Stress, Vulnerable Health Status, Clean Water Vulnerability, Economic Constraints, and Gender Inequality. In Saint Elizabeth (ranked 2 of 14), vulnerability is driven primarily by Clean Water Vulnerability, Gender Inequality, and Information Access Vulnerability. Saint Mary (ranked 3 of 14) shows a similar distribution, but is also strongly influenced by Recent Disaster Impacts following Hurricane Sandy in 2012.

In context, these sensitivities translate to increased susceptibility to hazard impacts as a result of limited economic resources, inability to access and comprehend vital emergency information, compromised water and sanitation services, gender-based differences in access to resources, services, and opportunities, and communities that may still be recovering from disaster impacts. While many of these factors are inextricably linked, vulnerability is complex, and a single intervention may not improve all

components. In the case of Saint Mary, emergency managers and policy makers may take action to direct humanitarian aid and promote economic growth to aid communities recovering from Hurricane Sandy. In Clarendon and Saint Elizabeth, government agencies and NGOs may work together to increase investment in public water and sewer infrastructure to reduce clean water vulnerability by promoting equitable access to flush toilets and safe, clean drinking water. Analysis of the vulnerability subcomponents is important for understanding where sensitive populations are located and how to design interventions to reduce their susceptibility to negative hazard impacts.

Coping Capacity

Coping capacity describes the ability of people, organizations, and systems, using available skills and resources, to face and manage adverse conditions, emergencies, or disasters. The Coping Capacity Index (illustrated in Figure 10) represents factors that influence the ability of a Parish to effectively absorb negative impacts associated with a hazard event. Where parishes show high coping capacity, this indicates a combination of strong governance, economic capacity at the household level, environmental capacity and availability of infrastructure that supports the population, both in normal conditions and during an emergency. Low Coping Capacity Index scores represent limitations in a parish's ability to absorb, manage and recover from hazard events. This information can be used to help decision-makers focus on areas of lower capacity and identify areas for focused improvement.

Unlike Multi-Hazard Exposure and Vulnerability, the Coping Capacity Index was calculated using a *weighted average* of the four subcomponents. Governance was weighted at 40%, Infrastructure at 30%, Economic Capacity at 20% and Environmental Capacity at 10%, thereby placing less emphasis on the economic and environmental dimensions of coping capacity.

By analyzing the different subcomponents of the Coping Capacity Index it becomes possible to identify distinct factors that drive a population's or organization's difficulty to cope with hazards. For example, low coping capacity in Manchester (ranked 14 of 14) is attributable to very low scores in Governance and Environmental Capacity, ranking in the bottom two for each. Westmoreland (ranked 13 of 14) similarly exhibits a low score for Governance, but also ranks lowest in the country in Infrastructure (especially Health Care and Communications). Saint Mary (ranked 12 of 14) ranks low in Infrastructure and Environmental Capacity.

Weaker Governance across the three parishes may lead to a range of problems in the management of hazards including reduced public safety and ineffective disaster planning. Additional support for local police, firefighters, and emergency medical resources may improve public safety, both in normal conditions and during an emergency. Adopting comprehensive plans for each phase of disaster management, and engaging the public to both understand and inform these plans could improve governance in the context of this assessment.

Lower Infrastructure scores can indicate a reduction in the exchange of information, and reduced access to vital resources and health services. Example interventions could include fostering national campaigns to improve equity of infrastructure across the island.

Examining the pattern of coping capacity across the country also gives disaster managers and decision-makers the opportunity to identify areas that may benefit from mutual-aid agreements. For example, the Parishes of Saint Catherine (ranked 5 of 14) and Saint Ann (ranked 12 of 14) share a border in central Jamaica but exhibit scores on opposite sides of the Coping Capacity Index. In the context of a disaster,

resource sharing could be beneficial to Saint Ann, taking the form of mutual-aid. Saint Catherine may be called upon to provide assistance to neighboring parishes in disaster response and recovery. In this way, Saint Ann could benefit from Saint Catherine's increased coping capacity despite not having the resources within its own borders.

Lack of Resilience

The Lack of Resilience index (mapped in Figure 11) represents the combination of Vulnerability and Coping Capacity. The graduation from two separate components to the larger overarching concept of resilience demonstrates the hierarchical approach of PDC's RVA, whereby results are built upwards to develop indices that have distinct implications for disaster risk reduction. Furthermore, as Vulnerability and Coping Capacity are measured independent of the hazard, disaster managers can overlay the Lack of Resilience Index with real-time hazard data to estimate risk on a per-event basis as new threats occur. Table 3 summarizes the results of the Lack of Resilience Index for Jamaica.

Table 3. Lack of Resilience Index, by parish

Parish	LR		V		CC	
	Score	Rank	Score	Rank	Score	Rank
Clarendon	0.634	1	0.678	1	0.411	7
Saint Elizabeth	0.632	2	0.664	2	0.401	10
Westmoreland	0.625	3	0.609	5	0.359	13
Saint Mary	0.609	4	0.622	3	0.403	8
Hanover	0.608	5	0.599	6	0.383	11
Saint Thomas	0.607	6	0.616	4	0.402	9
Trelawny	0.587	7	0.588	8	0.413	6
Saint Ann	0.574	8	0.512	9	0.364	12
Manchester	0.548	9	0.436	10	0.340	14
Portland	0.532	10	0.597	7	0.533	4
Saint Catherine	0.482	11	0.430	12	0.467	5
Saint James	0.438	12	0.435	11	0.560	3
Kingston	0.330	13	0.240	14	0.580	2
Saint Andrew	0.315	14	0.280	13	0.650	1

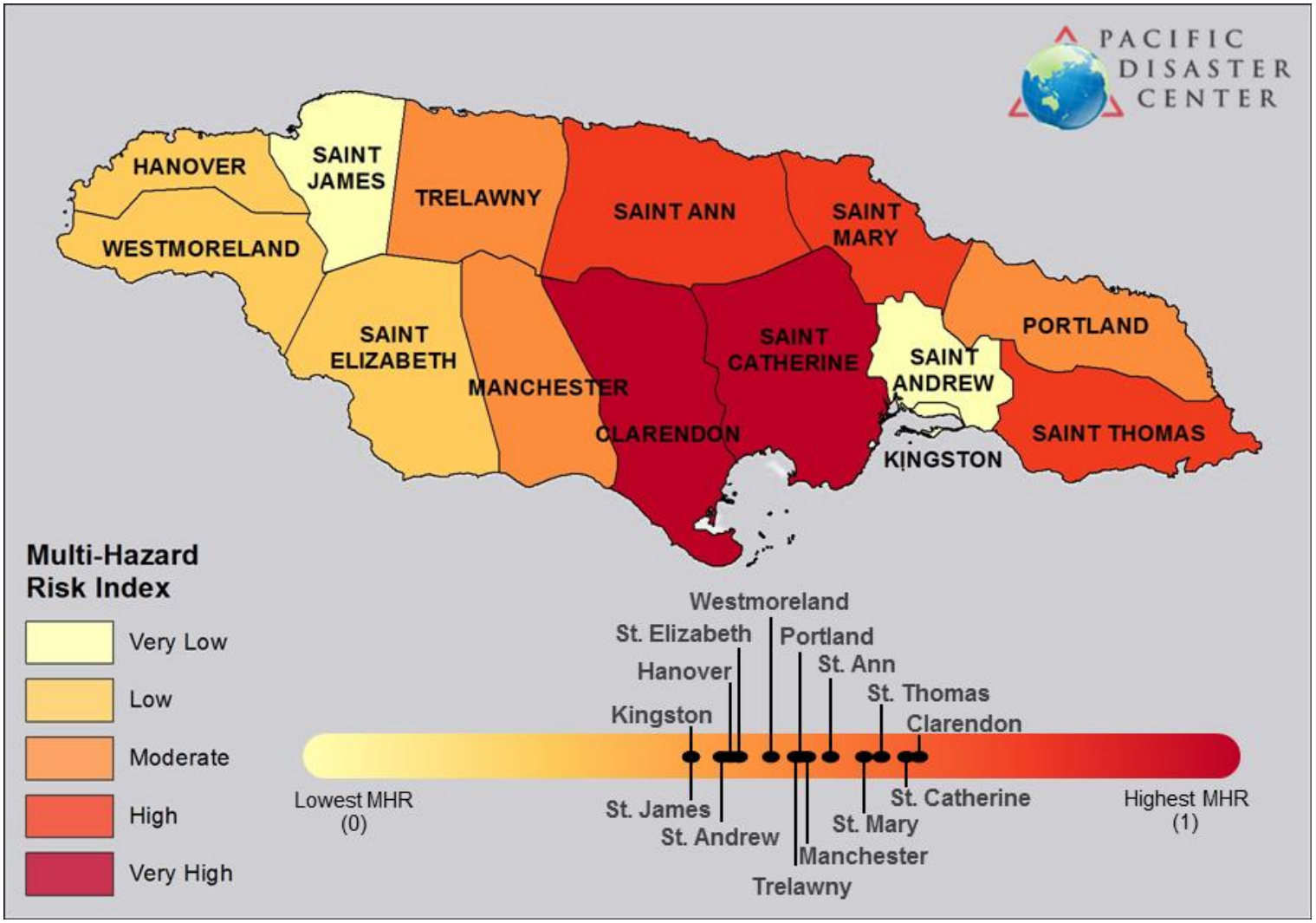


Figure 7. Distribution of Multi-Hazard Risk Index scores across parishes and relative ranking of each parish by MHR score.

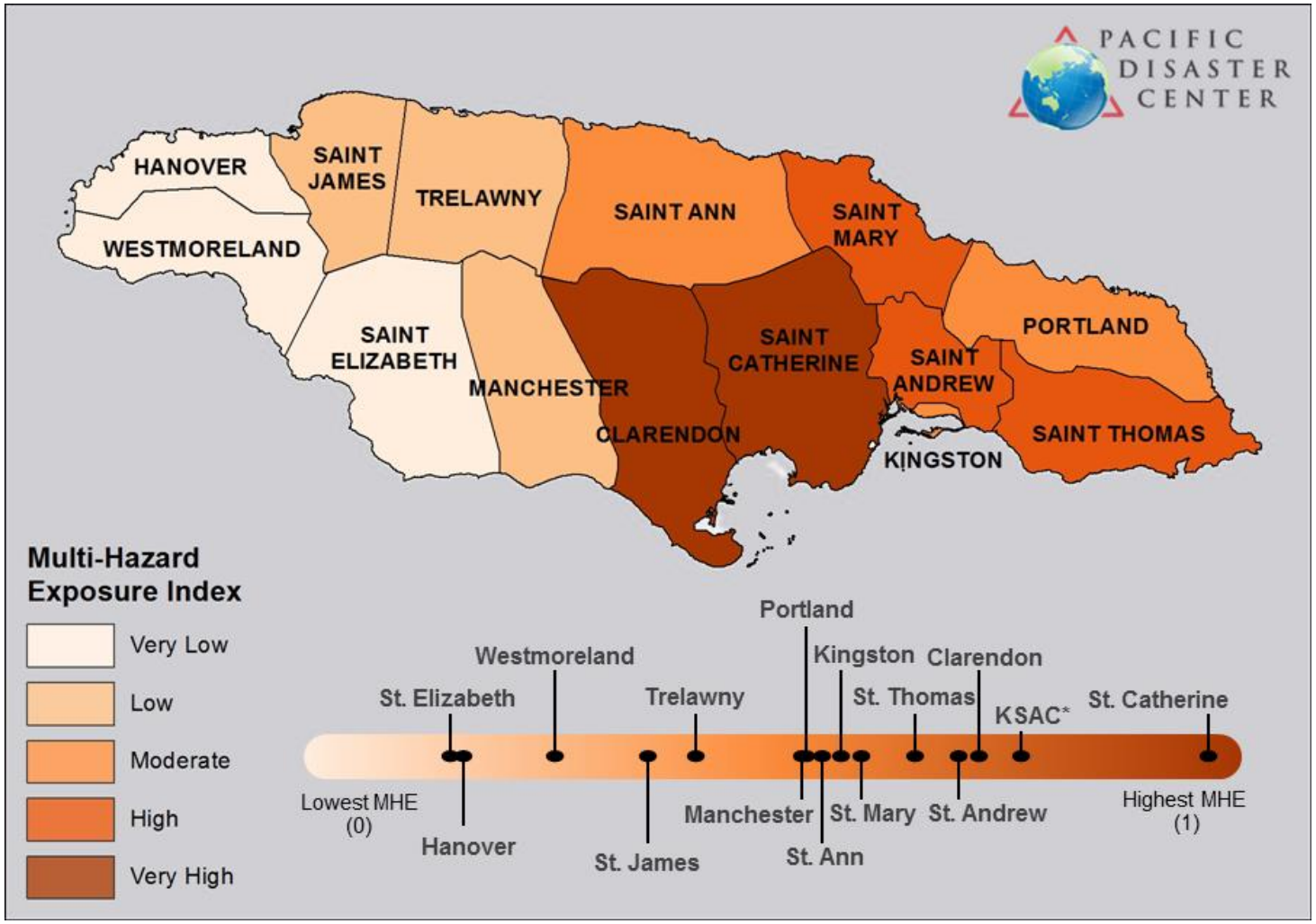


Figure 8. Distribution of Multi-Hazard Exposure Index scores across parishes with relative ranking of each parish by Multi-Hazard Exposure score.

*At the suggestion of in-country stakeholders, approximate Multi-Hazard Exposure for the Kingston and St. Andrew Corporation (KSAC) is noted in the chart above for reference only. When the two Parishes are combined, KSAC ranks 2nd in overall MHE. However, as the Parishes exhibit differences in the socioeconomic drivers of risk, Kingston and St. Andrew are presented separately in this assessment.

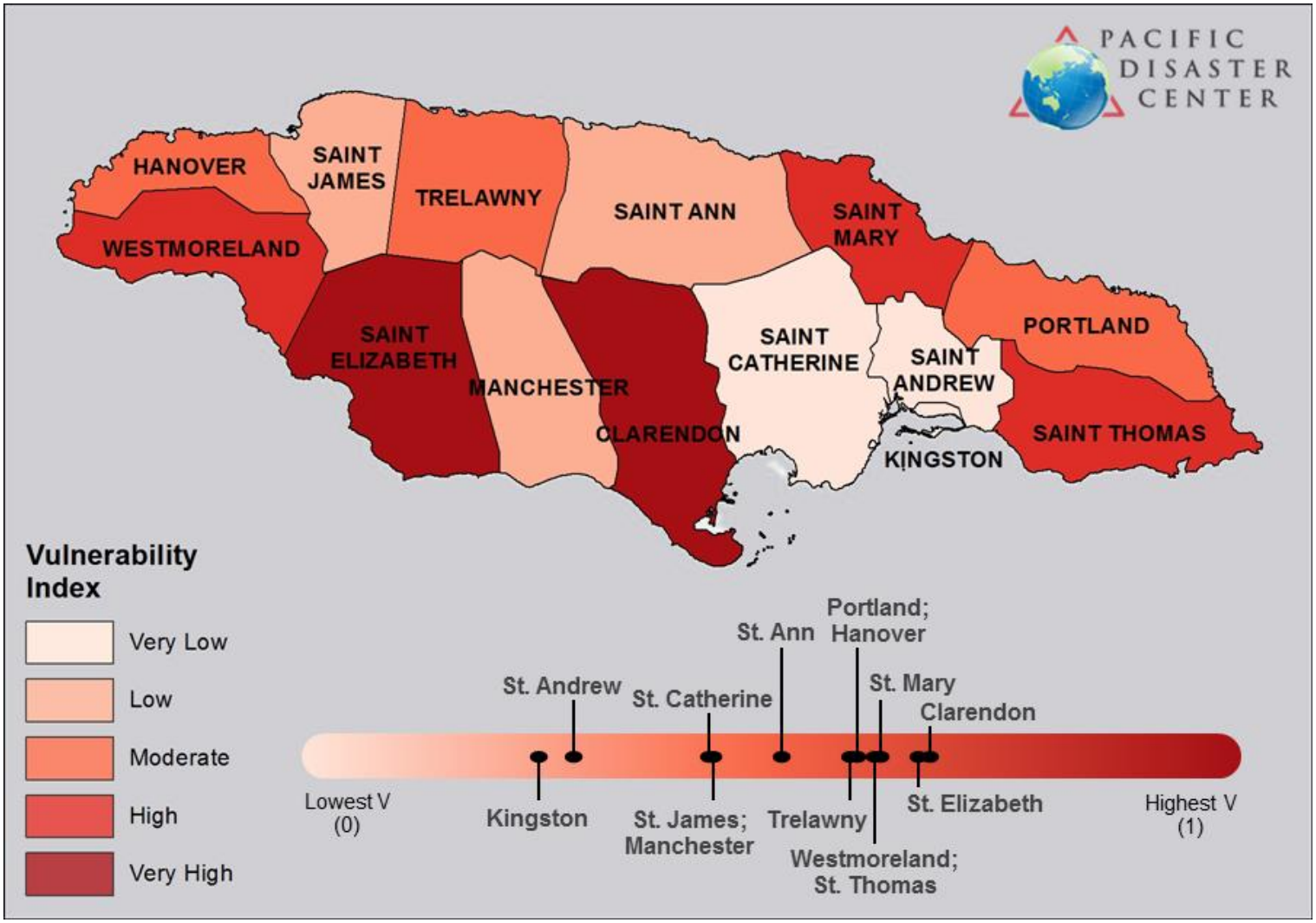


Figure 9. Distribution of Vulnerability Index scores across parishes and relative ranking of each parish by Vulnerability score.

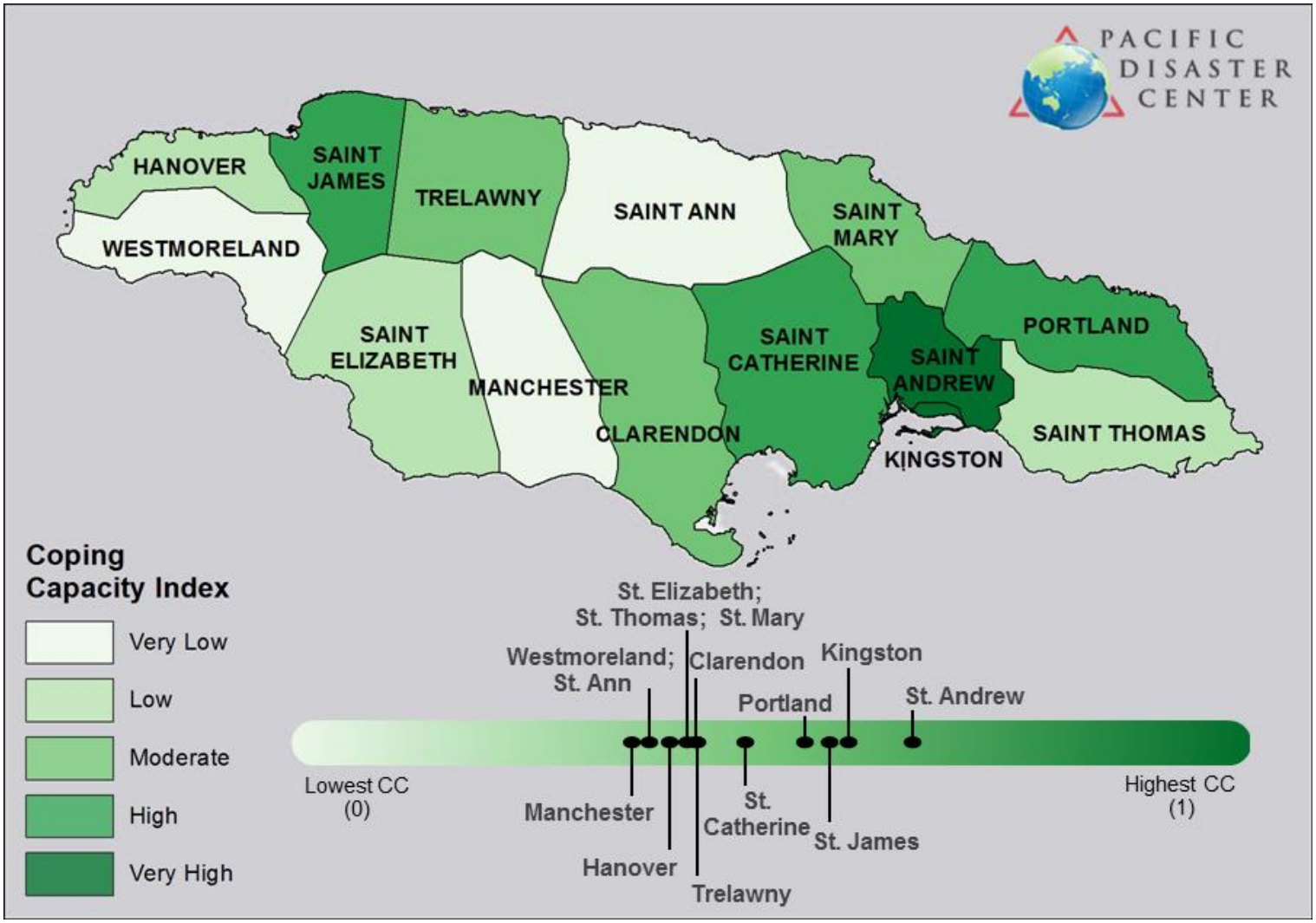


Figure 10. Distribution of Coping Capacity Index scores and relative ranking of each parish by Coping Capacity score.

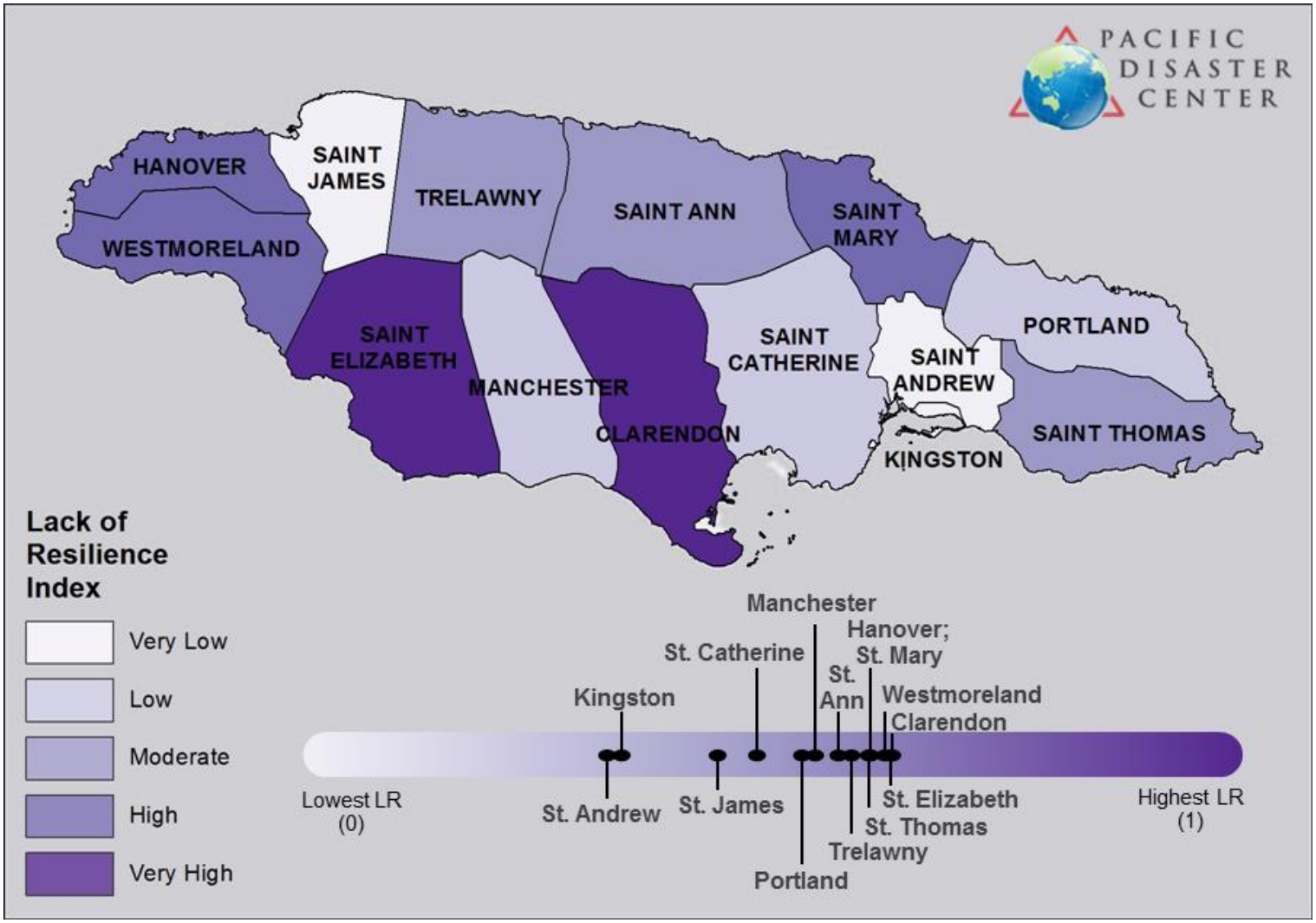
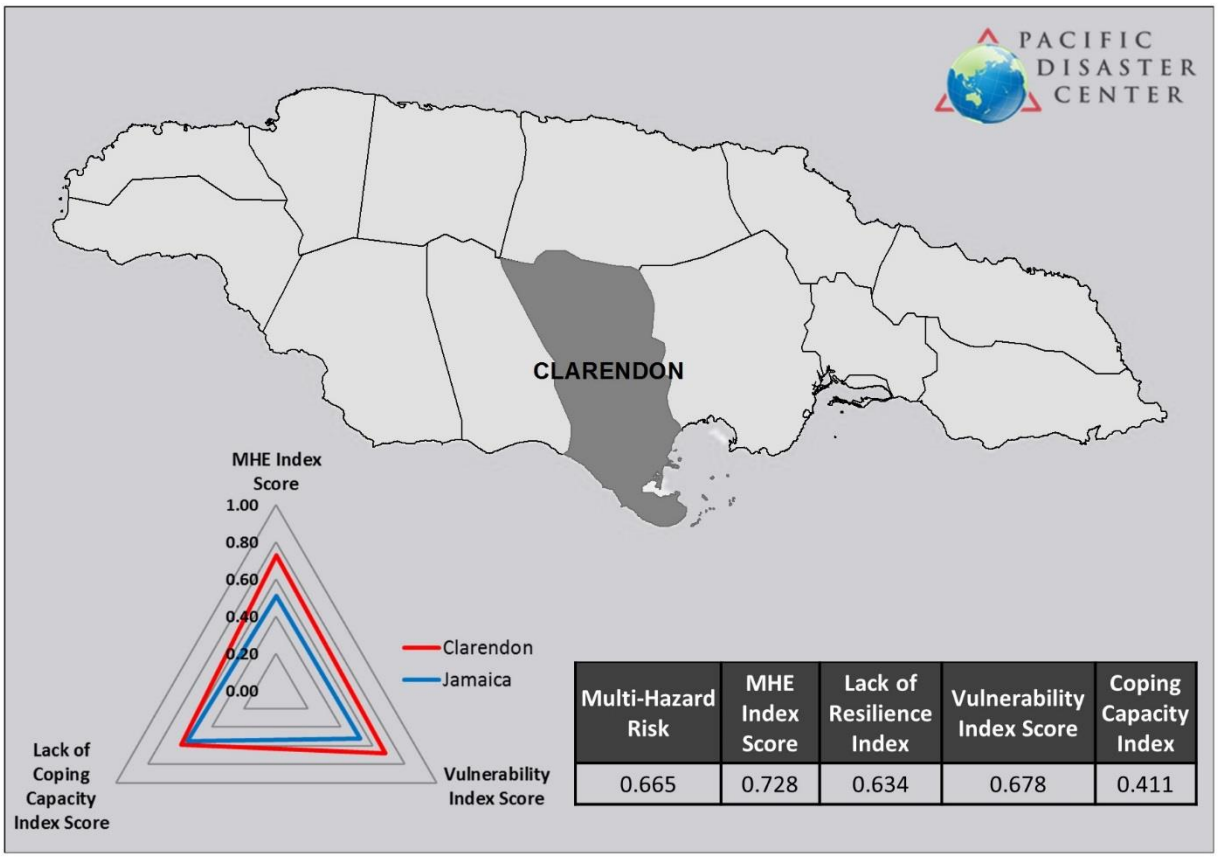


Figure 11. Distribution of Lack of Resilience Index scores across parishes and relative ranking of each parish by Lack of Resilience score.

Clarendon: Risk

Clarendon ranks **1st** of **14** on the Multi-Hazard Risk Index with a score of **0.665**. Clarendon's score and ranking are due to very high Multi-Hazard Exposure combined with moderate Coping Capacity and very high Vulnerability scores (see Figure 12). Clarendon has the 2nd highest Multi-Hazard Exposure in the country, the highest Vulnerability (Ranked 1 of 14), and the 7th highest Coping Capacity.



Multi-Hazard Risk	MHE Index Score	Lack of Resilience Index	Vulnerability Index Score	Coping Capacity Index
0.665	0.728	0.634	0.678	0.411

Figure 12. Risk scores for the parish of Clarendon

Clarendon: Lack of Resilience

Clarendon ranks **1st** of **14** on the Lack of Resilience Index with a score of **0.634** (refer to Table 4). Clarendon's score and ranking are due to very high Vulnerability combined with moderate Coping Capacity scores. Clarendon has the highest Vulnerability and the 7th highest Coping Capacity.

The three thematic areas with the weakest relative scores for the Parish of Clarendon are: **Clean Water Vulnerability**, **Environmental Stress**, and **Economic Capacity.**

Table 4. Lack of Resilience Index and Component scores for Clarendon

Index	Clarendon	
	Score	**Rank**
Lack of Resilience	0.634	1
Components		
Vulnerability	0.678	1
Coping Capacity	0.411	7

Clarendon: Coping Capacity

Clarendon's coping capacity ranks **7th** out of **14** with a score of **0.411** (see Table 5). The thematic areas with the weakest relative scores are **Economic Capacity, Governance** and **Infrastructure (Communications)** (refer also to Figure 13). These thematic areas appear to constrain coping capacity within this parish.

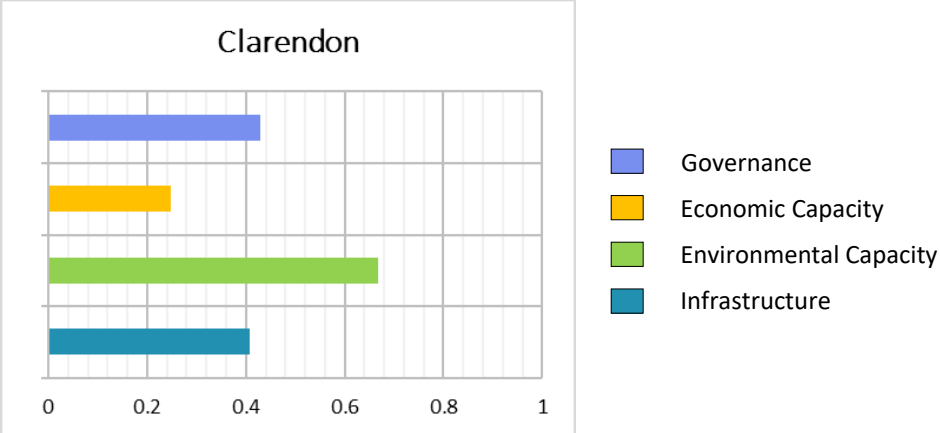


Figure 13. Coping Capacity subcomponents for Clarendon

Table 5. Coping Capacity Index, subcomponent and sub-index scores for Clarendon

Index	Clarendon	
	Score	Rank
Coping Capacity	0. 411	7
Subcomponents		
Governance	0. 429	10
Economic Capacity	0. 249	9
Environmental Capacity	0. 667	3
Infrastructure	0. 408	7
Infrastructure Sub-indices		
Health Care	0. 401	8
Transportation	0. 457	5
Communications	0. 367	11

Clarendon: Vulnerability

Clarendon ranks **1st** out of **14** on the Vulnerability Index with a score of **0.678**. Vulnerability in Clarendon is strongly influenced by **Clean Water Vulnerability**, **Environmental Stress**, **Information Access Vulnerability, Vulnerable Health Status, Economic Constraints,** and **Gender Inequality** subcomponent scores (see Table 6 and Figure 14).

Table 6. Vulnerability Index and subcomponent index scores for Clarendon

Index	Clarendon	
	Score	Rank
Vulnerability	0. 678	1
Subcomponents		
Economic Constraints	0.689	2
Info Access Vulnerability	0.719	6
Vulnerable Health Status	0.674	1
Clean Water Vulnerability	0.881	2
Environmental Stress	0. 737	1
Recent Disaster Impacts	0. 439	9
Gender Inequality	0. 607	3

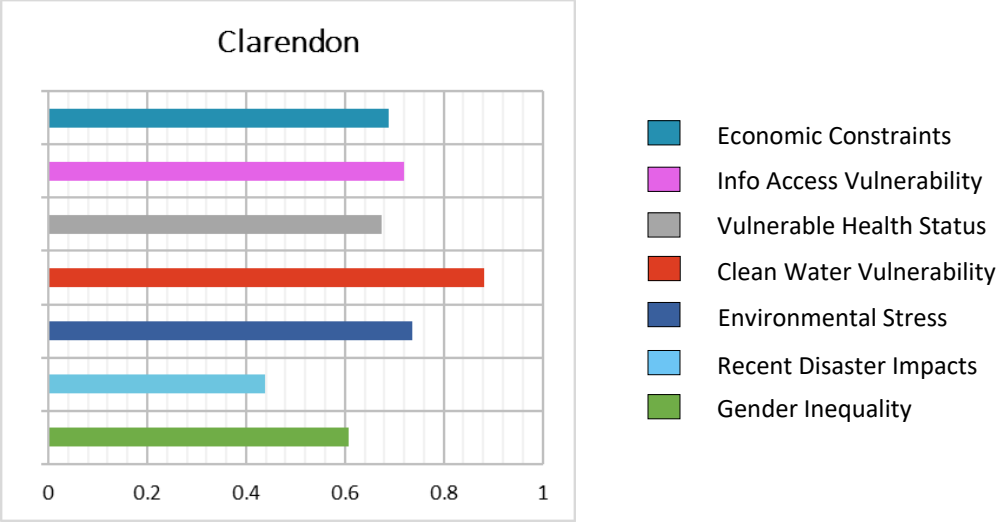


Figure 14. Vulnerability subcomponents for Clarendon

Clarendon: Multi-Hazard Exposure

Clarendon ranks **2nd** out of **14** on the Multi-Hazard Exposure index with a score of **0.728** (see Table 7). A large proportion of the population is exposed to **seismic activity**, **tropical cyclone, landslides,** and **inland flood**. While Clarendon is also exposed to coastal flood, this hazard affects a smaller proportion of the population (refer to Figure 15 and Figure 16).

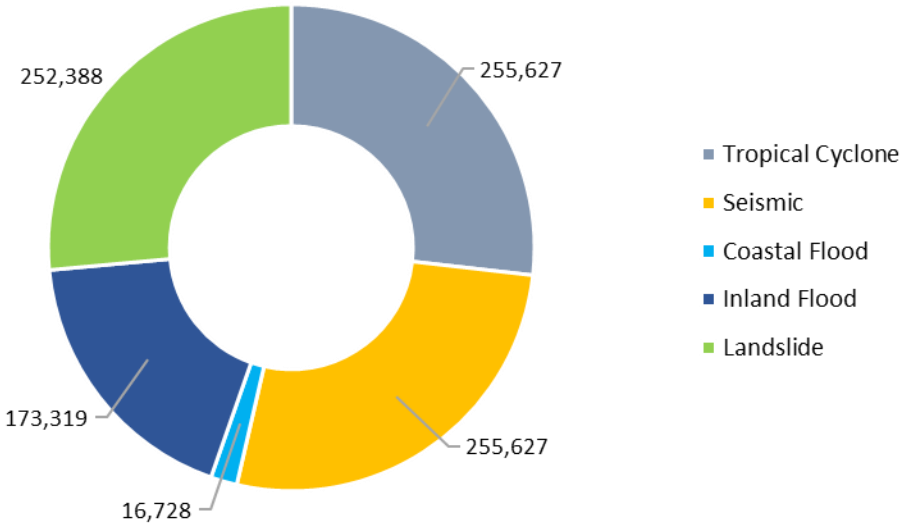


Figure 15. Raw population exposure by hazard type for Clarendon

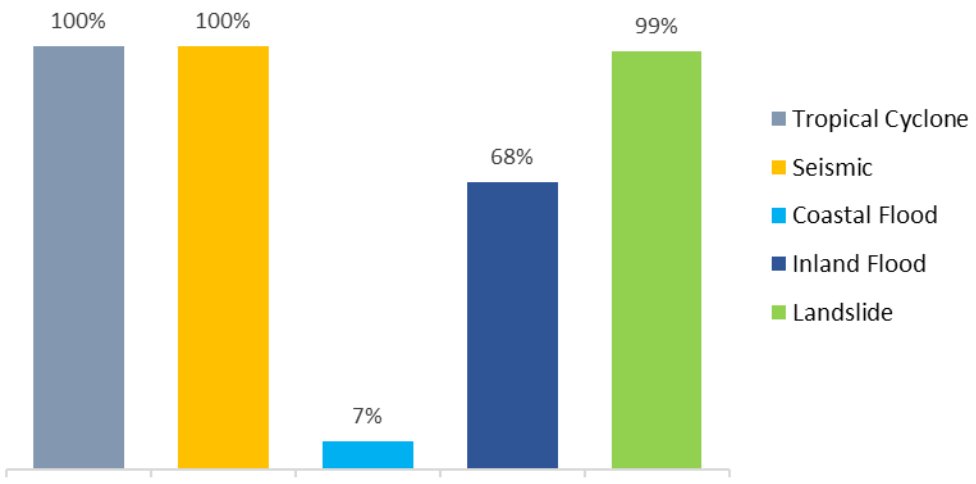


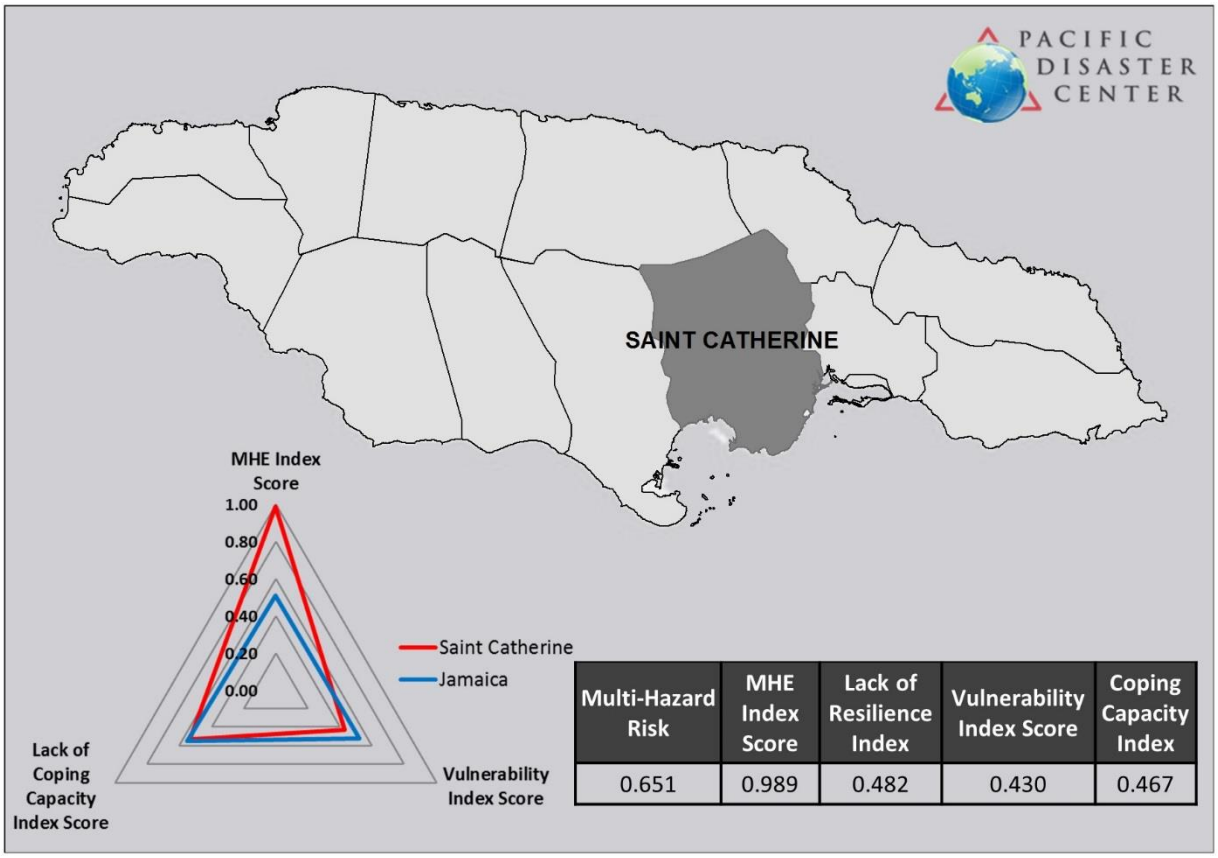
Figure 16. Percent population exposure to hazard type for Clarendon

Table 7. Multi-Hazard Exposure Index, Raw and Relative Exposure Index scores for Clarendon

Index	Clarendon	
	Score	**Rank**
Multi-Hazard Exposure	0. 728	2
Subcomponents		
Raw Exposure	0. 639	3
Relative Exposure	0. 817	5

Saint Catherine: Risk

Saint Catherine ranks **2nd** of **14** on the Multi-Hazard Risk Index with a score of **0.651**. Saint Catherine's score and ranking are driven almost completely by very high Multi-Hazard Exposure (see Figure 17). Saint Catherine has the highest Multi-Hazard Exposure in the country, the 12th highest Vulnerability, and the 5th highest Coping Capacity.



Multi-Hazard Risk	MHE Index Score	Lack of Resilience Index	Vulnerability Index Score	Coping Capacity Index
0.651	0.989	0.482	0.430	0.467

Figure 17. Risk scores for the parish of Saint Catherine

Saint Catherine: Lack of Resilience

Saint Catherine ranks **11th** of **14** on the Lack of Resilience Index with a score of **0.482**. Saint Catherine's score and ranking are due to very low Vulnerability combined with high Coping Capacity (see Table 8). Saint Catherine has the 12th highest Vulnerability and the 5th highest Coping Capacity.

While Saint Catherine exhibits relatively low Lack of Resilience overall, thematic areas with weak relative scores for the Parish of Saint Catherine are: **Recent Disaster Impacts, Governance,** and **Health Care Capacity.**

Table 8. Lack of Resilience Index and Component scores for Saint Catherine

Index	Saint Catherine	
	Score	**Rank**
Lack of Resilience	0.482	11
Components		
Vulnerability	0.430	12
Coping Capacity	0.467	5

Saint Catherine: Coping Capacity

Saint Catherine's Coping Capacity ranks **5th** out of **14** with a score of **0.467**. The thematic areas with the weakest relative scores are **Governance**, **Environmental Capacity,** and **Health Care Capacity** (refer to Table 9 and Figure 18). These thematic areas may constrain Coping Capacity within this parish.

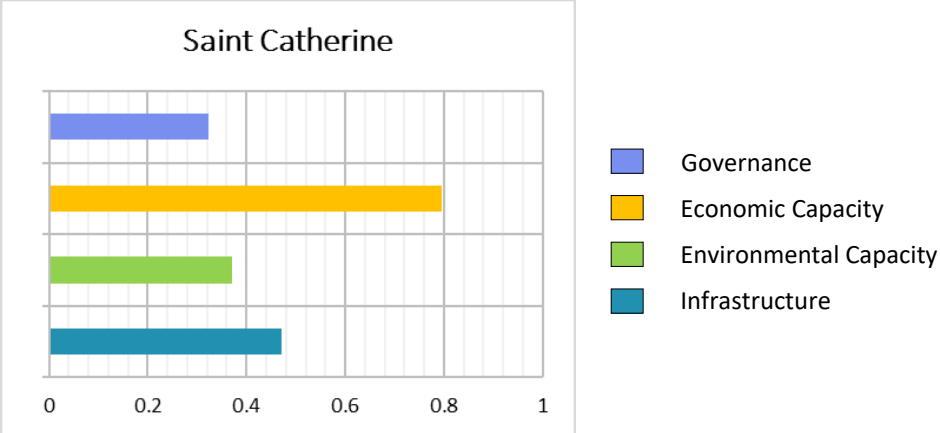


Figure 18. Coping Capacity subcomponents for Saint Catherine

Table 9. Coping Capacity Index, subcomponent and sub-index scores for Saint Catherine

Index	Saint Catherine	
	Score	**Rank**
Coping Capacity	0.467	5
Subcomponents		
Governance	0.323	13
Economic Capacity	0.794	3
Environmental Capacity	0.371	7
Infrastructure	0.471	5
Infrastructure Sub-indices		
Health Care	0.302	13
Transportation	0.464	4
Communications	0.646	4

Saint Catherine: Vulnerability

Saint Catherine ranks **12th** out of **14** on the Vulnerability Index with a score of **0.430**. Though Saint Catherine exhibits relatively low vulnerability overall, the index is influenced by a high **Recent Disaster Impacts** subcomponent score (refer to Table 10 and Figure 19).

Table 10. Vulnerability Index and subcomponent index scores for Saint Catherine

Index	Saint Catherine	
	Score	**Rank**
Vulnerability	0.430	12
Subcomponents		
Economic Constraints	0.499	9
Info Access Vulnerability	0.195	13
Vulnerable Health Status	0.370	12
Clean Water Vulnerability	0.294	12
Environmental Stress	0.489	7
Recent Disaster Impacts	0.696	4
Gender Inequality	0.468	11

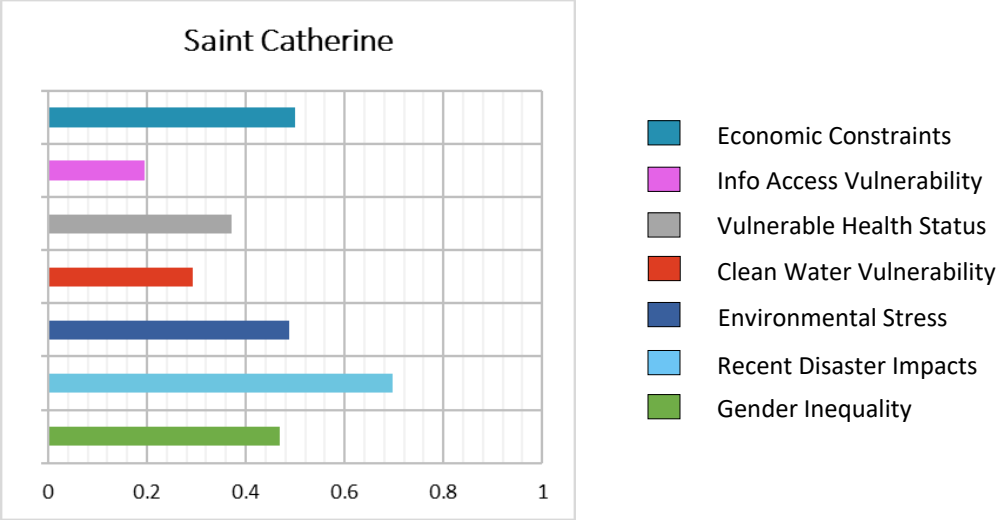


Figure 19. Vulnerability subcomponents for Saint Catherine

Saint Catherine: Multi-Hazard Exposure

Saint Catherine ranks **1st** out of **14** on the Multi-Hazard Exposure index with a score of **0.989** (see Table 11). Large numbers of people, and a significant proportion of the population, are exposed to **tropical cyclone wind**, **seismic activity**, **inland flood,** and **coastal flood** (refer to Figure 20 and Figure 21).

