



# BELIZE NATIONAL DISASTER PREPAREDNESS BASELINE ASSESSMENT

**A DATA-DRIVEN TOOL FOR  
ASSESSING RISK AND BUILDING  
LASTING RESILIENCE**





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- Belize Crime Observatory
- Belize Defence Force
- Belize Department of the Environment (DoE)
- Belize Economic Development Council
- Belize Election and Boundaries Department
- Belize Electric Company Limited (BECOL)
- Belize Legal Information Network
- Belize Ministry of Economic Development and National Human Development Advisory Committee
- Belize Ministry of Education, Youth, Sports and Culture
- Belize Ministry of Energy, Science Technology and Public Utilities
- Belize Ministry of Foreign Affairs
- Belize Ministry of Health
- Epidemiology Unit
- Belize Ministry of Natural Resources
- Belize Ministry of Public Service
- Belize Ministry of Public Works
- Belize Ministry of Sustainable Development, Climate Change and Disaster Risk Management
- Belize National Climate Change Office
- Belize National Emergency Management Organization (NEMO)
- Belize National Fire Service
- Belize Network of NGOs
- Belize Police Department
- Belize Red Cross Society
- Belize Social Investment Fund
- Belize Tourism Board
- Belize Tropical Forest Studies
- Biodiversity and Environmental Resource Data System of Belize (BERDS)
- Caribbean Disaster Emergency Management Agency (CDEMA); GeoCRIS
- Caribbean Handbook on Risk Information Management (CHARIM)
- National Bank of Belize (NBB)
- National Meteorological Service of Belize
- National Women’s Commission
- Statistical Institute of Belize
- University of Belize
- University of Belize Environmental Research Institute

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# LIST OF ABBREVIATIONS

**2030 Agenda; SDGs:**  
Sustainable Development  
Goals

**ACS:** Association of Caribbean  
States

**ANDA:** Association of National  
Development Agencies

**BATSUB:** British Army Training  
Support Unit Belize

**BCCAP:** Belize Climate  
Change Adaptation Policy

**BCG:** Belize Coast Guard

**BCRIP:** Belize Climate  
Resilient Infrastructure Project

**BDF:** Belize Defence Force

**BECOL:** Belize Electric  
Company, Ltd

**BHRAF:** Belize Hazard and  
Risk Assessment Framework

**BJNSC:** Belize Joint National  
Steering Committee

**BNE:** Belize Natural Energy

**BNSS:** Belize National  
Statistical System

**BPW:** Bureau of Public Works

**BRCS:** Belize Red Cross  
Society

**BSIF:** Belize Social Investment  
Fund

**BTB:** Belize Tourism Board

**BURDPP:** Belize Urban  
Resilience and Disaster  
Prevention Project

**CAFFGS:** Central American  
Flash Flood Guidance System

**CARICOM:** Caribbean  
Community

**CCA:** Climate change  
adaptation

**CCAPVAA:** Climate Change  
Adaptation Plan and  
Vulnerability and Adaptation  
Assessment

**CCCCC:** Caribbean  
Community Climate Change  
Centre

**CCDRMF:** Canada Caribbean  
Disaster Risk Management  
Fund

**CCRIF:** Caribbean Catastrophe  
Risk Insurance Facility

**CDAC:** CARICOM Disaster  
Assessment and Coordination  
(CDEMA)

**CDB:** Caribbean Development  
Bank

**CDEMA:** Caribbean Disaster  
Emergency Management  
Agency

**CDERA:** Caribbean Disaster  
Emergency Response Agency  
(predecessor of CDEMA)

**CDM:** Comprehensive Disaster  
Management

**CDM-SRF 2014-2024:**  
Comprehensive Disaster  
Management (CDM) Strategy  
and Results Framework 2014-  
2024

**CDRU:** CARICOM Disaster  
Relief Unit

**CEO:** Chief Executive Officer

**CERC:** Contingent Emergency  
Response Component

**CERT:** Community Emergency  
Response Team

**CIMH:** Caribbean Institute for  
Meteorology and Hydrology

**COG:** Continuity of  
Government

**COOP:** Continuity of  
Operations

**COP:** Common Operating  
Picture

**COST:** CARICOM Operational  
Support Team (CDEMA)

**CSO:** Civil society organization

**DANA:** Damage Assessment  
and Needs Analysis

**DANAC:** Damage Assessment  
and Needs Analysis  
Committee

**DC:** Diplomatic Corps

|   |   |   |
|---|---|---|
| <b>DEC:</b> District Emergency Committee                                  | <b>EOC:</b> Emergency Operations Center                           | <b>IADB:</b> Inter-American Development Bank  |
| <b>DED:</b> Department of Economic Development                            | <b>EPA:</b> Environmental Protection Act                          | <b>ICG/CARIBE-EWS:</b> Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Districts |
| <b>DHS:</b> Department of Human Services                                  | <b>ERT:</b> Emergency Response Team                               | <b>IFRC:</b> International Federation of Red Cross and Red Crescent Societies   |
| <b>DM:</b> Disaster management  | <b>ESF:</b> Emergency support function                            | <b>iGOPP:</b> Index of Governance and Public Policy (in Disaster Risk Management)   |
| <b>DPPSD:</b> Department of Public-Private Sector Dialogue                | <b>ESMF:</b> Environment and Social Management Framework          | <b>LU Act:</b> Land Utilization Act   |
| <b>DPR Act/2000:</b> Disaster Preparedness and Response Act, 2000         | <b>EWS:</b> Early Warning Systems                                 | <b>MAFFESD:</b> Ministry of Agriculture, Fisheries, Forestry, the Environment and Sustainable Development   |
| <b>DRR:</b> Disaster risk reduction                                       | <b>FAC:</b> Foreign Assistance Committee                          | <b>MCE:</b> Multi-Criteria Evaluation   |
| <b>DRRM:</b> Disaster risk reduction and management                       | <b>FFPA:</b> Forest Fire Protection Act                           | <b>MCPHC:</b> Medical Care and Public Health Committee  |
| <b>DSD:</b> Department of Sustainable Development                         | <b>GDP:</b> Gross domestic product                                | <b>MCSDFC 2017-2021:</b> Multi-Country Sustainable Development Framework in the Caribbean 2017 – 2021   |
| <b>EAF:</b> Emergency Assistance Fund (CEDEMA)                            | <b>GFDRR:</b> Global Facility for Disaster Reduction and Recovery | <b>MDGs:</b> Millennium Development Goals   |
| <b>EC:</b> Environment Committee  | <b>GIS:</b> Geographic information system                         | <b>MED:</b> Ministry of Economic Development  |
| <b>EDC:</b> Economic Development Council                                  | <b>GO:</b> Government Organization                                | <b>MEDP:</b> Ministry of Economic Development and Petroleum   |
| <b>EICWC:</b> Education, Information, Communication and Warning Committee | <b>GOB:</b> Government of Belize                                  |   |
| <b>EMC:</b> Emergency Management Coordinator                              | <b>HPPB:</b> Humana People to People Belize                       |   |
| <b>EMT:</b> Emergency medical technician                                  | <b>HRMC:</b> Human Resource Management Committee                  |   |
| <b>EMZ:</b> Emergency Management Zone                                     | <b>HSC:</b> Housing and Shelter Committee                         |   |
|   | <b>HTPA:</b> Housing and Town Planning Act                        |   |



**MFA:** Ministry of Foreign Affairs

**MHA:** Ministry of Home Affairs

**MHD:** Ministry of Human Development

**MHUD:** Ministry of Housing and Urban Development

**MIFT:** Ministry of Industry and Foreign Trade

**MIWC:** Mitigation and Infrastructure Work Committee

**MLLG:** Ministry of Labour and Local Government

**MLO:** Military Liaison Office

**MND:** Ministry of National Development

**MNR:** Ministry of Natural Resources

**MNRE:** Ministry of Natural Resources and Environment

**MNS:** Ministry of National Security

**MoA:** Ministry of Agriculture

**MoE:** Ministry of Education

**MoE/S&T/PU:** Ministry of Energy, Science & Technology and Public Utilities

**MoF:** Ministry of Finance

**MoF/ED/I:** Ministry of Finance, Economic Development & Investment

**MoH:** Ministry of Housing; Ministry of Health

**MoL/LG/RD:** Ministry of Labour, Local Government, and Rural Development

**MoW:** Ministry of Works

**MPS:** Ministry of Public Services

**MPUTC:** Ministry of Public Utilities, Transportation and Communications

**MPW:** Ministry of Public Works

**MSD/CC/DRM:** Ministry of Sustainable Development, Climate Change and Disaster Risk Management

**MSME:** Micro, Small, and Medium Enterprises

**MTW:** Ministry of Transport and Works

**NAC:** National Advisory Committee

**NCCO:** National Climate Change Office

**NDC:** Nationally determined contribution

**NDF:** National Development Framework

**NDSM:** National Disaster Management Strategy

**NDS 2030:** National Development Strategy 2030

**NEC:** National Emergency Coordinator

**NEMO:** National Emergency Management Organization

**NEOC:** National Emergency Operations Center

**NEPS:** National Environmental Policy and Strategy

**NESAP 2014-2024:** National Environmental Strategy and Action Plan 2014-2024

**NFS:** National Fire Service

**NGO:** Non-governmental organization

**NHMP:** National Hazard Mitigation Plan; National Hazard Mitigation Policy

**NHS:** National Hydrological Service

**NLUP:** National Land Use Policy

**NMS:** National Meteorological Service

**NWC:** National Women's Commission

**NWS/NOAA/NHC:** National Weather Service/ National Oceanic and Atmospheric Administration/National Hurricane Center

**OAS:** Organizations of

American States

**OC:** Operational Committee

**OECS:** Organization of Eastern Caribbean States

**OFDA:** Office of US Foreign Disaster Assistance

**OSIPP:** Office of Supervisor of Insurance & Private Pensions

**PAHO:** Pan American Health Organization

**PHA:** Public Health Act

**PM:** Prime Minister

**POA:** Plan of Action

**PPP:** Public/private partnership

**PS:** Participating State (of CDEMA)

**PSR:** Public Service Regulation

**PTWC:** Pacific Tsunami Warning Centre

**RC:** Recovery Committee

**RCC:** District Coordination Center (CDEMA)

**Revised DPR Act/2003:** Revised DPR Act/2000; 2003

**RNAT:** Rapid Needs Assessment Team

**RNGP:** Revised National Gender Policy

**RRM:** District Response Mechanism

**RSART:** District Search and Rescue Team

**RTC:** District Training Centre

**RUAC:** Restoration of Utilities and Access Committee

**SI:** Statutory Instrument

**SI 46/2020:** Statutory Instrument No. 46 of 2020

**SI 47/2020:** Statutory Instrument No. 47 of 2020

**SI 59/2014:** Statutory Instrument No. 59 of 2014

**SI 65/2020:** Statutory Instrument No. 65 of 2020

**SI 78/2020:** Statutory Instrument No. 78 of 2020

**SL:** Subsidiary Laws

**SOP:** Standard operating procedure

**SREC:** Search, Rescue, and Evacuation Committee

**SUMA:** Supplies Management

**TAP:** Technology Action Plan

**TC:** Transport Committee

**TNA:** Technology Needs Assessment

**TTMB:** Taiwan Technical Mission in Belize

**UB:** University of Belize

**UBDPS:** University of Belize

Department of Public Safety

**UN:** United Nations

**UNCAC:** United Nations Convention against Corruption

**UNDAC:** United Nations Disaster Assessment and Coordination

**UNDP:** United Nations Development Programme

**UNFCCC:** United Nations Framework Convention on Climate Change

**UNICEF:** United Nations Children's Fund

**UNMCSDFC:** United Nations Multi-Country Sustainable Development Framework in the Caribbean

**USAID:** U.S Agency for International Development

**USGS:** United States Geological Survey

**VNR:** Voluntary National Review

**WB:** World Bank (The)

**WHO:** World Health Organization

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# **EXECUTIVE SUMMARY**

**BELIZE NATIONAL DISASTER  
PREPAREDNESS BASELINE ASSESSMENT**

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# OVERVIEW

The Pacific Disaster Center (PDC, the Center) completed the Belize National Disaster Preparedness Baseline Assessment (NDPBA) in partnership with Belize’s National Emergency Management Organization (NEMO). Hazard-based risks, vulnerabilities, resilience, and disaster management capabilities were researched and analyzed to produce scientific data that can be used in the decision-making process during all phases of disaster management. The results are based on data made available by in-country partners during the period of the project from 2019-2022 and include recommendations that will increase disaster management readiness for supporting stakeholders. The NDPBA provides stakeholders with analytical tools, scientific data, and evidence-based practices that allow the disaster management community in Belize to reduce disaster risk and support response efforts. The methodology and associated recommendations are in alignment with United Nations Sustainable Development Goals (Agenda 2030, SDGs) and the Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework).

The NDPBA was funded by the United States Government through the US Southern Command (SOUTHCOM) and was conducted in coordination with the US Embassy in Belmopan. Although NEMO was PDC’s in-country partner during this project, the Center also developed relationships with multiple government and non-governmental agencies in Belize that supported the data gathering and vetting process. A complete list of PDC’s valued partners in the NDPBA effort is included at the beginning of this report.

A few months following the Kickoff workshop in Belize in November of 2019, the COVID-19 pandemic brought the world to a lockdown. International travel was severely impacted, and government agencies were overwhelmed with new challenges as they faced the pandemic. PDC worked with NEMO and the stakeholders to advance the project in spite of the unforeseen difficulties – we want to thank the Government of Belize for their commitment during this challenging time. With additional support from SOUTHCOM, PDC was able to advance the analysis. Notably, one consequence of COVID was that it served as a case study for how Belize manages complex emergencies.

The full report presents the data collected, the results of our modeling, analysis of these results, and the recommendations for closer alignment with the Sendai Framework. The following sections summarize these findings for executive review.

# SUMMARY OF FINDINGS

Although Belize is a small country with many challenges, it has made significant progress understanding existing risks and creating an environment that has allowed the disaster management community to prepare the foundation for reducing disaster risk and increasing capabilities. Although progress has been made, there is much work to be done.

Belize is a small nation, 151st in size in the world with an area of 22,966 square kilometers. It is the only Central American country that does not have access to the Pacific Ocean. Its landscape and geographic location provide an environment where many types of hazards can occur such as tropical cyclones, floods, storm surge, landslides, wildfires, and extreme heat.

Exposure to multiple hazards is compounded by socioeconomic vulnerabilities in Belize. The poverty rate has increased steadily from 41 percent in 2009 to 52 percent in 2018. Urban areas especially had a significant rise in poverty during the same time period, from 28 to 43 percent. The GDP dropped 11 percent from 2019-2020 due to the impacts of COVID-19 resulting in slowed economic development and increased poverty.

The combination of multi-hazard exposure and vulnerability put Belize at increased risk of impacts from natural hazards. Belize is particularly prone to tropical cyclone impacts, floods, and wildfires. In 2016 Hurricane Earl was a Category 1 storm when it made landfall just south of the most populous city, Belize City, causing considerable

## NATURAL HAZARD EXPOSURE

**110,000**

people affected by natural disasters (2010 - 2020)

**60,000**

people affected by Hurricane Eta in 2020



Earthquake



Flood



Landslide



Wildfire



Extreme Heat



Storms Surge



Tropical Cyclone Winds





damage from winds and storm surges. This slow-moving storm took 15 hours to fully cross the country, dumping nearly twelve inches of rain, leading to significant flooding and mudslides. Storm surges were marked at four to six feet along the coast and outer islands and many tourism businesses were heavily damaged. In Belize City, nearly 80 percent of homes were flooded, resulting in overcrowded shelters and over 100 search and rescue operations. Nearly all of the utilities in the nation were out, bridges in central parts of the nation were destroyed, water systems were damaged, and over 2,000 homes were damaged or destroyed. The economic impact was estimated at BZD\$188,678,394; the damage estimated to agriculture alone was BZD\$76,698,713. Nearly BZD\$32 million in damages was estimated for the tourism industry, impacting nearly 70 percent of their hotel stock – this had long-standing and cascading effects on their economy.

In 2020, Hurricane Eta brought nearly 20 inches of rain and severe flooding in Cayo, Stann Creek, and Belize District. Several areas experienced unprecedented flooding levels, impacting an estimated 50–60,000 people in mostly rural, impoverished areas. The transportation networks suffered major damage, including damage to the major highways which cut off communities entirely. Two of the major rivers in the Cayo district rose by 8.8 meters. Less than two weeks later, Hurricane Iota made landfall, again just south of Belize in Nicaragua, bringing an average of 10 inches of rain to central and southern Belize. Corozal, Orange Walk, Cayo and Belize District were heavily impacted due to rivers already at flood state from Hurricane Eta. Environmental stressors and a changing climate may exacerbate natural hazards in this region and prolong recovery. All districts in Belize are predicted to

## RECENT MAJOR DISASTERS

|  |  |
|--|--|
| <p style="font-size: 2em; font-weight: bold; color: #00a0e3;">2015</p> <p style="color: white; font-size: 0.9em;">Belize City Heavy Rains and Floods</p> | <p style="font-size: 2em; font-weight: bold; color: #00a0e3;">2020</p> <p style="font-size: 1.2em; font-weight: bold; color: #00a0e3;">Affected 60,000 people</p> <p style="color: white; font-size: 0.9em;">Hurricane Eta</p> |
|--|--|

see drops in precipitation of over 6 percent by the year 2050. All districts are also already reporting from 15–38 percent reductions in land productivity. Recent population growth throughout the country may put additional stress on the economy, as well as environmental resources and critical infrastructure. Nevertheless, Belize also has the potential for growth in many sectors of its economy, including significant growth already occurring in the tourism and ecotourism industries.

The Belize National Emergency Management Organization (NEMO) was established in February 1999 following Hurricane Mitch in 1998 due to the recognized national need for greater coordination and efficiency in disaster risk management and response. The Disaster Preparedness and Response Act of 2000 (DPR Act/2000; the Act) established NEMO as a Department of Government headed by a National Emergency Coordinator (NEC).

NEMO is the primary government department of Belize responsible for coordinating the general policy of the government related to the mitigation of, preparedness for, response to and recovery from emergencies and disasters. The organization is the full-time agency responsible for the training of responding agencies and fosters coordination across the public and private sectors during non-crises periods. The Department is also mandated to keep Belize in a state of preparedness for any emergency that may require a national response.

Disaster management legislation in Belize is driven primarily by the DPR Act/2000. Whilst the DPR Act/2000 mentions all disaster management (DM) phases, most NEMO committees and plans are focused on response. DPR Act/2000 needs revision to address all DM phases thoroughly and to better distribute and delineate roles and responsibilities of DM actors across all levels of government and all phases of DM. Legislation does not stipulate funding for DM activities; NEMO's budget covers recurrent expenditures like operating costs, some training costs, and hurricane preparedness but emergent costs like building improvements, hurricane relief, and emergency management must be provisioned for ad hoc.

Existing plans are disparate and not current. The NHMP is divided into several volumes and sub volumes pertaining to SOPs, specific hazards, phases, functionalities (i.e., evacuation, search and rescue), and district plans. But only a few of the sub volumes appear to have been written at all, and those that have been produced are at least ten years old and in need of review. Public Service Regulations require that ministries and departments prepare emergency plans that include ensuring continuity of government following a disaster. However, whilst Continuity of Operations (COOP) and Continuity of Government (COG) planning is required, plans remain either under development or are untested.

Whilst NEMO is the designated GOB agency tasked with coordination and support of DM and disaster risk reduction (DRR) capacity development, it appears that NEMO lacks the formal authority to require annual training and exercises at the national level; training and exercises are conducted on an ad hoc basis. NEMO supports training as a budgeted recurring expense, but training and exercise efforts are managed by staff with other regular (non-exercise) day-to-day job functions; there is not a designated training facility.

Major hazards are monitored; coordination of hazard information falls to NEMO based on advisories





from either the National Meteorological Service (NMS) or the Ministry of Natural Resources (MNR). Hazard monitoring efforts utilize up-to-date methods and technologies for some hazards. Notification and early warning functions are not centralized; it varies by locality, but the primary means of notification of hazards is door to door through the "street captains" of various political parties or volunteer members of Community Disaster Response Teams. NEMO's Damage Assessment and Needs Analysis (DANA) Committee's Plan of Action (POA) provides direction, including standard operating procedures (SOPs), for assessment activities to commence within two to eight hours of the onset of a disaster emergency. In turn, disaster assessments are used to inform declarations decision-making. Staff, equipment, and resources are at sufficient levels to conduct assessments in the immediate aftermath of major events. Assessment outcomes are a key driver behind incident action planning.

While a great deal of work has been accomplished, and much progress has been made, many additional actions can be taken by the Government of Belize and its partners to further build capacity for disaster resilience and response.

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# RECOMMENDATIONS



These recommendations are included in greater detail in the body of the report. Our hope is that the Government of Belize and key development and disaster management partners will leverage the results of this comprehensive assessment to enable a more robust and sustainable disaster risk-reduction effort in Belize that will contribute to saving lives and property.

## IN LIGHT OF OUR FINDINGS, PDC MAKES THE FOLLOWING RECOMMENDATIONS:

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# 1

**Review and update** legislation, especially DPR Act/2000, to secure durable mandates for roles and responsibilities for all disaster management actors, and to sufficiently address all phases of disaster management.

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# 2

**Legally establish a calamity fund**, with minimum annual contributions, for use during disaster relief efforts.

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# 3

**Legally establish a revolving disaster management contingency fund** with minimum annual contributions to facilitate disaster risk reduction, capacity building, and other and disaster management efforts.

4

**Enlist the Ministry of Sustainable Development, Climate Change & Disaster Risk Management, the National Climate Change Office, and NEMO** to formally plan and coordinate the integration of disaster risk reduction, Sendai, Sustainable Development Goals (2030 Agenda), and climate change adaptation across all policies, disaster management, and development plans.

5

**Draft and finalize the National Disaster Preparedness Response Plan** and make it widely accessible.

6

**Draft and publish disaster management plans** to fulfill the most critical missing volumes and annexes dictated by the National Hazard Management Plan and make them widely accessible

7

**Audit, update, and republish** all existing disaster management plans.

8

**Review dedicated facilities and equipment.**

9

**Expand and establish professionalized training** to improve disaster management and the human resources pool.

10

**Enhance resilience** through efforts to reduce vulnerabilities and increase coping capacities.

11

**Formalize the role of the University of Belize** in disaster management through linking research and training needs to academic programs.

12

**Establish national and local training** and exercise mandates with NEMO as lead agency.

13

**Establish requirements for risk assessment processes** and standards to inform disaster management policies, plans, practices, and interventional strategies.

14

**Strengthen systems to translate multi-hazard monitoring data** into comprehensive early warning capabilities.

---

15

**Establish a standardized, digitized, and centralized system** for data collection, management, and sharing.

---

16

**Increase public confidence** and engagement in disaster management efforts.

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17

**Engage non-governmental stakeholders** and non-traditional partners including the private sector into government disaster risk management framework.

---

18

**Increase information access** and sharing among all disaster management stakeholders by developing or promoting a continuity of operations platform.

---

19

**Reduce marginalization** and promote gender equality.

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20

**Reassess progress** made toward disaster risk reduction and resilience goals





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# AN INTRODUCTION

## TO PDC'S NATIONAL DISASTER PREPAREDNESS BASELINE ASSESSMENT (*NDPBA*)

The **NDPBA** uses a collaborative, stakeholder-driven approach; **PDC** worked to integrate national priorities and stakeholder feedback throughout every step of the process. The NDPBA for Belize included a Risk and Vulnerability Assessment (**RVA**) which examined several components of risk including exposure to hazards, vulnerability, coping capacity, and existing disaster management capabilities. The findings of the **RVA** were further reviewed through the lens of PDC's unique Disaster Management Analysis (**DMA**). The DMA contextualizes the RVA and guides recommendations designed to increase resilience and reduce disaster risk. Findings of this analysis were compiled into a Disaster Risk Reduction (**DRR**) Plan offering practical actions to be taken over a five-year period.

To receive access to the findings, recommendations, and data (tabular and spatial) used to conduct the Belize NDPBA analysis please consult the Pacific Disaster Center's DisasterAWARE platform to request access at: [disasteraware.pdc.org](https://disasteraware.pdc.org).





# BELIZE NDPBA

## APPLYING ASSESSMENT RESULTS

The Pacific Disaster Center’s (PDC) National Disaster Preparedness Baseline Assessment (NDPBA) is more than just an assessment; it is a sustainable system for accessing, understanding, updating, and applying critical risk information in decision making. The NDPBA provides the necessary tools, scientific data, and evidence-based practices to effectively reduce disaster risk—informing decisions at the national, subnational, and local levels.



### STRENGTHEN PARTNERSHIPS

- Use the NDPBA as a decision-support tool to create a transparent and efficient process for disaster risk reduction efforts within the context of Belize.
- Provides necessary tools and data for disaster monitoring to promote risk-informed decision making and sustainable development.
- Allows team members to conceptualize risk using data to understand the social, cultural, and economic drivers of risk.



### SUPPORT SENDAI COMMITMENTS

By participating in the NDPBA process, Belize significantly enhances its capacity to meet Sendai Framework commitments under each of these Priority Areas:

- Priority 1 - Understanding Disaster Risk**
- Priority 2 - Strengthening Disaster Risk Governance to Manage Disaster Risk**
- Priority 3 - Investing in Disaster Risk Reduction for Resilience**
- Priority 4 - Enhancing Disaster Preparedness for Effective Response and to “Build Back Better” in Recovery, Rehabilitation and Reconstruction**



### INCREASE RESILIENCE

- Align in areas where partner capacity development efforts overlap.
- Improve resilience at the subnational level and reduce potential impacts to the population.
- Rely on trusted and proven data-driven tools.



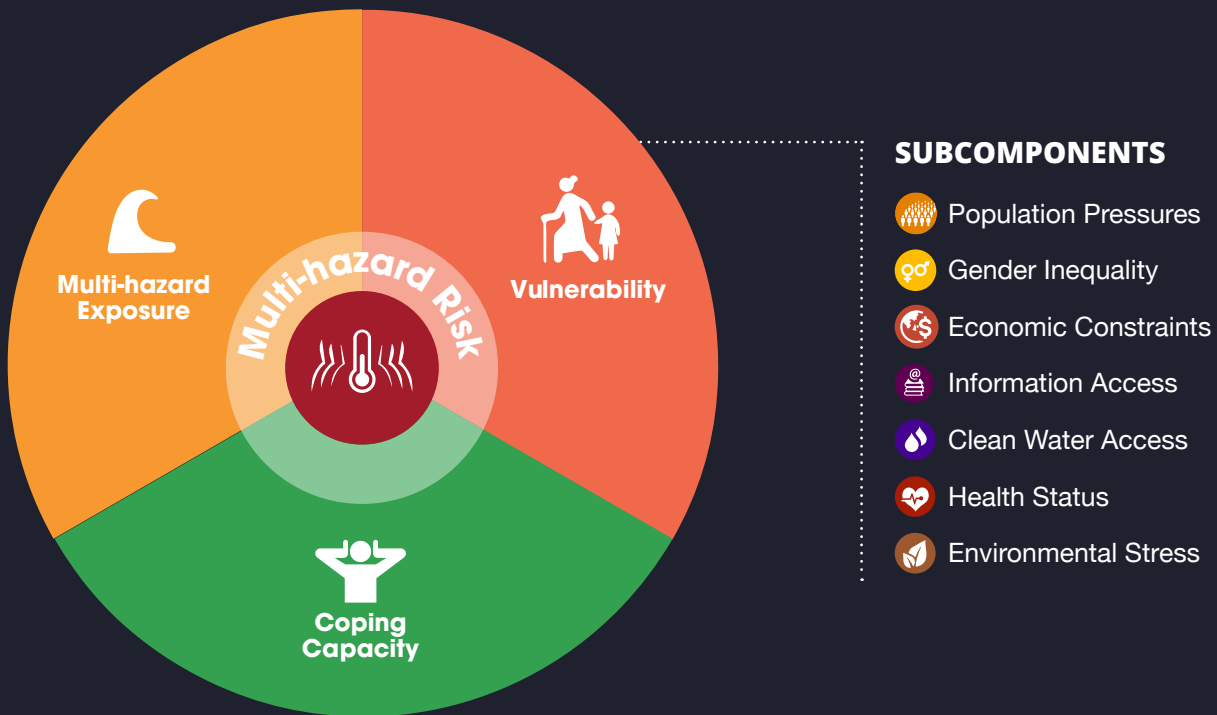
**NDPBA**

# **METHODOLOGY AND OBJECTIVES**

**OVERVIEW**

# MEASURING RISK

## RVA METHODOLOGY | COMPONENTS OF RISK



The NDPBA methodology is based on a composite index approach and investigates the underlying conditions that lead to increased risk. The assessment combines several components of risk which include multi-hazard exposure, coping capacity, and vulnerability. Individual components are comprised of subcomponents used to assess the status of thematic areas either as a sum or individually. Additional information on the assessment methodology can be found at: <https://pdc.org/methodology>.

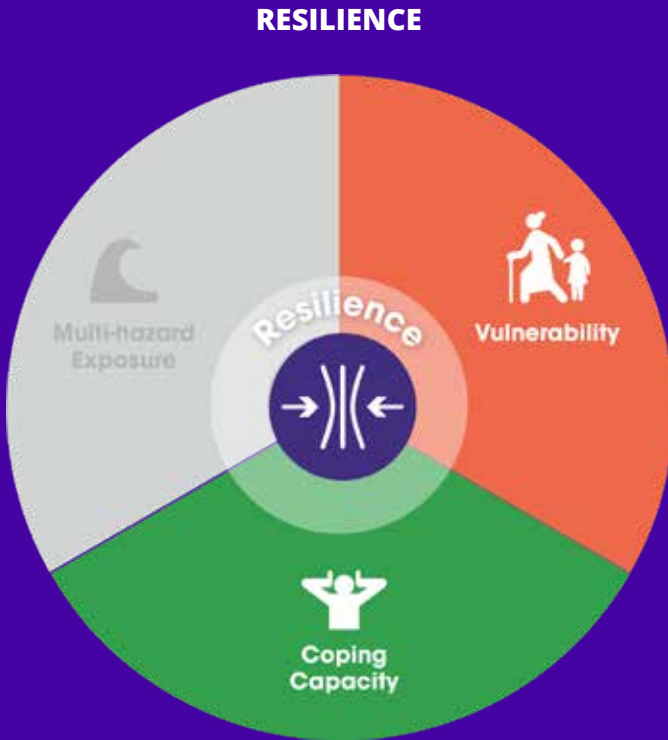
## OBJECTIVES

Form a foundation for long-term data sharing and monitoring to support disaster risk reduction.

Enhance decision making through improved access to temporal and spatial data.

# MEASURING RESILIENCE

## RVA METHODOLOGY



### HAZARD INDEPENDENT



Components of resilience are independent of natural hazard exposure. This type of measure helps rank countries based on their likelihood of experiencing a disruption outside of a naturally occurring event. The measure of resilience includes vulnerability and coping capacity components, including their subcomponents.

### OBJECTIVES

Use vulnerability and coping capacity indicators to determine initiatives and engagements that will decrease vulnerability and reduce disaster risk by increasing the resiliency of the population.

# KEY CONCEPTS

## RVA METHODOLOGY

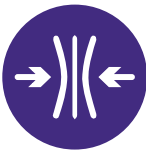
### EXAMPLES AND DEFINITIONS



**VULNERABILITY:** Provides visibility into the underlying socioeconomic and societal factors that predispose areas to disasters. A vulnerability analysis measures the physical, environmental, social, and economic conditions and processes that increase the susceptibility of communities and systems to the damaging effects of hazards. Multiple factors influencing disaster outcomes, including those linked to poverty and development, are considered in the analysis.



**COPING CAPACITY:** Provides visibility into the status of governance and capacity within each district. A coping capacity analysis measures people and societies' systems, means, and abilities to absorb and respond to disruptions in normal function. It considers a range of factors that contribute to the ability of an impacted population to limit the likelihood or severity of the damaging effects of hazards and to manage disruptions that do arise.

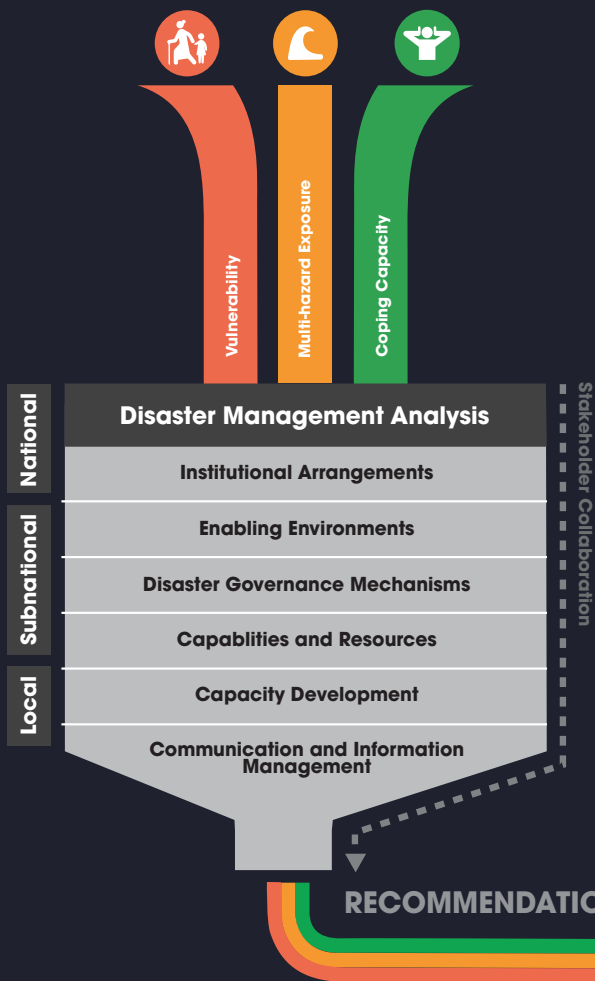


**RESILIENCE:** Provides an overall measure of the ability of a district to withstand shocks and disruptions to normal function. For instance, districts with lower resilience may also exhibit a decrease in the ability of a population to mitigate the negative impacts of a disaster and return to normal function. This measure is the combination of the vulnerability and coping capacity components.

# DISASTER MANAGEMENT ANALYSIS

## DMA METHODOLOGY

### RISK AND VULNERABILITY RESULTS



The Disaster Management Analysis (DMA) identifies, codifies, and characterizes capacity implementation needs given risks identified in the RVA and a country's risk reduction goals. The analysis looks at the capabilities, resources, and systems that have been developed or implemented to reduce disaster risk, to address unmet needs that arise from a subsequent disaster event, and to facilitate long-term recovery of people, economies, and societies.

### ANALYSIS OBJECTIVES

Increase resilience and reduce disaster risk through disaster management capacity development initiatives.



# DISASTER MANAGEMENT THEMES

The DMA aims to limit hazard risk as assessed and address the anticipated response and recovery needs of hazard-exposed populations, economies, and societies. The manner in which unmet capacity is identified, qualified, and quantified supports a sharper focus on cost-effective investment planning. It also helps support long-term development that directly reflects the Sendai Framework and Sustainable Development Goals. The analysis considers needs in relation to multi-hazard risk and is based on sector-defined capacity standards. Associated themes are listed below with examples of the data and information that help to inform the analysis.



**Institutional  
Arrangements**



**Enabling  
Environment**



**Disaster Governance  
Mechanisms**



**Capabilities  
and Resources**



**Capacity  
Development**



**Communication and  
Information Management**



# COUNTRY BACKGROUND AND OVERVIEW

**GEOGRAPHY**

## GEOGRAPHY

Belize is located on the Caribbean side of Central America. It shares borders with Mexico to the north and Guatemala to the west. Guatemala's land border line has been disputed for many years. The entirety of Belize's eastern coast is along the Caribbean Sea, with 386 km of coastline. It is also the only country in Central America without a Pacific coastline. Belize's total land area is 22,966 square kilometers (151st in the world). Belize's capital was formally relocated from Belize City on the coast to the interior in Belmopan around 1970 after extensive damage to Belize City from Hurricane Hattie. Belize is mostly flat with swampy coastal plains and low mountains to the south.

**22,966 km<sup>2</sup>**

Total area: ~8,867 sq mile

**542 KM**

Land Boundaries (total)

**276 km**

México

**6**

Districts

**386 KM**

Coastline

**266 km**

Guatemala

**Nearest Neighboring Country**

Mexico and Guatemala

**Belmopan**

Capital City

**Belize City**

Largest city



## GEOLOGY AND CLIMATE

Belize has a tropical climate with distinct wet and dry seasons. Temperatures average from 24 to 27 Degrees Celsius in most of the country, except for the southern highland areas where it is cooler all year round. Seasons in Belize are mainly characterized by humidity and rainfall as opposed to temperatures. Rainy season ranges from June to November and dry season from January to May. Much of Belize falls outside the tectonically active zone that impacts most of Central America. Most of the country is located in the Yucatan Platform, which is a very tectonically stable region. The Maya Mountains run from the northeast to the southwest of the country and are surrounded by hilly regions characterized by numerous sinkholes, caverns, and underground streams. The rest of the country is mainly flat.

### Key climate change risks



Extreme Heat

**113,883**

(32%)

People exposed



Wildfires

**226,891**

(63.5%)

People exposed



Earthquake

**48,315**

(13.5%)

People exposed



Landslide

**9,059**

(2.5%)

People exposed



Floods

**76,643**

(21.4%)

People exposed



Storm Surge

**55,978**

(16%)

People exposed



Tropical Cyclone Winds

**357,446**

(100%)

People exposed

# DEMOGRAPHICS

**357,446**

Total population (2021)

**1.67 %**

Avg. annual population growth

**78**

Global socioeconomic vulnerability ranking



**10.4**

Doctors per 10k people



**75**

Avg. life expectancy (2019)<sup>4</sup>



**12.6**

Infant deaths per 1k live births



**20**

Nurses per 10k people



**10**

Hospital beds per 10k people



**76.9%**

Adult literacy

## Languages

**63% English**

**57% Spanish**

**45% Creole**

**11% Maya**

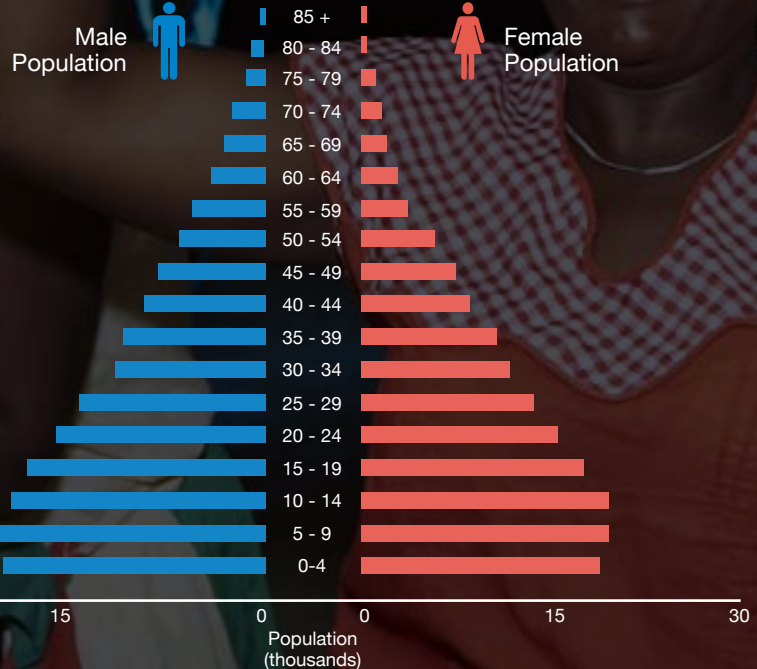
## Ethnic groups population

**53% Mestizo**

**26% Creole**

**11% Maya**

## AGE





# ECONOMY

As of 2020, Belize's GDP was \$1.64 billion (USD). Belize exports raw sugar, bananas, fruit juice, fish products, and crude petroleum. Most of Belize's exports go to the United Kingdom, United States, Spain, Jamaica, and Ireland. The country's top imports are refined petroleum, cigarettes, recreational boats, natural gas, and cars. The country is a very large importer of electricity, with nearly 243 million kWh estimated in 2016. Income inequality is a major challenge in Belize; 41% (2013) of the population is below the poverty line. With an unemployment rate of 9% (2017), Belize has a shortage of skilled labor and all types of technical personnel.

## GDP and Key Exports

**\$1.64 billion (USD)**  
**(-0.03%)**

GDP (2020)



**2.5**

Avg. annual growth in GDP  
(2014-2018)



**41%**

People living below national  
poverty line (2013)



Garment  
production



Food processing



Tourism



Petroleum



Construction

## Tourism

**1.94 million (2019)**

International visitor arrivals

**29.2% (2019)**

Tourism expenditures portion of GDP



# KEY INFRASTRUCTURE

## LOGISTICS



**1**

Large Airport



**91.8%**

Access to electricity



**10**

Medium Airports



**97%**

Access to improved water



**22**

Small Airports



**93%**

Access to improved drinking water



**33**

Ports, Marinas and Harbors



**82%**

Access to improved sanitation

## Emergency Services

**13**



Hospitals

**15**



Fire Stations

**40**



Police Stations

**290**



Emergency Shelters

**5**



Emergency Operations Centers (EOCs)

**5**



Emergency Warehouses

# DISASTER MANAGEMENT

## Major capacity improvement milestones:

### 2000

The Disaster Preparedness and Response Act, 2000 established NEMO as the foremost agency responsible for disaster management, the position of National Emergency Coordinator to serve as director of NEMO, and the National Advisory Committee.

### 2014

In 2014 the Caribbean Community Climate Change Centre and the Government of Belize developed two milestone reports: 1) A National Climate Change Policy, Strategy and Action Plan to Address Climate Change in Belize, and 2) Belize Marine Conservation and Climate Adaptation Initiative.

### 2020

The National Bank of Belize made special provisions for those adversely impacted by COVID-19 including:<sup>46</sup>

- Restructured/refinanced personal and business loans including reprieve from interest for up to 12 months
- Penalty and late fees waived for restructured loans
- Arrangement fees waived for restructured loans
- Provisions for low-interest personal loans for COVID-19 expenses

In April 2020, an emergency food assistance program was implemented to alleviate hunger caused by the economic crisis in the wake of COVID-19.<sup>48</sup> In addition, an unemployment relief program was put into place for at least 23,000 recipients. The food and unemployment benefits were made possible through a loan provided from the Central Bank Belize (CBB) to the Government of Belize (GOB).<sup>48</sup>

A person is loading several large rolls of fabric onto the back of a red truck. The truck has a yellow stripe on its side. In the background, another yellow truck is visible. The scene is outdoors with trees and a clear sky.

## Major Disaster Impacts (2010-2020)

- Toledo and Stann Creek Districts: Tropical Cyclone Matthew (2010)  
10,000 affected
- Belize City: Heavy Rains and Floods (2015)  
20,000 affected
- Belize and Cayo Districts: Tropical Cyclone Earl (2016)  
10,355 affected
- Cayo, Belize, Stann Creek, and Toledo Districts: Hurricane Eta (2020)  
60,000 affected





**THE RVA**

# **RISK AND VULNERABILITY ASSESSMENT RESULTS**

# RISK AND VULNERABILITY ASSESSMENT RESULTS

Provided in this section are the results of the Risk and Vulnerability Assessment (RVA) conducted by the Pacific Disaster Center as part of the Belize National Disaster Preparedness Baseline Assessment. For details on the methodology and data sets used see Appendix A.

## BELIZE DISTRICTS



## BELIZE BACKGROUND

Belize is an eastern Central American country bordering the west Caribbean Sea situated between Guatemala and Mexico. Approximately 50 percent of the population of Belize live in rural areas, approximately 30 percent live in Belize City, and approximately 20 percent spread out across the remaining areas. Belize is divided into six districts, forming the basis of the Risk Vulnerability data comparison.

## COMPONENTS OF RISK



**Vulnerability**



**Coping Capacity**



**Multi-Hazard Exposure**





**THE RVA**

# **MULTI-HAZARD EXPOSURE**

# MULTI-HAZARD EXPOSURE

Belize’s climate is primarily tropical and very hot and humid. Two main seasons dominate the local environment – the rainy season spans the months of May to November, and a short dry season stretches from February to May.

The EM DAT disaster database recorded 16 disaster events between 1990 and 2021 for Belize that affected approximately 304,000 people. Since 1990, 11 tropical cyclones have hit Belize, along with 4 floods and one cold wave.

## Global Multi-Hazard Exposure rank (PDC Global RVA)

**64** OUT OF 216 COUNTRIES / TERRITORIES ASSESSED

## Multi-Hazard Exposure rank among other Central American countries

**6** OUT OF 7 COUNTRIES / TERRITORIES ASSESSED

### BELIZE HAZARD ZONES

Multi-Hazard Exposure at the district level in Belize was assessed by combining components of earthquake, extreme heat, inland flood, landslide, storm surge, tropical cyclone winds and wildfire.



#### FLOOD

**21.4%**

Relative Population Exposure

**77,000**

Raw Population Exposure

**\$4.2 Billion**

Raw Economic Exposure (USD)



#### WILDFIRE

**63.5%**

Relative Population Exposure

**227,000**

Raw Population Exposure

**\$11.5 Billion**

Raw Economic Exposure (USD)



#### EARTHQUAKE

**13.5%**

Relative Population Exposure

**48,000**

Raw Population Exposure

**\$2.1 Billion**

Raw Economic Exposure (USD)



#### LANDSLIDE

**2.5%**

Relative Population Exposure

**9,000**

Raw Population Exposure

**\$100 Million**

Raw Economic Exposure (USD)



#### STORM SURGE

**15.7%**

Relative Population Exposure

**56,000**

Raw Population Exposure

**\$193 Million**

Raw Economic Exposure (USD)



#### EXTREME HEAT

**31.9%**

Relative Population Exposure

**114,000**

Raw Population Exposure

**\$1.7 Billion**

Raw Economic Exposure (USD)



#### TROPICAL CYCLONE WINDS

**100%**

Relative Population Exposure

**357,000**

Raw Population Exposure

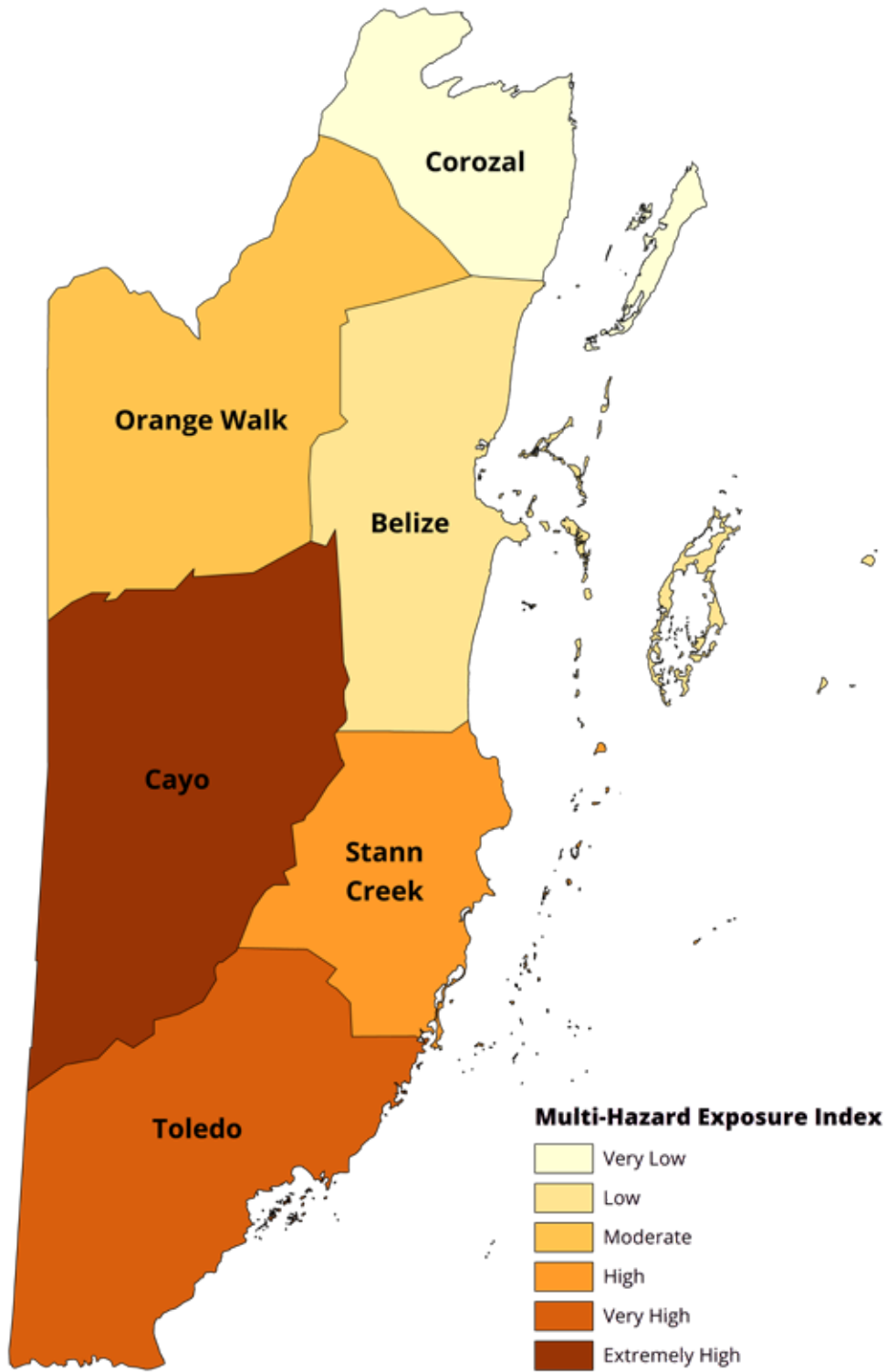
**\$13.6 Billion**

Raw Economic Exposure (USD)

### MULTI-HAZARD EXPOSURE BY DISTRICT

| RANK | DISTRICT    | INDEX SCORE |
|------|-------------|-------------|
| 1    | Cayo        | 0.763       |
| 2    | Toledo      | 0.756       |
| 3    | Stann Creek | 0.276       |
| 4    | Orange Walk | 0.218       |
| 5    | Belize      | 0.145       |
| 6    | Corozal     | 0.068       |









**THE RVA**

# **VULNERABILITY**



# VULNERABILITY

Vulnerability measures the physical, environmental, social, and economic conditions and processes that increase the susceptibility of communities and systems to the damaging effects of hazards. Vulnerability data is designed to capture the multi-dimensional nature of poverty, the inequality of access to resources due to gender, and the ability of a given area to support the population adequately. In coordination with stakeholders, the following indicators were selected to measure vulnerability subcomponents in Belize. Breaking down each vulnerability subcomponent to the indicator level allows users to identify the key drivers of vulnerability to support risk reduction efforts and policy decisions.