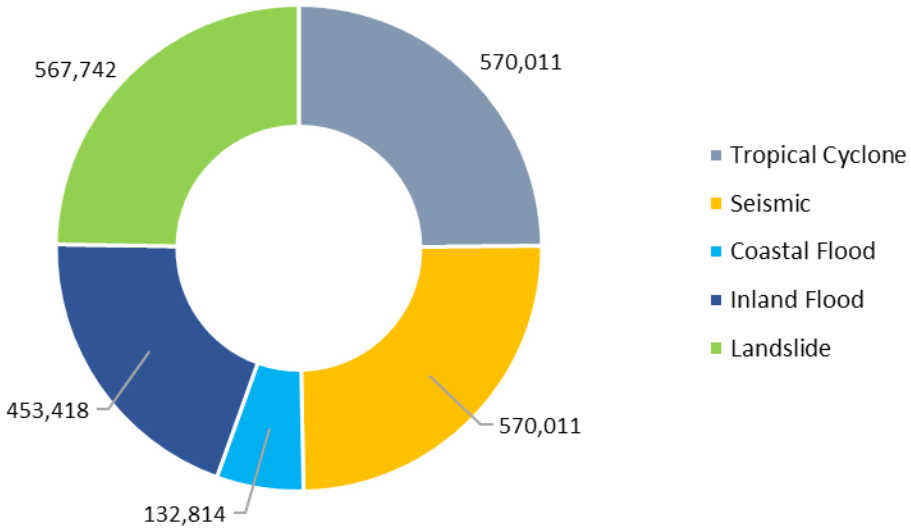


Figure 20. Raw population exposure by hazard type for Saint Catherine

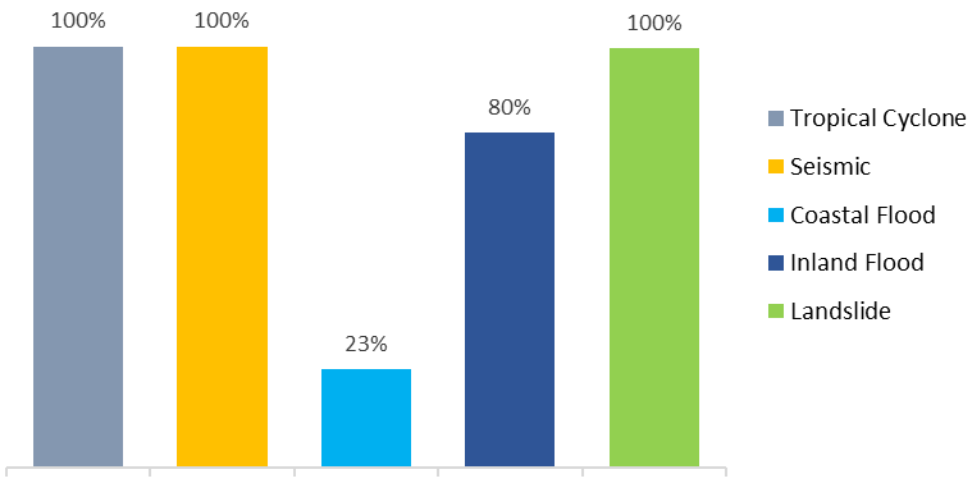


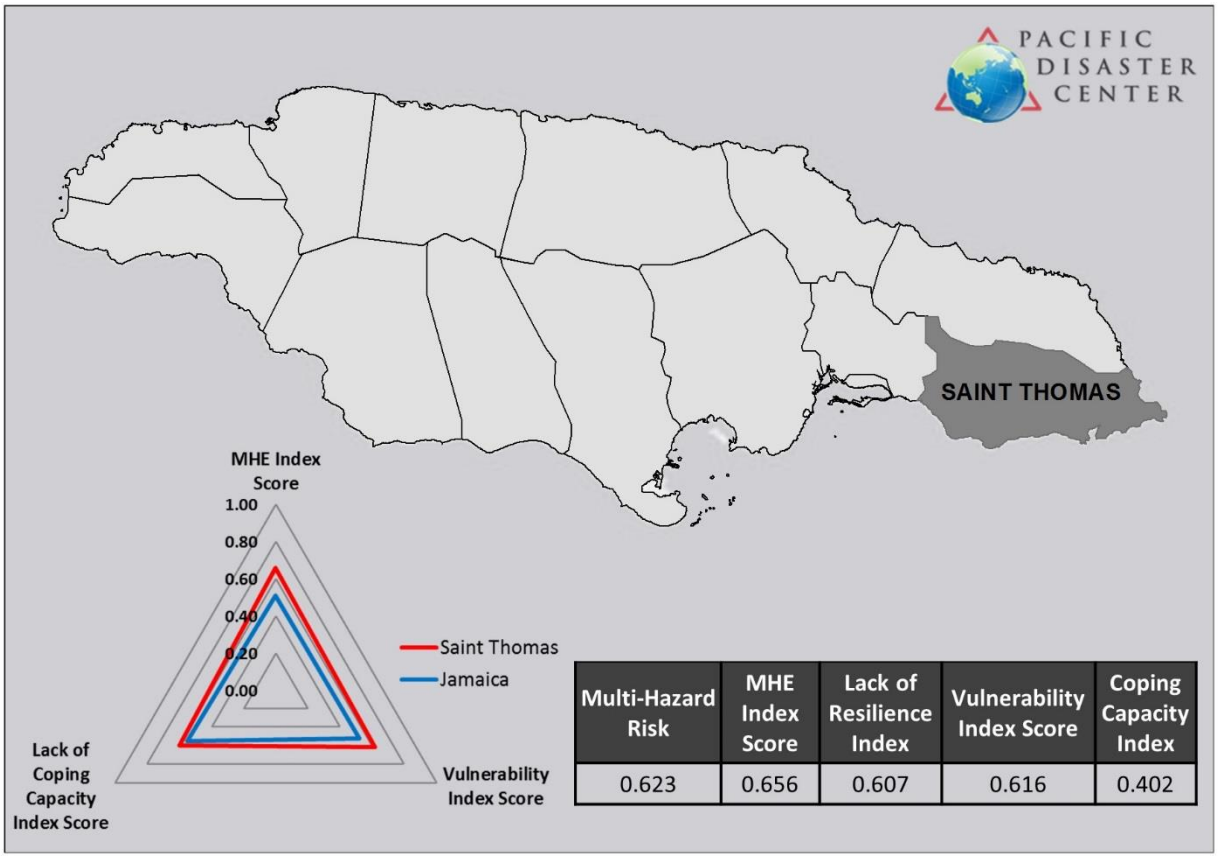
Figure 21. Percent population exposure to hazard type for Saint Catherine

Table 11. Multi-Hazard Exposure Index, Raw and Relative Exposure Index scores for Saint Catherine

Index	Saint Catherine	
	Score	**Rank**
Multi-Hazard Exposure	0.989	1
Subcomponents		
Raw Exposure	1.000	1
Relative Exposure	0.978	2

Saint Thomas: Risk

Saint Thomas ranks **3rd** out of **14** on the Multi-Hazard Risk Index with a score of **0.623**. The Multi-Hazard Risk in Saint Thomas is a product of high Multi-Hazard Exposure, high Vulnerability, and low Coping Capacity scores (see Figure 22). The Parish has the 4th highest Multi-Hazard Exposure, the 4th highest Vulnerability, and 9th highest Coping Capacity.



Multi-Hazard Risk	MHE Index Score	Lack of Resilience Index	Vulnerability Index Score	Coping Capacity Index
0.623	0.656	0.607	0.616	0.402

Figure 22. Risk scores for the parish of Saint Thomas

Saint Thomas: Lack of Resilience

Saint Thomas ranks **6th** of **14** on the Lack of Resilience Index with a score of **0.607**. Saint Thomas's score and ranking are due to high Vulnerability combined with low Coping Capacity scores (see Table 12). Saint Thomas has the 4h highest Vulnerability and 9th highest Coping Capacity.

The three thematic areas with the weakest relative scores for Saint Thomas Parish are: **Recent Disaster Impacts, Economic Capacity,** and **Information Access Vulnerability.**

Table 12. Lack of Resilience Index and Component scores for Saint Thomas

Index	Saint Thomas	
	Score	**Rank**
Lack of Resilience	0.607	6
Components		
Vulnerability	0.616	4
Coping Capacity	0.402	9

Saint Thomas: Coping Capacity

Saint Thomas's Coping Capacity ranks **9th** out of **14** with a score of **0.402**. The thematic areas with the weakest relative scores are **Governance** and **Infrastructure (specifically, Health Care Capacity).** Refer to Table 13 and Figure 23. These two thematic areas appear to constrain Coping Capacity within this parish.

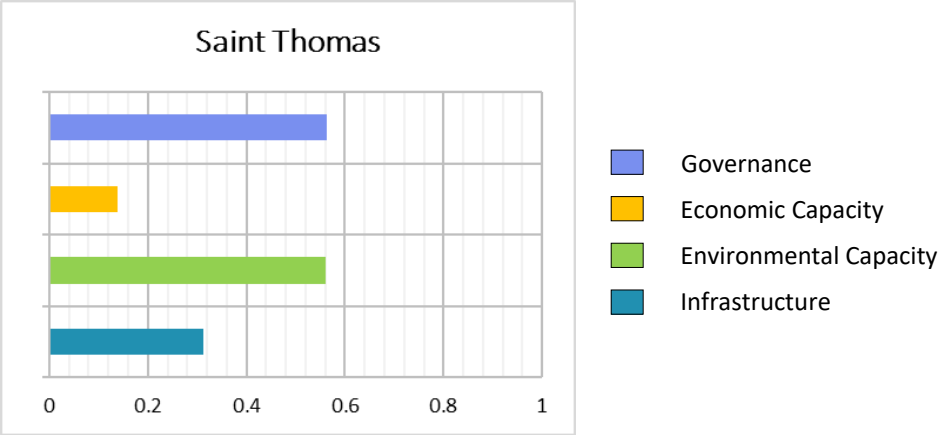


Figure 23. Coping Capacity subcomponents for Saint Thomas

Table 13. Coping Capacity Index, subcomponent and sub-index scores for Saint Thomas

Index	Saint Thomas	
	Score	Rank
Coping Capacity	0.402	9
Subcomponents		
Governance	0.562	3
Economic Capacity	0.138	12
Environmental Capacity	0.561	5
Infrastructure	0.312	14
Infrastructure Sub-indices		
Health Care	0.473	5
Transportation	0.154	13
Communications	0.309	12

Saint Thomas: Vulnerability

Saint Thomas ranks **4th** out of **14** on the Vulnerability Index with a score of **0.616**. Vulnerability in Saint Thomas is strongly influenced by **Recent Disaster Impacts, Economic Constraints, Information Access Vulnerability,** and **Clean Water Vulnerability** subcomponent scores (see Table 14 and Figure 24).

Table 14. Vulnerability Index and subcomponent index scores for Saint Thomas

Index	Saint Thomas	
	Score	Rank
Vulnerability	0.616	4
Subcomponents		
Economic Constraints	0.709	1
Info Access Vulnerability	0.757	5
Vulnerable Health Status	0.336	14
Clean Water Vulnerability	0.736	8
Environmental Stress	0.432	8
Recent Disaster Impacts	0.819	1
Gender Inequality	0.525	8

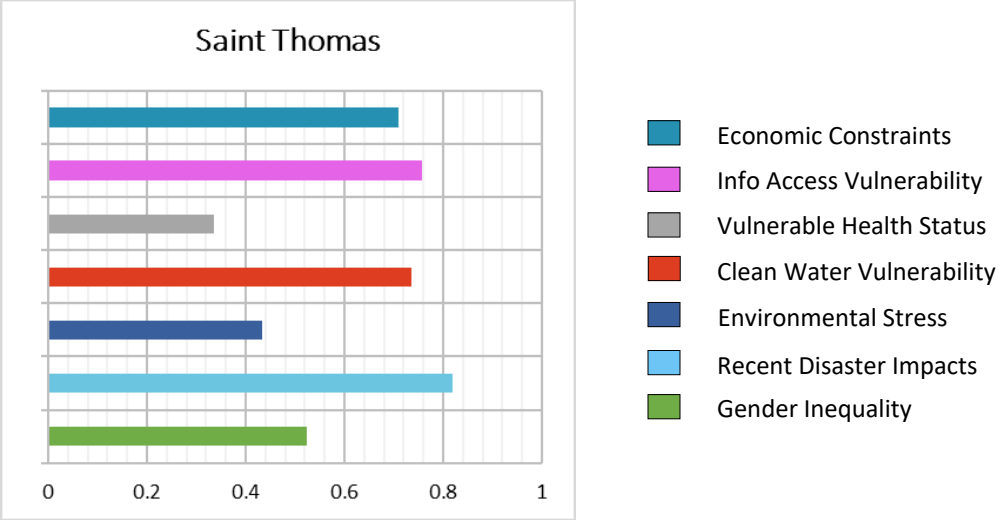


Figure 24. Vulnerability subcomponents for Saint Thomas

Saint Thomas: Multi-Hazard Exposure

Saint Thomas ranks **4th** out of **14** on the Multi-Hazard Exposure index with a score of **0.656** (see Table 15). A large proportion of the population is exposed to **tropical cyclone wind, seismic activity**, **landslides, inland flood,** and **coastal flood** (see Figure 25 and Figure 26).

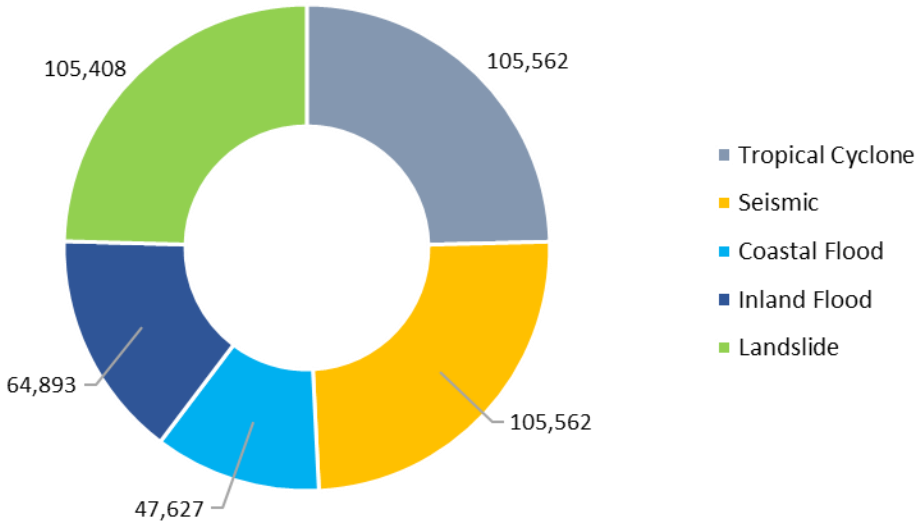


Figure 25. Raw population exposure by hazard type for Saint Thomas

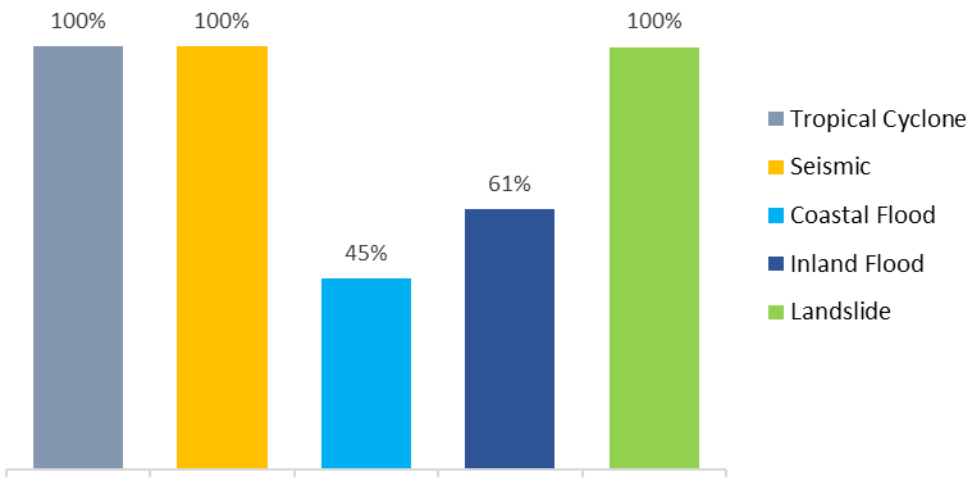


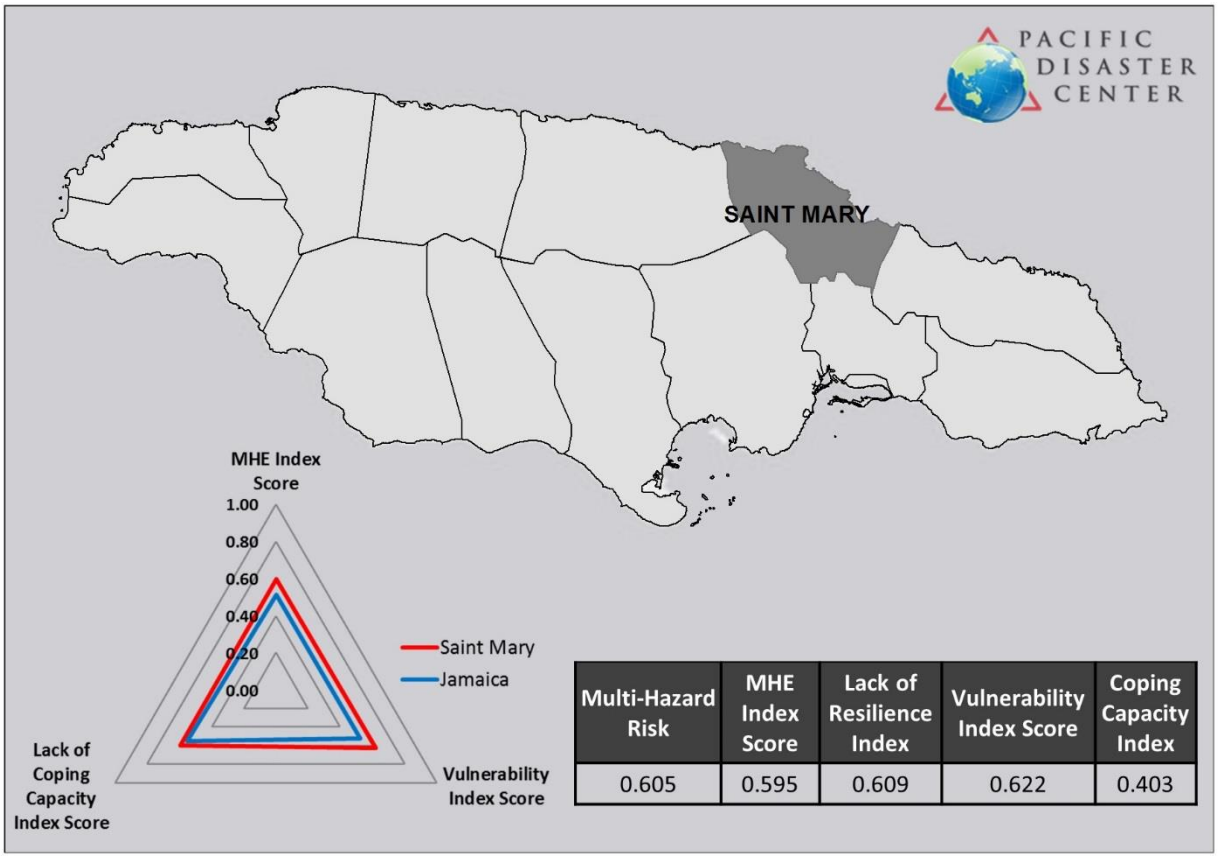
Figure 26. Percent population exposure to hazard type for Saint Thomas

Table 15. Multi-Hazard Exposure Index, Raw and Relative Exposure Index scores for Saint Thomas

Index	Saint Thomas	
	Score	**Rank**
Multi-Hazard Exposure	0.656	4
Subcomponents		
Raw Exposure	0.311	8
Relative Exposure	1.000	1

Saint Mary: Risk

Saint Mary ranks **4th** of **14** on the Multi-Hazard Risk Index with a score of **0.605**. Saint Mary's score and ranking are due to high Multi-Hazard Exposure combined with high Vulnerability and moderate Coping Capacity scores (see Figure 27). The Parish ranks 5th in Multi-Hazard Exposure, 3rd in Vulnerability, and 8th in Coping Capacity.



Multi-Hazard Risk	MHE Index Score	Lack of Resilience Index	Vulnerability Index Score	Coping Capacity Index
0.605	0.595	0.609	0.622	0.403

Figure 27. Risk scores for the parish of Saint Mary

Saint Mary: Lack of Resilience

Saint Mary ranks **4th** of **14** on the Lack of Resilience Index with a score of **0.609** (see Table 16). Saint Mary's score and ranking are due to high Vulnerability and low Coping Capacity. The Parish ranks 3rd in Vulnerability and 8th in Coping Capacity.

The three thematic areas with the weakest relative scores for the Saint Mary Parish are: **Economic Capacity, Environmental Capacity,** and **Recent Disaster Impacts**.

Table 16. Lack of Resilience Index and Component scores for Saint Mary

Index	Saint Mary	
	Score	**Rank**
Lack of Resilience	0.609	4
Components		
Vulnerability	0.622	3
Coping Capacity	0.403	8

Saint Mary: Coping Capacity

Saint Mary's Coping Capacity ranks **8th** out of **14** with a score of **0.403** (see Table 17). The thematic areas with the weakest relative scores are **Economic Capacity** and **Environmental Capacity** (see Figure 28). These two thematic areas appear to constrain Coping Capacity within this parish.

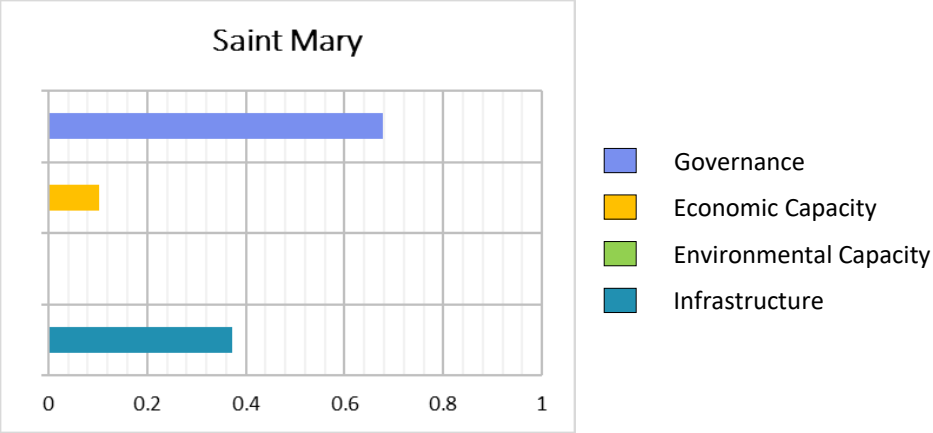


Figure 28. Coping Capacity subcomponents for Saint Mary

Table 17. Coping Capacity Index, subcomponent and sub-index scores for Saint Mary

Index	Saint Mary	
	Score	Rank
Coping Capacity	0.403	8
Subcomponents		
Governance	0.678	2
Economic Capacity	0.103	13
Environmental Capacity	0.000	14
Infrastructure	0.372	9
Infrastructure Sub-indices		
Health Care	0.665	2
Transportation	0.218	11
Communications	0.231	14

Saint Mary: Vulnerability

Saint Mary ranks **3rd** out of **14** on the Vulnerability Index with a score of **0.622**. Vulnerability in Saint Mary is strongly influenced by **Recent Disaster Impacts, Clean Water Vulnerability,** and **Information Access Vulnerability** subcomponent scores (see Table 18 and Figure 29).

Table 18. Vulnerability Index and subcomponent index scores for Saint Mary

Index	Saint Mary	
	Score	Rank
Vulnerability	0.622	3
Subcomponents		
Economic Constraints	0.486	10
Info Access Vulnerability	0.628	7
Vulnerable Health Status	0.586	4
Clean Water Vulnerability	0.739	7
Environmental Stress	0.583	4
Recent Disaster Impacts	0.749	3
Gender Inequality	0.584	5

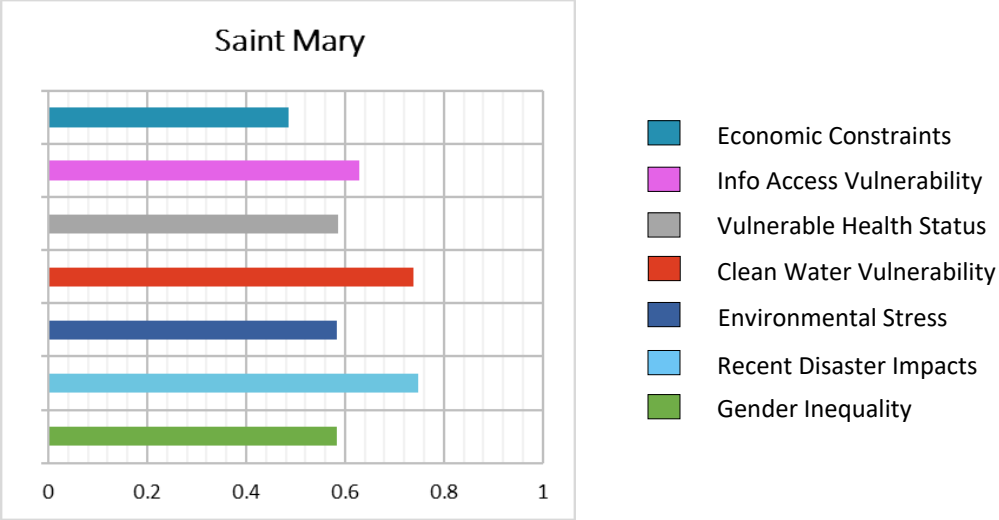


Figure 29. Vulnerability subcomponents for Saint Mary

Saint Mary: Multi-Hazard Exposure

Saint Mary ranks **5th** out of **14** on the Multi-Hazard Exposure index with a score of **0.595** (see Table 19). A large proportion of the population is exposed to **tropical cyclone wind, seismic activity**, **landslides, inland flood,** and **coastal flood** (refer to Figure 30 and Figure 31).

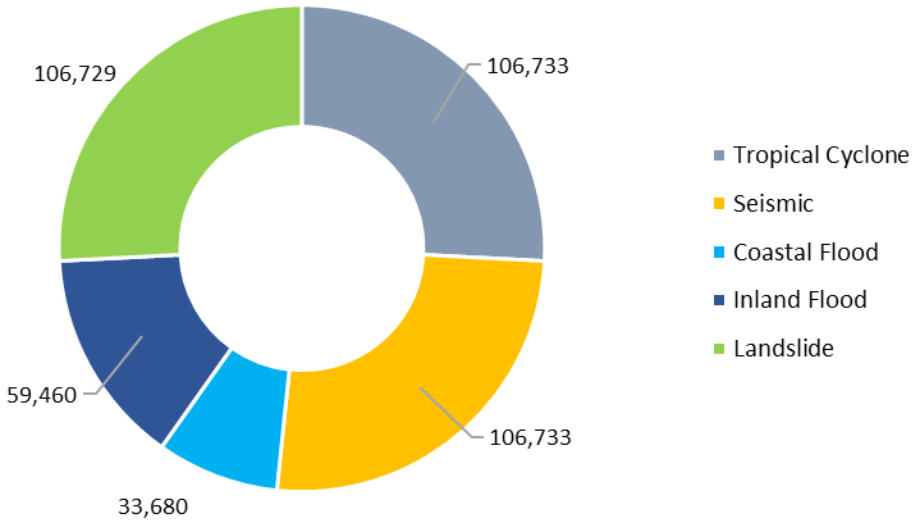


Figure 30. Raw population exposure by hazard type for Saint Mary

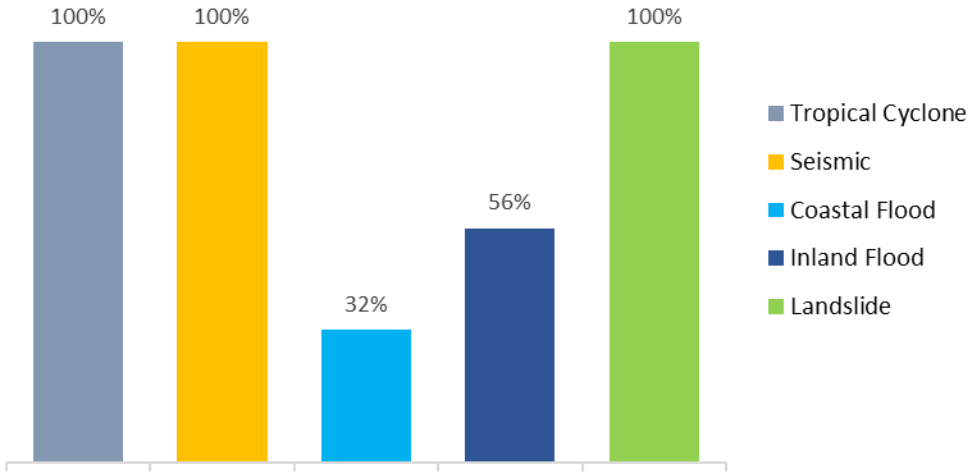


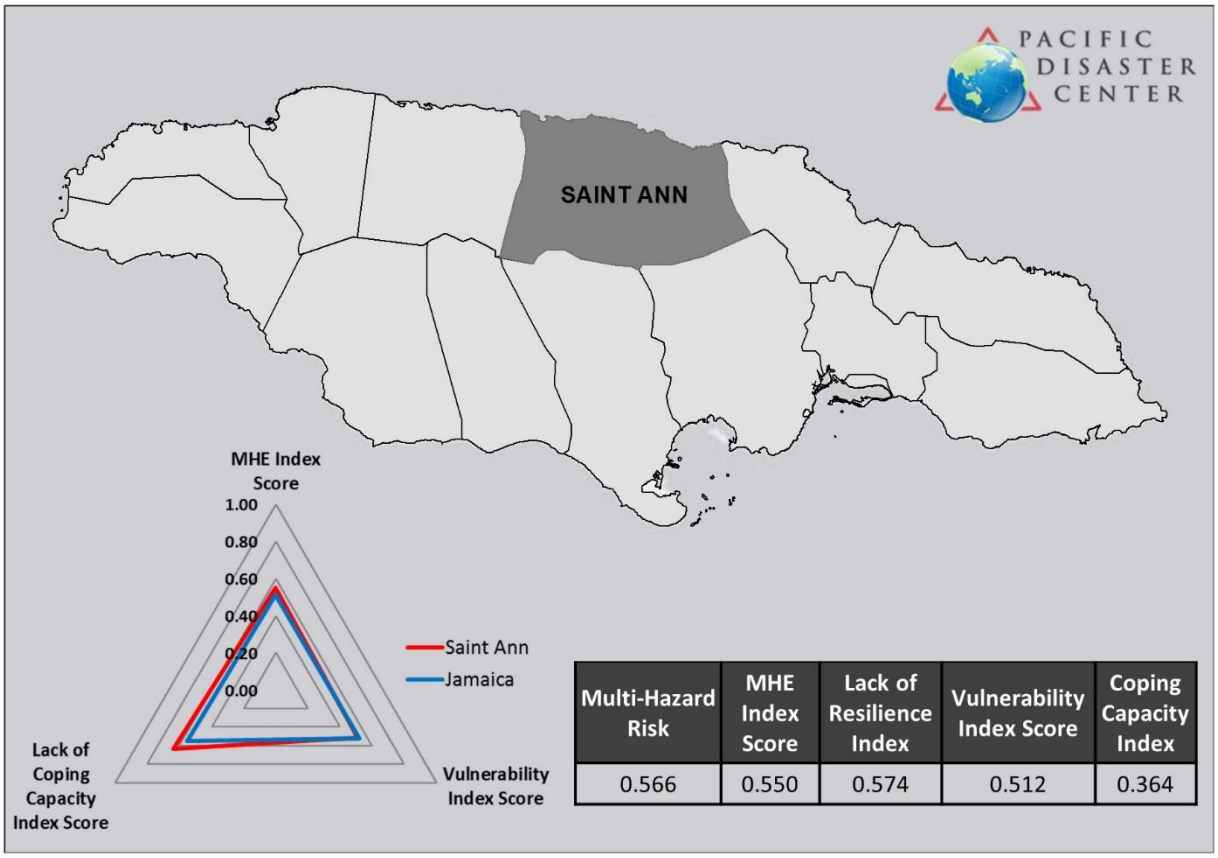
Figure 31. Percent population exposure to hazard type for Saint Mary

Table 19. Multi-Hazard Exposure Index, Raw and Relative Exposure Index scores for Saint Mary

Index	Saint Mary	
	Score	**Rank**
Multi-Hazard Exposure	0.595	5
Subcomponents		
Raw Exposure	0.296	10
Relative Exposure	0.895	3

Saint Ann: Risk

Saint Ann ranks **5th** out of **14** on the Multi-Hazard Risk Index with a score of **0.566**. Saint Ann's score and ranking are primarily driven by the combination of moderate Multi-Hazard Exposure and very low Coping Capacity (see Figure 32). The Parish ranks 7th in Multi-Hazard Exposure, 9th in Vulnerability, and 12th in Coping Capacity.



Multi-Hazard Risk	MHE Index Score	Lack of Resilience Index	Vulnerability Index Score	Coping Capacity Index
0.566	0.550	0.574	0.512	0.364

Figure 32. Risk scores for the parish of Saint Ann

Saint Ann: Lack of Resilience

Saint Ann ranks **8th** of **14** on the Lack or Resilience Index with a score of **0.574**. Saint Ann's score and ranking are due to its very low Coping Capacity. The Parish ranks 9th in Vulnerability and 12th in Coping Capacity (see Table 20).

The three thematic areas with the weakest relative scores for Saint Ann Parish: **Environmental Capacity, Economic Capacity,** and **Infrastructure**.

Table 20. Lack of Resilience Index and Component scores for Saint Ann

Index	Saint Ann	
	Score	**Rank**
Lack of Resilience	0.574	8
Components		
Vulnerability	0.512	9
Coping Capacity	0.364	12

Saint Ann: Coping Capacity

Saint Ann's Coping Capacity ranks **12th** out of **14** with a score of **0.364**. Saint Ann exhibits relatively low scores across all Coping Capacity subcomponents (refer to Table 21 and Figure 33). The thematic areas with the weakest relative scores are **Environmental Capacity, Economic Capacity,** and **Infrastructure**. Weaknesses in these thematic areas appear to constrain Coping Capacity within this parish.

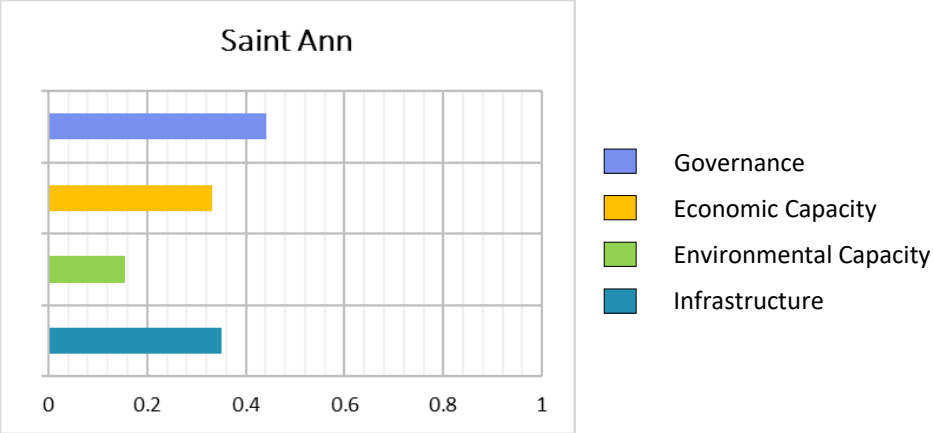


Figure 33. Coping Capacity subcomponents for Saint Ann

Table 21. Coping Capacity Index, subcomponent and sub-index scores for Saint Ann

Index	Saint Ann	
	Score	Rank
Coping Capacity	0.364	12
Subcomponents		
Governance	0.441	8
Economic Capacity	0.331	7
Environmental Capacity	0.156	11
Infrastructure	0.352	11
Infrastructure Sub-indices		
Health Care	0.327	11
Transportation	0.278	10
Communications	0.450	9

Saint Ann: Vulnerability

Saint Ann ranks **9th** out of **14** on the Vulnerability Index with a score of **0.512**. While Vulnerability in Saint Ann is relatively low, the Index is influenced by **Gender Inequality, Environmental Stress,** and **Clean Water Vulnerability** subcomponent scores (Refer to Table 22 and Figure 34).

Table 22. Vulnerability Index and subcomponent index scores for Saint Ann

Index	Saint Ann	
	Score	Rank
Vulnerability	0.512	9
Subcomponents		
Economic Constraints	0.466	11
Info Access Vulnerability	0.451	10
Vulnerable Health Status	0.422	11
Clean Water Vulnerability	0.687	10
Environmental Stress	0.579	5
Recent Disaster Impacts	0.379	10
Gender Inequality	0.598	4

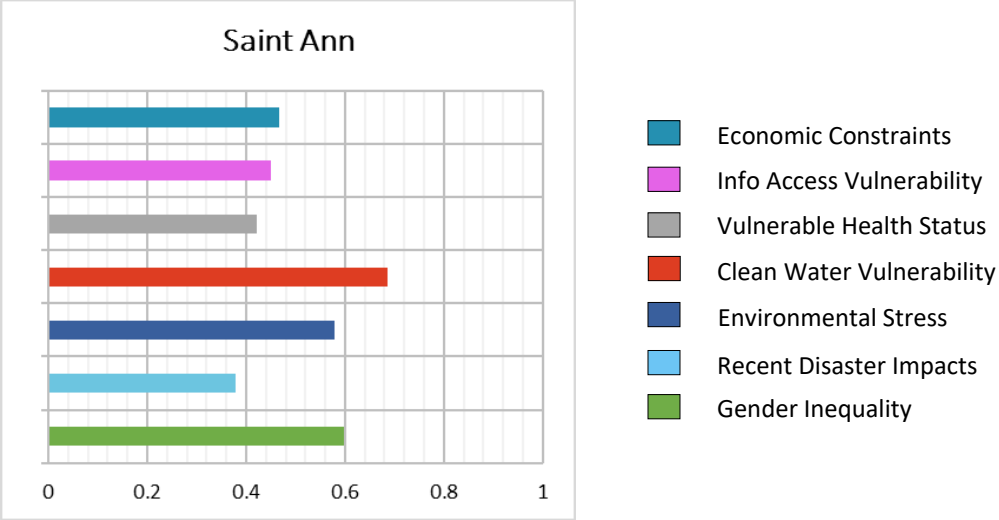


Figure 34. Vulnerability subcomponents for Saint Ann

Saint Ann: Multi-Hazard Exposure

Saint Ann ranks **7th** out of **14** on the Multi-Hazard Exposure index with a score of **0.550** (see Table 23). A large proportion of the population is exposed to **tropical cyclone wind, seismic activity,** and **landslides**. While Saint Ann is also exposed to inland and coastal floods, these hazards threaten a smaller proportion of the population (refer to Figure 35 and Figure 36).

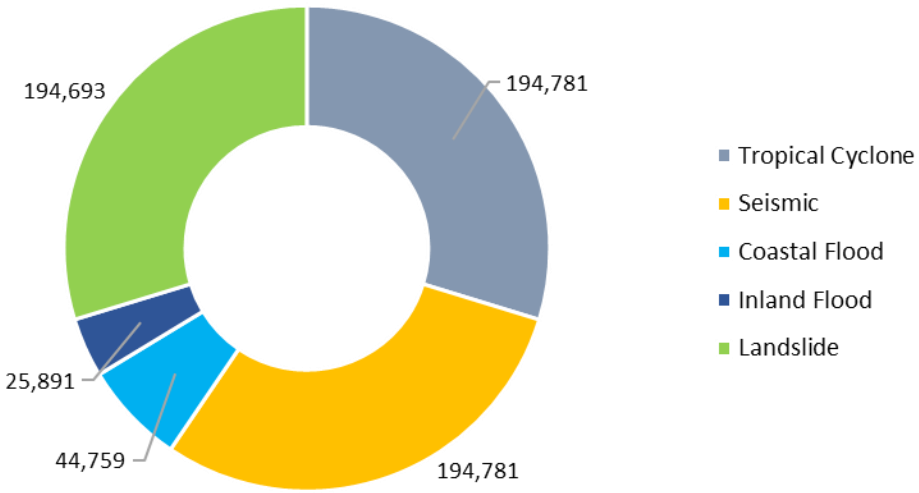


Figure 35. Raw population exposure by hazard type for Saint Ann

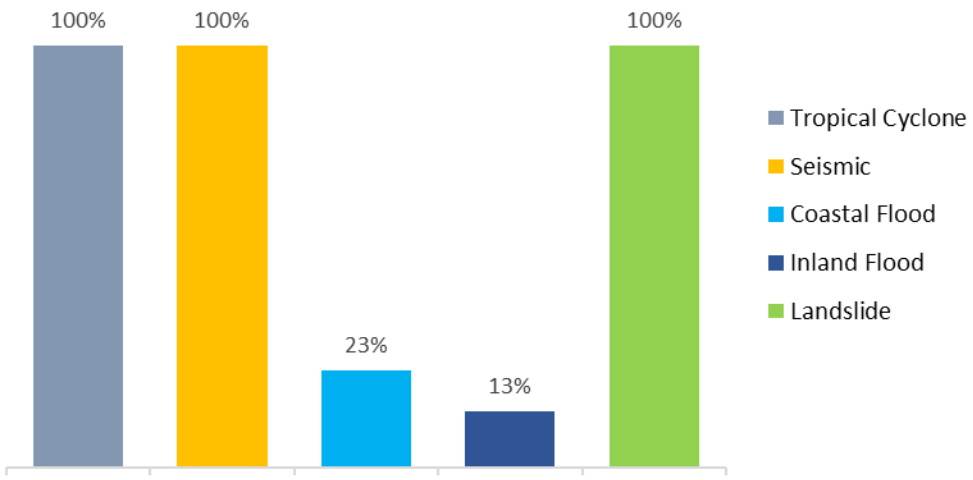


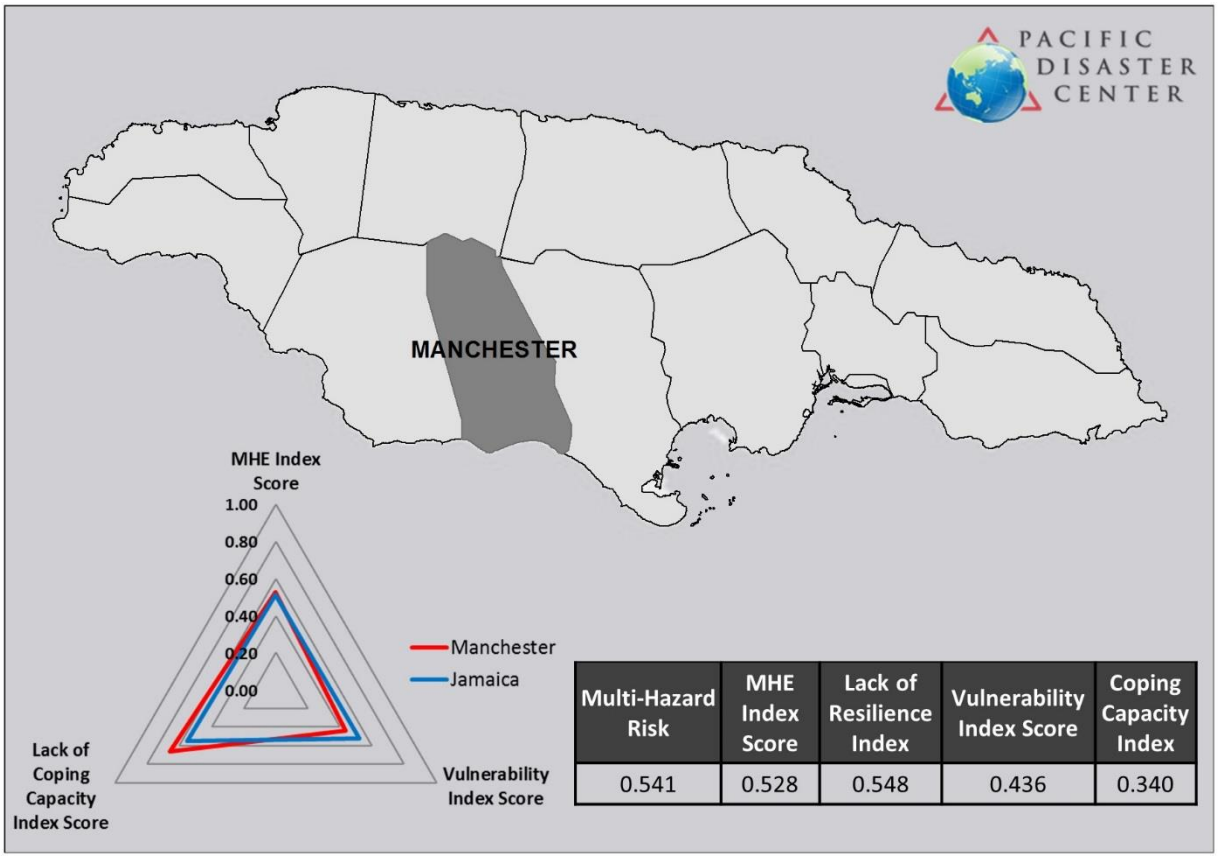
Figure 36. Percent population exposure to hazard type for Saint Ann

Table 23. Multi-Hazard Exposure Index, Raw and Relative Exposure Index scores for Saint Ann

Index	Saint Ann	
	Score	**Rank**
Multi-Hazard Exposure	0.550	7
Subcomponents		
Raw Exposure	0.485	5
Relative Exposure	0.616	8

Manchester: Risk

Manchester ranks **6th** of **14** on the Multi-Hazard Risk Index with a score of **0.541**. Manchester's score and ranking are driven primarily by very low Coping Capacity scores. Manchester ranks 9th in Multi-Hazard Exposure and 10th in Vulnerability, but has the lowest Coping Capacity score in the country (see Figure 37).



Multi-Hazard Risk	MHE Index Score	Lack of Resilience Index	Vulnerability Index Score	Coping Capacity Index
0.541	0.528	0.548	0.436	0.340

Figure 37. Risk scores for the parish of Manchester

Manchester: Lack of Resilience

Manchester ranks **9th** of **14** on the Lack of Resilience Index with a score of **0.548** (see Table 24). Manchester's score and ranking are due to its low Vulnerability and very low Coping Capacity. The Parish ranks 10th in Vulnerability and 14th in Coping Capacity.

The three thematic areas with the weakest relative scores for the Parish of Manchester are: **Governance, Environmental Capacity,** and **Clean Water Vulnerability**.

Table 24. Lack of Resilience Index and Component scores for Manchester

Index	Manchester	
	Score	**Rank**
Lack of Resilience	0.548	9
Components		
Vulnerability	0.436	10
Coping Capacity	0.340	14

Manchester: Coping Capacity

Manchester's Coping Capacity ranks **14th** out of **14** with a score of **0.340**. Thematically, this low coping capacity is driven by weak relative scores in **Governance** and **Environmental Capacity** (refer to Table 25). These two thematic areas appear to constrain Coping Capacity within this parish (refer to Figure 38).