## Global Vulnerability rank (PDC Global RVA)

**78** OUT OF 204 COUNTRIES / TERRITORIES ASSESSED

## Vulnerability rank among other Central American countries

**4** OUT OF 7 COUNTRIES / TERRITORIES ASSESSED

### VULNERABILITY SUBCOMPONENTS AND INDICATORS



#### Population Pressures

- Average annual population change
- Average annual urban population change
- Prevalence of stunting



#### Vulnerable Health Status

- New TB infections per 10,000 persons
- Dengue Incidence per 100,000 persons
- Malaria Incidence per 100,000 persons



#### Gender Inequality

- Female economic opportunity (Female to male transition to secondary education, Female to male labor force participation, Female to male median income)
- Domestic violence cases reported per 10,000 persons
- Female health care access (Unmet need for contraception, Adolescent birth rate, infant mortality rate, Maternal mortality rate)



#### Clean Water Access Vulnerability

- Households without Improved water
- Households without Improved sanitation



#### Economic Constraints

- Economic dependency ratio
- Poorest wealth quintile
- Unemployment rate
- Underemployment rate



#### Information Access Vulnerability

- Households without internet access
- Households without TV access
- Households without radio access
- Adult literacy rate
- Primary to secondary school transition rate
- Working population with no secondary school



#### Environmental Stress

- Tree cover loss
- Projected changes in annual precipitation
- Declining land productivity

## VULNERABILITY BY DISTRICT

| RANK | DISTRICT    | INDEX SCORE |
|------|-------------|-------------|
| 1    | Toledo      | 0.733       |
| 2    | Corozal     | 0.553       |
| 3    | Cayo        | 0.530       |
| 4    | Orange Walk | 0.473       |
| 5    | Belize      | 0.421       |
| 6    | Stann Creek | 0.341       |

VERY LOW

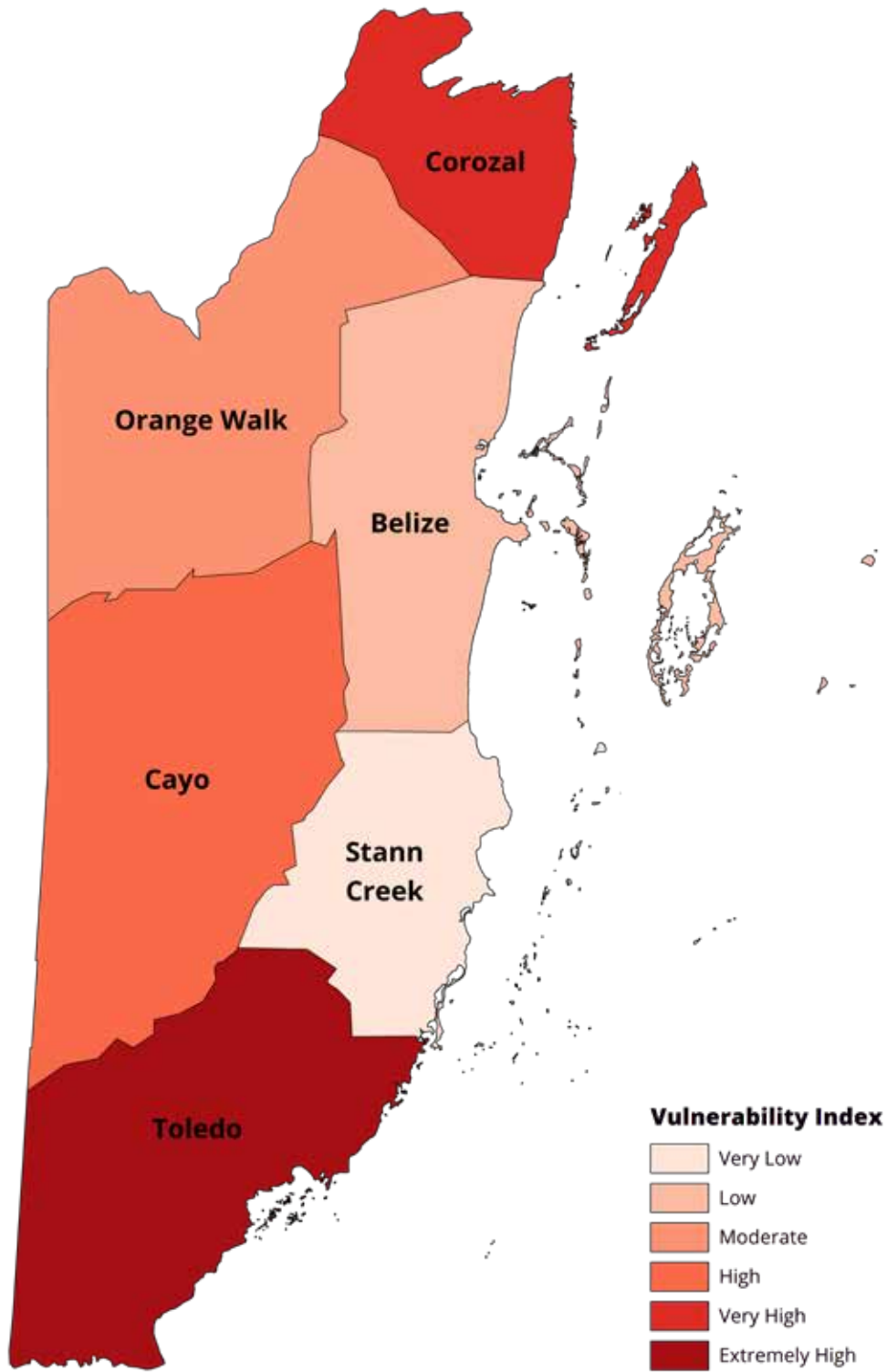
LOW

MODERATE

HIGH

VERY HIGH

EXTRA HIGH





**THE RVA**

# **COPING CAPACITY**

# COPING CAPACITY

Coping Capacity describes the ability of people, organizations, and systems, using available skills and resources, to face and manage adverse conditions, emergencies, and disasters.

In coordination with stakeholders, the following indicators were selected to measure coping capacity subcomponents in Belize. Breaking down each coping capacity subcomponent to the indicator level allows users to identify the critical drivers of coping capacity to support risk reduction efforts and policy decisions.

## Global Coping Capacity rank (PDC Global RVA)

**83** OUT OF 198 COUNTRIES / TERRITORIES ASSESSED

## Belize's Coping Capacity rank among other Central American countries

**3** OUT OF 7 COUNTRIES/ TERRITORIES ASSESSED

### COPING CAPACITY SUBCOMPONENTS AND INDICATORS



#### Economic Capacity

- Labor force participation
- Median monthly income
- Concentration of wealth
- Average revenue per available accommodation room
- Change in active tourism businesses
- Home ownership



#### Governance

- Municipal garbage collection
- Voter participation
- Major crime rate per 10,000 persons



#### Environmental Capacity

- Protected lands
- Low variability in water supply



#### Communications Capacity

- Fixed phone access
- Mobile phone access
- Average distance to cell tower



#### Transportation Capacity

- Distance to port
- Road density



#### Healthcare Capacities

- Hospital beds per 10,000 persons
- Physicians per 10,000 Persons
- Nurses per 10,000 Persons
- Health centers and health posts per 10,000 persons
- Distance to hospital
- Immunization coverage



#### Energy Capacity

- Households with electricity
- Households with gas for cooking



#### Emergency Services Capacity

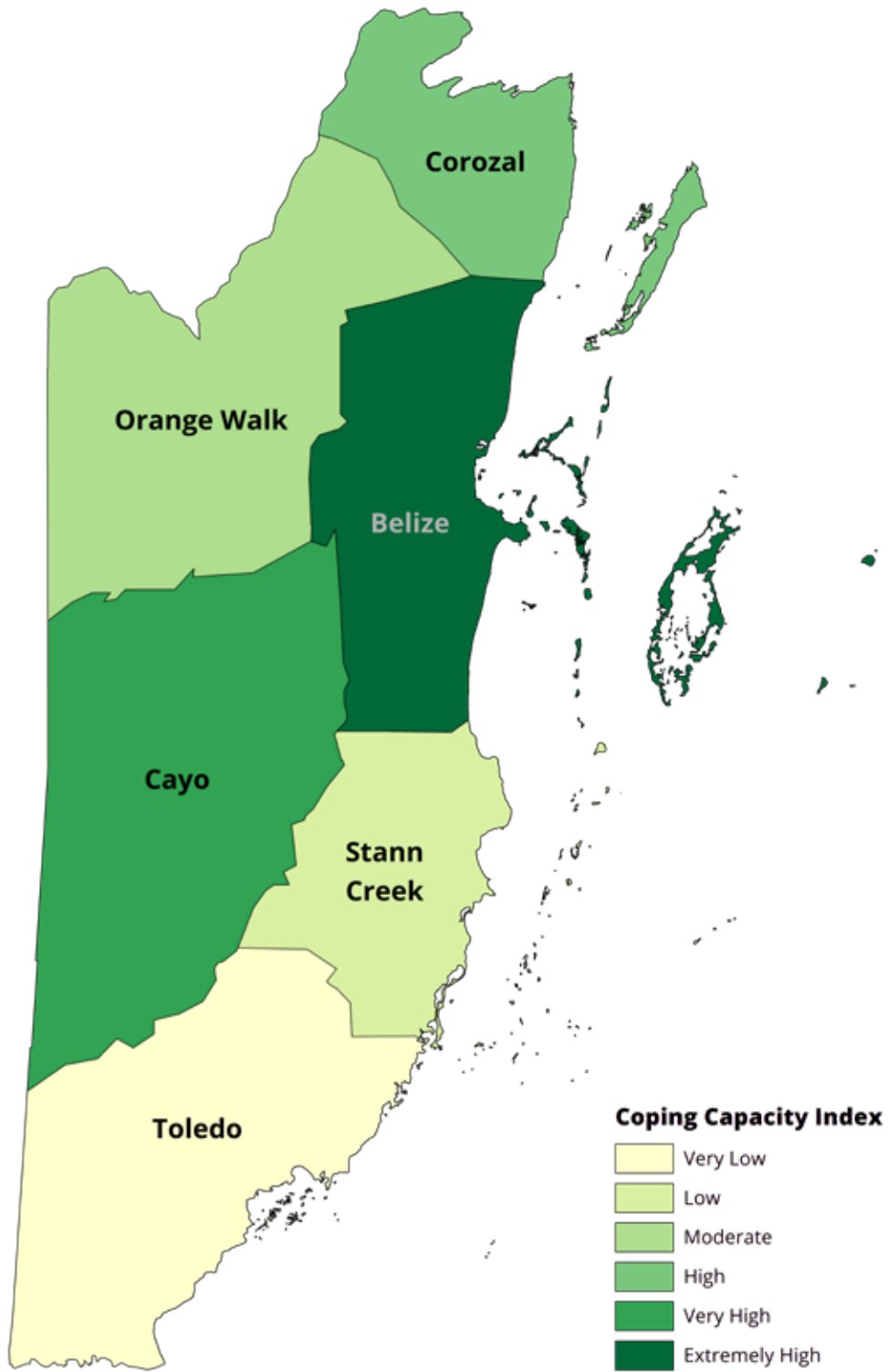
- Distance to shelter
- Shelter capacity per 10,000 persons
- Distance to national warehouse
- Distance to fire station
- Distance to police station



### COPING CAPACITY BY DISTRICT

| RANK | DISTRICT    | INDEX SCORE |
|------|-------------|-------------|
| 1    | Belize      | 0.602       |
| 2    | Cayo        | 0.560       |
| 3    | Corozal     | 0.485       |
| 4    | Orange Walk | 0.474       |
| 5    | Stann Creek | 0.397       |
| 6    | Toledo      | 0.304       |







**THE RVA**

# **RESILIENCE**

# RESILIENCE

Resilience represents the combination of susceptibility to impact with the relative ability to absorb, respond to, and recover from disaster impacts. Resilience provides an indication of current socioeconomic and disaster management conditions on the ground, independent of hazard exposure.

Resilience in Belize was calculated by averaging Vulnerability and Coping Capacity. Results are displayed across each district below, while the four main drivers of resilience with detailed recommendations are provided in the individual district profiles.

## Global Resilience rank (PDC Global RVA)




**100** OUT OF 194 COUNTRIES /  
TERRITORIES ASSESSED

## Belize's Resilience rank among other Central American countries

**3** OUT OF 7 COUNTRIES/  
TERRITORIES ASSESSED

## APPLYING RESILIENCE DATA

### Resilience data can be used to:

-  Prioritize response and recovery efforts during hazard events.
-  Identify the social, cultural, and economic factors that influence disaster risk and vulnerability.
-  Provide the necessary justification to support policy decisions that will protect lives and reduce losses resulting from disasters.
-  Establish a provincial-level foundation for monitoring risk and vulnerability over time.
-  Enhance decision making for disaster risk reduction initiatives.

## RESILIENCE COMPONENTS



**Vulnerability**



**Coping Capacity**

## RESILIENCE BY DISTRICT

| RANK | DISTRICT    | INDEX SCORE |
|------|-------------|-------------|
| 1    | Belize      | 0.591       |
| 2    | Stann Creek | 0.528       |
| 3    | Cayo        | 0.515       |
| 4    | Orange Walk | 0.500       |
| 5    | Corozal     | 0.466       |
| 6    | Toledo      | 0.285       |

VERY LOW

LOW

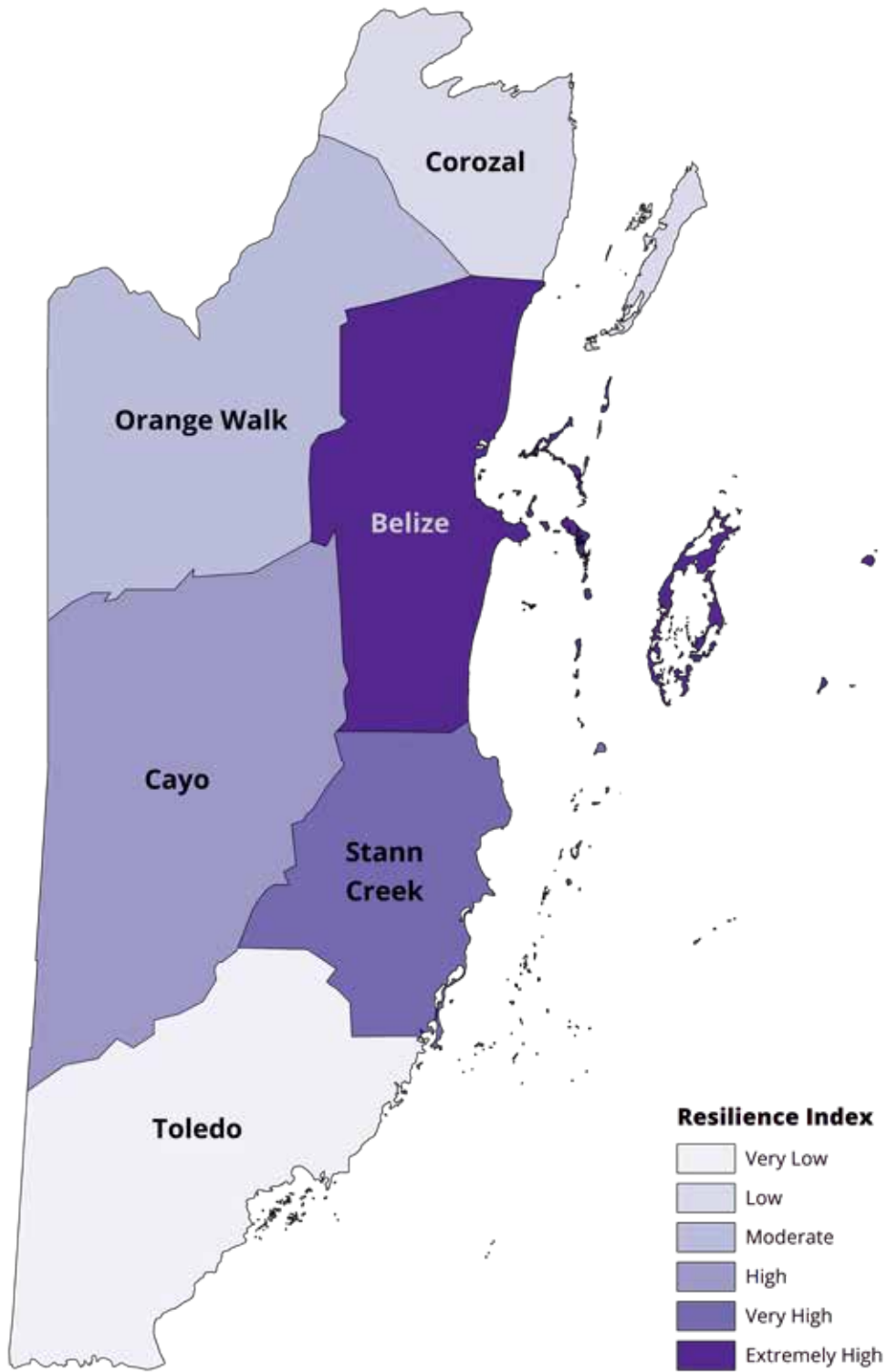
MODERATE

HIGH

VERY HIGH

EXTRA HIGH







THE RVA






# HAZARD-SPECIFIC RISK

# HAZARD-SPECIFIC RISK

Hazard-Specific Risk examines individual hazard exposure combined with resilience at the district level to provide a clear understanding of risk drivers for each hazard type. Specific hazards assessed include earthquake, extreme heat, inland flood, landslide, storm surge, tropical cyclone winds and wildfire. Hazard-Specific Risk provides a tool for disaster managers to anticipate, plan for, and mitigate outcomes of specific hazard events across Belize.

## APPLYING HAZARD-SPECIFIC RISK DATA

### Hazard-Specific Risk data can be used to:

-  Examine socioeconomic and cultural factors that make certain populations more susceptible to negative outcomes from a specific hazard.
-  Anticipate potential impacts of a specific hazard on a district's population.
-  Enhance national and subnational multi-hazard planning.
-  Prioritize national and district-level hazard-specific mitigation actions.
-  Provide necessary justification to enhance hazard monitoring and implement early warning systems.

## HAZARD RISK COMPARED



**Earthquake**



**Landslide**



**Flood**



**Storm Surge**



**Tropical  
Cyclone Winds**



**Wildfire**



**Extreme Heat**

### EARTHQUAKE RISK BY DISTRICT

| RANK | DISTRICT    | INDEX SCORE |
|------|-------------|-------------|
| 1    | Toledo      | 0.715       |
| 2    | Stann Creek | 0.309       |
| 3    | Belize      | 0           |
| 3    | Cayo        | 0           |
| 3    | Corozal     | 0           |
| 3    | Orange Walk | 0           |

**VERY LOW**

**MODERATE**

**HIGH**

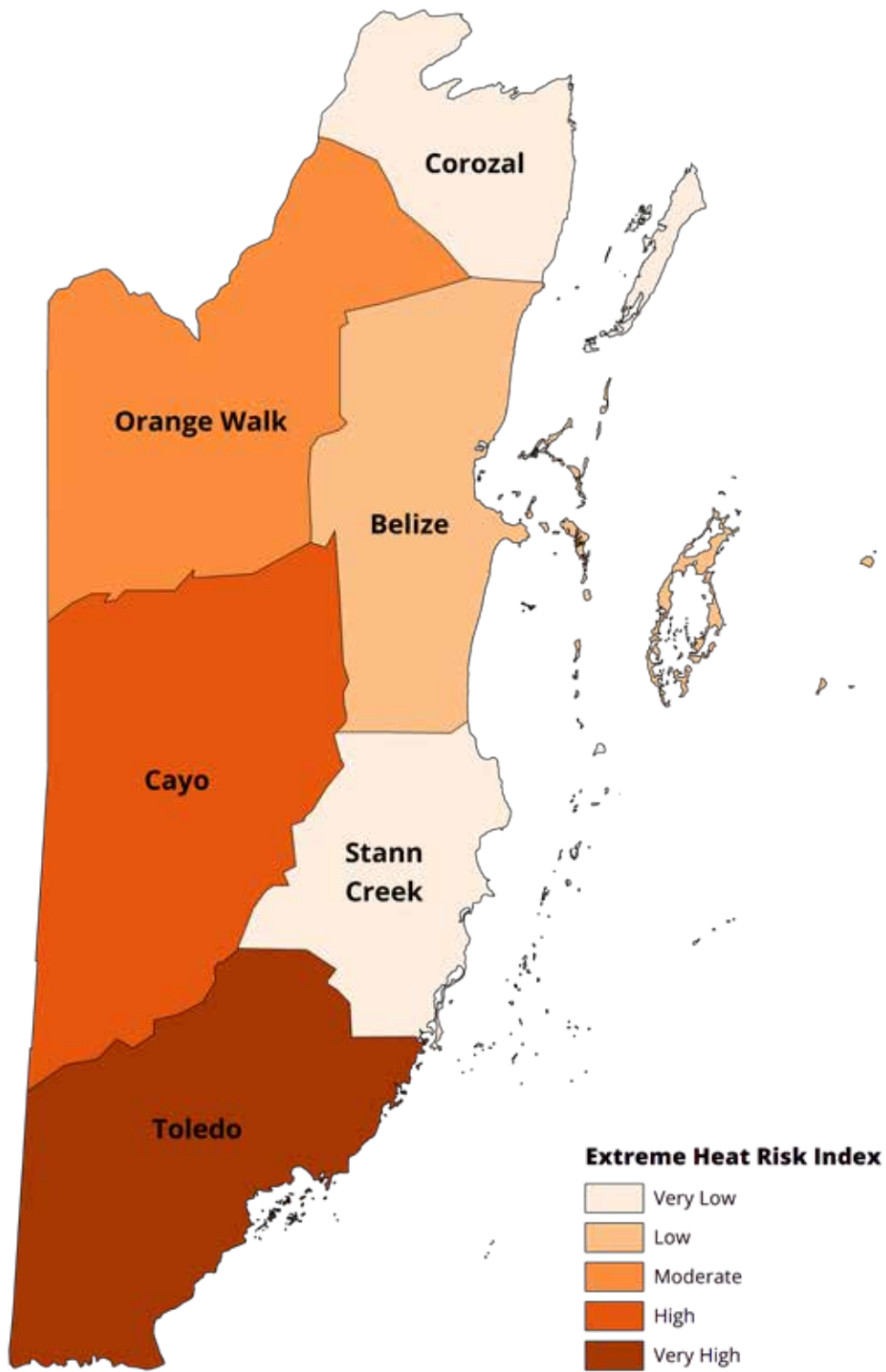




### EXTREME HEAT RISK BY DISTRICT

| RANK | DISTRICT    | INDEX SCORE |
|------|-------------|-------------|
| 1    | Toledo      | 0.503       |
| 2    | Cayo        | 0.479       |
| 3    | Orange Walk | 0.164       |
| 4    | Belize      | 0.054       |
| 5    | Corozal     | 0           |
| 5    | Stann Creek | 0           |