Figure 38. Coping Capacity subcomponents for Manchester

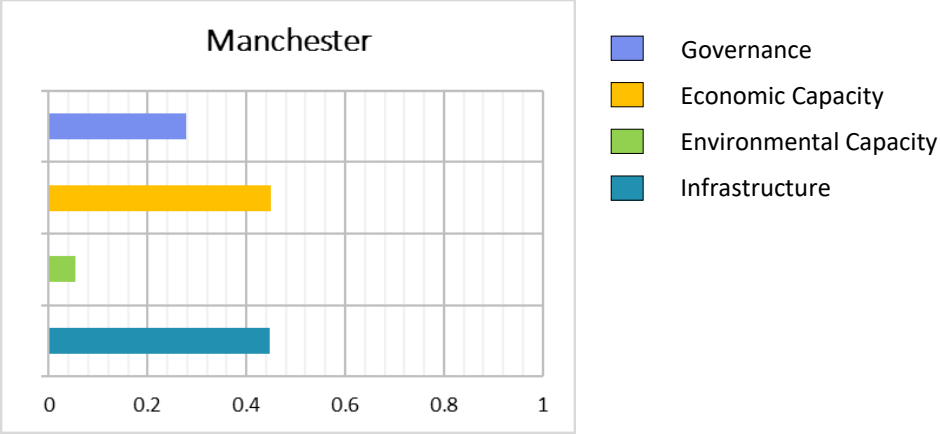


Table 25. Coping Capacity Index, subcomponent and sub-index scores for Manchester

Index	Manchester	
	Score	Rank
Coping Capacity	0.340	14
Subcomponents		
Governance	0.277	14
Economic Capacity	0.449	5
Environmental Capacity	0.055	13
Infrastructure	0.448	6
Infrastructure Sub-indices		
Health Care	0.379	9
Transportation	0.376	8
Communications	0.588	6

Manchester: Vulnerability

Manchester ranks **10th** out of **14** on the Vulnerability Index with a score of **0.436**. Though overall vulnerability is relatively low in Manchester, the index is influenced by high **Clean Water Vulnerability** and **Gender Inequality** subcomponent scores (refer to Table 26 and Figure 39).

Table 26. Vulnerability Index and subcomponent index scores for Manchester

Index	Manchester	
	Score	Rank
Vulnerability	0.436	10
Subcomponents		
Economic Constraints	0.331	14
Info Access Vulnerability	0.410	11
Vulnerable Health Status	0.428	10
Clean Water Vulnerability	0.771	6
Environmental Stress	0.247	13
Recent Disaster Impacts	0.292	12
Gender Inequality	0.572	6

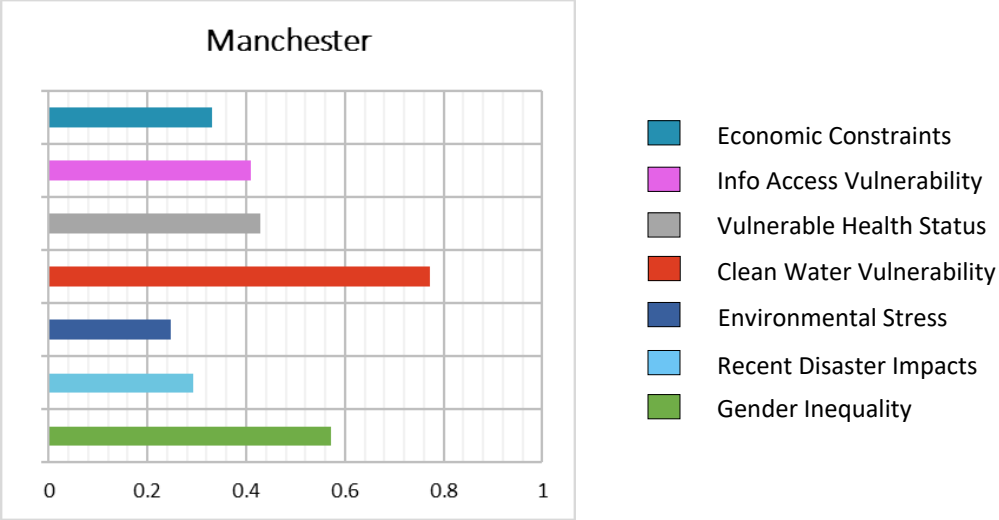


Figure 39. Vulnerability subcomponents for Manchester

Manchester: Multi-Hazard Exposure

Manchester ranks **9th** out of **14** on the Multi-Hazard Exposure Index with a score of **0.528** (see Table 27). A large proportion of the population is exposed to **tropical cyclones, seismic activity, landslides,** and **Inland flood**. A smaller proportion of Manchester's population is also exposed to coastal flood (see Figure 40 and Figure 41).

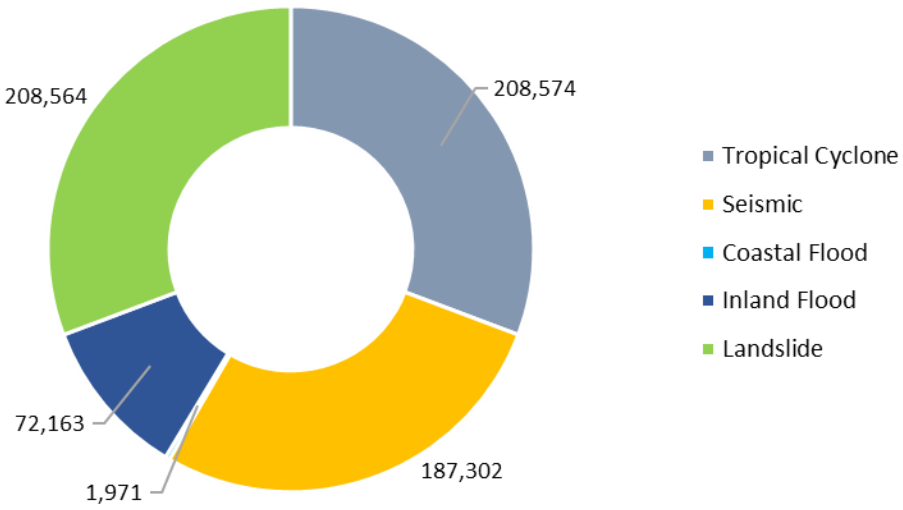


Figure 40. Raw population exposure by hazard type for Manchester

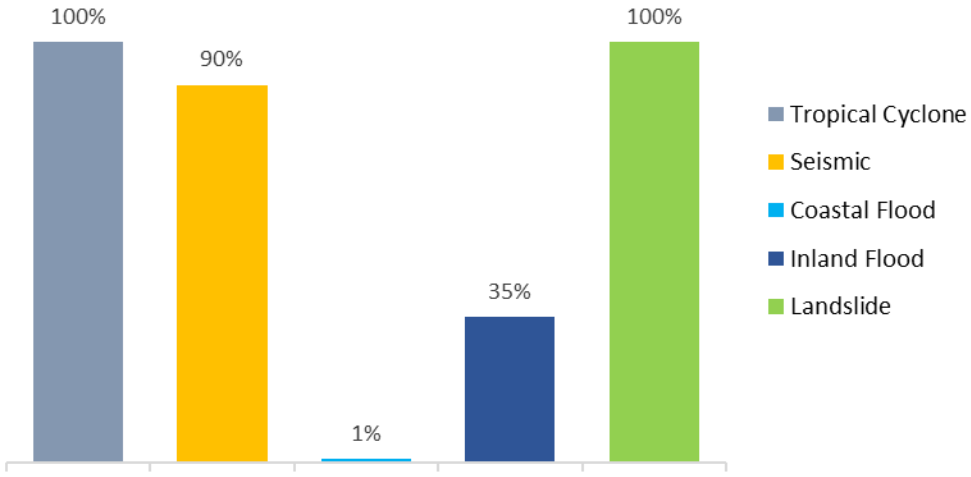


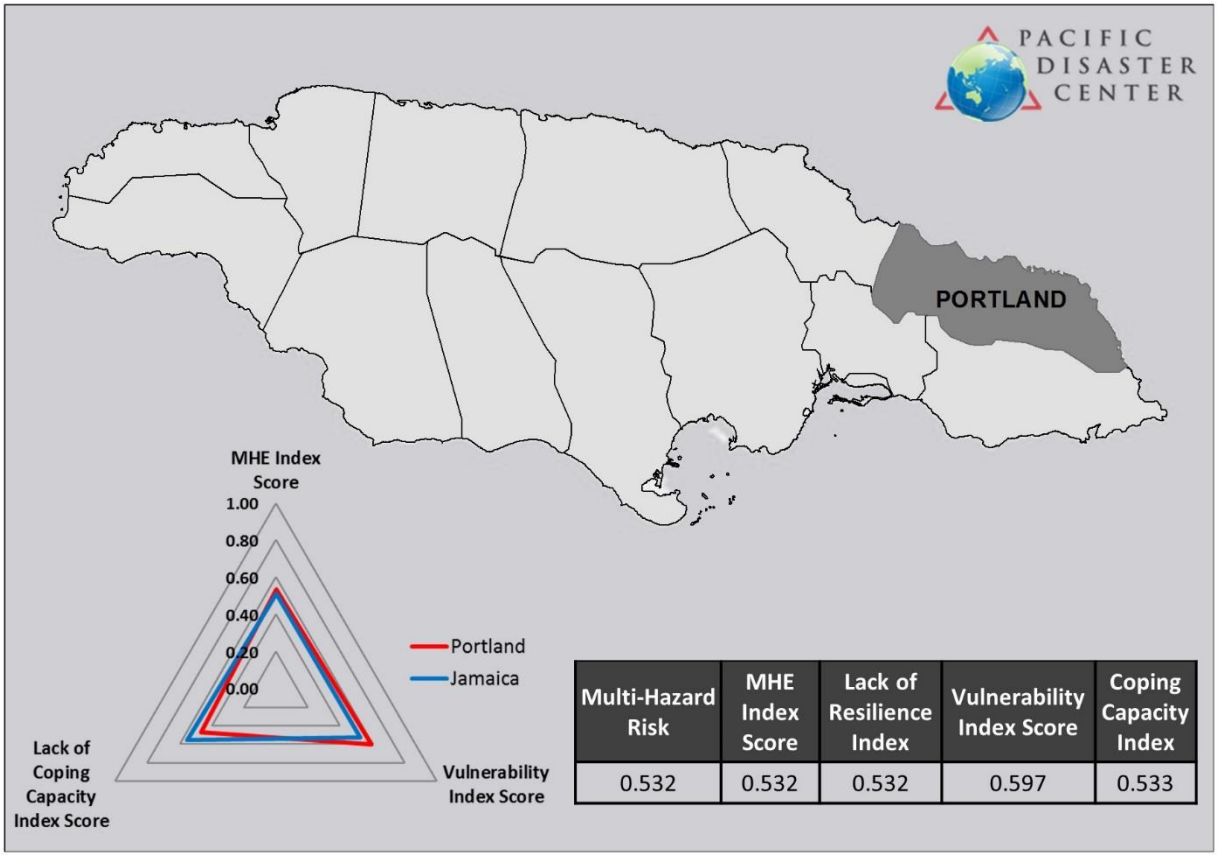
Figure 41. Percent population exposure to hazard type for Manchester

Table 27. Multi-Hazard Exposure Index, Raw and Relative Exposure Index scores for Manchester

Index	Manchester	
	Score	**Rank**
Multi-Hazard Exposure	0.528	9
Subcomponents		
Raw Exposure	0.499	4
Relative Exposure	0.556	9

Portland: Risk

Portland ranks **7th** out of **14** on the Multi-Hazard Risk Index with a score of **0.532**. Portland has moderate Multi-Hazard Exposure, moderate Vulnerability and high Coping Capacity (see Figure 42). The Parish ranks 8th in Multi-Hazard Exposure, 7th in Vulnerability, and 4h in Coping Capacity.



Multi-Hazard Risk	MHE Index Score	Lack of Resilience Index	Vulnerability Index Score	Coping Capacity Index
0.532	0.532	0.532	0.597	0.533

Figure 42. Risk scores for the parish of Portland

Portland: Lack of Resilience

Portland ranks **10th** of **14** on the Lack of Resilience Index with a score of **0.532** (see Table 28). Portland' score and ranking are due to its moderate Vulnerability combined with high Coping Capacity. The Parish ranks 7th in Vulnerability and 4th in Coping Capacity.

The three thematic areas with the weakest relative scores for the Parish of Portland are: **Economic Capacity**, **Information Access Vulnerability**, and **Recent Disaster Impacts**.

Table 28. Lack of Resilience Index and Component scores for Portland

Index	Portland	
	Score	**Rank**
Lack of Resilience	0.532	10
Components		
Vulnerability	0.597	7
Coping Capacity	0.533	4

Portland: Coping Capacity

Portland's Coping Capacity ranks **4th** out of **14** with a score of **0.533**. While overall coping capacity is relatively high in Portland, the index is influenced by an exceptionally weak score in the thematic area of **Economic Capacity**. Refer to Figure 43 and Table 29. This weakness may constrain Coping Capacity within the Parish.

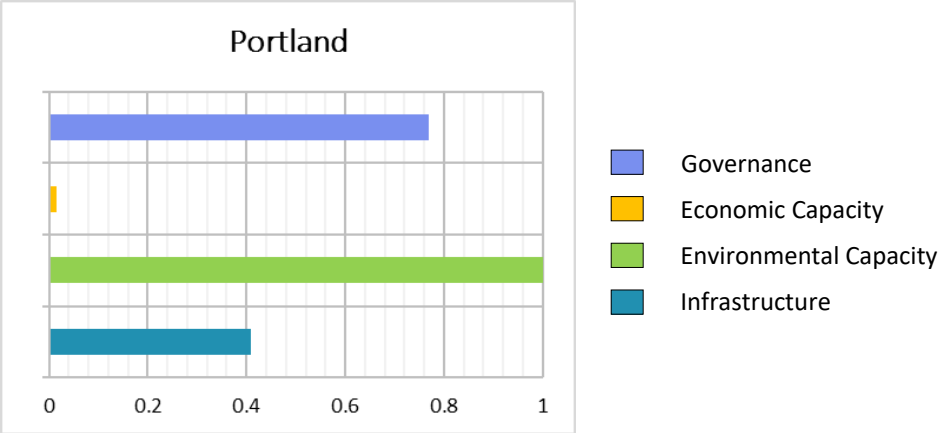


Figure 43. Coping Capacity subcomponents for Portland

Table 29. Coping Capacity Index, subcomponent and sub-index scores for Portland

Index	Portland	
	Score	Rank
Coping Capacity	0.533	4
Subcomponents		
Governance	0.768	1
Economic Capacity	0.015	14
Environmental Capacity	1.000	1
Infrastructure	0.408	8
Infrastructure Sub-indices		
Health Care	0.424	7
Transportation	0.203	12
Communications	0.597	5

Portland: Vulnerability

Portland ranks **7th** out of **14** on the Vulnerability Index with a score of **0.597**. Vulnerability in Portland is strongly influenced by **Recent Disaster Impacts, Information Access Vulnerability,** and **Clean Water Vulnerability** subcomponent scores. See Table 30 and Figure 44.

Table 30. Vulnerability Index and subcomponent index scores for Portland

Index	Portland	
	Score	Rank
Vulnerability	0.597	7
Subcomponents		
Economic Constraints	0.543	7
Info Access Vulnerability	0.764	2
Vulnerable Health Status	0.490	7
Clean Water Vulnerability	0.705	9
Environmental Stress	0.430	9
Recent Disaster Impacts	0.787	2
Gender Inequality	0.459	12

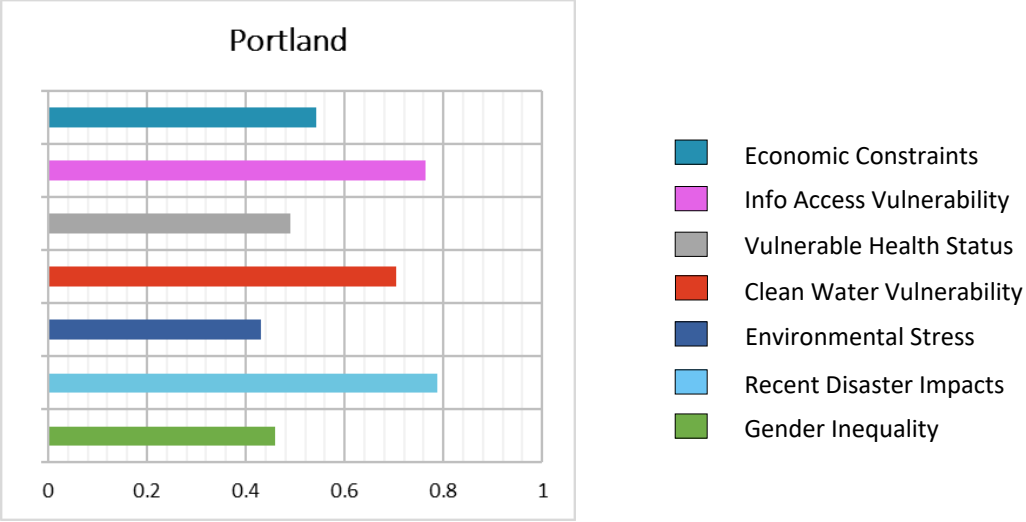


Figure 44. Vulnerability subcomponents for Portland

Portland: Multi-Hazard Exposure

Portland ranks **8th** out of **14** on the Multi-Hazard Exposure Index with a score of **0.532** (see Table 31). A large proportion of Portland's population is exposed to **tropical cyclones, seismic activity, landslides, coastal flood,** and **inland flood**. See Figure 45 and Figure 46.

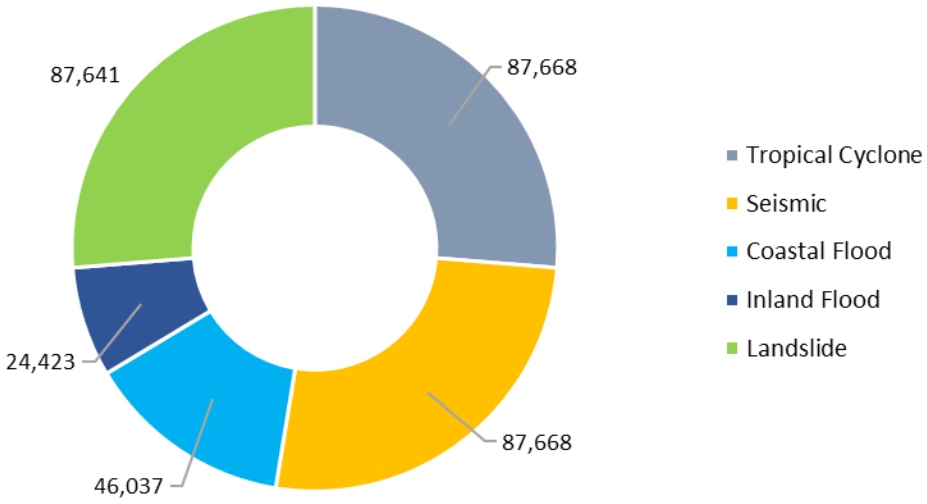


Figure 45. Raw population exposure by hazard type for Portland

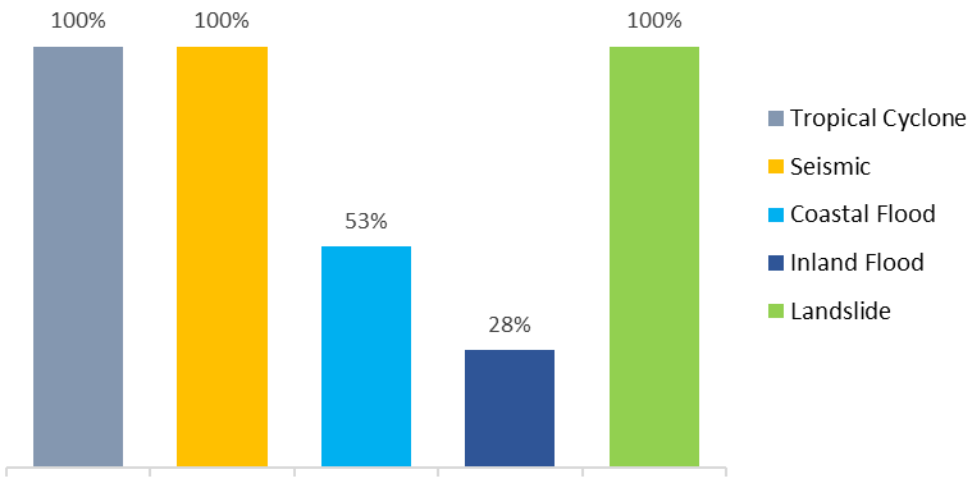


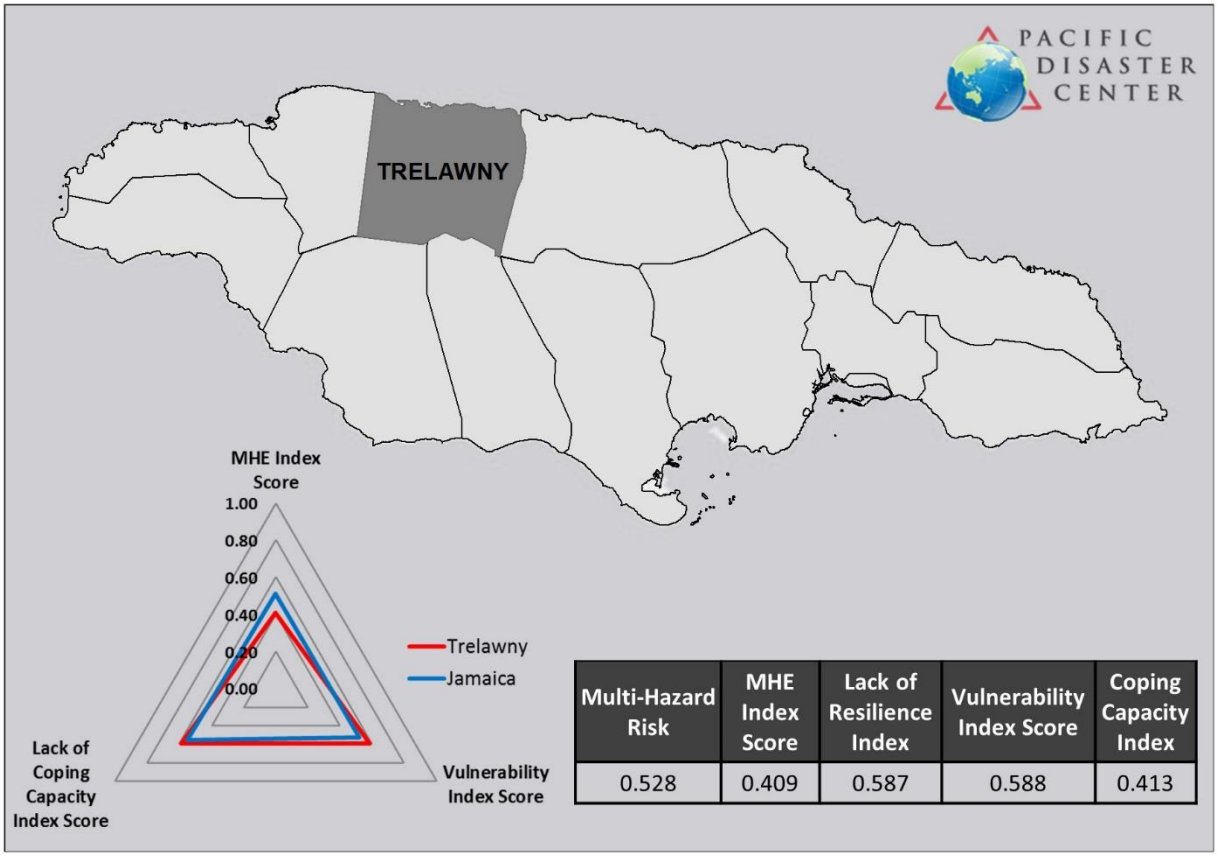
Figure 46. Percent population exposure to hazard type for Portland

Table 31. Multi-Hazard Exposure Index, Raw and Relative Exposure Index scores for Portland

Index	Portland	
	Score	**Rank**
Multi-Hazard Exposure	0.532	8
Subcomponents		
Raw Exposure	0.207	12
Relative Exposure	0.857	4

Trelawny: Risk

Trelawny ranks **8th** out of **14** on the Multi-Hazard Risk Index with a score of **0.528**. Trelawny has low Multi-Hazard Exposure, moderate Vulnerability, and moderate Coping Capacity (see Figure 47). The Parish ranks 10th in Multi-Hazard Exposure, 8th in Vulnerability, and 6th in Coping Capacity.



Multi-Hazard Risk	MHE Index Score	Lack of Resilience Index	Vulnerability Index Score	Coping Capacity Index
0.528	0.409	0.587	0.588	0.413

Figure 47. Risk scores for the parish of Trelawny

Trelawny: Lack of Resilience

Trelawny ranks **7th** of **14** on the Lack of Resilience Index with a score of **0.587** (see Table 32). Trelawny's score and ranking are due to its moderate Vulnerability and Coping Capacity. The Parish ranks 8th in Vulnerability and 6th in Coping Capacity.

The three thematic areas with the weakest relative scores for the Parish of Trelawny are: **Clean Water Vulnerability, Information Access Vulnerability**, and **Transportation Infrastructure**.

Table 32. Lack of Resilience Index and Component scores for Trelawny

Index	Trelawny	
	Score	**Rank**
Lack of Resilience	0.587	7
Components		
Vulnerability	0.588	8
Coping Capacity	0.413	6

Trelawny: Coping Capacity

Trelawny's Coping Capacity ranks **6th** out of **14** with a score of **0.413**. The thematic areas with the weakest relative scores are **Infrastructure (especially Transportation)** and **Economic Capacity** (refer to Figure 48 and Table 33). These two thematic areas appear to constrain Coping Capacity within this parish.

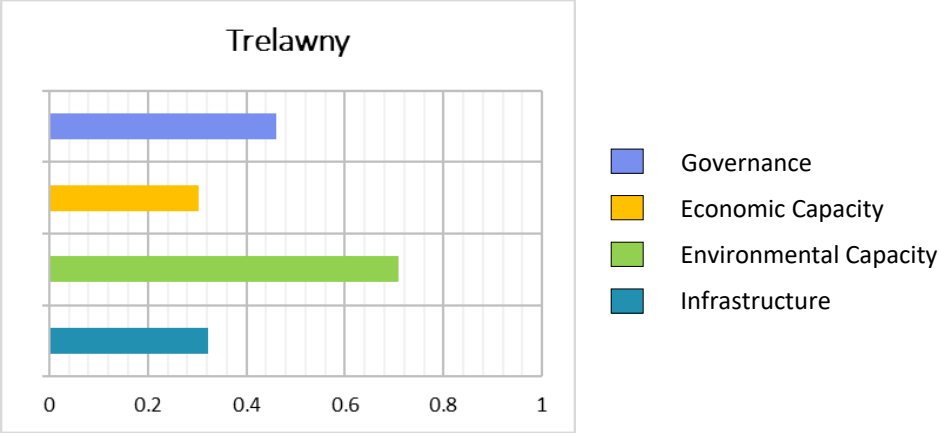


Figure 48. Coping Capacity subcomponents for Trelawny

Table 33. Coping Capacity Index, subcomponent and sub-index scores for Trelawny

Index	Trelawny	
	Score	Rank
Coping Capacity	0.413	6
Subcomponents		
Governance	0.461	7
Economic Capacity	0.304	8
Environmental Capacity	0.710	2
Infrastructure	0.322	12
Infrastructure Sub-indices		
Health Care	0.428	6
Transportation	0.113	14
Communications	0.425	10

Trelawny: Vulnerability

Trelawny ranks **8th** out of **14** on the Vulnerability Index with a score of **0.588**. Vulnerability in Trelawny is strongly influenced by **Clean Water Vulnerability, Information Access Vulnerability**, and **Vulnerable Health Status** subcomponent scores. Refer to Table 34 and Figure 49.

Table 34. Vulnerability Index and subcomponent index scores for Trelawny

Index	Trelawny	
	Score	Rank
Vulnerability	0.588	8
Subcomponents		
Economic Constraints	0.554	6
Info Access Vulnerability	0.805	1
Vulnerable Health Status	0.656	3
Clean Water Vulnerability	0.875	3
Environmental Stress	0.402	11
Recent Disaster Impacts	0.272	13
Gender Inequality	0.549	7

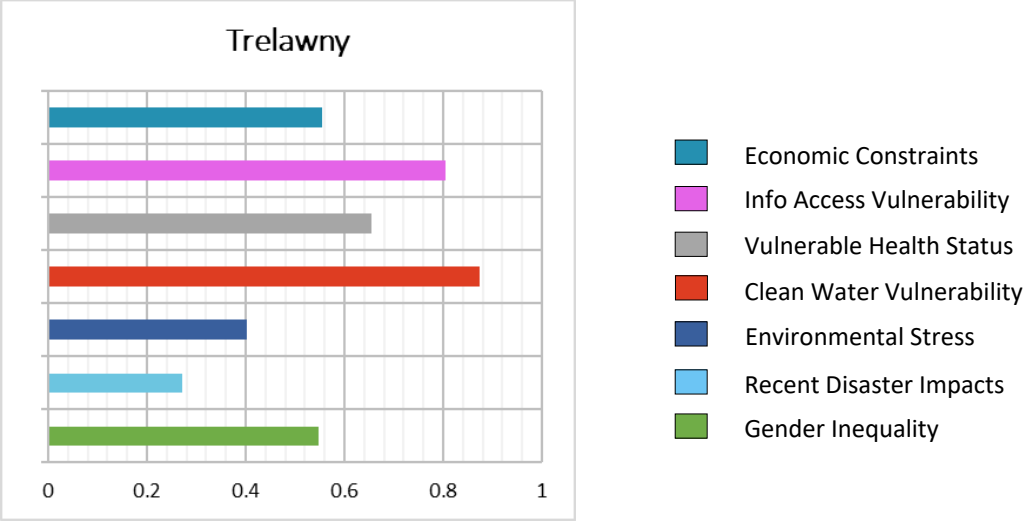


Figure 49. Vulnerability subcomponents for Trelawny

Trelawny: Multi-Hazard Exposure

Trelawny ranks **10th** out of **14** on the Multi-Hazard Exposure index with a score of **0.409** (refer to Table 35). A significant proportion of the population is exposed to **tropical cyclone, seismic activity, landslides, coastal flood,** and **inland flood**. Refer to Figure 50 and Figure 51.

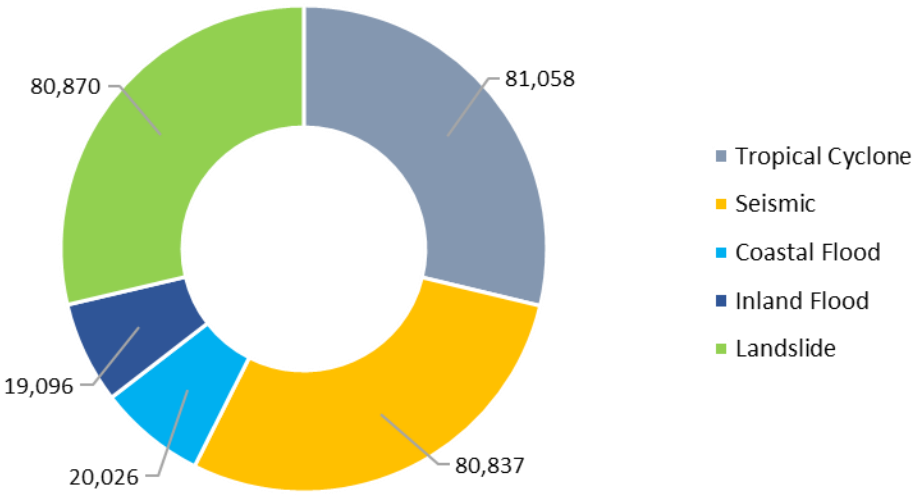


Figure 50. Raw population exposure by hazard type for Trelawny

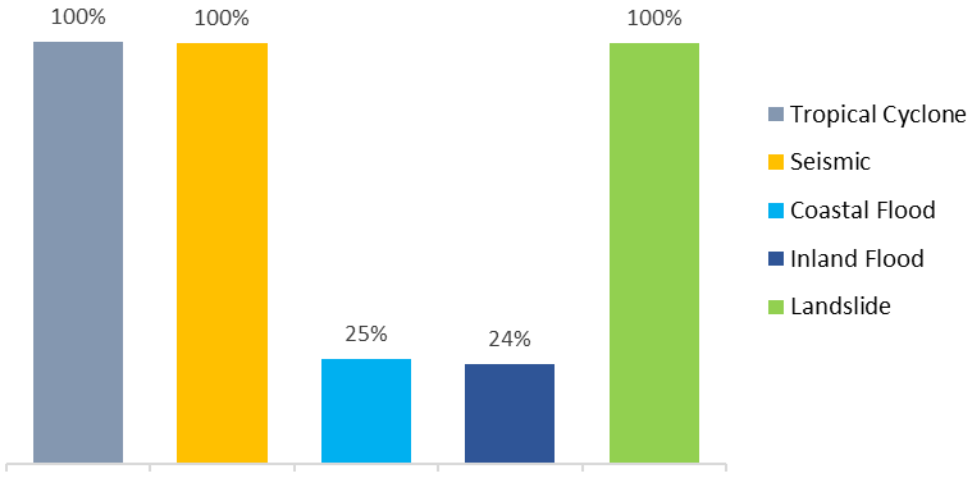


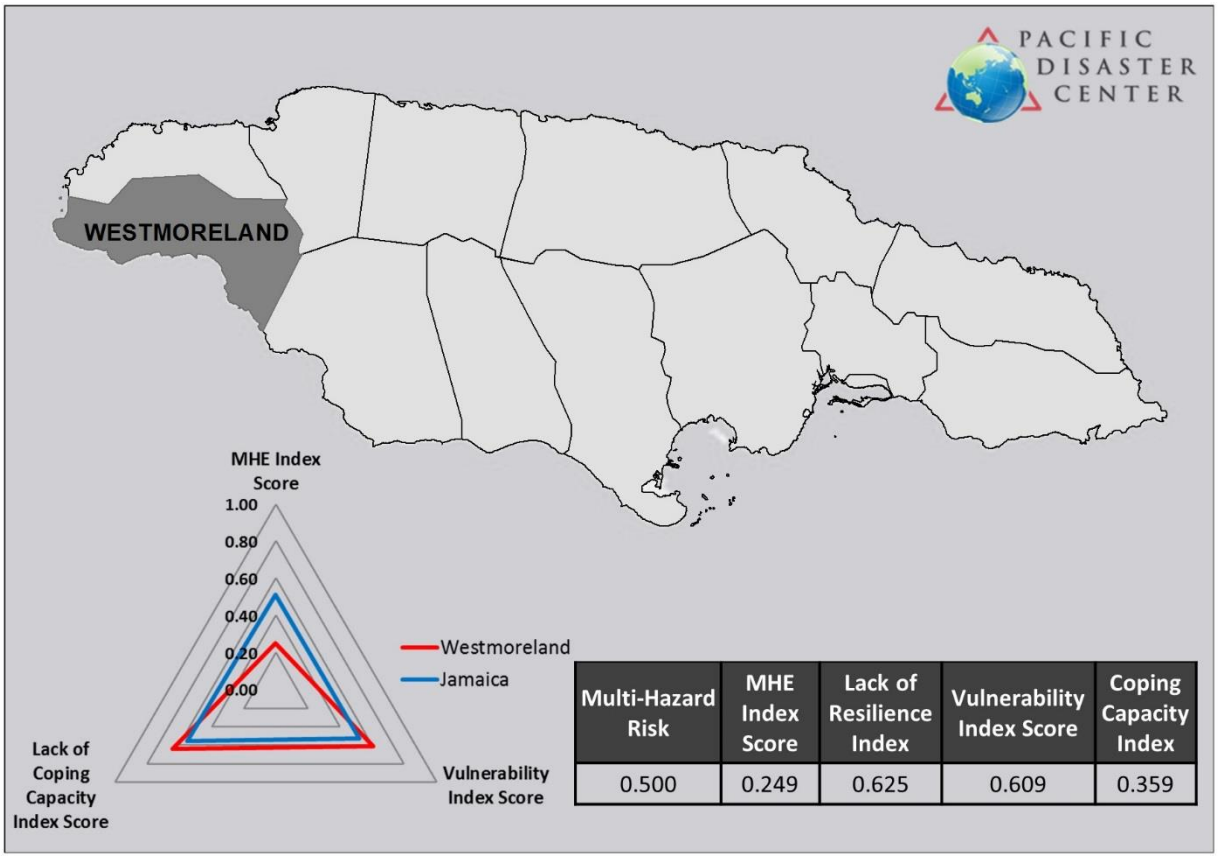
Figure 51. Percent population exposure to hazard type for Trelawny

Table 35. Multi-Hazard Exposure Index, Raw and Relative Exposure Index scores for Trelawny

Index	Trelawny	
	Score	**Rank**
Multi-Hazard Exposure	0.409	10
Subcomponents		
Raw Exposure	0.138	13
Relative Exposure	0.679	7

Westmoreland: Risk

Westmoreland ranks **9th** out of **14** on the Multi-Hazard Risk index with a score of **0.500**. Though Westmoreland has very low Multi-Hazard Exposure, the Parish exhibits high Vulnerability combined with very low Coping Capacity (see Figure 52). The Parish ranks 12th for Multi-Hazard Exposure, 5th in Vulnerability, and 13th in Coping Capacity.



Multi-Hazard Risk	MHE Index Score	Lack of Resilience Index	Vulnerability Index Score	Coping Capacity Index
0.500	0.249	0.625	0.609	0.359

Figure 52. Risk scores for the parish of Westmoreland

Westmoreland: Lack of Resilience

Westmoreland ranks **3rd** of **14** on the **Lack of Resilience Index** with a score of **0.625** (refer to Table 36). Westmoreland's score and ranking are due to the Parish's high Vulnerability combined with very low Coping Capacity. The Parish ranks 5th in Vulnerability and 13th in Coping Capacity.

The three thematic areas with the weakest relative scores for the Parish of Westmoreland are: **Governance**, **Clean Water Vulnerability**, and **Information Access Vulnerability**

Table 36. Lack of Resilience Index and Component scores for Westmoreland

Index	Westmoreland	
	Score	**Rank**
Lack of Resilience	0.625	3
Components		
Vulnerability	0.609	5
Coping Capacity	0.359	13

Westmoreland: Coping Capacity

Westmoreland's Coping Capacity ranks **13th** out of **14** with a score of **0.359**. The thematic areas with the weakest relative scores are **Governance, Environmental Capacity,** and **Infrastructure** (see Figure 53 and Table 37). These thematic areas appear to constrain Coping Capacity within this parish.

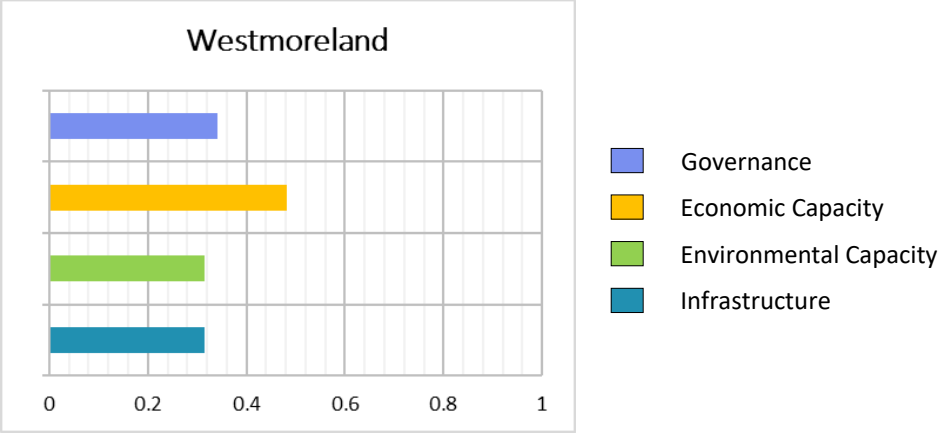


Figure 53. Coping Capacity subcomponents for Westmoreland

Table 37. Coping Capacity Index, subcomponent and sub-index scores for Westmoreland

Index	Westmoreland	
	Score	Rank
Coping Capacity	0.359	13
Subcomponents		
Governance	0.341	12
Economic Capacity	0.481	4
Environmental Capacity	0.314	9
Infrastructure	0.315	13
Infrastructure Sub-indices		
Health Care	0.307	12
Transportation	0.380	7
Communications	0.258	13

Westmoreland: Vulnerability

Westmoreland ranks **5th** out of **14** on the Vulnerability Index with a score of **0.609**. Vulnerability in Westmoreland is strongly influenced by **Clean Water Vulnerability**, **Information Access Vulnerability, Gender Inequality,** and **Economic Constraints** subcomponent scores. Refer to Table 38 and Figure 54.

Table 38. Vulnerability Index and subcomponent index scores for Westmoreland

Index	Westmoreland	
	Score	Rank
Vulnerability	0.609	5
Subcomponents		
Economic Constraints	0.645	3
Info Access Vulnerability	0.759	3
Vulnerable Health Status	0.440	9
Clean Water Vulnerability	0.789	4
Environmental Stress	0.531	6
Recent Disaster Impacts	0.479	8
Gender Inequality	0.619	2

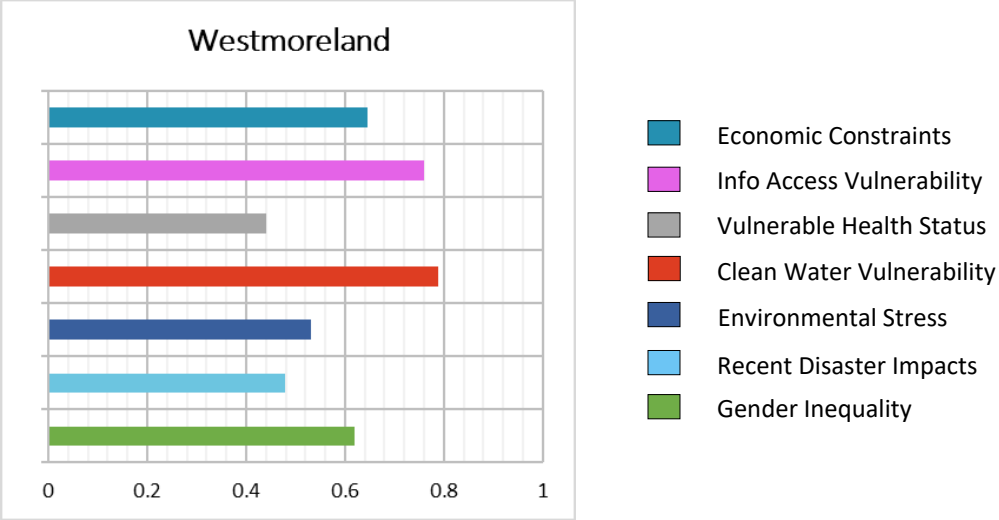


Figure 54. Vulnerability subcomponents for Westmoreland

Westmoreland: Multi-Hazard Exposure

Westmoreland ranks **12th** out of **14** on the Multi-Hazard Exposure index with a score of **0.249** (see Table 39). Despite this low rank, a significant proportion of the population is exposed to **tropical cyclones**, **landslides,** and **coastal flood** (see Figure 55 and Figure 56). A slightly smaller proportion of Westmoreland's population is also exposed to inland flood.

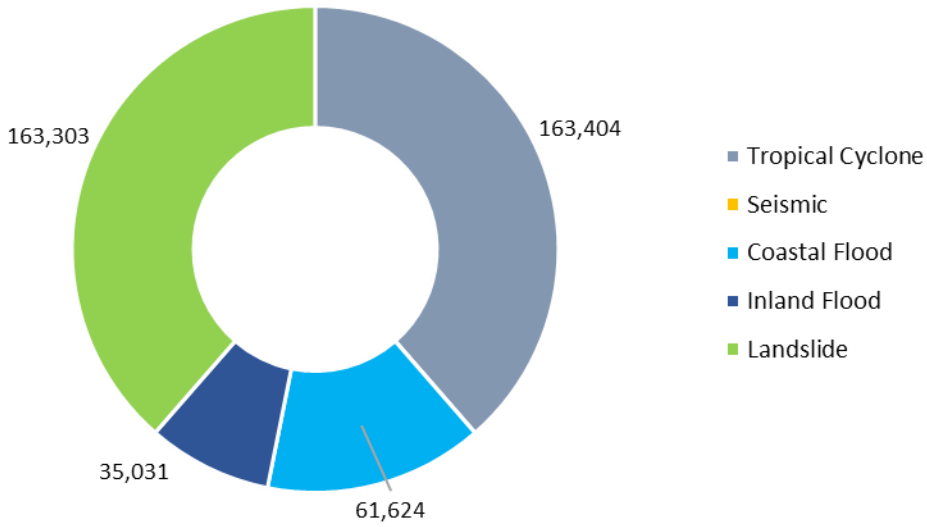


Figure 55. Raw population exposure by hazard type for Westmoreland

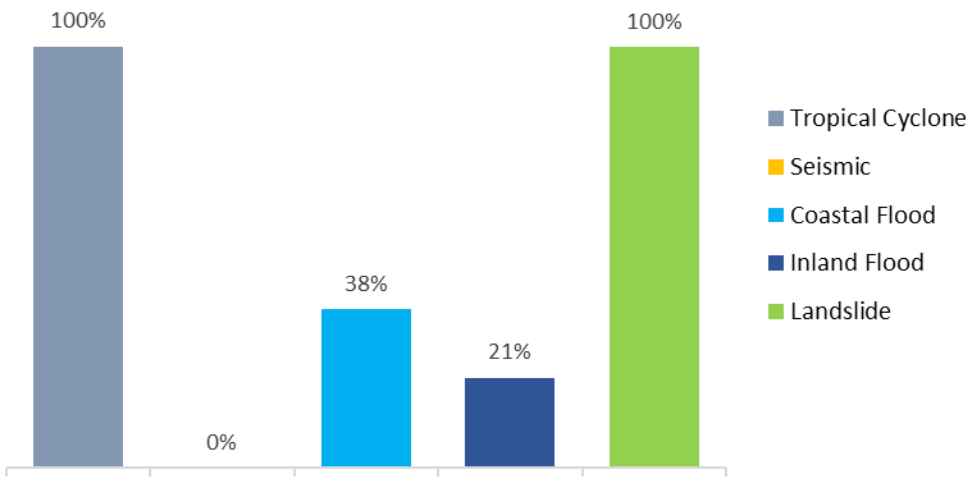


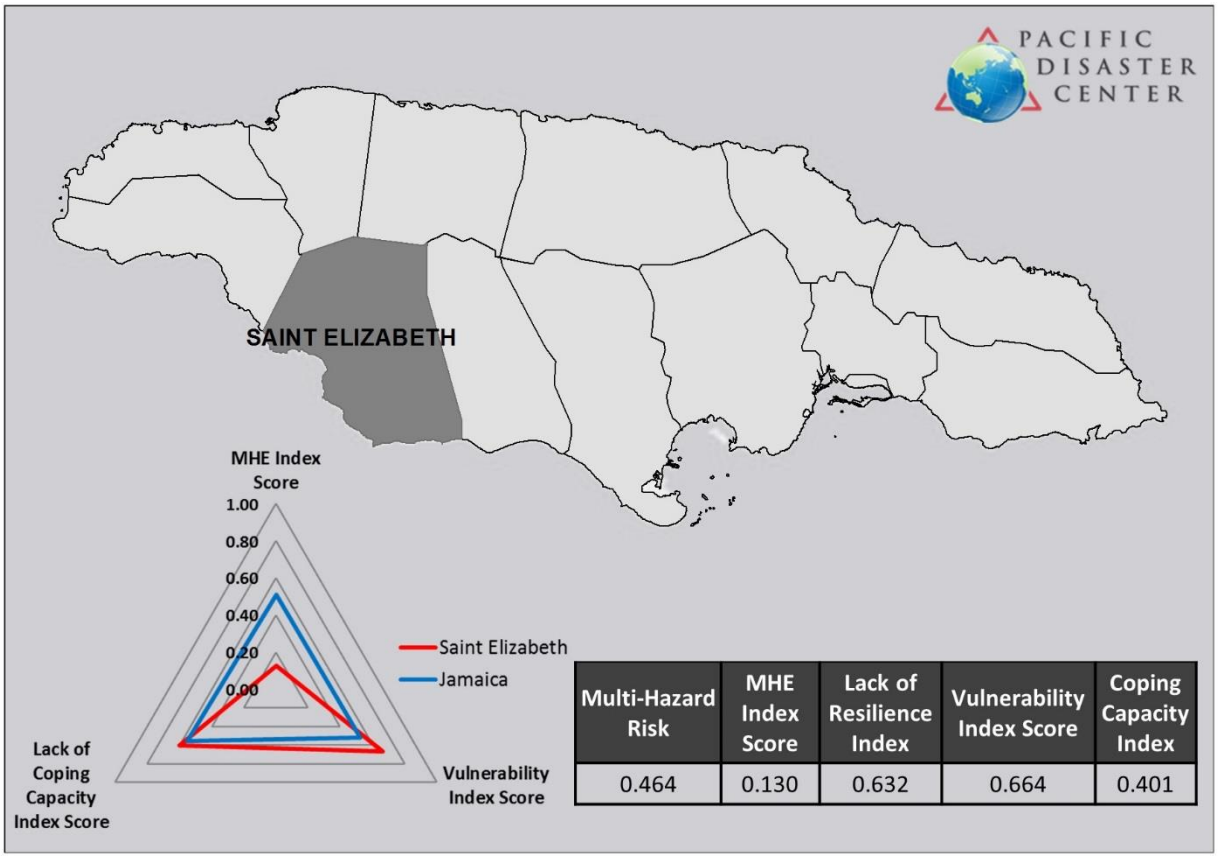
Figure 56. Percent population exposure to hazard type for Westmoreland

Table 39. Multi-Hazard Exposure Index, Raw and Relative Exposure Index scores for Westmoreland

Index	Westmoreland	
	Score	**Rank**
Multi-Hazard Exposure	0.249	12
Subcomponents		
Raw Exposure	0.306	9
Relative Exposure	0.193	13

Saint Elizabeth: Risk

Saint Elizabeth ranks **10th** out of **14** on the Multi-Hazard Risk index with a score of **0.464**. While Saint Elizabeth has very low Multi-Hazard Exposure, the Parish exhibits very high Vulnerability and low Coping Capacity (see Figure 57). The Parish ranks 14th for Multi-Hazard Exposure, 2nd in Vulnerability, and 10th in Coping Capacity.