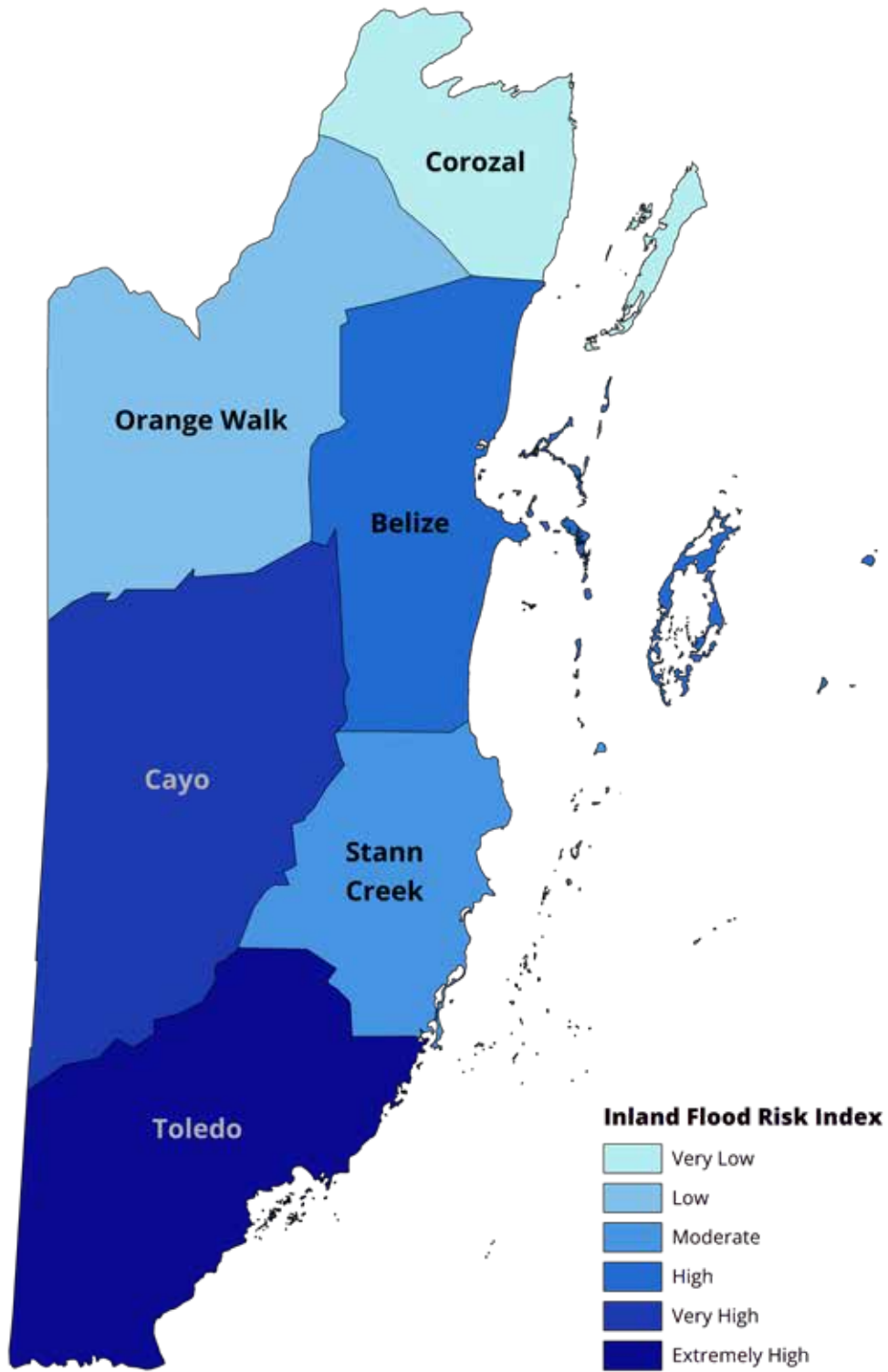




## INLAND FLOOD RISK BY DISTRICT

| RANK | DISTRICT    | INDEX SCORE |
|------|-------------|-------------|
| 1    | Toledo      | 0.57        |
| 2    | Cayo        | 0.247       |
| 3    | Belize      | 0.23        |
| 4    | Stann Creek | 0.221       |
| 5    | Orange Walk | 0.02        |
| 6    | Corozal     | 0.004       |



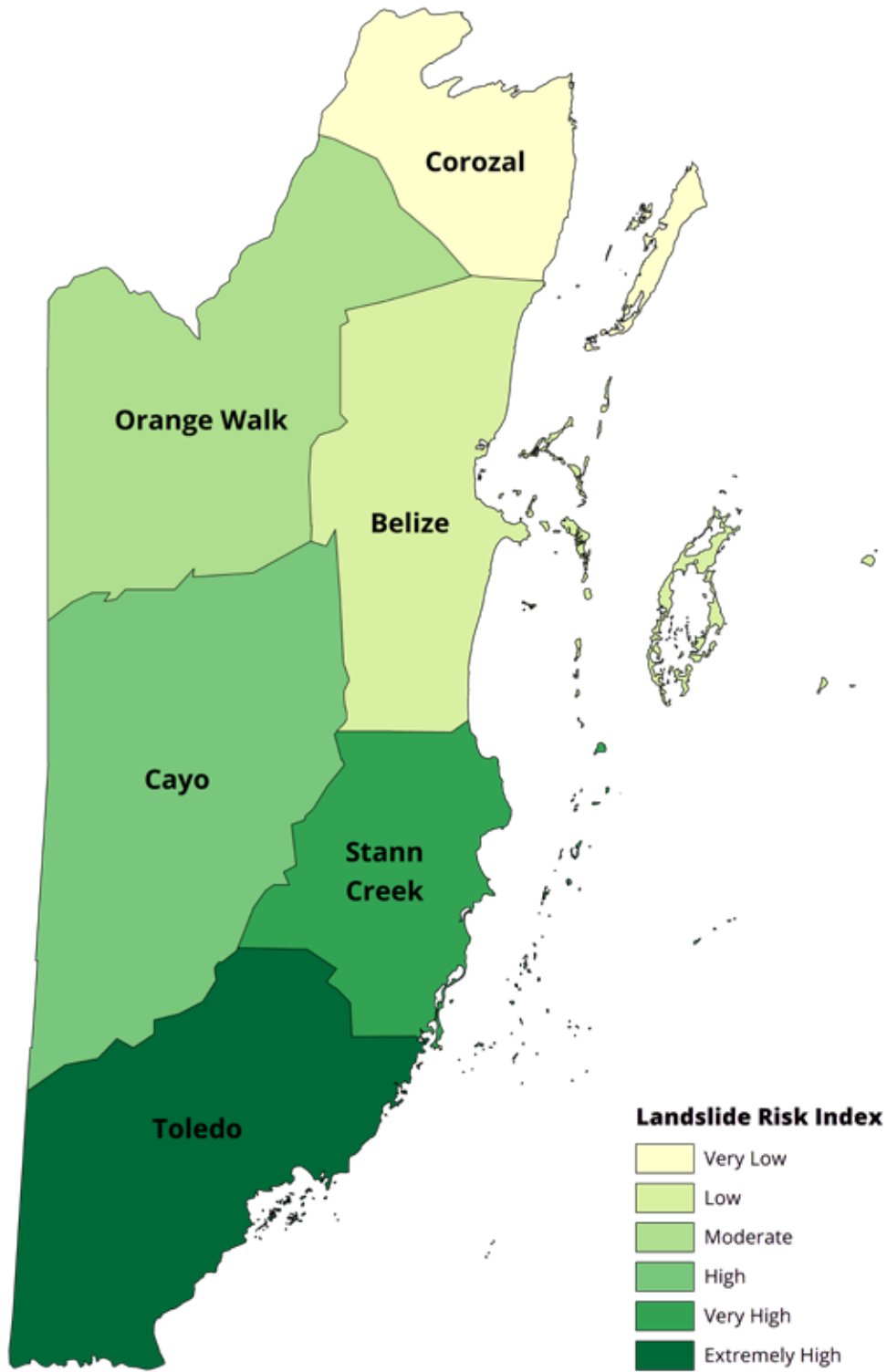


## LANDSLIDE RISK BY DISTRICT

| RANK | DISTRICT    | INDEX SCORE |
|------|-------------|-------------|
| 1    | Toledo      | 0.583       |
| 2    | Stann Creek | 0.309       |
| 3    | Cayo        | 0.264       |
| 4    | Orange Walk | 0.178       |
| 5    | Belize      | 0.022       |
| 6    | Corozal     | 0           |







### STORM SURGE RISK BY DISTRICT

| RANK | DISTRICT    | INDEX SCORE |
|------|-------------|-------------|
| 1    | Belize      | 0.344       |
| 2    | Stann Creek | 0.293       |
| 3    | Corozal     | 0.249       |
| 4    | Toledo      | 0.242       |
| 5    | Cayo        | 0           |
| 5    | Orange Walk | 0           |



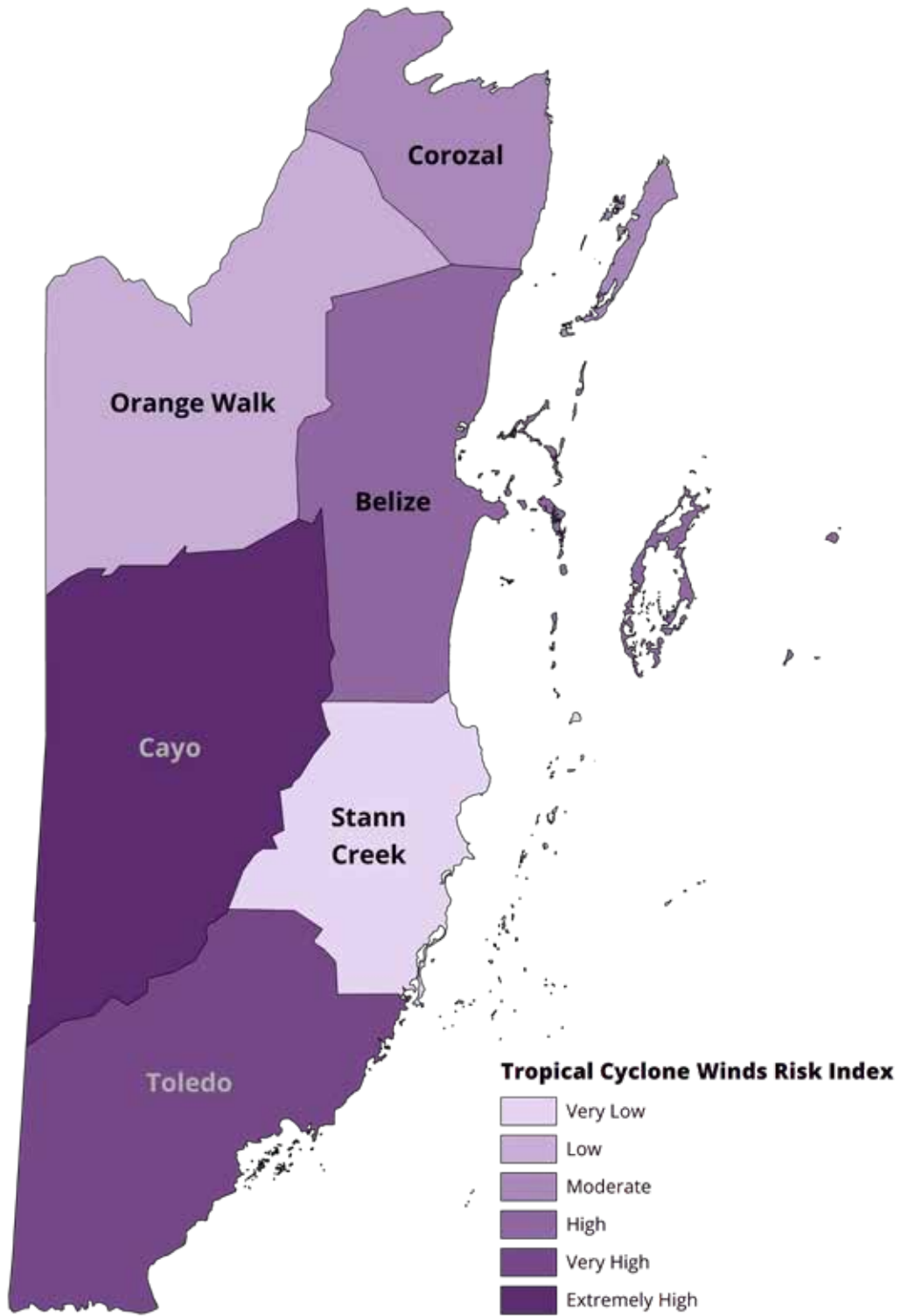


### TROPICAL CYCLONE WINDS RISK BY DISTRICT

| RANK | DISTRICT    | INDEX SCORE |
|------|-------------|-------------|
| 1    | Cayo        | 0.46        |
| 2    | Toledo      | 0.432       |
| 3    | Belize      | 0.326       |
| 4    | Corozal     | 0.303       |
| 5    | Orange Walk | 0.295       |
| 6    | Stann Creek | 0.265       |



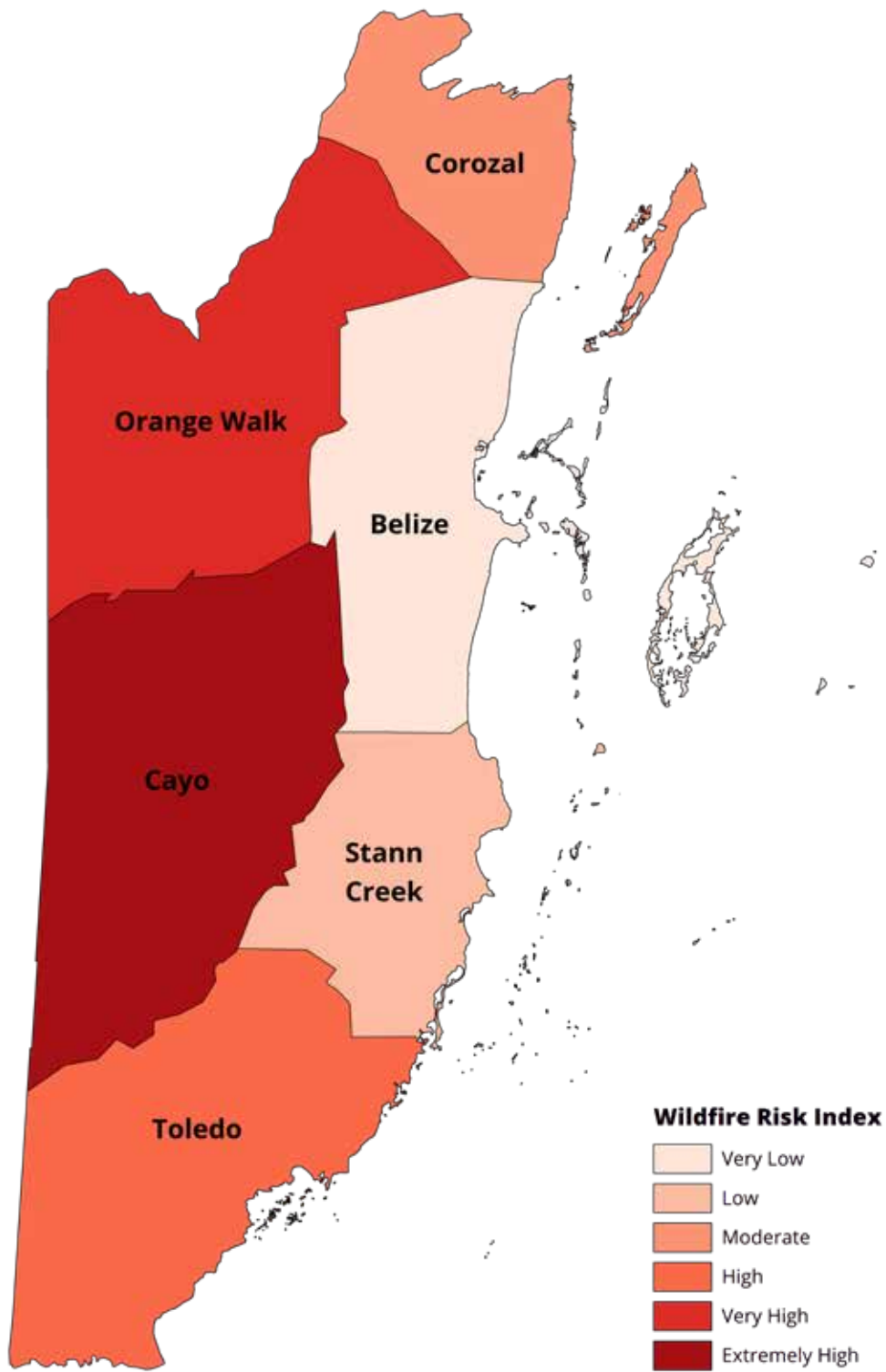




## WILDFIRE RISK BY DISTRICT

| RANK | DISTRICT    | INDEX SCORE |
|------|-------------|-------------|
| 1    | Cayo        | 0.472       |
| 2    | Orange Walk | 0.376       |
| 3    | Toledo      | 0.33        |
| 4    | Corozal     | 0.318       |
| 5    | Stann Creek | 0.184       |
| 6    | Belize      | 0.002       |







**THE RVA**

# **MULTI-HAZARD RISK**

# MULTI-HAZARD RISK

Multi-hazard risk combines hazard exposure, susceptibility to impact, and the relative ability to absorb negative disaster impacts to provide a collective measure of how each District may be affected by hazard and disasters as a whole over time. Analyzing risk information throughout all phases of disaster management – mitigation, preparedness, response, recovery – improves operations and promotes efficient resource allocation.

Multi-Hazard Risk in Belize was calculated by averaging Multi-Hazard Exposure, Vulnerability, and Coping Capacity. Results are displayed across each district below, while additional detail on district Risk is provided in the individual district profiles.

## Global Multi-Hazard Risk rank (PDC Global RVA)

**85** OUT OF 193 COUNTRIES / TERRITORIES ASSESSED

## Belize’s Multi-Hazard Risk rank among other Central American countries

**5** OUT OF 7 COUNTRIES / TERRITORIES ASSESSED

### MULTI-HAZARD RISK COMPONENTS



**Vulnerability**



**Coping Capacity**



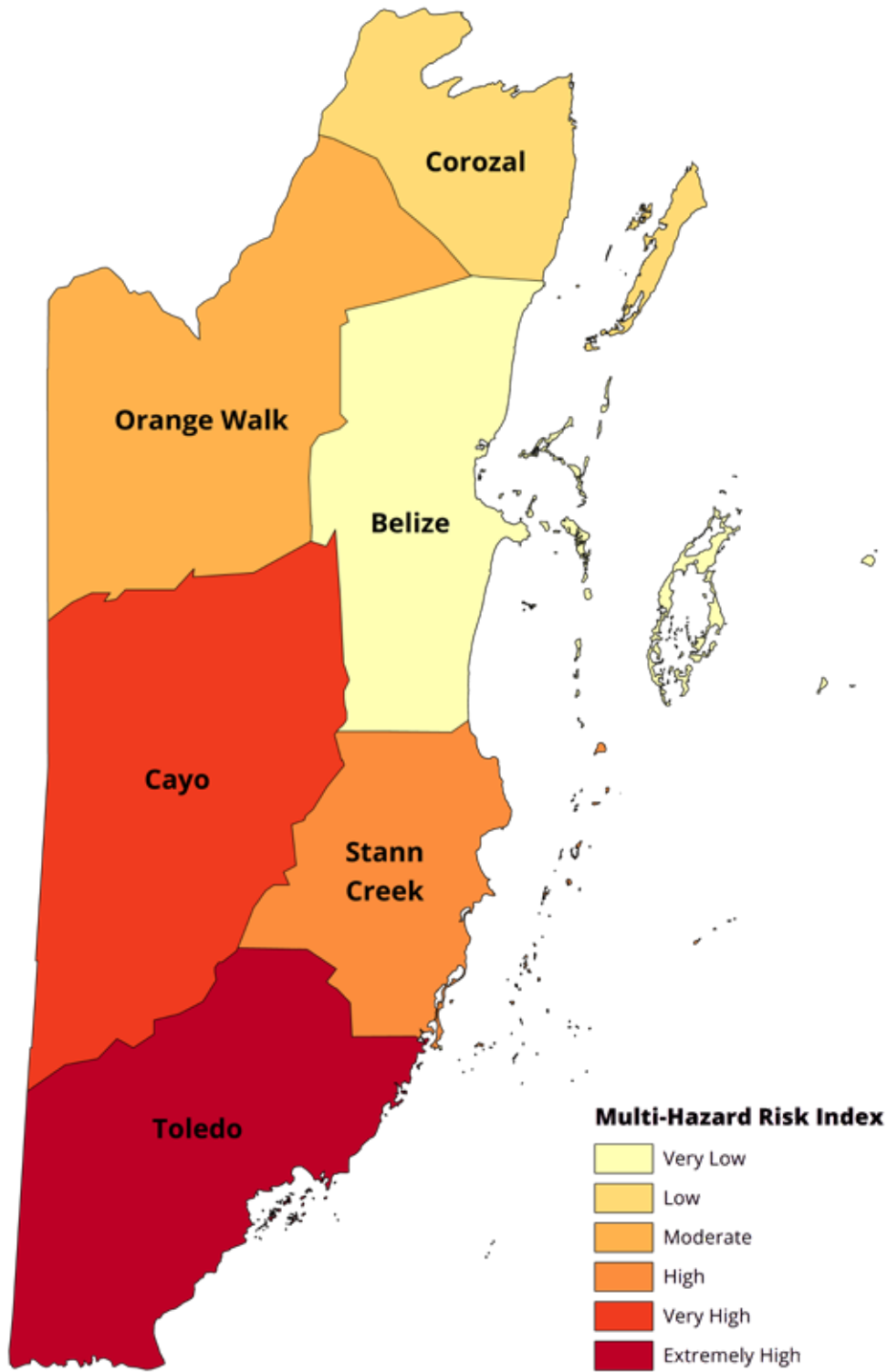
**Multi-Hazard Exposure**



### MULTI-HAZARD RISK BY DISTRICT

| RANK | DISTRICT    | INDEX SCORE |
|------|-------------|-------------|
| 1    | Toledo      | 0.719       |
| 2    | Cayo        | 0.531       |
| 3    | Stann Creek | 0.459       |
| 4    | Orange Walk | 0.449       |
| 5    | Corozal     | 0.437       |
| 6    | Belize      | 0.354       |







THE DMA

# DISASTER MANAGEMENT ANALYSIS

SUMMARY OF FINDINGS

# DISASTER MANAGEMENT ANALYSIS

## FINDINGS & RECOMMENDATIONS

Provided in this section are the results of the Disaster Management Analysis (DMA) that was conducted as part of the Belize National Disaster Preparedness Baseline Assessment. The outcome of the DMA enables more effective prioritization of risk reduction and resilience-building initiatives. Considering diverse community needs and operational successes and barriers, the DMA results enable decision makers and communities to prioritize actions for disaster risk reduction and disaster governance at all levels. The following section summarizes key findings in six broad areas of analysis: Institutional Arrangements; Enabling Environment; Disaster Governance Mechanisms; Capabilities and Resources; Capacities; and Communications and Information Management

### DISASTER MANAGEMENT ANALYSIS THEME AND SUBTHEMES



#### **Institutional Arrangements**

- Organizational Structures
- Leadership Arrangements
- Mechanisms for Stakeholder Engagement



#### **Disaster Governance Mechanisms**

- Plans, Processes, and Standard Operating Procedures
- Emergency Operations Centers
- Command, Control and Coordination Systems



#### **Enabling Environment**

- Legal Instruments
- Financial Resources
- Clear and Comprehensive Strategies
- Public Confidence and Political Support
- Attitudes and Experience



#### **Capacity Development**

- Capacity Development Plans and Strategies
- Training and Education Programs and Facilities
- Monitoring and Evaluation Processes and Systems



#### **Communication and Information Management**

- Hazard and Risk Analysis Systems
- Disaster Assessment
- Media and Public Affairs
- Information Collection, Management, and Distribution
- Monitoring and Notification



#### **Capabilities and Resources**

- Dedicated Facilities and Equipment
- Human Resources
- Inventory of Commodities and Supplies
- Targeted Functional Capabilities



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# **INSTITUTIONAL ARRANGEMENTS**



# INSITUTIONAL ARRANGEMENTS

The organizational and institutional structures through which disaster management capacity forms indicate a country’s institutional arrangements. By examining the organization and composition of diverse agencies and individuals that constitute a nation’s disaster management capacity—detailing the relationships and collaboration between them—tangible opportunities for increased effectiveness are often revealed. The DMA analyzes sub-themes that characterize institutional arrangements.