Multi-Hazard Risk	MHE Index Score	Lack of Resilience Index	Vulnerability Index Score	Coping Capacity Index
0.464	0.130	0.632	0.664	0.401

Figure 57. Risk scores for the parish of Saint Elizabeth

Saint Elizabeth: Lack of Resilience

Saint Elizabeth ranks **2nd** of **14** on the Lack of Resilience Index with a score of **0.632** (refer to Table 40). Saint Elizabeth's score and ranking are a product of very high Vulnerability combined with low Coping Capacity. The Parish ranks 2nd in Vulnerability and 10th in Coping Capacity.

The three thematic areas with the weakest relative scores for the Parish of Saint Elizabeth are: **Clean Water Vulnerability**, **Gender Inequality**, and **Health Care Capacity.**

Table 40. Lack of Resilience Index and Component scores for Saint Elizabeth

Index	Saint Elizabeth	
	Score	**Rank**
Lack of Resilience	0.632	2
Components		
Vulnerability	0.664	2
Coping Capacity	0.401	10

Saint Elizabeth: Coping Capacity

Saint Elizabeth's Coping Capacity ranks **10th** out of **14** with a score of **0.401**. The thematic areas with the weakest relative scores are **Economic Capacity** and **Infrastructure (especially Health Care Capacity)**. Refer to Figure 58 and Table 41. These two thematic areas appear to constrain Coping Capacity within this parish.

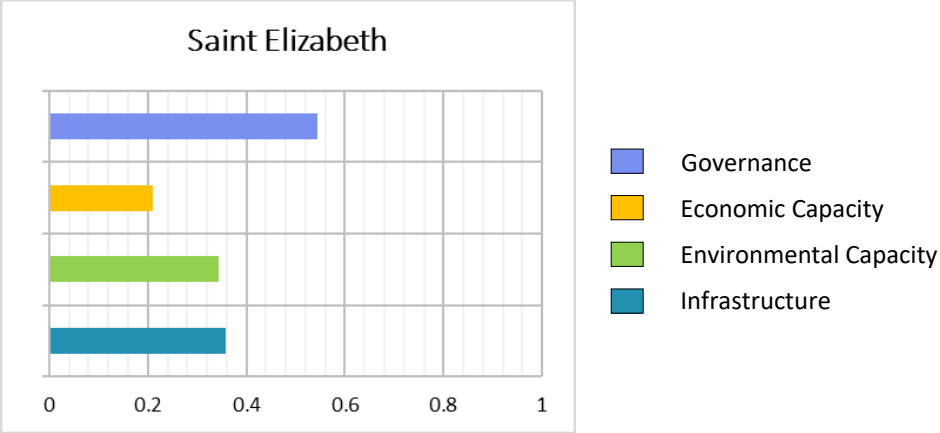


Figure 58. Coping Capacity subcomponents for Saint Elizabeth

Table 41. Coping Capacity Index, subcomponent and sub-index scores for Saint Elizabeth

Index	Saint Elizabeth	
	Score	Rank
Coping Capacity	0.401	10
Subcomponents		
Governance	0.544	4
Economic Capacity	0.209	10
Environmental Capacity	0.344	8
Infrastructure	0.357	10
Infrastructure Sub-indices		
Health Care	0.231	14
Transportation	0.372	9
Communications	0.467	8

Saint Elizabeth: Vulnerability

Saint Elizabeth ranks **2nd** out of **14** on the Vulnerability Index with a score of **0.664**. Vulnerability in Saint Elizabeth is strongly influenced by **Clean Water Vulnerability, Gender Inequality, Information Access Vulnerability,** and **Economic Constraints** subcomponent scores. Refer to Table 42 and Figure 59.

Table 42. Vulnerability Index and subcomponent index scores for Saint Elizabeth

Index	Saint Elizabeth	
	Score	Rank
Vulnerability	0.664	2
Subcomponents		
Economic Constraints	0.603	4
Info Access Vulnerability	0.757	4
Vulnerable Health Status	0.559	5
Clean Water Vulnerability	0.941	1
Environmental Stress	0.416	10
Recent Disaster Impacts	0.517	5
Gender Inequality	0.857	1

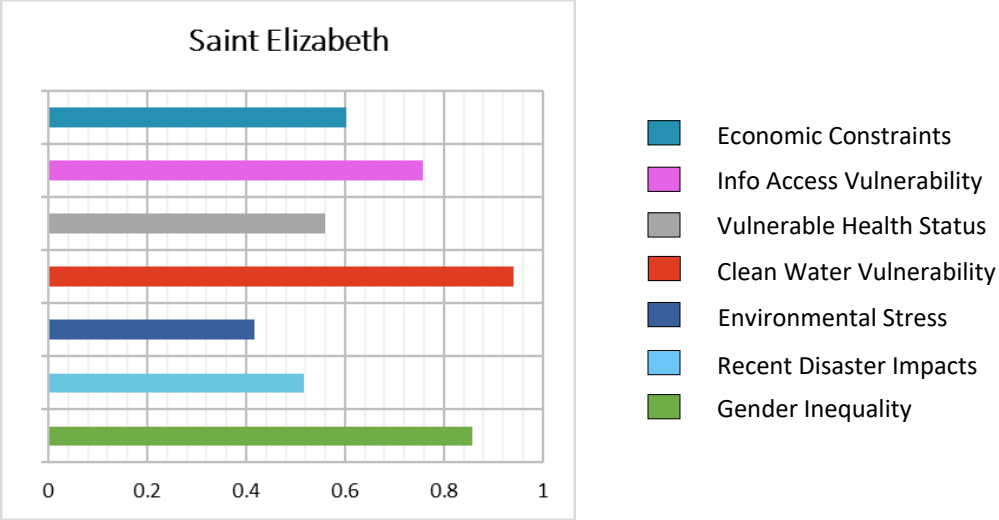


Figure 59. Vulnerability subcomponents for Saint Elizabeth

Saint Elizabeth: Multi-Hazard Exposure

Saint Elizabeth ranks **14th** out of **14** on the Multi-Hazard Exposure index with a score of **0.130** (refer to Table 43). Despite this low rank, a significant proportion of the population is exposed to **tropical cyclones** and **landslides** (see Figure 60 and Figure 61. Though Saint Elizabeth is also exposed to inland flood, coastal flood, and seismic activity, these hazards affect a smaller proportion of the Parish's population.

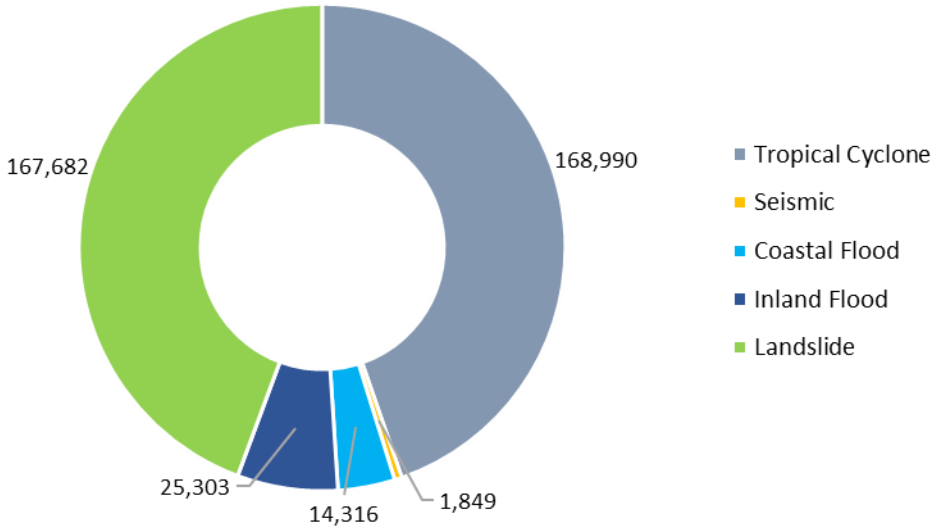


Figure 60. Raw population exposure by hazard type for Saint Elizabeth

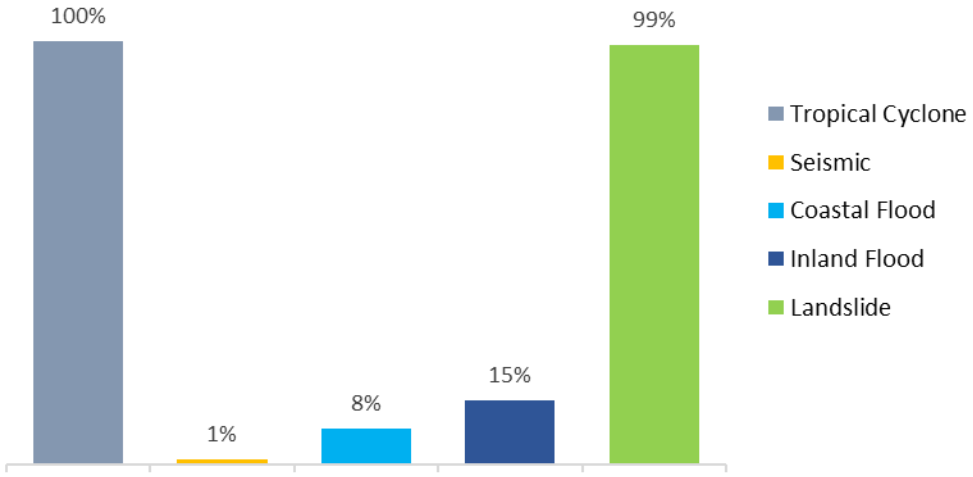


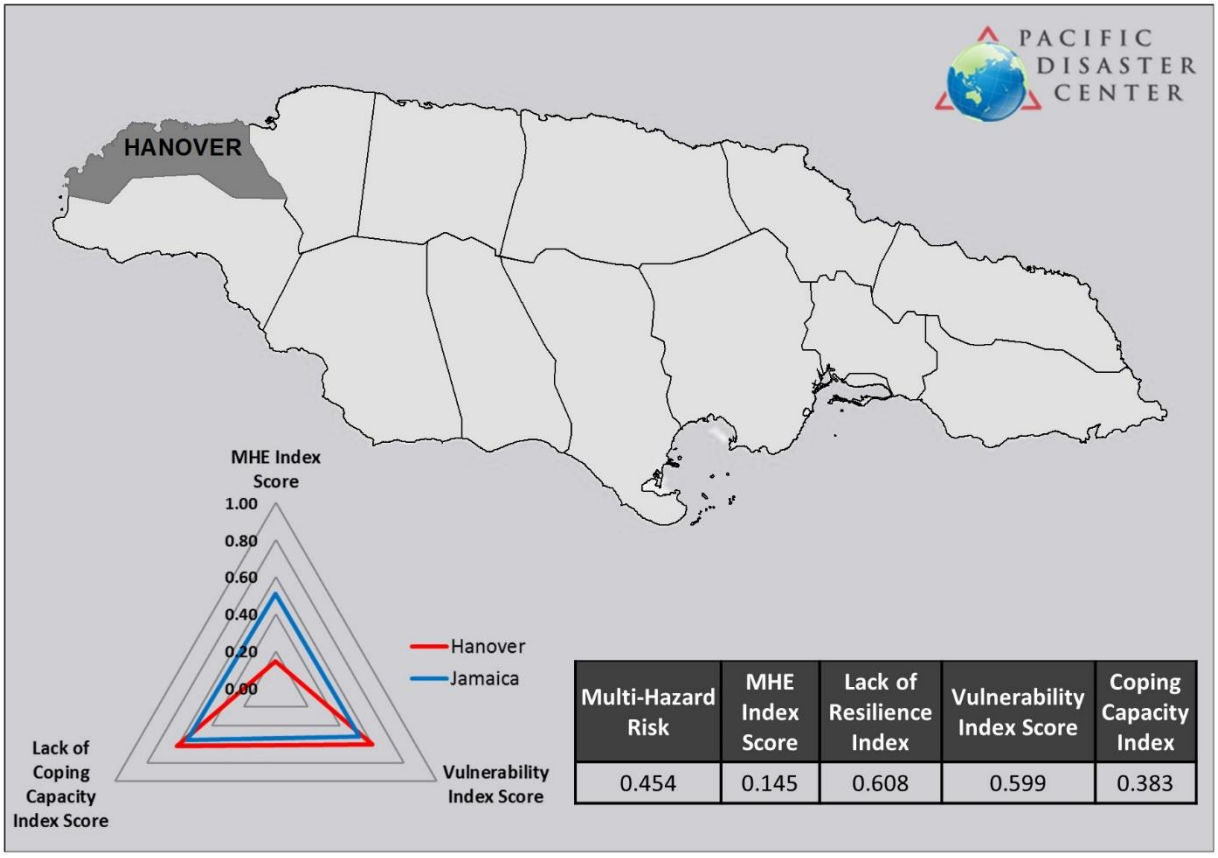
Figure 61. Percent population exposure to hazard type for Saint Elizabeth

Table 43. Multi-Hazard Exposure Index, Raw and Relative Exposure Index scores for Saint Elizabeth

Index	Saint Elizabeth	
	Score	**Rank**
Multi-Hazard Exposure	0.130	14
Subcomponents		
Raw Exposure	0.259	11
Relative Exposure	0.000	14

Hanover: Risk

Hanover ranks **11th** out of **14** on the Multi-Hazard Risk index with a score of **0.454**. Hanover has very low Multi-Hazard Exposure, moderate Vulnerability and low Coping Capacity (see Figure 62). The Parish ranks 13th in Multi-Hazard Exposure, 6th in Vulnerability, and 11th in Coping Capacity.



Multi-Hazard Risk	MHE Index Score	Lack of Resilience Index	Vulnerability Index Score	Coping Capacity Index
0.454	0.145	0.608	0.599	0.383

Figure 62. Risk scores for the parish of Hanover

Hanover: Lack of Resilience

Hanover ranks **5th** of **14** on the Lack of Resilience Index with a score of **0.608** (refer to Table 44). Hanover's score and ranking are due to moderate Vulnerability combined with low Coping Capacity. The Parish ranks 6th in Vulnerability and 11th in Coping Capacity.

The three thematic areas with the weakest relative scores for the Parish of Hanover are: **Governance**, **Environmental Capacity**, and **Economic Capacity.**

Table 44. Lack of Resilience Index and Component scores for Hanover

Index	Hanover	
	Score	**Rank**
Lack of Resilience	0.608	5
Components		
Vulnerability	0.599	6
Coping Capacity	0.383	11

Hanover: Coping Capacity

Hanover's Coping Capacity ranks **11th** out of **14** with a score of **0.383**. The thematic areas with the weakest relative scores are **Environmental Capacity** and **Governance** (refer to Figure 63 and Table 45). These two thematic areas appear to constrain Coping Capacity within this parish.

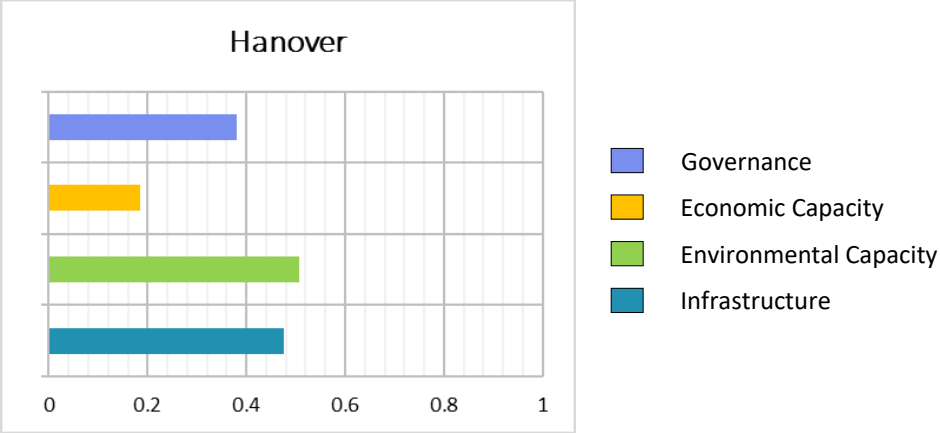


Figure 63. Coping Capacity subcomponents for Hanover

Table 45. Coping Capacity Index, subcomponent and sub-index scores for Hanover

Index	Hanover	
	Score	Rank
Coping Capacity	0.383	11
Subcomponents		
Governance	0.382	11
Economic Capacity	0.184	11
Environmental Capacity	0.507	6
Infrastructure	0.477	4
Infrastructure Sub-indices		
Health Care	0.526	4
Transportation	0.406	6
Communications	0.498	7

Hanover: Vulnerability

Hanover ranks **6th** out of **14** on the Vulnerability Index with a score of **0.599**. Vulnerability in Hanover is strongly influenced by **Environmental Stress, Vulnerable Health Status,** and **Clean Water Vulnerability** subcomponent scores. Refer to Table 46 and Figure 64.

Table 46. Vulnerability Index and subcomponent index scores for Hanover

Index	Hanover	
	Score	Rank
Vulnerability	0.599	6
Subcomponents		
Economic Constraints	0.537	8
Info Access Vulnerability	0.519	8
Vulnerable Health Status	0.673	2
Clean Water Vulnerability	0.774	5
Environmental Stress	0.708	2
Recent Disaster Impacts	0.480	7
Gender Inequality	0.503	9

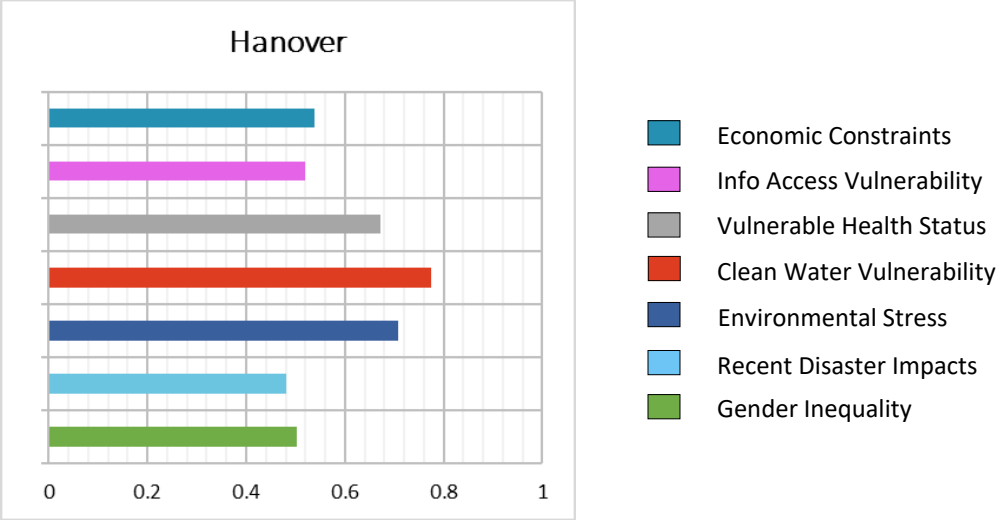


Figure 64. Vulnerability subcomponents for Hanover

Hanover: Multi-Hazard Exposure

Hanover ranks **13th** out of **14** on the Multi-Hazard Exposure index with a score of **0.145** (refer to Table 47). Despite this low rank, a significant proportion of the population is exposed to **tropical storms, landslides,** and **coastal and inland floods** (see Figure 65 and Figure 66).

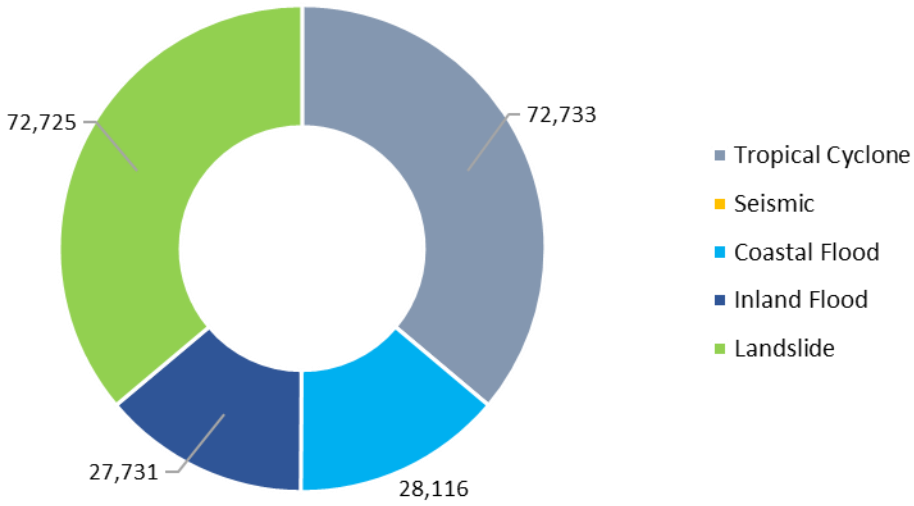


Figure 65. Raw population exposure by hazard type for Hanover

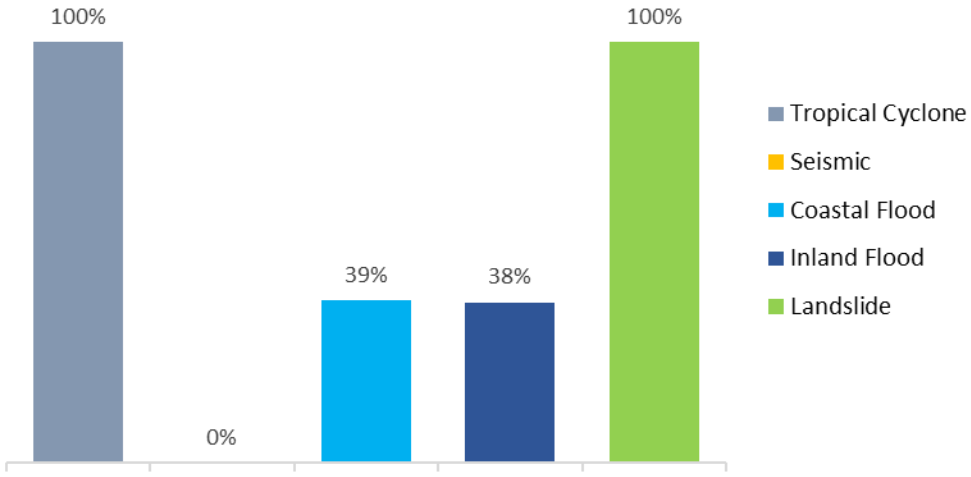


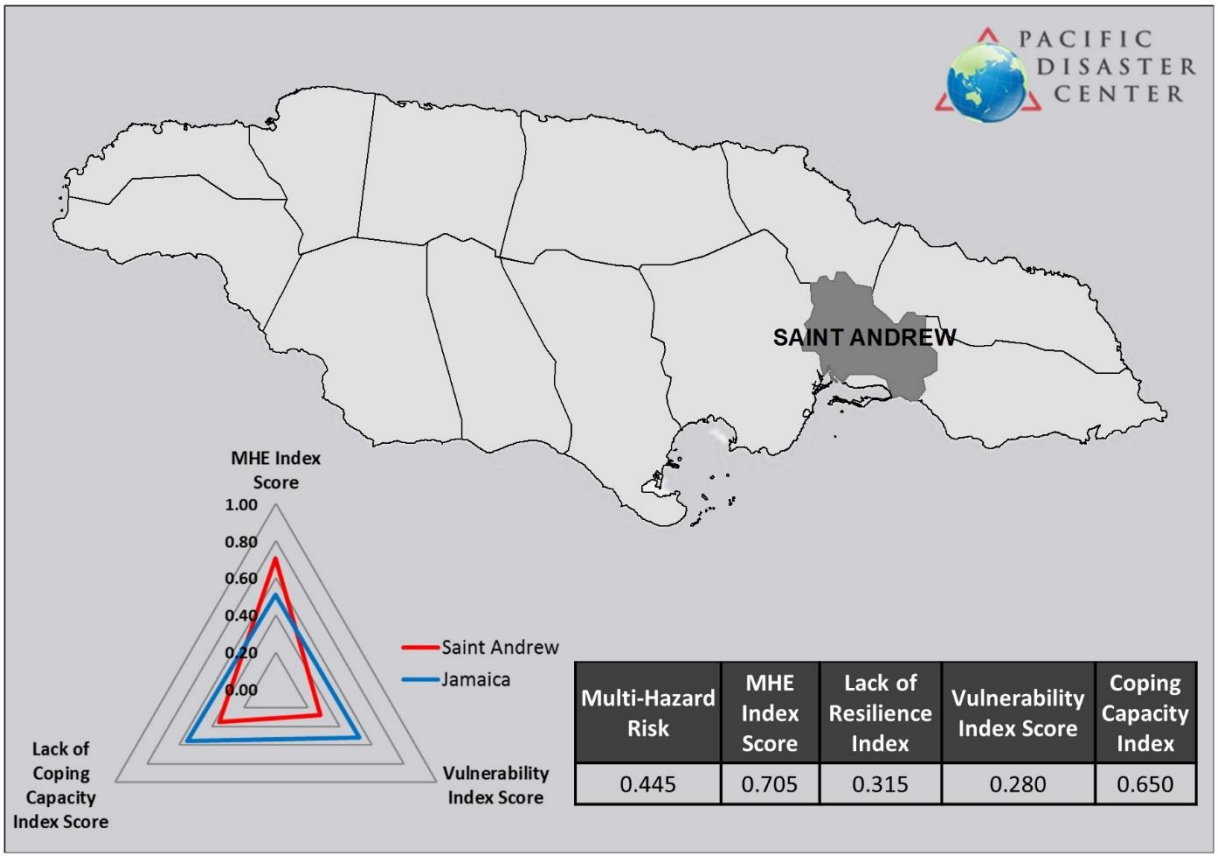
Figure 66. Percent population exposure to hazard type for Hanover

Table 47. Multi-Hazard Exposure Index, Raw and Relative Exposure Index scores for Hanover

Index	Hanover	
	Score	**Rank**
Multi-Hazard Exposure	0.145	13
Subcomponents		
Raw Exposure	0.000	14
Relative Exposure	0.290	12

Saint Andrew: Risk

Saint Andrew ranks **12th** out of **14** on the Multi-Hazard Risk index with a score of **0.445**. Though Saint Andrew has very high Multi-Hazard Exposure, this is combined with very low Vulnerability, and very high Coping Capacity for lower relative Risk (see Figure 67). The Parish ranks 3rd for Multi-Hazard Exposure, 13th in Vulnerability, and 1st in Coping Capacity.



Multi-Hazard Risk	MHE Index Score	Lack of Resilience Index	Vulnerability Index Score	Coping Capacity Index
0.445	0.705	0.315	0.280	0.650

Figure 67. Risk scores for the parish of Saint Andrew

Saint Andrew: Lack of Resilience

Saint Andrew ranks **14th** of **14** on the Lack of Resilience Index with a score of **0.315** (refer to Table 48). Saint Andrew's score and ranking are due to very low Vulnerability and very high Coping Capacity, indicating high resilience overall. The Parish ranks 13th in Vulnerability and 1st in Coping Capacity.

Saint Andrew exhibits relatively few thematic weaknesses in Vulnerability and Coping Capacity with three exceptions: **Environmental Capacity, Governance,** and **Recent Disaster Impacts**.

Table 48. Lack of Resilience Index and Component scores for Saint Andrew

Index	Saint Andrew	
	Score	**Rank**
Lack of Resilience	0.315	14
Components		
Vulnerability	0.280	13
Coping Capacity	0.650	1

Saint Andrew: Coping Capacity

Saint Andrew's Coping Capacity ranks **1st** out of **14** with a score of **0.650**. Consequently, Saint Andrew exhibits two areas of thematic weakness in Coping Capacity: **Environmental Capacity** and **Governance** (refer to Figure 68 and Table 49). These weaknesses may constrain Coping Capacity within this parish.

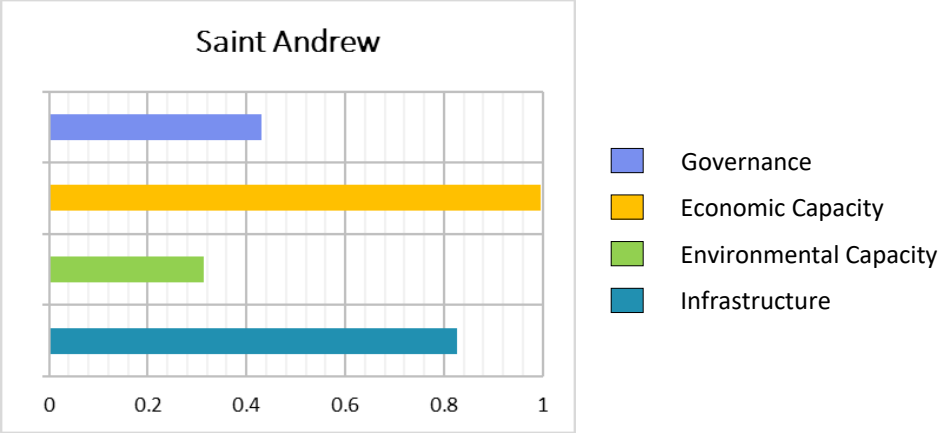


Figure 68. Coping Capacity subcomponents for Saint Andrew

Table 49. Coping Capacity Index, subcomponent and sub-index scores for Saint Andrew

Index	Saint Andrew	
	Score	Rank
Coping Capacity	0.650	1
Subcomponents		
Governance	0.431	9
Economic Capacity	0.995	1
Environmental Capacity	0.312	10
Infrastructure	0.826	1
Infrastructure Sub-indices		
Health Care	0.601	3
Transportation	1.000	1
Communications	0.877	1

Saint Andrew: Vulnerability

Saint Andrew ranks **13th** out of **14** on the Vulnerability Index with a score of **0.280**. Though Vulnerability in Saint Andrew is very low, the Index is influenced by the **Recent Disaster Impacts** subcomponent score (see Table 50 and Figure 69).

Table 50. Vulnerability Index and subcomponent index scores for Saint Andrew

Index	Saint Andrew	
	Score	Rank
Vulnerability	0.280	13
Subcomponents		
Economic Constraints	0.340	12
Info Access Vulnerability	0.079	14
Vulnerable Health Status	0.446	8
Clean Water Vulnerability	0.052	13
Environmental Stress	0.320	12
Recent Disaster Impacts	0.507	6
Gender Inequality	0.213	13

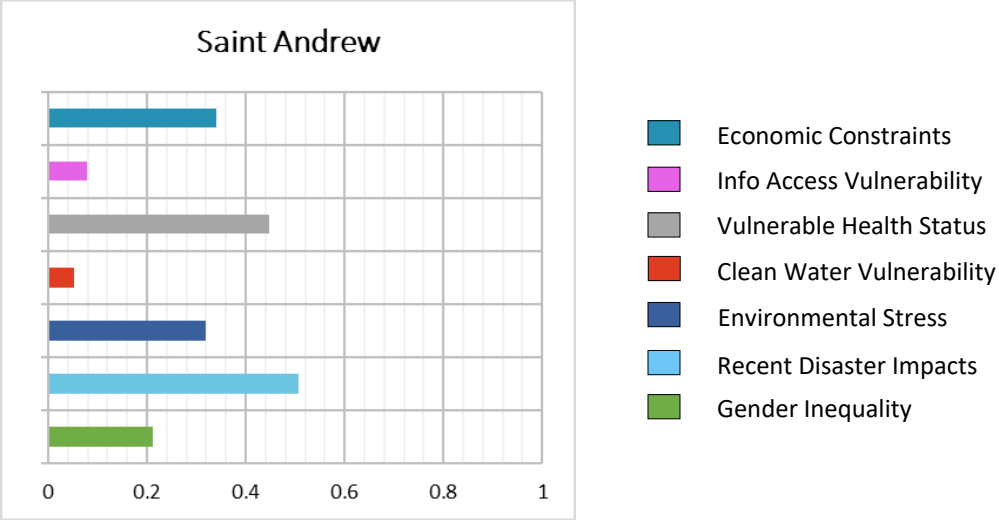


Figure 69. Vulnerability subcomponents for Saint Andrew

Saint Andrew: Multi-Hazard Exposure

Saint Andrew ranks **3rd** out of **14** on the Multi-Hazard Exposure index with a score of **0.705** (refer to Table 51). With a high population density, the Parish has a very large population exposed to multiple hazards including **tropical cyclones**, **seismic activity**, and **landslides** (refer to Figure 70 and Figure 71). Smaller proportions of Saint Andrew's population are also exposed to coastal and inland flood.

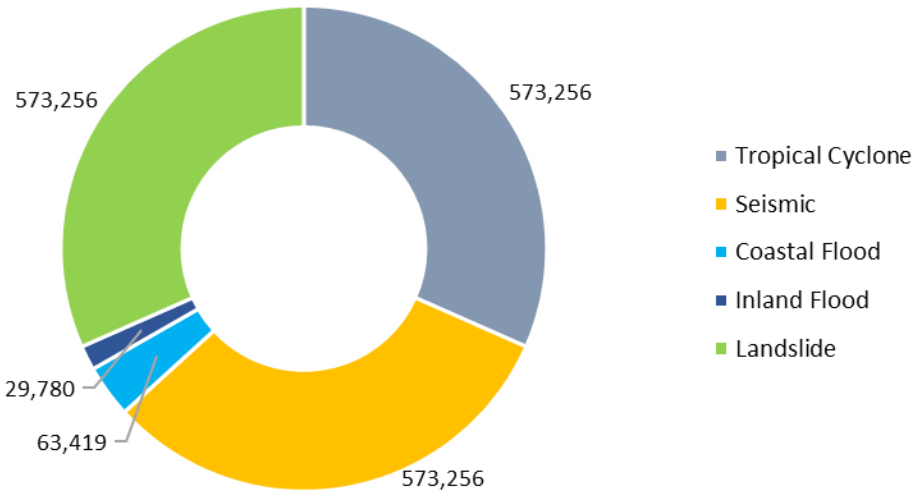


Figure 70. Raw population exposure by hazard type for Saint Andrew

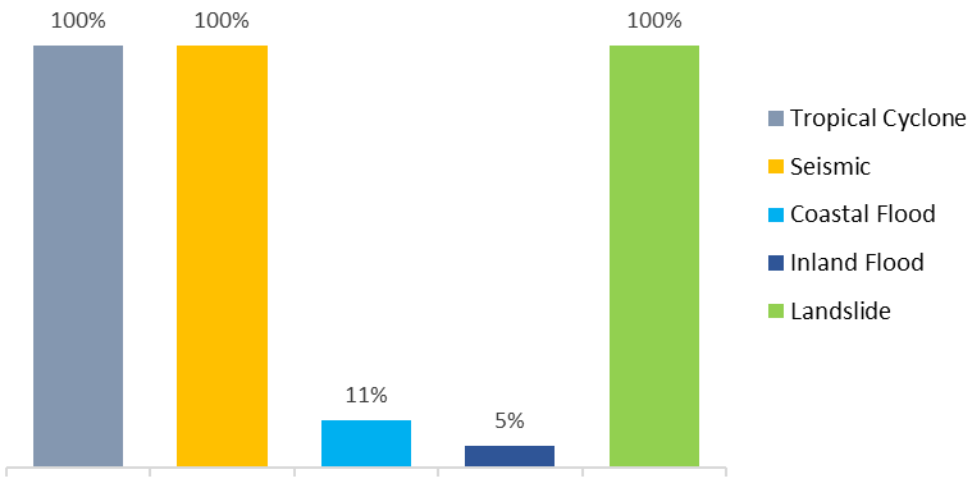


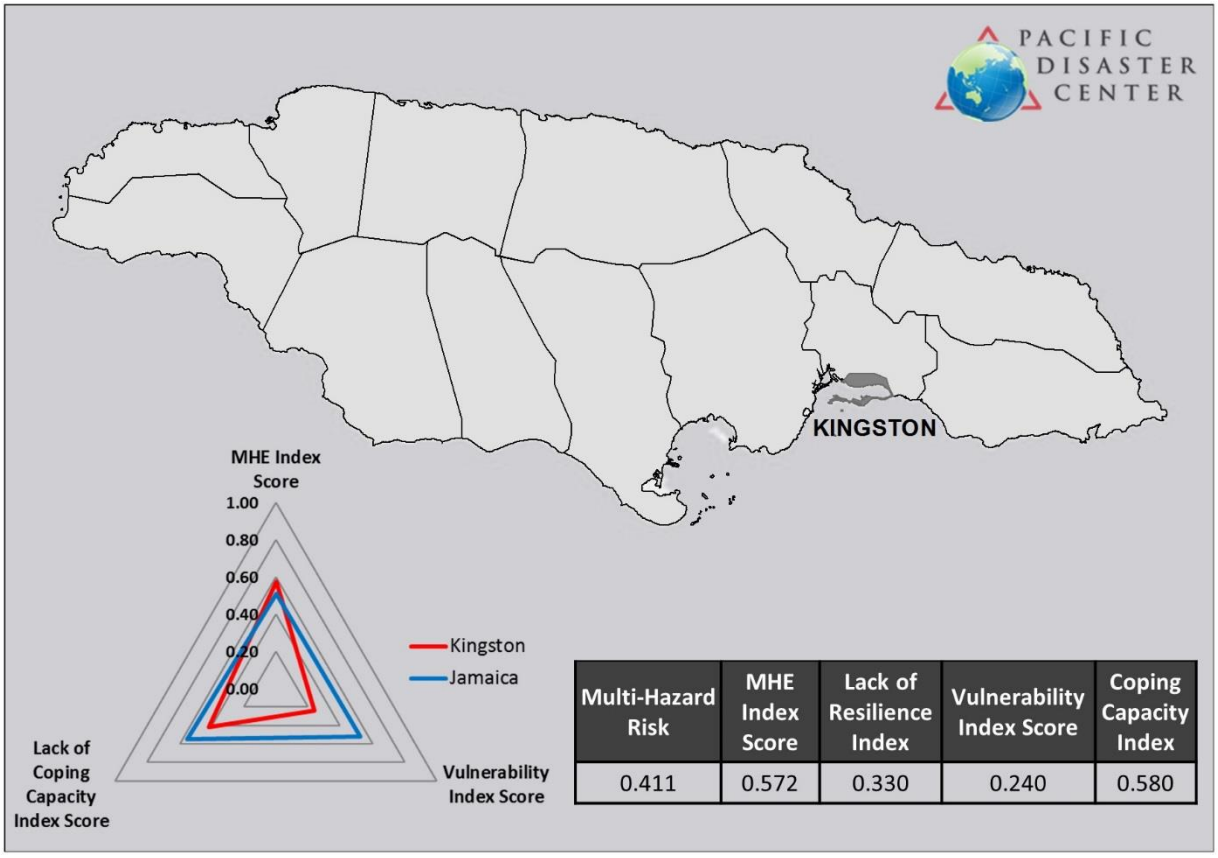
Figure 71. Percent population exposure to hazard type for Saint Andrew

Table 51. Multi-Hazard Exposure Index, Raw and Relative Exposure Index scores for Saint Andrew

Index	Saint Andrew	
	Score	**Rank**
Multi-Hazard Exposure	0.705	3
Subcomponents		
Raw Exposure	0.903	2
Relative Exposure	0.506	10

Kingston: Risk

Kingston ranks **13th** out of **14** on the Multi-Hazard Risk index with a score of **0.411**. Kingston has moderate Multi-Hazard Exposure, very low Vulnerability and very high Coping Capacity (see Figure 72). The Parish ranks 6th in Multi-Hazard Exposure, 14th in Vulnerability, and 2nd in Coping Capacity.



Multi-Hazard Risk	MHE Index Score	Lack of Resilience Index	Vulnerability Index Score	Coping Capacity Index
0.411	0.572	0.330	0.240	0.580

Figure 72. Risk scores for the parish of Kingston

Kingston: Lack of Resilience

Kingston ranks **13th** of **14** on the Lack of Resilience Index with a score of **0.330** (refer to Table 52). Kingston's score and ranking are due to very low Vulnerability and very high Coping Capacity, indicating high resilience overall. The Parish ranks 14th in Vulnerability and 2nd in Coping Capacity.

Kingston exhibits relatively few thematic weaknesses in Vulnerability and Coping Capacity with three notable exceptions: **Economic Capacity, Governance** and **Economic Constraints**.

Table 52. Lack of Resilience Index and Component scores for Kingston

Index	Kingston	
	Score	**Rank**
Lack of Resilience	0.330	13
Components		
Vulnerability	0.240	14
Coping Capacity	0.580	2

Kingston: Coping Capacity

Kingston's Coping Capacity ranks **2nd** out of **14** with a score of **0.580**. The thematic areas with the weakest relative scores are **Economic Capacity** and **Governance** (see Figure 73 and Table 53). These two thematic areas appear to constrain Coping Capacity within this parish.

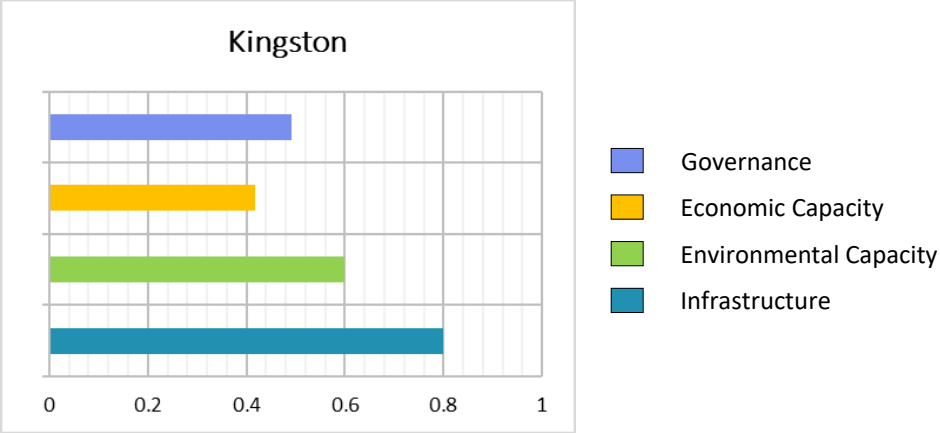


Figure 73. Coping Capacity subcomponents for Kingston

Table 53. Coping Capacity Index, subcomponent and sub-index scores for Kingston

Index	Kingston	
	Score	Rank
Coping Capacity	0.580	2
Subcomponents		
Governance	0.492	6
Economic Capacity	0.419	6
Environmental Capacity	0.599	4
Infrastructure	0.799	2
Infrastructure Sub-indices		
Health Care	0.722	1
Transportation	1.000	1
Communications	0.676	3

Kingston: Vulnerability

Kingston ranks **14th** out of **14** on the Vulnerability Index with a score of **0.240**. Despite having the lowest overall vulnerability in the country, Kingston is influenced by a high subcomponent score in the thematic area of **Economic Constraints**. Refer to Table 54 and Figure 74.

Table 54. Vulnerability Index and subcomponent index scores for Kingston

Index	Kingston	
	Score	Rank
Vulnerability	0.240	14
Subcomponents		
Economic Constraints	0.587	5
Info Access Vulnerability	0.465	9
Vulnerable Health Status	0.348	13
Clean Water Vulnerability	0.000	14
Environmental Stress	0.246	14
Recent Disaster Impacts	0.000	14
Gender Inequality	0.036	14

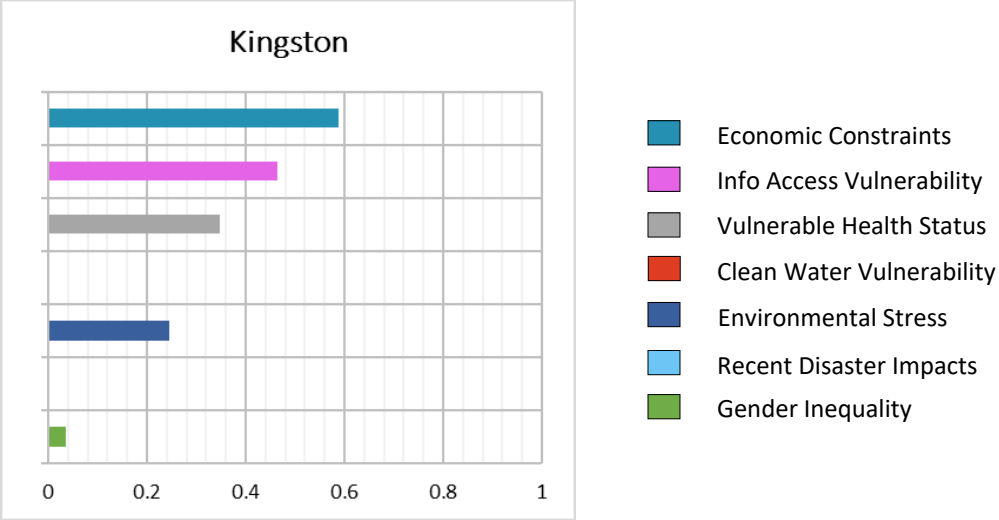


Figure 74. Vulnerability subcomponents for Kingston

Kingston: Multi-Hazard Exposure

Kingston ranks **6th** out of **14** on the Multi-Hazard Exposure index with a score of **0.572** (refer to Table 55). A large proportion of Kingston's population is exposed to **tropical cyclones**, **seismic activity,** and **coastal flood** (see Figure 75 and Figure 76). A smaller proportion of Kingston's population is also exposed to inland flood.

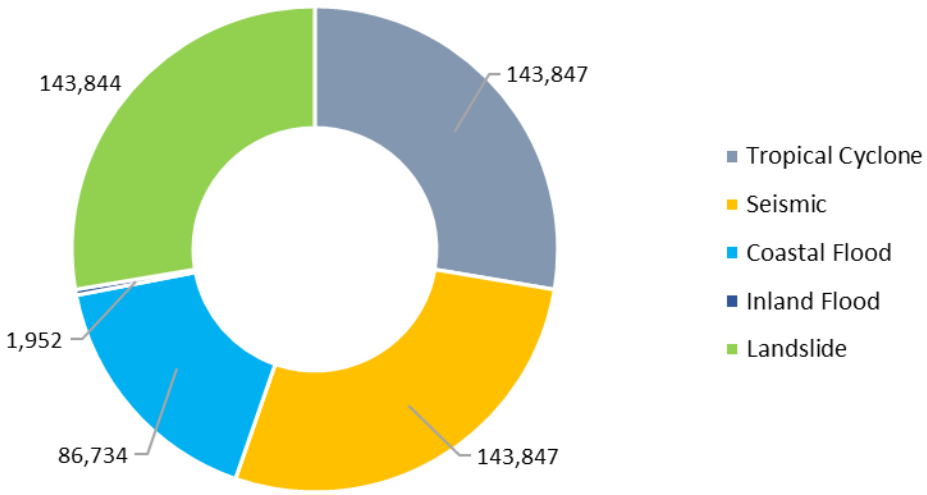


Figure 75. Raw population exposure by hazard type for Kingston

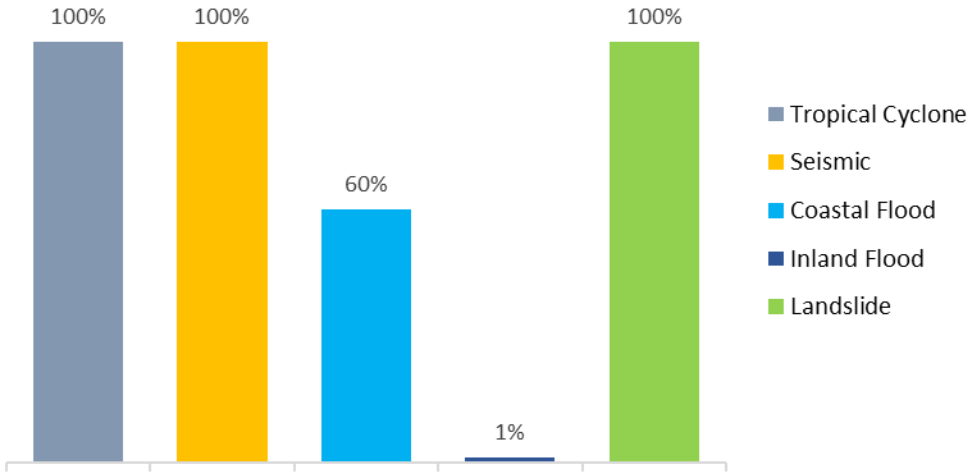


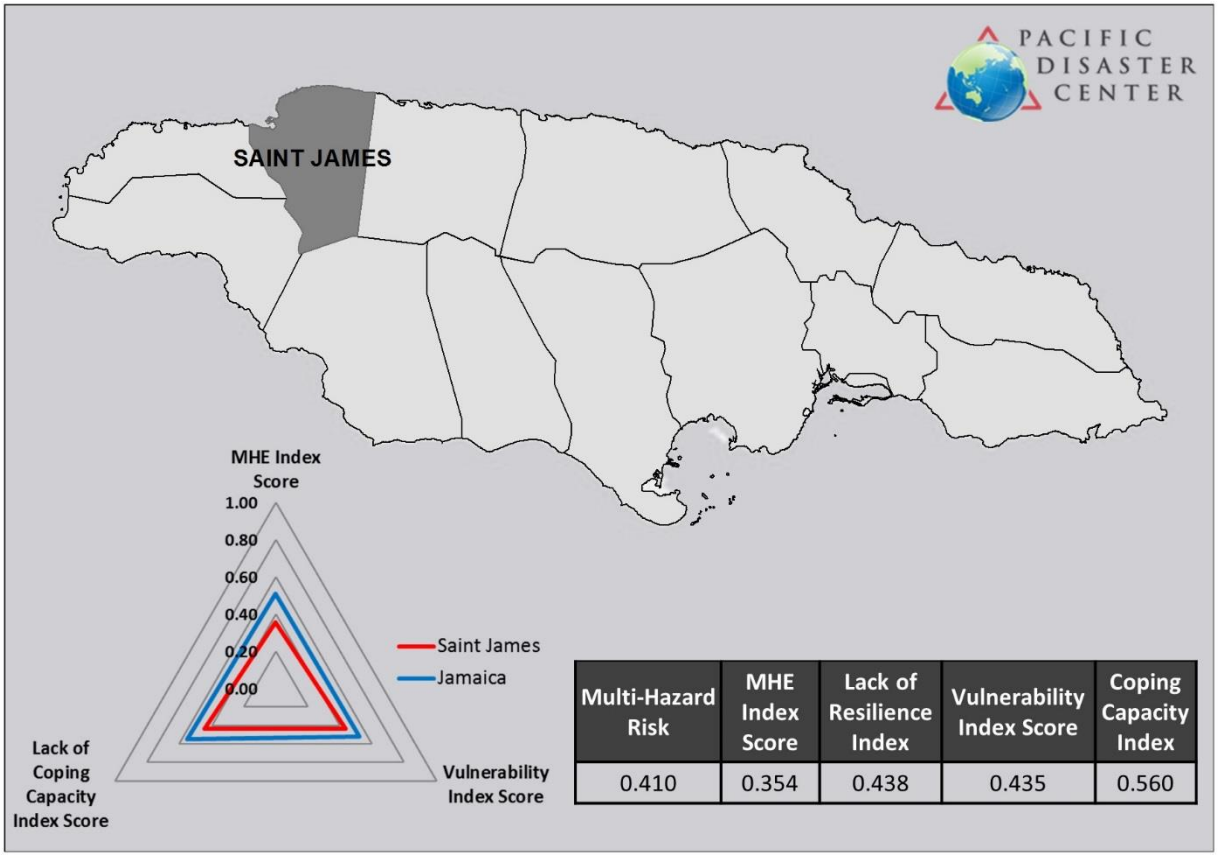
Figure 76. Percent population exposure to hazard type for Kingston

Table 55. Multi-Hazard Exposure Index, Raw and Relative Exposure Index scores for Kingston

Index	Kingston	
	Score	**Rank**
Multi-Hazard Exposure	0.572	6
Subcomponents		
Raw Exposure	0.390	7
Relative Exposure	0.755	6

Saint James: Risk

Saint James ranks **14th** out of **14** on the Multi-Hazard Risk index with a score of **0.410**. Saint James has low Multi-Hazard Exposure, low Vulnerability, and high Coping Capacity (see Figure 77). The Parish ranks 11th in Multi-Hazard Exposure, 11th in Vulnerability, and 3rd in Coping Capacity.



Multi-Hazard Risk	MHE Index Score	Lack of Resilience Index	Vulnerability Index Score	Coping Capacity Index
0.410	0.354	0.438	0.435	0.560

Figure 77. Risk scores for the parish of Saint James

Saint James: Lack of Resilience

Saint James ranks **12th** of **14** on the Lack of Resilience Index with a score of **0.438** (refer to Table 56). Saint James's score and ranking are due to low Vulnerability combined with high Coping Capacity, indicating higher overall resilience. Saint James Parish ranks 11th in Vulnerability and 3rd in Coping Capacity.

The three thematic areas with the weakest relative scores for the Parish of Saint James are: **Environmental Capacity**, **Health Care Capacity** and **Environmental Stress.**

Table 56. Lack of Resilience Index and Component scores for Saint James

Index	Saint James	
	Score	**Rank**
Lack of Resilience	0.438	12
Components		
Vulnerability	0.435	11
Coping Capacity	0.560	3

Saint James: Coping Capacity

Saint James's Coping Capacity ranks **3rd** out of **14** with a score of **0.560**. The thematic areas with the weakest relative scores are **Environmental Capacity** and **Health Care Capacity** (refer to Figure 78 and Table 57). These two thematic areas appear to constrain Coping Capacity within this parish.

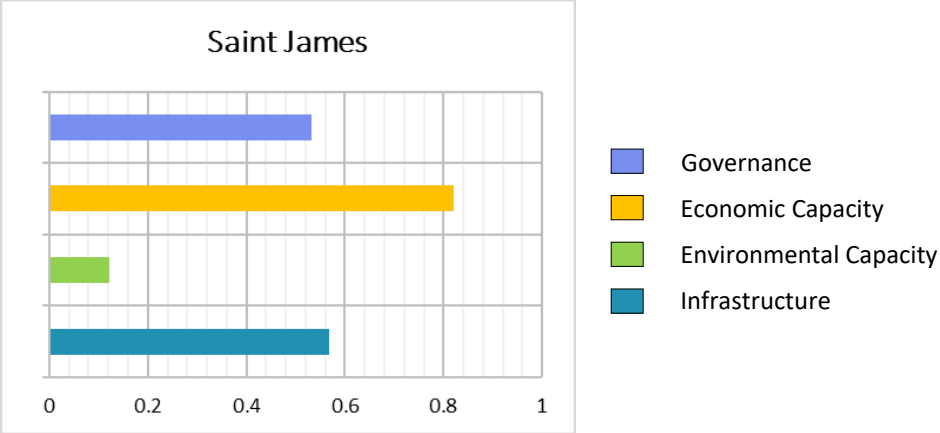


Figure 78. Coping Capacity subcomponents for Saint James

Table 57. Coping Capacity Index, subcomponent and sub-index scores for Saint James

Index	Saint James	
	Score	Rank
Coping Capacity	0.560	3
Subcomponents		
Governance	0.532	5
Economic Capacity	0.820	2
Environmental Capacity	0.122	12
Infrastructure	0.568	3
Infrastructure Sub-indices		
Health Care	0.376	10
Transportation	0.618	3
Communications	0.710	2

Saint James: Vulnerability

Saint James ranks **11th** out of **14** on the Vulnerability Index with a score of **0.435**. Though Vulnerability in Saint James is relatively low, the Index is influenced by subcomponent scores in the areas of **Environmental Stress** and **Vulnerable Health Status**. Refer to Figure 79 and Table 58.

Table 58. Vulnerability Index and subcomponent index scores for Saint James

Index	Saint James	
	Score	Rank
Vulnerability	0.435	11
Subcomponents		
Economic Constraints	0.335	13
Info Access Vulnerability	0.327	12
Vulnerable Health Status	0.556	6
Clean Water Vulnerability	0.400	11
Environmental Stress	0.603	3
Recent Disaster Impacts	0.326	11
Gender Inequality	0.500	10

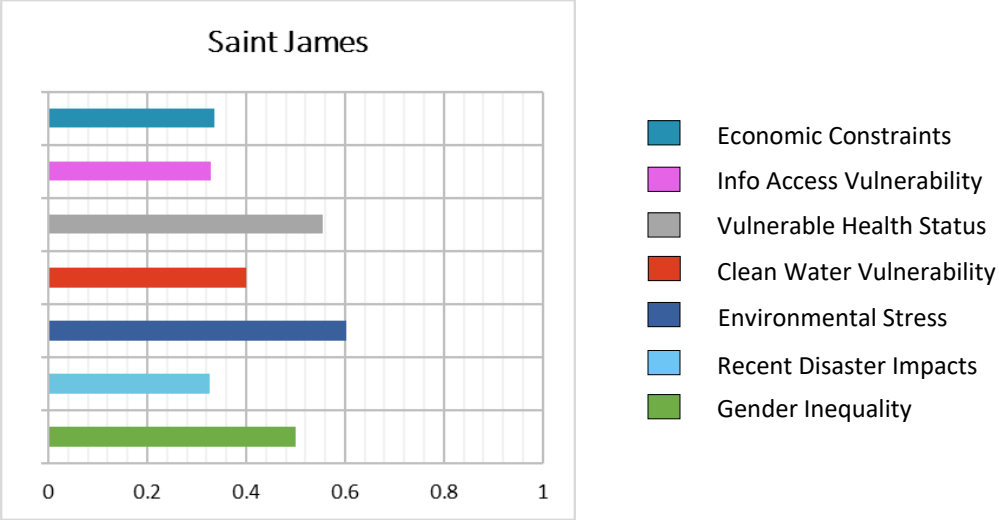


Figure 79: Vulnerability subcomponents for Saint James

Saint James: Multi-Hazard Exposure

Saint James ranks **11th** out of **14** on the Multi-Hazard Exposure index with a score of **0.354** (refer to Table 59). Despite this low rank, a significant proportion of the population is exposed to **tropical cyclones, landslides, coastal flood, and inland flood** (see Figure 80 and Figure 81). While Saint James is also exposed to seismic activity, this hazard threatens a smaller proportion of the population.

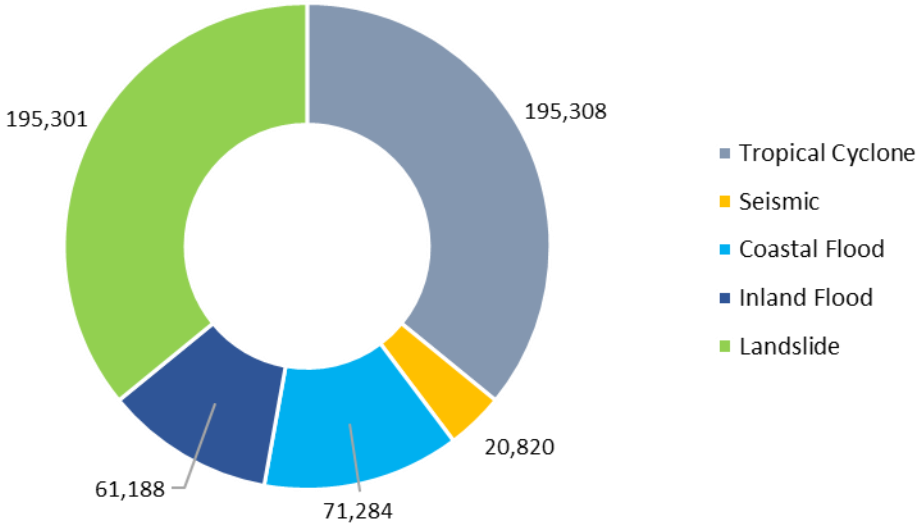


Figure 80. Raw population exposure by hazard type for Saint James

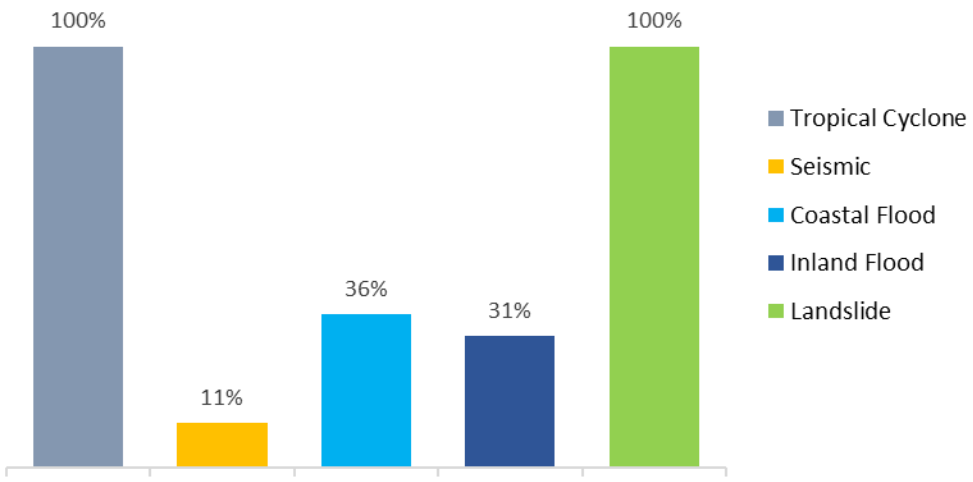


Figure 81. Percent population exposure to hazard type for Saint James

Table 59. Multi-Hazard Exposure Index, Raw and Relative Exposure Index scores for Saint James

Index	Saint James	
	Score	**Rank**
Multi-Hazard Exposure	0.354	11
Subcomponents		
Raw Exposure	0.408	6
Relative Exposure	0.300	11

RVA Recommendations

The following recommendations are a product of the Jamaica Risk and Vulnerability Assessment, both as a process and a result. These overarching recommendations are designed to acknowledge the complex drivers of risk that are prevalent throughout the country. As presented above, the specific drivers of risk can vary widely across parishes. Consequently, to focus interventions that reduce vulnerability and increase coping capacity at the parish level, decision-makers must carefully examine these drivers for each parish. Using this analysis, Figure 82 illustrates a sample 5-Year Implementation Plan for all nine RVA recommendations.

Programmatic Recommendations to Support Risk and Vulnerability Assessments

1. Implement strategies to strengthen data sharing between all organizations active in disaster management to support evidence-based decision making.
2. Develop and adopt data standards to ensure that hazards and vulnerability data are consistently defined, documented, updated, and applied.
    a. Implement plans to improve and update documentation of subnational health care resources (ex. Physicians and nurses per 10,000 persons) to provide a more comprehensive understanding of health care capacity at the Parish and local levels.
3. Strengthen strategic multi-stakeholder partnerships to expand disaster risk reduction resources to include non-traditional disaster management partners.

Strategies to Reduce Vulnerability and Increase Coping Capacity at the Parish Level

The recommendations listed below represent a summary of the subnational RVA assessment for Jamaica. To identify or prioritize specific DRR investments for each parish, refer to the detailed 5-page summaries provided above. By examining the specific drivers that increase risk in each parish, focused interventions can be tailored to reduce vulnerability, increase coping capacity, and acknowledge exposure at the subnational level. Clarendon Parish is one example where investment in public water and sewer infrastructure would reduce overall Risk by decreasing Clean Water Vulnerability (see Figure 83).

Based on RVA results, it is recommended that Jamaica:

1. Increase investment in public water and sewer infrastructure to reduce clean water vulnerability by promoting equitable access to flush toilets and safe, clean drinking water.
2. Foster economic development and small business growth to create jobs, raise local incomes, and stimulate local GDP, thereby reducing economic constraints and building capacity to prepare for, respond to, and recover from disasters.
3. Support efforts to promote gender equality including equal enrollment in higher education, labor participation, wages and access to credit, and political rights and representation.
4. Support comprehensive efforts to reduce information access vulnerability by acknowledging challenges in telecommunications (ex. radio, television, internet) by distributing disaster information across multiple platforms and increasing investment to ensure that vulnerable communities receive critical disaster information.
5. Develop mutual-aid agreements to support the sharing of vital disaster management resources to increase coping capacity in less-equipped Parishes.

a. For example, Saint Ann Parish (very low coping capacity) could benefit from a formal mutual aid agreement with Saint Catherine (high coping capacity), a neighboring parish.

6. Institutionalize multi-hazard planning at the parish and local levels, engaging the public in the process. This will reduce risk by both acknowledging hazard exposure and increasing coping capacity by improving governance in the context of disaster management.

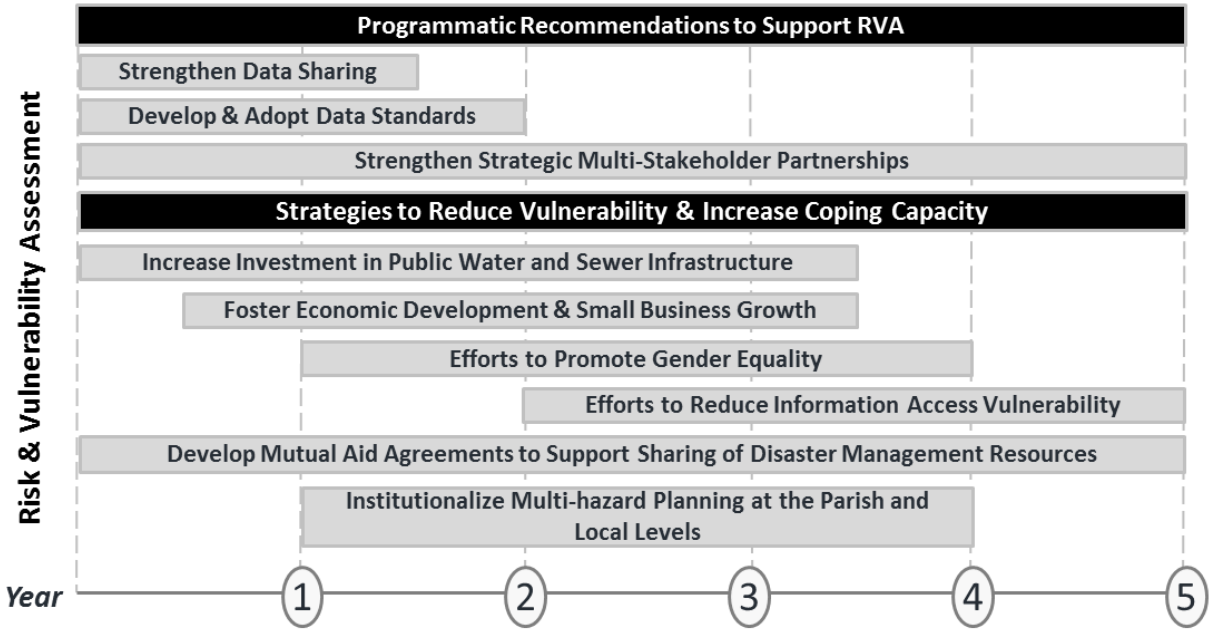


Figure 82. Sample 5-year Implementation Plan for RVA Recommendations

As illustrated in Figure 83 below, Multi-Hazard Risk in Clarendon Parish is driven primarily by Multi-Hazard Exposure (Tropical Cyclones, Seismic hazards, Landslides, and Inland flood), and Vulnerability (Clean Water Vulnerability, Environmental Stress, Information Access Vulnerability, Economic Constraints, and Vulnerable Health Status). Based on these RVA results, investment in public water and sewer infrastructure would reduce overall Risk by decreasing Clean Water Vulnerability.

Risk Profile for the Parish of Clarendon

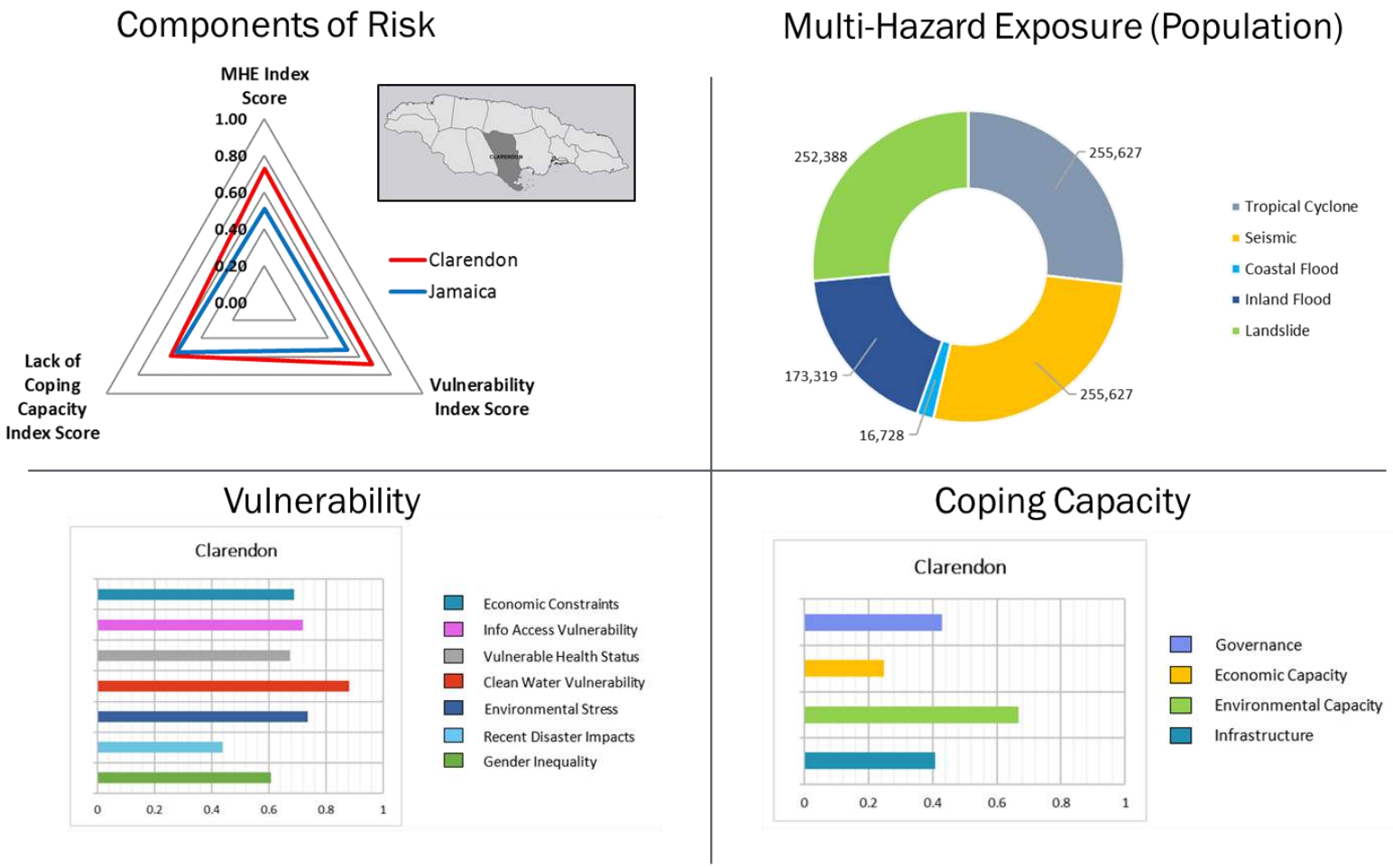


Figure 83. Multi-Hazard Risk profile for Clarendon Parish

Comprehensive Disaster Management (CDM) Findings

JAMAICA

NATIONAL DISASTER PREPAREDNESS BASELINE ASSESSMENT

PACIFIC DISASTER CENTER

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Findings: Comprehensive Disaster Management (CDM)

The CDM findings presented in this section provide a summary of the CDM analysis, followed by a discussion of each CDM theme to include identified challenges and recommendations. Detailed recommendations for each CDM theme, along with a five-year implementation plan, have been designed to strengthen CDM in Jamaica.

The CDM helps to:

1. Provide a contextual overview of Jamaica's disaster management capabilities;
2. Identify the strengths and challenges of Jamaica's disaster management system; and
3. Provide context to the RVA results previously discussed by highlighting the larger DRR framework in Jamaica.

Data gathering for the CDM assessment took place through detailed stakeholder interviews, surveys conducted during facilitated Knowledge Exchanges, site visits to critical facilities, and reviews of over 200 official documents. Detailed survey results are included for reference in **Appendices C, D** and **E**. Interviews were conducted with twenty-two disaster management partners from ten stakeholder organizations. The project team conducted ten site visits that included parish council chambers, parish-based disaster inventory storage areas, government and NGO partners, and ODPEM disaster storage warehouses. Data were analyzed using a mixed-methods approach, with quantitative and qualitative information integrated into the overall findings and recommendations. This approach allowed for a more complete assessment of policy, critical inventory and facilities, and perceptions of disaster management in Jamaica.

Summary

Key Strengths

Jamaica has a strong national disaster management system with trained and knowledgeable leadership. ODPEM personnel and Parish Disaster Coordinators clearly illustrated proficiency in disaster management duties and responsibilities throughout the NDPBA process.

ODPEM leadership is aware of, and transparent in acknowledging, existing shortfalls in the national disaster management system, many of which are addressed in the recently-enacted Disaster Risk Management Act, gazetted in 2015 and in ODPEM's Operational Plan 2016-2017. Jamaica has a comprehensive and concise national disaster management law with clearly designated authorities, and is proactively distributing and socializing the new legislation. To test the preparedness of national disaster response plans and operations, ODPEM has conducted national simulation exercises regularly since 2010. Though national resources designated for disaster management are limited, ODPEM applies Operational Plan 2016-2017 to focus their limited resources in critical areas. Finally, national and parish-level disaster managers collaborate closely with international organizations and NGOs, and the system for requesting international aid is clearly understood by NGOs and ODPEM.

Key Challenges

This assessment also identifies key challenges in Jamaica's disaster management system, which may impede the effectiveness of disaster management activities. A lack of a sole-purpose National Emergency Operations Center (NEOC) presents challenges for effective response to quick-onset events.

Interviewees also frequently cited the lack of a nation-wide emergency communications system as a major barrier to effective service delivery. Consequently, many disaster practitioners must rely on mobile telephone connections, which are susceptible to system failure during disaster events.

The lack of a robust disaster management structure at the parish and local levels reduces the capacity for subnational coordination. Disaster management in Jamaica is currently a top-driven system, with the majority of resources and personnel at the national level. In thirteen of fourteen parishes, the Parish Disaster Coordinator is the only person dedicated to disaster management, and there is no paid disaster management workforce below the parish level. Though all parishes have designated EOCs, they are all dual-use facilities and are generally only activated when instructed by ODPEM. This lack of capacity at the subnational level hinders ODPEM's stated goal of pushing tactical disaster response operations to the parish level and below. These challenges, and others discussed below, significantly reduce disaster response capacity and hinder attempts to increase the comprehensive disaster management capability of Jamaica.

The following is an overview of CDM findings by theme. Key challenges, and their implications for the overall effectiveness of Jamaica's disaster management system are outlined in detail. Individual recommendations are provided for each identified gap.

Good Leadership by Professionally Trained Officials

The basis of successful disaster management centers upon the importance of well-trained professionals. A community or country that has established professionalization of the disaster management field through standardized training and education programs is ensuring a foundation of understanding and leadership among disaster management personnel at all levels.

Formalized training and exercise programs increase the professionalization of the disaster management field by establishing well-trained disaster management personnel at all levels. Training and exercises also offer opportunities to build leadership capacity in the disaster management field. Less than half (42%) of survey participants felt their organizations exhibit strong disaster management leadership. Just over a third (39%) perceived their organizations as having effective disaster management programs.

In Jamaica, there are minimal training requirements for disaster management personnel across all levels. The absence of a well-trained cadre of disaster management professionals can be an indicator of an undeveloped or under-developed program, leading to limitations in effectiveness. With support from NGO partners, ODPEM conducts training on an "as-needed" basis at the national and parish levels. Training curricula include courses in a variety of disaster management activities, and only half (49%) of survey participants responded that their organizations' training programs have helped build capacity among disaster management staff. All EOC staff members participate in a national EOC training program.

The only regularly scheduled training is the national EOC training program, which occurs annually. Survey respondents felt that more frequent training opportunities, particularly at the community level, would make disaster response more effective.

In Jamaica, there are no national guidelines for exercise frequency. As such, there have been just three national-level disaster exercises since 2010. Exercises occur more frequently at the subnational level, with Parish Disaster Coordinators conducting disaster drills annually. Forty-two percent (42%) of survey respondents indicated that their organizations disaster plans are tested, drilled, or exercised regularly. One concern expressed through interviews with ODPEM training staff is the lack of standardized tracking or reporting of subnational exercises.

Training Programs

Formalized training programs designed to build the capacity of staff encourages the professionalization of the disaster management field by increasing the availability of qualified staff. Interviews and documents provided by ODPEM training personnel show that, in coordination with NGO partners including the Jamaica Red Cross, the Adventist Development and Relief Agency (ADRA), and HelpAge International, ODPEM conducts trainings on an "as-needed" basis at both the national and parish levels. Training curricula include courses in damage assessment, shelter management, emergency operation center training, and emergency telecommunications. Forty-eight percent (48%) of survey respondents indicated that their organizations have training programs to help build capacity among disaster management staff and 46% stated that training was required.

While ODPEM's Operational Plan 2016-2017 outlines recommended courses for disaster management personnel, the curriculum is in development, and there are no explicit minimum training requirements for disaster management personnel at the national or subnational levels. One exception exists for EOC staff, all of whom receive training on EOC operations. At the parish level, Disaster Coordinators conduct training courses, including, EOC training, shelter management, and damage assessment, and report results to ODPEM. There is no centralized repository for tracking training achievements, preventing the validation of credentials to ensure adequately trained staff.

Training Frequency

Frequent training offerings allow disaster management personnel to advance skills and qualifications, and increase their overall capacity in the field. In Jamaica, training curricula are in development, and training is primarily offered on an "as-needed" basis. The previously-noted exception is national EOC training, which is held annually.

Ninety-three percent (93%) of survey respondents indicated they had been afforded the opportunity to attend disaster management training felt that disaster management training improved their ability to effectively perform job requirements. Respondents frequently cited professional training as an effective disaster preparedness activity, noting that training increased their knowledge of and capacity for comprehensive disaster management. In addition, respondents consistently mentioned training as a way to increase the effectiveness of disaster response. Despite the availability of training courses, 39% of respondents indicated that they had experienced some barrier to attending training, suggesting that courses are not equally accessible to all disaster management practitioners across Jamaica.

Exercise Frequency

Interviews showed that ODPEM has conducted three national-level simulation exercises since 2010. A national exercise program is addressed in ODPEM's Operational Plan 2016-2017, but national guidelines for exercise frequency or specific requirements for participation at the parish or local level do not exist. ODPEM receives funding to conduct national exercises by gaining cabinet approval for the National

Simulation Training Exercise Program (NSTEP). While annual drills are conducted at the parish level, no standard tracking or reporting of subnational exercises exists.

Challenges Identified

1. Jamaica has not established minimum training requirements for disaster management personnel at the national and parish levels, which may result in potential knowledge gaps, and impact the availability of qualified staff.
2. A centralized repository for tracking training achievements does not exist, preventing the validation of credentials to ensure adequately trained staff.
3. No national exercise program with participation requirements for organizations and agencies at all levels is in place, which would minimize capacity gaps, particularly at the subnational level.

Recommendations

1. Finalize training curricula and establish minimum training requirements for all government employees with roles in disaster management to increase capacity and skills.
2. Establish a centralized repository that documents disaster management training achievements and institutionalize national guidelines for the credentialing of trained professionals to promote the professionalization of the disaster management field.
3. Establish and resource a national exercise program that includes participation requirements for governmental organizations at all levels.

Foundation of Supportive Values for Government Action

More than good leadership by well-trained professionals is required for effective and efficient disaster management. A foundation of supportive values for government action is an essential component, which enables concepts to be developed into policies and provides government leaders the backing to spend money to obtain necessary resources. This is critical for communities and countries with a limited economic base. Disaster preparedness is only one of many issues a government may face. Government support must be encouraged to ensure that the proper importance is placed on disaster management mitigation and preparedness in an effort to build disaster resilient communities with a focus on saving lives and reducing disaster losses.

Disaster management capacity in Jamaica is hindered by budgetary constraints and limited disaster reserve funds. Stakeholders repeatedly conveyed that the existing budget did not provide adequate funds to cover the cost of the most recent disaster response. ODPEM's operational budget in 2015 was J$353 million (approximately US$2.7 million). Only one survey respondent felt that the national disaster budget was sufficient to meet disaster management requirements in Jamaica. An insufficient annual budget for disaster management may indicate a lack of support for government action in Jamaica.

The Government of Jamaica (GOJ) appropriates J$50 million annually for the National Disaster Fund, to support response and recovery operations following a national disaster declaration. Even with annual contributions and the flexibility to roll-over unused funds year to year, Jamaica's national disaster fund is largely unable to cover costs associated with average annual disaster damages, nor is it adequate for responding to a major disaster.

Annual Budget

ODPEM's operational budget for 2015 was J$353M (approximately $2.7M USD). ODPEM currently has a full-time staff of approximately 65, with no disaster reserve cadre or volunteer program to provide additional support. This equates to about 2.5 ODPEM personnel per 100,000 in population.[1] Based on stakeholder interviews and surveys, there is a perception that ODPEM's budget allocations are insufficient to meet disaster management needs. Of 28 survey respondents, only one felt that the national disaster budget was sufficient to meet disaster management requirements.

The GOJ does not track monies spent by other ministries on DRR activities in Jamaica. Therefore, the sum of the government budget supporting the disaster management system is unknown.

Parishes do not have an allocated budget for disaster management. Only one parish has a disaster preparedness budget (Saint James), one has a disaster fund (Saint Catherine), and one has more than one paid disaster management staff (also Saint Catherine). Fifty-four percent (54%) of survey respondents felt parishes lack the capacity to effectively respond to local disasters. Those interviewed raised concerns regarding the limited capacity to coordinate tactical response and relief efforts at the parish level. These actions tend to be centralized at the national level and coordinated by ODPEM. This limitation suggests a lack of government support for subnational emergency management operations.

National Disaster Fund

The GOJ appropriates J$50M (approximately $390,000 USD) each year for the National Disaster Fund (NDF). Funds from the NDF can be released to support response and recovery efforts following a disaster declaration. Unused funds roll over annually if not used. There is currently about J$250M in the NDF (approximately $1.9M USD). Stakeholders frequently stated that the NDF is insufficient to support even minor rebuilding efforts, and no survey respondents felt the NDF was adequate to respond to a major disaster. ODPEM estimated that Jamaica would need a disaster reserve fund of J$50B ($387M USD) to cover annual disaster impacts. Though the GOJ participates in the Caribbean Catastrophe Risk Insurance Facility (CCRIF), the hurricane policy does not cover damages from rain or landslides, which limits the effectiveness of the CCRIF payout to provide support for damages from secondary hazards.

Appointed/Cabinet-level Position

The ODPEM Director General is appointed by the Minister of Local Government and Community Development (MLGCD). The Director General reports to the MLGCD Minister. During disaster events the Director General has direct access to the Prime Minister. Explicit experiential requirements for the Director General position do not exist.

Challenges Identified

1. ODPEM's budget allocations are insufficient, limiting ODPEM's capacity for DRR initiatives and reducing the effectiveness of the comprehensive disaster management system in Jamaica.
2. DRR efforts being undertaken by the GOJ lack visibility. Poor communication about these activities could result in potential duplication of effort.

[1] 2016 population: 2,803,362

3. Inadequate disaster management funding and few personnel at the parish level limits the capacity of subnational disaster management. Consequently, tactical disaster response and relief operations are centralized at the national level.
4. Insufficient NDF funds reduces the effectiveness of disaster response operations in Jamaica.

Recommendations

1. Prioritize new requirements outlined in DRMA 2015 and work with partners to explore alternative funding sources and methods to increase the availability of funds dedicated to disaster management to increase ODPEM's capacity.
   Strategies for increasing capacity might include:
   - *Develop an internship program and use interns to pursue specific projects.*
   - *Recruit, train, and use volunteers to pursue program goals.*
   - *Develop specific projects based on DRMA requirements and pursue grant funding or other support.*
   - *Work with the US and other governments to provide subject matter experts for specific parts of projects (developing project requirements, overall strategy, developing training courses, and localizing training courses).*
2. To increase transparency and strengthen a more holistic approach to disaster risk reduction, develop a method to capture, analyze, and share with partners all GOJ funds spent on disaster management activities, including disaster risk reduction activities (such as culvert enlargements, mangrove protection projects, and reforestation efforts).
3. Explore methods to increase the availability of funding and resources at the subnational level to increase CDM capacity. For example, develop partnerships with traditional and non-traditional disaster management actors to leverage resources at the parish and zonal level in order to increase subnational CDM capacity.
4. Work with national and international partners to identify alternative sources to increase appropriations to the NDF to the point that it can cover all disaster expenses incurred each year based on a 20-year disaster loss average.

Legal Authority to Act

Legal Authority to Act provides the necessary foundation for implementation of CDM. The legal framework within which disaster operations occur has a significant impact on preparedness, response, recovery and mitigation. Without the authority to act and the support of government officials, CDM activities can be halted, leaving residents vulnerable to disasters.

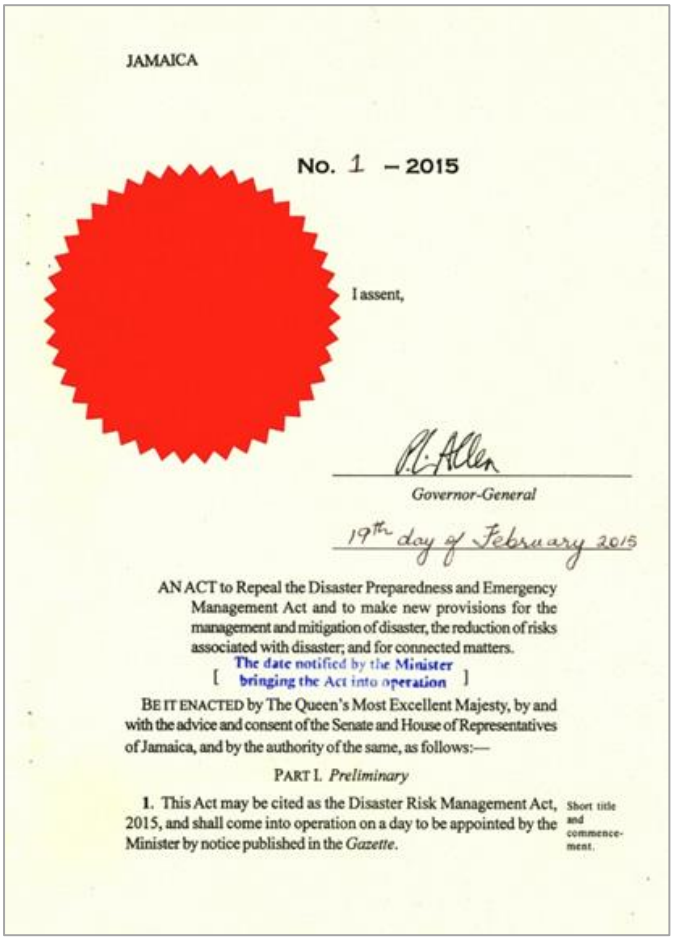
The legal framework for disaster management activities is provided by the Disaster Risk Management Act (DRMA), enacted in 2015. DRMA provides the necessary authority to the National Disaster Risk Management Council (NDRMC) as well as Parish and Zonal Disaster Committees. DRMA also establishes the National Disaster Fund and provides guidelines for specific, response-related activities for vulnerable populations and "specially vulnerable areas."

NDRMC is responsible for overall coordination of disaster management activities in Jamaica. ODPEM serves as the operational arm of the NDRMC. ODPEM is charged with developing and implementing comprehensive disaster management plans—addressing all phases of disaster management—across all levels of government. At the subnational level, disaster management activities are carried out by Parish Disaster Committees and Parish Disaster Coordinators. DRMA 2015 provides guidelines for the roles and responsibilities of entities operating within Jamaica's disaster management system. Survey responses indicate a lack of clarity regarding roles and responsibilities resulting in overlap and duplication of efforts between disaster management organizations impacting use of Jamaica's limited resources.

DRMA 2015 and other disaster management documentation, including Jamaica's National Disaster Action Plan (1997) and hazard-specific standard operating procedures (SOPs), are available through ODPEM's website. Stakeholders stated that they have access to the National Disaster Action Plan. Sharing of disaster management plans across agencies, however, is low. Interviews and surveys indicated that organizations could improve disaster management by sharing more DRM/DRR information between agencies. Sixty-seven percent (67%) of survey respondents acknowledged that their organizations have disaster response plans, about one-third (31%) reported not having a copy of disaster management plans. Only 22% of survey participants indicated their organizations regularly update disaster management plans and SOPs.

Disaster Management Legislation

DRMA 2015 was signed into law and published in the Gazette in 2015. DRMA 2015 provides legal recognition for, and defines roles and function of, the National Disaster Risk Management Council, and Parish and Zonal Disaster Committees. Although these entities have been in place since at least 1996, they were not codified in any laws. It also establishes the National Disaster Fund, the right to legally evacuate persons identified as at-risk as a preventive measure, identification and description of high-risk areas called "specially vulnerable areas". DRMA 2015 expands the powers of ODPEM during emergencies and disasters. The law adds duties and responsibilities to ODPEM's writ, establishes requirements for a national alert system, and provides additional authorities to take mitigative measures as a disaster threatens. While the new law specifies a host of new provisions to increase comprehensive disaster management capacity in Jamaica, implementation remains a key challenge. ODPEM's Operational Plan 2016-2017 includes a goal to complete five (5)



JAMAICA

No. 1 – 2015

I assent,

Governor-General

19th day of February 2015

AN ACT to Repeal the Disaster Preparedness and Emergency Management Act and to make new provisions for the management and mitigation of disaster, the reduction of risks associated with disaster; and for connected matters.

[The date notified by the Minister bringing the Act into operation]

BE IT ENACTED by The Queen's Most Excellent Majesty, by and with the advice and consent of the Senate and House of Representatives of Jamaica, and by the authority of the same, as follows:—

PART I. *Preliminary*

1. This Act may be cited as the Disaster Risk Management Act, 2015, and shall come into operation on a day to be appointed by the Minister by notice published in the *Gazette*. Short title and commencement.

Figure 84. Disaster Risk Management Act 2015

implementing regulations for DRMA 2015 by the end of 2017. Stakeholder interviews confirmed that ODPEM has not begun developing regulations to implement DRMA 2015 or prioritized the order in which they should be developed.

Designated Authorities

DRMA 2015 provides both comprehensive and specific designations for national and local authorities to act before, during, and after disasters. As mentioned previously, coordination of the disaster management system in Jamaica is vested in the NDRMC, with ODPEM in charge of day-to-day operations. ODPEM has the authority to develop and implement programs at the national and local level for all phases of disaster management. ODPEM also has the authority to direct activities during disasters, require cooperation from other governmental organizations, and make any necessary rules to ensure public safety during disasters. The Parish Disaster Committees and Parish Disaster Coordinators have specific roles, responsibilities and authorities within the disaster management system. Based on a thorough review of DRMA 2015, the law sufficiently designates authorities for DRR activities and disaster response and recovery requirements in Jamaica. Those interviewed generally expressed satisfaction with DRMA 2015. However, some interviewees identified mandatory evacuations as an authority they would like to see enacted, demonstrating that they were still unfamiliar with some provisions of the new law.

Disaster Management Documentation Availability

Jamaica's National Disaster Action Plan (1997) and hazard-specific SOPs are available through the ODPEM website, and disaster management partners stated during interviews that they regularly reference the plan. A review of DRMA 2015 and interviews with ODPEM staff highlight that ministries and sectors are not required to complete disaster management plans, and few have done so. Surveys revealed that some organizations (44%) share their plans with other agencies. Most respondents (61%) indicated that they do not have copies of their organizations' disaster management plans. Archival research and survey results indicate that many plans do not address all phases of emergency management.

ODPEM maintains and uses Operational Plan 2016-2017 to organize and track disaster management and risk reductions projects. The plan, in matrix format, lists each project, the unit or department of ODPEM responsible for it, the objective, strategy, output, performance measures, overall target, and quarterly targets and costs. The Operational Plan allows ODPEM to review all ongoing projects and the resources required to carry them out. ODPEM uses the plan to focus resources on critical projects and prioritize limited funds, displaying a commitment to sustainable disaster management. Senior ODPEM officials frequently referenced the plan during interviews, indicating that ODPEM regularly reviews progress against the plan and updates it on an annual basis. ODPEM regularly reviews the plan with the UN Humanitarian Country Team.

Parish site visits and research showed that St. Catherine is the only parish to make its disaster plan available online. However, the plan is in draft form and incomplete. Stakeholder interviews confirmed that all other parish disaster plans are incomplete or in revision. Parishes generally rely on the National Disaster Action Plan (NDAP) to execute operations, resulting in tactical disaster response operations being directed from the NEOC rather than by local actors.

Several Parish Disaster Coordinators expressed interest in having a standard Parish Disaster Plan template to ensure that plans are standardized and comprehensive. A template would facilitate the completion of plans and ensure the plan addresses all phases of emergency management.

Stakeholder interviews indicated that ODPEM maintains hard copies of parish plans that may be unavailable to staff members. This limitation highlights the need for a central location to store and access all disaster plans.