## CURRENT STATUS INSTITUTIONAL ARRANGEMENTS

- Limited or No Capacity
- Early Capacity Development
- Achievement with Significant Limitations
- Substantial Progress with Some Limitation
- Advanced Capacity



The National Emergency Management Organization’s (NEMO) organizational structure under the Ministry of Sustainable Development, Climate Change & Disaster Risk Management (MSD/CC/DRR) includes a wide range of representation from both the public and private sectors. Organizational arrangements for DM are explicated in the Belize National Hazard Mitigation Plan, including designations of disaster management (DM) responsibilities regarding the 13 Operational Committees (OC) at NEMO and interagency coordination,<sup>1,2</sup> however effective implementation and coordination mechanisms have not been established. Thus, there is a reported lack of impetus amongst governmental DM stakeholders, especially within the Operational Committees at NEMO, whose members all already have full-time positions in their respective ministries but with no apparent mandate regarding hours spent attending to their NEMO committee responsibilities. Furthermore, NEMO’s 3 Regional (North, South, and Central) and 9 District Emergency Committees have limited operational functionality.<sup>3(p. 19)</sup> Like the organizational arrangements, leadership competencies and arrangements are spelled out in legislation, plans, and policies but durable implementation and coordination mechanisms are not in evidence. This has placed undue pressure on the National Emergency Coordinator (NEC) position, whose mandated responsibilities are extensive but without mechanisms for support to execute those responsibilities—thereby creating limitations throughout the entire DM apparatus in general. Regarding arrangements for stakeholder representation and engagement, whilst most of NEMO’s OC’s membership includes representation from the private sector, NGOs, and religious organizations, durable mandates for engagement are lacking. The same appears to be true regarding the National Advisory Committee (NAC).

Some integration of disaster risk reduction (DRR), climate change adaptation (CCA) and sustainable development (SD) exists, but in an ad hoc manner. The newly established MSD/CC/DRR signals the Government of Belize’s (GOB) intentions to formalize such integration. In summary, the documentation for institutional arrangements shows a lot of thought and organization; where it could be improved upon is in the implementation and coordination of responsibilities and procedures.

# SUBTHEME STATUS

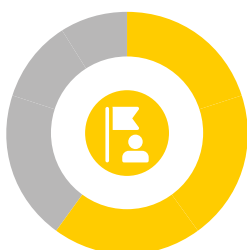
## INSTITUTIONAL ARRANGEMENTS

- Limited or No Capacity
- Early Capacity Development
- Achievement with Significant Limitations
- Substantial Progress with Some Limitation
- Advanced Capacity



### Organizational Structures

- Organization of DM functions
- Development of DM organizational structure
- Engagement with bilateral, international, and other humanitarian actors
- Regionalized disaster management capacity
- Integration of military into civil DM structure
- National platform or office to manage disaster risk reduction (DRR) and Sendai Framework implementation
- National platform/office to manage climate change adaptation (CCA)
- National platform/office to manage sustainable development (SD)
- Integration of DRR, CCA and SD



### Leadership Arrangements

- Disaster management leadership arrangements
- Linkage of disaster management leadership to political leadership
- Requirements for job-specific competencies for disaster management leadership
- Leadership structure during major disaster response events
- Disaster management committee structure to support response and recovery operations
- Dedicated disaster risk management policy-making committees



## Mechanisms for Stakeholder Engagement

- Nongovernmental stakeholders represented in governmental disaster management structure
  - Public-private partnerships
  - Inventory of NGO and private-sector disaster management capabilities
  - Capacity of nongovernmental stakeholders engaged in disaster management
  - Engagement of private sector entities in disaster management
  - Organizational arrangements used by NGOs to support disaster management efforts
  - Involvement of academia in disaster management efforts
  - Relationship between national governments, regional entities, and global disaster management organizations
- ★ NEMO Committees: Foreign Assistance; Damage Assessment and Needs Analysis (DANA); Relief and Supplies Management; Education, Information, Communications, and Warning; Search and Rescue and Security; Transport and Evacuation; Housing and Shelter; Economic and Recovery; Medical Care and Public Health; Environmental and Solid Waste; Restoration and Utilities.

# FINDINGS AND ACTIONS TO REACH ADVANCED CAPACITY

## ORGANIZATIONAL STRUCTURES AND LEADERSHIP ARRANGEMENTS

### Findings

Organizational arrangements for DM are explicated in the Belize National Hazard Mitigation Plan, including designations of DM responsibilities regarding the thirteen (13) Operational Committees at NEMO and interagency coordination,<sup>1,2</sup> however effective implementation and coordination mechanisms have not been established. Thus, there is a reported lack of impetus amongst governmental DM stakeholders, especially within the Operational Committees at NEMO, whose members all already have full-time positions in their respective ministries but with no apparent mandate regarding hours spent attending to their NEMO committee responsibilities. The same appears to be true regarding the National Advisory Committee (NAC).

### Actions to Reach Advanced Capacity

- ✓ Findings point to thoughtful conceptualizations for organizational structures, but the endeavor would benefit from durable mechanisms that would ensure that the concepts are actualized.
- ✓ Require the NAC and NEMO's Operational Committees to be active and operational during non-disaster times and establish mechanisms to ensure they spend a required number of hours during non-disaster times to fulfill their mandates

### Findings

NEMO's three (3) Regional (North, South, and Central) and nine (9) District Emergency Committees have limited operational functionality.<sup>3(p. 19)</sup>

Leadership competencies and arrangements are spelled out in legislation,<sup>2</sup> plans, and policies but durable implementation and coordination mechanisms are not in evidence. This has placed undue pressure on the National Emergency Coordinator (NEC) position, whose mandated responsibilities are extensive but without mechanisms for support to execute those responsibilities thereby created limitations throughout the entire DM apparatus in general.

The structure of NEMO is such that most DM positions are held by happenstance of political appointments, and thereby are not based on formally defined merit-based expectations.

Job-specific competencies and experience are required, but are not explicitly defined in plans, policies, and regulations.<sup>13</sup> Recruitment is handled by the Ministry of Public Service.<sup>18(p. 97)</sup>

## Actions to Reach Advanced Capacity

- ✓ Amend/develop legislation to formally define and strengthen staff competency requirements and operational functions of NEMO personnel, the three (3) Regional, and nine (9) NEMO District Emergency Committees.
- ✓ Ensure that interagency DM responsibilities are clearly mapped for effective disaster risk management (DRM) implementation within NEMO and across all agencies beyond response activities to include preparedness and DRR.
- ✓ Abandon the practice of political/discretionary appointments.

## Findings

Some integration of DRR, CCA and SD exists, but in an ad hoc manner. The newly established Ministry of Sustainable Development, Climate Change & Disaster Risk Management appears to signal the GOB's intentions to formalize integration.

There is no platform to manage the implementation of DRR, the Sendai Framework, SDGs, and CCA, nor is it apparent whether plans exist to establish a national platform.<sup>8,9</sup> A Joint National Steering Committee was formed to develop a Country Implementation Plan to track the progress of the 2030 Agenda for Sustainable Development (SD).<sup>10</sup> The National Climate Change Office (NCCO) has posted two (2) relevant reports: Climate Change Adaptation Plan and Vulnerability and Adaptation Assessment.<sup>11,12</sup> Whilst both reports are referenced on the NCCO's website, dates are unknown, download options are not live, and they are unavailable for review. It is unclear whether they have been written yet.

Overall, integration of DRR, CCA, and SD is incipient.

The Ministry of Foreign Affairs (MOFA) is responsible for engagement with bilateral, international, and other humanitarian organizations and coordinates with regional organizations.<sup>6,7</sup>

As a Participating State to CDEMA, Belize has access to CDEMA's Regional Response Mechanism (RRM) Caribbean Community (CARICOM) network.

## Actions to Reach Advanced Capacity

- ✓ Establish integrated national platform managed by the Ministry of Sustainable Development, Climate Change & Disaster Risk Management, National Climate Change Office, and NEMO to coordinate the implementation of DRR, Sendai, SDGs, and CCA.
- ✓ Develop a governmental office/organization to manage the coordination of DRR, the Sendai Framework, SDGs, and CCA goals
- ✓ Develop a national plan to guide the integration of DRR, CCA and SDGs across all plans,



projects, planning efforts. Include local governments in the process. Develop a process to ensure integration of DRR, CCA, and SDGs and track progress at all levels.

- ✓ Develop a formal mechanism to assess progress made toward DRR, CCA, and SDGs.

## MECHANISMS FOR STAKEHOLDER ENGAGEMENT

### Findings

The Belize Network of NGOs website includes an inventory and registry that lists NGOs and details their capabilities and resources; these are not limited to NGOs with explicit DM missions.<sup>21</sup>

The Department of Public-Private Sector Dialogue under the Office of the PM exists to support the development and facilitation of public-private partnerships in Belize.<sup>20</sup> Despite this, the implementation of public-private partnerships (PPPs) is limited in number and scope.

The private sector is officially included in DM arrangements such as the Belize National Hazard Mitigation Plan<sup>2</sup> but is not translated into practice.

The University of Belize's participation in DM appears to be limited to response procedures via its Department of Public Safety, while research on disaster risk and risk mitigation is absent.<sup>22(p. 52)</sup>

Regarding arrangements for stakeholder representation and engagement, whilst most of NEMO's Operational Committees' membership includes representation from the private sector, NGOs, and religious organizations, durable mandates for engagement are lacking.

### Actions to Reach Advanced Capacity

- ✓ Schedule quarterly reviews of SDGs with stakeholders.
- ✓ Strengthen policies to ensure NGOs, private sector partners, and other sectoral organizations are comprehensively engaged in government disaster management efforts in a coordinated and complementary manner. Formally integrate them into plans. Formalize and build relationships with key partners in these sectors.
- ✓ Expand the activities of NGOs and private sector partners and formalize them to operate at the subnational level to address specific needs of populations.
- ✓ Create a formal NGO Association with website and database whose program/mission areas have DM.
- ✓ Create a centralized inventory of the NGO and private-sector DM stakeholder communities with DM program areas/missions in coordination with the Prevention department and EOC Liaison Officers (LNOs).
- ✓ Maintain and establish a private sector resource and logistics capability database

- ✓ Strengthen the policies to ensure NGOs, private sector partners, and other sectoral organizations are comprehensively engaged in government disaster management efforts in a coordinated and complementary manner. Formally integrate them into plans. Formalize and build relationships with key partners in these sectors.
- ✓ Expand the activities of NGOs and private sector partners and formalize them to operate at the subnational level to address specific needs of populations.
- ✓ Fully engage higher education institutions in technical committees through memoranda of understanding (MOUs) and proper funding mechanisms. Tie these to the science and technology (S&T) agenda.
- ✓ Include academia in DM by linking DM research and training needs to academic programs.



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# **ENABLING ENVIRONMENT**

# ENABLING ENVIRONMENT



## CURRENT STATUS ENABLING ENVIRONMENT

- Legal Instruments
- Financial Resources
- Clear and Comprehensive Strategies
- Public Confidence and Political Support
- Attitudes, Engagement, and Experience

Limited or  
No Capacity



Advanced  
Capacity

Disaster management (DM) legislation in Belize is driven primarily by the DPR Act/2000. Whilst the DPR Act/2000 mentions all DM phases, most NEMO committees and plans are focused on response. DPR Act/2000 needs revision to fully address all DM phases and to better distribute and delineate roles and responsibilities of DM actors across all levels of government and all phases of DM. A revision represents an opportunity to remedy stipulations in DPR Act/2000 that place an unreasonably large burden of responsibility onto one individual (the NEC) without provisioning proper support for the NEC to fulfill the expectations laid out in the Act. The revision should include durable, enforceable mechanisms for the operationalization of the dictates of the legislation. A dearth of updated DM and DRR strategic plans and policies also hinders disaster risk reduction and management (DRRM) efforts considerably.

Financial resources are chronically insufficient to address DM needs; this affects virtually every aspect of the DM apparatus. The DM budget exists as a subcomponent of an agency-level budget, not as a general budget line item.<sup>24-29</sup> Legislation does not stipulate funding for DM activities; NEMO’s budget covers recurrent expenditures like operating costs, some training costs, and hurricane preparedness but emergent costs like building improvements, hurricane relief, and emergency management must be provisioned for ad hoc. Because there are no ex-ante contingency or relief funds in place, disaster-impacted districts must request support at the time of an emergency.<sup>30</sup> The current funding arrangement effectively sidelines NEMO’s latitude to consider formal, proactive programs aimed at



DM and DRR capacity development (CD) efforts.

Standalone DM and DRR strategic plans exist but they are not comprehensive, nor do they address all DM phases. The National Disaster Preparedness Response Plan (NDPRP) mandated by the DPR Act/2000 does not exist in a contiguous format but rather in separate volumes and annexes relating to DM phases, hazards, functions, and general structural/operational stipulations. Furthermore, several of those annexes stipulated in the NDPRP are either older than ten (10) years old, not prepared or in draft form, or have not been tested or operationalized. Moreover, there is an acknowledged need to strengthen and formalize engagement with NGOs and other nongovernmental stakeholders in the planning process. At present, none of the proposed plans integrate DRRM, CCA, or SD with development, recovery, and reconstruction. As with legal and financial arrangements, a thorough audit of plans, policies, and strategies would benefit DM efforts at every level of the GOB for every stage of DM.

The available data on public confidence and political support is limited. Likewise, the same is true for data on attitudes, engagement, and experience. Overall, there has been some good progress regarding the enabling environment, but it could be improved upon with concerted efforts to ensure that instruments (legal, financial, policies, and plans) can readily facilitate their fullest operationalization to ensure resiliency.

## SUBTHEME STATUS

### ENABLING ENVIRONMENT

- Limited or No Capacity
- Early Capacity Development
- Achievement with Significant Limitations
- Substantial Progress with Some Limitation
- Advanced Capacity



## Legal Instruments

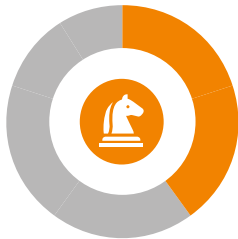
- Legal foundation of international and cross-border disaster management engagement to include participation in regional and international disaster management frameworks
- Legal arrangements for disaster management requirements
- Scope of Legislation: Phases of disaster management
- Legal foundation for the establishment of disaster management institutions
- Level of socialization of disaster management legislation throughout government
- Formalized legislative process, cooperation mechanisms and means to acquire human and material resources during disasters.
- Scope of legislative requirements related to a State of Emergency declaration
- Legal requirements for disaster management structures at sub-national levels of government
- Legislative guide and support to disaster risk reduction activities and requirements
- Legal authority of military in support of disaster management activities





## Financial Resources

- Budget arrangements for disaster management
- Compliance with disaster management funding and legislative targets
- Scope of the disaster management budget
- Role of grant programs to support preparedness and disaster risk reduction programs at all sub-national and local levels of government
- Inclusion of training, education, and research and development in the disaster management budget
- Inclusion of funding to support capacity development at lower jurisdictional levels
- Existence of a dedicated emergency or contingency funds
- Current level of disaster management budget support
- Status of a catastrophic risk insurance market
- Availability of low-interest loan availability to support households, business, or NGO recovery
- GOB support for disaster microfinance
- Guidelines for the provision of disaster relief funds to impacted jurisdictions.



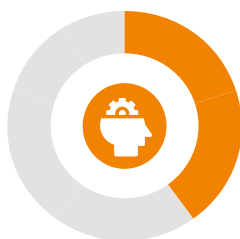
## Strategies

- Existence of disaster management and disaster risk reduction strategic plans and policies
- Engagement of disaster management stakeholders in the development of strategic plans
- Level of guidance and oversight provided to disaster management stakeholders
- Policy support for the integration of disaster risk reduction
- Integration of disaster risk reduction and disaster management policies across government
- Integration of mitigation planning into DRR policy instruments
- Inclusion of gender and vulnerable groups in DM and DRR strategies and policies



## Public Confidence and Political Support

- Support from Top GOB Officials
- Support of the Legislature
- Interagency and Multi-stakeholder Input in the Legislative Process



## Attitudes and Experience

- Practical disaster management experience at the individual, subnational and national level
- Level of public engagement with disaster management efforts
- Private sector participation in disaster management efforts

# FINDINGS AND ACTIONS TO REACH ADVANCED CAPACITY

## LEGAL INSTRUMENTS

### Findings

Disaster management legislation in Belize is driven primarily by the DPR Act/2000.

The Act established NEMO, the position of NEC to serve as director of NEMO, and the NAC.<sup>23</sup> DPR Act/2000 adequately establishes DM institutions and socializes them throughout the GOB at national down to local levels but lacks enforcement mechanisms to operationalize functions.

Whilst the DPR Act/2000 mentions all DM phases, most NEMO committees and plans are focused on response.

DPR Act/2000 places an unreasonably large burden of responsibility onto one individual (the NEC) without provisioning proper support for the NEC to fulfill the expectations laid out in the Act.

The DPR Act/2000 does not adequately distribute responsibilities and duties throughout NEMO or to other governmental and nongovernmental entities to foster and reinforce progress toward shared DRRM goals in an integrated DM structural apparatus.<sup>3(p. 12)</sup>

## Actions to Reach Advanced Capacity

- ✓ Review and update DPR Act/2000 to address all DM phases thoroughly and to better distribute and delineate roles and responsibilities of DM actors across all levels of government and all phases of DM.
  - ✓ Mandate, with enforceable implementation schedules, comprehensive mitigation, preparation, and recovery & rebuild plans.
  - ✓ Assign responsibility to the NEC, the NAC, and other specific personnel chosen by them to produce the plans in a timely manner. Stipulate deadlines and mechanisms to enforce deadlines
  - ✓ Mandate consultation with a wide range of stakeholders, especially from NGOs and private sector
  - ✓ Mandate coordination with Ministry of Sustainable Development, Climate Change & Disaster Risk Management, the National Climate Change Office, and NEMO to ensure all plans align with CCA, DRR, and SDGs.
  - ✓ Formally codify mechanisms to ensure minimum contributions amongst all NEMO Committees, especially during nonemergency times
- ✓ Ensure multistakeholder input in the legal review by establishing linkages between NEMO's membership, OCs, and legislative bodies

## FINANCIAL RESOURCES

### Findings

Financial resources are chronically insufficient to address DM needs; this affects virtually every aspect of the DM apparatus.

Belize participates in a nonprofit, multi-country catastrophic insurance pool administered by the Caribbean Catastrophe Risk Insurance Facility (CCRIF); however, because it is not affordable to most, private sector penetration and coverage is limited.<sup>33(p. 38)</sup>

### Actions to Reach Advanced Capacity

- ✓ Legally establish a calamity fund, with minimum annual contributions, for use during disaster relief efforts
- ✓ Legally establish a revolving DM fund, with minimum annual contributions, to facilitate DRR, capacity building, and other and disaster preparedness and long-term recovery activities
- ✓ Provision risk financing mechanisms for the private sector

- ✓ Create affordable formal microfinancing mechanisms through PPPs.
- ✓ Establish low-interest loans available to support household, business, or NGO recovery costs that are ineligible under other funding streams or options.

## STRATEGIES

### Findings

A dearth of updated DM and DRR strategic plans and policies hinders DRRM efforts considerably.

### Actions to Reach Advanced Capacity

- ✓ Update and strengthen plans policies to ensure NGOs, private sector partners, and other sectoral organizations are comprehensively engaged in government disaster management efforts in a coordinated and complementary manner. Formally integrate them into plans. Formalize and build relationships with key partners in these sectors.

## PUBLIC CONFIDENCE AND POLITICAL SUPPORT / ATTITUDES, ENGAGEMENT, AND EXPERIENCE

### Findings

There is not enough data available for Public Confidence and Political Support / Attitudes, Engagement, and Experience indicators to facilitate a meaningful assessment.

### Actions to Reach Advanced Capacity

- ✓ Establish initiatives for political and public engagement by establishing pathways for legislative activities and targeted outreach campaigns for volunteer recruitment
- ✓ Periodically collect political approval ratings/assess household preparedness levels to determine core DRR/DM needs and gaps within communities
- ✓ Periodically conduct surveys to assess the DRM/DRR needs of vulnerable populations within each jurisdiction.







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# **DISASTER GOVERNANCE MECHANISMS**

# DISASTER GOVERNANCE MECHANISMS



## CURRENT STATUS DISASTER GOVERNANCE MECHANISMS

- Limited or No Capacity
- Early Capacity Development
- Achievement with Significant Limitations
- Substantial Progress with Some Limitation
- Advanced Capacity



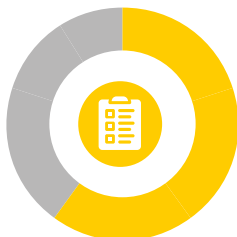
Existing plans are disparate and not current. The National Hazard Mitigation Plan (NHMP) is divided into several volumes and sub volumes pertaining to SOPs, specific hazards, phases, functionalities (i.e., evacuation, search and rescue), and district plans.<sup>17</sup> But only a few of the sub volumes appear to have been written, and those that have been produced are at least ten (10) years old and in need of review. The National Disaster Preparedness Response Plan (NDPRP) is mandated to be reviewed and submitted annually by the NEC,<sup>39 (Part 2)</sup> but the NDPRP is either not in existence or publicly unavailable. Its purported content is supposed to include procedures related to the preparedness of other GOB ministries and departments and requires coordination of the plan and its implementation with other ministries and departments, public officers, volunteers, local governments, and statutory bodies.<sup>16,41</sup> Further to the DPR Act/2000 mandate is that the NDPRP shall fully explicate incident command and management systems and structures, including decision-making authority and reporting hierarchies; this is not actualized at present. <sup>39 (Part 3-8[2])</sup>

Public Service regulations require ministries and departments to prepare emergency plans that include ensuring continuity of government following a disaster.<sup>13</sup> However, whilst COOP and COG planning is required, plans remain either under development or are untested. Regarding governance infrastructure, Belize maintains a purpose-built Emergency Operations Center (EOC) to serve as the headquarters for disaster response activities, but EOC resources are not adequate to support large-scale response coordination.

# SUBTHEME STATUS

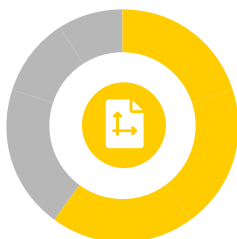
## DISASTER GOVERNANCE MECHANISMS

- Limited or No Capacity
- Early Capacity Development
- Achievement with Significant Limitations
- Substantial Progress with Some Limitation
- Advanced Capacity



### Plans and Standard Operating Procedures

- Emergency declarations
- DM phases addressed in plans and procedures: Limited data
- Level of coordination across the GOB to support disaster management plans: Limited data
- Clarity of roles and responsibilities in existing plans and procedures
- Inclusion of Continuity of Operations and Continuity of Government in plans and procedures
- Coordination and crosswalk of minimum disaster management requirements at every level of government.
- Adoption and implementation of formalized mutual aid agreements at all levels of the GOB to support disaster management efforts
- Clarity in process and protocols to activate and integrate external disaster assistance
- Clarity and functioning of existing protocols to process, accept, and utilize donated goods and volunteer resources



### Command, Control, and Coordination Systems

- Incident Command and Coordination Systems
- Incident Coordination Systems
- Legal Basis of Command and Coordination Structures
- Command and Coordination by Function
- Facilitation of Interagency Coordination



## Governance Infrastructure: Emergency Operations Centers

- Support for and existence of jurisdictional sole-use, purpose-built EOCs
- Existence of dedicated EOC facilities
- Minimum standards for EOC equipment and operationalization
- Policy and practice for minimum time to full EOC activation: No data.
- Duration of EOC operations with existing, staff, equipment, and resources: No data.
- Mitigation protection implemented for primary EOC from known hazards
- Accessibility of the national EOC to key GOB officials
- Existence of primary and secondary EOCs
- Establishment of field-level coordination centers
- Establishment and clarity of plans and procedures to support long-term community recovery
- Field-Level Coordination Centers: No data.
- Long-Term Community Recovery Facilitation Capacity: No data
- Communications Interoperability: No data
- Responder Credentialing: No data

# FINDINGS AND ACTIONS TO REACH ADVANCED CAPACITY

## PLANS, PROCESSES, AND STANDARD OPERATING PROCEDURES

### Findings

Existing plans are disparate and not current.