Documentation / SOP Update Frequency

Jamaica currently uses the National Disaster Action Plan (NDAP) for disaster response operations. The NDAP was published in 1997 and has not been updated since, resulting in planning gaps, particularly regarding mitigation activities. Interviews indicate that NDAP is widely available, used and understood, resulting in a common base of knowledge and comprehension for disaster operations. Under DRMA 2015, ODPEM is required to create a National Disaster Response Coordination Plan (NDRCP). The NDRCP is designed to replace the NDAP and will provide an avenue to update the disaster response system in Jamaica. The NDRCP must be updated every five years and will include a comprehensive disaster management strategy for the nation (which the current NDAP does not provide). The ODPEM Operational Plan 2016-2017 does not address completing the NDRCP, although it does address completing annexes that would become part of the NDRCP. Overall, interviews indicated that there is no plan or SOP update requirement at the national or parish level. Twenty-two percent (22%) of survey respondents indicated that their organizations update plans and SOPs regularly.

Challenges Identified

1. Strategies to complete the implementing regulations outlined by DRMA 2015 have not been formalized, resulting in many aspects of the law not being applied.
2. There is a lack of ministry and sector-specific comprehensive disaster management plans.
3. Parish disaster plans are largely unavailable and incomplete.
    a. A standard format is not in place for parish disaster plans.
    b. No central repository is available to store and provide access to disaster plans.
4. Because parish disaster plans are largely incomplete or unavailable, parishes rely on national disaster plans during disaster response operations.
5. There is currently no strategy in place to complete the NDRCP.
6. National standards for updating plans and SOPs have not yet been established, resulting in generally incomplete and outdated plans.

Recommendations

1. Develop a strategy to implement DRMA 2015 regulations.
2. Establish requirements for ministries and sectors to develop, complete, and maintain disaster plans.
3. Develop a parish disaster plan template. See sample template included in **Appendix F**: Sample Parish-level Comprehensive Disaster Management Plan Outline.
    a. Assist parishes with revising and completing their disaster plans, including validating the plans by conducting an exercise.

b. Provide a central location to store all disaster plans (national, parish, and zonal) that is accessible to government employees, NGOs involved in disaster management, and the public.

4. Promote a culture of developing, understanding, and using plans during disaster activities at all levels.
5. Complete NDRCP (required by DRMA 2015) and validate the plan by conducting an exercise.
6. Develop and promulgate minimum requirements for updating plans and SOPs.
   Example requirement:
   - *All plans and SOPs specific to hurricanes are reviewed annually and formally updated at least every three years. All other plans and SOPs are reviewed and updated at least every five years.*

Advocacy Supporting Action

Advocacy supporting action is necessary to ensure that disaster management policies are implemented nation-wide. The backing of political leaders is not always enough to ensure that hazard policies are implemented. Successful disaster management requires strong stakeholder support across all levels. Following a disaster, stakeholder support for action is generally high and may play a key role in hazard policy implementation. Stakeholders include traditional and non-traditional partners involving the general public, non-governmental organizations, academic institutions, the private sector, and those providing assistance before, during and after a disaster.

Seventy-nine percent (79%) of the survey participants reported that their organizations are active in disaster response. For most of the participants, Hurricane Sandy (2012) was the last major disaster that required their organization to respond, followed by the Riverton fire and the Chikungunya outbreak. Less than half (46%) of the survey participants felt the national response to the last major disaster was effective.

Disaster declarations in Jamaica can only be made at the national level, by the Prime Minister. Disasters occur at the local level, yet there is no provision for Parish Mayors to make local disaster declarations, rather, disaster declarations are made for the entire country.

The legal framework for declaring disasters is provided by the Disaster Risk Management Act (DRMA) enacted in 2015. Although the impact of DRMA is better understood among disaster management professionals at the national level, interviews with local-level disaster managers indicate that there is uncertainty in the implementation and impact of DRMA within the parishes.

DRMA also outlines disaster management activities to be conducted at all levels—from the national level by ODPEM to the subnational level by Parish Disaster Committees. The ODPEM Director General is responsible for drafting a National Disaster Response Coordination Plan (NDRCP). Within the NDRCP, procedures for disaster preparedness and response of non-governmental organizations (NGOs) must be considered. In Jamaica, NGOs are actively engaged in disaster preparedness at the local level. Due to a lack of requirements and standard operating procedures (SOPs), coordination and aligning of DRR projects with national DRR strategy between ODPEM and NGOs remains a challenge.

Recent Disaster Events

Based on interviews with ODPEM and the Parish Disaster Coordinators, the three most recent major disaster events at the national level were: 1) the Riverton Fire of 2015, 2) the Chikungunya outbreak and response of 2014, and 3) Hurricane Sandy in 2012. The Riverton fire affected Kingston and St. Andrew Parishes, while the Chikungunya outbreak was nationwide. Hurricane Sandy had major impacts on the eastern end of Jamaica, primarily affecting St. Thomas, Portland, and St. Mary Parishes.

In interviews, Parish Disaster Coordinators shared that parishes activate their EOCs only if directed to by ODPEM, even if there is little or no local need for response. During local emergencies, Parish Disaster Coordinators ask ODPEM for permission to open their EOC. Interviews with ODPEM and Parish staff indicate that there is little capacity at the parish level to conduct disaster management activities. This limitation is confirmed by the survey results, where 54% of respondents indicated that the parishes do not have the capacity to effectively respond to disasters.

Survey results highlighted stakeholder perceptions on the effectiveness of response to recent disasters. While 78% of respondents indicated that their organization is active in disaster response, only 46% considered the response to the last major disaster to be effective. Fifty-two percent (52%) of respondents indicated that their organizations do not have adequate staffing to conduct response activities.

Those surveyed commonly cited the need for increased coordination between all levels of government (national to community level), more available resources (human, financial, and material), and improved information sharing and communication among all relevant disaster response stakeholders.

Disaster Declarations

According to DRMA 2015 and interviews with senior ODPEM staff, disaster declarations can only be made by the Prime Minister, but are usually made at the request of the ODPEM Director General and the Minister of Local Government and Community Development. Currently, there is no provision for Parish Mayors to make local disaster declarations. Instead, disaster declarations are made for the entire country. Per DRMA 2015, the Prime Minister can declare “disaster areas”, resulting in “no-build” designations, and those living inside the area must relocate, creating social disruption and challenges for enforcement. Thus, disaster areas are rarely designated.

Recent Disaster Legislation

DRMA 2015 is being operationalized at the national level. As noted by ODPEM interviewees, some aspects addressed in the legislation could take years to implement, for example, implementing a nation-wide warning system and identifying “specially vulnerable areas”. ODPEM employees understand how the law will affect their work and job responsibilities. Though survey responses indicated that most stakeholders (61%) know that the DRMA 2015 will affect their organizations, those interviewed working outside of ODPEM did not know the impacts the law would have on their work. Similar sentiments were expressed in interviews with Parish Disaster Coordinators, who were unsure how DRMA 2015 would affect them. However, they stated that ODPEM is rectifying this by conducting outreach efforts with Disaster Coordinators, Mayors, Secretary Managers, and Town Clerks.

Number of NGOs with a Disaster Focus Active in the Country

ODPEM consistently engages with six NGOs with a disaster focus working in Jamaica: Jamaica Red Cross, the Salvation Army, the Adventist Disaster Relief Agency, Help Aid International, Food for the Poor, and Catholic Relief Services. Other NGOS are also active in the country. Eighty-two percent (82%) of survey respondents indicated that NGOs are engaged in disaster preparedness at the local level in Jamaica.

Stakeholder interviews highlighted concerns that there are currently no requirements or SOPs for organizations to notify or coordinate their activities with ODPEM. Furthermore, there are no requirements for government ministries applying for INGO support to notify or involve ODPEM when developing DRR projects. This lack of coordination may result in DRR project efforts that are not aligned with the national DRR objectives.

Challenges Identified

1. Because parish governments generally do not have the capacity to conduct local tactical disaster response and relief activities these actions are directed by national-level actors. This results in overly-centralized and less efficient disaster response operations.
2. Ministries applying for international support for DRR projects and NGOs conducting DRR projects within Jamaica are not required to coordinate with ODPEM.

Recommendations

1. Work with GOJ, private sector, and NGO partners to increase capacity at the parish and zonal level to conduct all disaster management responsibilities through: leveraging collaborative relationships to provide additional opportunities for training and exercise participation; adopting standardized training requirements, planning templates, and disaster management doctrine; and providing programs that strengthen local disaster management response capabilities (including community resilience building, developing and rehearsing plans, and response-operations management training).

   Example strategies:

   - *Disaster management doctrine: develop or modify existing doctrine to establish a systematic, proactive approach to guide all levels of government, NGOs and the private sector to work seamlessly together (i.e., the National Incident Management System in the U.S.*
   - *Community resilience building: continue the community resilience program and consider including those aspects of the Hawaii Hazards Awareness and Resilience Program (HHARP)[2] that will make the program stronger.*
   - *Response management operations training: examples include Incident Command System (ICS) and National Incident Management System (NIMS) courses from FEMA, and Damage and Loss Assessment and Recovery Planning courses from the Pacific Disaster Center.*

[2] The Hawaii Hazards Awareness & Resilience Program (HHARP) enhances community resilience through education and outreach sessions that help communities prepare to be self-reliant during and after natural hazard events, improve their ability to take care of their own needs, and reduce the negative impacts of disasters. The program was developed by Pacific Disaster Center in collaboration with Hawaii Emergency Management Agency in 2013.

2. Develop a methodology and a requirement for all ministries and NGOs conducting DRR activities in Jamaica to provide a project overview and status report to ODPEM.

Necessary Institutional Resources

It is critical that every jurisdiction has an accurate assessment of available resources (human and material), and the availability of those resources during a disaster. Although a jurisdiction may have a limited economic base and few immediate resources, through mutual-aid agreements with neighboring jurisdictions, resources can be easily mobilized to respond. Being able to quickly assess the community needs and having the knowledge of available resources, aid can be requested in a timely manner to ensure immediate emergency needs are met.

Survey responses consistently indicated that Jamaica lacks adequate resources—human, financial, and material—for disaster management activities. Common themes for improving disaster management suggested by those surveyed included dedicating more resources to disaster management at all levels of government and increasing the availability and appropriate use of resources for disaster response.

Jamaica is currently working on a project to develop a database of national resources for disaster management, a requirement of the 2015 Disaster Risk Management Act (DRMA). The database is still in an early form, so a national inventory of available resources was not provided as part of the assessment.

To overcome some of the challenges related to resources, parish-level Disaster Coordinators in Jamaica maintain agreements with local suppliers to provide relief supplies during a disaster. Seventy-six percent (76%) of survey respondents stated that their organizations have pre-established agreements (such as mutual-aid agreements) for support during disasters. Most of these agreements are with private organizations to provide food and supplies.

Sixty-one percent (61%) of survey respondents indicated that their organizations maintain an Emergency Operations Center (EOC). Yet, just 15% of those respondents whose organizations maintained EOCs felt they have adequate resources to perform their responsibilities effectively. Effective use of EOCs during disaster response is limited by the fact that EOC supply lists are not maintained at the national or parish level, nor are facilities equipped for immediate activation.

Resources Designated for Disaster Management

GOJ resources are available for use during disasters, though specifically-designated resources are in short supply. Sixty-seven percent (67%) of survey respondents acknowledged that national supplies are insufficient for disaster response. International aid is generally needed to support disaster relief.

ODPEM maintains eight warehouses around the country stocked with response and relief supplies that are audited quarterly and routinely checked for serviceability. GOJ disaster relief supplies include non-food items for about 1,000 families. Each parish also has a cache of disaster supplies, originally provided by ODPEM. While some parishes restock supplies at their own expense, other parishes rely on ODPEM to restock them. ODPEM and the Jamaica Red Cross maintain disaster supplies at the national headquarters and in the parishes. Red Cross inventory includes non-food items for about 1,000 families (estimating five people per family). The Jamaica Red Cross can also provide groceries for 300-500 families for roughly two weeks (depending on the value of the Jamaican dollar). Food is accessed through local stores with which the Jamaica Red Cross has established lines of credit. One critical limitation conveyed by stakeholders is the lack of a single, shared database of available disaster relief

supplies in Jamaica. When a disaster occurs, ODPEM convenes a meeting of all organizations with warehoused disaster supplies to determine how best to meet the needs of those affected.

Figure 85. Disaster Relief Storage: ODPEM Disaster Response Supplies, Kingston (left); and Jamaica Red Cross Disaster Relief (right)

The ODPEM building is considered the National EOC (NEOC). The NEOC Operations Room is a dual-use space on the ground floor of the ODPEM building, and is not configured for immediate operations. Once the NEOC is activated, equipment such as computers, phones, and office supplies are brought in and installed. EOC activation drills are not conducted, so the time required for the EOC to become operational is unknown. The lack of a sole-purpose EOC is a critical gap in disaster operations, especially given Jamaica's exposure to quick-onset hazards, such as earthquakes.

Similarly, rooms or buildings designated as EOCs at the parish and ministerial levels tend to be dual-purpose and require set-up to become operational for disaster response. Parish stakeholders noted that government representatives often go to their ministry's EOC rather than supporting the local parish EOC during activations. The result is a lack of support and advocacy at the parish level during disaster response and relief operations.

Figure 86. The St. Catherine Parish Council Chamber is also the Parish Emergency Operations Center

A widely-cited resource limitation, reiterated by disaster management stakeholders across Jamaica, is the lack of a nation-wide emergency communications system. Consequently, practitioners rely heavily on landline and cellular telephone networks, which are prone to failure during disasters. In the four parishes and one municipality visited, none of the emergency radios provided by ODPEM were in working condition. A Japan International Cooperation Agency (JICA) project to improve emergency communications across Jamaica is underway, but specific details were not provided.

Jamaica has 1,341 designated emergency shelters, of which, 500 are designated as 'high-priority'. Priority takes into consideration elements of population, location and frequency of use. ODPEM, the parishes and the Jamaica Red Cross collaborate to train shelter managers to ensure adequate staffing for priority shelters.

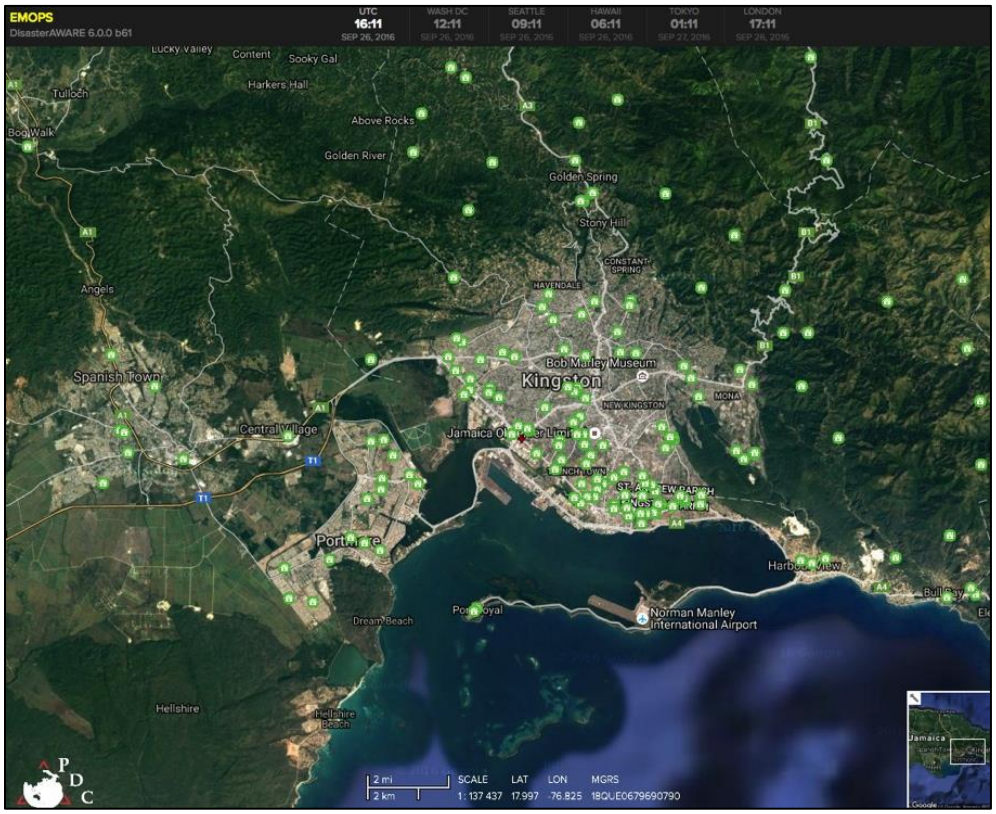


Figure 87. Emergency Shelter Locations, Kingston Area

Inventory of Available Resources

DRMA 2015 requires ODPEM to develop a database of available institutional resources and equipment for use in support of disaster operations. A draft resource registry is currently in progress. Parish Disaster Coordinators do not maintain databases of equipment at the Parish level, relying on resource owners (National Works Agency, Parish Roads and Works departments, etc.) to maintain and provide this information as needed.

Mutual-Aid Agreements

Jamaica is part of a regional emergency response association, the Caribbean Disaster and Emergency Management Agency (CDEMA). In addition, ODPEM has a sheltering MOU in place with the Jamaica Red Cross. Parish Disaster Coordinators have agreements with local suppliers to provide relief supplies. While there are no formal mutual aid agreements between parishes, they often support one another during disasters. Seventy-six percent (76%) of survey respondents indicated that their organizations have pre-established agreements for support during times of disaster. Most of Jamaica's support agreements engage private organizations for provision of food and supplies during disaster response activities.

EOC Supply List

All EOCs visited during the NDPBA were dual-use facilities. None were equipped for immediate activation. Neither ODPEM, nor any of the parishes visited, conduct EOC activation drills to determine the time required to become operational. Stakeholders interviewed stated that no EOC supply lists are maintained at national or parish levels. Survey responses further confirmed this deficiency, with only 15% of the opinion that their EOCs have adequate supplies to function effectively.

Challenges Identified

1. The absence of a sole-purpose national EOC could result in critical delays in response efforts, particularly during quick-onset events.
2. An operational nation-wide emergency communications system has not been established to address critical communication needs when land and cellular telephone networks are unavailable.
3. Personnel from national ministries sometimes report to their organizational EOCs rather than local parish EOCs, resulting in a lack of advocacy and support at the Parish level during disaster response and relief operations.
4. The absence of an inventory of disaster relief supplies maintained by and shared among national and parish governments and NGOs, inhibits efficient provision of relief supplies.
5. ODPEM has no database or inventory of institutional resources and equipment in each jurisdiction that may be used to support disaster response operations.

Recommendations

1. Plan, construct and provide necessary equipment for a stand-alone, purpose-built NEOC that can house all GOJ functions needed to respond to a large-scale national emergency.
    a. To more effectively support disaster response operations while a permanent NEOC is under construction, utilize space in the existing ODPEM facility to obtain and install equipment (computers, displays, high-speed data networks, communications equipment, knowledge management software, and furniture) to construct a sole-purpose NEOC operations area.
2. Plan, construct, and maintain a nationwide emergency communications system, linking ODPEM with (at a minimum) other ministries' coordination centers, JCF and JFB offices across Jamaica, JDF headquarters and parish EOCs.
3. Develop and utilize designations that clearly delineate between the NEOC, the parish EOCs, and other coordination centers, such as ministry emergency coordination centers at the national level and coordination centers that ministries oversee at the parish level.
   For Example:
    - *Reserve the term EOC only for the multi-agency coordination nodes at the NEOC and parish level EOCs. Ministries would have Ministry Coordination Centers (MCCs) in Kingston, and if applicable, Area Coordination Centers (ACCs) in parish or regional offices.*
        - *If the JCB and JFB establish coordination centers in their national or regional offices they would be Constabulary Coordination Centers (CCCs) and Fire Coordination Centers (FCCs), respectively.*
    - *Using this methodology will help differentiate between the most critical multi-agency coordination nodes (the EOCs) and the single-agency nodes (the coordination centers), and*

highlights the importance of staffing the EOCs over the coordination centers to centralize national response operations.

4. Develop, maintain, and share among disaster management stakeholders a single inventory of all disaster relief supplies warehoused by GOJ, parishes, and NGO partners.
5. Complete ODPEM's resource registry database of institutional resources and equipment in each jurisdiction to be used in support of disaster management operations.

Recommended Projects to Enhance CDM

The following recommended projects have been developed based on the findings, gaps and recommendations identified above. The recommended projects are grouped according to the five CDM components, and have been evaluated and color-coded by the level of effort, relative difficulty, estimated cost for completion, and expected impact on increasing Jamaica's CDM capacity and capability. Refer to Table 59 and Table 60 for additional information on the evaluation criteria.

If only a select number of the following major projects can be completed, it is PDC's recommendation that Jamaica focus on the highest impact projects – identified as "significant" – in order to increase the comprehensive disaster management capability of Jamaica.

Using this analysis, Figure 88 illustrates a sample 5-Year Implementation Plan for all 20 CDM recommendations, further defined by approximate cost.

Table 60. Definitions of CDM Evaluation Criteria

Definitions	
Level of Effort	Estimated length of time it will take to complete the project once it is started
Difficulty	Overall complexity based on the estimated amount of staff time, resources, and collaboration required to complete the project
Cost	Estimated annual cost of the project, not including salaries, based on a percentage of the current NDMO annual budget
Impact	The amount the project will increase the comprehensive disaster management capability of the nation

Table 61. Ratings

Ratings		
Level of Effort		12 months or less
		13 – 60 months
		>61 months
Difficulty	Simple	Few resources, time or collaboration required to implement
	Medium	Some resources, time or collaboration required
	Complex	A great deal of resources, time, or collaboration required
Cost	$	<1% of NDMO operational budget on an annual basis
	$$	1% to 10% of NDMO operational budget on an annual basis
	$$$	>10% of NDMO operational budget on an annual basis
Impact	Minor	Some impact on increasing the CDM capability of the nation
	Moderate	Moderate impact on increasing the CDM capability of the nation
	Significant	Significant impact on increasing the CDM capability of the nation

Table 62. Recommended Projects for CDM Theme: Good Leadership by Professionally Trained Officials

CDM Theme: Good Leadership by Professionally Trained Officials				
Recommendations: To further strengthen the professionalization of disaster management in Jamaica.	**Level of Effort**	**Difficulty**	**Cost**	**Impact**
Finalize training curricula and establish minimum training requirements for all government employees with roles in disaster management to increase capacity and skills.	12	Simple	$	Moderate
Establish a centralized repository that documents disaster management training achievements, and institutionalize national guidelines for the credentialing of trained professionals to promote the professionalization of the disaster management field.	12	Medium	S	Moderate
Establish and resource a national exercise program that includes participation requirements for national- and parish-level governmental organizations.	36	Complex	$$	Significant

Table 63. Recommended Projects for CDM Theme: Foundation of Supportive Values for Government Action

CDM Theme: Foundation of Supportive Values for Government Action				
Recommendations: To enhance government support for disaster management efforts at all administrative levels.	**Level of Effort**	**Difficulty**	**Cost**	**Impact**
Prioritize new requirements outlined in DRMA 2015 and work with partners to explore alternative funding sources and methods to increase the availability of funds dedicated to disaster management to increase ODPEM's capacity. Strategies for increasing capacity might include: 1) Develop an internship program and use interns to pursue specific projects; 2) Recruit, train, and use volunteers to pursue program goals; 3) Develop specific projects based on DRMA requirements and pursue grant funding or other support; and 4) Work with the US and other governments to provide subject matter experts for specific parts of projects (developing project requirements, overall strategy, developing training courses, and localizing training courses).	60+	Complex	$$$	Significant
To increase transparency and strengthen a more holistic approach to disaster risk reduction, develop a method to capture, analyze, and share with partners all GOJ funds spent on disaster management activities, including disaster risk reduction activities (such as culvert enlargements, mangrove protection projects, and reforestation efforts).	36	Medium	$	Minor
Explore methods to increase the availability of funding and resources at the subnational level to increase CDM capacity. For example, develop partnerships with traditional and non-traditional disaster management actors to leverage resources at the parish and zonal level in order to increase subnational CDM capacity	60+	Complex	$$$	Significant
Work with national and international partners to identify alternative sources to increase appropriations to the NDF to the point that it can cover all disaster expenses incurred each year based on a 20-year disaster loss average	60+	Complex	$$$	Moderate

Table 64. Recommended Projects for CDM Theme: Legal Authority to Act

CDM Theme: Legal Authority to Act				
Recommendations: To ensure the development and implementation of relevant disaster management legislation throughout Jamaica.	**Level of Effort**	**Difficulty**	**Cost**	**Impact**
Develop a strategy to implement DRMA 2015 regulations.	60+	Complex	$	Significant
Establish requirements for ministries and sectors to develop, complete, and maintain disaster plans.	12	Simple	$	Moderate
Develop a Parish Disaster Plan template. Assist parishes with revising and completing their disaster plans, including validating the plans by conducting an exercise. Provide a central location to store all disaster plans (national, parish, and zonal) that is accessible to government employees, NGOs involved in disaster management, and the public.	24	Medium	$S	Moderate
Promote a culture of developing, understanding, and using plans during disaster activities at all levels.	60+	Medium	$	Moderate
Complete NDRCP (required by DRMA 2015) and validate the plan by conducting an exercise	36	Medium	$$	Moderate
Develop and promulgate minimum requirements for updating plans and SOPs	12	Simple	$	Minor

Table 65. Recommended Projects for CDM Theme: Advocacy Supporting Action

CDM Theme: Advocacy Supporting Action				
Recommendations: To further strengthen non-governmental stakeholder engagement and support for disaster management activities in Jamaica.	**Level of Effort**	**Difficulty**	**Cost**	**Impact**
Work with GOJ, private sector, and NGO partners to increase capacity at the parish and zonal level to conduct all disaster management responsibilities through: leveraging collaborative relationships to provide additional opportunities for training and exercise participation; adopting standardized training requirements, planning templates, and disaster management doctrine; and providing programs that strengthen local disaster management response capabilities (including community resilience building, developing and rehearsing plans, and response-operations management training).	60+	Complex	$$$	Significant
Develop a methodology and a requirement for all ministries and NGOs conducting DRR activities in Jamaica to provide a project overview and status report to ODPEM.	24	Medium	$	Minor

Table 66. Recommended Projects for CDM Theme: Necessary Institutional Resources

CDM Theme: Necessary Institutional Resources				
Recommendations: To increase the availability of and access to the necessary resources for effective disaster management in Jamaica.	**Level of Effort**	**Difficulty**	**Cost**	**Impact**
Plan, construct and provide necessary equipment for a stand-alone, purpose-built NEOC that can house all GOJ functions needed to respond to a large-scale national emergency. To more effectively support disaster response operations while a permanent NEOC is under construction, utilize space in the existing ODPEM facility to obtain and install equipment (computers, displays, high-speed data networks, communications equipment, knowledge management software, and furniture) to construct a sole-purpose NEOC operations area.	60+	Complex	$$$	Significant
Plan, construct, and maintain a nationwide emergency communications system, linking ODPEM with (at a minimum) other ministries' coordination centers, JCF and JFB offices across Jamaica, JDF headquarters and parish EOCs.	60+	Complex	$$$	Significant
Develop and utilize designations that clearly delineate between the NEOC, the parish EOCs, and other coordination centers, such as ministry emergency coordination centers at the national level and coordination centers that ministries oversee at the parish level.	12	Medium	$	Minor
Develop, maintain, and share among disaster management stakeholders a single inventory of all disaster relief supplies warehoused by GOJ, parishes, and NGO partners.	24	Simple	$	Minor
Complete ODPEM's resource registry database of institutional resources and equipment in each jurisdiction to be used in support of disaster management operations.	12	Simple	$	Minor

CDM Recommendations for Jamaica by Cost

Figure 88. Sample Five-Year Implementation Plan for CDM Recommendations, by Approximate Cost

Conclusion

The goal of the Jamaica NDPBA was to develop and conduct a baseline assessment focused on risk and vulnerability identification, and evaluation of existing disaster management capacities, leading to enhanced resilience to future hazards. Using two concurrent, stakeholder-driven analyses: Risk and Vulnerability Assessment (RVA) and Comprehensive Disaster Management (CDM), the Jamaica NDPBA results provide a comprehensive understanding of the strengths and challenges for managing and reducing disaster risk in Jamaica. Emerging from these results, are actionable recommendations to increase disaster management capabilities and guide investments with an aim to strengthen overall resilience.

The goal of the RVA was to characterize the elements of multi-hazard risk, and estimate the likelihood of a negative occurrence given exposure to natural hazards. RVA results describe the collective characteristics of each Parish that predispose it to detrimental hazard impacts, including an examination of Multi-Hazard Exposure, Vulnerability, and Coping Capacity.

The results of the RVA highlighted areas of the country that may require support in preparing for, responding to, and recovering from disasters. By identifying specific factors that influence risk in each Parish, the RVA supports evidence-based decision making through focused interventions that increase coping capacity, reduce vulnerability, and acknowledge hazard exposure at the subnational level. In summarizing the results of the RVA across Jamaica, prevalent drivers of risk included Clean Water Vulnerability, Economic Constraints, Access to Information, and Gender Inequality. Furthermore, as a small island nation, Jamaica is exposed to multiple hazards. In more densely populated parishes (Saint Catherine, for example), exposure plays a significant role in driving overall risk.

The goal of disaster management is to create safer communities and implement programs that protect human life, reduce losses and promote rapid recovery. Using a mixed methods approach, the CDM assessment examines preparedness and response capacities and capabilities in Jamaica. CDM provides actionable recommendations that draw on existing strengths and address possible gaps that affect the delivery of effective disaster management.

Jamaica has a strong disaster management system with competent leadership with an awareness of, and transparency in, acknowledging limitations. By addressing some key gaps, including the absence of a sole-purpose national EOC, the lack of an emergency communications system, and limited DRM capacity at the parish and local levels, Jamaica can significantly increase its capacity to deliver and maintain comprehensive disaster management.

The RVA and CDM components of the NDPBA are complementary, providing valuable context for increasing resilience in Jamaica. The RVA helps disaster managers decide where and how to focus limited resources, and enables them to anticipate the severity of impacts and the need for response activities such as evacuation and sheltering. The CDM assessment characterizes the structure and capacity of the country's disaster management system, through which DRR activities will take place.

The recommendations provided in this assessment are designed to be implemented over the next five years, after which time a follow-up assessment can be used to evaluate program effectiveness and progress from the baseline provided by the NDPBA. As a measurable and repeatable approach, the NDPBA provides a methodology to support national and regional efforts to save lives and protect property by continuing to build a more disaster-resilient nation.

RVA and CDM Integration

A suggested five-year timeline to implement programmatic recommendations and strategies to reduce disaster risk and strengthen comprehensive disaster management in Jamaica are presented in Table 67 and Table 68.

Table 67. Five-year implementation plan to reduce disaster risk

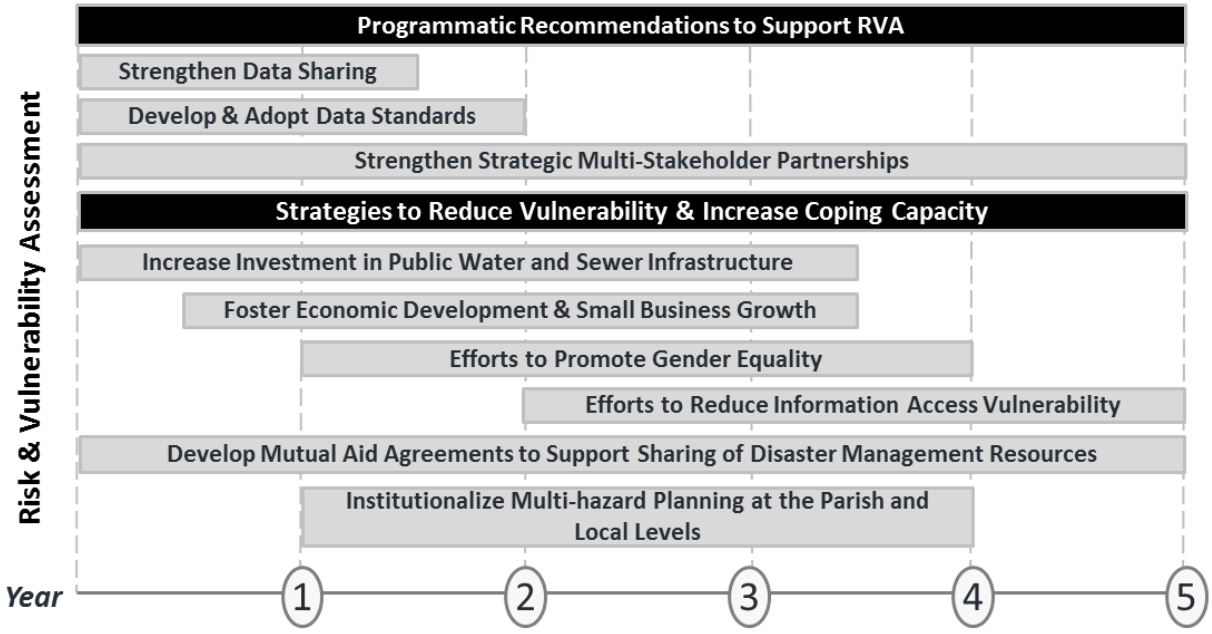
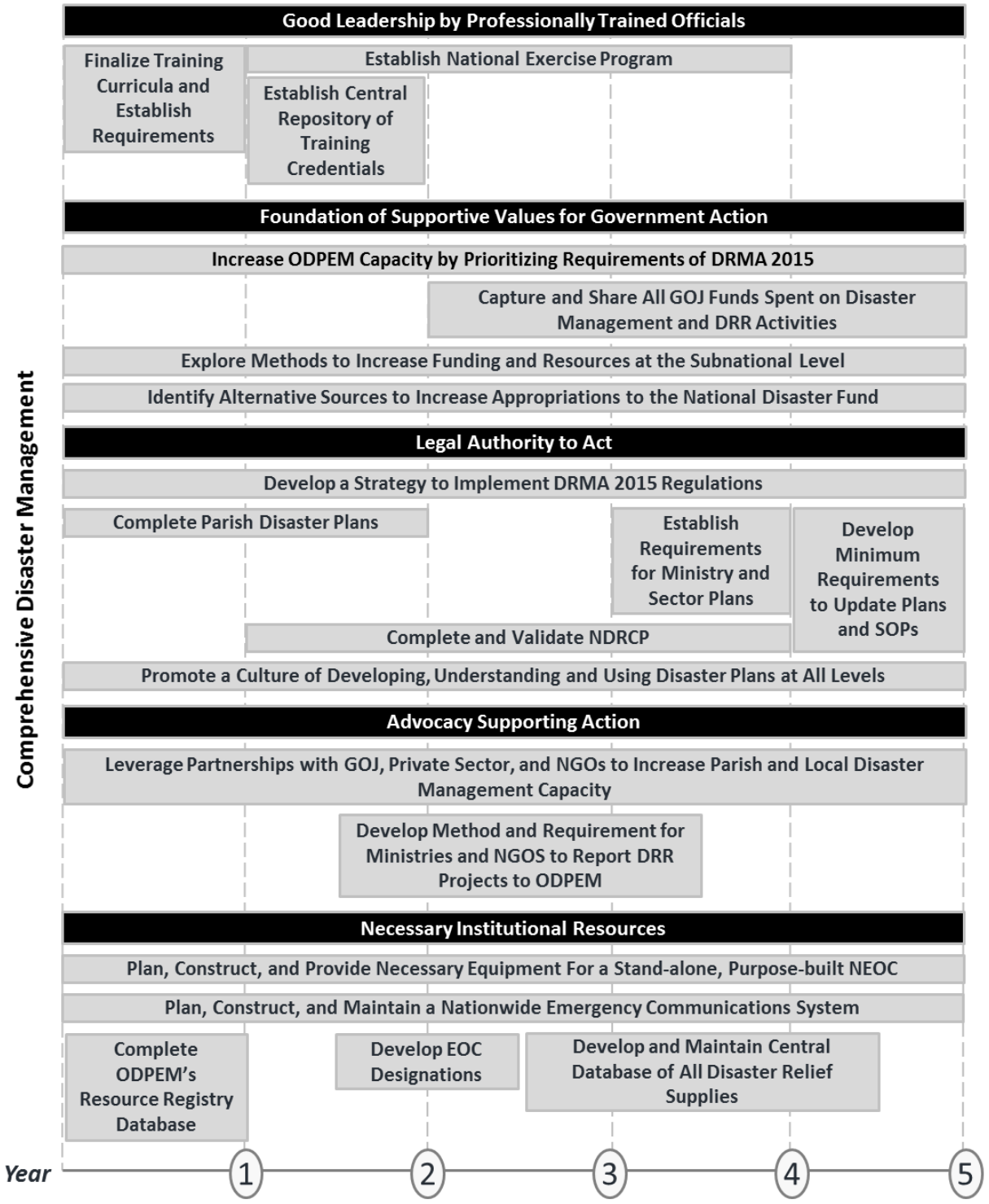


Table 68. Five-year implementation plan to strengthen CDM



Appendices

JAMAICA

NATIONAL DISASTER PREPAREDNESS BASELINE ASSESSMENT

PACIFIC DISASTER CENTER

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Appendix A: RVA Component Index Hierarchies and Thematic Rationale

Multi-Hazard Exposure

Table 69. Multi-Hazard Exposure Scores and Ranks for All Indices and Subcomponents.

Department	MHE Index		Raw MHE		Relative MHE	
	Score	Rank	Score	Rank	Score	Rank
Clarendon	0.728	2	0.639	3	0.817	5
Hanover	0.145	13	0.000	14	0.290	12
Kingston	0.572	6	0.390	7	0.755	6
Manchester	0.528	9	0.499	4	0.556	9
Portland	0.532	8	0.207	12	0.857	4
St. Andrew	0.705	3	0.903	2	0.506	10
St. Ann	0.550	7	0.485	5	0.616	8
St. Catherine	0.989	1	1.000	1	0.978	2
St. Elizabeth	0.130	14	0.259	11	0.000	14
St. James	0.354	11	0.408	6	0.300	11
St. Mary	0.595	5	0.296	10	0.895	3
St. Thomas	0.656	4	0.311	8	1.000	1
Trelawny	0.409	10	0.138	13	0.679	7
Westmoreland	0.249	12	0.306	9	0.193	13

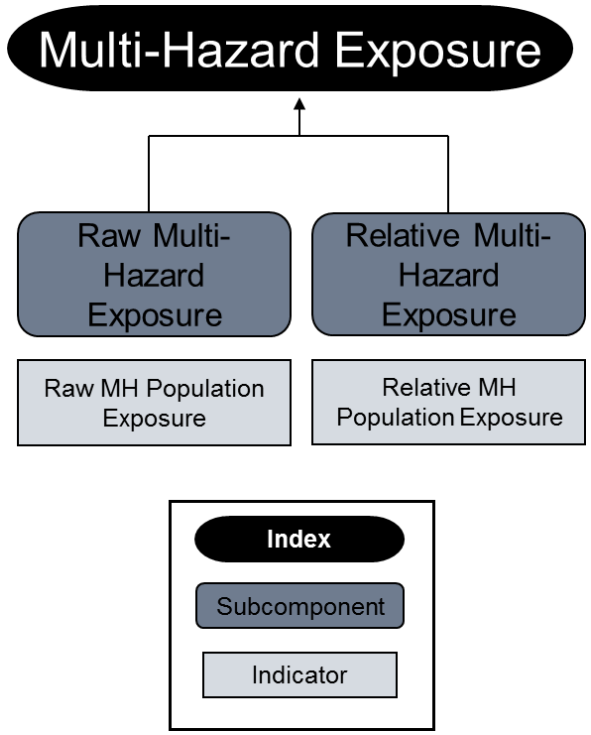

Figure 89. Multi-Hazard Exposure Index Hierarchy for Jamaica

Table 70. RVA—Multi-Hazard Exposure Metadata

Multi-Hazard Exposure					
Subcomponent	**Indicator**	**Source(s)**	**Year**	**Description**	**Notes**
Raw Exposure	Raw Population Exposure	NSDMD/ Mona Geoinformatics Institute (coastal and inland flood); MunichRe/USGS HAZPAC (Storm Intensity Zones); Salazar, Brown & Mannette (2013) Probabilistic Seismic Hazard Assessment for Jamaica (Earthquake); ORNL Landscan (population)	2014 (population)	Raw count of person units exposed to multiple hazards, including inland floods, coastal flood, earthquake, and landslides	*Hazard Zones were defined as follows:* *Coastal Flood: Coastal areas with elevation <=10 meters were combined with maximum coastal inundation areas for Annotto Bay, Fahrquar's Beach, Homer's Cove, Margaret's Bay, 100-year storm surge inundation for Montego Bay and Observed Storm Surge for Hurricane Allen* *Inland Flood: Areas Susceptible to inland flood (island-wide coverage) were combined with 100-year flood zones for Hope River, Rio Cobre, Rio Grande, Rio Minho and the Yallahs River as well as observed flood areas in Manchester Parish* *Landslide: Areas susceptible to landslide were estimated using environmental inputs of slope, aspect, land cover, and proximity to roads, streams and faults. Susceptibility was classified on a relative scale. Areas of 'very high', 'high' and medium susceptibility were used to define the hazard zone.* *Tropical Cyclone Wind: Areas with wind intensity equal to Category 1 or greater* *Earthquake: Areas with MMI VII and above based on 1.0 second spectral acceleration at a 2475-year return period* Citation for Earthquake Data: Salazar, Walter, Lyndon Brown, and Garth Mannette. "Probabilistic Seismic Hazard Assessment for Jamaica." Journal of Civil Engineering and Architecture 7, no. 9 (2013): 1118.
Relative Exposure	Relative Population Exposure	NSDMD/ Mona Geoinformatics Institute (coastal and inland flood); MunichRe/USGS HAZPAC (Storm Intensity Zones); Salazar, Brown & Mannette's (2013) probabilistic Seismic Hazard Assessment for Jamaica (Earthquake); ORNL Landscan (population)	2014 (population)	Total count of person units exposed to multiple hazards by parish population	See above for detailed description of hazard zones

Vulnerability

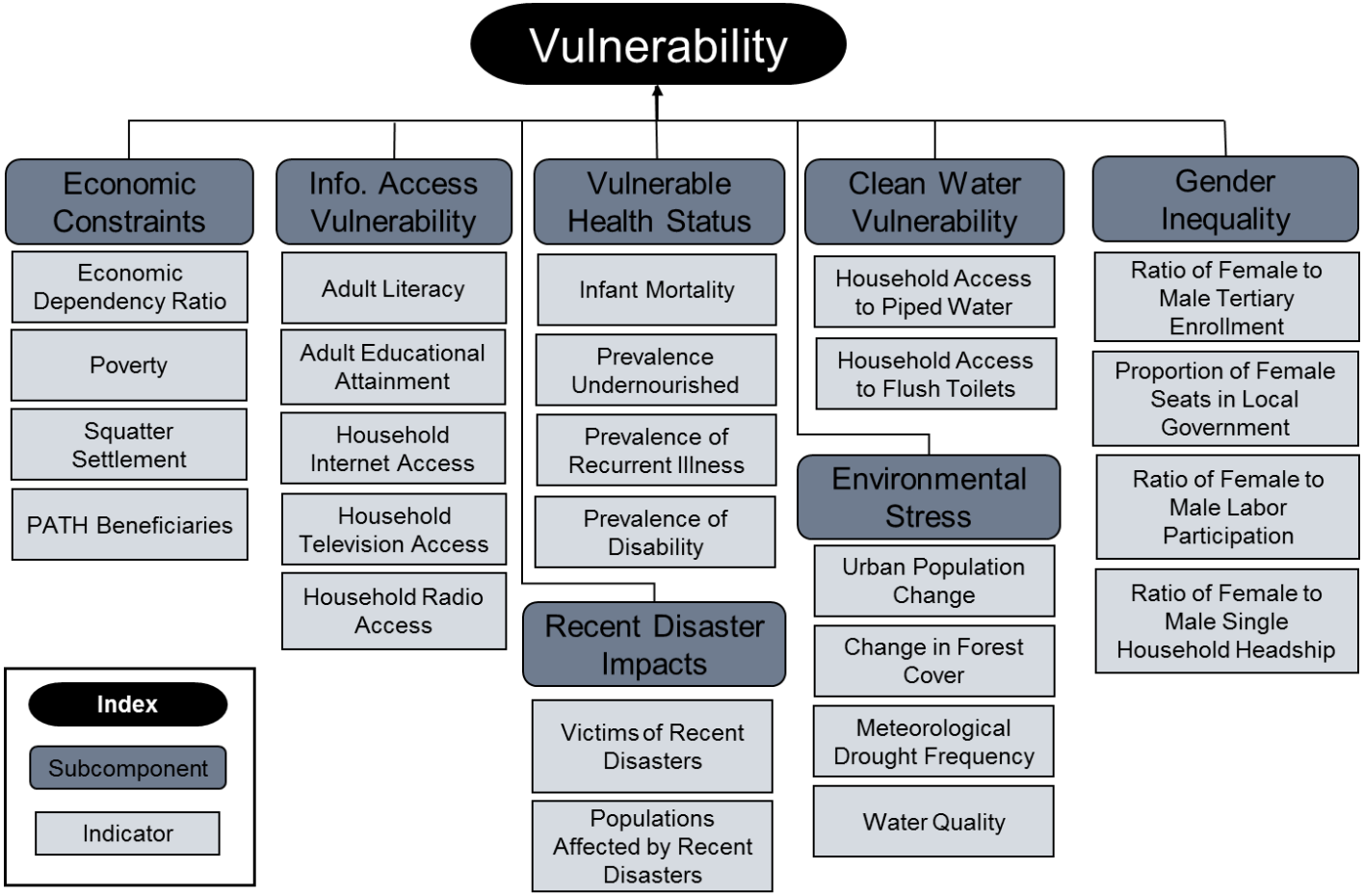

Figure 90. Vulnerability Index Hierarchy for Jamaica

Table 71. RVA—Vulnerability Subcomponent Themes and Rationale

Subcomponent Theme	Rationale for Inclusion
Economic Constraints	Represent limitations on resources available to take hazard mitigation and preparedness measures.
Access to Information	Represents the ability to access and comprehend hazard and disaster related information before, during and after an event. If mediums of information exchange are limited, or if people lack familiarity with somewhat technical information, critical information on impending hazard events, preparedness measures, available resources, and mitigation options may not be received.
Access to Clean Water	Represents the general state of water-related infrastructure. Poor distribution and containment systems contribute to reduced water quality and increase the potential for spread of disease.
Vulnerable Health Status	Reflects the population's general health as an outcome of multiple factors (e.g., health care processes and practices, biophysical and socio-economic environment). Poor health contributes to increased susceptibility to injury, disease, and stress associated with disasters and may necessitate special accommodations for activities such as evacuation.
Environmental Stress	Environmental stressors such as substantial water stress and land degradation can damage habitat and reduce quantity and quality of resources required to maintain human health and livelihoods. Additionally, these stressors increase the likelihood and magnitude of hazards such as flooding, landslides, and subsidence and can exacerbate impacts.
Gender Inequality	Represents gender-based differences in access to resources, services, opportunities and formal economic and political structures. Marginalized populations are less likely to have their needs met under "normal" conditions, and therefore become more susceptible to harm during times of disaster. They may be overlooked in mitigation and preparedness planning and subsequent response and recovery activities.
Recent Disaster Impacts	Departments that have recently been affected by disaster may still be recovering and are more susceptible to additional stressors.

Table 72. RVA—Vulnerability Scores and Ranks for All Indices and Subcomponents

Department	Vulnerability Index		Economic Constraints		Info Access Vuln.		Clean Water Vuln.		Vuln. Health Status		Gender Inequality		Recent Disaster Impacts		Environ. Stress	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Clarendon	0.678	1	0.689	2	0.719	6	0.881	2	0.674	1	0.607	3	0.439	9	0.737	1
Hanover	0.599	6	0.537	8	0.519	8	0.774	5	0.673	2	0.503	9	0.480	7	0.708	2
Kingston	0.240	14	0.587	5	0.465	9	0.000	14	0.348	13	0.036	14	0.000	14	0.246	14*
Manchester	0.436	10	0.331	14	0.410	11	0.771	6	0.428	10	0.572	6	0.292	12	0.247	13
Portland	0.597	7	0.543	7	0.764	2	0.705	9	0.490	7	0.459	12	0.787	2	0.430	9
St. Andrew	0.280	13	0.340	12	0.079	14	0.052	13	0.446	8	0.213	13	0.507	6	0.320	12
St. Ann	0.512	9	0.466	11	0.451	10	0.687	10	0.422	11	0.598	4	0.379	10	0.579	5
St. Catherine	0.430	12	0.499	9	0.195	13	0.294	12	0.370	12	0.468	11	0.696	4	0.489	7
St. Elizabeth	0.664	2	0.603	4	0.757	4	0.941	1	0.559	5	0.857	1	0.517	5	0.416	10
St. James	0.435	11	0.335	13	0.327	12	0.400	11	0.556	6	0.500	10	0.326	11	0.603	3
St. Mary	0.622	3	0.486	10	0.628	7	0.739	7	0.586	4	0.584	5	0.749	3	0.583	4
St. Thomas	0.616	4	0.709	1	0.757	5	0.736	8	0.336	14	0.525	8	0.819	1	0.432	8
Trelawny	0.588	8	0.554	6	0.805	1	0.875	3	0.656	3	0.549	7	0.272	13	0.402	11
Westmoreland	0.609	5	0.645	3	0.759	3	0.789	4	0.440	9	0.619	2	0.479	8	0.531	6

*Water Quality was not included in the measure of Environmental Stress for Kingston as data were not available.

Table 73. RVA - Vulnerability Metadata

Vulnerability					
Subcomponent	**Indicator**	**Source(s)**	**Year**	**Description**	**Notes**
Economic Constraints	Economic Dependency Ratio	STATIN - Population and Housing Census 2011	2011	Ratio of dependents - people younger than 15 and older than 64 - to the working-age population - those ages 15-64	
	Poverty	Planning Institute of Jamaica - JAMSTATS	2012	The proportion of the population living below the poverty threshold	
	Squatter Settlements	Squatter Management Unit, Housing Directorate, Ministry of Economic Growth & Job Creation	Received 2016	Percentage of total squatter settlements (national) located in each Parish	Derived variable represents a percentage of the national total. Kingston and St Andrew are reported together, so derived values will match for these Parishes
	PATH Beneficiaries	Planning Institute of Jamaica - Economic and Social Survey of Jamaica 2014	2014	Total PATH beneficiaries registered per 100 persons	PATH is a conditional cash transfer (CCT) programme funded by the Government of Jamaica and the World Bank and is aimed at delivering benefits by way of cash grants to the most needy and vulnerable in the society. PATH was introduced island-wide in 2002. There are 5 broad categories of beneficiaries, all of which must satisfy the criteria of poverty to qualify for benefits. These are: 1) Children: from birth to completion of secondary education; 2) Elderly: 60 years or over, and not in receipt of a pension; 3) Persons with Disabilities; 4) Pregnant and Lactating Women; 5) Poor Adults 18-59 years Kingston and St Andrew are reported together, so derived values will match for these Parishes
Access to Information Vulnerability	Adult Literacy Rate	Planning Institute of Jamaica - Jamaica Survey of Living Conditions Parish Report 2008	2008	Percentage of the adult population with at least "minimum literacy"	

Vulnerability					
Subcomponent	**Indicator**	**Source(s)**	**Year**	**Description**	**Notes**
	Adult Population that has not completed Secondary Education	STATIN - Population and Housing Census 2011	2011	Percentage of the population aged 15 years and older, not currently enrolled in school, that have not completed secondary education	
	Households without Internet	STATIN - Population and Housing Census 2011	2011	Percentage of Households that DO NOT have an internet-enabled computer	
	Households without Television	STATIN - Population and Housing Census 2011	2011	Percentage of Households that DO NOT have a television	
	Households without Radio	STATIN - Population and Housing Census 2011	2011	Percentage of Households that DO NOT have radio	
Access to Clean Water Vulnerability	Households receiving Piped Water	STATIN - Population and Housing Census 2011	2011	Percentage of Households receiving water piped to yard or dwelling	
	Households with access to Flush Toilets	STATIN - Population and Housing Census 2011	2011	Percentage of Households with access to WC	Values include both shared and unshared facilities.
Vulnerable Health Status	Infant Mortality	STATIN - Population and Housing Census 2011	2011	Single-year infant mortality ratio per 1,000 live births	
	Prevalence Undernourished	Planning Institute of Jamaica - Jamaica Survey of Living Conditions Parish Report 2008	2008	Proportion of children aged under 5 years with weight for height that is more than 2 standard deviations below the median (international reference)	
	Recurrent Illness	Planning Institute of Jamaica - Jamaica Survey of Living Conditions Parish Report 2008	2008	Percentage of the total population that reported being sick with a recurrent Illness in the last 4 weeks	Indicator was derived to convert the data universe from total sick population to total population overall. Consequently, the value represents a percentage of the total population that is sick with a recurrent illness.

Vulnerability					
Subcomponent	**Indicator**	**Source(s)**	**Year**	**Description**	**Notes**
	Prevalence of Disability	STATIN Census 2011 (Online Tables)	2011	Disabilities per 100 persons in the total population.	Disabilities are characterized by those that reportedly inhibit daily activities with 'much difficulty' or 'cannot do it at all' for the following: Self-care, Lifting, Remembering and Concentrating, Walking, Sight, Hearing, and Communicating Indicator represents prevalence of disability rather than the percentage of the population that is disabled because individuals may have multiple or combined disabilities. Data does not provide a count of the population with 'any' or 'multiple' disability.
Environmental Stress	Average Annual Urban Population Change	STATIN - Population and Housing Census 2011	2001 - 2011	Average annual percentage of urban population change for the period of 2001 to 2011	
	Average Annual Change in Forest Cover	Forestry Department	1998 - 2013	Average annual change in forest land cover.	
	Severe Drought Frequency	Meteorological Service of Jamaica	2015	For the period of 2011 through 2015, the percentage of bi-monthly periods that exhibited severe drought conditions	Severe meteorological drought conditions occur when rainfall amounts are 40% or less of normal for a period of eight consecutive weeks. Normal precipitation conditions are defined using average (rainfall) over the 30-yr period 1971-2000. Kingston and St Andrew are reported together, so derived values will match for these Parishes
	Freshwater Quality	National Environment and Planning Agency	Received 2016	Percentage of Freshwater quality test sites that meet or exceed Jamaica National Ambient Water Quality Standards for Nitrate, Phosphate, Biochemical Oxygen Demand and pH	Quality standards, "Draft Jamaica National Ambient Water Quality Standard, Freshwater, 2009" were obtained from the NEPA website: http://www.nepa.gov.jm/new/legal_matters/policies_standards/index.php Data were not available for Kingston, as no test sites were located within the Parish boundary

Vulnerability					
Subcomponent	**Indicator**	**Source(s)**	**Year**	**Description**	**Notes**
Recent Disaster Impacts	Average Annual Victims of Recent Disasters	DesInventar (Disaster Impacts); STATIN (Population)	2010-2014 (Disaster Impacts); 2011 (Population)	Average annual number of disaster victims per 10,000 people, 2010 to 2014	**"Victims"** are defined as the number of persons whose goods and/or individual or collective services have suffered serious damage, directly associated with the event. For example, partial or total destruction of their homes and goods; loss of crops and/or crops stored in warehouses, etc.
	Average Annual People Affected by Recent Disasters	DesInventar (Disaster Impacts); STATIN (Population)	2010-2014 (Disaster Impacts); 2011 (Population)	Average annual number of people affected by disasters per 10,000 people, 2010 to 2015	**"Affected persons"** are defined as the number of persons who suffer indirect or secondary effects related to a disaster. This refers to the number of people, distinct from victims, who suffer the impact of secondary effects of disasters for such reasons as deficiencies in public services, commerce, work, or because of isolation.
Gender Inequality	Proportion of Female Seats in Local Gov't	Ministry of Local Government and Community Development (Councilor data); STATIN - Population and Housing Census 2011 (Population data)	2015 (Councilor Data); 2011 (population data)	**FOR INDEX**: Proportion of female seats in local government council by Proportion of females in total population **FOR DISPLAY**: Percentage of Council seats occupied by women	
	Ratio of Female to Male Tertiary Education Enrollment	STATIN - Population and Housing Census 2011	2011	Ratio of female tertiary school enrollment to male tertiary school enrollment Tertiary school enrollment expressed as the proportion of students enrolled in tertiary education to the population aged 20-24 (inclusive) - by gender	The age range of 20-24 is used to represent the generalized cohort age for tertiary enrollment, consistent with tertiary cohort definition in Economic and Social Survey of Jamaica, 2014, p.26.

Vulnerability					
Subcomponent	**Indicator**	**Source(s)**	**Year**	**Description**	**Notes**
	Ratio of Female to Male Single Household Headship	STATIN - Population and Housing Census 2011	2011	Ratio of single female household headship to single male household headship	Indicator serves a proxy for gender parity among single-income households
	Female to Male Labor Ratio	STATIN - Population and Housing Census 2011	2011	Ratio of female labor participation rate to male labor participation rate Labor participation expressed at the ratio of economically active working-age population to total working - age population - by gender	PDC examined "usual" labor participation over the 12-month period preceding the census instead of the week preceding the census to provide a more comprehensive snapshot.

Coping Capacity

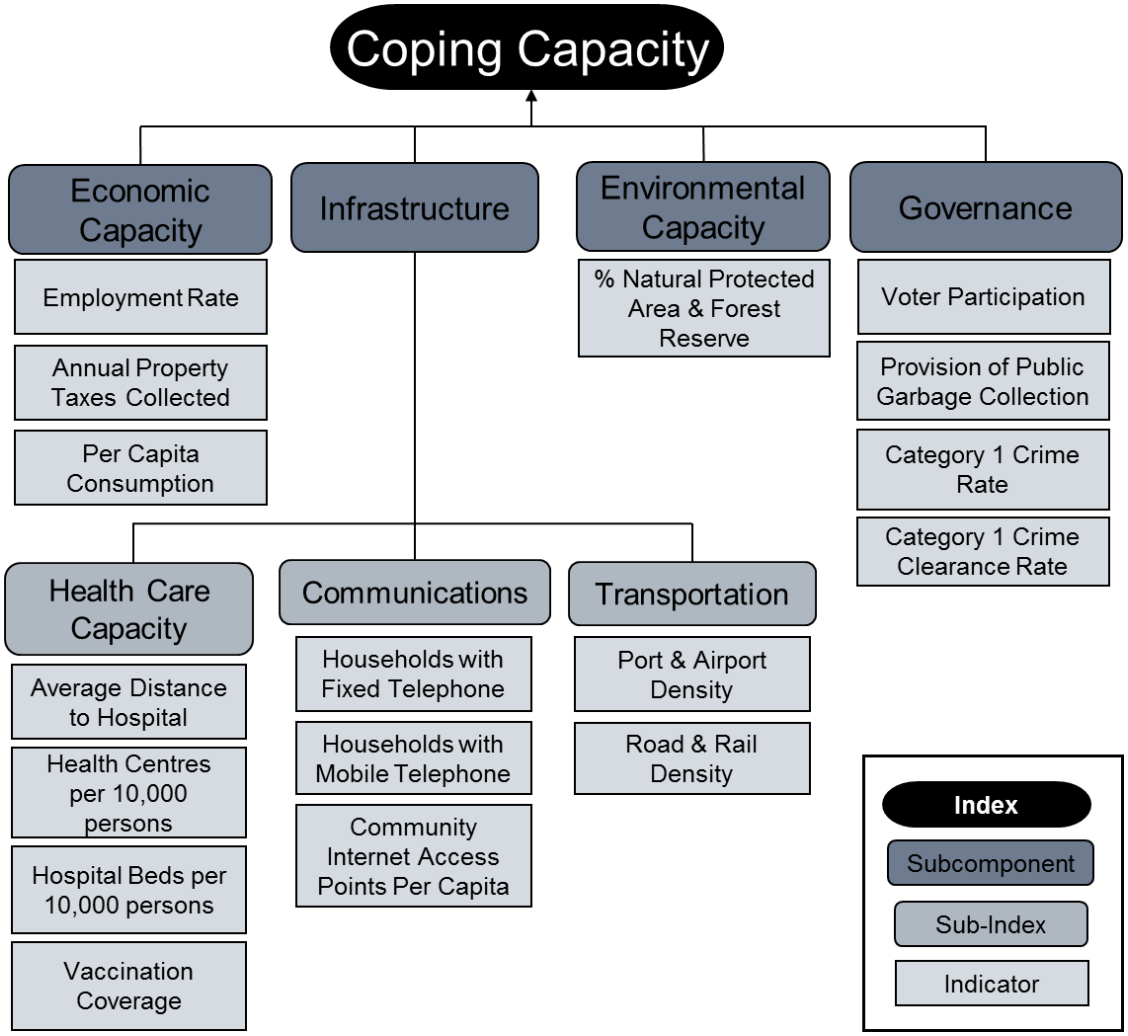

Figure 91. Coping Capacity Index Hierarchy for Jamaica

Table 74. RVA - Coping Capacity Subcomponent Theme Rationale

Subcomponent Theme	Rationale for Inclusion
Governance	Reflects the stability and effectiveness of institutional structures to provide equitable public services, freedom in selecting government, and enforcement of laws to prevent and control crime and violence.
Economic Capacity	Represents a region's ability to absorb immediate economic losses and quickly mobilize financial assets to provide needed assistance.
Environmental Capacity	Represents the ability of the environment to recover from a shock and maintain species health, biodiversity, and critical ecosystem services after impact.
Infrastructure	Represents the ability to learn about needs and exchange information (Communications), and physically distribute goods and services to those affected (Transportation and Health Care).

Table 75. RVA - Coping Capacity Scores and Ranks for all Indices and Subcomponents

Department	Coping Capacity Index		Governance		Econ. Capacity		Environ. Capacity		Infrastructure Index		Health Care (Infra.)		Transport (Infra)		Comms (Infra.)	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Clarendon	0.411	7	0.429	10	0.249	9	0.667	3	0.408	7	0.401	8	0.457	5	0.367	11
Hanover	0.383	11	0.382	11	0.184	11	0.507	6	0.477	4	0.526	4	0.406	6	0.498	7
Kingston	0.580	2	0.492	6	0.419	6	0.599	4	0.799	2	0.722	1	1.000	1	0.676	3
Manchester	0.340	14	0.277	14	0.449	5	0.055	13	0.448	6	0.379	9	0.376	8	0.588	6
Portland	0.533	4	0.768	1	0.015	14	1.000	1	0.408	8	0.424	7	0.203	12	0.597	5
St. Andrew	0.650	1	0.431	9	0.995	1	0.312	10	0.826	1	0.601	3	1.000	1	0.877	1
St. Ann	0.364	12	0.441	8	0.331	7	0.156	11	0.352	11	0.327	11	0.278	10	0.450	9
St. Catherine	0.467	5	0.323	13	0.794	3	0.371	7	0.471	5	0.302	13	0.464	4	0.646	4
St. Elizabeth	0.401	10	0.544	4	0.209	10	0.344	8	0.357	10	0.231	14	0.372	9	0.467	8
St. James	0.560	3	0.532	5	0.820	2	0.122	12	0.568	3	0.376	10	0.618	3	0.710	2
St. Mary	0.403	8	0.678	2	0.103	13	0.000	14	0.372	9	0.665	2	0.218	11	0.231	14
St. Thomas	0.402	9	0.562	3	0.138	12	0.561	5	0.312	14	0.473	5	0.154	13	0.309	12
Trelawny	0.413	6	0.461	7	0.304	8	0.710	2	0.322	12	0.428	6	0.113	14	0.425	10
Westmoreland	0.359	13	0.341	12	0.481	4	0.314	9	0.315	13	0.307	12	0.380	7	0.258	13

Table 76. RVA - Coping Capacity Metadata

Coping Capacity					
Subcomponent	**Indicator**	**Source(s)**	**Year**	**Description**	**Notes**
Environmental Capacity	Protected Area and Forest Reserve	National Environment and Planning Agency	Received 2016	Percentage of Parish land area that is either protected or in forest reserves	
Infrastructure - Healthcare	Average Distance to Hospital	NSDMD/Mona Geoinformatics Institute/PIOJ	2010	Average distance to hospital	Average distance was calculated for populated areas only. Populated areas were estimated using the 2014 ORNL Landscan population grid, including all areas with population above zero.
	Hospital beds per 10,000 persons	Ministry of Health (Hospital Beds); Planning Institute of Jamaica - Economic and Social Survey of Jamaica 2014 (Population)	2016	Hospital bed complement per 10,000 persons	Hospital bed complement available for public hospitals only. Kingston and St Andrew were combined to prevent an extreme outlier as a result of Kingston's small area. Derived values will match for these Parishes.
	Health Centres per 10,000 persons	NSDMD/Mona Geoinformatics Institute (Health Centres); Planning Institute of Jamaica - Economic and Social Survey of Jamaica 2014 (Population)	2010	Health Centres per 10,000 persons in the population	Kingston and St Andrew were combined to prevent an extreme outlier as a result of Kingston's small area. Derived values will match for these Parishes.
Infrastructure – Healthcare – Vaccination Coverage	DPT Vaccination Coverage	Planning Institute of Jamaica - Jamaica Survey of Living Conditions Parish Report 2008	2008	Percentage of Children aged 6 - 59 months that have received 3 or more doses of DPT Vaccine	
	OPV Vaccination Coverage (Polio)	Planning Institute of Jamaica - Jamaica Survey of Living Conditions Parish Report 2008	2008	Percentage of Children aged 6 - 59 months that have received 3 or more doses of OPV (Polio) Vaccine	
	BCG Vaccination Coverage (TB)	Planning Institute of Jamaica - Jamaica Survey of Living Conditions Parish Report 2008	2008	Percentage of Children aged 6 - 59 months that have received BCG (TB)	

Coping Capacity					
Subcomponent	**Indicator**	**Source(s)**	**Year**	**Description**	**Notes**
				Vaccine	
	Measles Vaccination Coverage	Planning Institute of Jamaica - Jamaica Survey of Living Conditions Parish Report 2008	2008	Percentage of Children aged 12 - 59 months that have received Measles Vaccine	
Infrastructure - Transportation	Road Density	National Land Agency of Jamaica	2016	Total length of road (km) per sq. km of land	Road centrelines may overlap at parish borders. Kingston and St Andrew were combined to prevent an extreme outlier as a result of Kingston's small area. Derived values will match for these Parishes.
	Port and Airport Density	NSDMD/Mona Geoinformatics Institute	2010	Count of seaports and airports per 1,000 sq. km land area	Count of airports includes airstrips, airfields and aerodromes. Kingston and St Andrew were combined to prevent an extreme outlier as a result of Kingston's small area. Derived values will match for these Parishes.
Infrastructure - Communications	Fixed Phone Access	STATIN - Population and Housing Census 2011	2011	Percentage of households that have a fixed phone line	
	Mobile Phone Access	STATIN - Population and Housing Census 2011	2011	Percentage of households that have a mobile cellular telephone	
	Internet Access Points	Universal Service Fund (Access points); Planning Institute of Jamaica - Economic and Social Survey of Jamaica 2014 (population)	2016 (access points); End year 2014 (population)	Estimate of community internet access points per 10,000 persons	Total community internet access points include both completed projects and projects in progress. Kingston and St Andrew are reported together, so derived values will match for these Parishes.
Economic Capacity	Employment	STATIN - Population and Housing Census 2011	2011	Percentage of the population aged 14 years and older that were "usually employed" in the 12 months preceding the census	PDC examined "usual" employment over the 12-month period preceding the census instead of the week preceding the census to provide a more comprehensive snapshot.
	Annual Property Tax Estimate	Planning Institute of Jamaica - Jamaica Survey of Living Conditions	2008	Estimate of collected annual property tax	Property Tax Payments are being used here as a proxy for Parish tax revenue.

Coping Capacity					
Subcomponent	**Indicator**	**Source(s)**	**Year**	**Description**	**Notes**
		Parish Report 2008			Note that the number of households was not reported, but was estimated using the total population and average persons per household, included in the report.
	Per Capita Consumption	Planning Institute of Jamaica - Jamaica Survey of Living Conditions Parish Report 2008	2008	Average monthly consumption expenditure per capita	Consumption is being used here as a proxy for income, with the assumption that Parishes that consume more, earn more.
Governance	Voter Participation	Electoral Commission of Jamaica	2016	Percentage of Voter Participation during February 2016 General Election	
	Households Receiving Public Garbage Collection	STATIN - Population and Housing Census 2011	2011	Percentage of households that receive public garbage collection services	
	Violent Crime Rate	Planning Institute of Jamaica - Economic and Social Survey of Jamaica 2014	2014	Category 1 crime rate per 100,000 persons	Category 1 crimes include murder, shooting, rape, aggravated assault, robbery, break-in and larceny. Kingston and St Andrew are reported together, so derived values will match for these Parishes.
	Violent Crime Case Clearance Rate	Planning Institute of Jamaica - Economic and Social Survey of Jamaica 2014	2014	Percentage of Category 1 crimes committed that have been charged	

Appendix B: RVA Index Construction

After finalizing the datasets for the analysis, indicators were created. Indicators are simply standardized datasets representing one aspect of multi-hazard risk that can be combined in a meaningful way. The indicators used to create subcomponent indices represent a wide range of concepts and are often measured using inconsistent units, ranges, and scales. To make meaningful comparisons between concepts, and to combine them and perform the mathematical operations required to create a single composite index score, indicator values were normalized. Normalization produces a consistent value range and direction across all indicators.

However, as data skewness and outliers may heavily influence the distribution of observations along a normalized scale, some transformations were made prior to rescaling. Minimums, maximums, standard deviations, means, and skew were calculated for each dataset. Datasets showing substantial skewness (beyond +/-1) were evaluated on a case by case basis and transformed using common statistical methods (e.g., natural log, square root, or cube root). In addition to controlling for skewness, indicators were evaluated to ensure consistent conceptual direction between the data and the overall concept modeled in the subcomponent and component index. For example, an indicator of households' access to internet is included within the Information Access Vulnerability subcomponent in the Vulnerability Index. However, *increases* in household internet access conceptually *decrease* vulnerability. To match the direction of the indicator with its effect on overall vulnerability, the data is transformed using the reflection equation:

(Indicator maximum value + 1) – Observed indicator value

Following these transformations, indicators were normalized to create scaled scores ranging from 0 to 1, with the following equation:

(Observed indicator value – Indicator minimum value) /
(Indicator maximum value – Indicator minimum value)

In cases where an indicator observed value was outside +/- 3 standard deviations from the mean, these were excluded from the scaling equation (e.g., 'indicator minimum value' and 'indicator maximum value' in the above equation). Instead the value closest to 3 standard deviations of the mean (without exceeding) was substituted, replacing the minimum or maximum value.

This approach to establishing minimum and maximum values conceptually anchors the range, indicating relative position between the "worst realistic case" and the "best realistic case" for each indicator in the country. Subcomponent scores represent the unweighted average of indicators. Likewise, component Indices (MHE, V, and C) represent the average of their respective subcomponent scores. This method maintains a consistent scale and range through the index construction hierarchy, with a minimum value of 0 and a maximum value of 1.

It is important to note that "0" does not represent "No Risk," (or Hazard Exposure or Coping Capacity or Vulnerability), but instead indicates the minimum realistic case relative to the data analyzed for the country. The resulting indices are mapped using a quantile classification to illustrate the relative distribution of each overall concept throughout Jamaica.

Appendix C: Jamaica: Kickoff Survey Analysis (November 2015)

Introduction

As part of CDM data gathering efforts, stakeholder participants completed an initial survey during the NDPBA Kickoff Meeting/Knowledge Exchange in Kingston, Jamaica, on 03 November 2015. The survey questions were designed to provide insight into how participants perceived CDM efforts within Jamaica. The results for survey questions 1-21 are discussed in relation to CDM components below, followed by a qualitative analysis for survey questions 22 to 24. Frequency tables for responses to survey questions 1-21 can be found in **Annex A**: **Frequency Tables – Kickoff Survey** of this document. **Annex B: Participant Definitions of 'Comprehensive Disaster Management'** supplies full responses to definitions of 'Comprehensive Disaster Management' provided by each participant.

A total of 28 stakeholders participated in the survey, with 54% of the respondents representing central government, 14% local government, 4% international non-governmental organizations (NGOs), 3% United Nations and the balance (25%) not stating their organizational affiliation (see Figure 93). Respondents were 61% female and 39% male. Approximately 39% of respondents were between the ages of 31-40, 22% were 51-60, 14% were 41-50, 7% were 26-30, and 4% were between the ages of 18 and 25. The remaining 14% did not respond to this question.

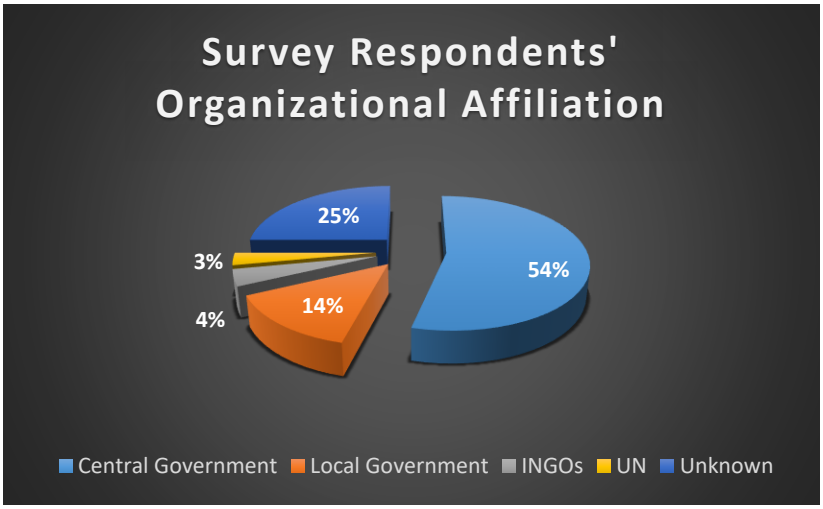

Figure 92: Organizational affiliation of survey respondents

Survey responses were validated through interviews conducted by PDC staff over the course of the project. Interview subjects represented national and parish-level government organizations and NGOs, and included leaders and specialists in the field of disaster management.

Responses to Quantitative Survey Questions (1-21)

Good Leadership by Professionally Trained Officials

Of the participants responding to the survey, 86% (24/28) were in a position of leadership within their organizations. Almost all (93%; 26/28) participants have been afforded opportunities for disaster management training despite it being required for only 46% (13/28) of those surveyed. Although 93% (26/28) felt that disaster management training has improved their ability to effectively perform their job duties/requirements, 39% (11/28) have experienced some barrier to attending disaster management training.

Foundation of Supportive Values for Government Action

Most survey participants expressed the opinion that funding for disasters at the national level is insufficient to carry out necessary requirements. None of the respondents consider the National Disaster Fund adequate to cover the costs associated with response to a major disaster, and only one person considers the national disaster management budget adequate to meet disaster management requirements. When asked about the participation of local government, 61% (17/28) of those surveyed felt that parish governments actively support disaster management in Jamaica.

Legal Authority to Act

Survey participants were asked about their familiarity with DRMA 2015, which was gazetted, or enacted in 2015. Sixty-one percent (17/28) were familiar with this legislation. The same number (61%; 17/28) of respondents felt that this legislation would impact their organizations in some way.

Advocacy Supporting Action

Several survey questions asked about the support of stakeholders outside the formal government disaster management structure (see Figure 93). Respondents had a positive regard for community support of disaster management in Jamaica. A majority (68% 19/28) of respondents felt that parish communities support their local authorities in disaster management efforts. Fewer felt that there is support for public-private partnerships (29%; 8/28) in disaster management at the local level. A majority (82%; 23/28) felt that non-government organizations (NGOs) are actively engaged in disaster preparedness at the local level. However, only 36% (10/28) felt that NGOs were effectively supporting national disaster management goals.

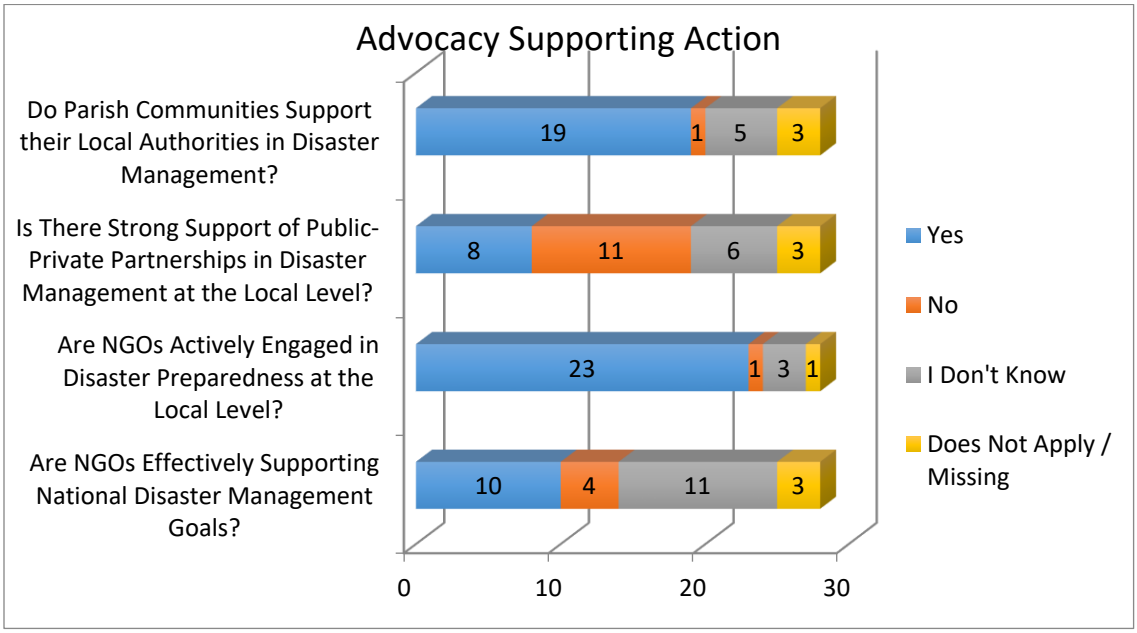

Figure 93: Survey results characterizing Advocacy Supporting Action

Necessary Institutional Resources

Survey participants were in general agreement that there were inadequate necessary institutional resources to perform disaster management functions. Sixty-eight percent (19/28) felt that they did not have the necessary resources to effectively perform assigned job requirements. Only 32% (9/28) of organizations had budgets dedicated to disaster preparedness or disaster response. Only 36% (10/28) had mutual-aid agreements in place. Only 11% (3/28) felt that parishes currently have the capacity to effectively respond to a local disaster. Not one person surveyed felt there was sufficient inventory in their organization to respond to a large-scale disaster. Likewise, none of those surveyed felt that there were sufficient government supplies to respond to a large-scale disaster.

Responses to Qualitative Survey Questions (22-24)

Survey questions 22-24 asked participants to describe the qualities of an effective leader, identify the types of trainings that enhance leadership capacity, and provide details about the specific disaster management training courses completed by respondents. Participants were also asked to provide a definition of 'Comprehensive Disaster Management.' Complete definitions are included in **Annex B: Participant Definitions of 'Comprehensive Disaster Management'** for reference.

Twenty-four out of 28 (86%) survey participants provided a definition of 'Comprehensive Disaster Management.' Seventy-one percent of respondents highlighted the 'inclusion of all phases of disaster management' in their definitions, with 54% referencing the 'inclusion of all hazards'. The 'inclusion of all stakeholders', as well as a 'people-centered approach', were common responses, along with the importance of 'coordination' and 'effectiveness'. 'Accounting for diverse impacts' was an additional theme included by survey participants.

Twenty-five out of 28 respondents (89%) provided answers to Question 22 ("In your opinion, what qualities make an effective leader?"). The quality most-often mentioned was that of a leader being an 'effective communicator' (40%), followed by being 'visionary' (24%), 'leading by example' (20%), and being 'motivational' (20%). An 'openness to learning', 'understanding', being 'honest', and an attitude of 'productiveness' and 'proactivity' were additional highlighted qualities (see Figure 94).

Figure 94: Word Cloud of survey responses to Question 22 ("What qualities make an effective leader?").

Seventy-nine percent (22/28) of survey participants responded to Question 23 ("In your opinion, what

types of training help strengthen leadership capacity?"). Predominant themes included 'team building', 'communication', 'time management', 'project management', and 'human resource management'. Additional training themes centered around 'DRR/DRM-specific trainings', 'strategic management', 'planning', 'coordination', 'critical thinking', 'management skills', 'capacity building', 'problem solving', 'psychology courses', and 'practical exercises' (see Figure 95).

Figure 95: Word Cloud of survey responses to Question 23 ("What types of training help strengthen leadership capacity?")

Question 24 consisted of three parts (A, B, and C). Part A asked participants what elements of disaster management were covered in the training courses they had completed, and to tick the box next to all that applied: mitigation, preparedness, response, recovery, other. Parts B and C elaborated on participant training experiences. Twenty-four out of 28 (86%) survey participants provided a response to part B ("How did your understanding of disaster management improve after completing the selected training courses?"). All respondents reported an increase in their knowledge and an enhanced capacity for understanding and engaging in comprehensive disaster management activities in Jamaica. For Part C ("List the last three disaster management training courses you have attended (include course name and date)"), 23 out of 28 (82%) survey participants provided input on their respective training experiences. Common trainings included 'Relief Supply Tracking System', 'Emergency Operation Centre training', 'Hazmat training', and various specialized 'Damage Assessment trainings'. Listed trainings were taken as early as 2009 and as recently as late 2015.

Summary of Survey Results

Disaster management training is generally available in Jamaica, but almost 40% report having experienced a barrier to training attendance. There is wide belief that the national disaster management budget and the national disaster fund are insufficiently resourced. A majority of participants expressed that local communities support the parishes in disaster management activities. Survey respondents identified budgetary gaps and consider necessary institutional resources to be insufficient. Only 32% reported having a budget for preparedness or response, and just 36% reported having assistance agreements in place. Not one person stated that there were sufficient organizational or government resources available for a large-scale disaster.

Annex A: Frequency Tables – Kickoff Survey

Table 77. Kickoff Survey - Question 1

Are you in a position of leadership within your organization?	*Frequency*	*Percent*
No	2	7.1
Yes	24	85.7
I don't know	0	0
Does not apply	0	0
Missing	2	7.1
Total	28	100

Table 78. Kickoff Survey - Question 2

Do you feel you have the necessary resources to effectively perform your job requirements?	*Frequency*	*Percent*
No	19	67.9
Yes	6	21.4
I don't know	0	0
Does not apply	0	0
Missing	3	10.7
Total	28	100

Table 79. Kickoff Survey - Question 3

In your current position, have you been provided with opportunities for disaster management training?	*Frequency*	*Percent*
No	2	7.1
Yes	26	92.9
I don't know	0	0
Does not apply	0	0
Missing	0	0
Total	28	100

Table 80. Kickoff Survey - Question 4

Does your organization require you to complete training on disaster management?	*Frequency*	*Percent*
No	11	39.3
Yes	13	46.4
I don't know	1	3.6
Does not apply	1	3.6
Missing	2	7.1
Total	28	100

Table 81. Kickoff Survey - Question 5

Has disaster management training improved your ability to effectively perform your job duties/requirements?	*Frequency*	*Percent*
No	1	3.6
Yes	26	92.9
I don't know	0	0
Does not apply	0	0
Missing	1	3.6
Total	28	100

Table 82. Kickoff Survey - Question 6

Have you experienced any barriers to attending disaster management training?	*Frequency*	*Percent*
No	10	35.7
Yes	11	39.3
I don't know	0	0
Does not apply	2	7.1
Missing	5	17.9
Total	28	100

Table 83. Kickoff Survey - Question 7

Does your organization have a dedicated budget for disaster preparedness?	*Frequency*	*Percent*
No	14	50.0
Yes	9	32.1
I don't know	3	10.7
Does not apply	1	3.6
Missing	1	3.6
Total	28	100

Table 84. Kickoff Survey - Question 8

Does your organization have a dedicated budget for disaster response?	*Frequency*	*Percent*
No	11	39.3
Yes	9	32.1
I don't know	4	14.3
Does not apply	1	3.6
Missing	3	10.7
Total	28	100

Table 85. Kickoff Survey - Question 9

Does your organization have mutual-aid agreements in place?	*Frequency*	*Percent*
No	7	25.0
Yes	10	35.7
I don't know	5	17.9
Does not apply	1	3.6
Missing	5	17.9
Total	28	100

Table 86. Kickoff Survey - Question 10

In your opinion, does your organization have sufficient inventory to respond to a large-scale disaster?	*Frequency*	*Percent*
No	22	78.6
Yes	0	0
I don't know	1	3.6
Does not apply	3	10.7
Missing	2	7.1
Total	28	100

Table 87. Kickoff Survey - Question 11

Are you familiar with the Disaster Risk Management Act 2014?	*Frequency*	*Percent*
No	7	25.0
Yes	17	60.7
I don't know	1	3.6
Does not apply	0	0
Missing	3	10.7
Total	28	100

Table 88. Kickoff Survey - Question 12

Will the Disaster Risk Management Act 2014 impact your organization?	*Frequency*	*Percent*
No	0	0
Yes	17	60.7
I don't know	4	14.3
Does not apply	0	0
Missing	7	25.0
Total	28	100

Table 89. Kickoff Survey - Question 13

In your opinion, do Parish governments actively support disaster management?	*Frequency*	*Percent*
No	5	17.9
Yes	17	60.7
I don't know	3	10.7
Does not apply	0	0
Missing	3	10.7
Total	28	100

Table 90. Kickoff Survey - Question 14

In your opinion, do Parish communities support their Local Authorities in disaster management?	*Frequency*	*Percent*
No	1	3.6
Yes	19	67.9
I don't know	5	17.9
Does not apply	0	0
Missing	3	10.7
Total	28	100

Table 91. Kickoff Survey - Question 15

In your opinion, do Parishes currently have the capacity to effectively respond to local disasters?	*Frequency*	*Percent*
No	15	53.6
Yes	3	10.7
I don't know	4	14.3
Does not apply	0	0
Missing	6	21.4
Total	28	100

Table 92. Kickoff Survey - Question 16

In your opinion, is there strong support of public-private partnerships in disaster management at the local level?	*Frequency*	*Percent*
No	11	39.3
Yes	8	28.6
I don't know	6	21.4
Does not apply	1	3.6
Missing	2	7.1
Total	28	100

Table 93. Kickoff Survey - Question 17

In your opinion, are non-government organizations (NGOs) actively engaged in disaster preparedness at the local level?	*Frequency*	*Percent*
No	1	3.6
Yes	23	82.1
I don't know	3	10.7
Does not apply	0	0
Missing	1	3.6
Total	28	100

Table 94. Kickoff Survey - Question 18

In your opinion, is the National Disaster Fund adequate to respond to a major disaster?	*Frequency*	*Percent*
No	18	64.3
Yes	0	0
I don't know	8	28.6
Does not apply	1	3.6
Missing	1	3.6
Total	28	100

Table 95. Kickoff Survey - Question 19

In your opinion, is the National Disaster Management budget adequate to meet disaster management requirements?	*Frequency*	*Percent*
No	18	64.3
Yes	1	3.6
I don't know	6	21.4
Does not apply	2	7.1
Missing	1	3.6
Total	28	100

Table 96. Kickoff Survey - Question 20

In your opinion, is there sufficient government inventory (supplies) to respond to a large-scale disaster?	*Frequency*	*Percent*
No	18	64.3
Yes	0	0
I don't know	7	25.0
Does not apply	2	7.1
Missing	1	3.6
Total	28	100

Table 97. Kickoff Survey - Question 21

In your opinion, are non-government organizations (NGOs) effectively supporting national disaster management goals?	*Frequency*	*Percent*
No	4	14.3
Yes	10	35.7
I don't know	11	39.3
Does not apply	1	3.6
Missing	2	7.1
Total	28	100

Annex B: Participant Definitions of 'Comprehensive Disaster Management'

Is the ability to effective management any disaster in respect of resisting, coping and recovery.
A system/situation where each stakeholder/participant is fully aware of standing procedures, orders, and expectations in order to have an efficient and thorough response to a situation.
All activities of the DM cycle. Covers all aspects of the DM cycle to effectively respond to, plan for, and mitigate against disasters.
An approach to the management of hazards and disasters that is inclusive of all components and areas of the process; a multi-sector approach.
Disaster management that integrates all sectors and systems and levels of Governance mechanisms to predict events and outcomes and allow for appropriate, timely and coordinated response.
Disaster Mat that looks at all hazards and deals with all phases - preparedness, mitigation, response and recovery.
This is a strategic approach to Disaster Management at all levels - regional, national, local and sectoral to strengthen the disaster management cycle at all phases - preparedness, mitigation, response, recovery and rehabilitation.
Comprehensive Disaster Management is consideration of all hazards in the planning of disaster management.
The process of managing the preparation for, response to, and mitigation against all types of disasters that affect an area.
Looking at all hazard and people preparing for responding to and mitigating against disaster.
Disaster management that takes account of all possible hazards (both natural or man-made).
A strategic framework with set goals and objectives for reducing risk and building resilience to natural and manmade disasters.
Incorporating all aspects of disaster management.
A system intended to strengthen local and national capacity to manage various hazards and properly manage response and recovery efforts. Its DM using all people and the different forms as available.
A systematically coordinated approach to Disaster Management that takes diverse impacts and stakeholders into account.
Use of systems, norms, procedures, normative instruments, and command and control to proactive awareness of hazards in such a way that it focuses on the hazard identification and analysis, response, preparedness and mitigation and recovery processes. The aim is to reduce vulnerability and build resilience to achieve development.
Coordination of all aspects of the impacts of a hazard with the integrated involvement of all stakeholders with the aim of mitigation and early recovery.
CDM is disaster management which takes into consideration all activities related to mitigation, preparedness, response to and recovery from all types of disasters/emergencies - both man-made and natural.
Action taken to include all aspects of disaster preparedness, response and recovery.
Disaster management that is multifaceted, integrated to an intended outcome to assist governments and people.
All-encompassing and integrated systems that work together to arrive at solutions for hazards and their impacts on vulnerable populations and locations.
CDM is defined as the coordination, collaboration and mitigation strategies employed within the overall management of disaster risk. CDM is multi-sectoral and ranges throughout the entire governance of a country as disasters affect everyone.

A set of modalities aimed at preventing, mitigating and effectively responding to adverse events.
Having a complete understanding and appreciation for the methods/procedures regarding mitigatory actions against any event that has impacted an area severely.

Appendix D: Jamaica: CDM Preparedness Survey (March 2016)

Introduction

As part of CDM data gathering efforts, stakeholder participants completed a second survey during the NDPBA Knowledge Exchange II in Kingston, Jamaica, on 15 March 2016. The preparedness survey was designed to assess the presence of comprehensive disaster management plans, specific components of disaster management plans, and the drilling and exercising of plans within organizations at both the national and subnational level. The survey was organized into two sections – a quantitative portion (questions 1-28) and a qualitative portion (questions 29-32). Frequency tables for responses to survey questions 1-28 may be referred to in **Annex C**: **Frequency Tables – Preparedness Survey**.

A total of 36 stakeholders participated in the survey, with 39% of the respondents representing central government agencies, 11% representing local government agencies, 8% the United Nations, and 6% from universities in Jamaica (see 78). 36% of participants chose not to list their organizations. Respondents were 43% male and 57% female. Approximately 37% of respondents were between the ages of 31-40, 33% were 41-50, 15% were 51-60, 7% were 61-65, 4% were 18-25, and the remaining 4% were between the ages of 26-30.

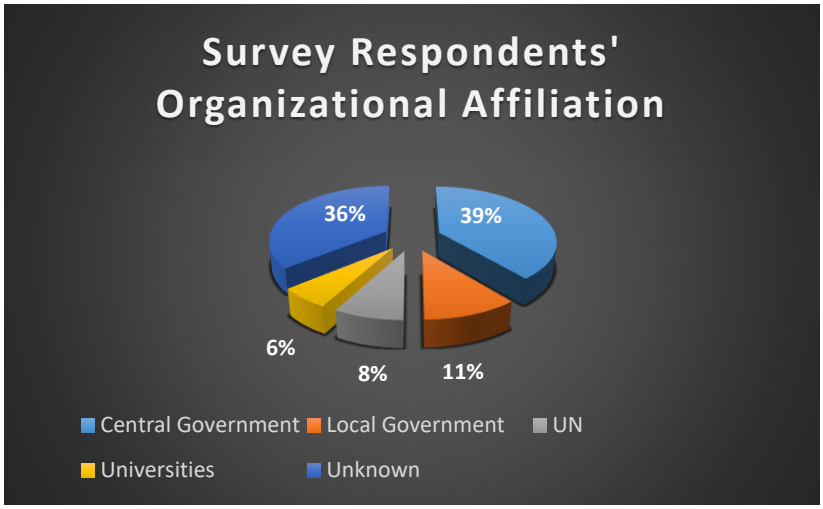

Figure 96: Organizational affiliation of survey respondents

Survey responses were validated during interviews conducted by PDC staff over the course of the project. Interview subjects represented national and parish government organizations and NGOs, and included leaders and specialists in disaster management.

Responses to Quantitative Survey Questions (1-28)

Availability and Accessibility of Disaster Plans

Effective disaster management is dependent upon the entire disaster management community working together to develop, revise, practice and execute disaster plans in a coordinated manner. Of those participating in the Knowledge Exchange II, just over a third (36%; 13/36) reported that their organizations have 'comprehensive disaster management' plans. Over two-thirds (67%; 24/36) reported the presence of disaster response plans for their organizations. Slightly less than half of participants (47%; 17/36) reported the existence of disaster preparedness plans, while fewer reported having disaster mitigation plans (36%; 13/36) or recovery plans (36%; 13/36) for their organizations (see Figure 97). Only a third of plans included information on all hazard types (33%; 12/36).

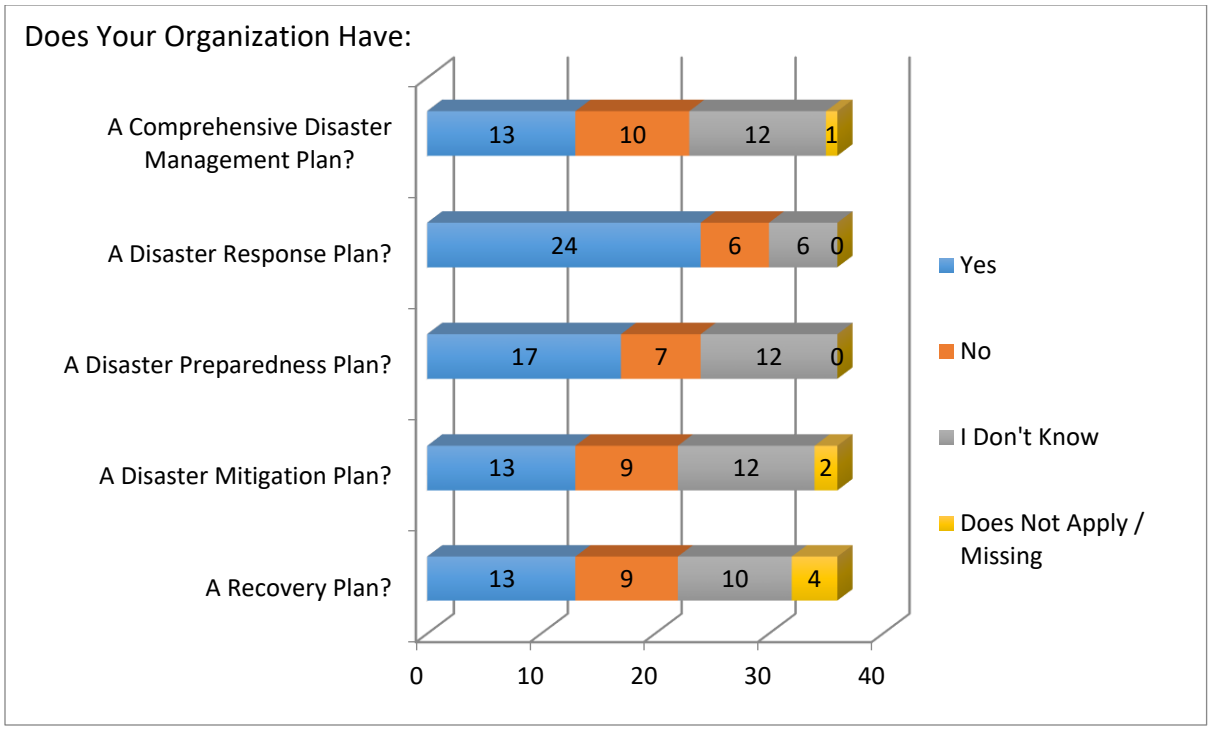

Figure 97: Availability and accessibility of disaster plans according to survey results.