The NDPRP is mandated to be reviewed and submitted annually by the NEC,<sup>39 (Part 2)</sup> but the NDPRP is either not in existence or unavailable. Its purported content is supposed to include procedures related to preparedness of other GOB ministries and departments and requires coordination of the plan and its implementation with other ministries and departments, public officers, volunteers, and local governments.<sup>16,41</sup>

The National Hazard Mitigation Plan (NHMP) is divided into several volumes and sub volumes pertaining to SOPs, specific hazards, phases, functionalities (i.e., evacuation, search and rescue), and district plans.<sup>17</sup> But only a few of the sub volumes appear to have been written at all, and those that have been produced are at least ten (10) years old and in need of review.

### Actions to Reach Advanced Capacity

- ✓ Audit, update, and re-publish all existing DM plans
- ✓ Address comprehensive disaster management (CDM) (All-hazards, all phases, and whole-of-society); base it on CDEMA's Regional CDM Strategy and Results Framework 2014 – 2024
- ✓ Draft and publish DM plans to fulfill all the volumes and annexes dictated by the NHMP and make them widely accessible
- ✓ Analyze the Annex listings to determine the most critically important plans
- ✓ Draft/finalize the NDPRP and make it widely accessible
- ✓ Integrate the NDPRP with plans and policies across the national and subnational government and critical infrastructure sectors.
- ✓ Address gender and vulnerable groups in national and local plans
- ✓ Solicit input from a wide range of stakeholders including NGOs, CSOs, and businesses.

## COMMAND, CONTROL AND COORDINATION

### Findings

Whilst COOP and COG planning is required, plans remain either under development or are untested.

### Actions to Reach Advanced Capacity

- ✓ Develop and require the use of COOP and COG plans. Leverage the existing COOP strategy by Latin American and Caribbean Economic System
- ✓ Leverage PDC's DisasterAWARE Pro, a GIS-based data management system (available to the Belize DM community by virtue of participation in this assessment), for a common operating picture and planning efforts amongst all DM stakeholders. Utilize the risk and vulnerability assessments, map layers of infrastructure and other relevant data generated by PDC for this NDPBA. At any time, through collaboration with PDC, new data may be incorporated by NEMO, SIB's GIS unit, and external agencies – particularly the UN, International Federation of Red Cross and Red Crescent Societies (IFRC), and RCSB.
- ✓ When applicable, hold EOC training, so ESF personnel understand NEMO's and SIB's GIS unit capabilities and know what to ask for concerning mapping.

## GOVERNANCE INFRASTRUCTURE: EMERGENCY OPERATIONS CENTERS

### Findings

Belize maintains a purpose-built, dedicated EOC that also serves non-disaster functions. The EOC does not have enough room to house the staff and computer equipment to support large scale response operations. Similarly, it is unclear where international partners would be staged to support national efforts to a large-scale event.

### Actions to Reach Advanced Capacity

- ✓ Upgrade and outfit the NEOC's capabilities to be fully functional in a large-scale disaster event





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# CAPABILITIES AND RESOURCES

# CAPABILITIES AND RESOURCES



## CURRENT STATUS CAPABILITIES AND RESOURCES

- Limited or No Capacity
- Early Capacity Development
- Achievement with Significant Limitations
- Substantial Progress with Some Limitation
- Advanced Capacity



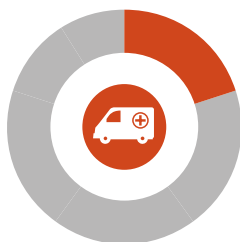
Capabilities and resources are at incipient levels in Belize. Equipment and supply inventories (including shelters), human resources, and functional capabilities (such as provisions for WASH requirements) are all insufficient to meet DM requirements. There is a recognized shortage of skilled DM personnel.

In sum, whilst there is limited data and/or documentation regarding the indices in this section, there is room to grow these capabilities and resources with the targeted strategies below.

# SUBTHEME STATUS

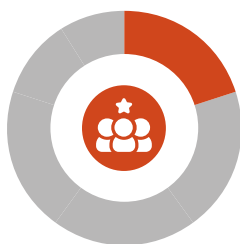
## CAPABILITIES AND RESOURCES

- Limited or No Capacity
- Early Capacity Development
- Achievement with Significant Limitations
- Substantial Progress with Some Limitation
- Advanced Capacity



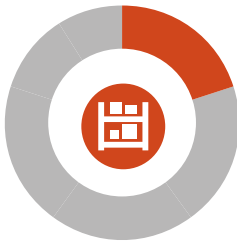
### Dedicated Facilities and Equipment

- Emergency Services Facilities Capacity: Limited data
- Material Resources Available for DM: Limited data
- Supplemental DM Resources
- DM Equipment Inventories: Limited to no data
- Shelter Capacity
- Shelter Equipment: Limited to no data
- Shelter Suitability Assessments: Limited to no data
- Warehousing Capacity
- ***There is not enough data regarding dedicated facilities and equipment indicators to facilitate a meaningful assessment.***



### Human Resources

- Dedicated emergency management staff: Limited to no data.
- Dedicated disaster/catastrophe planning and civil protection staff
- Plan and process for integrating surge staffing for DM. Limited to no data.
- Existing surge staffing sources and levels: Limited to no data.
- Rosters of critical post-impact professionals: No data.
- Mechanisms to easily activate disaster-related technical staff: No data.
- City Pairing or Similar Technical Staffing Partnerships: No data.



## Inventory of Commodities and Supplies

- Generating Estimates of Post-Disaster Commodity Needs
- Commodity Stockpile Quantities
- Location of Commodity Stockpiles
- Basis of Commodity Stockpile Distribution
- Commodity Contracts
- DM Resource and Supply Inventories
- Frequency of Resource and Supply Inventory Updates
- Hosting of Resource and Supply Inventories
- ***There is not enough data regarding dedicated facilities and equipment indicators to facilitate a meaningful assessment.***



## Targeted Functional Capabilities

- Public Health and Medical
- Mass Care
- Psychosocial
- Water, Sanitation, and Hygiene (WASH)
- Targeted Functional Capabilities
- Evacuation
- Safety and Security
- Transportation
- Hazardous Materials: No data
- Communications: No data
- Logistics/SC: No data
- Search and Rescue: Limited data
- Long-Term Recovery: No data
- Public Works and Engineering: No data
- Agriculture and Natural Resources: No data
- Finance: No data
- Energy: Limited data

# FINDINGS AND ACTIONS TO REACH ADVANCED CAPACITY

## DEDICATED FACILITIES AND EQUIPMENT

### Findings

There is not enough data regarding dedicated facilities and equipment indicators to facilitate a meaningful assessment.

There are fifteen (15) fire stations in Belize; this translates to roughly one station per ~26,000 people (about 75% of the desired capacity per international norms).<sup>43(p. 555)</sup>

NEMO maintains a national shelter list that is updated annually, including shelters by district/village.<sup>44</sup> However, alternate sheltering capabilities would likely have to be identified to address shelter needs based on realistic hazard scenarios generated using findings from the RVA of this study.

NEMO maintains disaster warehouses in Ladyville, Orange Walk, Belmopan, Stann Creek and Toledo District that provide adequate geographic coverage however the capacities are not assessed or not known.<sup>45</sup>

NEMO’s Medical Care and Public Health Committee (NMCPHC) and the MOH are responsible for public health and medical response in partnership with their international partners, the Pan American Health Organization/World Health Organization (PAHO/WHO).

The NMCPHC Plan is a detailed and comprehensive demonstration of the Ministry of Health’s (MOH) leadership in mass care. The NMCPHC Plan carries many responsibilities therein, including but not limited to distribution of medical supplies wherever needed, rapid assessments, the installation of field hospital units when called for, and plans for mass casualty events and stress management in emergencies.<sup>16(p. 5)</sup>

MOH has a mutual aid agreement with the BRCS, who is an active partner in MOH’s health and medical planning for disasters including the provisioning for water, sanitation, and hygiene (WASH) needs in cooperation with the IFRC<sup>46</sup>.

### Actions to Reach Advanced Capacity

- ✓ Expand the firefighting and first responder infrastructure, especially by recruiting and securing training for volunteer firefighters
- ✓ Thoroughly review shelter inventory, establish additional shelters, and ensure the suitability of all shelters

## HUMAN RESOURCES

### Findings

There is not enough available data regarding human resource indicators to facilitate a meaningful assessment, but there are known human resource shortages.

### Actions to Reach Advanced Capacity

- ✓ Expand and train/professionalize the DM human resource pool
- ✓ Formalize and diversify the identification of surge staffing resources from throughout the disaster management stakeholder community, including non-governmental organizations, the private sector, and other government agencies.
- ✓ Promote the development and use of pairing arrangements and other similar mechanisms to address disaster-related technical staffing requirements.
- ✓ Establish dedicated personnel for tracking SDGs, training, exercises, planning and tracking of international NGOs operating in the country.
- ✓ Ensure all leadership positions within NEMO and other DM agencies are filled

## COMMODITY AND SUPPLY INVENTORY

### Findings

There is not enough available data regarding commodity and supply inventory indicators to facilitate a meaningful assessment.

## FUNCTIONAL CAPABILITIES

### Findings

There is not enough available data regarding commodity and supply inventory indicators to facilitate a meaningful assessment.

Parallel to the NMCPHC Plan, the GOB addresses other functional support in part through its access to CDEMA's RRM network via its six Regional Response Units: 1) Disaster Relief Unit (DRU), 2) Emergency coordination – Operational Support Team (OST), 3) Initial humanitarian needs assessments – Disaster Assessment and Coordination (DAC), 4) Initial sectoral assessments –



Rapid Needs Assessment Team (RNAT), 5) Search and rescue – Regional Search and Rescue Team (RSART), and 6) CDEMA Technical Support (Specialist) Team.

Regarding sanitation, whilst the Solid Waste Management Authority is authorized to make decisions, procedures for response/recovery operations are not spelled out in the relevant plans or statutes.<sup>47</sup>

The Ministry of Energy, Science & Technology and Public Utilities' Strategic Plan does not address resiliency or recovery from disasters.<sup>48</sup>

The NEP enlists NEMO, its Operational Committees (especially the National Search and Rescue and Evacuation Committee), District and Special Emergency Committees, Village Emergency Committees, and private organizations to follow its SOPs for communicating with the affected populations, assembly points, and transportation of the evacuees,<sup>17(p. 3)</sup> while the Police Department and the BDF oversee safety and security during a disaster.





THE DMA

# CAPACITY DEVELOPMENT

# CAPACITY DEVELOPMENT



## CURRENT STATUS CAPACITY DEVELOPMENT

- Limited or No Capacity
- Early Capacity Development
- Achievement with Significant Limitations
- Substantial Progress with Some Limitation
- Advanced Capacity



There is an overall lack of DM plans and strategies at national or local levels that could be used to drive capacity development efforts. Moreover, there is a lack of assessment protocols regarding DM capacity and resource needs due to an absence of deliberative planning for such needs. Whilst NEMO is the designated GOB agency tasked with coordination and support of DM and DRR capacity development, it appears that NEMO lacks the formal authority to require annual training and exercises at the national level; training and exercises are conducted on an ad hoc basis.<sup>29(p. 202)</sup> NEMO supports training as a budgeted recurring expense, but training and exercise efforts are managed by staff with other regular (non-exercise) day-to-day job functions; there is not a designated training facility.

The structure of NEMO is such that most (if not all) DM positions are held by happenstance of political appointments, and thereby are not based on formally defined merit-based expectations.

NEMO does not have adequate resources to offer sufficient training and education. NEMO does conduct public information and education sessions regularly, but our team was not able to gain a complete understanding of the depth and extent of these efforts. Likewise, higher education support for DM professionalization is in its infancy.

In sum, capacity development, like capabilities and resources, is hindered by a shortage of plans and limited resources.

# SUBTHEME STATUS

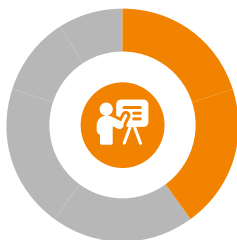
## CAPACITY DEVELOPMENT

- Limited or No Capacity
- Early Capacity Development
- Achievement with Significant Limitations
- Substantial Progress with Some Limitation
- Advanced Capacity



### Capacity Development Plans and Strategies

- Training and Exercise Requirements and/or Recommendations
- Position-Specific Competency Requirements
- Coordination of CD Efforts
- Strategy Driven Efforts
- DM and DRR Capacity and Resource Needs Assessments
- Coordination with Regional/Global CD Efforts
- National Science and Technology Agenda



### Training and Education Programs and Facilities

- Coordination with Regional/Global CD Efforts
- Scope of disaster management/disaster risk reduction training and education
- Level of exercise program implementation and staffing
- Existence of training schedule and/or catalog
- Exercise evaluation standards: No data
- Structured annual exercise schedule
- National-level exercises
- National support for district and regional exercise efforts: No data
- Participation requirements of GOB agencies with DM functions
- Higher-education support for disaster management
- Higher-education offerings
- Existence of a formalized public awareness and resilience building programs
- Community centers and public awareness/education



## Monitoring and Evaluation Processes and Systems

- Procedures to guide the evaluation and revisions of plans, strategies, and SOPs: No data
- Established reviews for plans, strategies, and SOPs
- Established process to review and update of disaster management legislation
- Requirements for post-disaster review and evaluation: No data
- Incorporation of evaluations into plans, policies, and SOPs: No data

# FINDINGS AND ACTIONS TO REACH ADVANCED CAPACITY

## FORMALIZED CAPACITY DEVELOPMENT PLANS AND STRATEGIES

### Findings

In general, NEMO lacks plans and strategies that could be used to drive capacity development efforts. Moreover, there is generally a lack of assessment protocols regarding DM and DRR capacity and resource needs due to an overall lack of deliberative planning in anticipation of disasters.

There is an overall deficiency of plans, strategies, and SOPs; thus, evaluation and revision are often precluded. Plans that do exist are at least ten (10) years old and have not been reviewed or updated.

### Actions to Reach Advanced Capacity

- ✓ Review, update, and/or draft plans, strategies, and SOPs and utilize them to drive capacity development efforts.
- ✓ Reduce disparities in infrastructure and increase resilience nationwide by implementing physical and social resilience projects
- ✓ Integrate plans and policies across the national and subnational governments and critical infrastructure sectors.

## TRAINING AND EDUCATION PROGRAMS AND FACILITIES

### Findings

NEMO supports training as a budgeted recurring expense, although training and exercise efforts are managed by staff with other regular (non-exercise) day-to-day job functions; there is not a



designated training facility.

NEMO does not have adequate resources to offer fulfill training and education needs. Training and exercises are conducted on an ad hoc basis.<sup>29(p. 202)</sup>

National-level exercises are held on a basis that is less frequent than annually.

Structured annual training schedules/catalogs of available courses do not exist.

As a Participating State to CDEMA Belize has access to their Regional Training Centre (RTC).<sup>50</sup> The RTC is headquartered in Barbados but also conducts training off-site in member countries.

Disaster preparedness information is provided to a generalized audience through media and other active campaigns; information is provided on various GOB websites. But public awareness, preparedness, and resilience-building programs face implementation challenges and are conducted in an ad-hoc manner.<sup>57-60</sup>

The BRCS is engaged in the promotion of disaster awareness, preparedness, and training.<sup>61-63</sup>

Belize fortifies its DM/DRR capacities from its many international working relationships, particularly CDEMA.

Exercise evaluation standards do not exist.

The national science and technology agenda does not address hazard risk mitigation or technological measures to combat disasters.

The extent of the higher education community's involvement in DM professionalization is very limited in number and the scope of offerings,<sup>52(pp. 21-23)</sup> no degrees or certificates offered.

K-12 schools are provided with very little DM or DRR curricula.<sup>53-56</sup>

### **Actions to Reach Advanced Capacity**

- ✓ Prioritize funding for dedicated training staff and resources at both the national and local levels.
- ✓ Institutionalize DRM training with a dedicated budget, staff, and facilities.
- ✓ Establish national and local training and exercise mandates with NEMO as lead agency
- ✓ Create/enhance a comprehensive DRM training and education curriculum that closely tracks emerging needs and is inclusive of stakeholders, would open opportunities to build capacity among individuals and organizations. Publish in a catalog with a regularly occurring set schedule.
- ✓ Provide material, technical, and staffing support to subnational level training and exercises.
- ✓ Create/enhance formal public awareness programs for preparedness and resilience building.

- ✓ Facilitate the full participation of community centers/organizations in the promotion of disaster awareness, preparedness, and training.
- ✓ Through chambers of commerce and other professional organizations, provide and integrate private sector into disaster preparedness programs.
- ✓ Fully utilize all CDEMA Regional Training Center (RTC) resources
- ✓ As an internal exercise program is created, develop evaluation standards based on law, plans, policies, etc.
- ✓ Train personnel on how to properly evaluate exercises.
- ✓ Include disaster risk mitigation analysis and implementation in the national science & technology agenda
- ✓ Include disaster risk analysis and CC in the national science & technology agenda
- ✓ Formalize the role of the University of Belize in DM through linking DM research and training needs to academic programs
- ✓ Fully engage higher education institutions in technical committees through memoranda of understanding (MOUs) and proper funding mechanisms. Tie these to the science and technology (S&T) agenda.
- ✓ Develop and implement formal DRM curricula at the K-12 education level

## **MONITORING AND EVALUATION PROCESSES AND SYSTEMS**

### **Findings**

There is not enough data regarding monitoring and evaluation processes and systems indicators to facilitate a meaningful assessment.



**THE DMA**

# **COMMUNICATION AND INFORMATION MANAGEMENT**

# COMMUNICATION AND INFORMATION MANAGEMENT



## CURRENT STATUS

### COMMUNICATION AND INFORMATION MANAGEMENT

- Limited or No Capacity
- Early Capacity Development
- Achievement with Significant Limitations
- Substantial Progress with Some Limitation
- Advanced Capacity



Belize does not have sufficient skilled staff and resources to manage risk assessment needs, nor are risk mapping capabilities and resources maintained by NEMO. There are no durable mandates or mechanisms to ensure the practice of conducting risk assessments and analyses; these should be an integral component used to inform and drive all DM and DRR plans. Subsequently, risk assessment is not regularly performed in Belize. No GIS system is used to report risk assessment data; risk mapping capabilities and resources are not maintained by NEMO. Regulatory mechanisms for risk-based planning or requirements for risk assessments at the national and subnational levels do not exist. Assessments should also be used to inform CD efforts and inform the development process. Regarding information collection, management, and distribution, although the NHMP dictates the establishment of an information management system, it has not happened yet.<sup>64</sup> In sum, communication and information management indicators show some achievement, especially in disaster assessments, but DM efforts in this area need greater support.

Major hazards are monitored; coordination of hazard information falls to NEMO based on advisories from either the National Meteorological Service (NMS) or the Ministry of Natural Resources (MNR).<sup>65</sup> Hazard monitoring efforts utilize up-to-date methods and technologies for some hazards. Notification and early warning functions are not centralized; it varies by locality, but the primary means of notification of hazards is door to door through the "street captains" of various political parties or volunteer members of Community Disaster Response Teams.<sup>66-68</sup> Standard procedures to facilitate notification and early warning processes are in development, but any standard process is unlikely to decrease dependency on the need to send volunteers door to door in most areas.<sup>66-68</sup> Early warning systems (EWS) can target specific locations according to risk for some hazards. However, EWS coverage is estimated to be 25 - 75% of the country. Some populations served by early warning systems are provided with pre-disaster training or education about message meaning and appropriate response. According to the NHMP, the Relief and Supplies Management Committee shall liaise with the Education, Information, Communications and Warning Committee on warnings for special populations such as those with impaired hearing and vision, aged and physically challenged but there is no evidence of this happening on the ground.<sup>15(p. 31)</sup>

NEMO’s Damage Assessment and Needs Analysis (DANA) Committee’s Plan of Action (POA) provides direction, including SOPs, for assessment activities to commence within two to eight (2-8) hours of the onset of a disaster emergency.<sup>14</sup> In turn, disaster assessments are used to inform declarations decision-making. Staff, equipment, and resources are at sufficient levels to conduct assessments in the immediate aftermath of major events. Assessment outcomes are a key driver behind incident action planning. Disaster assessment efforts show good progress, but data gathered from assessments have not been integrated into disaster preparedness planning due in part to an absence of full integration pre and post disaster hazard data into modeling and predictive analytics to help lessen the impacts of future disasters.

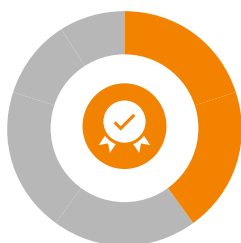
## SUBTHEME STATUS COMMUNICATION AND INFORMATION MANAGEMENT

- Limited or No Capacity
- Early Capacity Development
- Achievement with Significant Limitations
- Substantial Progress with Some Limitation
- Advanced Capacity



### Hazard and Risk Analysis Systems

- Risk assessment processes and standards
- Risk assessment requirements for DM planning
- Risk assessment staffing capacity
- Hosting of risk assessment information
- Risk mapping requirements
- Risk mapping capacity
- Risk assessment link to development processes



### Monitoring and Notification

- Existence of hazard monitoring
- Coordination of hazard monitoring
- Population in areas served by monitoring efforts
- Doppler radar coverage
- Hazard monitoring responsibility
- Hazard monitoring methods
- Assignment of notification/early warning responsibilities
- Standard procedures for early warning
- Early warnings communication channels
- Population targeting of early warning messages: Limited to no data
- Early warning systems coverage area

- Testing of early warning systems: No data
- Training and education for warning recipients
- Targeted early warning capabilities



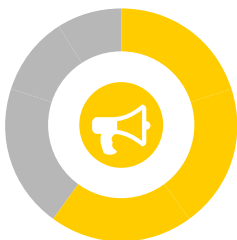
## Disaster Assessment

- Disaster assessment capabilities
- Disaster assessment requirements in the declaration process
- Nationally authorized assessment methodology
- Assessment resource capacity
- Assessments and incident action planning
- Stakeholder engagement in the assessment process



## Information Collection, Management, and Distribution

- Data collection and storage standards
- Data format
- Data sharing
- Use of a GIS-based data management system for a common operating picture
- Linkage between disaster loss database and national statistics agency
- Disaster management information sharing



## Media and Public Affairs

- Designated Public Information Officer (PIO)
- Documented communications strategy: No data
- Dedicated media briefing space: No data
- Media training for staff engaged in briefings: No data
- Processes to obtain and disseminate public information in multiple formats and channels
- Development and deployment of pre-scripted information bulletins: Limited data
- Scope of audience for public information capabilities
- Tracking of publicly generated information (social media): No data



# FINDINGS AND ACTIONS TO REACH ADVANCED CAPACITY

## HAZARD AND RISK ANALYSIS SYSTEMS

### Findings

There is an absence of risk assessment processes and standards that should encompass the policies, plans, practices, and interventional strategies formally used to understand, assess, and address known and emerging natural and human-caused hazards.

There are no durable mandates or mechanisms to ensure the practice of conducting risk assessments and analyses

Belize does not have sufficient skilled staff and resources to manage risk assessment needs, nor are risk mapping capabilities and resources maintained by NEMO.

### Actions to Reach Advanced Capacity

- ✓ Recruit and train staff to manage risk assessment needs
- ✓ Establish requirements for risk assessment processes and standards to inform DM policies, plans, practices, and interventional strategies.
- ✓ Develop the capability to assess vulnerability and include vulnerability assessments in planning.
- ✓ Include climate change in risk assessments.
- ✓ Incorporate local knowledge into risk assessments
- ✓ Task NEMO with hosting risk assessment information, but make sure it is available to all who require it. NEMO and the GIS unit at SIB should coordinate on mapping requirements.
- ✓ Mandate risk assessments: these should be an integral component used to inform and drive all DM and DRR plans
- ✓ Assessments should also be used to inform CD efforts and inform the development process.

## MONITORING AND NOTIFICATIONS

### Findings

Major hazards are monitored; coordination of hazard information falls to NEMO based on advisories from either the National Meteorological Service (NMS) or the Ministry of Natural Resources (MNR).<sup>65</sup>

Hazard monitoring efforts utilize up-to-date methods and technologies for some hazards.

Notification and early warning functions are not centralized; it varies by locality, but the primary means of notification of hazards is door to door through the "street captains" of various political parties or volunteer members of Community Disaster Response Teams.<sup>66-68</sup>

Standard procedures to facilitate notification and early warning processes are in development, but any standard process is unlikely to decrease dependency on the need to send volunteers door to door in most areas.<sup>66-68</sup>

Early warning systems (EWS) can target specific locations according to risk for some, but not all, hazards. Some populations served by early warning systems are provided with pre-disaster training or education about message meaning and appropriate response.