Only 22% (8/36) reported that their plans were regularly updated, although 42% (15/36) of plans are drilled or tested regularly. Most of the stakeholders interviewed during this project indicated that their organizations' plans were incomplete or in draft form.

Planning Collaboration

The coordination of disaster activities across a broad range of partner organizations is most successful when partners are encouraged to engage throughout the planning process, from the initial drafting of plans to the sharing of relevant plans between organizations. Thirty-six percent (13/36) of participants reported their involvement in the drafting of one or more of their organizations' disaster plans. Thirty-one percent (11/36) of participants have access to copies of their organizations' disaster management plans. Inter-agency or organizational sharing of plans is not universal with only 44% (16/36) reporting that their disaster plans have been shared with other agencies or organizations active in disaster management. Virtually everyone interviewed during this project had access to Jamaica's National Disaster Action Plan, were familiar with it and used it regularly. Interviews with the Jamaica Red Cross highlighted their inclusion by ODPEM in reviewing and developing plans.

Composition of Disaster Plans

Comprehensive disaster management planning results in a plan that addresses all phases of disaster management, and considers all relevant hazards. It discusses activities related to disaster response and recovery, and details the planning elements specific to each hazard. Table 98 summarizes the specific components included in organizational disaster management plans according to survey responses.

One-third of participants (33%; 12/36) reported that their organizations' disaster management plans include information on all hazard types. One-third (33%; 12/36) have disaster plans that address public

outreach. Forty-four percent (16/36) reported that their disaster plans addresses early warning, and half of participants (50%; 18/36) have disaster plans that address evacuation. Fifty-six percent (20/36) of participants reported that their disaster plans address logistics management, 61% (22/36) of participants have disaster plans that address transportation, and 44% (16/36) have disaster plans that address shelter operations. Forty-two percent (15/36) have plans that address public safety and security. Only a quarter of respondents (25%; 9/36) reported that their organizations have disaster plans that address long-term community recovery.

More than half of participants (61%; 22/36) have organizational disaster plans that address when and how to activate the Emergency Operations Center (EOC), while 39% (14/36) indicated that their organizations have separate standard operating procedures (SOPs) for activating their EOCs. Sixty-one percent (22/36) address emergency communications during times of disaster. Thirty-one percent (11/36) of respondents reported that their organizations have disaster plans that address public works and engineering, with 28% (10/36) stating that their plans address public health and medical services. Twenty-two percent (8/36) maintain disaster plans that address search and rescue.

Less than a quarter of respondents (19%; 7/36) reported that their organizational plans address oil and hazardous materials response. Seventeen percent (6/36) have disaster plans that address agriculture and natural resources.

Table 98: Frequency of responses to questions regarding specific components of disaster management plans in Jamaica.

Does plan include information on:	*Yes*		*No*		*Don't Know*		*Does Not Apply*		*Missing*	
	N	*%*	*N*	*(%)*	*N*	*%*	*N*	*%*	*N*	*%*
All Hazard Types	*12*	*(33.3)*	*9*	*(25.0)*	*10*	*(27.8)*	*3*	*(8.3)*	*2*	*(5.6)*
Public Outreach	*12*	*(33.3)*	*4*	*(11.1)*	*12*	*(33.3)*	*3*	*(8.3)*	*5*	*(13.9)*
Early Warning	*16*	*(44.4)*	*5*	*(13.9)*	*11*	*(30.6)*	*3*	*(8.3)*	*1*	*(2.8)*
Evacuation	*18*	*(50.0)*	*3*	*(8.3)*	*10*	*(27.8)*	*3*	*(8.3)*	*2*	*(5.6)*
Logistics	*20*	*(55.6)*	*4*	*(11.1)*	*6*	*(16.7)*	*4*	*(11.1)*	*2*	*(5.6)*
Shelter Ops.	*16*	*(44.4)*	*7*	*(19.4)*	*8*	*(22.2)*	*3*	*(8.3)*	*2*	*(5.6)*
EOC activation	*22*	*(61.1)*	*2*	*(5.6)*	*7*	*(19.4)*	*4*	*(11.1)*	*1*	*(2.8)*
Separate SOP for EOC Activation	*14*	*(38.9)*	*7*	*(19.4)*	*11*	*(30.6)*	*2*	*(5.6)*	*2*	*(5.6)*
Transportation	*22*	*(61.1)*	*2*	*(5.6)*	*6*	*(16.7)*	*4*	*(11.1)*	*2*	*(5.66)*
Communications	*22*	*(61.1)*	*2*	*(5.6)*	*8*	*(22.2)*	*2*	*(5.6)*	*2*	*(5.6)*
Public Works and Engineering	*11*	*(30.6)*	*10*	*(27.8)*	*7*	*(19.4)*	*6*	*(16.7)*	*2*	*(5.6)*
Public health and medical services	*10*	*(27.8)*	*11*	*(30.6)*	*9*	*(25.0)*	*3*	*(8.3)*	*3*	*(8.3)*
Search and Rescue	*8*	*(22.2)*	*11*	*(30.6)*	*10*	*(27.8)*	*5*	*(13.9)*	*2*	*(5.6)*
Hazardous Materials	*7*	*(19.4)*	*13*	*(36.1)*	*9*	*(25.0)*	*5*	*(13.9)*	*2*	*(5.66)*
Agricultural and Natural Resources	*6*	*(16.7)*	*13*	*(36.1)*	*9*	*(25.0)*	*4*	*(11.1)*	*4*	*(11.1)*
Public Safety	*15*	*(41.7)*	*7*	*(19.4)*	*9*	*(25.0)*	*3*	*(8.3)*	*2*	*(5.6)*
Long-term Recovery	*9*	*(25.0)*	*11*	*(30.6)*	*10*	*(28.0)*	*4*	*(11.1)*	*2*	*(5.6)*

Perceptions of Disaster Management Leadership and Programs

Strong leadership enhances the overall effectiveness and efficiency of disaster management programs. Forty-two percent (15/36) of those surveyed felt that their organizations exhibit strong disaster management leadership, with 39% (14/36) indicating that their organizations have effective disaster management programs.

Responses to Qualitative Survey Questions (29-32)

Survey questions 29-32 asked participants about the role of their organizations in providing effective disaster management within Jamaica. Respondents were asked to provide a definition of 'effective disaster management' and supply brief answers to open-ended questions (29-32).

Twenty-seven (75%) survey participants provided a definition of 'effective disaster management'. Responses heavily favored the concept of comprehensiveness, highlighting every phase and aspect of the disaster management process. Sixteen respondents referenced either the word 'comprehensive' or phrasing that evoked the quality of comprehensiveness in their answers (see Figure 98). The second most common theme was that of 'minimal negative impacts' resulting from disaster management actions. Eight respondents included some reference to the minimization of negative impacts from disaster management actions in their answers. Additional recurrent themes included the 'appropriate utilization of resources' (human, financial, and material), and effective disaster management as 'a management process' (six responses each). Complete definitions are included in **Annex D: Participant Definitions of 'Effective Disaster Management'** for reference.

Figure 98: Word Cloud of survey responses defining "effective disaster management."

Thirty (83%) respondents provided an answer to Question 29 ("What is the role of your organization in disaster management?"). Many responded that their role was to support the Government of Jamaica's disaster management efforts. Additional organizational roles included: disaster risk reduction, monitoring and evaluation, technical support, response coordination, damage assessments, and the management of grants for damage compensation.

Question 30 ("What are the three most effective preparedness activities that your organization has undertaken?") was answered by 69% of survey respondents. The most common activity was training

across all levels of government in Jamaica in relation to a variety of disaster management issues. Public education, simulations and drills, and planning were additional recurring answers to this question.

Twenty-eight (78%) survey participants responded to Question 31 ("How can your organization improve disaster management?"). The two most common themes pertained to 'participating in more DRM/DRR information sharing' between agencies, and 'dedicating more resources (human, financial, and material)' to disaster management at all levels of government. Other themes of note included capacity building, the streamlining of disaster management processes, and public outreach and community education.

Seventy-five percent of respondents (27/36) answered Question 32 ("What is your organization's area of responsibility? (Local, provincial, national, all, etc.)"). A majority of respondents were responsible for disaster management activities at the national level (18). One respondent dealt with disaster management specifically at the regional level, and three focused on the parish/local level of the country. Three respondents worked at all levels of the government and two worked at both the national and the regional level towards the effective management of disasters.

Summary of Survey Results

Jamaica's National Disaster Action Plan is universally available, understood, and utilized by those engaged in disaster management in the country. Over two-thirds (67%; 24/36) of those surveyed stated that their organizations had disaster response plans, but only 31% (11/36) responded that they have copies of the plans. The rate of inter-agency or organizational sharing of plans is low, with only 44% (16/36) reporting that disaster plans had been shared with other agencies or organizations active in disaster management.

The components included in disaster plans vary widely. Most (61%) reported that their plans include EOC activation, communications and transportation components. Least evident, was the inclusion of long-term recovery planning, with only 9 respondents (25%) reporting that their plans include this component. Forty-two percent (15/36) of participants felt that their organizations exhibit strong disaster management leadership and 39% (14/36) indicated that their organizations have effective disaster management programs. Effective preparedness activities identified by the respondents include training across all levels of government in Jamaica in relation to a variety of disaster management issues, public education, simulations and drills, and planning. Finally, in answer to "How can your organization improve disaster management?" the most common themes pertained to participating in more DRM/DRR information sharing between agencies and 'dedicating more resources (human, financial, and material)' to disaster management at all levels of government.

Annex C: Frequency Tables – Preparedness Survey

Table 99. Preparedness Survey - Question 1

Does your organization have a comprehensive disaster management plan?	*Frequency*	*Percent*
No	10	27.8
Yes	13	36.1
I don't know	12	33.3
Does not apply	0	0
Missing	1	2.8
Total	36	100

Table 100. Preparedness Survey - Question 2

Does your organization have a disaster response plan?	*Frequency*	*Percent*
No	6	16.7
Yes	24	66.7
I don't know	6	16.7
Does not apply	0	0
Missing	0	0
Total	36	100

Table 101. Preparedness Survey - Question 3

Does your organization have a disaster preparedness plan?	*Frequency*	*Percent*
No	7	19.4
Yes	17	47.2
I don't know	12	33.3
Does not apply	0	0
Missing	0	0
Total	36	100

Table 102. Preparedness Survey - Question 4

Does your organization have a disaster mitigation plan?	*Frequency*	*Percent*
No	9	25.0
Yes	13	36.1
I don't know	12	33.3
Does not apply	1	2.8
Missing	1	2.8
Total	36	100

Table 103. Preparedness Survey - Question 5

Does your organization have a recovery plan?	*Frequency*	*Percent*
No	9	25.0
Yes	13	36.1
I don't know	10	27.8
Does not apply	0	0
Missing	4	11.1
Total	36	100

Table 104. Preparedness Survey - Question 6

Did you participate in the drafting of any of the disaster plans?	*Frequency*	*Percent*
No	21	58.3
Yes	13	36.1
I don't know	0	0
Does not apply	0	0
Missing	2	5.6
Total	36	100

Table 105. Preparedness Survey - Question 7

Do you have a copy of the disaster management plan(s)?	*Frequency*	*Percent*
No	22	61.1
Yes	11	30.6
I don't know	1	2.8
Does not apply	0	0
Missing	2	5.6
Total	36	100

Table 106. Preparedness Survey - Question 8

Does your disaster management plan include information on all hazard types (example: earthquakes, landslide, tsunami, extreme cold, floods, etc.)?	*Frequency*	*Percent*
No	9	25.0
Yes	12	33.3
I don't know	10	27.8
Does not apply	3	8.3
Missing	2	5.6
Total	36	100

Table 107. Preparedness Survey - Question 9

Has your plan been shared with other agencies or organizations active in disaster management?	*Frequency*	*Percent*
No	2	5.6
Yes	16	44.4
I don't know	13	36.1
Does not apply	4	11.1
Missing	1	2.8
Total	36	100

Table 108. Preparedness Survey - Question 10.A

Are your organization's disaster plans updated regularly?	*Frequency*	*Percent*
No	12	33.3
Yes	8	22.2
I don't know	10	27.8
Does not apply	4	11.1
Missing	2	5.6
Total	36	100

Table 109. Preparedness Survey - Question 10.B

Are your organization's disaster plans tested, drilled or exercised regularly?	*Frequency*	*Percent*
No	11	30.6
Yes	15	41.7
I don't know	5	13.9
Does not apply	4	11.1
Missing	1	2.8
Total	36	100

Table 110. Preparedness Survey - Question 11

Do your disaster plans address public outreach?	*Frequency*	*Percent*
No	4	11.1
Yes	12	33.3
I don't know	12	33.3
Does not apply	3	8.3
Missing	5	13.9
Total	36	100

Table 111. Preparedness Survey - Question 12

Do your disaster plans address early warning?	*Frequency*	*Percent*
No	5	13.9
Yes	16	44.4
I don't know	11	30.6
Does not apply	3	8.3
Missing	1	2.8
Total	36	100

Table 112. Preparedness Survey - Question 13

Do your disaster plans address evacuation?	*Frequency*	*Percent*
No	3	8.3
Yes	18	50.0
I don't know	10	27.8
Does not apply	3	8.3
Missing	2	5.6
Total	36	100

Table 113. Preparedness Survey - Question 14

Do your disaster plans address logistics management (the movement of personnel and resources during times of disasters)?	*Frequency*	*Percent*
No	4	11.1
Yes	20	55.6
I don't know	6	16.7
Does not apply	4	11.1
Missing	2	5.6
Total	36	100

Table 114. Preparedness Survey - Question 15

Do your disaster plans address shelter operations?	*Frequency*	*Percent*
No	7	19.4
Yes	16	44.4
I don't know	8	22.2
Does not apply	3	8.3
Missing	2	5.6
Total	36	100

Table 115. Preparedness Survey - Question 16

Do your disaster plans address when and how to activate the Emergency Operation Center?	*Frequency*	*Percent*
No	2	5.6
Yes	22	61.1
I don't know	7	19.4
Does not apply	4	11.1
Missing	1	2.8
Total	36	100

Table 116. Preparedness Survey - Question 17

Does your organization have a separate standard operating procedure (SOP) for how to activate the Emergency Operation Center?	*Frequency*	*Percent*
No	7	19.4
Yes	14	38.9
I don't know	11	30.6
Does not apply	2	5.6
Missing	2	5.6
Total	36	100

Table 117. Preparedness Survey - Question 18

Do your disaster plans address transportation during times of disasters?	*Frequency*	*Percent*
No	2	5.6
Yes	22	61.1
I don't know	6	16.7
Does not apply	4	11.1
Missing	5	5.6
Total	36	100

Table 118. Preparedness Survey - Question 19

Do your disaster management plans address emergency communications during times of disaster?	*Frequency*	*Percent*
No	2	5.6
Yes	22	61.1
I don't know	8	22.2
Does not apply	2	5.6
Missing	2	5.6
Total	36	100

Table 119. Preparedness Survey - Question 20

Do your disaster plans address public works and engineering?	*Frequency*	*Percent*
No	10	27.8
Yes	11	30.6
I don't know	7	19.4
Does not apply	6	16.7
Missing	2	5.6
Total	36	100

Table 120. Preparedness Survey - Question 21

Do your disaster plans address public health and medical services?	*Frequency*	*Percent*
No	11	30.6
Yes	10	27.8
I don't know	9	25.0
Does not apply	3	8.3
Missing	3	8.3
Total	36	100

Table 121. Preparedness Survey - Question 22

Do your plans address search and rescue?	*Frequency*	*Percent*
No	11	30.6
Yes	8	22.2
I don't know	10	27.8
Does not apply	5	13.9
Missing	2	5.6
Total	36	100

Table 122. Preparedness Survey - Question 23

Do your plans address oil and hazardous materials response (chemical, biological, radiological, etc.)?	*Frequency*	*Percent*
No	13	36.1
Yes	7	19.4
I don't know	9	25.0
Does not apply	5	13.9
Missing	2	5.6
Total	36	100

Table 123. Preparedness Survey - Question 24

Do your plans address agriculture and natural resources?	*Frequency*	*Percent*
No	13	36.1
Yes	6	16.7
I don't know	9	25.0
Does not apply	4	11.1
Missing	4	11.1
Total	36	100

Table 124. Preparedness Survey - Question 25

Do your plans address public safety and security?	*Frequency*	*Percent*
No	7	19.4
Yes	15	41.7
I don't know	9	25.0
Does not apply	3	8.3
Missing	2	5.6
Total	36	100

Table 125. Preparedness Survey - Question 26

Do your plans address long-term community recovery?	*Frequency*	*Percent*
No	11	30.6
Yes	9	25.0
I don't know	10	27.8
Does not apply	4	11.1
Missing	2	5.6
Total	36	100

Table 126. Preparedness Survey - Question 27

Does your organization have strong disaster management leadership?	*Frequency*	*Percent*
No	9	25.0
Yes	15	41.7
I don't know	7	19.4
Does not apply	2	5.6
Missing	3	8.3
Total	36	100

Table 127. Preparedness Survey - Question 28

Do you think your organization has an effective disaster management program?	*Frequency*	*Percent*
No	11	30.6
Yes	14	38.9
I don't know	8	22.2
Does not apply	1	2.8
Missing	2	5.6
Total	36	100

Annex D: Participant Definitions of 'Effective Disaster Management'

A collaborative effort among government agency, NGOs, civic group to reduce impact of disasters.
Effective response encapsulates time based appropriateness of respondents that impact those in need.
Providing timely and speedy response to the affected population based on the identified needs.
Timely and relevant to the needs of communities affected.
Effect disaster response is the ability of all the stakeholders to promptly and effectively respond to a disaster in order to limit the possible effects of that disaster on the most vulnerable and the community as a whole.
Well-coordinated, efficiently run, client responsive with built-in feedback loop for evaluation and improvement.
The use of procedures and tools that allow for collaboration between relevant organizations to mitigate damage and loss of life due to disasters.
Effective disaster response can be defined as sharing of information on risk and communication of risk with communities and the private sector.
The timely manner of getting a nation to some semblance of normalcy after a disaster and limiting the loss of life and property. Additionally, the prevention or mitigation of public health hazards/diseases.
Being able to provide information on comprehensive disaster management to the entire population of my parish.
The provision of tools, services and actors that enables a systematic management of data and information to effectively address the mitigation, preparedness, response, and recovery aspects of any disaster or event.
Effective disaster response entails actioning a disaster related issue in a timely, coordinated, efficient manner so as to lessen the impact on individuals.
Responding to planned and unplanned issues (proactive and reactive) as they during a disaster.
Ability to respond timely and in such a manner to minimize damage and loss of life.
Response that is coordinated in such a manner that long periods of time does not pass before response is felt. Equipped with tools and resources to save lives.
Good quality - timely - effective focus on recovery process and damage control.
The capacity to establish command access resource and effective communication with other agencies.
This process involves but not limited to the use of: knowledge, skill sets and tools to mitigate against disaster before and after; and to save life and property.
Timely efficient action targeted to key areas and addressing required issues and concerns.
The ability to activate established response procedures in the shortest possible timeframe for quick and effective restoration of operations.
Being able to respond to a disaster in a systematic approach beginning at the preparedness stage then response and recovery in a way that reduce stress and bring about normalcy to people's lives in the shortest period of time.

Have the right person and resources (human, financial) and knowledge for pre, impact, and post disaster response.
Effective disaster response suggests making contact - with not only persons who are affected but providing relief in a timely manner that will not increase a person's vulnerability.
To give precise information to the public as fast as possible.
Rapid response to a disaster in the best possible way that will ensure the safety of the population.

Appendix E: Jamaica: CDM Response Survey (March 2016)

Introduction

As part of comprehensive disaster management (CDM) data gathering efforts, stakeholder participants completed a third survey during the NDPBA Knowledge Exchange II in Kingston, Jamaica, on 15 March 2016. The response survey explored a variety of aspects pertaining to disaster response activities within the country. Questions were focused on, but not limited to, resources and capacity building, damage and needs assessments, staffing, roles and responsibilities during disaster response operations, budget allocations, early warning system usage, the existence of mutual-aid agreements, response partnerships and collaboration, and the operationalization of Emergency Operations Centers. The survey was organized into two sections – a quantitative portion (questions 1-15) and a qualitative portion (questions 16-20). Frequency tables for responses to survey questions 1-15 are provided for reference in **Annex E: Frequency Tables – Response Survey** of this document.

A total of 33 stakeholders participated in the survey, with 30% representing central government agencies, 9% from local government agencies, 6% representing the United Nations, and 6% from universities in Jamaica. Nearly half of participants (49%) chose not to list their organizations (see Figure 100). Respondents were 43% male and 57% female. Approximately 42% of respondents were between the ages of 31-40, 25% were 41-50, 21% were 51-60, 4% were 61-65, 4% were 18-25, and the remaining 4% were between the ages of 26-30.

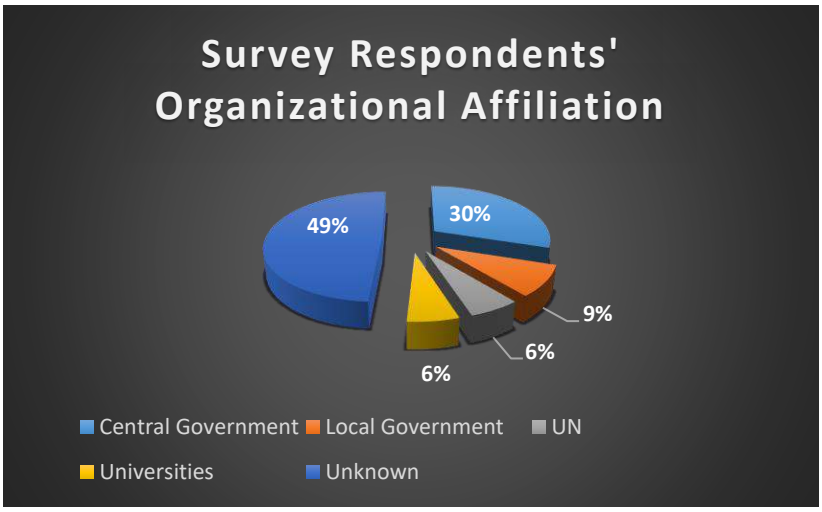

Figure 99: Organizational affiliation of survey respondents

Survey responses were validated through interviews conducted by PDC staff over the course of the project. Interview subjects represented national and parish-level government organizations and NGOs, and included leaders and specialists in disaster management.

Responses to Quantitative Survey Questions (1-15)

Out of thirty-three survey participants, more than three-quarters (79%; 26/33) reported that their organizations are active in disaster response. Survey questions were designed to assess specific response components within Jamaica's disaster management system (discussed below).

Effectiveness of Recent Disaster Event Response

Analyzing national and subnational responses to recent major disaster events provides insight into a country's willingness to support disaster response action at multiple levels (national, subnational, local). According to the results of the response survey, 46% (15/33) of respondents felt that the national

response to the last major disaster was effective. Nearly half of respondents (49%; 16/33) felt that disaster alert/warning messages were effectively issued during the last major disaster. Just under one-third of respondents (30%; 10/33) believed that the mobilization of resources and response personnel was effective during the last disaster.

Organizational Resources and Capacity Building for Disaster Response

An organization's ability to respond adequately to a disaster event is indicative of the broader commitment to, and support for, disaster management activities by communities and the government. More than three-quarters of respondents (79%; 26/33) identified their organizations as being active in disaster response. Seventy-six percent (25/33) stated that their organizations have pre-established agreements for support, such as mutual-aid agreements, during times of disaster. Thirty-six percent (12/33) of respondents indicated that their organizations engage with the military to support disaster response, while almost half (49%; 16/33) reported that their organizations engage with the private sector for such support (see Figure 100).

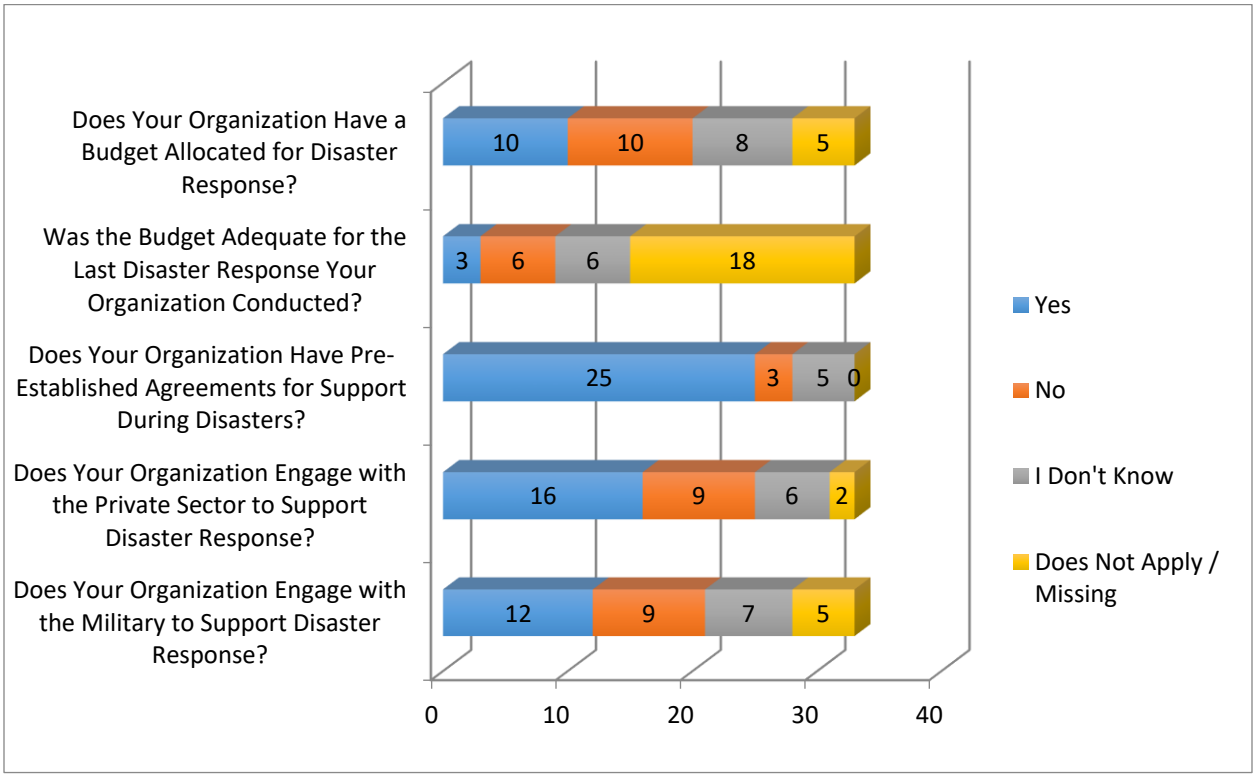

Figure 100: Availability of disaster management resources according to survey results

Only about one-quarter (24%; 8/33) of respondents felt that their organizations have adequate staffing to conduct disaster response. Forty-nine percent (16/33) stated that their organizations have training programs to help develop and build capacity among staff members with disaster management roles.

Thirty percent (10/33) of respondents indicated that their organizations have a budget allocated for disaster response. However, few respondents (9%; 3/33) considered the amount allocated by their organization for response to be adequate during the most recent disaster (see Figure 100).

Post-Disaster Damage and Needs Assessments

Immediately following a disaster event, damage and needs assessments are conducted in order to assess the consequent damage and develop a plan to address the resultant needs of the affected population. Fifty-eight percent (19/33) of respondents indicated that their organizations are responsible for post-disaster damage and needs assessments. Forty-two percent (14/33) reported that post-disaster damage and needs assessments were conducted following the last major disaster, however, only 21% (7/33) of respondents believed assessments were performed accurately.

Emergency Operations Centers

Having a dedicated location from which to conduct disaster response operations allows for more successful and comprehensive disaster management at the national and subnational levels. More than half of survey respondents (61%; 20/33) indicated that their organizations maintain Emergency Operations Centers. Yet only 15% (5/33) of those surveyed were of the opinion that their Emergency Operations Centers have adequate resources to function effectively.

Roles and Responsibilities in Disaster Response

Clarity regarding roles and responsibilities for all stakeholders engaged in a country's disaster management system is essential to minimize duplication of effort, and maximize the utilization of limited resources. Thirty percent (10/33) of respondents stated that disaster response tasks are clearly defined, however, almost half of respondents (49%; 16/33) felt that there is overlap between organizations active in disaster response in the country.

Responses to Qualitative Survey Questions (16-20)

Survey questions 16-20 focused on organizational capabilities and challenges to disaster response in Jamaica. Respondents were asked to provide a definition of 'effective disaster response', and supply brief answers to open-ended questions (16-20).

Twenty-six (79%) survey participants provided a definition of what 'effective disaster response' is to them (see Figure 101).

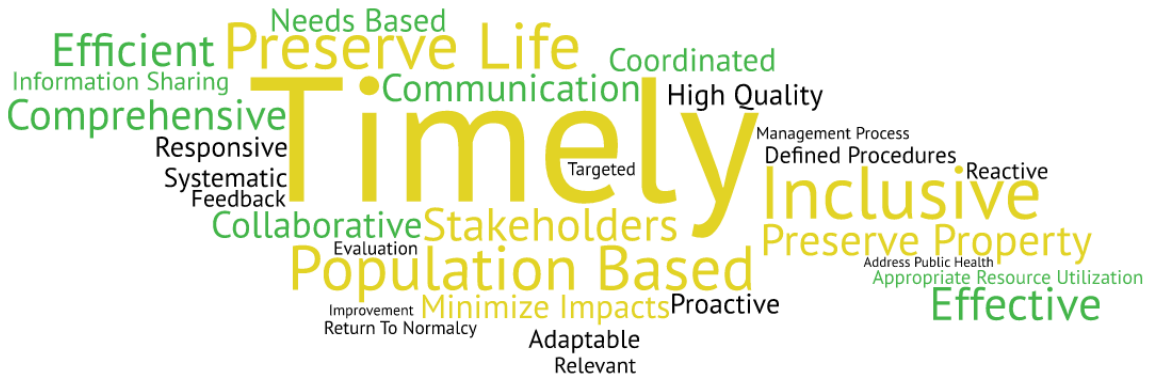

Figure 101: Word Cloud of survey responses defining 'effective disaster response.'

Responses heavily favored the concept of disaster response being 'timely', bringing about appropriate actions to those in need in the shortest amount of time. Fifteen respondents referenced either the word 'timely' or phrasing that evoked the quality of timeliness in their answers. The second most common theme was that of disaster response being 'focused on the population'. Eight respondents included some reference to this in their answers. Other recurrent themes emphasized that effective disaster response: be 'concerned with the preservation of life and property' (6 responses), produce 'minimal negative impacts' (6 responses), 'utilize resources appropriately' (5 responses), and be 'inclusive of all stakeholders' (5 responses). Complete definitions as provided by respondents are included in **Annex F: Participant Definitions of 'Effective Disaster Response'** of this document.

Twenty-eight (85%) respondents provided an answer to Question 16 ('How do you receive disaster alerts or warning messages?'). The most common method for receiving disaster alerts and warning messages is through mass media, such as radio and television. Telephone calls and emails were also common ways of receiving early warning notifications. Other means for receiving alerts include SMS, mobile applications, the Internet, early warning systems, and directly from ODPEM and other disaster management organizations.

Question 17 ('What was the last major disaster that required your organization to respond?') was answered by 82% (27/33) of survey respondents. The most common response was Hurricane Sandy in 2012, followed by the Riverton fires in 2015 and the Chikungunya outbreak in 2014. Other disasters of note included 'the last hurricane', the 2010 Haiti Earthquake, and various flooding events.

Seventy-six percent (25/33) of respondents answered Question 18 ('In your opinion, in what disaster was your organization's response most effective?'). Many respondents believed their organizational responses to hurricanes and tropical storms were most effective, with Hurricane Sandy, Hurricane Ivan, and Tropical Storm Nicole all cited as examples. Flood events, earthquakes, and chemical spills were also mentioned, with several respondents replying that they did not know which disaster elicited the most effective response from their organization(s).

Twenty-nine (88%) respondents provided an answer to Question 19 ('In your opinion, what would make disaster response more effective in Jamaica?'). Most respondents agreed that: increased coordination between all levels of government down to the community level; an increase in the availability of resources (human, financial, and material); and increased information sharing at all levels would greatly enhance the overall effectiveness of disaster response in Jamaica. Equally important, were suggestions regarding regular emergency response simulations and drills; more frequent training and capacity building opportunities, particularly at the community level; and strengthened communication among all relevant disaster response stakeholders.

Additional suggestions focused on better organization, and clarity in the definition of responsibilities among agencies.

Question 20 ('In your opinion, what is the greatest challenge to effective disaster response?') was answered by 82% (27/33) of survey respondents. Responses overwhelmingly referenced a lack of adequate resources (human, financial and material), as well as inadequate communication and coordination among agencies (see Figure 102). Additional challenges include a lack of advance planning, limited public awareness and cultural challenges, difficulties regarding open data sharing, a lack of adequately trained personnel, and competition between agencies.

Figure 102: Word Cloud of survey responses to Question 20 ('What is the greatest challenge to effective disaster response?')

Summary of Survey Results

Resourcing was highlighted as the greatest challenge to effective disaster response in Jamaica (see Figure 100). Only 9% (3/33) felt that their organization had an adequate budget for the most recent disaster response they participated in, and only 15% (5/33) felt that their Emergency Operations Centers have adequate resources to perform their responsibilities effectively. Over three-quarters (76%; 25/33) stated that their organizations have pre-established agreements (e.g., mutual-aid agreements) for support during times of disaster, and almost half (49%; 16/33) engage with the private sector for support. Just over one-third (36%; 12/33) indicated that their organizations engage with the military to support disaster response.

Annex E: Frequency Tables – Response Survey

Table 128. Response Survey - Question 1

Is your organization active in disaster response?	*Frequency*	*Percent*
No	6	18.2
Yes	26	78.8
I don't know	0	0
Does not apply	1	3.0
Missing	0	0
Total	33	100

Table 129. Response Survey - Question 2

In your opinion, was the national response to the last major disaster effective?	*Frequency*	*Percent*
No	7	21.2
Yes	15	45.5
I don't know	8	24.2
Does not apply	1	3.0
Missing	2	6.1
Total	33	100

Table 130. Response Survey - Question 3

Do you feel that disaster alert/warning messages were issued effectively during the last disaster?	*Frequency*	*Percent*
No	6	18.2
Yes	16	48.5
I don't know	8	24.2
Does not apply	1	3.0
Missing	2	6.1
Total	33	100

Table 131. Response Survey - Question 4

In your opinion, was the mobilization of resources and response personnel effective during the last disaster?	*Frequency*	*Percent*
No	8	24.2
Yes	10	30.3
I don't know	12	36.4
Does not apply	0	0
Missing	3	9.1
Total	33	100

Table 132. Response Survey - Question 5

Does your organization have pre-established agreements for support during times of disaster (i.e. mutual-aid agreements)?	*Frequency*	*Percent*
No	3	9.1
Yes	25	75.8
I don't know	5	15.2
Does not apply	0	0
Missing	0	0
Total	33	100

Table 133. Response Survey - Question 6

Is your organization responsible for post-disaster damage and needs assessments?	*Frequency*	*Percent*
No	8	24.2
Yes	19	57.6
I don't know	2	6.1
Does not apply	2	6.1
Missing	2	6.1
Total	33	100

Table 134. Response Survey - Question 7.A

Were post-disaster damage and needs assessments conducted following the last major disaster?	*Frequency*	*Percent*
No	0	0
Yes	18	54.5
I don't know	14	42.4
Does not apply	0	0
Missing	1	3.0
Total	33	100

Table 135. Response Survey - Question 7.B

If yes, were they done accurately?	*Frequency*	*Percent*
No	2	6.1
Yes	7	21.2
I don't know	12	36.4
Does not apply	2	6.1
Missing	10	30.3
Total	33	100

Table 136. Response Survey - Question 8.A

Does your organization maintain an Emergency Operations Center?	*Frequency*	*Percent*
No	9	27.3
Yes	20	60.6
I don't know	3	9.1
Does not apply	0	0
Missing	1	3.0
Total	33	100

Table 137. Response Survey - Question 8.B

If yes, does the Emergency Operations Center have adequate resources to perform its responsibilities effectively?	*Frequency*	*Percent*
No	11	33.3
Yes	5	15.2
I don't know	6	18.2
Does not apply	6	18.2
Missing	5	15.2
Total	33	100

Table 138. Response Survey - Question 9

In your opinion, does your organization have adequate staffing to conduct disaster response?	*Frequency*	*Percent*
No	17	51.5
Yes	8	24.2
I don't know	5	15.2
Does not apply	3	9.1
Missing	0	0
Total	33	100

Table 139. Response Survey - Question 10

Does your organization have a training program to help develop and build capacity in disaster management staff members?	*Frequency*	*Percent*
No	14	42.4
Yes	16	48.5
I don't know	2	6.1
Does not apply	0	0
Missing	1	3.0
Total	33	100

Table 140. Response Survey - Question 11

In your opinion, are disaster response tasks clearly defined?	*Frequency*	*Percent*
No	11	33.3
Yes	10	30.3
I don't know	9	27.3
Does not apply	0	0
Missing	3	9.1
Total	33	100

Table 141. Response Survey - Question 12

In your opinion, is there overlap between organizations active in disaster response in Jamaica?	*Frequency*	*Percent*
No	9	27.3
Yes	16	48.5
I don't know	7	21.2
Does not apply	0	0
Missing	1	3.0
Total	33	100

Table 142. Response Survey - Question 13

Does your organization engage with the military to support disaster response?	*Frequency*	*Percent*
No	9	27.3
Yes	12	36.4
I don't know	7	21.2
Does not apply	4	12.1
Missing	1	3.0
Total	33	100

Table 143. Response Survey - Question 14

Does your organization engage with the private sector to support disaster response?	*Frequency*	*Percent*
No	9	27.3
Yes	16	48.5
I don't know	6	18.2
Does not apply	1	3.0
Missing	1	3.0
Total	33	100

Table 144. Response Survey - Question 15.A

Does your organization have a budget allocated for disaster response?	*Frequency*	*Percent*
No	10	30.3
Yes	10	30.3
I don't know	8	24.2
Does not apply	2	6.1
Missing	3	9.1
Total	33	100

Table 145. Response Survey - Question 15.B

If yes, was the budget adequate for the last disaster response your organization conducted?	*Frequency*	*Percent*
No	6	18.2
Yes	3	9.1
I don't know	6	18.2
Does not apply	6	18.2
Missing	12	36.4
Total	33	100

Annex F: Participant Definitions of 'Effective Disaster Response'

Function of ability to efficiently capture information in events and coordinate response mechanisms based on accurate information.
The ability to appropriately respond to the needs of all sectors and communities in a coordinated and efficient way in the event of a disaster.
Effective disaster management is the management and organization of programs and activities that cover measures to prevent, mitigate, and prepare for adverse effects of national and other hazards.
Being in a position to prepare for and respond to disasters, with funds, supplies and training. Effective communication, awareness raising and outreach.
multi-hazard, multi-phase evidence-based long term linking to short term (e.g. response-recovery linkages).
The use of tools, policies, and procedures that allow for effective collaboration to prevent and mitigate the effects of disasters.
The management of disasters to effectively deal with assistance, coping and recovery when a disaster occurs to minimize loss of life, property.
The appropriate management of hazard risk to ensure minimal loss to life and property.
Ongoing assessment of a country's socio-economic and environmental resources to forecast areas of greatest concern thus planning effective mitigation strategies or preventing potential hazards.
Being able to reach every level of society with the relevant information/data on Comprehensive Disaster Management.
This can be defined as the process by which stakeholders at all levels work together using various tools and practices that will result in an overall structured management of resources at the preparedness, response, and recovery stages of every emergency or disaster.
Accurate communication of risk and vulnerability warning and coordination of response.
Effective disaster management requires pre, during, post disaster issues. It must consider all types of disasters including not just natural (e.g. organizations must recover from information systems going down). Management requires planning for, managing during and recovering as quickly as possible after the disaster.
Policies and systems that mitigate the negative effects/impacts of disasters.
Effective disaster management centers around policies that are designed to effectively manage/mitigate disasters, taking into account factors such as children, vulnerability areas, etc.
Having relevant and appropriate planning and risk anticipation and response strategies in place along with trained personnel in every strata of the country in readiness to respond, and the basic required tools and resources to carry out activities to minimize the after-effects of a disaster if it occurs.
Ability to respond timely and effectively before, during, and after a disaster.
A system that is able to operate or manage people's lives in the event of a disaster. That is the preservation of lives.

Comprehensive approach that it is inclusive, human rights oriented with gender perspective, taking cultural issues in consideration and take in consideration different scenarios.
The speed and efficiency at which multi agencies can pull together in resolving an emergency/disaster situation.
This process is done by use of knowledge and required skill sets and tools to executing the mitigation and recovery before and after a disaster.
Have procedures set on how to proceed in the event of various types of disasters leading to quick and efficient recovery.
Effective disaster management is having a comprehensive and detailed disaster plan that focuses on mitigation/preparedness, in order to lessen the likely impact of recovery and be able to better prepare individuals through awareness programs.
The ability to plan for and mitigate against the negative effects of natural disasters.
A system whereby policies and protocols are clearly outlined, administered and followed by each participant and agencies and persons at a local level and national level.
To create a system which is easy to be implemented.
When coordination and resources are at its best in minimizing the negative effects of disasters on the population.

Appendix F: Sample Parish-level Comprehensive Disaster Management Plan Outline

This sample Parish-level plan outline is provided to address a gap identified in the CDM Analysis concerning the Legal Authority to Act. In interviews with both ODPEM staff and the Parish Disaster Coordinators, stakeholders noted a need for a template to ensure the completeness, comprehensiveness, and consistency of subnational disaster plans. This sample outline draws upon best practices in planning from the international community, including the Association of South-East Asian Nations (ASEAN), county and city plans in the United States of America, and Parish and local plans in Jamaica.

Letter of Promulgation

Record of Revisions

Table of Contents

1. Introduction
    a. Purpose (of the Plan)
    b. Scope and Applicability (of the Plan)
    c. Mission (of the Disaster Management Unit)
    d. Organization (of the Plan)
    e. Authorities (Listing of Laws, Rules and Regulations Affecting Disaster Management)
    f. Policies (Parish policies supporting the disaster management Plan)
    g. Key Concepts (Provide guidance to the management of incidents)

2. Planning Assumptions and Considerations
    a. Geographical, Climatological, and Topographical Considerations
    b. Demographics
    c. Economic Profile
    d. Hazard and Vulnerability Analysis (including table of hazards in order)
    e. Capability Assessment
    f. Disaster Management Overview
    g. Provision of Parish Services
    h. Citizen Responsibility
    i. Limitations

3. Concept of Operations and Incident Management Actions
    a. General – identify how the parish disaster team is organized and the overall way that disaster management activities are conducted and coordinated, including the different phases and their starting and ending conditions. ODPEM has established Amber Phases 1-5 for hurricanes. Examples of a way to phase operations

        Phase 1 – Normal Operations – begins with publishing of the plan, ends when Phase 2 is declared

        Phase 2 – Alert – (Amber Phases 1-4 in NDAP) begins with threat identified and ends when impacts of the threat affect Jamaica or cause response activities to begin

            2a – Threat identified (inside cone of error, high amounts of rainfall predicted)

2b – Imminent impact (hurricane watch/flood watch issued)

Phase 3 – Response (Amber Phase 5 in NDAP) – begins when TS-force winds impact Jamaica, or impacts cause response actions to take place, and ends when all life-saving and life safety issues have been resolved.

Phase 4 – Recovery – begins when all life-saving and life safety issues have been resolved and continues until the parish has recovered (examples of defining recovery end-state: housing stock is within x% of pre-disaster values, building permit applications are within x% of pre-disaster numbers, population is within x%, infrastructure repair is x% complete).

b. Disaster Management - General Concepts
c. Disaster Management Priorities
d. Organization, Direction and Coordination
    i. General
    ii. Disaster management organization
        1. Phase 1
        2. Phase 2
        3. Phase 3
        4. Phase 4
    iii. Disaster coordination and operations facilities
    iv. EOC organization, staffing and activation levels
    v. EOC activation procedures
e. Logistics
f. Public Information
g. Communications
h. Preparedness Actions and Activities (Phase 1)
    i. Planning
    ii. Public awareness
i. Alert Actions (Phase 2)
    i. Alert and Warning
    ii. Evacuation
    iii. Sheltering
j. Response Actions (Phases 3 and 4)
    i. Post-disaster needs assessments
    ii. Response operations
    iii. Mutual-aid and requests for assistance
    iv. Assistance from ODPEM/MLSS
    v. Coordination with other disaster management organizations (ODPEM, other parishes, zonal committees, NGOs)
k. Recovery Actions (Phase 5)
    i. Establish a recovery organization
    ii. Develop a recovery plan
    iii. Track projects, conduct assessments
    iv. Restock disaster supplies
l. Mitigation Actions
    i. Identify, develop and prioritize mitigation projects

ii. Identify funding sources for mitigation projects
iii. Identify especially vulnerable areas

4. Roles and Responsibilities
    a. Purpose
    b. General
    c. Parish Disaster Committee
        i. Phase 1 Responsibilities / Tasks / Actions
        ii. Phase 2a Responsibilities / Tasks / Actions
        iii. Phase 2b Responsibilities / Tasks / Actions
        iv. Phase 3 Responsibilities / Tasks / Actions
        v. Phase 4 Responsibilities / Tasks / Actions
    d. Sub-committees (List each subcommittee)
        i. Disaster Management Sub-committee
            1. Phase 1 Responsibilities / Tasks / Actions
            2. Phase 2a Responsibilities / Tasks / Actions
            3. Phase 2b Responsibilities / Tasks / Actions
            4. Phase 3 Responsibilities / Tasks / Actions
            5. Phase 4 Responsibilities / Tasks / Actions
        ii. Fiscal Sub-committee
            1. Phase 1 Responsibilities / Tasks / Actions
            2. Phase 2a Responsibilities / Tasks / Actions
            3. Phase 2b Responsibilities / Tasks / Actions
            4. Phase 3 Responsibilities / Tasks / Actions
            5. Phase 4 Responsibilities / Tasks / Actions
    e. Parish Disaster Coordinator
    f. Department, Office and Cooperating Agency Responsibilities
        i. Mayor
        ii. Secretary Manager
        iii. Financial Manager
        iv. Roads and Works Department
        v. Jamaica Red Cross
        vi. Jamaica Fire Brigade
        vii. Jamaica Constabulary Force
        viii. Jamaica Defense Force
        ix. MOH
        x. MOE
        xi. MLSS
    g. Zonal Committees

5. Plan Maintenance
    a. Review – identify how often the plan will be reviewed
    b. Revision – identify how revisions will be approved and added to the plan
    c. Training and Exercises (drills, simulations, tabletops, functional, full-scale, etc.)
    d. Distribution List

6. Annexes
    a. Definitions and Acronyms
    b. Actions/Tasks by Phase
    c. Evacuation Plan
    d. Hazard 1 (Highest Probability / Impact)
    e. Hazard 2
    f. Hazard 3
    g. Hazard 4