Overall, we see some achievement in monitoring, but the information is not tailored to meet demographic needs regarding its translation into EWS.

### Actions to Reach Advanced Capacity

- ✓ Upgrade/acquire technologies to monitor all hazards and promote adoption and use of information and communications technology (ICT) among sub-sectors of the population such as the elderly, disabled, and those who are socially isolated to facilitate timely and effective receipt and dissemination of information before, during, and after a disaster.
- ✓ Expand the efforts for hazard monitoring to match the Sendai commitments ("The entire population is expected to be served by hazard monitoring efforts by 2024.")
- ✓ Strengthen systems to translate multi-hazard monitoring data into comprehensive early warning capabilities
- ✓ Develop alternate means of warning (lights, sirens) should normal communications be interrupted due to the disaster.

## DISASTER ASSESSMENT

### Findings

NEMO's Damage Assessment and Needs Analysis (DANA) Committee's Plan of Action (POA) provides direction, including SOPs, for assessment activities to commence within two to eight (2-8) hours of the onset of a disaster emergency.<sup>14</sup> In turn, disaster assessments are used to inform declarations decision-making.

According to the NHMP, the Relief and Supplies Management Committee shall liaise with the Education, Information, Communications and Warning Committee on warnings for special populations such as those with impaired hearing and vision, aged and physically challenged but there is no evidence of this happening on the ground.<sup>15(p. 31)</sup>

Disaster assessment efforts show good progress, but data gathered from assessments have not been integrated into disaster preparedness planning due in part to an absence of full integration pre and post disaster hazard data into modeling and predictive analytics.

### Actions to Reach Advanced Capacity

- ✓ Develop assessment standards so no matter who does the assessment, the standards are the same.
- ✓ Develop a database for incorporation of disaster assessments.
- ✓ Train personnel on how to properly conduct assessments.

## INFORMATION COLLECTION, MANAGEMENT, AND DISTRIBUTION

### Findings

Regarding information collection, management, and distribution, the NHMP dictates the establishment of an information management system. However, it has not happened yet.<sup>64</sup>

The declared goal according to Chief of Technology Officer and Advisor to the Prime Minister of Belize is to gather and standardize data being collected, housed, and utilized by various ministries and partners into one online system; progress is underway toward national data interoperability framework.<sup>70</sup>

At present there are no standards, central database, format requirements, systems, etc. for data collection, management, storage, and distribution. This is done independently by some agencies, but not openly shared.

### Actions to Reach Advanced Capacity

- ✓ Create/adopt national standards for DM data collection, management, storage, and sharing in a fully digitized format that can be shared between government, NGOs, and other stakeholders to support decision making.
- ✓ NEMO should build a centralized repository for data, documentation, and information regarding DM and DRR through the Statistics Office.

## **MEDIA AND PUBLIC AFFAIRS**

### **Findings**

Each of the DM agencies maintains a PIO position or capacity as a standard of practice.

Various NEMO committees have communications responsibilities and requirements. NEMO headquarters has a dedicated media briefing space.

For all major hazards pre-scripted information bulletins are deployed.

The National Relief and Supplies Management Plan (NRSMP) stipulates identification of populations with special needs shall be shared with the Education, Information, Communications and Warning Committee. (EICWC)15(p. 5) However, whilst the EICWC is mandated to publicize significant NEMO decisions to the public”,33(p. 46) there is no specific mandate to address populations with special needs in the available documentation.

### **Actions to Reach Advanced Capacity**

- ✓ Address the gaps in communicating with vulnerable populations by thoroughly assessing existing barriers.



# NATIONAL RECOMMENDATIONS

# NATIONAL RECOMMENDATIONS

The following national recommendations are presented based on the findings of Belize's National Disaster Preparedness Baseline Assessment, conducted by the Pacific Disaster Center in coordination with NEMO and other disaster management stakeholders in Belize. The recommendations focus on strengthening the culture of disaster risk reduction through comprehensive disaster management and disaster risk governance.



## **REVIEW AND UPDATE LEGISLATION, ESPECIALLY DPR ACT/2000, TO SECURE DURABLE MANDATES FOR ROLES AND RESPONSIBILITIES FOR ALL DISASTER MANAGEMENT ACTORS, AND TO SUFFICIENTLY ADDRESS ALL PHASES OF DISASTER MANAGEMENT.**

- Implement statutory (enforceable) mechanisms to ensure the NAC's and the Operational Committees' interagency disaster management responsibilities are clearly mapped out, coordinated, and fulfilled.
  - Require the NAC and NEMO's Operational Committees to be active and operational during non-disaster times.
  - Establish mechanisms to ensure they spend a required number of hours during non-disaster times to fulfill their mandates.
- Amend and develop legislation to formally define and strengthen staff competency requirements and operational functions of NEMO personnel, the 3 Regional, and 9 NEMO District Emergency Committees.
  - Establish and update training mandates and protocols for the established position-specific competency requirements.
- Stipulate incident-specific proxy leadership arrangements depending on the nature of the disaster.
- Mandate an annual National Level Exercise involving all ministries, Emergency Support Functions, and government leadership.
  - Mandate evaluation of all exercises, mandate evaluation standards.
  - Mandate training for personnel on how to properly evaluate exercises.
  - Mandate quarterly Tabletop exercises to evaluate plans and training.
- Mandate a long-term exercise plan that is coordinated with national planning efforts.
- Ensure multistakeholder input in the legal review by establishing linkages between NEMO's membership, Operational Committees, and legislative bodies.



- Mandate, with enforceable implementation schedules, comprehensive mitigation, preparation, and recovery and rebuild plans.
  - Assign responsibility to the NEC, the NAC, and other specific personnel chosen by them to produce the plans in a timely manner.
- Stipulate deadlines and mechanisms to enforce deadlines.
  - Mandate consultation with a wide range of stakeholders, especially from NGOs and private sector.
  - Mandate coordination with Ministry of Sustainable Development, Climate Change & Disaster Risk Management, the National Climate Change Office, and NEMO to ensure all plans align with CCA, DRR, and SDGs.

## 2

### **LEGALLY ESTABLISH A CALAMITY FUND, WITH MINIMUM ANNUAL CONTRIBUTIONS, FOR USE DURING DISASTER RELIEF EFFORTS.**

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- Establish statutory guidelines for access and use.
  - Establish guidelines for provision of funds to assist in disaster relief.
  - Provision transfer mechanisms of calamity funds to sub-national level governments.
- Consider implementing a tourist tax (or other specific tax) to help fund this initiative.

## 3

### **LEGALLY ESTABLISH A REVOLVING DISASTER MANAGEMENT CONTINGENCY FUND WITH MINIMUM ANNUAL CONTRIBUTIONS TO FACILITATE DRR, CAPACITY BUILDING, AND OTHER AND DISASTER MANAGEMENT AND DISASTER RISK REDUCTION EFFORTS.**

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- Use funds to cover expenses for new and existing mandates in revised DPR Act/2000.
- Provide access for capacity development at national and subnational levels.
  - Establish guidelines for access and use.

# 4

## **ENLIST THE MINISTRY OF SUSTAINABLE DEVELOPMENT, CLIMATE CHANGE & DISASTER RISK MANAGEMENT, THE NATIONAL CLIMATE CHANGE OFFICE, AND NEMO TO FORMALLY PLAN AND COORDINATE THE INTEGRATION OF DISASTER RISK REDUCTION, SENDAI, SUSTAINABLE DEVELOPMENT GOALS (2030 AGENDA), AND CLIMATE CHANGE ADAPTATION ACROSS ALL POLICIES, DISASTER MANAGEMENT, AND DEVELOPMENT PLANS.**

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- Integrate plans and policies across the national and subnational governments and critical infrastructure sectors.
- Develop a formal mechanism to assess progress made toward the integration of DRR, CCA, Sendai Framework, SDGs and the SD/2030 Agenda in plans and policies.
  - Solicit a wide range of stakeholders for support and input.

# 5

## **DRAFT AND FINALIZE THE NATIONAL DISASTER PREPAREDNESS RESPONSE PLAN (NDPRP) AND MAKE IT WIDELY ACCESSIBLE.**

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- Integrate the NDPRP with plans and policies across the national and subnational government and critical infrastructure sectors.
- Address gender and vulnerable groups in national and local plans.
- Solicit input from a wide range of stakeholders including NGOs, CSOs, and businesses.
- Map locations of critical infrastructure in relation to hazard zones and identify backup locations for shelters and warehouses.
- Provide plan guidance to localities and exercise the plans.
- Require plans to be updated and submitted annually to the NAC and the NEC for review and make necessary adjustments as the need arises.

# 6

## **DRAFT AND PUBLISH DISASTER MANAGEMENT PLANS TO FULFILL THE MOST CRITICAL MISSING VOLUMES AND ANNEXES DICTATED BY THE NATIONAL HAZARD MANAGEMENT PLAN AND MAKE THEM WIDELY ACCESSIBLE.**

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- Analyze the Annex listings to determine the most critically important plans
- Require all plans to be updated and submitted annually to the NEC and the NAC for review and make necessary adjustments as the need arises.

# 7

## **AUDIT, UPDATE, AND RE-PUBLISH ALL EXISTING DISASTER MANAGEMENT PLANS.**

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- Use updated plans to drive capacity development efforts.
- Require disaster management plans to be updated and submitted annually to NEMO for review and implementation.

# 8

## **REVIEW DEDICATED FACILITIES AND EQUIPMENT.**

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- Upgrade and outfit the NEOC's capabilities to be fully functional in a large-scale disaster event.
  - Equip NEOC with updated communication and computer equipment.
  - Develop and train on communication procedures and communication plans.
  - Enforce the use of official emails and phone numbers for disaster response activities.
  - Use call logs to track incoming/outgoing calls within the EOC, to include each ESF
- Thoroughly review shelter inventory and shelter locations.
- Establish additional shelters based on review outside of repeated hazard zones.
- If shelters must be located within hazard zones, set up and document back up shelter locations which would be accessible.
- Implement Fire-Wise landscaping and defensible spaces around shelters and other critical infrastructure.
  - Ensure shelter suitability assessments are completed and documented.
  - Develop shelter plans that ensure measures are installed for safety protocols in a pandemic environment.
- Thoroughly review commodity and supply inventory.
- Once gaps are identified, campaign BRCS, IFRC, CDEMA, etc. to help.

# 9

## **EXPAND AND ESTABLISH PROFESSIONALIZED TRAINING TO IMPROVE DISASTER MANAGEMENT AND HUMAN RESOURCES POOL.**

---

- Fully utilize all CDEMA Regional Training Center (RTC) resources.
  - CDEMA will deliver in-country training to all CDEMA Participating States.
  - CDEMA offers wide range of trainings in the following thematic areas:
    - Emergency Operations and Contingency Planning
    - Disaster Risk Management (Introductory)
    - Programme Development and Management for comprehensive disaster management
- Ensure all leadership positions within NEMO and other disaster management agencies are filled.
  - Review/update job descriptions and positional requirements for NEMO.
  - Require a mix of experience and/or academic qualifications for NEMO positions, increasing with seniority level.
  - Work closely with supporting ministries to identify personnel with experience and qualifications to augment NEMO during disasters.
  - Increase NEMO staffing to allow for dedicated planning staff.
- Recruit and train staff to manage risk assessment needs (6).
- Develop a roster of private sector organizations that have the capability to support disaster response and recovery.
  - Develop a list of capabilities that these organizations can provide.
  - Formalize existing relationships and develop MOUs/MOAs detailing potential support and costs.
- Expand the firefighting and first responder infrastructure, especially by recruiting and securing training for volunteer firefighters.
  - Training arrangements: Obtain A-2 visas for recruits to enter the US to receive training.
- Coordinate with Belize Heroes (501c3 in the US).
  - Create new fire and first responder infrastructure in Corozal, Orange Walk and Toledo where only a single location is dedicated for the entire district.

# 10

## **ENHANCE RESILIENCE THROUGH EFFORTS TO REDUCE VULNERABILITIES AND INCREASE COPING CAPACITIES.**

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- Work closely with NGOs based in-country and integrate NGOs and capabilities into disaster management plans.
- Develop a means to track the NGOs in country, their capabilities, their current projects, and their locations.
- Leverage NGOs in raising disaster awareness and in supporting local projects where applicable.
- Promote environmental stewardship.
- Ensure building codes properly reflect hazard zones and are enforced to prevent crowding and reduce risk in disaster-prone areas. Work to build new infrastructure that uses the latest technology and international best practices to reduce environmental impacts.
- Enforce building codes, especially in coastal areas.
- Promote community readiness through education and advertising campaigns and the expansion of the Community Emergency Response Team (CERT) program.

# 11

## **FORMALIZE THE ROLE OF THE UNIVERSITY OF BELIZE IN DISASTER MANAGEMENT THROUGH LINKING DISASTER MANAGEMENT RESEARCH AND TRAINING NEEDS TO ACADEMIC PROGRAMS.**

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- Work with UB to develop a disaster management degree. Start at Certificate level and work towards degrees.

# 12

## **ESTABLISH NATIONAL AND LOCAL TRAINING AND EXERCISE MANDATES WITH NEMO AS LEAD AGENCY.**

---

- Institute and expand training programs and exercise requirements and link to competencies in key leadership positions and all relevant disaster management staff.
  - Develop a long-term (3-year) disaster management training plan.
  - Develop and maintain approved trainings and curriculum which can be used as

- references for new personnel or as refreshers.
- Develop a set training program for NEMO personnel, both at onboarding and during their tenure.
- Continue development of competency requirements and implement.
- Create a long-term exercise plan that is coordinated with national planning efforts.
  - Develop an internal capability to design and execute exercises.
- As an internal exercise program is created, develop evaluation standards, then codify into law, plans, policies, etc.
- Conduct quarterly Tabletop exercises to evaluate plans and training.
- Require AARs following response operations, training, and exercises. Incorporate findings into plans and processes.
  - Conduct an annual National Level Exercise involving all ministries, Emergency Support Functions, and government leadership.
- Increase NGO and private sector participation in training and exercises
- Maintain electronic training records.

# 13

## **ESTABLISH REQUIREMENTS FOR RISK ASSESSMENT PROCESSES AND STANDARDS TO INFORM DISASTER MANAGEMENT POLICIES, PLANS, PRACTICES, AND INTERVENTIONAL STRATEGIES.**

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- Develop the capability to conduct risk assessments amongst NEMO personnel (and/or other relevant personnel).
  - Develop assessment standards so no matter who does the assessment, the standards are the same.
  - Establish a GIS system and train personnel to report risk assessment data.
  - Develop risk mapping capabilities and resources amongst NEMO personnel.
- NEMO and BRCS should coordinate on mapping requirements.
  - Develop maps and ensure availability.
  - Hold EOC training so ESF personnel understand GIS capabilities and know what to ask for regarding mapping.
- Require the incorporation of risk assessments into planning.
- Develop the capability to assess vulnerability and include vulnerability assessments in planning.
- Include climate change in risk assessments.
- Incorporate local knowledge into risk assessments
- Task NEMO with hosting of risk assessment information, and make sure it is available to all who require it



# 14

## **STRENGTHEN SYSTEMS TO TRANSLATE MULTI-HAZARD MONITORING DATA INTO COMPREHENSIVE EARLY WARNING CAPABILITIES.**

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- Develop additional mechanisms for data and warning information to reach the public in places with little to no internet, tv or radio infrastructure.
- Convey data and warnings in a way that is easily understood by those with less than secondary levels of education.

# 15

## **ESTABLISH A STANDARDIZED, DIGITIZED, AND CENTRALIZED SYSTEM FOR DATA COLLECTION, MANAGEMENT, AND SHARING.**

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- Develop standards for data collection and storage
- Store data in a manner that is accessible throughout the GOB
- Use data and maps to help educate the public on hazard zones and safe spaces during disasters

# 16

## **INCREASE PUBLIC CONFIDENCE AND ENGAGEMENT IN DISASTER MANAGEMENT EFFORTS**

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- Periodically collect political approval ratings; combine findings with household preparedness levels to assess core DRR/disaster management needs and gaps within communities, and measure, enhance public perception of disaster management activities, and garner citizen participation through exercises
- Periodically conduct surveys to assess the DRM/DRR needs of vulnerable populations within each jurisdiction.
- Address the needs, resource contribution capabilities, and participation of all stakeholder groups including NGOs and the private sector.
- Through legal provisions, establish robust governance foundation for emergency preparedness related activities.
- Enhance/instill public training/education programs for pre-disaster awareness
  - Expand current public education efforts in schools, social media, and national media
- Expand the Community Emergency Response Team training (CERT)

# 17

## **ENGAGE NON-GOVERNMENTAL STAKEHOLDERS AND NON-TRADITIONAL PARTNERS INCLUDING THE PRIVATE SECTOR INTO GOVERNMENT DISASTER RISK MANAGEMENT FRAMEWORK.**

---

- Develop plans and procedures to integrated private sector resources into plans and response.
- Develop matrices of available personnel, equipment and commodities that can be utilized during disaster response.
- Work with non-governmental partners, including the private sector, to develop and standardize procedures for the provision, acceptance, and distribution of personnel and material support.

# 18

## **INCREASE INFORMATION ACCESS AND SHARING AMONG ALL DISASTER MANAGEMENT STAKEHOLDERS BY DEVELOPING OR PROMOTING A CONTINUITY OF OPERATIONS PLATFORM.**

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- Develop/select a national common operating picture platform to ensure availability of information across all levels of government and increase information sharing.
- Increase BNGIS and the Department of Information Services involvement in DRR and DRM efforts.
- Establish a national spatial data infrastructure within BNGIS to promote data quality, consistency, and transparency.
- Provide training on capabilities of BNGIS and the map services they can provide.
- Share data with other regional spatial data partners like GeoCRIS.

# 19

## **REDUCE MARGINALIZATION AND PROMOTE GENDER EQUALITY.**

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- Continue efforts to monitor and reduce gender-based discrimination and bias. Promote policies that support economic and educational opportunities for women, including equal income, employment, and access to credit
- Introduce programs and educational support for women's health services and increase levels of funding for these services in rural areas
- Actively engage women and other marginalized groups in disaster management and community plans. Provide equal opportunities throughout society to reduce disparities and incorporate feedback mechanisms into policies and programs to ensure effective implementation
- Leverage PDC's DisasterAWARE® Pro, a GIS-based data management system (available to the Belize DM community by virtue of participation in this assessment), for a common operating picture and planning efforts amongst all DM stakeholders. Utilize the risk and vulnerability assessments, map layers of infrastructure and other relevant data generated by PDC for this NDPBA. At any time, through collaboration with PDC, new data may be incorporated by NEMO, SIB's GIS unit, and external agencies – particularly the UN, International Federation of Red Cross and Red Crescent Societies (IFRC), and RCSB

# 20

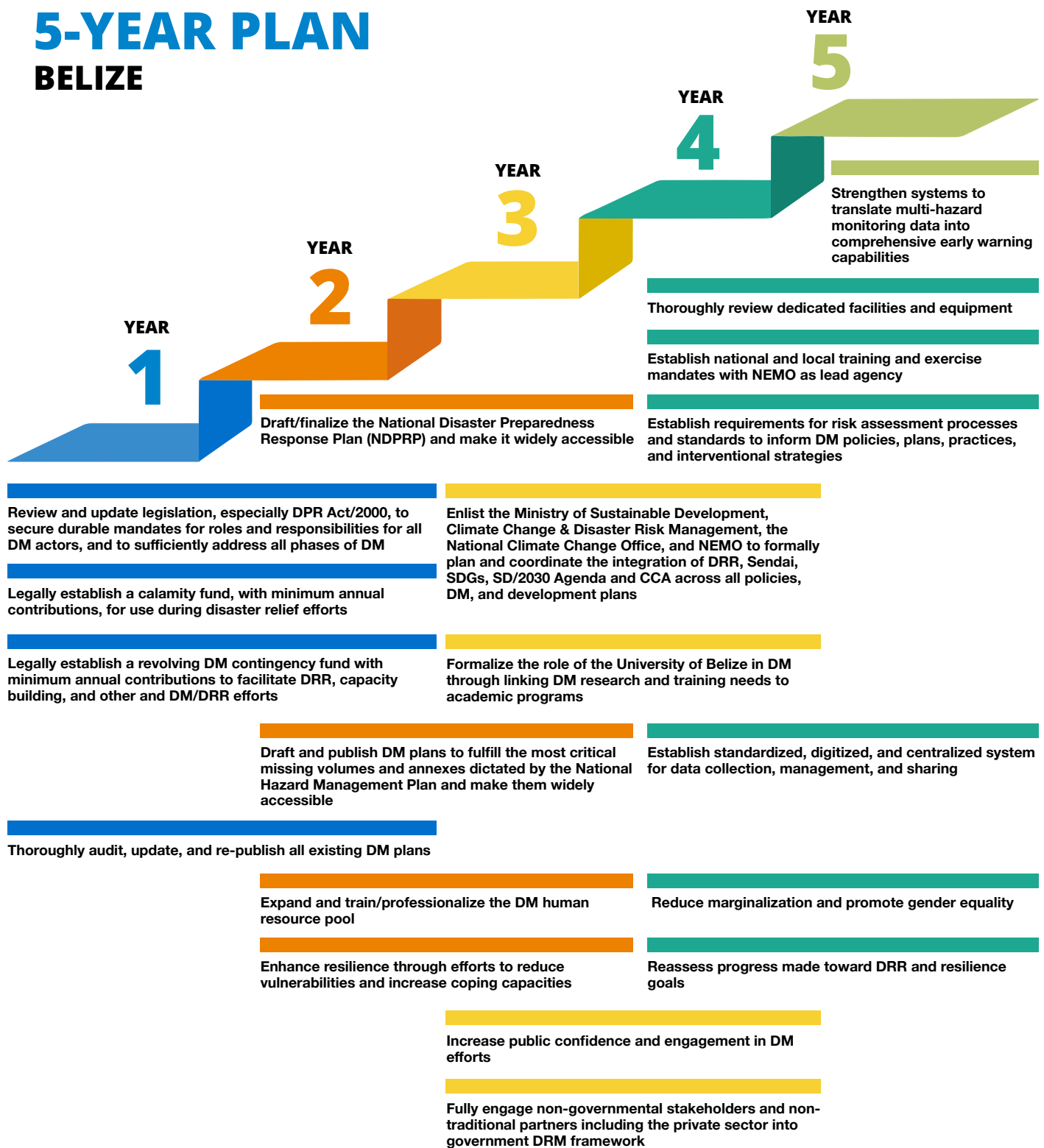
## **REASSESS PROGRESS MADE TOWARD DISASTER RISK REDUCTION AND RESILIENCE GOALS.**

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- Update the NDPBA, including both the RVA and DMA analyses, to track progress toward reducing vulnerabilities, increasing coping capacities, and building disaster management capabilities in support of The Belize Disaster Risk Reduction and Sustainable Development Goals for a more resilient nation.

# 5-YEAR PLAN

## BELIZE







# DISTRICT RISK PROFILES

## SUBNATIONAL ASSESSMENT RESULTS

Download District Risk profiles: <https://www.pdc.org/wp-content/uploads/NDPBA-BLZ-Subnational-Profiles-English-Merged-vF.pdf>

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# DISTRICT RISK PROFILES

The subnational report developed for each District offers a more detailed understanding of risk in Belize. These are provided separately from this report and include drivers of vulnerability, coping capacity, and resilience; a comparison of each District with the overall country; and strategic, data-driven, actionable recommendations.

Each provincial recommendation looks at one of the top four drivers of resilience through the lens of the existing national disaster management structure in Belize. The recommendations are designed to be concise, actionable, and supported by the data.

## APPLYING RESULTS

Characterizing risk in terms of multi-hazard exposure, vulnerability, and coping capacity, the RVA provides necessary justification to support policy decisions that will protect lives and reduce losses from disasters. The RVA results allow decision makers examine the drivers of risk for each District in Belize, providing evidence to support the identification, assessment, and prioritization of investments that will have the greatest impact on disaster risk reduction. The NDPBA RVA results establish a subnational foundation for monitoring risk and vulnerability over time and enhance the DRR decision making process through improved access to temporal and spatial data for all districts in Belize.





**NDPBA**  
**APPENDIX A**  
**RESOURCES**

# APPENDIX A

## RVA METADATA

| Multi-Hazard Exposure   |                         |      |  |
|---|-------------------------|------|--|
| Subcomponent: Raw Exposure  |                         |      |  |
| Indicator   | Source(s)               | Year | Description  |
| Raw Multi-Hazard Population Exposure  | Pacific Disaster Center | 2021 | Raw multi-hazard population exposure represents an estimation of the number of people exposed to one or more of seven hazards. |
| <b>Notes</b>  |                         |      |  |
| <p>Calculated as: Exposed person units = [population exposed to inland flood hazard] + [population exposed to storm surge hazard] + [population exposed to landslide hazard] + [population exposed to wildfire hazard] + [population exposed to tropical cyclone wind hazard] + [population exposed to earthquake hazard]+ [population exposed to extreme heat hazard]. Raw values are shown here.</p> <p>Population data (2021) from PDC's AIM 3.0.</p> <p>Hazard exposure zones were calculated as follows:</p> <p><b>Inland Flood:</b> The Inland Flood Hazard zone includes all return period areas of both pluvial (rainfall) and fluvial (riverine) flood sources. Data source is the Caribbean Handbook on Risk Information Management (2016). All areas with any return period of flood hazard were used as inputs for exposure analysis.</p> <p><b>Storm Surge:</b> Coastal flooding as a result of storm surge data were provided by the Caribbean Handbook on Risk Information Management (CHARIM) (2016) (<a href="http://charim-geonode.net/layers/geonode:coastal_flood_category">http://charim-geonode.net/layers/geonode:coastal_flood_category</a>). All areas with flooding during any category (1-5) of storm were used as inputs for exposure analysis.</p> <p><b>Extreme Heat:</b> The Extreme Heat Hazard zone is classified based on an existing and widely accepted heat stress indicator, the Wet Bulb Globe Temperature (WBGT, in °C) – more specifically the daily maximum WBGT. The damaging intensity thresholds are applied following the definition of slight/low (&lt;28°C), moderate/high (28-32°C) and severe/very high (&gt;32°C) heat stress. The data source is World Bank (UNEP) (2017). Areas of Severe/Very High (&gt;32°C) heat stress were used as inputs for exposure analysis.</p> <p><b>Landslide:</b> The Landslide Hazard zone shows the combination of The Global Landslide Hazard Map: Median Annual Rainfall-Triggered Landslide Hazard (1980-2018) and The Global Landslide Hazard Map: Earthquake-Triggered Landslide Hazard which has then been simplified to four categories, ranging from Very low to High landslide hazard, based on the existing system used by ThinkHazard! Data source is the Global Landslide Hazard Map from GFDRRLab (2020). Areas approximating the Medium and High hazard categories were used as inputs for exposure analysis.</p> <p><b>Wildfire:</b> The Wildfire Hazard zone is derived from the Biodiversity and Environmental Resource Data System of Belize (BERDS) Belize Fire Risk Map (2004) (<a href="http://www.biodiversity.bz/">http://www.biodiversity.bz/</a>). Areas approximating Medium to Extreme wildfire hazard were used as inputs for exposure analysis.</p> <p><b>Tropical Cyclone Winds:</b> The Tropical Cyclone Winds Hazard zone is derived from the Munich Reinsurance Company's (Munich Re) World Map of Natural Hazards (2002). Areas approximating hurricane winds in Categories 1-3 were used as inputs for exposure analysis. No areas of Belize were predicted to experience categories 4 or 5 levels winds within that time, so those values are not included here.</p> <p><b>Earthquake:</b> The Earthquake Hazard zone represents areas with an estimated Modified Mercalli Intensity (MMI) of VII and above, based on 1.0 second Spectral Acceleration (SA) at a return period of 2475 years. The data source is Global Earthquake Model CAPRA RESIS-II Project (2010). Areas approximating MMI greater than or equal to VII were used as inputs for exposure analysis.</p> |                         |      |  |

# APPENDIX A

## RVA METADATA

| Multi-Hazard Exposure   |                         |      |  |
|---|-------------------------|------|--|
| Subcomponent: Raw Exposure  |                         |      |  |
| Indicator   | Source(s)               | Year | Description  |
| Raw Multi-Hazard Economic Exposure  | Pacific Disaster Center | 2021 | Raw multi-hazard economic exposure represents an estimation of the replacement cost of economic stock exposed to one or more of seven hazards. |
| Notes   |                         |      |  |
| <p>Calculated as: Total value (Million USD) of capital stock exposed = [capital stock exposed to inland flood hazard] + [capital stock exposed to storm surge hazard] + [capital stock exposed to landslide hazard] + [capital stock exposed to wildfire hazard] + [capital stock exposed to tropical cyclone wind hazard] + [capital stock exposed to earthquake hazard] + [capital stock exposed to extreme heat hazard]. Raw values are shown here.</p> <p>Capital stock data from AIM 3.0 - Pacific Disaster Center.</p> <p>See above for detailed description of hazard zones.</p> |                         |      |  |

| Multi-Hazard Exposure   |                         |      |  |
|---|-------------------------|------|--|
| Subcomponent: Raw Exposure  |                         |      |  |
| Indicator   | Source(s)               | Year | Description  |
| Raw Multi-Hazard Critical Infrastructure Exposure   | Pacific Disaster Center | 2021 | Raw Multi-Hazard Critical Infrastructure Exposure represents an estimation of the total critical infrastructure locations exposed to one or more of seven hazards. |
| Notes   |                         |      |  |
| <p>Calculated as: Exposed critical infrastructure units = [critical infrastructure exposed to inland flood hazard] + [critical infrastructure exposed to storm surge hazard] + [critical infrastructure exposed to landslide hazard] + [critical infrastructure exposed to wildfire hazard] + [critical infrastructure exposed to tropical cyclone wind hazard] + [critical infrastructure exposed to earthquake hazard] + [critical infrastructure exposed to extreme heat hazard]. Raw values are shown here.</p> <p>Critical Infrastructure data (various dates) from PDC's global and national datasets.</p> <p>See above for detailed description of hazard zones.</p> |                         |      |  |

# APPENDIX A

## RVA METADATA

### Multi-Hazard Exposure

#### Subcomponent: Relative Exposure

| Indicator   | Source(s)               | Year | Description  |
|---|-------------------------|------|--|
| Relative Multi-Hazard Population Exposure   | Pacific Disaster Center | 2021 | The cumulative number of people exposed to multiple hazards, divided by the total population of the district in Belize |
| <b>Notes</b>  |                         |      |  |
| <p>Calculated as: [total person units exposed to multiple hazards] / [estimated total population].<br/>           Population data (2021) from PDC's AIM 3.0.<br/>           See above for detailed description of hazard zones.</p> |                         |      |  |

### Multi-Hazard Exposure

#### Subcomponent: Relative Exposure

| Indicator  | Source(s)               | Year | Description   | Notes  |
|--|-------------------------|------|---|--|
| Relative Multi-Hazard Economic Exposure                | Pacific Disaster Center | 2021 | The cumulative value of economic capital stock exposed to multiple hazards, divided by the total economic capital stock value of the district in Belize.  | <p>Calculated as: [value of capital stock exposed to multiple hazards (see detailed hazard information above)] / [estimated total economic value of capital stock].</p> <p>Capital stock data from AIM 3.0 - Pacific Disaster Center.</p> <p>See above for detailed description of hazard zones.</p>                                 |
| Relative Multi-Hazard Critical Infrastructure Exposure | Pacific Disaster Center | 2021 | Relative Multi-Hazard Critical Infrastructure Exposure represents a cumulative ratio of critical infrastructure units (airports, clinics, EOCs, fire stations, hospitals, police stations, ports, schools, shelters and warehouses) exposed to multiple hazards, including inland flood, storm surge, earthquakes, landslides, extreme heat, tropical cyclone winds and wildfires in Belize, by district. | <p>Calculated as: [count of critical infrastructure exposed to multiple hazards (see detailed hazard information)] / [estimated total count of critical infrastructure].</p> <p>Critical Infrastructure data (various dates) from PDC's global and national datasets.</p> <p>See above for detailed description of hazard zones.</p> |

# APPENDIX A

## RVA METADATA

| Vulnerability                      |  |      |  |
|------------------------------------|--|------|--|
| Subcomponent: Economic Constraints |  |      |  |
| Indicator                          | Source(s)  | Year | Description  |
| Economic Dependency Ratio          | Statistical Institute of Belize; Ministry of Health, Epidemiology Unit; Belize Basic Indicators, 2010; Volume 8, Year 2011; page 4 | 2010 | The Economic Dependency Ratio per 100 persons in Belize, by district.                          |
| Poorest Wealth Quintile            | UNICEF MICS; Multiple Indicator Cluster Survey, 2015-2016  | 2016 | The percent of the household population in the poorest wealth quintile in Belize, by district. |
| Unemployment Rate                  | Statistical Institute of Belize; Labour Force Survey, September 2019   | 2019 | The average unemployment rate by district in Belize for 2019.                                  |
| Underemployment Rate               | Statistical Institute of Belize; Labour Force Survey, September 2019   | 2019 | The rate of underemployment per district in Belize for 2019.                                   |

| Vulnerability                                  |   |      |  |
|--|---|------|--|
| Subcomponent: Clean Water Access Vulnerability |   |      |  |
| Indicator                                      | Source(s)   | Year | Description  |
| Households Without Improved Water              | Statistical Institute of Belize; Abstract of Statistics, 2019 Table 1.18: Households by Major Administrative Area and Main Source of Drinking Water: Belize 2018 - 2019 | 2019 | Percentage of households in Belize using an unimproved drinking water source, by district. |
| Households Without Improved Sanitation         | Statistical Institute of Belize; Abstract of Statistics, 2019; Table 1.15: Households by Major Administrative Area and Main Type of Toilet Facility: 2018 - 2019        | 2019 | Percentage of households without improved sanitation facilities in Belize, by district.    |



# APPENDIX A

## RVA METADATA

| Vulnerability                                  |   |      |  |   |
|--|---|------|--|---|
| Subcomponent: Information Access Vulnerability |   |      |  |   |
| Indicator                                      | Source(s)   | Year | Description  | Notes   |
| Households without Internet Access             | Statistical Institute of Belize; Population and Housing Census 2010 (Processed with Redatam WebServer - UNECLAC/CELADE) | 2010 | The percentage of households in Belize without internet access, by district.                                     |   |
| Households without TV Access                   | Statistical Institute of Belize; Population and Housing Census 2010 (Processed with Redatam WebServer - UNECLAC/CELADE) | 2010 | The percentage of households in Belize without access to a television, by district.                              |   |
| Households without Radio Access                | Statistical Institute of Belize; Population and Housing Census 2010 (Processed with Redatam WebServer - UNECLAC/CELADE) | 2010 | The percentage of households in Belize without radio access, by district.  |   |
| Adult Literacy Rate                            | Statistical Institute of Belize; Population and Housing Census 2010; Education Section Tables, Table 15                 | 2010 | Percent of the population in Belize (ages 15 years and over) who are literate, shown by district.                | Data was reflected for use in the Index   |
| Primary to Secondary School Transition Rate    | SIB & Ministry of Education; Abstract of Education Statistics. 2018 - 2019  | 2019 | The transition rate of students from primary to secondary school in Belize, by district.                         | Stann Creek Value set at 100 instead of raw of 103.4; Data was reflected for use in the Index |
| Working Population with No Secondary School    | Statistical Institute of Belize; Labour Force Survey, April 2019  | 2019 | The percentage of the working age population in Belize who did not complete secondary school, shown by district. |   |



# APPENDIX A

## RVA METADATA

| Vulnerability                          |   |      |  |
|--|---|------|--|
| Subcomponent: Vulnerable Health Status |   |      |  |
| Indicator                              | Source(s)   | Year | Description  |
| New TB Infections per 10,000 Persons   | Ministry of Health; Annual HIV Statistical Report 2016                              | 2016 | The number of new Tuberculosis (TB) infections per 10,000 persons in Belize, by district.    |
| Dengue Incidence                       | Epidemiology Unit, Ministry of Health Belize; Health Statistics of Belize 2006-2010 | 2010 | The number of new dengue cases during 2006-2010 per 100,000 persons in Belize, by district.  |
| Malaria Incidence                      | Epidemiology Unit, Ministry of Health Belize; Health Statistics of Belize 2006-2010 | 2010 | The number of new malaria cases during 2006-2010 per 100,000 persons in Belize, by district. |

| Vulnerability                          |  |      |   |
|--|--|------|---|
| Subcomponent: Population Pressures     |  |      |   |
| Indicator                              | Source(s)  | Year | Description   |
| Average Annual Population Change       | Statistical Institute of Belize; Abstract of Statistics, 2019  | 2019 | Percentage of average annual population growth between 2000-2019 in Belize, by district.            |
| Average Annual Urban Population Change | Statistical Institute of Belize; Abstract of Statistics, 2019  | 2019 | Percentage of average annual urban population growth between 2000-2019 in Belize, by district.      |
| Prevalence of Stunting                 | Statistical Institute of Belize and UN/UNICEF; Belize Multiple Indicator Cluster Survey, 2015-2016. Percentage of Children under 5 with height or length for age more than two standard deviations below the World Health Organization (WHO) Child Growth Standards median | 2016 | The percentage of children in Belize under 5 whose growth is considered stunted, shown by district. |

# APPENDIX A

## RVA METADATA

| Vulnerability                             |  |      |  |
|---|--|------|--|
| Subcomponent: Environmental Stress        |  |      |  |
| Indicator                                 | Source(s)  | Year | Description  |
| Tree Cover Loss                           | Global Forest Watch; Dashboard; Hansen, M. C., P. V. Potapov, R. Moore, M. Hancher, S. A. Turubanova, A. Tyukavina, D. Thau, S. V. Stehman, S. J. Goetz, T. R. Loveland, A. Kommareddy, A. Egorov, L. Chini, C. O. Justice, and J. R. G. Townshend. 2013. "High-Resolution Global Maps of 21st-Century Forest Cover Change." <i>Science</i> 342 (15 November): 850–53. Data available on-line from: <a href="https://glad.earthengine.app/view/global-forest-change">https://glad.earthengine.app/view/global-forest-change</a> . Accessed through Global Forest Watch on 11/08/2021. <a href="http://www.globalforestwatch.org">www.globalforestwatch.org</a> | 2020 | Percentage of tree cover loss from a baseline in 2000 through 2020 in Belize, by district.       |
| Projected Changes in Annual Precipitation | World Bank; Funding Proposal: FP101: Resilient Rural Belize (Be-Resilient)   | 2018 | The percentage of projected change in annual precipitation in Belize by 2050, shown by district. |
| Declining Land Productivity               | International Fund for Agricultural Development - IFAD Proposal; Funding Proposal: FP101: Resilient Rural Belize (Be-Resilient)  | 2019 | The percentage of land area with reported declining land productivity in Belize, by district.    |

| Vulnerability   |  |      |  |
|---|--|------|--|
| Subcomponent: Gender Inequality < Female Economic Opportunity |  |      |  |
| Indicator   | Source(s)  | Year | Description  |
| Domestic Violence Case Density                                | Ministry of Health; Health Statistics of Belize 2006 -2010               | 2010 | Total domestic violence cases reported from 2006-2010 per 10,000 persons in Belize, by district.                   |
| Female to Male Transition to Secondary Education              | SIB/Ministry of Education; Abstract of Education Statistics. 2018 - 2019 | 2019 | The ratio of females to males who successfully transition from primary to secondary school, in Belize by district. |
| Female to Male Labor Force Participation                      | Statistical Institute of Belize; Labour Force Survey, April 2019         | 2019 | The ratio of females to males in the labor force in Belize, by district.   |

# APPENDIX A

## RVA METADATA

| Vulnerability   |   |      |   |
|---|---|------|---|
| Subcomponent: Gender Inequality < Female Health Care Access Vulnerability |   |      |   |
| Indicator   | Source(s)   | Year | Description   |
| Adolescent Birth Rate   | Statistical Institute of Belize and UN/ UNICEF; Belize Multiple Indicator Cluster Survey, 2015-2016. Table RH.2: Adolescent birth rate and total fertility rate | 2016 | The adolescent birth rate per 1,000 women in Belize, by district.       |
| Infant Mortality Rate   | Statistical Institute of Belize / Ministry of Health; Abstract of Statistics, 2018  | 2018 | Infant mortality rate per 1,000 live births in Belize, by district.     |
| Maternal Mortality Rate   | Statistical Institute of Belize / Ministry of Health; Abstract of Statistics, 2018  | 2017 | Maternal mortality rate per 100,000 live births in Belize, by district. |

| Coping Capacity                     |  |      |   |
|-------------------------------------|--|------|---|
| Subcomponent: Governance            |  |      |   |
| Indicator                           | Source(s)  | Year | Description   |
| Municipal Garbage Collection        | Statistical Institute of Belize; Population and Housing Census 2010; Table 13 of Household Tables  | 2010 | The percentage of households with municipal garbage collection in Belize, by district.                          |
| Voter Participation                 | Election and Boundaries Department; General Election, Official Results, 11th November 2020   | 2020 | The percent of registered voters who cast a vote in the November 2020 General elections in Belize, by district. |
| Major Crime Rate Per 10,000 Persons | Statistical Institute of Belize; Belize Police Department; Belize Crime Observatory; 2019 Abstract of Statistics; Table 14.5: Major Crimes by Type and district: 2019; Table 1.4: Mid-Year Population Estimates by district and Sex: 2017 - 2019 | 2019 | Major crimes reported per 10,000 persons in Belize, by district   |

# APPENDIX A

## RVA METADATA

| Coping Capacity                                  |  |      |   |
|--|--|------|---|
| Subcomponent: Economic Capacity                  |  |      |   |
| Indicator  | Source(s)  | Year | Description   |
| Labor Force Participation                        | Statistical Institute of Belize; Labour Force Survey, April 2019         | 2019 | The labor force participation rate for Belize, by district.                                     |
| Median Monthly Income                            | Statistical Institute of Belize; Labour Force Survey, April 2019         | 2019 | The median monthly income in Belizean dollars, by district.                                     |
| Concentration of Wealth                          | UNICEF MICS; Multiple Indicator Cluster Survey, 2015-2016                | 2016 | The percentage of household members within the highest wealth quintile in Belize, by district.  |
| Average Revenue Per Available Accommodation Room | Belize Tourism Board; Accommodation Sector Performance Report 2013-2019  | 2019 | The average revenue generated (in BZD) per accommodation room in 2019 in Belize, by district.   |
| Change in Active Tourism Businesses              | Belize Tourism Board; Tourism's Economic Impact Indicators (2013 - 2019) | 2019 | The percent change in active tourism businesses from 2016 to 2019 in Belize, shown by district. |
| Home Ownership                                   | Statistical Institute of Belize; 2019 Abstract of Statistics             | 2019 | The percentage of households owning their home in Belize, by district.                          |

# APPENDIX A

## RVA METADATA

| Coping Capacity                      |  |      |  |   |
|--------------------------------------|--|------|--|---|
| Subcomponent: Environmental Capacity |  |      |  |   |
| Indicator                            | Source(s)  | Year | Description  |   |
| Protected Lands                      | Biodiversity & Environmental Resource Data System; Belize_Protected_Areas_All_2015 Dataset | 2017 | The percentage of protected land area per district in Belize.  | Note that marine protected areas were not included because it was not clear which district they should be “assigned” to for this measure.   |
| Low Variability in Water Supply      | Aqueduct; Online GDB   | 2014 | Percentage of land area with low amounts of inter-annual variability in water supply in Belize, by district. | Inter-Annual Variability measures the average between year variability of available water supply, including both renewable surface and groundwater supplies. Higher values indicate wider variations in available supply from year to year. |

| Coping Capacity                 |  |      |   |  |
|---------------------------------|--|------|---|--|
| Subcomponent: Energy Capacity   |  |      |   |  |
| Indicator                       | Source(s)  | Year | Description   |  |
| Households with Electricity     | Statistical Institute of Belize and UN/ UNICEF; Belize Multiple Indicator Cluster Survey, 2015-2016. Table HH.6: Housing Characteristics                     | 2016 | The percentage of households in Belize that have electricity, by district.                                      |  |
| Households with Gas for Cooking | Statistical Institute of Belize; Abstract of Statistics, 2019 Table 1.16: Households by Major Administrative Area and Main Type of Cooking Fuel: 2018 - 2019 | 2019 | The percentage of households in Belize that use gas (Butane or Biogas) as their main cooking fuel, by district. |  |

# APPENDIX A

## RVA METADATA

| Coping Capacity                                    |  |      |  |
|--|--|------|--|
| Subcomponent: Health Care Capacity                 |  |      |  |
| Indicator  | Source(s)  | Year | Description  |
| Physicians per 10,000 Persons                      | Ministry of Health; Ministry of Health, Epidemiology Unit; Belize Basic Indicators, 2010; Volume 8, Year 2011 (p. 10)  | 2010 | The number of physicians per 10,000 persons in Belize, by district.                                      |
| Nurses per 10,000 Persons                          | Ministry of Health; Ministry of Health, Epidemiology Unit; Belize Basic Indicators, 2010; Volume 8, Year 2011 (p. 10)  | 2010 | The number of nurses per 10,000 persons in Belize, by district.  |
| Hospital Beds per 10,000 Persons                   | Ministry of Health; Ministry of Health, Epidemiology Unit; Belize Basic Indicators, 2010; Volume 8, Year 2011 (p. 10)  | 2010 | The number of hospital beds per 10,000 persons in Belize, by district.                                   |
| Immunization Coverage                              | Statistical Institute of Belize and UNICEF; UNICEF Multiple Indicator Cluster Survey (MICS), 2016  | 2016 | The percentage of children who are fully vaccinated in Belize, by district.                              |
| Distance to Hospital                               | Global Healthsites Mapping Project; Healthsites GIS dataset  | 2019 | The average distance in kilometers to the nearest hospital from populated places in Belize, by district. |
| Health Centers and Health Posts per 10,000 Persons | Statistical Institute of Belize; 2019 Abstract of Statistics; Page 34 for # of infrastructure (Table 2.18: Number of Health Centers and Health Posts by district: 2016 - 2018), see page 12 for 2018 population estimate | 2018 | The number of Health Centers and Health Posts per 10,000 persons in Belize, by district.                 |



# APPENDIX A

## RVA METADATA

| Coping Capacity                           |   |      |   |   |
|---|---|------|---|---|
| Subcomponent: Emergency Services Capacity |   |      |   |   |
| Indicator                                 | Source(s)   | Year | Description   |   |
| Distance to Shelter                       | NEMO; 2020 Hurricane Shelters List  | 2020 | The average distance in kilometers to the nearest emergency shelter in Belize, by district.             | Values reflected for use in the index. Not all emergency shelters were able to be geolocated. A full list of missing shelters is in the full metadata for this layer. |
| Shelter Capacity per 10,000 Persons       | NEMO, CRIS, HOTOSM; 2020 Hurricane Shelters List  | 2020 | The capacity of located emergency shelters in Belize, per 10,000 persons, shown by district.            |   |
| Distance to National Warehouse            | NEMO; (individual locations were described in various PDFs and reports not really in one list.) | 2021 | The average distance in kilometers to the nearest disaster management warehouse in Belize, by district. | Values reflected for use in the index.  |
| Distance to Fire Station                  | HOTOSM, Google Maps; HOTOSM, Google Maps  | 2021 | The average distance in kilometers to the nearest fire station in Belize, by district.                  | Values reflected for use in the index.  |
| Distance to Police Station                | HOTOSM, Google Maps; HOTOSM, Google Maps  | 2021 | The average distance in kilometers to the nearest police station in Belize, by district.                | Values reflected for use in the index.  |

# APPENDIX A

## RVA METADATA

| Coping Capacity                       |  |      |  |
|---------------------------------------|--|------|--|
| Subcomponent: Communications Capacity |  |      |  |
| Indicator                             | Source(s)  | Year | Description  |
| Fixed Phone Access                    | Statistical Institute of Belize; Population and Housing Census 2010 (Processed with Redatam WebServer - UNECLAC/ CELADE) | 2010 | The percentage of households that reported having fixed line phone service in Belize, by district.     |
| Mobile Phone Access                   | Statistical Institute of Belize; Population and Housing Census 2010 (Processed with Redatam WebServer - UNECLAC/ CELADE) | 2010 | The percentage of households reporting at least one cell phone in Belize, by district.                 |
| Average Distance to Cell Tower        | Opencellid.org; OpenCellID Project is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License | 2021 | The average distance in kilometers to a cell phone tower from populated places in Belize, by district. |

| Coping Capacity                       |  |      |   |
|---------------------------------------|--|------|---|
| Subcomponent: Transportation Capacity |  |      |   |
| Indicator                             | Source(s)                                  | Year | Description   |
| Road Density                          | PDC; HOTOSM                                | 2019 | Road density (km per square km) in Belize, by district.                                   |
| Distance to Port                      | PDC; PDC Global Ports, PDC Global Airports | 2021 | The average distance in kilometers to the nearest port or airport in Belize, by district. |

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